Insurance policy for Singrauli project

UNITED INDIA INSURANCE COMPANY LIMITED

D-24 & E-25, HIMALAYA HOUSE 23, K G MARG, NEW DELHI NEW DELHI, NCR, DELHI - 110001
PHONE: (11) 23318077 FAX: EMAIL:

MARINE CUM ERECTION INSURANCE POLICY

POLICY NO.:5003004424P112714552 (SCE) / 5003002124P112714555 (MCE)

UIN NO. IRDAN545CP0066V01200708

PERIOD OF INSURANCE
From 18:00 Hrs of 15/10/2024
To Midnight of 14/04/2029

Insured

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR NOTHERN REGION (PSNR)
HRDI & PSNR COMPLEX, PLOT NO. 25, SECTOR - 16 A , FLIMCITY
201301
GAUTAM BUDDHA NAGAR
UTTAR PRADESH

Agent Name	:
Agent Code	:
Mobile/Landline Number/Email	:

The genuineness of the policy can be verified through "Verify Your Policy" link at www.uiic.co.in.

For any Information, Service Requests, Claim intimation and Grievances please write to 500300@uiic.co.in

MARINE CUM ERECTION INSURANCE POLICY
SCHEDULE

Policy No.	**5003004424P112714552 (SCE) / 5003002124P112714555 (MCE)**		Prev. Pol. No.	5003004415P110928190			
Name Of Insured/ID	**BHARAT HEAVY ELECTRICALS LIMITED / 23015876332**						
Tel.(O)		Fax		Tel.(R)		Mobile	
Business/Occupation	None			Email			
Period of Insurance	From	**18:00 Hrs of 15/10/2024**	To	**Midnight of 14/04/2029**			

Coinsurance Details:

Company Name	Office Code	Leader(L)/Non-Leader(N)	Share(%)
UIIC	500300	L	50
TNIA	930000	N	10
RGIC	1301	N	15
GDG	12402	N	25

Unique Reference Code:	UII500300EN0123310642425

Principal,Contractor and Subcontractor Details:As Per list Attached

Extended Maintenance Cover Period(Months): 18

(Including 3.00 Month Testing Period and Followed By Maintenance Period(Months):NA)

EarthQuake Cover Is:Include (Full Cover)

Storage Premium: ₹ 321879226 Thirty-two crores eighteen lakhs seventy-nine thousand two hundred twenty-six rupees only

TPL Sum Insured: ₹ 100,000,000.00	**AOY Limit:** ₹ 100,000,000.00

Marine Premium	₹ 2,000,003.05

Single Carring Limit ₹ 320,000,000.00
Per Bottom Limit ₹ 0.00

Limit: ₹ 320,000,000.00 **any one vessel**

LOCATION CLAUSE : In case of loss and /or damage before shipment after discharge to the insured interest in any one locality the underwriter notwithstanding anything to the contrary contained in this contract,shall not be liable in respect of any one accident or series of accidents arising ,out of the same event for more than its proportion of an amount upto,but not exceeding ,the sum of
The conveyance of the insured interest upon interior or by land transit shall not be deemed to be shipment within the meaning of this clause.

Voyage: Air Sea Rail Road
Voyage From:-ANYWHERE IN INDIA,**Voyage To:-**PROJECT SITE

Premium: 379817487
Type of Cover ICC A
Nature Of Project : Power Plants: Steam based

PERIOD: The Cover commences from the data of the first consignment or depatch from the manufacturer's /supplier's warehouse either in India and abroad and remains in force for the period as mentioned above (the said period starting from the arrival of the first consignment or despatch at the site of erection) or the completion of erection including test period not exceeding four weeks ,whichever is earlier.
Premium: as per Premium Endorsement hereunder:Claims Payable : On the basis of the actual loss sustained at the time of claim.NOTICE of loss or damage to be given and survey arranged and a certificate obtained from the Company's Agent at Part of discharge or in case where the company has no agent,by a Certificate from Lloyd's Agents,without which Certificates on claim for loss will be paid.

Closing Particulars: All shipments are to be declared to the Company immediately upon receipt of shipping documents and stamped Certificates to be obtained from the company's Office at the issuing office.

Full Description of Plant and Machinery: 2*800 MW STPP SINGRAULI STAGE III EPC PACKAGE SHAKTINAGAR, DISTRICT SONBHADRA, UTTAR PRADESH SONBHADRA STATE-UTTAR PRADESH PIN-231219

Site Of Erection: 2*800 MW STPP SINGRAULI STAGE III EPC PACKAGE SHAKTINAGAR, DISTRICT SONBHADRA, UTTAR PRADESH SONBHADRA STATE-UTTAR PRADESH PIN-231219

Type of Sales Contract CIF

Storage Premium:	₹	381,759,335.00
EQ Premium :	₹	62,095,725.00
STFI Premium :	₹	248,382,900.00
Terrorist Loading:	₹	42,302,705.00
Net Premium:	₹	321,879,226.00
IGST(18%):	₹	57,938,261.00
Stamp Duty:	₹	1.00
Total Premium:	₹	**379817487**
Receipt No.:		1015003002411495352O, 1015003002411495352 2
Receipt Date:		12/11/2024, 12/11/2024

Agency/Broker Code:

Description	SECTION I MATERIAL DAMAGE	Sum Insured(₹)
1.	Plant & Equipment To Be Erected (Brief Details)	137990500000
1.2	Machinery Fabricated Or Manufactured In India	137990500000
1.2.1	Invoice Cost incl. Freight,Insurance,Handling,Clearing & Transport upto Factory Site	
2.	Increased Replacement Value	

(a) Imported	SCE 0.00%	MCE 0.02	12,710,000,000.00
(b) Indegeneous	SCE 0.00%	MCE 0.02	84,840,300,000.00
TOTAL FOR SECTION I			97,550,300,000.00

SECTION II:

1.	Limit of indemnity in respect of any one person	₹100,000,000.00
2.	Limit of indemnity in respect of any one accident or series of accidents arising out of one event	₹100,000,000.00
3.	Total limit for Section II during Policy period	₹100,000,000.00

EXCESS for Section I and II

Risk Code	Normal Excess	Testing Excess	AOG Excess	For Risk Complying with Regulations for Fire Protection as per Endorsement 'B'	For Risk Not Complying with Regulations for Fire Protection as per Endorsement 'B'
153006	For each claim 5% of claim amount subject to minimum of ₹ 0	For each claim 5% of claim amount subject to minimum of ₹ 0	For each claim 10% of claim amount subject to minimum of ₹ 0	For each claim 5% claim amount Subject to a minimum of Testing Period Excess ₹ 0	For each claim 10% claim amount Subject to a minimum of Testing Period Excess ₹ 0

Attachment of Standard Marine Clauses :Notwithstanding contained herein to the contarary, it is hereby declared and agreed that the relevant Clause viz (1) Institute Cargo Clause (A),(2) Institute War Clauses (Cargo),(3)Institute Strike Clause,(4) Inland Transit (Railway and/or Road) Clause(A),(5)Inland Strike Clause (Cargo),(6) Institute Cargo Clause(Air),(7)Institute War Clause(Air Cargo),(8)Institute Strike Clause(Air Cargo) and (9) Institute classification Clause(1-7-78) To the extent relevant and applicable are deemed to have been attached to this Policy .The attached Clauses and Endorsements from part of this Policy.

1.Sanction Limitation and Exclusion Clause
2.ENGG/END-101: CIVIL ENGINEERING WORKS
3.ENGG/END-103: ENDORSEMENT REGARDING CROSS LIABILITY COVER
4.ENGG/END-104: ENDORSEMENT REGARDING ESCALATION
5.ENGG/ENGG-105: ENDORSEMENT REGARDING AIR FREIGHT
6.ENGG/END-106: ENDORSEMENT REGARDING ADDITIONAL CUSTOMS DUTY
7.ENGG/END-109: HYDROCARBON ENDORSEMENT FOR TESTING & COMMISSIONING
8.ENGG/END-110: ENDORSEMENT CONCERNING STORAGE
9.ENGG/END-113: MAINTENANCE VISITS AND EXTENDED MAINTENANCE COVER
10.Institute Cargo Clauses (Air Cargo)
11.Institute Cargo Clause (A)
12.Institute Cargo Clause (C)
13.Inland Transit (Rail or Road) A-All Risk
14.Institute Theft Pilferage and Nondelivery Clause
15.IMPORTANT NOTICE
16.Institute Classification Clause
17.Institute Replacement Clause
18.Institute war cancellation clause
19.heavy light medium machine new
20.machinery clause
21.pair and set clauses
22.Second hand machinery clause
23.Specified Territory Exclusion Clause

Special Condition	ALL TERMS AND CONDITIONS , ADDONS, DEDUCTIBLES, WARRANTIES & EXCLUSIONS AS PER TENDER NO. BHEL:CO:FIN:INS::NTPC2*800 MW SINGRAULI STPP STAGE III DATED 21.8.2004 & Annexure attached . WAR CANCELLATION/ PARAMOUNT WAR CANCELLATION & TERMINATION OF TRANSIT (TERRORISM) CONDITIONS SHALL BE APPLICABLE. RATE FOR EXTENSION- PRORATA RATE WILL BE APPLICABLE FOR POLICY PERIOD+ EMP NOT GREATER THAN 96 MONTHS SUBJECT TO ICR LESS THAN 60% . FOR POLICY PERIOD + EMP MORE THAN 96 MONTHS , AS DECIDED BY REINSURER.

Principal Contractor & SubContractor List:

Principal Details	Contractors Details	Sub Contractor Details
NTPC LTD, NOIDA THERMAL POWER	BHARAT HEAVY ELECTRICALS LTD. NEW DELHI ENGINEERING	NA

Cover Details:-

Cover Name	SI(₹)	Premium(₹)
Material Damage	137,990,500,000.00	0.00
50 50 Clause	0.00	0.00
72 hrs Clause	0.00	0.00
Additional Customs Duty	100,000,000.00	0.00
Amendment in Fire Fighting Endorsement Wording	137,990,500,000.00	0.00
Cross Liability Cover	100,000,000.00	0.00
Earthquake Cover	137,990,500,000.00	62,095,725.00
Expediting Cost Including Air Freight and Express Freight	1.00	0.00

Extended Maintenance Cover	137,990,500,000.00	9,659,335.00
Free Automatic Reinstatement Clause	13,799,050,000.00	0.00
Loss Minimisation Expenses	0.00	0.00
OffSite Storage or Fabrication	250,000,000.00	4,829,667.50
Owner Surrounding Property	13,799,050,000.00	0.00
Professional Fees	0.00	0.00
Removal of Debris	10,000,000.00	4,829,667.50
STFI	137,990,500,000.00	248,382,900.00
Terrorism Cover	137,990,500,000.00	42,302,705.00
Third Party Liability	100,000,000.00	4,829,667.50
Waiver of Contribution Clause	137,990,500,000.00	0.00
Waiver of Subrogation Clause	137,990,500,000.00	4,829,667.50
Basic Marine	97,550,300,000.00	1,951,006.00
War and SRCC	12,710,000,000.00	48,997.05

Escalation- 10% of Sum Insured

Customer GST/UIN No.:	09AAACB4146PCZ2	**Office GST No.:**	07AAACU5552C1ZL
SAC Code:	997137	**Invoice No. & Date:**	4424I112714552 & 12/11/2024
Amount Subject to Reverse Charges-NIL			

We hereby declare that though our aggregate turnover in any preceding financial year from 2017-18 onwards is more than the aggregate turnover notified under sub-rule (4) of rule 48, we are not required to prepare an invoice in terms of the provisions of the said sub-rule.

Anti Money Laundering Clause:-In the event of a claim under the policy exceeding ₹ 1 lakh or a claim for refund of premium exceeding ₹ 1 lakh, the insured will comply with the provisions of AML policy of the company. The AML policy is available in all our operating offices as well as Company's web site.

LET US JOIN THE FIGHT AGAINST CORRUPTION. PLEASE TAKE THE PLEDGE AT https://pledge.cvc.nic.in.

Date of Proposal and Declaration : 15/10/2024

IN WITNESS WHEREOF, the undersigned being duly authorised has hereunto set his/her hand at LCB DELHI 500300 on this 12th day of November , 2024 .

For and On behalf of
United India Insurance Co. Ltd.

Affix Policy Stamp here.

Duly Constituted Attorney(s)
Underwritten By - VIN46413 (RO UNDERWRITER) , Approved By - ABH29704(HO UNDERWRITER_ENGINEERING),RUC29326(COINSURER HUB APPROVER)

MARINE CUM ERECTION INSURANCE POLICY

WHEREAS the insured named in the Schedule hereto had made to UNITED INDIA INSURANCE CO. LTD. (hereinafter called 'the Company') a written proposal by completing a Proposal Form which together with any other statements made in writing by the insured for the purpose of this Policy, is deemed to be incorporated herein.

NOW THIS POLICY OF INSURANCE WITNESSETH

that subject to and in consideration of the Insured having paid to the Company, the premium mentioned in the said Schedule and subject to the terms, exclusions, provisions and conditions contained herein or endorsed hereon the company will indemnify the Insured against sudden and unforeseen physical loss of or damage to the property insured in the manner and to the extent hereinafter provided.

GENERAL EXCLUSIONS

The Company will not indemnify the Insured in respect of loss, damage or liability directly or indirectly caused by or arising out of or aggravated by-

a) War, invasion, act of foreign enemy, hostilities or war like operations (whether war be declared or not). civil war, rebellion, revolution, insurrection, mutiny, civil commotion, military or usurped power, martial law, conspiracy, confiscation, commandeering a group of malicious persons or persons acting on behalf of or in connection with any political organisation, requisition or destruction or damage by order of any government dejure or de facto or by any public, municipal or local authority.

b) Nuclear reaction, nuclear radiation or radioactive contamination.

c) Willful act or willful negligence of the Insured or his responsible representative

d) Cessation of work whether total or partial.

e) Loss, damage , cost or expense of whatsoever nature directly or indirectly caused by, resulting from or in connection with any act of terrorism regardless of any other cause or event contributing concurrently or in any other sequence to the loss are excluded.

For the purpose of this warranty an act of terrorism means an act, including but not limited to the use of force or violence and/ or the threat thereof, of any person or group(s) of persons whether acting alone or on behalf of or in connection with any organisation(s) or Government(s) committed for political, religious, ideological or similar purpose including the intention to influence any Government and/ or to put the public, or any section of the public in fear.

The Warranty also excludes loss, damage , cost or expense of whatsoever nature directly or indirectly caused by, resulting from or in connection with any action taken in controlling, preventing suppressing or in anyway relating to action taken in respect of an act of terrorism.

If the Company alleges that by reason of this exclusion, any loss, damage, cost or expenses is not covered by this insurance the burden of proving the contrary shall be upon the Assured.

In the event any portion of this exclusion is found to be invalid or unenforceable, the reminder shall remain in full force and effect.

In any action, suit or other proceedings where the company allege that by reason of the provisions of Exclusion(a) above any loss, destruction, damage or liability is not covered by this insurance, the burden of proving that such loss, destruction, damage or liability is covered shall be upon the Insured.

PERIOD OF COVER

The liability of the Company shall commence, (notwithstanding any date to the contrary specified in the Schedule) only from the time after the unloading of the property specified in the Schedule from any conveyance at the site specified in the schedule and shall continue until immediately after the first test operation or test loading is concluded (whichever is earlier) but in no case beyond four weeks from the day on which after completion of erection a trial running is made and/or readiness for work is declared by the erectors/contractors, whichever is earlier.If however, a part of a plant or one or several machine/s is /are tested and put into operation the cover and consequently the liability of the Company for that particular part of the plant or machine ceases whereas it continues for the remaining part which are not yet ready.

In case after the expiry of four weeks of trial running, approval of the plant or any part thereof is not given by the concerned Authorities the cover for the extended period of further trial running can be covered at extra premium to be arranged before hand.

If the actual erection period is shorter than the period indicated in the Schedule, no refund of premium shall be allowed, unless specifically allowed by Insurers.

In the case of second-hand/used property, the insurance hereunder shall however, cease immediately on the commencement of the testing.

At the latest , the insurance shall expire on the date specified in the Schedule but if the work of erection and test operations included in the insurance is not completed within the time specified hereunder, the company may extend the period of Insurance but the Insured shall pay to the Company additional premium at agreed rates.

1. The due observance and fulfillment of the terms of this Policy in so far as they relate to anything to be done or compiled with by the Insured and the truth of the statement and the answers in the questionnarie and proposal made by the Insured shall be a condition precedent to any liability of the company.

2. The Schedule and the Section(s) shall be deemed to be incorporated in and form part of this policy and expression 'this Policy' wherever used in this contract shall be read as including the Schedule and the Section(s). Any word or expression to which a specific meaning has been attached in any part of this Policy or of the Schedule or of the Section(s) shall bear such meaning wherever it may appear.

3. The Insured shall at his own expense take all reasonable precautions and comply with all reasonable recommendations of the Company to prevent loss, or damage or liability and comply with statutory requirements and manufacturer's recommendations

4. (a) Representatives of the Company shall at any reasonable time have the right to inspect and examine the risk and the Insured shall provide the representatives of the company with all details and information necessary for the assessment of the risk.

(b) The Insured shall immediately notify the Company by telegram and in writing of any material change in the risk and cause at his own expense such additional

precautions to be taken as circumstances may require and the scope of cover and/or premium shall, if necessary be adjusted accordingly.

No material alteration shall be made or admitted by the Insured whereby the risk is increased unless the continuance of the Insurance be confirmed in writing by the Company.

5. In the event of any occurrence ,which might give rise to a claim under this Policy, the Insured shall-

a) Immediately notify the Company by telephone or telegram as well as in writing giving an indication as to the nature and extent of loss or damage.

b) Take all steps within his power to minimise the extent of the loss or damage

c) Preserve the parts affected and make them available for inspection by a representative of the company or surveyor deputed by the Company.

d) Furnish all such information and documentary evidence as the company may require.

e) Inform the police authorities in case of loss or damage due to theft or burlgary.

The Company shall not in any case be liable for loss, damage or liability of which no notice has been received by the Company within 14 days of its detection.

Upon notification being given to the Company under this condition, the Insured may carry out the repair or replacement of any minor damage not exceeding Rs.7,500/-.In all other cases a representative of the company shall have the opportunity of inspecting the loss or damage before any repairs or alterations are affected.If a representatives of the company does not carry out the inspection within a period of time that could be considered as adequate under the circumstances the Insured is entitled to proceed with the repairs or replacement.

The liability of the Company under this Policy in respect of any item sustaining damage shall cease if said item is not repaired properly without delay.

6. The Insured shall at the expense of the Company do and concur in doing and permit to be done all such acts and things as may be necessary or required by the Company in the interest of any right or remedies, or of obtaining relief or indemnity from parties (other than those insured under this Policy) to which the company shall be or would become entitled or subrogated upon their paying for or making good anyloss or damage under this Policy, whether such acts and things shall be or become necessary or required before or after the Insured's indemnification by the company.

7. If any dispute or difference shall arise as to the quantum to be paid under this Policy (liability being otherwise admitted) such difference shall independently of all other questions be referred to the decision of a sole arbitrator, to be appointed in writing by the parties to or, if they cannot agree upon a single arbitrator within 30 days of any party invoking Arbitration, the same shall be referred to a panel of three Arbitrators comprising of two Arbitrators- one to be appointed by each of the parties to the dispute /difference, and the third Arbitrator to be appointed by such two Arbitrators and arbitration shall be conducted under and in accordance with the provisions of the Arbitration and Conciliation Act 1996.

It is clearly agreed and understood that no difference or dispute shall be referable to arbitration as herein before provided, if the Company has disputed or not accepted liability under or in respect of this Policy.

It is hereby expressly stipulated and declared that it shall be a condition precedent to any right of action or suit upon this Policy that award by such Arbitrator/Arbitrators of the amount of the loss or damage shall be first obtained.

8. If a claim is in any respect fraudulent, or if any false declaration is made or used in support thereof, or if any fraudulent means or devices are used by the Insured or anyone acting on his behalf to obtain any benefit under this Policy, or if a claim is made and rejected and no action or suit is commenced within three months after such rejection or, in case of arbitration taking place as provided therein, within three months after the Arbitrator or Arbitrators or Umpire have made their award, all benefit under this Policy shall be forfeited.

9. If at the time any claim arises under this Policy there be any other insurance covering the same loss, or damage or liability the company shall not be liable to pay or contribute more than their rateable proportion of any claim for such loss, damage or liability.

10. This insurance may be terminated at the request of the Insured at any time in which case the Insurers will refund appropriate premium amount subject to the following conditions-

i) Claims experience under the policy as on date of cancellation should be less than 60 % of reworked premium.

ii) 'The unexpired period is not less than 3 months or 25 % of the policy period whichever is less'.

iii) Testing period should not have commenced.

This insurance may also at any time be terminated at the option of the Company, on 15 days' notice to that effect being given to the Insured, on grounds of mis-representation, fraud, non-disclosure of material facts or non-cooperation of the insured, in which case the Company shall be liable to repay on demand a rateable proportion of the premium for the unexpired term from the date of the cancellation.

SECTION I - MATERIAL DAMAGE

The Company hereby agrees with the Insured (subject to the exclusions and conditions contained herein or endorsed hereon) that if, at any time during the period of insurance stated in the said Schedule, or during any further period of extension thereof the property (except packing materials of any kind) or any part thereof described in the said Schedule be lost, damaged or destroyed by any cause, other than those specifically excluded hereunder, in a manner necessitating replacement or repair the Company will pay or make good all such loss or damage up to an amount not exceeding in respect of each of the items specified in the Schedule the sum set opposite thereto and not exceeding in the whole the total sum insured hereby-

The Company will also reimburse the Insured for the cost of clearence and removal of debris following upon any event giving rise to an admissible claim under this policy but not exceeding in all the sum (if any) set opposite thereto in the Schedule.

EXCLUSIONS TO SECTION - I

The Company shall not, however, be liable for -

a) the first amount of the loss arising out of each and every occurrence shown as Excess in the Schedule;
b) loss discovered only at the time of taking an inventory;
c) normal wear and tear, gradual deterioration due to atmospheric conditions or otherwise, rust, scratching of painted or polished surfaces or breakage of glass;
d) loss or damage due to faulty design, defective material or casting, bad workmanship other than faults in erection.

This exclusion shall be limited to the items immediately affected and shall not be deemed to exclude loss or damage to other insured items resulting from such excluded perils;

e) the cost necessary for rectification or correction of any error during erection unless resulting in physical loss or damage;

f) loss of or damage to files, drawings, accounts, bills, currency, stamps, deeds, evidence of debts, notes, securities, cheques, packing materials such as cases, boxes, crates;

g) any damage or penalties on account of the Insured's non-fulfillment of the terms of delivery or completion under his Contract of Erection or of any obligations assumed thereunder including consequential loss of any kind or description or for any aesthetic defects or operational deficiencies.

PROVISIONS APPLYING TO SECTION I

Memo 1. SUM INSURED

It is a requirement of this insurance that the Sum of Insurance stated in the Schedule shall not be less than the completely erected value of the property inclusive of freights, customs duty, erection cost and the Insured undertakes to increase or decrease the amount of insurance in the event of any material fluctuation in the level of wages or prices. Provided always that such increase or decrease shall take affect only after the same has been recorded on the Policy by the Company.

If, in the event of the occurrence of a loss, or damage it is found that the Sum Insured representing the completely erected value of the property and/or of particular items involved is less than the amount required to be insured the amount recoverable by the Insured under the policy shall be reduced in such proportion as the Sum Insured bears to the amount required to be insured.

Memo 2 . PREMIUM ADJUSTMENT

The sum Insured under the Policy representing the completely erected value of the plant machinery/project shall be adjustable at completion of erection on the basis of actual values to be declared by the insured in respect of freight and handling charges, customs dues and cost of erection and the difference in premium shall be met with by payment, at the rate agreed to or by the insured as the case may be. Any increase or decrease in the Prime cost of plant and equipment shall not be the subject matter of premium adjustment.

Memo 3 .BASIS OF LOSS SETTLEMENT

In the event of any loss or damage the basis of any settlement under this Policy shall be-

a) in the case of damage which can be repaired, the cost of repairs necessary to restore the items to their condition immediately before the occurrence of the damage less salvage,

OR

b) in the case of a total loss the actual value of the items immediately before the occurrence of the loss less salvage;

However, only to the extent the cost claimed has to be borne by the Insured and to the extent they are included in the Sum Insured and provided always that the provisions and conditions have been compiled with.

All damages which can be repaired shall be repaired , but if the cost of repairing any damage equals or exceeds the value of the items immediately before the occurrence of the damage the settlement shall be made on the basis provided for in (b) above.

The cost of any provisional repairs will be borne by the Company if such repairs constitute part of the final repairs and do not increase the total repair expenses.
The cost of any alterations, additions and/or improvements shall not be recoverable under this Policy.
EXTENSION OF COVER - Any extra charges incurred for overtime, work on holidays, express freight (excluding air freight), are not covered by this insurance, unless agreed upon at an additional premium.
In the event of loss or damage the insurance shall not withstanding be maintained in force during the period of insurance for the sum insured, the insured undertaking to pay a pro-rata additional premium of the full amount of each claim for the loss or damage from the date of such loss to the expiry of the period of insurance.

Memo 4. CONSTRUCTION PLANT AND MACHINERY

Loss of or damage to Construction Plant and Machinery exclude loss or damage directly caused by its own explosion or its own mechanical or electrical breakdown or derangement.

Memo 5 . SURROUNDING PROPERTY

Loss or damage to property located on or adjacent to the site and belonging to or held in care, custody or control of the Principal (s) or the Contractor(s) shall only be covered if occurring directly due to the erection, construction or the testing of the items insured under Section I and happening during the period of cover, and provided that a separate Sum therefore has been entered in the Schedule under Section I, Item 5 for Principal's specified surrounding property. This cover does not apply to construction/erection machinery, plants and equipment.

Memo 6 . MAJOR PERILS/ACTS OF GOD CLAIMS
The Major Peril/Acts of God claims shall mean claims arising out of-

a) Earthquake - Fire & Shock
b) Landslide/Rockslide/Subsidence,
c) Flood/Inundation,
d) Storm/Tempest/Hurricane/Typhoon/Cyclone/Lightning or other atmospheric disturbances.

SECTION II - THIRD PARTY LIABILITY

The Company will indemnify the insured against-

a) Legal liability for accidental loss or damage caused to property of other persons including property held in trust by or under custody of the Insured for which he is responsible excluding any such property used in connection with erection thereon;
b) Legal liability (liability under contract excepted) for fatal or non-fatal injury to any persons other than the Insured's own employees or workmen or employees of the owner of the works or premises or other firms connected with any other erection work thereon, or members of the Insured's family or of any of the aforesaid; directly consequent upon or solely due to the erection of any property described in the Schedule.
Provided that the total liability of the Company during the period of Insurance under this cause shall not exceed the limits of Indemnity set opposite thereto in the

Schedule.

In respect of a claim for compensation to which the indemnity provided herein applies, the Company will, in addition, indemnify the Insured against-

a) all costs and expenses of litigation recovered by any claimant from the Insured, **and**

b) all costs and expenses incurred with the written consent of the Company.

The exclusion contained in paragraphs (d), (f) &(g) in Section I of this Policy shall apply also to this Section also.

EXCLUSIONS TO SECTION II-

The Company will not indemnify the Insured in respect of-

1. The Excess stated in the Schedule to be borne by the Insured in anyone occurrence related to property damage.

2. Expenditure incurred in doing or redoing or making good or repairing or replacing anything covered or coverable under Section I of this Policy;

3. Liability consequent upon
   a) bodily injury to or illness of employees or workmen of the Contractor(s) or the Principal(s) or any other firm connected with the project which or part of which is insured under Section I, or members of their families;
   b) loss of or damage to property belonging to or held in care, custody or control of the Contractor(s) , the Principal(s) or any other firm connected with the project which or part of which is insured under Section-I, or an employee or workman of one of the aforesaid;
   c) any accident caused by vehicles licensed for general road use or by waterborne vessels or aircraft;
   d) any agreement by the Insured to pay any sum by way of indemnity or otherwise unless such liability would have attached also in the absence of such agreement.

CONDITIONS APPLYING TO SECTION II

1. No admission, offer, promise,payment or indemnity shall be made or given by or on behalf of the Insured without the written consent of the Company who shall be entitled if they so desire, to take over and conduct in the name of the Insured the defence or settlement of any claim or to prosecute for their own benefit in the name of the Insured any claim for indemnity or damage or otherwise and shall have full discretion in the conduct of any proceedings or in the settlement of any claim and the Insured shall give all such information and asistance as the Company may require.

2. The Company may, so far as any accident is concerned, pay to the Insured the limit of indemnity for any one accident/any one period, but deducting thereform in such case any sum/s already paid as compensation in respect thereof or any lesser sum for which the claim or claims arising from such accident can be settled and the company shall thereafter be under no further liability in respect of such accident under this section.

PREMIUM INSTALLMENT CLAUSE

It is hereby understood and agreed that the premium shall be paid in the following installments:-

SR.NO	NET PREMIUM (₹)	IGST (₹)	TERRORISM PREMIUM (₹)	TERRORISM GST (₹)	STAMP DUTY (₹)	TOTAL (₹)	RECEIVED	PAYABLE ON OR BEFORE
Installment 1	71,904,922.00	12,942,886.00	42,302,705.00	7,614,487.00	1.00	84,847,807.00	12/11/2024	
Installment 2	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/01/2025
Installment 3	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/04/2025
Installment 4	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/07/2025
Installment 5	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/10/2025
Installment 6	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/01/2026
Installment 7	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/04/2026
Installment 8	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/07/2026
Installment 9	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/10/2026
Installment 10	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/01/2027
Installment 11	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/04/2027
Installment 12	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/07/2027
Installment 13	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/10/2027
Installment 14	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/01/2028
Installment 15	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/04/2028
Installment 16	15,623,394.00	2,812,211.00	0.00	0.00	NA	18,435,605.00		14/07/2028
Installment 17	15,623,394.00	2,812,210.00	0.00	0.00	NA	18,435,605.00		14/10/2028

Nevertheless it is further understood and agreed that:

Notwithstanding any provision as to notice of cancellation contained in this Policy, it is a condition that in the event of any installment not being paid by its due date the cover afforded by this Policy shall be deemed to have ceased at midnight of such due date.

In the event of a claim hereunder which exceeds the installments of premium paid on this Policy the installments of premium then outstanding shall become payable forthwith.

Importance Notice

Procedure in the event of Loss or Damage for which Underwriters may be liable.

LIABILITY OF CARRIES,BAILEES OR OTHER THIRD PARTIES

It is the duty of the Assured and their Agents ,in all cases to take such measures as may be reasonable for the purpose of averting or minimizing a loss and to ensure that all rights against Carriers Bailees or other third parties are properly preserved and exercised.In particular, the Assured or their Agents are required:-

1. To claim immediately on the Carriers, Port Authorities or other Bailees for any missing packages.
2. To apply immediately for survey by Carrier's or other Bailee's Representative, if any loss or damage be apparent and claim on the carriers or other Bailees for any actual loss or damage found at such survey.
3. In a circumstances, except under written protest, to give clean receipts where goods are in doubtful condition.
4. To give notice in writing to the Carriers or other Bailees within 3 days of delivery if the loss or damage was not apparent at the time of taking delivery.

Note:The Consignees or their Agents are recommended to make themselves familiar with the Regulation of the port Authority at the port of discharge.

SURVEY AND CLAIM SETTLEMENT

In the event of loss or damage which may involve a claim under this insurance immediate notice of such loss or damage should be given to and a survey Report obtained from Lloyd's Agents as below.
In the event of any claim arising under this insurance request for settlement should be made to
who is/are authorized by United India Insurance Co. Ltd to adjust and settle claims on behalf of the Company.

DOCUMENTATION OF CLAIMS

To enable claims to be dealt with promptly the Assured or their Agent are advised to submit all available supporting documents without delay, including when applicable:-

1. Original policy or certificate of insurance.
2. Original or copy of shipping invoices, together with shipping specification and/or weight notes.
3. Original Bill of Lading and/or other contract of carriage.
4. Survey report or other documentary evidence to show the extent of the loss or damage
5. Landing account and weight notes at final destination.
6. Correspondence exchanged with the Carries and other Parties regarding their liability for the loss or damage.

1.11.2002 INSTITUTE EXTENDED RADIOACTIVE CONTAMINATION EXCLUSION CLAUSE

This clause shall be paramount and shall override anything contained in this Insurance inconsistent therewith

1. In no case shall this insurance cover loss damage liability or expense directly or indirectly caused by or contributed to by or arising from
   - 1.1 ionizing radiations from or contamination by radioactivity from any nuclear fuel or from any nuclear waste or from the combustion of nuclear fuel
   - 1.2 the radioactive, toxic, explosive or other hazardous or contaminating properties of any nuclear installation, reactor or other nuclear assembly or nuclear component thereof
   - 1.3 any weapon or device employing atomic or nuclear fission and/or fusion or other like reaction or radioactive force or matter.
   - 1.4 the radioactive, toxic, explosive or other hazardous or contaminating properties of any radioactive matter. The exclusion in this sub-clause does not extend to radioactive isotopes, other than nuclear fuel, when such isotopes are being prepared, carried, stored, or used for commercial, agricultural, medical, scientific or other similar peaceful purposes.

RADIOACTIVE CONTAMINATION EXCLUSION CLAUSE(U.S.A ENDORSEMENT)

This insurance is subject to the Institute Extended Radioactive Contamination Exclusion Clause 1st November 2002 provided
That if fire is an insured peril and where the subject matter insured or in the case of a reinsurance, the subject matter by the original insurance, is within the U.S.A, its Islands, onshore territories or possessions and
a fire arises directly or indirectly from one or more of the causes detailed in sub-clauses 1.1, 1.2 and 1.4 of the Institute Extended Radioactive Contamination Exclusion Clause 1.11.2002 any loss or damage arising directly from that fire shall, subject to the provisions of this insurance(reinsurance), be covered, EXCLUDING however any loss damage liability or expense caused by nuclear reaction, nuclear radiation or radioactive contamination arising directly or indirectly from that fire.

CHEMICAL, BIOLOGICAL, BIO- CHEMICAL AND ELECTROMAGNETIC WEAPONS EXCLUSIONS CLAUSE

With respect to the peril of Terrorism as defined in the Terrorism Exclusion Clause, this clause shall be paramount and shall override anything contain in this insurance inconsistent therewith.

1. In no case shall this insurance cover loss damage liability or expense directly or indirectly caused by or contributed to by or arising from
   - 1.1 Any chemical, biological, bio-chemical or electromagnetic weapon or device.

1.10.82 INSTITUTE REPLACEMENT CLAUSE

In the event of loss or damage to any part or parts of an insured machine caused by a peril covered by the policy the sum recoverable shall not exceed the cost of replacement or repair of such part or parts plus charges for forwarding and refitting, if incurred, but excluding duty unless the full duty is included in the amount insured, in which case loss, if any, sustained by payment of additional duty shall also be recoverable provided always that in no case shall the liability of Underwriters exceed the insured value of the complete machine.

Communicable Disease Exclusion Clause:-

1. Notwithstanding any provision, clause or term of the Policy, to the contrary, it is declared and/or clarified that nothing in the Policy shall be construed as covering loss, cost, damage, liability, claim, fines, penalty or expense or any other amount of whatsoever nature, whether directly or indirectly and/or in whole or in part, related to, caused by, contributed to by, resulting from, as a consequence of, attributable to, arising under, out of or in connection with, or in any way involving (this includes all other terms commonly used and/or understood to reflect or describe nexus and/or connection from one thing to another whether direct or indirect):

1.1 a Communicable Disease including fear and/or threat thereof (whether actual or perceived), the actual or alleged transmission thereof, regardless of any other cause or event having occurred or contributed thereto either concurrently or in any sequence

1.2 a pandemic or epidemic, whether declared by the World Health Organisation or any governmental authority.

2. As used herein, Communicable Disease means: any infectious, contagious or communicable substance or agent and/or any infectious, contagious or communicable disease which can be caused and/or transmitted by means of substance or agent where:

2.1 the disease includes, but is not limited to an illness, sickness, condition or an interruption or disorder of body functions, systems or organs, and

2.2 the substance or agent includes, but is not limited to, a virus, bacterium, parasite, other organism or other micro-organism (whether asymptomatic or not); including any variation or mutation thereof, whether deemed living or not, and

2.3 the method of transmission, whether direct or indirect, includes but not limited to, airborne transmission, bodily fluid transmission, transmission through contact with human fluids, waste or the like, transmission from or to any surface or object, solid, liquid or gas or between organisms including between humans, animals, or from any animal to any human or from any human to any animal, and

2.4 the disease, substance or agent is such:

2.4.1 that causes or threatens damage or can cause or threaten damage to human health or human welfare, or

2.4.2 that causes or threatens damage to or can cause or threaten damage to, deterioration to, contamination of, loss of value of, loss of marketability of or loss of use or usefulness of, tangible or intangible property. For avoidance of doubt, Communicable Disease includes but is not limited to Coronavirus Disease 2019 (Covid -19) and any variation or mutation thereof.

3. For further avoidance of doubt, any contingent or other business interruption loss, cost, damage, loss of income, loss of use, increased cost of working and/or extra expense arising out of or attributable to:

3.1 any partial or complete closure of and/or slowdown in, including but not limited to any closure by or under the advisories of public, military, government or civil authorities, or any prevention/denial of access to insured premises, or customer and or supplier premises (including service / utility providers), or

3.2 change in consumer behaviour, or

3.3 an absence of infected employees or employees suspected of being infected shall not be covered by this Insurance Contract.
4.For still further avoidance of doubt, loss, cost, damage, liability, claim, fines, penalty or expense or any other amountexcluded hereby, includes but is not limited to any cost to identify, clean-up, detoxify, disinfect, decontaminate, mitigate, remove, evacuate, repair, replace, monitor, sanitize or test:
(1) for a Communicable Disease or
(2) any tangible or intangible property covered by this Iinsurance Contract that is affected by such Communicable Disease.
5. It is clarified that
(1) no other prior, concurrent or subsequent provision, clause, term or exception of this Insurance Contract (including (but not limited to) any prior, concurrent or subsequent endorsement and/or any provision, clause, term, buy back or exception that operates, or is intended to operate, to extend the coverage of, or protections provided by, this Insurance Contract by whatever name called like any coverage extension, additional coverage, global extension, exception to any exclusion);
(2) any change in the law, clause or similar provision;
(3) any follow the fortunes clause or similar provision; and/or
(4) no change in the law or any regulation (to the extent permitted by applicable law), shall operate to provide any Insurance, coverage or protection under this Insurance Contract that would otherwise be excluded through the exclusion set forth in this Endorsement Clause.
6.If the Insurer alleges that by reason of this Endorsement, any amount is not covered by this Insurance Contract,the burden of proving to the contrary shall be upon the Insured.

Sanctions Limitation and Exclusion Clause

No insurer shall be deemed to provide cover and no insurer shall be liable to pay any claim or provide any benefit hereunder to the extent that the provision of such cover payment of such claim or provision of such benefit would expose that insurer to any sanction, prohibition or restriction under United Nations resolutions or the trade or economic sanctions laws or regulations of the European Union, United Kingdom or the United States of America.

Specified Territory Exclusion Clause

Notwithstanding anything to the contrary herein, all Specified Territory Exposures whether direct or indirect, are excluded, The term Specified Territory Exposure includes but is not limited to any activity, transaction, legal proceedings, operation, entity, subsidiary, headquarters , branch, products, good, property, asset , services in a Specified Territory or, as applicable, delivered to, located in, originating in, transitioning from, to or through a Specified Territory, as well as any person ordinarily resident in a Specified Territory, the government of a Specified Territory as well as any entity owned or controlled by an entity in a Specified Territory including, without limitation affiliates outside of a Specified Territory. Specified Territory means The Republic of Belarus, Ukraine, and/or The Russian Federation.

ENGG/END-101: CIVIL ENGINEERING WORKS -

It is hereby declared and agreed, subject to the exceptions contained herein, or endorsed hereon, that this Policy is extended to cover the risks of loss or damage to property brought on to the Site of Erection for the performance of the erection contract, details of which are stated as under --

a) All permanent Civil Engineering Works such as buildings, foundations earthwork including materials for the constructions thereon,

b) All temporary works such as buildings, sheds

PROVIDED that the following exclusions shall apply -

i) loss or damage directly caused by defective workmanship material, or design or wear and tear,
ii) loss or damage directly caused by mechanical breakdown or derangement,
iii) loss or damage directly caused by deterioration due to lack of use or obsolescence,
iv) any loss of property either by disappearance or by shortage if such disappearance or shortage alone is revealed during and after an inventory is made,
v) Cessation of work whether total or partial,
vi) loss, destruction or damage of accounts, bills, currency stamps, deeds, evidence of debt, money, notes or securities.
The exclusions of loss or damage caused by (i), (ii) and (iii) above shall be limited to the machine structure or work immediately affected and shall not extend to other work or the property lost or damaged in consequence of the defect, wear & tear, breakdown, derangement or deterioration, subject to the Condition that:-

The Insured shall take all reasonable precautions in the selection of labour and to maintain in efficient condition all tools and equipments used in connection with performance of this erection contract.

Provided that all the conditions of this Policy shall apply in all respects to the Insurance granted by this extension save in so far as the same are expressly varied hereby and any reference to loss or damage in the conditions of the Policy shall be deemed to include the perils hereby insured against.

ENGG/END-103: ENDORSEMENT REGARDING CROSS LIABILITY COVER -

The following endorsement should be used for the purpose -

'It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon and subject to the insured having paid the agreed extra premium, the Third party Liability Cover of the policy shall apply to the insured parties named in the Schedule as if a separate policy had been issued to each party, provided the Company shall not indemnify the insured under the Endorsement in respect of liability for -

(i) loss of or damage to items insured or insurable under Section 1 of the policy even if not recoverable due to excess or any limit,

(ii) fatal or non-fatal injury or illness of employees or workmen who are or could have been insured under workmen's compensation and/or employer's liability insurance.

(iii) The Insurer's total liability in respect of the insured parties shall not however exceed in the aggregate for any one accident or series of accidents arising out of one event the limit of indemnity stated in the Schedule'.

ENGG/END-104: ENDORSEMENT REGARDING ESCALATION -

The following Endorsement Wording has to be used for the purpose -

In consideration of the payment of an additional premium of Rs. . It is hereby declared and agreed that the Company shall provide for escalation in Sum Insured under items of Section I of the schedule attached to the policy upto % of the Original Site value, the basis of claim settlement shall be the original Site value of effected equipment plus increase in cost of replacement, if any, provided that the increase in the value of such equipment does not exceed % of the original site value.

It is also hereby declared and agreed that in the event of a claim the insured would be considered as fully insured upto the Sum Insured inclusive of % increase as per selected escalation and under-insurance would apply only in the event of the cost of replacement of the effected equipment exceeding the original value of selected % towards escalation.

It is however understood and agreed that the premium collected against price escalation herein above shall not be subject to refund the premium adjustment clause in the memo 2 of the policy.

It is further understood and agreed that in case of additional premium chargeable during final adjustment, additional escalation premium will be charged to the insured but in case of any premium refundable during final adjustment no refund shall be allowed against the escalation premium already charged to the insured'.

ENGG/ENGG-105: ENDORSEMENT REGARDING AIR FREIGHT -

The Endorsement wording for covering the Air Freight will be as under -

'It is hereby declared and agreed that the policy shall also indemnify towards Air Freight incurred by the Insured in connection with the idemnifiable loss under the Policy.

In consideration thereof an additional premium of Rs. is charged hereby.

Limit of indemnity shall be Rs. during currency of the Policy.

Each and every claim shall be subject to a minimum Excess of 5 % of the admissible Air Freight incurred over and above the excess as applicable under the Policy.

Subject otherwise to terms, conditions and exceptions of the policy'.

ENGG/END-106: ENDORSEMENT REGARDING ADDITIONAL CUSTOMS DUTY -

The following Endorsement Wording to be used for the purpose -

In consideration of the insured having paid an additional premium of Rs. it is hereby declared and agreed that the insured shall also be indemnified during the currency of this policy, towards Additional Custom Duty Rs. which may be incurred by the insured over and above the Custom Duty amount taken into account in arriving at the Sum Insured of the affected item.

Each and every claim payable under this extension shall be subject to an Excess of 5% of the admissible Additional Custom Duty incurred and will be in addition to the Excess amount applicable for the affected item under the Policy.

The Indemnity for such Additional Custom Duty will stand reduced after occurrence of the claim unless reinstated by payment of an additional premium prescribed by the Company.

Subject otherwise to the terms conditions and exceptions of the policy'.

ENGG/END-109: HYDROCARBON ENDORSEMENT FOR TESTING & COMMISSIONING

Article 1 - It is warranted that the insured shall give previous notice in writing to the Company of the date of the initial start - up operation for testing of plant.

Commencing date of the initial start-up operation referred to in the preceding paragraph shall mean the date of the first introduction of feed stock or initially filled mixture of oil or Hydrocarbon for cleaning or purging or Naphtha Fuel for burning into the plant, whichever date is earlier. However the operation carried out for cleaning and purging in each individual unit will be considered a part of erection work provided such cleaning and purging work does not exceed a period of two weeks in each unit. It is however under stood and agreed that during any operation whatever cleaning, purging, testing or commissioning, where hydrocarbons or Hydrogen are involved the deductible excess shall be 5 % of claim amount subject to minimum of Rs. 5,00,000/-.

Article 2 - As from the introduction of hydrocarbon/feedstock into the plant, the company shall not be liable for the loss or damage to -

a) Catalysts unless specifically covered by separate endorsement;
b) Reforming units due to overheating or cracking of any tubes.
Note- Any consequential damage to the neighbouring items of plant or machinery indirectly due to cracking or overheating of tubes in reforming units is however indemnifiable under the policy.
c) The insured plant due to overheating or cracking following an exothermic reaction.
d) The insured plant due to non-observation of prescribed techniques or cutting out of safety devices and/or any liability resulting therefrom.

The Insurers shall only indemnify the Insured for loss or damage resulting directly or indirectly from fire and/or explosion if adequate fire fighting facilities for the insured plant are installed and rendered serviceable immediately after the completion of the rough structure of the building and before any machinery is stored and/or installed therein.

All machinery and equipments shall be stored in such a manner that the value of items stored per storing unit shall not exceed Rs and that such individual storing unit shall be at least feet apart separated by fireproof walls.

Should the value per storage unit exceed Rs. then in the event of a claim, the liability of the Company shall be in the same proportion as Rs bears to the total value of items stored in the concerned individual storage unit as defined above.

Following article is to be included after excluding 2(a) above, in case the Insured desires cover for catalyst during testing period -

Article 3 -

Catalyst valued at Rs.are specifically covered during Hot Testing Period for any loss or damage caused by an indemnifiable loss or damage to the insured plant and/or equipment.

Each and every claim shall be subject to an excess/deductible franchise of 5 % of the value of catalysts in the system subject to a minimum of Rs.2, 50,000/- which is the Hot Testing period Excess/Deductible Franchise.

ENGG/END-110: ENDORSEMENT CONCERNING STORAGE -

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall only indemnify the Insured for loss of or damage to the Insured items during storage upto a value per storage unit not exceeding the equivalent of Rs.. The individual storage units shall be either atleast 50 m apart or separated by fireproof walls.

ENGG/END-113: MAINTENANCE VISITS AND EXTENDED MAINTENANCE COVER -

a) Limited Maintenance Visits Cover:

In consideration of the payment of an additional premium by the insured (which is included in the Total Premium set forth in the schedule), it is hereby declared and agreed that the indemnity provided by this policy is extended to include maintenance cover for the period of November months to be reckoned from the date of completion of Testing, provided the policy period has been extended till completion of Testing. However, during the Maintenance Period this Insurance shall cover solely loss of or damage to the contract works caused by the insured contractor(s) in the course of the operations carried out for the purpose of complying with the obligations under the maintenance provisions of the contract.

b) Extended Maintenance Cover -

In consideration of the payment of an additional premium by the Insured (which is included in the total premium set forth in the schedule) it is hereby declared and agreed that the indemnity provided by this policy is extended to include Maintenance Cover for the period of months to be reckoned from the date of completion of Testing, provided the policy period has been extended till completion of Testing. However, during the Maintenance period this insurance shall cover loss or damage to the contract works -

i) Caused by the Insured contractor(s) in the course of the operations carried out for the purpose of complying with the obligations under the maintenance provisions of the contract.
ii) Occurring during the maintenance period provided such loss or damage was caused on the site during the erection period.

1.1.82 **INSTITUTE CARGO CLAUSES (AIR)**
(excluding sendings by Post)

RISKS COVERED

1 This insurance covers all risks of loss of or damage to the subject-matter insured except as provided in Clauses 2, 3 and 4 below. — Risks Clause

EXCLUSIONS

2 In no case shall this insurance cover — General Exclusions Clause
- 2.1 loss damage or expense attributable to willful misconduct of the Assured
- 2.2 ordinary leakage, ordinary loss in weight or volume, or ordinary wear and tear of the subject-matter insured
- 2.3 loss damage or expense caused by insufficiency or unsuitability of packing or preparation of the subject-matter insured (for the purpose of this Clause 2.3 "packing" shall be deemed to include stowage in a container of liftvan but only when such stowage is carried out prior to attachment of this insurance or by the Assured or their servants).
- 2.4 loss damage or expense caused by inherent vice or nature of the subject-matter insured
- 2.5 loss damage or expense arising from unfitness of aircraft conveyance container or liftvan for the safe carriage of the subject-matter insured, where the Assured or their servants are privy to such unfitness at the time the subject-matter insured is loaded therein
- 2.6 loss damage or expense proximately caused by delay, even though the delay be caused by a risk insured against
- 2.7 loss damage or expense arising from insolvency or financial default of the owners managers charterers or operators of the aircraft
- 2.8 loss damage or expense arising from the use of any weapon of war employing atomic or nuclear fission and/or fusion or other like reaction or radioactive force or matter.

3 In no case shall this insurance cover loss damage or expense caused by — War Exclusion Clause
- 3.1 war civil war revolution rebellion insurrection, or civil strife arising therefrom, or any hostile act by or against a belligerent power
- 3.2 capture seizure arrest restraint or detainment (piracy excepted), and the consequences thereof or any attempt thereat
- 3.3 derelict mines torpedoes bombs or other derelict weapons of war

4 In no case shall this insurance cover loss damage or expense — Strikes Exclusion Clause
- 4.1 caused by strikers, locked-out workmen, or persons taking part in labour disturbances, riots or civil commotions
- 4.2 resulting from strikes, lock-outs, labour disturbances, riots or civil commotions
- 4.3 caused by any terrorist or any person acting from a political motive.

DURATION

5 5.1 This insurance attaches from the time the subject-matter insured leaves the warehouse, premises or place of storage at the place named herein for the commencement of the transit, continues during the ordinary course of transit and terminates either — Transit Clause
- 5.1.1 on delivery to the Consignees' or other final warehouse, premises or place of storage at the destination named herein,
- 5.1.2 on delivery to any other warehouse, premises or place of storage, whether prior to or at the destination named herein, which the Assured elect to use either
  - 5.1.2.1 for storage other than in the ordinary course of transit or
  - 5.1.2.1 for allocation or distribution

  or
- 5.1.3 on the expiry of 30 days after unloading the subject-matter insured from the aircraft at the final place of discharge,

whichever shall first occur

5.2 If, after unloading from the aircraft at the final place of discharge, but prior to termination of this insurance, the subject-matter insured is forwarded to a destination other than that to which it is insured hereunder, this insurance, whilst remaining subject to termination as provided for above, shall not extend beyond the commencement of transit to such other destination.

5.3 This insurance shall remain in force (subject to termination as provided for above and to the provisions of Clause 6 below) during delay beyond the control of the Assured, any deviation, forced discharge, reshipment or transhipment and during any variation of the adventure arising from the exercise of a liberty granted to the air carriers under the contract of carriage.

6 If owing to circumstances beyond the control of the Assured either the contract of carriage is terminated at a place other than the destination named therein or the transit is otherwise terminated before delivery of the subject-matter insured as provided for in Clause 5 above, then this insurance shall also terminate *unless prompt notice is given to the Underwriters and continuation of cover is requested when the insurance shall remain in force, subject to an additional premium if required by the Underwriters,* either — Termination of Contract of Carriage clause
- 6.1 until the subject-matter is sold and delivered at such place or, unless otherwise specially agreed, until the expiry of 30 days after arrival of the subject-matter hereby insured at such place, whichever shall first occur, (or)
- 6.2 if the subject-matter is forwarded within the said period of 30 days (or any agreed extension thereof) to the destination named herein or to any other destination, until terminated in accordance with the provisions of Clause 5 above.

7 Where, after attachment of this insurance, the destination is changed by the Assured, *held covered at a premium and on conditions to be arranged subject to prompt notice being given to the Underwriters.* — Change of Transit Clause

CLAIMS

8 8.1 In order to recover under this insurance the Assured must have an insurable interest in the subject-matter insured at the time of the loss — Insurable Interest Clause

8.2 Subject to 8.1 above, the Assured shall be entitled to recover for insured loss occurring during the period covered by this insurance, notwithstanding that the loss occurred before the contract of insurance was concluded, unless the Assured were aware of the loss and the Underwriters were not.

9 Where, as a result of the operation of a risk covered by this insurance, the insured transit is terminated at a place other than that to which the — Forwarding

subject-matter is covered under this insurance, the Underwriters will reimburse the Assured for any extra charges properly and reasonably incurred in unloading storing and forwarding the subject-matter to the destination to which it is insured hereunder. Charges Clause

This Clause 9, which does not apply to general average or salvage charges, shall be subject to the exclusions contained in Clauses 2,3 and 4 above, and shall not include charges arising from the fault negligence insolvency or financial default of the Assured or their servants.

10 No claim for Constructive Total Loss shall be recoverable hereunder unless the subject-matter insured is reasonably abandoned either on account of its actual total loss appearing to be unavoidable or because the cost of recovering, reconditioning and forwarding the subject-matter to the destination to which it is insured would exceed its value on arrival. Constructive Total Loss Clause

11 11.1 If any Increased Value insurance is effected by the Assured on the cargo insured herein the agreed value of the cargo shall be deemed to be increased to the total amount insured under this insurance and all Increased Value insurances covering the loss, and liability under this insurance shall be in such proportion as the sum insured herein bears to such total amount insured. Increased Value Clause

In the event of claim the Assured shall provide the Underwriters with evidence of the amounts insured under all other insurances.

11.2 **Where this insurance is on Increased Value the following clause shall apply:**

The agreed value of the cargo shall be deemed to be equal to the total amount insured under the primary insurance and all Increased Value insurances covering the loss and effected on the cargo by the Assured, and liability under this insurance shall be in such proportion as the sum insured herein bears to such total amount insured.

In the event of claim the Assured shall provide the Underwriters with evidence of the amounts insured under all other insurances.

BENEFIT OF INSURANCE Not to Inure Clause

12 This insurance shall not inure to the benefit of the carrier or other bailee.

MINIMISING LOSSES Duty of Assured Clause

13 It is the duty of the Assured and their servants and agents in respect of loss recoverable hereunder

13.1 to take such measures as may be reasonable for the purpose of averting or minimising such loss,and

13.2 to ensure that all rights against carriers, bailees or other third parties are properly preserved and exercised and the Underwriters will, in addition to any loss recoverable hereunder, reimburse the Assured for any charges properly and reasonably incurred in pursuance of these duties.

14 Measures taken by the Assured or the Underwriters with the object of saving, protecting or recovering the subject-matter insured shall not be considered as a waiver or acceptance of abandonment or otherwise prejudice the rights of either party. Waiver Clause

AVOIDANCE OF DELAY Reasonable Despatch clause

15 It is a condition of this insurance that the Assured shall act with reasonable despatch in all circumstances within their control.

LAW AND PRACTICE English Law and Practice Clause

16 This insurance is subject to English law and practice.

NOTE:- *It is necessary for the Assured when they become aware of an event which is "held covered" under this insurance to give prompt notice to the Underwriters and the right to such cover is dependent upon compliance with this obligation.*

1.1.82 **INSTITUTE WAR CLAUSES (AIR CARGO)**
(excluding sendings by Post)

RISKS COVERED

1 This insurance covers, except as provided in Clause 2 below, loss of or damage to the subject-matter insured caused by Risks Clause

1.1 war civil war revolution rebellion insurrection, or civil strife arising therefrom, or any hostile act by or against a belligerent power

1.2 capture seizure arrest restraint or detainment, arising from risks covered under 1.1 above, and the consequences thereof or any attempt thereat

1.3 derelict mines torpedoes bombs or other derelict weapons of war.

EXCLUSIONS

2 In no case shall this insurance cover General ExclusionsClause

2.1 loss damage or expense attributable to wilful misconduct of the Assured

2.2 ordinary leakage, ordinary loss in weight or volume, or ordinary wear and tear of the subject-matter insured

2.3 loss damage or expense caused by insufficiency or unsuitability of packing or preparation of the subject-matter insured (for the purpose of this Clause 2.3 "packing" shall be deemed to include stowage in a container or liftvan but only when such stowage is carried out prior to attachment of this insurance or by the Assured or their servants)

2.4 loss damage or expense caused by inherent vice or nature of the subject-matter insured

2.5 loss damage or expense arising from unfitness or aircraft conveyance container or liftvan for the safe carriage of the subject-matter insured, where the Assured or their servants are privy to such unfitness at the time the subject-matter insured is loaded therein

2.6 loss damage or expense proximately caused by delay, even though the delay be caused by a risk insured against

2.7 loss damage or expense arising from insolvency or financial default of the owners managers charterers or operators of the aircraft

2.8 any claim based upon loss of or frustration of the voyage or adventure

2.9 loss damage or expense arising from any hostile use of any weapon of war employing atomic or nuclear fission and/or fusion or other like reaction or radioactive force or matter.

DURATION

3 3.1 This insurance Transit Clause

3.1.1 attaches only as the subject-matter insured and as to any part as that part is loaded on the aircraft for the commencement of the air transit insured
and

3.1.2 terminates, subject to 3.2 and 3.3 below, either as the subject-matter insured and as to any part as that part is discharged from the aircraft at the final place of discharge or on expiry of 15 days counting from midnight of the day of arrival of the aircraft at the final place of discharge,
whichever shall first occur;
nevertheless,
subject to prompt notice to the Underwriters and to an additional premium, such insurance

3.1.3 reattaches when, without having discharged the subject-matter insured at the final place of discharge, the aircraft departs there from, and

3.1.4 terminates, subject to 3.2 and 3.3 below, either as the subject-matter insured and as to any part as that part is thereafter discharged from the aircraft at the final (or substituted) on expiry of 15 days counting from midnight of the day of re-arrival of the aircraft at the final place of discharge or arrival of the aircraft at a substituted place of discharge, whichever shall first occur.

3.2 If during the insured transit the aircraft arrives at an intermediate place to discharge the subject-matter insured for on-carriage by aircraft or oversea vessel, then, subject to 3.3 below and to an additional premium if required, this insurance continues until the expiry of 15 days counting from midnight of the day of arrival of the aircraft at such place, but thereafter reattaches as the subject-matter insured and as to any part as that part is loaded on an on-carrying aircraft or oversea vessel. During the period of 15 days the insurance remains in force after discharge only whilst the subject-matter insured and as to any part as that part is at such intermediate place. If the goods are on-carried within the said period of 15 days or if the insurance reattaches as provided in this Clause 3.2

3.2.1 where the on-carriage is by aircraft this insurance continues subject to the terms of these clauses, or

3.2.2 where the on-carriage is by oversea vessel, the current Institute War Clauses (Cargo) shall be deemed to form part of this insurance

and shall apply to the on-carriage by sea.

3.3 If the air transit in the contract of carriage is terminated at a place other than the destination agreed therein, that place shall be deemed to be the final place of discharge and such insurance terminates in accordance with 3.1.2. If the subject-matter insured is subsequently consigned to the original or any other destination, then, provided notice is given to the Underwriters before the commencement of such further transit and subject to an additional premium, such insurance reattaches

3.3.1 in the case of the subject-matter insured having been discharged, as the subject-matter insured and as to any part as that part is loaded on the on-carrying aircraft for the transit;

3.3.2 in the case of the subject-matter insured not having been discharged, when the aircraft departs from such deemed final place of discharge;

3.4 *Subject to prompt notice to Underwriters, and to an additional premium if required*, this insurance shall remain in force within the provisions of these Clauses during any deviation, or any variation of the adventure arising from the exercise of a liberty granted to the air carrier under the contract of carriage.

(For the purpose of Clause 3)

"oversea vessel" shall be deemed to mean a vessel carrying the subject-matter from one port or place to another where such voyage involves a sea passage by that vessel)

4 Where, after attachment of this insurance, the destination is changed by the Assured, *held covered at a premium and on conditions to be arranged subject to prompt notice being given to the Underwriters.* — Change of Transit Clause

5 Anything contained in this contract which is inconsistent with Clauses 2.8, 2.9 or 3 shall, to the extent of such inconsistency, be null and void.

CLAIMS

6 6.1 In order to recover under this insurance the Assured must have an insurable interest in the subject-matter insured at the time of the loss. — Insurable Interest Clause

6.2 Subject to 6.1 above, the Assured shall be entitled to recover for insured loss occurring during the period covered by this insurance, notwithstanding that the loss occurred before the contract of insurance was concluded, unless the Assured were aware of the loss and the Underwriters were not.

7 7.1 If any Increased Value insurance is effected by the Assured on the cargo insured herein the agreed value of the cargo shall be deemed to be increased to the total amount insured under this insurance and all Increased Value insurances covering the loss, and liability under this insurance shall be in such proportion as the sum insured herein bears to such total amount insured.In the event of claim the Assured shall provide the Underwriters with evidence of the amounts insured under all other insurances. — Increased Value Clausee

7.2 **Where this insurance is on Increased Value the following clause shall apply:**
The agreed value of the cargo shall be deemed to be equal to the total amount insured under the primary insurance and all Increased Value insurances covering the loss and effected on the cargo by the Assured, and liability under this insurance shall be in such proportion as the sum insured herein bears to such total amount insured.
In the event of claim the Assured shall provide the Underwriters with evidence of the amounts insured under all other insurances.

BENEFIT OF INSURANCE — Not to Inure Clause

8 This insurance shall not inure to the benefit of the carrier or other bailee.

MINIMISING LOSSES — Duty of Assured Clause

9 It is the duty of the Assured and their servants and agents in respect of loss recoverable hereunder

9.1 to take such measures as may be reasonable for the purpose of averting or minimising such loss, and

9.2 to ensure that all rights against carriers, bailees or other third parties are properly preserved and exercised and the Underwriters will, in addition to any loss recoverable hereunder, reimburse the Assured for any charges properly and reasonably incurred in pursuance of these duties.

10 Measures taken by the Assured or the Underwriters with the object of saving, protecting or recovering the subject-matter insured shall not be considered as a waiver or acceptance of abandonment or otherwise prejudice the rights of either party. — Waiver Clause

AVOIDANCE OF DELAY — Reasonable Despatch clause

11 It is a condition of this insurance that the Assured shall act with reasonable despatch in all circumstances within their control.

LAW AND PRACTICE — English Law & Practice Clause

12 This insurance is subject to English law and practice.

NOTE:- *It is necessary for the Assured when they become aware of an event which is "held covered" under this insurance to give prompt notice to the Underwriters and the right to such cover is dependent upon compliance with this obligation.*

1.1.82 INSTITUTE STRIKES CLAUSES (AIR CARGO)

RISKS COVERED

1 This insurance covers, except as provided in Clause 2 below, loss of or damage to the subject-matter insured caused by — Risks Clause

1.1 strikers, locked-out workmen, or persons taking part in labour disturbances, riots or civil commotions

1.2 any terrorist or any person acting from a political motive.

EXCLUSIONS

2

In no case shall this insurance cover — General Exclusions Clause

2.1 loss damage or expense attributable to wilful misconduct of the Assured

2.2 ordinary leakage, ordinary loss in weight or volume, or ordinary wear and tear of the subject-matter insured

2.3 loss damage or expense caused by insufficiency or unsuitability of packing or preparation of the subject-matter insured (for the purpose of this Clause 2.3 "packing" shall be deemed to include stowage in a container or liftvan but only when such stowage is carried out prior to attachment of this insurance or by the Assured or their servants)

2.4 loss damage or expense caused by inherent vice or nature of the subject-matter insured

2.5 loss damage or expense arising from unfitness of aircraft conveyance container or liftvan for the safe carriage of the subject -matter insured, where the Assured or their servants are privy to such unfitness at the time the subject-matter insured is loaded therein

2.6 loss damage or expense proximately caused by delay, even though the delay be caused by a risk insured against

2.7 loss damage or expense arising from insolvency or financial default of the owners managers charterers or operators of the aircraft

2.8 loss damage or expense arising from the absence shortage or withholding of labour of any description whatsoever resulting from any strike, lockout, labour disturbance, riot or civil commotion

2.9 any claim based upon loss of or frustration of the voyage or adventure

2.10 loss damage or expense arising from the use of any weapon of war employing atomic or nuclear fission and/or fusion or other like reaction or radioactive force or matter

2.11 loss damage or expense caused by war civil war revolution rebellion insurrection, or civil strife arising therefrom, or any hostile act by or against a belligerent power.

DURATION

3 3.1 This insurance attaches from the time the subject-matter insured leaves the warehouse, premises or place of storage at the place named herein for the commencement of the transit, continues during the ordinary course of transit and terminates either — Transit Clause

3.1.1 on delivery to the Consignees or other final warehouse, premises or place of storage at the destination named herein,

3.1.2 on delivery to any other warehouse, premises or place of storage, whether prior to or at the destination named herein, which the Assured elect to use either

3.1.2.1 for storage other than in the ordinary course of transit or

3.1.2.2 for allocation or distribution, or

3.1.3 on the expiry of 30 days after unloading the subject-matter insured from the aircraft at the final place of discharge,

whichever shall first occur.

3.2 If, after unloading from the aircraft at the final place of discharge, but prior to termination of this insurance, the subject-matter insured is forwarded to a destination other than that to which it is insured hereunder, this insurance, whilst remaining subject to termination as provided for above, shall not extend beyond the commencement of transit to such other destination.

3.2.1 where the on-carriage is by aircraft this insurance continues subject to the terms of these clauses, or

3.2.2 where the on-carriage is by oversea vessel, the current Institute War Clauses (Cargo) shall be deemed to form part of this insurance and shall apply to the on-carriage by sea.

3.3 This insurance shall remain in force (subject to the termination as provided for above and to the provisions of Clause 4 below) during delay beyond the control of the Assured, any deviation, forced discharge, reshipment or transhipment and during any variation of the adventure arising from the exercise of a liberty granted to the air carriers under the contract of carriage.

4 If owing to circumstances beyond the control of the Assured either the contract of carriage is terminated at a place other than the destination named therein or the transit is otherwise terminated before delivery of the subject-matter insured as provided for in Clause 3 above, then this insurance shall also terminate unless prompt notice is given to the Underwriters and continuation of cover is requested when the insurance shall remain in force, subject to an additional premium if required by the Underwriters, either — Termination of Contract of Carriage Clause

4.1 until the subject-matter is sold and delivered at such place or, unless otherwise specially agreed, until the expiry of 30 days after arrival of the subject-matter hereby insured at such place, whichever shall first occur,

or

4.2 if the subject-matter insured is forwarded within the said period of 30 days (or any agreed extension thereof) to the destination named herein or to any other destination, until terminated in accordance with the provisions of Clause 3 above.

5 Where, after attachment of this insurance, the destination is changed by the Assured, *held covered at a premium and on conditions to be arranged subject to prompt notice being given to the Underwriters.* — Change of Transit Clause

CLAIMS

6 6.1 In order to recover under this insurance the Assured must have an insurable interest in the subject-matter insured at the time of the loss. — Insurable Interest Clause

6.2 Subject to 6.1 above, the Assured shall be entitled to recover for insured loss occurring during the period covered by this insurance, notwithstanding that the loss occurred before the contract of insurance was concluded, unless the Assured were aware of the loss and the Underwriters were not.

7 7.1 If any Increased Value insurance is effected by the Assured on the cargo insured herein the agreed value of the cargo shall be deemed to be increased to the total amount insured under this insurance and all Increased Value insurances covering the loss, and liability under this insurance shall be in such proportion as the sum insured herein bears to such total amount insured. — Increased Value Clausee

In the event of claim the Assured shall provide the Underwriters with evidence of the amounts insured under all other insurances.

7.2 **Where this insurance is on Increased Value the following clause shall apply:**

The agreed value of the cargo shall be deemed to be equal to the total amount insured under the primary insurance and all Increased Value insurances covering the loss and effected on the cargo by the Assured, and liability under this insurance shall be in such proportion as the sum insured herein bears to such total amount insured.

In the event of claim the Assured shall provide the Underwriters with evidence of the amounts insured under all other insurances.

BENEFIT OF INSURANCE — Not to Inure Clause

8 This insurance shall not inure to the benefit of the carrier or other bailee.

MINIMISING LOSSES — Duty of Assured Clause

9 It is the duty of the Assured and their servants and agents in respect of loss recoverable hereunder

9.1 to take such measures as may be reasonable for the purpose of averting or minimising such loss, and

9.2 to ensure that all rights against carriers, bailees or other third parties are properly preserved and exercised

and the Underwriters will, in addition to any loss recoverable hereunder, reimburse the Assured for any charges properly and reasonably incurred in pursuance of these duties.

10 Measures taken by the Assured or the Underwriters with the object of saving, protecting or recovering the subject-matter insured shall not be considered as waiver or acceptance of abandonment or otherwise prejudice the rights of either party. — Waiver Clause

AVOIDANCE OF DELAY — Reasonable Despatch clause

11 It is a condition of this insurance that the Assured shall act with reasonable despatch in all circumstances within their control.

LAW AND PRACTICE — English Law& Practice Clause

12 This insurance is subject to English law and practice.

NOTE:- *It is necessary for the Assured when they become aware of an event which is "held covered" under this insurance to give prompt notice to the Underwriters and the right to such cover is dependent upon compliance with this obligation.*

1.1.82 **INSTITUTE CARGO CLAUSES (A)**

RISKS COVERED

1 This insurance covers all risks of loss of or damage to the subject-matter insured except as provided in Clauses 4, 5, 6 and 7 below. — Risks Clause

2 This insurance covers general average and salvage charges, adjusted or determined according to the contract of affreightment and/or the governing law and practice, incurred to avoid or in connection with the avoidance of loss from any cause except those excluded in Clauses 4, 5, 6 and 7 or elsewhere in this insurance. — General Average Clause

3 This insurance is extended to indemnify the Assured against such proportion of liability under the contract of affreightment "Both to Blame Collision" Clause as is in respect of a loss recoverable hereunder. In the event of any claim by shipowners under the said Clause the Assured agree to notify the Underwriters who shall have the right, at their own cost and expense, to defend the Assured against such claim. — "Both to Blame Collision" Clause

EXCLUSIONS

4 In no case shall this insurance cover — General Exclusions Clause

4.1 loss damage or expense attributable to wilful misconduct of the Assured

4.2 ordinary leakage, ordinary loss in weight or volume, or ordinary wear and tear of the subject-matter insured

4.3 loss damage or expense caused by insufficiency or unsuitability of packing or preparation of the subject-matter insured (for the purpose of this Clause 4.3 "packing" shall be deemed to include stowage in a container or liftvan but only when such stowage is carried out prior to attachment of this insurance or by the Assured or their servants)

4.4 loss damage or expense caused by inherent vice or nature of the subject-matter insured

4.5 loss damage or expense proximately caused by delay, even though the delay be caused by a risk insured against (except expenses payable under Clause 2 above)

4.6 loss damage or expense arising from insolvency or financial default of the owners managers charterers or operators of the vessel

4.7 loss damage or expense arising from the use of any weapon of war employing atomic or nuclear fission and/or fusion or other like reaction or radioactive force or matter.

5 5.1 In no case shall this insurance cover loss damage or expense arising from
unseaworthiness of vessel or craft,
unfitness of vessel craft conveyance container or liftvan for the safe carriage of the subject-matter insured,
where the Assured or their servants are privy to such unseaworthiness or unfitness, at the time the subject-matter insured is loaded therein. — Unseaworthiness and Unfitness Exclusion Clause

5.2 The Underwriters waive any breach of the implied warranties of seaworthiness of the ship and fitness of the ship to carry the subject-matter insured to destination, unless the Assured or their servants are privy to such unseaworthiness or unfitness.

6 In no case shall this insurance cover loss damage or expense caused by

6.1 war civil war revolution rebellion insurrection, or civil strife arising therefrom, or any hostile act by or against a belligerent power — War Exclusion Clausee

6.2 capture seizure arrest restraint or detainment (piracy excepted), and the consequences thereof or any attempt thereat

6.3 derelict mines torpedoes bombs or other derelict weapons of war.

7 In no case shall this insurance cover loss damage or expense

7.1 caused by strikers, locked-out workmen, or persons taking part in labour disturbances, riots or civil commotions — Strikes Exclusion Clause

7.2 resulting from strikes, lock-outs, labour disturbances, riots or civil commotions

7.3 caused by any terrorist or any person acting from a political motive.

DURATION

8 8.1 This insurance attaches from the time the goods leave the warehouse or place of storage at the place named herein for the commencement of the transit, continues during the ordinary course of transit and terminates either — Transit Clause

8.1.1 on delivery to the Consignees' or other final warehouse or place of storage at the destination named herein,

8.1.2 on delivery to any other warehouse or place of storage, whether prior to or at the destination named herein, which the Assured elect to use either

8.1.2.1 for storage other than in the ordinary course of transit or

8.1.2.2 for allocation or distribution, or

8.1.3 on the expiry of 60 days after completion of discharge overside of the goods hereby insured from the oversea vessel at the final port of discharge, whichever shall first occur.

8.2 If, after discharge overside from the oversea vessel at the final port of discharge, but prior to termination of this insurance, the goods are to be forwarded to a destination other than that to which they are insured hereunder, this insurance, whilst remaining subject to termination as provided for above, shall not extend beyond the commencement of transit to such other destination.

8.3 This insurance shall remain in force (subject to termination as provided for above and to the provisions of Clause 9 below) during delay beyond the control of the Assured, any deviation, forced reshipment or transshipment and during any variation of the adventure arising from the exercise of a liberty granted to shipowners or charterers under the contract of affreightment.

9 If owing to circumstances beyond the control of the Assured either the contract of carriage is terminated at a port or place other than the destination named therein or the transit is otherwise terminated before delivery of the goods as provided for in Clause 8 above, then this insurance shall also terminate unless prompt notice is given to the Underwriters and continuation of cover is requested when the insurance shall remain in force, subject to an additional premium if required by the Underwriters, either — Termination of Contract of Carriage Clause

9.1 until the goods are sold and delivered at such port or place, or, unless otherwise specially agreed, until the expiry of 60 days after arrival of the goods hereby insured at such port or place, whichever shall first occur or

9.2 if the goods are forwarded within the said period of 60 days (or any agreed extension thereof) to the destination named herein or to any other destination, until terminated in accordance with the provisions of Clause 8 above.

10 Where, after attachment of this insurance, the destination is changed by the Assured, *held covered at a premium and on conditions to be arranged subject to prompt notice being given to the Underwriters* — Change of Voyage Clause

CLAIMS

11 11.1 In order to recover under this insurance the Assured must have an insurable interest in the subject-matter insured at the time of the loss. — Insurable Interest Clause

11.2 Subject to 11.1 above, the Assured shall be entitled to recover for insured loss occurring during the period covered by this insurance, notwithstanding that the loss occurred before the contract of insurance was concluded, unless the Assured were aware of the loss and the Underwriters were not.

12 Where, as a result of the operation of a risk covered by this insurance the insured transit is terminated at a port or place other than that to which the subject-matter is covered under this insurance, the Underwriters will reimburse the Assured for any extra charges properly and reasonably incurred in unloading storing and forwarding the subject-matter to the destination to which it is insured hereunder. — Forwarding Charges Clause

This Clause 12, which does not apply to general average or salvage charges, shall be subject to the exclusions contained in Clauses 4, 5, 6 and 7 above, and shall not include charges arising from the fault negligence insolvency or financial default of the Assured or their servants.

13 No claim for Constructive Total Loss shall be recoverable hereunder unless the subject-matter insured is reasonably abandoned either on account of its actual total loss appearing to be unavoidable or because the cost of recovering, reconditioning and forwarding the subject-matter to the destination to which it is insured would exceed its value on arrival. — Constructive Total Loss Clause

14 14.1 In order to recover under this insurance the Assured must have an insurable interest in the subject-matter insured at the time of the loss. — Increased Value Clause

14.2 **Where this insurance is on Increased Value the following clause shall apply:**
The agreed value of the cargo shall be deemed to be equal to the total amount insured under the primary insurance and all Increased Value insurances covering the loss and effected on the cargo by the Assured, and liability under this insurance shall be in such proportion as the sum insured herein bears to such total amount insured.
In the event of claim the Assured shall provide the Underwriters with evidence of the amounts insured under all other insurances.

BENEFIT OF INSURANCE

15 This insurance shall not inure to the benefit of the carrier or other bailee. — Not to Inure Clause

MINIMISING LOSSES

16 It is the duty of the Assured and their servants and agents in respect of loss recoverable hereunder — Duty of Assured Clause

16.1 to take such measures as may be reasonable for the purpose of averting or minimising such loss, and

16.2 to ensure that all rights against carriers, bailees or other third parties are properly preserved and exercised and the Underwriters will, in addition to any loss recoverable hereunder, reimburse the Assured for any charges properly and reasonably incurred in pursuance of these duties.

17 Measures taken by the Assured or the Underwriters with the object of saving, protecting or recovering the subject-matter insured shall not be considered as a waiver or acceptance of abandonment or otherwise prejudice the rights of either party. Waiver Clause

AVOIDANCE OF DELAY Reasonable Despatch clause

18 It is a condition of this insurance that the Assured shall act with reasonable despatch in all circumstances within their control.

LAW AND PRACTICE English Law and Practice Clause

19 This insurance is subject to English law and practice.

NOTE:- *It is necessary for the Assured when they become aware of an event which is "held covered" under this insurance to give prompt notice to the Underwriters and the right to such cover is dependent upon compliance with this obligation.*

1.1.82 **INSTITUTE WAR CLAUSES (CARGO)**

RISKS COVERED

1 This insurance covers, except as provided in Clauses 3 and 4 below, loss of or damage to the subject-matter insured caused by Risks Clause

1.1 war civil war revolution rebellion insurrection, or civil strife arising therefrom, or any hostile act by or against a belligerent power

1.2 capture seizure arrest restraint or detainment, arising from risks covered under 1.1 above, and the consequences thereof or any attempt thereat

1.3 derelict mines torpedoes bombs or other derelict weapons of war.

2 This insurance covers general average and salvage charges, adjusted or determined according to the contract of affreightment and/or the governing law and practice, incurred to avoid or in connection with the avoidance of loss from a risk covered under these clauses. General Average Clause

EXCLUSIONS

3 In no case shall this insurance cover General Exclusions Clause

3.1 loss damage or expense attributable to wilful misconduct of the Assured

3.2 ordinary leakage, ordinary loss in weight or volume, or ordinary wear and tear of the subject-matter insured

3.3 loss damage or expense caused by insufficiency or unsuitability of packing or preparation of the subject-matter insured (for the purpose of this Clause 3.3 "packing" shall be deemed to include stowage in a container or liftvan but only when such stowage is carried out prior to attachment of this insurance or by the Assured or their servants)

3.4 loss damage or expense caused by inherent vice or nature of the subject-matter insured

3.5 loss damage or expense proximately caused by delay, even though the delay be caused by a risk insured against (except expenses payable under Clause 2 above)

3.6 loss damage or expense arising from insolvency or financial default of the owners managers charterers or operators of the vessel

3.7 any claim based upon loss of or frustration of the voyage or adventure

3.8 loss damage or expense arising from any hostile use of any weapon of war employing atomic or nuclear fission and/or fusion or other like reaction or radioactive force or matter.

4 4.1 In no case shall this insurance cover loss damage or expense arising from unseaworthiness of vessel or craft, unfitness of vessel craft conveyance container or liftvan for the safe carriage of the subject-matter insured, where the Assured or their servants are privy to such unseaworthiness or unfitness, at the time the subject-matter insured is loaded therein. Unseaworthiness and Unfitness Exclusion Clause

4.2 The Underwriters waive any breach of the implied warranties of seaworthiness of the ship and fitness of the ship to carry the subject-matter insured to destination, unless the Assured or their servants are privy to such unseaworthiness or unfitness.

DURATION

5 5.1 This insurance Transit Clause

5.1.1 attaches only as the subject-matter insured and as to any part as that part is loaded on an oversea vessel and

5.1.2 terminates, subject to 5.2 and 5.3 below, either as the subject-matter insured and as to any part as that part is discharged from an oversea vessel at the final port or place of discharge, or on expiry of 15 days counting from midnight of the day of arrival of the vessel at the final port or place of discharge, whichever shall first occur; nevertheless, subject to prompt notice to the Underwriters and to an additional premium, such insurance

5.1.3 reattaches when, without having discharged the subject-matter insured at the final port or place of discharge, the vessel sails therefrom, and

5.2 If during the insured voyage the oversea vessel arrives at an intermediate port or place to discharge the subject-matter insured for on-carriage by oversea vessel or by aircraft, or the goods are discharged from the vessel at a port or place of refuge, then subject to 5.3 below and to an additional premium if required, this insurance continues until the expiry of 15 days counting from midnight of the day of arrival of the vessel at such port or place, but thereafter reattaches as the subject-matter insured and as to any part as that part is loaded on an on-carrying oversea vessel or aircraft. During the period of 15 days the insurance remains in force after discharge only whilst the subject-matter insured and as to any part as that part is at such port or place. If the goods are on-carried within the said period of 15 days or if the insurance reattaches as provided in this Clause 5.2

5.2.1 where the on-carriage is by oversea vessel this insurance continues subject to the terms of these clauses, or

5.2.2 where the on-carriage is by aircraft, the current Institute War Clauses (Air Cargo) (excluding sendings by Post) shall be deemed to form part of this insurance and shall apply to the on-carriage by air.

5.3 If the voyage in the contract of carriage is terminated at a port or place other than the destination agreed therein, such port or place shall be deemed to be the final port of discharge and such insurance terminates in accordance with 5.1.2. If the subject-matter insured is subsequently reshipped to the original or any other destination, then, *provided notice is given to the Underwriters before the commencement of such further transit and subject to an additional premium,* such insurancereattaches

5.3.1 in the case of the subject-matter insured having been discharged, as the subject-matter insured and as to any part as that part is loaded on the on-carrying vessel for the voyage;

5.3.2 in the case of the subject-matter not having been discharged, when the vessel sails from such deemed final port of discharge; thereafter such insurance terminates in accordance with 5.1.4.

5.4 The insurance against the risks of mines and derelict torpedoes, floating or submerged, is extended whilst the subject-matter insured or any part thereof is on craft whilst in transit to or from the oversea vessel, but in no case beyond the expiry of 60 days after discharge from the oversea vessel unless otherwise specially agreed by the Underwriters.

5.5 *Subject to prompt notice to Underwriters, and to an additional premium if required*, this insurance shall remain in force within the provisions of these Clauses during any deviation, or any variation of the adventure arising from the exercise of a liberty granted to shipowners or charterers under the contract of affreightment.

(For the purpose of Clause 5)

"arrival" shall be deemed to mean that the vessel is anchored, moored or otherwise secured at a berth or place within the Harbour Authority area. If such a berth or place is not available, arrival is deemed to have occurred when the vessel first anchors, moors or otherwise secures

either at or off the intended port or place of discharge "oversea vessel" shall be deemed to mean a vessel carrying the subject-matter from one port or place to another where such voyage involves a sea passage by that vessel)

6 Where, after attachment of this insurance, the destination is changed by the Assured, held covered at a premium and on conditions to be arranged subject to prompt notice being given to the Underwriters. — Change of Voyage Clause

7 **Anything contained in this contract which is inconsistent with Clauses 3.7, 3.8 or 5 shall, to the extent of such inconsistency, be null and void.**

CLAIMS

8 8.1 In order to recover under this insurance the Assured must have an insurable interest in the subject matter insured at the time of the loss. — Insurable Interest Clause

8.2 Subject to 8.1 above, the Assured shall be entitled to recover for insured loss occurring during the period covered by this insurance, notwithstanding that the loss occurred before the contract of insurance was concluded, unless the Assured were aware of the loss and the Underwriters were not.

9 9.1 If any Increased Value insurance is effected by the Assured on the cargo insured herein the agreed value of the cargo shall be deemed to be increased to the total amount insured under this insurance and all Increased Value insurances covering the loss, and liability under this insurance shall be in such proportion as the sum insured herein bears to such total amount insured. — Increased Value Clause
In the event of claim the Assured shall provide the Underwriters with evidence of the amounts insured under all other insurances

9.2 **Where this insurance is on Increased Value the following clause shall apply:**
The Agreed value of the cargo shall be deemed to be equal to the total amount insured under the primary insurance and all Increased Value insurances covering the loss and effected on the cargo by the Assured, and liability under this insurance shall be in such proportion as the sum insured herein bears to such total amount insured.
In th In the event of claim the Assured shall provide the Underwriters with evidence of the amounts insured under all other insurances.

BENEFIT OF INSURANCE — Not to Inure Clause

10 This insurance shall not inure to the benefit of the carrier or other bailee.

MINIMISING LOSSES

11 It is the duty of the Assured and their servants and agents in respect of loss recoverable hereunder — Duty of Assured Clause

11.1 to take such measures as may be reasonable for the purpose of averting or minimizing such loss, and

11.2 to ensure that all rights against carriers, bailees or other third parties are properly preserved and exercised and the Underwriters will, in addition to any loss recoverable hereunder, reimburse the Assured for any charges properly and reasonably incurred in pursuance of these duties.

12 Measures taken by the Assured or the Underwriters with the object of saving, protecting or recovering the subject-matter insured shall not be considered as a waiver or acceptance of abandonment or otherwise prejudice the rights of either party. — Waiver Clause

AVOIDANCE OF DELAY

13 It is a condition of this insurance that the Assured shall act with reasonable despatch in all circumstances within their control. — Reasonable Despatch Clause

LAW AND PRACTICE — English Law and Practice Clause

14 This insurance is subject to English law and practice.

NOTE:- *It is necessary for the Assured when they become aware of an event which is "held covered" under this insurance to give prompt notice to the Underwriters and the right to such cover is dependent upon compliance with this obligation.*

1.1.82 **INSTITUTE STRIKES CLAUSES (CARGO)**

RISKS COVERED

1 This insurance covers, except as provided in Clauses 3 and 4 below, loss of or damage to the subject-matter insured caused by — Risks Clause

1.1 strikers, locked-out workmen, or persons taking part in labour disturbances, riots or civil commotions

1.2 any terrorist or any person acting from a political motive

2 This insurance covers general average and salvage charges, adjusted or determined according to the contract of affreightment and/or the governing law and practice, incurred to avoid or in connection with the avoidance of loss from a risk covered under these clauses. — General Average Clause

EXCLUSIONS

3 In no case shall this insurance cover — General Exclusions Clause

3.1 loss damage or expense attributable to wilful misconduct of the Assured

3.2 ordinary leakage, ordinary loss in weight or volume, or ordinary wear and tear of the subject-matter insured

3.3 loss damage or expense caused by insufficiency or unsuitability of packing or preparation of the subject-matter insured (for the purpose of this Clause 3.3 "packing" shall be deemed to include stowage in a container or liftvan but only when such stowage is carried out prior to attachment of this insurance or by the Assured or their servants)

3.4 loss damage or expense caused by inherent vice or nature of the subject-matter insured

3.5 loss damage or expense proximately caused by delay, even though the delay be caused by a risk insured against (except expenses payable under Clause 2 above)

3.6 loss damage or expense arising from insolvency or financial default of the owners managers charterers or operators of the vessel

3.7 loss damage or expense arising from the absence shortage or withholding of labour of any description whatsoever resulting from any strike, lockout, labour disturbance, riot or civil commotion

3.8 any claim based upon loss of or frustration of the voyage or adventure

3.9 loss damage or expense arising from the use of any weapon of war employing atomic or nuclear fission and/or fusion or other like reaction or radioactive force or matter

3.10 loss damage or expense caused by war civil war revolution rebellion insurrection, or civil strife arising therefrom, or any hostile act by or against a belligerent power.

4 4.1 In no case shall this insurance cover loss damage or expense arising from unseaworthiness of vessel or craft, unfitness of vessel craft conveyance container or liftvan for the safe carriage of the subject-matter insured, where the Assured or their servants are privy to such unseaworthiness or unfitness, at the time the subject-matter insured is loaded therein. — Unseaworthiness and Unfitness Exclusion Clause

4.2 The Underwriters waive any breach of the implied warranties of seaworthiness of the ship and fitness of the ship to carry the subject-matter insured to destination, unless the Assured or their servants are privy to such unseaworthiness or unfitness.

DURATION

5 5.1 This insurance attaches from the time the goods leave the warehouse or place of storage at the place named herein for the commencement of the transit, continues during the ordinary course of transit and terminates either — Transit Clause

5.1.1 on delivery to the Consignees' or other final warehouse or place of storage at the destination named herein,

5.1.2 on delivery to any other warehouse or place of storage, whether prior to or at the destination named herein, which the Assured elect to use either

5.1.2.1 for storage other than in the ordinary course of transit or

8.1.2.2 for allocation or distribution, or

5.1.3 on the expiry of 60 days after completion of discharge overside of the goods hereby insured from the oversea vessel at the final port of discharge,whichever shall first occur.

5.2 If, after discharge overside from the oversea vessel at the final port of discharge, but prior to termination of this insurance, the goods are to be forwarded to a destination other than that to which they are insured hereunder, this insurance, whilst remaining subject to termination as provided for above, shall not extend beyond the commencement of transit to such other destination.

5.3 This insurance shall remain in force (subject to termination as provided for above and to the provisions of Clause 6 below) during delay beyond the control of the Assured, any deviation, forced discharge, reshipment or transhipment and during any variation of the adventure arising from the exercise of a liberty granted to ship owners or charterers under the contract of affreightment.

6 If owing to circumstances beyond the control of the Assured either the contract of carriage is terminated at a port or place other than the destination named therein or the transit is otherwise terminated before delivery of the goods as provided for in Clause 5 above, then this insurance shall also terminate *unless prompt notice is given to the Underwriters and continuation of cover is requested when the insurance shall remain in force, subject to an additional premium if required by the Underwriters,* either — Termination of Contract of Carriage Clause

6.1 until the goods are sold and delivered at such port or place, or, unless otherwise specially agreed, until the expiry of 60 days after arrival of the goods hereby insured at such port or place, whichever shall first occur, or

6.2 if the goods are forwarded within the said period of 60 days (or any agreed extension thereof) to the destination named herein or to any other destination, until terminated in accordance with the provisions of Clause 5 above.

7 Where, after attachment of this insurance, the destination is changed by the Assured, *held covered at a premium and on conditions to be arranged subject to prompt notice being given to the Underwriters.* — Change of Voyage Clause

CLAIMS

8 8.1 In order to recover under this insurance the Assured must have an insurable interest in the subject-matter insured at the time of the loss. — Insurable Interest Clause

8.2 Subject to 8.1 above, the Assured shall be entitled to recover for insured loss occurring during the period covered by this insurance, notwithstanding that the loss occurred before the contract of insurance was concluded, unless the Assured were aware of the loss and the Underwriters were not.

9 9.1 If any Increased Value insurance is effected by the Assured on the cargo insured herein the agreed value of the cargo shall be deemed to be increased to the total amount insured under this insurance and all Increased Value insurances covering the loss, and liability under this insurance shall be in such proportion as the sum insured herein bears to such total amount insured. — Increased Value Clause
In the event of claim the Assured shall provide the Underwriters with evidence of the amounts insured under all other insurances.

9.2 **Where this insurance is on Increased Value the following clause shall apply:**
The Agreed value of the cargo shall be deemed to be equal to the total amount insured under the primary insurance and all Increased Value insurances covering the loss and effected on the cargo by the Assured, and liability under this insurance shall be in such proportion as the sum insured herein bears to such total amount insured.
In th In the event of claim the Assured shall provide the Underwriters with evidence of the amounts insured under all other insurances.

BENEFIT OF INSURANCE — Not to Inure Clause

10 This insurance shall not inure to the benefit of the carrier or other bailee.

MINIMISING LOSSES

11 It is the duty of the Assured and their servants and agents in respect of loss recoverable hereunder — Duty of Assured Clause

11.1 to take such measures as may be reasonable for the purpose of averting or minimizing such loss, and

11.2 to ensure that all rights against carriers, bailees or other third parties are properly preserved and exercised and the Underwriters will, in addition to any loss recoverable hereunder, reimburse the Assured for any charges properly and reasonably incurred in pursuance of these duties.

12 Measures taken by the Assured or the Underwriters with the object of saving, protecting or recovering the subject-matter insured shall not be considered as a waiver or acceptance of abandonment or otherwise prejudice the rights of either party. — Waiver Clause

AVOIDANCE OF DELAY

13 It is a condition of this insurance that the Assured shall act with reasonable despatch in all circumstances within their control. — Reasonable Despatch Clause

LAW AND PRACTICE — English Law and Practice Clause

14 This insurance is subject to English law and practice.

NOTE:- *It is necessary for the Assured when they become aware of an event which is "held covered" under this insurance to give prompt notice to the Underwriters and the right to such cover is dependent upon compliance with this obligation.*

INLAND TRANSIT (RAIL OR ROAD) CLAUSE - A
(ALL RISKS)

RISKS COVERED

1 This insurance covers all risks of loss or damage to the subject matter insured except as provided in clause Nos.2,3,& 4 below.

EXCLUSIONS

2 In no case shall this insurance cover

2.1 loss damage or expense attributable to willful misconduct of the Assured.

2.2 ordinary leakage ordinary loss in weight or volume or ordinary wear and tear of the subject matter insured.

2.3 loss damage or expense caused by insufficiency or unsuitability of packing or preparation of the subject matter insured(for the purpose of this clause 2.3."Packing" shall be deemed to include stowage in container or liftvan but only when such stowage is carried out prior to attachment of this insurance or by the Assured or their servants).

2.4 loss damage or expense proximately caused by delay even though the delay be caused by a risk insured against

2.5 loss damage or expense caused by inherent vice or nature of the subject matter insured

3 In no case shall this insurance cover loss damage or expense caused by

3.1 War civil war revolution rebellion insurrection, or civil strife arising there from or any hostile act by or against a belligerent power.

3.2 Capture seizure arrest restraint or detainment and the consequences there of any attempt there at

3.3 Derelict mines' bombs or other derelict weapons of war.

4 In no case shall this insurance cover loss damage or expense

4.1 caused by strikers. locked out workmen or persons taking part in labour disturbances, riots or civil commotions.

4.2 resulting from strikers, lock outs, labour disturbance riots or civil commotions.

4.3 caused by any terrorist or any person action from political motive.

DURATION

5 This insurance attaches from the time the goods leave the warehouse and/or the store at the place named in the policy for the commencement of transit and contiues during the ordinary course of transit including customary transhipments, if any

(i) Untill delivery to the final warehouse at the destination named in the policy or

(ii) In respect of transits by Rail only or rail and road untill expiry of 7 days after arrival of the railway wagon at the final destination railwaystation or

(iii) In respect of transit by Road only untill expiry of 7 days after arrival of the vehicle at the destination town named in the policy.

whichever shall first occur.

N.B 1. The period of 7 days referred to above shall be reckoned from the midnight of the day of arrival of railway wagon at the final destination railway station or vehicle

at the destination town named in this policy

2.Transit by Rail only shall include incidental transit by Road performed by Railway Authorities to or from Railway Out Agency.

CLAIMS

6 6.1 In order to recover under this insurance the Assured must have an insurable interest in the subject matter insured at the time of loss.

6.2 Subject to 6.1 above the Assured shall be entitled to recover for insured loss occurring during the period covered by this insurance, notwithstanding that the loss occurred before the contract of insurance was concluded unless the Assured were aware of the loss and the underwriters were not.

BENEFIT OF INSURANCE

7 This insurance , shall not inure to the benefit of the carrier or other bailees.

MINIMIZING LOSSES

8 It is the duty of Assured and their servants and agents in respect of loss recoverable hereunder.

8.1 to take such measures as may be reasonable for the purpose or averting of minimizing such loss and.

8.2 To ensure that all rights against carriers , bailees or other third parties are properly preserved and exercised by lodging a monetary claim against railway/road carriers/bailees within six months from the date of railway/lorry receipt or as prescribed by the relavant statute and the underwriters will in addition to any loss recoverable hereunder, reimburse the Assured for any charges properly and reasonably incurred in pursuance of these duties.

9 Measures taken by the Assured or the underwriters with the object of saving, protecting or recovering the subject matter insured shall not be considered as a waiver or acceptance of abandonment or otherwise prejudice the rights of either party.

AVOIDANCE OF DELAY

10 It is a condition of this insurance that the assured shall act with reasonable dispatch in all circumstances within their control.

"STRIKES RIOT AND CIVIL COMMOTIONS CLAUSE"
(INLAND TRANSIT NOT IN CONJUCTION WITH OCEAN GOING VOYAGE)

RISKS COVERED

1 Subject otherwise to the terms, conditions and warranties of the policy on goods against transit risks this insurance covers, except as provided in clause 2 below loss of or damage to the subject matter insured caused by.

1.1. Strikers,Locked-out workmen or persons taking part in labour disturbances, riots or civil commotions:

1.2. any terrorist or any person acting from a political motive

1.3. persons acting maliciously.

EXCLUSIONS

2 In no case shall this insurance cover

2.1. loss damage or expense proximately caused by delay, inherent vice or nature of the subject matter insured.

2.2. loss damage or expense proximately caused by the absence, shortage or withholding of labour of any description whatsoever during any strike, lock-out labour disturbances riot or civil commotion.

2.3. any claim for expenses arising from delay or other consequential or indirect loss or damage of any kind.

2.4. loss damage or expenses caused by war, civil war, revolution, rebellion, insurrection or civil strife arising there from, or any hostile act by or against a belligerent power

1.12.82

INSTITUTE THEFT, PILFERAGE AND NON-DELIVERY CLAUSE

In consideration of an additional premium, it is hereby agreed that this insurance covers loss of or damage to the subject - matter insured caused by theft or pilferage, or by non-delivery of an entire package, subject always to the exclusions contained in this insurance.

13.4.92 **INSTITUTE CLASSIFICATION CLAUSE**

The marine transit rates agreed for this insurance apply only to cargoes and/or interests carried by mechanically self-propelled vessels of steel construction, classed as below by one of the following classification societies:

Lloyd's Register	**100A1 or B.S.**
American Bureau of Shipping	**✠A1**
Bureau Veritas	**1 3/3 E ✠**
China Classification Society	**★CSA**
Germanischer Lloyd	**✠100 A5**
Korean Register of Shipping	**✠ KRS 1**
Maritime Register of Shipping	**KM ★**
Nippon Kaiji Kyokai	**NS ✻**
Norske Veritas	**✠ 1A1**
Registro Italiano	**★ 100-A-1.1.**

Provided such Vessels are:

a) (i) not bulk and/or combination carriers over 10 years of age;
(ii) not mineral oil tankers exceeding 50,000 GRT which are over 10 years of age.

b) (i) not over 15 years of age; OR
(ii) over 15 years of age but not over 25 years of age and have established and maintained a regular pattern of trading on an advertised schedule to load and unload at specified ports.

CHARTERED VESSELS AND ALSO VESSELS UNDER 1000 G.R.T. WHICH ARE MECHANICALLY SELF-PROPELLED AND OF STEEL CONSTRUCTION MUST BE CLASSED AS ABOVE AND NOT OVER THE AGE LIMITATIONS SPECIFIED ABOVE.

THE REQUIREMENTS OF THE INSTITUTE CLASSIFICATION CLAUSE DO NOT APPLY TO ANY CRAFT, RAFT OR LIGHTER, USED TO LOAD OR UNLOAD THE VESSEL, WHILST THEY ARE WITHIN THE PORT AREA.

CARGOES AND/OR INTERESTS CARRIED BY MECHANICALLY SELF-PROPELLED VESSELS NOT FALLING WITHIN THE SCOPE OF THE ABOVE ARE HELD COVERED SUBJECT TO A PREMIUM AND ON CONDITIONS TO BE AGREED.

1.10.82 **INSTITUTE REPLACEMENT CLAUSE**

In the event of loss or damage to any part or parts of an insured machine caused by a peril covered by the policy the sum recoverable shall not exceed the cost of replacement or repair of such part or parts plus charges for forwarding and refitting, if incurred, but excluding duty unless the full duty is included in the amount insured, in which case loss, if any, sustained by payment of additional duty shall also be recoverable.

provided always that in no case shall the liability of Underwriters exceed the insured value of the complete machine.

1.11.82 **INSTITUTE WAR CANCELLATION CLAUSE (CARGO)**

The cover against war risks (as defined in the relevant Institute War /clauses) may be cancelled by either the Underwriters or the Assured except in respect of any insurance which shall have attached in accordance with the condition of the Institute War Clauses before the cancellation becomes effective. Such cancellation shall however only become effective on the expiry of 7 days from midnight of the day on which notice of the cancellation is issued by or to the underwriters.

HEAVY/MEDIUM/LIGHT MACHINE (NEW)

Warranted that the interest hereunder is new and has not previously been in use.

MACHINERY AND SIMILAR ITEMS

In the event of loss of or damage to any part or parts of an insured machine cause by a peril covered by the Policy, the sum recoverable shall not exceed the cost of replacement or repair of such part or parts plus charges for forwarding and refitting if incurred.

Provided always that in no case shall the liability of Underwriters exceed the insured value of the complete machine.

PAIR & SET CLAUSES

Where any item insured under this policy consists of articles in a pair or set the Company's liability shall not exceed the value of any particular part or parts which may be lost or damage without reference to any special value which such article or articles may have as part of such pair of set not more than a proportionate part of the insured vale of the pair or set.

SECOND HAND / RECONDITIONED MACHINERY CLAUSE

Warranted that the interest insured hereunder is second hand, insured,

i) for depreciated cost arrived on the basis of current market price of a similar brand new machine

OR

ii) For the purchased price of such machinery.(delete whichever is not applicable)

Schedule rate to be loaded by 100%. Claims payable subject to 'Condition of Average' as below.

This insurance is subject to Average and in the event of the sum insured at the time of loss being less than the value of the Machinery reckoned as per the warranty in the policy the insured shall be entitled to recover for repair/replacement only such proportion as the sum insured bears to the value of the machinery.

Terrorism Damage Cover Endorsement (Material Damage only)

INSURING CLAUSE

Subject otherwise to the terms, exclusions, provisions and conditions contained in the Policy and in consideration of the payment by the Insured to the Company of additional premium as stated in the Schedule, it is hereby agreed and declared that notwithstanding anything stated in the 'Terrorism Risk Exclusion' of this Policy to the contrary, this Policy is extended to cover physical loss or physical damage occurring during the period of this Policy caused by an act of terrorism, subject to the exclusions, limits and excess described hereinafter.

For the purpose of this cover, an act of terrorism means an act or series of acts, including but not limited to the use of force or violence and/or the threat thereof, of any person or group(s) of persons, whether acting alone or on behalf of or in connection with any organisation(s) or government(s), or unlawful associations, recognized under Unlawful Activities (Prevention) Amendment Act, 2008 or any other related and applicable national or state legislation formulated to combat unlawful and terrorist activities in the nation for the time being in force, committed for political, religious, ideological or similar purposes including the intention to influence any government and/or to put the public or any section of the public in fear for such purposes.

This cover also includes loss, damage, cost or expense directly caused by, resulting from or in connection with any action taken in suppressing, controlling, preventing or minimizing the consequences of an act of terrorism by the duly empowered government or Military Authority.

Provided that If the Insured is eligible for indemnity under any government compensation plan or other similar scheme in respect of the damage described above, this Policy shall be excess of any recovery due from such plan or scheme.

For the purpose of the aforesaid inclusion clause, "Military Authority" shall mean armed forces, para military forces, police or any other authority constituted by the government for maintaining law and order.

LOSSES EXCLUDED

This cover shall not indemnify loss of or damage to property caused by any or all of the following:-

1. loss by seizure or legal or illegal occupation;
2. loss or damage caused by:
   (i) voluntary abandonment or vacation,
   (ii) confiscation, commandeering, nationalisation, requisition, detention, embargo, quarantine, or any result of any order of public or government authority, which deprives the Insured of the use or value of its property;

3. loss or damage arising from acts of contraband or illegal transportation or illegal trade;

4. loss or damage directly or indirectly arising from or in consequence of the seepage and or discharge of pollutants or contaminants, which pollutants and contaminants shall include but not be limited to any solid, liquid, gaseous or thermal irritant, contaminant or toxic or hazardous substance or any substance the presence, existence or release of which endangers or threatens to endanger the health, safety or welfare of persons or the environment;

5. loss or damage arising directly or indirectly from or in consequence of chemical or biological emission, release, discharge, dispersal or escape or chemical or biological exposure of any kind;

6. loss or damage arising directly or indirectly from or in consequence of asbestos emission, release, discharge, dispersal or escape or asbestos expo-sure of any kind;

7. any fine, levy, duty, interest or penalty or cost or compensation/damages and/or other assessment which is incurred by the Insured or which is imposed by any court, government agency, public or civil authority or any other person;

8. loss or damage by electronic means including but not limited to computer hacking or the introduction of any form of computer virus or corrupting or unauthorised instructions or code or the use of any electromagnetic weapon. This exclusion shall not operate to exclude losses (which would otherwise be covered under this Policy) arising from the use of any computer, computer system or computer software programme or any other electronic system in the launch and/or guidance system and/or firing mechanism of any weapon or missile;

9. loss or damage caused by vandals or other persons acting maliciously or by way of protest or strikes, labour unrest, riots or civil commotion;

10. loss or increased cost occasioned by any public or government or local or civil authority's enforcement of any ordinance or law regulating the reconstruction, repair or demolition of any property insured hereunder;

11. any consequential loss or damage, loss of use, delay or loss of markets, loss of income, depreciation, reduction in functionality, or increased cost of working;

12. loss or damage caused by factors including but not limited to cessation, fluctuation or variation in, or insufficiency of, water, gas or electricity sup-plies and telecommunications or any type of service;

13. loss or increased cost as a result of threat or hoax;

14. loss or damage caused by or arising out of burglary, house-breaking, looting, theft, larceny or any such attempt or any omission of any kind of any person (whether or not such act is committed in the course of a disturbance of public peace) in any action taken in respect of an act of terrorism;

15. loss or damage caused by mysterious disappearance or unexplained loss;

16. loss or damage directly or indirectly caused by mould, mildew, fungus, spores or other micro-organism of any type, nature or description, including but not limited to any substance whose presence poses an actual or poten-tial threat to human health;

17. total or partial cessation of work or the retardation or interruption or cessation of any process or operations or omissions of any kind.

LIMIT OF INDEMNITY

The limit of indemnity under this cover shall not exceed the Total Sum Insured given in the Policy Schedule or INR 10,000,000,000 whichever is lower. In respect of several insurance policies within the same compound/location with one or different insurers, the maximum aggregate loss payable per compound/location by any one or all insurers shall be INR 10,000,000,000. If the actual aggregate loss suffered at one compound/location is more than INR 10,000,000,000, the amounts payable under individual policies shall be reduced in proportion to the sum insured of the policies.

EXCESS

Shops & Residential Risks: 1 % of the claim amount for each and every claim subject to Minimum of INR 10,000 and Maximum of INR 500,000

Non Industrial Risks: 1 % of the claim amount for each and every claim subject to Minimum of INR 25,000 and Maximum of INR 1,000,000

Industrial Risks: 5 % of the claim amount for each and every claim subject to Minimum of INR 100,000 and Maximum of INR 25,000,000

CANCELLATION CLAUSE

Notwithstanding the cancellation provisions relating to the basic insurance policy on which this endorsement is issued, there shall be no refund of premium allowed for cancellation of the Terrorism risk insurance during the period of insurance except where such cancellation is done along with the cancellation of the basic insur-ance. Where a policy is cancelled and rewritten midterm purely for the purpose of coinciding with the accounting year of the insured, prorate refund of the can-celled policy premium will be allowed.
If the cancellation is for any other purpose, refund of premium will only be allowed after charging short term scale rates.
Note: The definitions, terms and conditions of main Policy save as modified or endorsed herein shall apply.

WARRANTIES

PILING WORKS
Notwithstanding anything contained herein to the contrary, it is a condition of this Policy that the Insurers shall not be liable to indemnify the Insured under Section 1 Material Damage in respect of:
(A) foundation piles and/or casings and/or sheet pile constructions which are:
(a) misplaced and/or misaligned;
(b) lost or damaged during driving and/or extraction;
(c) the subject of individual or block disconnection or declutching;
(B) the cost of repair, replacement, or rectification of piling work necessitated by Leakage or infiltration of fluids or material at seams, joints, connections and/or beneath sheet pile constructions or into casings, unless such leakage or infiltration is a direct consequence of other physical loss or damage for which indemnity is provided by this policy;
(C) any abandoned piling work, unless such abandonment is a direct consequence of other physical loss or damage for which indemnity is provided by this Policy;
(D) Piles which have failed to pass a load test or to reach the required bearing load, unless such failure is a direct consequence of other physical loss or damage for which indemnity is provided by this policy.

SECTION WARRANTY
In respect of road construction, the combine maximum length of excavation work, subgrade and subbase courses not covered by a waterproof wearing course shall not exceed any one of the following at any one time.
A road portion is deemed to be not completed until the asphalt or concrete course has been laid. It is understood that road shall include all types of roads including but not limited to motorways and highways.
a) Projects in J&K, Ladakh, Himachal, Bihar, UP, Uttarakhand and 8 north eastern states to have open section limit as maximum 12% of the project length at any given time with minimum distance of 400 meters between two sections
b) Project in other states to have open section limit as maximum 20% of the project length at any given time with minimum distance of 250 meters between two sections
c) 150 meters x 3 unconnected sections for internal & access roads of hydel power projects and any two unconnected sections separated by a distance of 50 meters from each other.

WORK TIME SCHEDULE
Notwithstanding anything contained herein to the contrary, it is a condition of this Policy that if any calendar date as contained in the Works Time Schedule varies in respect of any material part or unit of the works by more than the period stated below, such variation shall be regarded as a material change to which the obligations as set forth in General Conditions will apply.
Calendar date variation: 4 weeks

EXCLUSION OF CROPS (THIRD PARTY LIABILITY)
Notwithstanding anything contained herein to the contrary, it is hereby agreed that as of the inception date of this Policy, the following Exclusion is added to Section 2 Third Party Liability:
The Insurers will not indemnify the Insured in respect of any liability, directly or indirectly, due to or arising from loss or damage to forests, woods, crops, plants, cultures, flowers and fish farms.

SPECIAL CONDITIONS CONCERNING SAFETY MEASURES WITH RESPECT TO PRECIPITATION, FLOOD AND INUNDATION
It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall indemnify the Insured for loss, damage or liability caused directly or indirectly by precipitation only if adequate precautions have been taken in designing and executing the project involved. In this context, adequate precautions shall mean that allowance is made for precipitation, flood and inundation up to a return period of 20 years for the location insured and the entire policy period on the basis of statistics prepared by the Meteorological agencies.
Loss, damage or liability resulting from the Insured's not immediately removing obstruction (e.g. sand, trees) from watercourses, whether carrying water or not, in order to maintain free water flow shall not be indemnifiable.

RAIN WATER DAMAGE EXCLUSION WARRANTY
It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall NOT indemnify damage caused by hill erosion, gully erosion and rain cuts caused by flow of rain water.

Direct/consequential loss/damage/liability
No direct/consequential loss/damage/liability on the works completed before commencement of the policy shall be admissible.

WET RISK ENDORSEMENT (applicable for projects involving wet risks)
A. Exclusion The insurer shall not indemnify the insured in respect of costs incurred for:-
1. Loss or damage to berths, wharves, jetties and the likes caused by their subsidence or sinking
2. Normal action of the river/sea/ Water Channel and the like
3. Loss of or damage to more than 200 metre of uncompleted or unprotected seawell, quay or similar other marine structure
4. Loss, damage or liability due to soil erosion
5. Dredging or re-dredging
6. Lost or damaged fill material
7. Replacing or rectifying piles or retaining wall elements:
   which have become misplaced or misaligned or jammed during their construction
   which are lost or abandoned or damaged during driving or extraction, or
   which have become obstructed by jammed or damaged piling equipment or casings
8. Cost of Rectifying disconnected or de-clutched sheet piles
9. Cost of Rectifying any leakage or infiltration of material of any kind
10. Cost as a result of piles or foundation elements having failed to pass a load bearing test or otherwise not having reached their designed load bearing capacity
11. Cost for reinstating profiles or dimensions
12. any floating and other equipment such as caissons, barges and the like and liabilities therefrom
13. any mobilization/demobilization and /or other costs which arise for stand-by/waiting on weather of offshore and/or in water/on waterborne vessel construction equipment
14. loss or damages to pulling wires, anchors, chains and buoys
15. loss or damage due to impact of shipping
16. marine liability

B.Definition
Normal action of the sea /River means the state of the sea/River, which manifests itself up to No. 8 on the Beaufort scale(or comparable for River), or the state of the tides, current and wave action of the sea/River, which must be statistically expected to occur once during a 20 year period, whichever is the more onerous.
C . Warranties
It is agreed and understood that subject otherwise to the terms, exclusions and provisions contained in the policy or endorsed thereon, the insured shall:
- Receive weekly weather updates from the local meteorological office during the period of insurance and make continuous contact to the local meteorological office within 12 hours notice of an imminent storm.
- Make navigation distance for public traffic to work site at minimum 100m.
- In the event of Heavy Rains and/or Flood like situation the assured will keep in touch with local Public Authorities in respect of any imminent warning of discharge of water from any upstream Dam and or reservoir and would initiate suitable protective safety measures.

ENGG/END-111: ENDORSEMENT REGARDING SAFETY MEASURES -
It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall only indemnify the Insured for loss, damage or liability directly or indirectly caused by flood and inundation if adequate safety measures have been taken during planning and execution of the project.
Adequate safety measures in this context shall mean that the average monthly rainfall, flood and inundation hazard as known from statistics of the competent meteorological offices for the respective month and location has been taken into account.

ENGG/END-114: WARRANTY CONCERNING UNDERGROUND CABLES AND PIPES -
It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the insurers shall only indemnify the Insured in respect of loss of or damage to existing underground cables and/or pipes or other underground facilities if, prior to the commencement of works, the Insured has enquired with the relevant authorities about the exact position of such cables, pipes or other underground facilities.
The indemnity shall in any case be restricted to the repair costs of such cables, pipes or other underground facilities, any consequential damage being excluded from the cover.

ENGG/END-115: SPECIAL CONDITIONS FOR OPEN TRENCHES DURING LAYING OF PIPELINES DUCTS AND CABLES -
It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers will indemnify the Insured for any loss or damage due to storm, rainfall, flood, inundation such as sanding, silting up, mudding up, erosion, collapse and floating up of pipes, ducts or cables, sustained by completely or partly excavated open trenches and/or items laid therein, upto a maximum length of 3 km open trench only one loss event.
The Insured shall make sure that plugging facilities are available near the pipe ends for emergency purposes and that pipe ends exposed to flooding are plugged before any interruption during idle work periods such as nights and holidays.

WARRANTY CONCERNING CONSTRUCTION MATERIAL:
It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the insurers shall only indemnify the Insured for loss, damage or liability directly or indirectly caused to construction material by flood or inundation is such construction material does not exceed three days demand and the exceeding quantities are kept in areas not endangered by 25 years flood.

EPI 46 Ground Water Pumping
It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, Insurers will not indemnify the Insured in respect of:
(a) any loss or damage arising directly or indirectly from breakdown of any groundwater pumping system unless standby pumping facilities, equivalent to at least the capacity of the largest operating pump, are installed and ready for immediate use prior to the commencement of the pumping operations; and
(b) any costs or expenses incurred in respect of groundwater pumping operations.

Minimum Damage Area Warranty
Any loss or damage admissible in the policy consisting of Single/ Multiple patches, the policy shall indemnify only those individual Patches which are more than 100 sqm.

Road widening and augmentation works warranty
It is agreed and understood that
(a) For existing road, the coverage is restricted to the actual work done on the existing road as per the contract agreement.
(b) The Sections/ Chainages damaged previously & not reinstated shall not be covered till complete reinstatement subject to declaration of Insured confirming reinstatement.

Storage Warranty:
Notwithstanding the conditions, provisions and other endorsements of the Policy, it is agreed and understood that the company shall indemnify the Insured in respect of any loss or damage caused by Fire/Explosion only if the following requirements are fulfilled.
1. Watch and Ward facility shall be provided round the clock at the site.
2. Materials and equipments stored in buildings (sheds) or in open area shall be divided into sub-units with the value, which shall not exceed 10% of the sum insured or Rs. 50 Crores whichever is less. Wherever value of single equipment stored exceeds this limit, its value shall be taken as the limit. The sub-units in open area shall be separated from each other by a distance of atleast 15 m. In case of storage buildings, firewalls of 9" thickness carried upto roof shall be erected without any wall openings between the sub-units.
3. Packing materials, scaffolding etc. combustible materials and liquids and explosive substances should be stored at a 30 M safe distance from other buildings, plants and stores.
4. Utmost attention should be paid to good housekeeping such as -
i. Orderly storage;
ii. Periodic removal of combustible packing material, either by burning on site at a safe distance of 100 M away or removal from the site;
iii. Clean - up of site atleast once a week
5. Open flame work (welding, cutting etc.) requires utmost caution. All combustible materials lying about must be removed or covered.
6. Grass and/or any other vegetation in and around the site are regularly removed.
7. 'No smoking' rules must be enforced in areas exposed to fire (stores etc.) and in the vicinity of hazardous operations.
8. Living quarters should be well separated (100 M away) from construction site.

Attached to & forming part of policy no. 5003004424P112714552(SCE)/5003002124P112714555(MCE) w.e.f. 15.10.2024 to 14.4.2029

Add ons:

a) 50/50 clause
b) 72 hours clause
c) Free automatic reinstatement clause up to 10% of the Sum Insured.
d) Loss minimization expenses.
e) Debris removal up to Rs.1 Cr AOA/ Aggregate
f) Professional fees up to INR 5 CRS AOA/ Aggregate
g) Waiver of contribution clause.
h) Waiver of Subrogation Clause.
i) Extra charge cover
j) Air Fright cover
k) Pair or set clause
l) Expediting cost including Air freight and Express freight (Up to 30% of net claim amount)
m) Claim preparation Clause INR-5 Crs
n) Amendment in firefighting endorsement wordings
o) Fragile Items like glass, insulation, refractory, insulators, mineral wool mattress, fire bricks etc. (in boxes or loose as may be) - with Sum Insured up to ₹2 crores
p) Property belonging to or held in the care, custody or control of the insured up to a value of 5 crores
q) Additional Custom Duty upto Rs.10 crores
r) Off-site storage up to Rs. up to INR 25 CRS AOA/Aggregate
s) Inland transit up to a value of ₹10 crores to cover movement / transit between one part of site & other part of site including movement from / to off-site storage spanning over public road in between
t) Civil Engineering Works – To cover the risk of loss or damage to the property brought on to the Site of Erection for the performance of the contract, as follows:
    1. All permanent Civil Engineering Works such as buildings, foundations, earthwork including materials for the constructions thereon.
    2. All temporary civil works such as buildings, sheds.

u) Extended Maintenance period– 18 months
v) Escalation- 10% of SI
x) Third Party Liability including cross liabilities- Rs.10 crores (AOA:AOY)
y) Owner's surrounding party with FLEXA-10% of Sum insured
z) Earthquake, STFI and Terrorism as per Indian Terrorism pool

Warranties:

1. PILING WORKS

Notwithstanding anything contained herein to the contrary, it is a condition of this Policy that the Insurers shall not be liable to indemnify the Insured under Section 1 Material Damage in respect of:

(A) foundation piles and/or casings and/or sheet pile constructions which are:

(a) misplaced and/or misaligned;

(b) lost or damaged during driving and/or extraction;

(c) the subject of individual or block disconnection or declutching;

(B) the cost of repair, replacement, or rectification of piling work necessitated by Leakage or infiltration of fluids or material at seams, joints, connections and/or beneath sheet pile constructions or into casings, unless such leakage or infiltration is a direct consequence of other physical loss or damage for which indemnity is provided by this policy;

(C) any abandoned piling work, unless such abandonment is a direct consequence of other physical loss or damage for which indemnity is provided by this Policy;

(D) Piles which have failed to pass a load test or to reach the required bearing load, unless such failure is a direct consequence of other physical loss or damage for which indemnity is provided by this policy.

2. SECTION WARRANTY

In respect of road construction, the combine maximum length of excavation work, subgrade and subbase courses not covered by a waterproof wearing course shall not exceed any one of the following at any one time.

A road portion is deemed to be not completed until the asphalt or concrete course has been laid. It is understood that road shall include all types of roads including but not limited to motorways and highways.

a) Projects in J&K, Ladakh, Himachal, Bihar, UP, Uttarakhand and 8 north eastern states to have open section limit as maximum 12% of the project length at any given time with minimum distance of 400 meters between two sections

b) Project in other states to have open section limit as maximum 20% of the project length at any given time with minimum distance of 250 meters between two sections

c) 150 meters x 3 unconnected sections for internal & access roads of hydel power projects and any two unconnected sections separated by a distance of 50 meters from each other.

3. **WORK TIME SCHEDULE**

Notwithstanding anything contained herein to the contrary, it is a condition of this Policy that if any calendar date as contained in the Works Time Schedule varies in respect of any material part or unit of the works by more than the period stated below, such variation shall be regarded as a material change to which the obligations as set forth in General Conditions will apply. Calendar date variation: 4 weeks

4. EXCLUSION OF CROPS (THIRD PARTY LIABILITY)

Notwithstanding anything contained herein to the contrary, it is hereby agreed that as of the inception date of this Policy, the following Exclusion is added to Section 2 Third Party Liability:

The Insurers will not indemnify the Insured in respect of any liability, directly or indirectly, due to or arising from loss or damage to forests, woods, crops, plants, cultures, flowers and fish farms.

5. **SPECIAL CONDITIONS CONCERNING SAFETY MEASURES WITH RESPECT TO PRECIPITATION, FLOOD AND INUNDATION**

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall indemnify the Insured for loss, damage or liability caused directly or indirectly by precipitation only if adequate precautions have been taken in designing and executing the project involved.

In this context, adequate precautions shall mean that allowance is made for precipitation, flood and inundation up to a return period of 20 years for the location insured and the entire policy period on the basis of statistics prepared by the Meteorological agencies.

Loss, damage or liability resulting from the Insured's not immediately removing obstruction (e.g. sand, trees) from watercourses, whether carrying water or not, in order to maintain free water flow shall not be indemnifiable.

6. RAIN WATER DAMAGE EXCLUSION WARRANTY

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall NOT indemnify damage caused by rill erosion, gully erosion and rain cuts caused by flow of rain water.

7. No direct/consequential loss/damage/liability on the works completed before commencement of the policy shall be admissible.

8. WET RISK ENDORSEMENT (to be incorporated in policies involving wet risks)

A. Exclusion

The insurer shall not indemnify the insured in respect of costs incurred for:-

1. Loss or damage to berths, wharves, jetties and the likes caused by their subsidence or sinking

2. Normal action of the river/sea/ Water Channel and the like

3. Loss of or damage to more than 200 metre of uncompleted or unprotected seawell, quay or or similar other marine structure

4. Loss, damage or liability due to soil erosion

5. Dredging or re-dredging

6. Lost or damaged fill material

7. Replacing or rectifying piles or retaining wall elements:

¨ which have become misplaced or misaligned or jammed during their construction

¨ which are lost or abandoned or damaged during driving or extraction, or

¨ which have become obstructed by jammed or damaged piling equipment or casings

8. Cost Of Rectifying disconnected or de-clutched sheet piles

9. Cost Of Rectifying any leakage or infiltration of material of any kind

10. Cost as a result of piles or foundation elements having failed to pass a load bearing test or otherwise not having reached their designed load bearing capacity

11. Cost for reinstating profiles or dimensions

12. any floating and other equipment such as caissons, barges and the like and liabilities therefrom

13. any mobilization/demobilization and /or other costs which arise for stand-by/waiting on weather of offshore and/or in water/on waterborne vessel construction equipment

14. loss or damages to pulling wires, anchors, chains and buoys

15. loss or damage due to impact of shipping

16. marine liability

B. Definition

Normal action of the sea /River means the state of the sea/River, which manifests itself up to No. 8 on the Beaufort scale(or comparable for River), or the state of the tides, current and wave action of the sea/River, which must be statistically expected to occur once during a 20 year period, whichever is the more onerous.

C . Warranties

It is agreed and understood that subject otherwise to the terms, exclusions and provisions contained in the policy or endorsed thereon, the insured shall:

Receive weekly weather updates from the local meteorological office during the period of insurance and make continuous contact to the local meteorological office within 12 hours notice of an imminent storm.

Make navigation distance for public traffic to work site at minimum 100m.

In the event of Heavy Rains and/or Flood like situation the assured will keep in touch with local Public Authorities in respect of any imminent warning of discharge of water from any upstream Dam and or reservoir and would initiate suitable protective safety measures.

9. ABANDONMENT OF SHAFTS -

It is hereby agreed and declared that, notwithstanding anything contained in the contrary, this endorsement excludes any loss or damage resulting as a consequence of shaft being abandoned due to any reason whatsoever.

10. ENGG/END-111: ENDORSEMENT REGARDING SAFETY MEASURES -

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers shall only indemnify the Insured for loss, damage or liability directly or indirectly caused by flood and inundation if adequate safety measures have been taken during planning and execution of the project.

Adequate safety measures in this context shall mean that the average monthly rainfall, flood and inundation hazard as known from statistics of the competent meteorological offices for the respective month and location has been taken into account.

11. **ENGG/END-114: WARRANTY CONCERNING UNDERGROUND CABLES AND PIPES**

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the insurers shall only indemnify the Insured in respect of

loss of or damage to existing underground cables and/or pipes or other underground facilities if, prior to the commencement of works, the Insured has enquired with the relevant authorities about the exact position of such cables, pipes or other underground facilities.

The indemnity shall in any case be restricted to the repair costs of such cables, pipes or other underground facilities, any consequential damage being excluded from the cover.

12. ENGG/END-115: SPECIAL CONDITIONS FOR OPEN TRENCHES DURING LAYING OF PIPELINES DUCTS AND CABLES -

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the Insurers will indemnify the Insured for any loss or damage due to storm, rainfall, flood, inundation such as sanding, silting up, mudding up, erosion, collapse and floating up of pipes, ducts or cables, sustained by completely or partly excavated open trenches and/or items laid therein, upto a maximum length of **3 kM** open trench only one loss event.

The Insured shall make sure that plugging facilities are available near the pipe ends for emergency purposes and that pipe ends exposed to flooding are plugged before any interruption during idle work periods such as nights and holidays.

13. **Storage Warranty:**

Notwithstanding the conditions, provisions and other endorsements of the Policy, it is agreed and understood that the company shall indemnify the Insured in respect of any loss or damage caused by Fire/Explosion only if the following requirements are fulfilled.

1. Watch and Ward facility shall be provided round the clock at the site.

2. Materials and equipments stored in buildings (sheds) or in open area shall be divided into sub-units with the value, which shall not exceed 10% of the sum insured or Rs. 50 Crores whichever is less. Wherever value of single equipment stored exceeds this limit, its value shall be taken as the limit. The sub-units in open area shall be separated from each other by a distance of atleast 15 m. In case of storage buildings, firewalls of 9" thickness carried upto roof shall be erected without any wall openings between the sub-units.

3. Packing materials, scaffolding etc. combustible materials and liquids and explosive substances should be stored at a 30 M safe distance from other buildings, plants and stores.

4. Utmost attention should be paid to good housekeeping such as -

i. Orderly storage;

ii. Periodic removal of combustible packing material, either by burning on site at a safe distance of 100 M away or removal from the site;

iii. Clean - up of site atleast once a week

5. Open flame work (welding, cutting etc.) requires utmost caution. All combustible materials lying about must be removed or covered.

6. Grass and/or any other vegetation in and around the site are regularly removed.

7. 'No smoking' rules must be enforced in areas exposed to fire (stores etc.) and in the vicinity of hazardous operations.

8. Living quarters should be well separated (100 M away) from construction site.

14. **WARRANTY CONCERNING CONSTRUCTION MATERIAL:**

It is agreed and understood that otherwise subject to the terms, exclusions, provisions and conditions contained in the policy or endorsed thereon, the insurers shall only indemnify the Insured for loss, damage or liability directly or indirectly caused to construction material by flood or inundation is such construction material does not exceed three days demand and the exceeding quantities are kept in areas not endangered by 25 years flood.

15. EPI 46 Ground Water Pumping

It is agreed that in Section 1, Material Damage the following is added to Exclusions to Section 1:

Insurers will not indemnify the Insured in respect of:

(a) any loss or damage arising directly or indirectly from breakdown of any groundwater pumping system unless standby pumping facilities, equivalent to at least the capacity of the largest operating pump, are installed and ready for immediate use prior to the commencement of the pumping operations; and

(b) any costs or expenses incurred in respect of groundwater pumping operations.

16. Minimum Damage area Warranty

Any loss or damage admissible in the policy consisting of Single/ Multiple patches, the policy shall indemnify only those individual Patches which are more than 100 Sqmt.

17. For Road widening and augmentation works ,additional conditions to be imposed in the policy are as given below.

a) For existing road, the coverage is restricted to the actual work done on the existing road as per the contract agreement.

b) The Sections/ Chainages damaged previously & not reinstated shall not be covered till complete reinstatement subject to declaration of Insured confirming reinstatement.

Kindly note that Complete contract value should be taken for policy SI.

If the insured wants to exclude GST from SI, please note that No GST(on parts/materials/labour) will payable to the insured in the event of a claim & the same to be specified in the conditions.

Also kindly make sure a declaration regarding the same is obtained from the insured.

18. Slope Protection Warranty

It is agreed and understood that otherwise subject to the terms, exclusions provisions and conditions contained in the Policy or endorsed thereon, the Insurers shall only indemnify the Insured for loss and/or damage resulting therefrom the slope failure provided that adequate and approved safety measures have been taken in designing and executing the slope protection. For the purposes of this Endorsement, adequate and approved safety measures shall mean that, at all times throughout the policy period, allowance is made for

a. erosion protection to the slope surface caused by precipitation and/or flood and/or inundation,
b. measures which become necessary to improve or stabilize ground conditions or to seal against water ingress/egress,
c. filling voids or for replacing lost bentonite/soil,
d. for reinstating profiles or dimensions of the slope surface (e.g. refilling cavities, profiling slope gradient & etc) to improve or stabilize ground conditions &
e. Immediately removing obstructions (e.g. sand, rocks, trees & etc) from watercourses within the construction site.

The insurers will not indemnify the Insured for

a. loss or damage which is foreseeable having regard to the nature of the construction work or the manner of its execution,
b. loss or damage caused by subsidence if caused by insufficient compacting, and
c. the costs of loss prevention or minimization measures which become necessary during the period of insurance

19. ABANDONMENT OF SHAFTS

It is hereby agreed and declared that, notwithstanding anything contained in the contrary, this endorsement excludes any loss or damage resulting as a consequence of shaft being abandoned due to any reason whatsoever.

20. CARGO WARRANTIES

Over Dimensional cargo Definition:

1) Any Cargo which including packing has dimensions in excess of 12 Meters length and/or 2.5 Meters wide and/or 2.5 Meters high [or US equivalent] and therefore does not fit inside a standard 40 foot container or equivalent road trailer.
2) Any Cargo including packing with a weight in excess of 30 Metric Tonnes.

Over Dimensional cargo is covered subject to the below given warranties:

1.Road safety (Route) survey to be done in cases of ODC.
2. ODC is carried in multi-axle low bed trailer which should be adequately lashed/strapped before commencement of inland transit. Such consignments should be loaded /stowed/ fastened / lashed or barged (if any)and secured & unloaded on to and from inland conveyance & the entire operation of logistics including deck stowing should be carried out under supervision of an approved surveyor and all recommendations of surveyor complied with.
All statutory requirements to be complied with regarding movement of ODC cargo.
3. Capacity of carrying vehicle should be more than the weight of the consignment.
4. Carrying vehicle should be suitable to carry the cargo.
5.Advance intimation regarding transit of ODC consignments should be given to insurance company.

Deductibles :

For Storage / Erection and Testing Cover :

For Boilers, TG Set and Power Transformer

Normal Period - 5% of claim amount subject to minimum of Rs. 15 Lakhs

Testing Period - 5% of claim amount subject to minimum of Rs. 60 Lakhs.

For Other Equipments :

Normal Period - 5% of claim amount subject to minimum of Rs. 2.25 Lakhs

Testing Period - 5% of claim amount subject to minimum of Rs. 6 Lakhs

Excess for AOG Claims : 10% of claim amount subject to minimum of testing period excess with an maximum limit of Rs. 5 Crores.

NTPC Limited

(A Government of India Enterprise)

SINGRAULI SUPER THERMAL POWER PROJECT
STAGE - III (2x800MW)

PART - D

ERECTION CONDITIONS OF CONTRACT

SECTION – VI

TECHNICAL SPECIFICATION

FOR

EPC PACKAGE

BIDDING DOCUMENT NO.: CS-1150-001R-2

1.00.00 GENERAL

1.01.00 The following provisions shall supplement the conditions already contained in the other parts of these specifications and documents and shall govern that portion of the work of this contract which is to be performed at site. The erection requirements and procedures not specified in these documents shall be in accordance with the recommendations of the equipment manufacturer, or as mutually agreed to between the Employer and the Contractor prior to commencement of erection work.

1.02.00 The Contractor upon signing of the Contract shall, in addition to a Project Co-ordinator, nominate another responsible officer as his representative at Site suitably designated for the purpose of overall responsibility and co-ordination of the Works to be performed at Site. Such a person shall function from the Site office of the Contractor during the pendency of Contract.

2.00.00 REGULATION OF LOCAL AUTHORITIES AND STATUTES

2.01.00 In addition to the local laws and regulations, the Contractor shall also comply with the Minimum Wages Act and the Payment of Wages Act (both of the Government of India) and the rules made there under in respect of its labour and the labour of its sub-contractors currently employed on or connected with the contract.

2.02.00 All registration and statutory inspection fees, if any, in respect of his work pursuant to this Contract shall be to the account of the Contractor. However, any registration, statutory inspection fees lawfully pay-able under the provisions of the Indian Boiler Regula-tions and any other statutory laws and its amendments from time to time during erection in respect of the plant equipment ultimately to be owned by the Employer, shall be to the account of the Employer. Should any such inspection or registration need to be re-arranged due to the fault of the Contractor or his Sub-Contractor, the additional fees for such inspection and/or registration shall be borne by the Contractor.

3.00.00 WELDING OF PRESSURE PARTS AND HIGH PRESSURE PIPING

The welding of all pressure parts and high pressure piping shall be in accordance with the following requirements:

3.01.00 Qualification of Weld Procedures

Only qualified welding procedures as per ASME Section IX shall be used by contractor at site. Procedure qualification records along with WPS shall be submitted to NTPC for review. Welding procedure shall indicate all essential and non-essential parameters as per ASME Section IX. Makes of welding consumables shall be subject to employer's approval.

3.02.00 Welder's Qualification

Only welders who are qualified in accordance with the latest applicable requirements of the Indian Boiler Regulations, shall be permitted to perform any welding work on the pressure parts and its attachment welding. In addition to such statutory qualification requirements, the welders shall also undergo a satisfactory pre-production qualification test to be conducted by the Contractor at site as per ASME Sec IX in presence of employer's representative(s), prior to performing work under these specifications. The services of an independent testing laboratory shall be retained by the Contractor to perform welder qualification tests for welders.

All the welders carrying out welding at site shall carry an identification badge, which shall indicate the category and the grade of welding for which they have been tested

and authorised to carry out welding.

3.03.00 **Records**

Welders performance shall be monitored regularly and record of their performance shall be maintained by contractor in a manner acceptable to the employer. Contractor shall maintain such records including record of procedure qualification & welder qualification and hand-over to the employer at the end of work.

3.04.00 **MARKING**

On completion of each welded joint, the welder shall mark his regularly assigned identification mark near the joint. The welder's identification numbers, inspection stamps or code symbol stamps and any other information shall not be directly stamped on any alloy steel piping. In alloy steel piping, all such information shall be stamped on separate marking plate which shall be tack welded on pipe near the weld.

3.05.00 Welding Equipment for high pressure (Boiler, PCP) -

For GTAW process: HF Welding machines to be used.

For SMAW process: Inverter based welding machine are to be used.

Main contractor to ensure the availability of sufficient numbers of welding equipment during the each phase of project construction so as not to impede the progress of the project

4.00.00 HEAT TREATMENT

4.01.00 Heat Treatment -Pre-heating, post-heating and post-weld heat treatment operations of all welds, shall be performed in accordance with the requirements of applicable code and WPS. Local post weld heat treatments shall be adopted only in cases where it is normally impracticable to subject the entire assembly as such for stress relieving operations. Heating may be by means of electric induction coils or electric resistance coils as acceptable to employer. Oxyacetylene flame heating or exothermic chemical heating methods will not be permitted. Complete recording of the temperatures through out the stress relieving cycle of the material and the weld subjected to heat treatment shall be made by means of chartless recorder / IIOT sensors duly password protected with a connectivity to remote server /Cloud. All hardware and software required to meet above intent shall be in the scope of bidder.

4.02.00 After setting up the weld joint for heat treatment operation, the Employer's signature shall be obtained on the strips chart of the recorder prior to starting of heat treatment cycle. The right hand corner of the strip chart at the starting point of the heat treatment cycle shall contain details like the weld number, material, diameter and thickness, method of heating adopted, prescribed ranges of heat treatment temperatures, date of heat treatment, reference to item number of the Field welding Schedule (as specified at clause no 7.00.00- of this chapter) etc.

4.03.00 Heat Treatment - weld number, material, diameter and thickness, method of heating adopted, prescribed ranges of heat treatment temperatures, date of heat treatment, reference to item number of the Field welding. Schedule shall be mentioned on data for identification.

5.00.00 WELD EDGE PREPARATION

Preparation at site of weld joint shall be in accordance with details acceptable to the Employer. Wherever possible, machining or automatic flame cutting shall be used for edge preparation. Hand flame cutting will be permitted only where edge preparation otherwise is impractical. All slag shall be removed from cuts and all the hand cuts shall be ground smooth to the satisfaction of the Employer. Flame cutting of alloy steel pipe shall be avoided. Wherever such cutting is done, a 200mm length at the cut face shall be removed by machining. Pneumatic hand tools such as edge preparation, tube cutting machine can be used.

6.00.00 CLEANING AND SERVICING

6.01.00 The inside of all tubes, pipes, valves and fittings shall be free from dirt, and loose scales before being erected. All the pipelines shall be thoroughly blown and/or flushed. Each steam and water tubes shall be blown with compressed air and shall be subjected to 'ball test' before erection to ensure that no obstructions exist. A system for recording of all such operations shall be developed and maintained in a manner to ensure that no obstructions are left inside the tubes and no tubes are left uncleaned and untested.

6.02.00 All valves and valve actuators, and dampers and damper actuators, if any, shall be thoroughly cleaned and serviced prior to pre-commissioning tests and/or Initial Operations of the plant. A system for recording of such servicing operation shall be developed and maintained in a manner acceptable to the Employer and to ensure that no valves or dampers including their actuators are left unserviced.

6.03.00 All interior surfaces of the turbine shall be thoroughly cleaned prior to boxing - up to remove all traces of oil preservations.

7.00.00 FIELD WELDING SCHEDULE

The Contractor shall submit to the Employer, a certified and complete field welding schedule for all the field welding activities to be carried out in respect of the pressure parts involved in the equipment furnished and erected by him, at least 90 days prior to the scheduled start of erection work at site. Such schedule will be strictly followed by the Contractor during the process of erection. The above field-welding schedule to be issued by the Contractor shall contain the following:

(a.) Drawing No (s)

(b.) Location of the weld

(c.) Size of the weld (outside diameter and thickness)

(d.) Type of joints

(e.) Material specifications

(f.) Size of fillet on backing ring, when the type of joint is with backing ring

(g.) Electrode/ filler metal specifications

(h.) Number of welds per unit

(i.) Quantity of filler metal per weld

(j.) Indication of required Non-destructive Examination (NDE) for each weld

(k.) Pre-heat temperatures for welding

(l.) Process of welding

(m.) Post-welding heat treatment temperature ranges, duration, under as specified at clause no 4.00.00 of this chapter entitled "Heat Treatment".

(n.) Qualification details of weld procedures to be adopted as specified at clause no 3.01.00 of this chapter entitled 'Qualification of Weld Procedures'.

8.00.00 SITE RUN MISCELLANEOUS PIPING

Sketches or diagrams of the proposed routings of all piping, not already indicated and routed on the shop drawings which were reviewed by the Employer, shall be submitted to the Employer for review, Employer's acceptance of such site routings shall be obtained before the piping is erected. All these site run piping shall be installed in such a manner as to present an orderly and neat installation. They shall be located as to avoid obstruction of access and passages. Valves, instruments or any other special items shall be located convenient for operation by the operating personnel. Pipe runs shall be plumb or level except where pitch for drainage is required. Pipe runs that are not parallel to the building structure, walls or column rows shall be avoided so that deflection of pipes between hangers does not exceed 6 mm. No miscellaneous pipe shall be routed and installed above or adjacent to electrical equipment.

9.00.00 THERMAL EXPANSIONS

All piping installation shall be such that no excessive or destructive expansion forces exist either in the cold condition or under condition of maximum temperature. All bends, expansion joints and any other special fittings, necessary to provide proper expansion, shall be incorporated. During installation of expansion joints and anchors, care must be taken to make sure that full design movement is available at all times for maximum to minimum temperature and vice-versa.

10.00.00 PIPING SUPPORTS

10.01.00 Hangers, supports and anchors shall be installed as required to obtain a safe, reliable and complete pipe installation. All supports shall be properly levelled and anchored when installed. The anchors shall be so placed that thermal expansion will be absorbed by bends without subjecting the valves or equipment to excessive strains.

10.02.00 The hanger assemblies shall not be used for the attachment of rigging to hoist the pipe into place. Other means shall be used to securely hold the pipe in place till the pipe support is completely assembled and attached to the pipe and building structures and spring support is set to accommodate the pipe way. All temporary rigging shall be removed in such a way that the pipe support is not subjected to any sudden load. All piping, having variable spring type supports, shall be held securely in place by temporary means during the hydraulic test of pipe system. Constant support type spring hangers used during hydraulic test shall be pinned or blocked solid during the test. After complete installation and insulation of the piping and filling of the piping with its normal operating medium, the pipe support springs shall be adjusted to the cold positions. If necessary, the spring support shall be re-adjusted to the hot positions after the line has been placed for service at its normal maximum operating temperature conditions. Electric arc welding only shall be used to weld all pipe supports to structural steel members that form part of the building supporting structure. The structural beams shall not be heated more than necessary during welding of supports and such welds shall run parallel to the axis of the span. All lugs or any other attachments welded to the piping shall be of the same material as the pipe.

11.00.00 PRESSURE TESTING

11.01.00 On completion of erection of pressure parts, a hydraulic test in accordance with the requirements of the Indian Boiler Regulations shall be performed by the Contractor.

11.02.00 All the valves, high pressure pipes and inter-connected pipes connecting the pressure parts shall be tested along with pressure parts. All blank flanges or any removable plugs required for openings not closed by the valves, and piping provided, shall be furnished by the Contractor. The pressurization equipment including water piping from the supply, needed for the above test shall also be furnished by the Contractor. Any defects noticed during the testing are to be rectified and the unit re-tested. If any welding is done on the pressure parts after the Hydraulic test, the Hydraulic test for that portion of pressure parts shall be repeated.

11.03.00 Thy hydraulic test shall be considered successful only on certification to that effect

by the concerned inspecting Authority as per the provisions of the Indian Boiler Regulations and the Employer.

12.00.00 THERMOWELLS AND FLOW NOZZLES

12.01.00 All the thermowells and flow nozzles in the equipment furnished under the technical specifications shall be installed as a part of this work.

12.02.00 All thermowell connections incorporated in the steam service shall be plugged during the pressure testing and the blow out of steam piping systems. Upon completion of the blow out operation, all thermowells shall be installed and seam welded. Similarly, all flow nozzles in the steam lines shall also be installed only on completion of steam blowing operations unless otherwise agreed to by the Employer, depending upon the sequence of cleaning and purging operations to be adopted by the Contractor at the field.

13.00.00 INSULATION, LAGGING AND CLADDING

The provision of insulation, lagging and cladding of the various equipments and portion of the equipment covered under the Contract, shall be furnished by the Contractor as specified elsewhere or agree to separately in writing. Welds required for holding insulation on pressure parts shall be carried out by IBR qualified welder.

13.01.00 **Piping, Pipe Fittings & Valves**

All piping insulation and metal cladding furnished with the equipment to be erected shall be applied as specified herein.

13.01.01 **Piping**

The insulation on piping shall be applied using wire loops on 150mm centres. These wire loops shall be thoroughly embedded into the outer insulation surface and all cracks, voids and depressions shall be filled with insulating cement suitable for the piping temperature so as to form a smooth base for application of cladding. The wires used for piping insulation shall be of 16 SWG. The surface shall be smooth and uniform before applying the outer covering. All piping insulation ends shall be terminated at a sufficient distance from flanges to facilitate removal of bolts.

13.01.02 **Flanges**

Insulation on flanges shall be by means of blocks of insulating material securely bound to the flange by wire loops. Such blocks of insulation shall be long enough to

overlap the adjacent pipe insulation by an amount equal to the thickness of adjacent pipe insulation. Smooth finish shall be obtained by the application of insulating cement. Alternatively, sectional pipe insulation of proper diameter may be used. Insulation on flanges shall not be done until the pipe and equipment have been in service during the initial operation and till all the flange bolts have been retightened.

13.01.03 **Bends and Elbows**

Insulation on bends and elbows shall be cut into sections sufficiently short to form a reasonable smooth external surface. After the application of insulation material in place, it shall be smoothly coated with insulating cement. Elbows may be insulated as above or alternatively by means of specially moulded insulation enclosures.

13.01.04 **Cladding**

Cladding shall be of aluminium sheet of thickness as per details given in detail Technical Specification or will be provided during detail engineering shall be machine rolled and formed to accurately fit insulation curvatures. Cladding shall be secured using self-tapping screws. Screws shall be adequate number and so located as to produce tight joints. The spacing of screws shall be as far as possible uniform and on centres not exceeding 150 mm. For outside diameters less than 230 mm, spacing of screws shall be on centres not exceeding 100 mm. adequate number of screws shall be provided for fixing the cladding and be so placed in such locations, as to produce a smooth cladding finish without bellying'. Insulated elbows having insulated diameters less than 330 mm shall be provided with preformed smooth aluminium elbow jackets. Wherever possible, all joints should be lapped a minimum of 50 mm with joints facing downwards and so placed that they are obscured from normal points of vision. All the joints in the cladding shall be made with suitable provisions for expansions. All butt joints such as those at piping tees shall be made using rolled seams. In addition, to prevent galvanic corrosion, suitable action, as specified at clause no 13.02.00 of this chapter, shall be taken.

13.01.05 **Valves and Fittings**

All valves and fittings (above valve size of 2 inches) installed in the pipelines shall also be applied with insulation and furnished with suitably shaped boxes so as to facilitate easy dismantling of the fittings. The insulation thickness for valves, valve fittings etc., shall be same as that used on the line on which they are installed. All voids shall be properly filled up with insulating material and as per the directions of the Employer.

13.02.00 **Protection of Equipment during Insulation Applications**

All equipment and structures shall be suitably protected from damage while applying insulation after completion of insulation. All equipment and structures shall be thoroughly cleaned and remove insulating materials which might have fallen on them.

14.00.00 CODE REQUIREMENTS

The erection requirements and procedures to be followed during the installation of the equipment shall be in accordance with the relevant Indian Electricity Rules & Codes, Indian Boiler Regulations, ASME codes and accepted good practices, the Employer's Drawings and other applicable Indian recognised codes and laws and regulations of the Government of India.

15.00.00 ELECTRICAL SAFETY REGULATIONS

15.01.00 In no circumstances will the Contractor interfere with fuses and electrical equipment belonging to the other Contractor or Employer.

15.02.00 Before the Contractor connects any electrical appliances to any plug or socket belonging to the other Contractor or Employer, he shall:

(a) Satisfy the Employer that the appliance is in good working condition.

(b) Inform the Employer of the maximum current rating,voltage and phase of the appliances.

(c) Obtain permission of the Employer detailing the socket to which the appliances may be connected.

The Employer will not grant permission to connect unitl he is satisfied that

(d) The appliance is in good condition and is fitted with suitable plug

(e) The appliance is fitted with a suitable cable having two earth conductors,one of which shall be an earthened metal sheath surrounding the cores.

15.03.00 No electric cable in use by the other Contractor/Employer will be disturbed without permission.No weight of any description willl be imposed on any such cable and ladder or similar equipment will rest against or to be attached with it.

15.04.00 No reapir work shall be carried out on any live equipment.The equipment must be declared safe by the Employer and a permit to work issued before any work is carried out.

15.05.00 The Contractor shall employ the necessary number of qualified,full time electricians to maintain his temporary electrical installation..

16.00.00 REMOVAL OF MATERIAL

No material brought to the Site shall be removed from the Site by the Contractor and/or his Sub-Contractors without the prior written approval of the Employer.

17.00.00 INSPECTION, TESTING AND INSPECTION CERTIFICATES

The provisions of the clause entitled Inspection, Testing and Inspection Certificates given in Part - C of the Technical Specification, shall also be applicable to the erection portion of the Works. The Employer shall have the right to re-inspect any equipment though previously inspected and approved by him at the Contractor's works, before and after the same are erected at Site. If by the above inspection, the Employer rejects any equipment, the Contractor shall make good for such rejections either by replacement or modification/ repairs as may be necessary to the satisfaction of the Employer. Such replacements will also include the replacements or re-execution of such of those works of other Contractors and/or agencies, which might have got damaged or affected by the replacements or re-work done to the Contractor's work.

18.00.00 ACCESS TO SITE AND WORKS ON SITE

18.01.00 Suitable access to site and permission to work at the Site shall be accorded to the Contractor by the Employer in reasonable time.

18.02.00 In the execution of the Works, no person other than the Contractor or his duly appointed representative, Sub-Contractor and workmen, shall be allowed to do work

on the Site, except by the special permission, in writing by the Employer or his representative.

19.00.00 CONTRACTOR'S SITE OFFICE ESTABLISHMENT

The Contractor shall establish a Office at the Site and keep posted an authorised representative for the purpose of the Contract. Any written order or instruction of the Employer or his duly authorised representative, shall be communicated to the said authorised resident representative of the Contractor and the same shall be deemed to have been communicated to the Contractor at his legal address.

20.00.00 CO-OPERATION WITH OTHER CONTRACTORS

20.01.00 Contractor, who may be performing other works on behalf of the Employer and the workmen who may be employed by the Employer and doing work in the vicinity of the works under the Contract. The Contractor shall also arrange to perform his work as to minimise, to the maximum extent possible, interference with the work of other Contracts and their workmen. Any injury or damage that may be sustained by the employees of the other Contractors and the Employer, due to the Contractor's work shall promptly be made good at his own expense. The Employer shall determine the resolution of any difference or conflict that may arise between the Contractor and other Contractors or between the Contractor and the workmen of the Employer in regard to their work. If the work of the Contractor is delayed because of the any acts of omission of another Contractor, the same shall be dealt in accordance with GCC.

Employer shall have full access to visit the contractor's site at any time for inspection and surveillance checks.

20.02.00 The Employer shall be notified promptly by the Contractor of any defects in the other Contractor's works that could affect the Contractor's Works. The Employer shall determine the corrective measures if any, required to rectify this situation after inspection of the works and such decisions by the Employer shall be binding on the Contractor.

21.00.00 DISCIPLINE OF WORKMEN

The Contractor shall adhere to the disciplinary procedure set by the Employer in respect of his employees and workmen at Site. The Employer shall be at liberty to object to the presence of any representative or employee of the Contractor at the Site, if in the opinion of the Employer such employee has mis-conducted himself or is incompetent, negligent or otherwise unde-sirable then the Contractor shall remove such a person objected to and provide in his place a competent replacement.

22.00.00 **CONTRACTOR'S FIELD OPERATION**

22.01.00 The Contractor shall keep the Employer informed in advance regarding his field activity plans and schedules for carrying out each part of the works. Any review of such plan or schedule or method of work by the Employer shall not relieve the Contractor of any of his responsibilities towards the field activities. Such reviews shall also not be considered as an assumption of any risk or liability by the Employer or any of his representatives and no claim of the Contractor will be entertained because of the failure or inefficiency of any such plan or schedule or method of work reviewed. The Contractor shall be solely responsible for the safety, adequacy and efficiency of plant and equipment and his erection methods.

22.02.00	The Contractor shall have the complete responsibility for the conditions of the Work-Site including the safety of all persons employed by him or his Sub-Contractor and all the properties under his custody during the performance of the work. This requirement shall apply continuously till the completion of the Contract and shall not be limited to normal working hours. The construction review by the Employer is not intended to include review of Contractor's safety measures in, on or near the Work-Site, and their adequacy or otherwise.
23.00.00	**PHOTOGRAPHS AND PROGRESS REPORT**
23.01.00	The Contractor shall furnish three (3) prints each to the Employer of progress photographs of the work done at Site. Photographs shall be taken as and when indicated by the Employer or his representative. Photographs shall be adequate in size and number to indicate various stages of erection. Each photograph shall contain the date, the name of the Contractor and the title of the photograph.
23.02.00	The above photographs shall accompany the monthly progress report detailing out the progress achieved on all erection activities as compared to the schedules. The report shall also indicate the reasons for the variance between the scheduled and actual progress and the action proposed for corrective measures, wherever necessary.
23.03.00	Project Management System to be implemented as defined in Annexure-A to sub section IIC (Project Management) of technical specifications Section VI, Part A.
24.00.00	**MAN-POWER REPORT**
24.01.00	The Contractor shall submit to the Employer, on the first day of every month, a man hour schedule for the month, detailing the man hours scheduled for the month, skill-wise and area-wise.
24.02.00	The Contractor shall also submit to the Employer on the first day of every month, a man power report of the previous month detailing the number of persons scheduled to have been employed and actually employed, skill- wise and the areas of employment of such labour.
25.00.00	**PROTECTION OF WORK**
	The Contractor shall have total responsibility for protecting his works till it is finally taken over by the Employer. No claim will be entertained by the Employer or the representative of the Employer for any damage or loss to the Contractor's works and the Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings. Should any such damage to the Contractor's Works occur because of other party not being under his supervision or control, the Contractor shall make his claim directly with the party concerned. If disagreement or conflict or dispute develops between the Contractor and the other party or parties concerned regarding the responsibility for damage to the Contractor's Works the same shall be resolved as per the provisions of the as specified at clause no 20.00.00- of this chapter entitled "Co-operation with other Contractors." The Contractor shall not cause any delay in the repair of such damaged Works because of any delay in the resolution of such disputes. The Contractor shall proceed to repair the Work immediately and no cause thereof will be assigned pending resolution of such disputes.
26.00.00	**EMPLOYMENT OF LABOUR**

26.01.00	In addition to all local laws and regulations pertaining to the employment of labour to be complied with by the Contractor pursuant to GCC, the Contractor will be expected to employ on the work its employees with relevant skills and experience of the particular work. No female labour shall be employed after darkness. No person below the age of eighteen years shall be deployed. The deployment shall be in compliance of all the applicable labour laws.
26.02.00	All travelling expenses including provisions of all necessary transport to and from Site, lodging allow-ances and other payments to the Contractor's employees shall be the sole responsibility of the Contractor.
26.03.00	The hours of work on the Site shall be decided by the Principal Employer and the Contractor shall adhere to it. Working hours will normally be eight (8) hours per day - Monday through Saturday.
26.04.00	Contractor's employees shall wear identification badges while on work at Site.
26.05.00	In case the Principal Employer becomes liable to pay any wages or dues to the labour or any Government agency under any of the provisions of the Minimum Wages Act, Workmen Compensation Act, Contact Labour Regulation Abolition Act or any other law due to act of omission of the Contractor, the Principal Employer may make such payments and shall recover the same from the Contractor's Bills.
27.00.00	**FACILITIES TO BE PROVIDED BY THE EMPLOYER**
27.01.00	**Communication** The Employer will extend the telephone facilities, if available at Site, for purposes of Contract. The Contractor shall be charged at actuals for such facili-ties.
27.02.00	**Railway Siding** Railway siding shall be provided by owner (up to plant entry point) for coal transportation to site. However the same may not be available to the bidder for material/supplies transport etc. Bidder has to plan its own arrangement for movement of ODC consignment to plant site. Further, irrespective of readiness of railway siding, owner reserves the option of coal supply in stackyard before the synchronization of first unit for which bidder has to ensure readiness of coal supply system up to mill bunker.
28.00.00	**FACILITIES TO BE PROVIDED BY THE CONTRACTOR**
28.01.00	**Contractor's site office Establishment** The Contractor shall establish a site office at the site and keep posted an authorized representative for the purpose of the contract, pursuant to GCC. The site office will include one conference meeting room (250-300 Sq Ft) for site meetings between the Contractor and the Employer. The contractor shall also provide four (4) furnished office rooms (150-250 SqFt) for use by the Employer to facilitate effective co-ordination during the tenancy of the contract.
28.02.00	**Tools, tackles and scaffoldings** The Contractor shall provide all the construction equipments, tools, tackles and scaffoldings required for pre-assembly, installation, testing, commissioning and conducting Guarantee tests of the equipments covered under the Contract. He shall submit a list of all such materials to the Employer before the commencement of pre-assembly at Site. These tools and tackles shall not be removed from the Site without

the written permission of the Employer. The Contractor shall arrange Dozer, Hydra, Cranes, Trailer, etc. for the purpose of fabrication, erection and commissioning.

28.03.00 **Testing Equipment and Facilities:**

The contractor shall provide the necessary testing, equipment and facilities.

28.04.00 **Site laboratory for civil works:**

Contractor shall provide and maintain a site laboratory for the testing of construction material under the direction and general supervision of employer.

28.05.00 **First-aid**

28.05.01 The Contractor shall provide necessary first-aid facilities for all his employees, representatives and workmen working at the Site. Enough number of Contractor's personnel shall be trained in administering first-aid.

28.05.02 As per NTPC Safety rules, ambulance is to be provided by the contractor, however, in case of any emergency, employer may provide the services of an ambulance for transportation to the nearest hospital.

28.06.00 **Cleanliness**

28.06.01 The Contractor shall be responsible for keeping the entire area allotted to him clean and free from rubbish, debris etc. during the period of Contract. The Contractor shall employ enough number of special personnel to thoroughly clean his work-area at least once in a day. All such rubbish and scrap material shall be stacked or disposed in a place to be identified by the Employer. Materials and stores shall be so arranged to permit easy cleaning of the area. In areas where equipment might drip oil and cause damage to the floor surface, a suitable protective cover of a flame resistant, oil proof sheet shall be provided to protect the floor from such damage.

28.06.02 Similarly the labour colony, the offices and the residential areas of the Contractor's employees and workmen shall be kept clean and neat to the entire satisfaction of the Employer. Proper sanitary arrangements shall be provided by the Contractor, in the work-areas, office and residential areas of the Contractor.

28.07.00 **Not used**

28.08.00 **Electricity**

Refer to construction power, as envisaged in Sub Section-II-B, Part A, Sec VI of Technical specification.

28.09.00 **Water**

Contractor shall make all arrangements himself for the supply of construction water as well as potable water for labour and other personnel at the worksite/colony. However, drawal of construction/potable water from bore-well shall be permitted if found suitable. Any statutory clearance required shall be obtained by the contractor. Assistance, if required shall be provided by the owner.

29.00.00 LINES AND GRADES

All the Works shall be performed to the lines, grades and elevations indicated on the drawings. The Contractor shall be responsible to locate and layout the Works. Basic horizontal and vertical control points will be established and marked by the Employer at Site at suitable points. These points shall be used as datum for the works under the Contract. The Contractor shall inform the Employer well in advance

of the times and places at which he wishes to do work in the area allotted to him so that suitable datum points may be established and checked by the Employer to enable the Contractor to proceed with his works. Any work done without being properly located may be removed and/or dismantled by the Employer at Contractor's expense.

30.00.00 FIRE PROTECTION

30.01.00 The work procedures that are to be used during the erection shall be those which minimise fire hazards to the extent practicable. Combustible materials, combustible waste and rubbish shall be collected and removed from the Site at least once each day. Fuels, oils and volatile or flammable materials shall be stored away from the construction and equipment and materials storage areas in safe containers. Untreated canvas, paper, plastic or other flammable flexible materials shall not at all be used at Site for any other purpose unless otherwise specified. If any such materials are received with the equipment at the Site, the same shall be removed and replaced with acceptable material before moving into the construction or storage area.

30.02.00 Similarly corrugated paper fabricated cartons etc. will not be permitted in the construction area either for storage or for handling of materials. All such materials used shall be of water proof and flame resistant type. All the other materials such as working drawings, plans etc. which are combustible but are essential for the works to be executed shall be protected against combustion resulting from welding sparks, cutting flames and other similar fire sources.

30.03.00 All the Contractor's supervisory personnel and sufficient number of workers shall be trained for fire-fighting and shall be assigned specific fire protection duties. Enough of such trained personnel must be available at the Site during the entire period of the Contract.

30.04.00 The Contractor shall provide enough fire protection equipment of the types and number for the warehouses, office, temporary structures, labour colony area etc. Access to such fire protection equipment, shall be easy and kept open at all time.

31.00.00 SECURITY

The Contractor shall have total responsibility for all equipment and materials in his custody stores, loose, semi-assembled and/or erected by him at Site. The Contractor shall make suitable security arrangements including employment of security personnel to ensure the protection of all materials, equipment and works from theft, fire, pilferage and any other damages and loss. All materials of the Contractor shall enter and leave the Employer Site only with the written permission of the Employer in the prescribed manner.

32.00.00 CONTRACTOR'S AREA LIMITS

The Employer will mark-out the boundary limits of access roads, parking spaces, storage and construction areas for the Contractor and the Contractor shall not trespass the areas not so marked out for him. The Contractor shall be responsible to ensure that none of his personnel move out of the areas marked out for his operations. In case of such a need for the Contactor's personnel to work out of the areas marked out for him the same shall be done only with the written permission of the Employer.

33.00.00 CONTRACTOR'S CO-OPERATION WITH THE EMPLOYER

In case where the performance of the erection work by the Contractor affects the operation of the system facilities of the Employer, such erection work of the Contractor shall be scheduled to be performed only in the manner stipulated by the Employer and the same shall be acceptable at all times to the Contractor. The Employer may impose such restrictions on the facilities provided to the Contractor such as electricity, etc. as he may think fit in the interest of the Employer and the Contractor shall strictly adhere to such restrictions and co-operate with the Employer. It will be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and operation of the equipment systems which are erected by him. The Contractor shall also be responsible for flushing and initial filling of all the oil and lubricants required for the equipment furnished and installed by him, so as to make such equipment ready for operation. The Contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in documents and specifications.

34.00.00 PRE-COMMISSIONING AND COMMISSIONING ACTIVITIES

34.01.00 **GENERAL**

34.01.01 The Contractor upon completion of installation of equipments and systems, shall conduct pre-commissioning and commissioning activities, to make the equipment/systems ready for safe, reliable and efficient operation on sustained basis. All pre-commissioning/commissioning activities considered essential for such readiness of the equipment/systems including those mutually agreed and included in the Contractor's quality assurance programme as well as those indicated in clauses elsewhere in the technical specifications shall be performed by the contractor.

34.01.02 The pre-commissioning and commissioning activities including Guarantee/ demonstration/acceptability tests, checks and trial operations of the equipment/ systems furnished and installed by the contractor shall be the responsibility of the Contractor as detailed in relevant clauses in Technical Specification. The Contractor shall provide, in addition, test instruments, calibrating devices etc. and labour required for successful performance of these operations. If it is anticipated that the above test may prolong for a long time, the Contractor’s workmen required for the above test shall always be present at site during such operations.

34.01.03 The following activities shall be carried out by the contractor, 18 month prior to schedule date of commissioning of the equipment/systems installed by him.

(a.) The contractor shall furnish the organization chart of his operation and commissioning engineers for the acceptance of employer. Adequate number of operation and commissioning engineers shall be deployed by the contractor to effectively meet the requirement of round the clock operation in shifts also, till the plant is taken over by the employer.

(b.) The contractor shall submit the bio-data containing the details of experience of his operation and commissioning engineers for the acceptance of employer.

(c.) The contractor shall furnish the deployment schedule of his operation and commissioning engineers for the acceptance of the employer.

(d.) Apart from above, contractor shall ensure deployment of sufficient skilled/semi-skilled/unskilled manpower during pre-commissioning and commissioning activities.

34.01.04 It shall be the responsibility of the Contractor to provide all necessary temporary instrumentation and other measuring devices required during start-up and initial operation of the equipment/systems which are installed by him.

34.01.05 The Contractor shall also be responsible for flushing and initial filling of all oils and lubricants required for the equipment furnished and installed by him so as to make such equipment ready for operation. The Contractor shall be responsible for supplying such flushing oil and other lubricants unless otherwise specified elsewhere in these specifications and documents.

34.02.00 **COMMISSIONING DOCUMENTATION**

34.02.01 The contractor shall submit the commissioning documentation, comprising of Standard checklists, pre-commissioning procedures, testing schedules, commissioning schedules and commissioning networks for various equipment/ systems covered under the contract, for the approval of employer.

34.02.02 Standard checklist, as the name suggests, shall be a fairly general documents, containing the list of all checks required to be carried out for similar and repetitive type of equipment to ensure consistent and thorough checking. An indicative list of such equipment is enclosed as Annexure I.

34.02.03 The testing schedule is a document, designed for safe and systematic commissioning of individual equipment/sub-system (for example Boiler Feed Pump, condensate pump, compressor etc) Commissioning schedule is a document envisaged for commissioning of a system (for example feed system, Condensate system, Compressed Air system, Fire water system, Unit commissioning etc). The testing/Commissioning schedule shall have a standard format in order to maintain consistency of presentation, content and reporting. A brief write up on the contents of the Testing Schedule/Commissioning Schedule is enclosed as Annexure-II.

34.02.04 The contractor shall submit the list of commissioning documentation to be submitted by him, alongwith their submission schedule for various equipment/systems covered under the contract, with in 6(six) month from the date of award of contract, for the acceptance of employer.

34.02.05 The Contractor shall submit the commissioning documentation, for various equipment/covered under the contract, for the approval of employer, at least 18 months before the scheduled date of commissioning of the equipment/systems.

34.03.00 **COMMISSIONING ACTIVITIES**

34.03.01 Upon completion of pre-commissioning activities/tests, the contractor shall initiate commissioning of facilities. During commissioning the Contractor shall carry out system checking and reliability trials on various parts of the facilities.

34.03.02 Contractor shall carry out the checks/tests at site to prove to the Employer that each equipment of the supply complies with requirements stipulated and is installed in accordance with requirements specified.

34.03.03 Before the plant is put into initial operation the Contractor shall be required to conduct test to demonstrate to the Employer that each item of the plant is capable of correctly performing the functions for which it was specified and its performance,

	parameters etc. are as per the specified/approved values. These tests may be conducted concurrently with those required under commissioning sequence.
34.03.04	The Contractor shall also demonstrate the performance of all C&I equipment, the tests on main equipment of prior to that as the case may be.
34.03.05	Other tests shall be conducted, if required by the Employer, to establish that the plant equipment are in accordance with requirements of the specifications.
34.03.06	The Contractor shall conduct all the commissioning tests and undertake commissioning activities pertaining to all other auxiliaries and equipments including all electrical and C&I equipment/systems not specifically brought out above but are within the scope of work and facilities being supplied and installed by the Contractor and follow the guidelines indicated above or elsewhere in these technical specifications.
34.05.00	**Initial Operation**
	Upon completion of system checking/Tests as above and as a part of commissioning of facilities, complete plant/facilities shall be put on initial operation as stipulated in General Technical Requirements.
35.00.00	**MATERIALS HANDLING AND STORAGE**
35.01.00	All the equipments furnished under the Contract and arriving at Site shall be promptly received, unloaded and transported and stored in the storage spaces by the Contractor.
35.02.00	Contractor shall be responsible for examining all the shipment and notify the Employer immediately of any damage, shortage, discrepancy etc. for the purpose of Employer's information only. The Contractor shall submit to the Employer every week a report detailing all the receipts during the week. However, the Contractor shall be solely responsible for any shortages or damage in transit, handling and / or in storage and erection of the equipment at Site. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor.
35.03.00	The Contractor shall maintain an accurate and exhaus-tive record detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the Employer.
35.04.00	All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings, etc. shall be used for unloading and/or handling of the equipment without the specific written permission of the Employer. The equipment stored shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the store shall be moved to the actual location at the appropriate time so as to avoid damage of such equip-ment at Site.
35.05.00	All electrical panels, controls gear, motors and such other devices shall be properly dried by heating before they are installed and energised. Motor bearings, slip rings, commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion due to prolonged storage.
35.06.00	All the electrical equipment such as motors, genera-tors, etc. shall be tested for insulation resistance as per OEM Practice. Storage of EHV/Generator transformers

under Nitrogen /Dry air shall not exceed the time duration as defined by OEM practice.

35.07.00 The Contractor shall ensure that all the packing materials and protection devices used for the various equipments during transit and storage are removed before the equipment are installed.

35.08.00 The consumables and other supplies likely to deteriorate due to storage must be thoroughly protected and stored in a suitable manner to prevent damage or deterioration in quality by storage.

35.09.00 All the materials stored in the open or dusty location must be covered with suitable weatherproof and flame-proof covering material wherever applicable.

35.10.00 If the materials belonging to the Contractor are stored in areas other than those earmarked for him, the Employer will have the right to get it moved to the area earmarked for the Contractor at the Contractor's cost.

35.11.00 The Contractor shall be responsible for making suitable indoor storage facilities to store all equipment which require indoor storage. Normally, all the electrical equipments such as motors, control gear, generators, exciters and consumables like electrodes, lubricants etc. shall be stored in the closed storage space. The Employer, in addition, may direct the Contractor to move certain other materials, which in his opinion will require indoor storage, to indoor storage areas which the Contractor shall strictly comply with.

35.12.00 Sound Storage Management system need to be followed for storage of material. First in First Out method (FIFO) to be adopted to avoid longtime storage. Storage duration of any material at site shall not be more than 3 months. Accordingly supply of material in sequence of erection at site to be ensured. To achieve the same, following is to be adopted:

a. Dispatch clearance is to be given in order of sequence of erection. To achieve the goal, proper tags shall be maintained in ascending order. The tag shall be self-explanatory.
b. MDCC shall be issued by RIO based on clearance from Site FQA head, Main contractor, Erection head for dispatch and supply of material. Strict adherence to sequential supply of material as per supply schedule.

35.13.00 An automated storage and retrieval system consists of a variety of computer-controlled systems for automatically placing and retrieving of material may be adopted. Accordingly, each material shall be marked with unique identification code.

36.00.00 CONSTRUCTION MANAGEMENT

36.01.00 The field activities of the Contractors working at Site, will be coordinated by the Employer and the Employer decision shall be final in resolving any disputes or conflicts between the Contractor and other Contractors and tradesmen of the Employer regarding scheduling and co- ordination of work. Such decision by the Employer shall not be a cause for extra compensation or extension of time for the Contractor.

36.02.00 The Employer shall hold weekly meetings of all the Contractors working at Site, at a time and place to be designated by the Employer. The Contractor shall attend such meetings and take notes of discussions during the meeting and the decisions of the Employer and shall strictly adhere to those decisions in performing his Works. In

addition to the above weekly meeting, the Employer may call for other meeting either with individual Contractors or with selected number of Contractors and in such a case the Contractor if called, will also attend such meetings.

36.03.00 Time is the essence of the Contract and the Contractor shall be responsible for performance of his works in accordance with the specified construction schedule. If at any time, the Contractor is falling behind the schedule, he shall take necessary action to make good for such delays by increasing his work force or by working overtime or otherwise accelerate the progress of the work to comply with the schedule and shall communicate such actions in writing to the Employer, satisfying that his action will compensate for the delay. The Contractor shall not be allowed any extra compensation for such action.

36.04.00 The Employer shall however not be responsible for provision of additional labour and/or materials or supply or any other services to the Contractor except for the co-ordination work between various Contractors as set out earlier.

36.05.00 **Site management during construction phase till handing over of plant**

Bidder shall ensure that the plant site within the plant boundary is managed in a coordinated and professional way all through the construction phase till handing over of plant, ensuring safe, easy & unhindered working conditions and a healthy & hygienic working environment at site. He shall ensure the following measures at site while executing the project.

a) Unhindered motorable road access to all work areas and facilities both during the construction/erection and as they get completed progressively. Required temporary access roads other than the permanent roads shall also be provided. Bidder shall prioritize the construction of approach roads, roads around the main plant block, roads to office & storage areas and the offsite areas from the start of project itself. He shall finalize and submit the complete road layout plan along with priority and completion schedule immediately after the award for review by the Employer. He shall ensure that the roads are promptly repaired and maintained against any damages due to movement of traffic/heavy trailers & cranes etc providing motorable access at all times. Adequate onsite stock of road materials shall be kept and maintained disturbed over the site for repairs especially before the monsoon period.

b) Proper drainage of rainwater, ground water from excavations, water flows from batching plant / construction sites etc. He shall prioritize the construction of permanent drains from the start of the project itself. Till such time the permanent drainage network is done, he shall construct adequate temporary drains to ensure that there is no accumulation /stagnation of water in the plant site. Bidder may consider providing pre-cast RCC drains for temporary/ permanent drain construction for faster construction of drains. The drain construction shall be matched with progress of road construction for preventing damage to roads. Bidder shall provide and maintain adequate number of drainage pumps (both electrical and diesel operated) of suitable capacity for pumping out accumulated water especially during the monsoon periods. All drain diversions required shall be undertaken at the start of the project itself.

c) The plant site is fully secured against unauthorized access.

d) Proper housekeeping by systematic and proper disposal of earth from excavations(separately for usable & surplus earth), muck (from pile bores or otherwise), wastes (from dismantling of pile tops, concrete works etc), packing & insulation wastes, steel scrap, cable wastes etc generated during construction / erection works. Suitable disposal sites for each of above shall be identified in the layout and at site in the beginning of the project itself. It shall be ensured that all agencies engaged by the bidder follow the discipline to dispose off of earth spoils and wastes at the designated places. Preferably once in a week suitable time slot will be identified for housekeeping by all agencies and suitable instructions shall be issued in this regard. Bidder may engage a separate agency or identify a gang for collection of wastes and disposal to designated places. Suitable arrangement / tie-up will also be made for periodic disposal of wastes/ scrap from the designated places.

e) All fabrication areas shall be suitably hard crusted to provide a water free and proper working platform. Suitable sheds preferably pre-engineered structures to be provided for paint shops, fabrication workshops etc for ensuring all weather work conditions for onsite structural works. For the main plant and auxiliary buildings, bidder should preferably plan the works in such a way that structural fabrication is done in suppliers' offsite works / workshops and onsite fabrication works are avoided / kept minimum.

f) Suitable onsite maintenance workshop for day to day breakdown maintenance heavy plant and equipment like batching plants, cranes, earth moving equipment, welding equipment etc. The workshop shall have stock of frequently needed spares and suitable repair facilities with experienced technicians/mechanics. A central test laboratory equipped with test equipment for routine tests like tests on soil, concrete, bricks, aggregates, welds etc with experienced staff shall be established at the start of the project itself.

g) All office and covered store buildings of the bidder and its agencies shall be of prefab/ pre-engineered / porta cabin construction. Shabby semi-finished constructions in brickwork/ GI / asbestos roof etc shall not be permitted.

h) First aid facilities and amenities like rest rooms, suitable pre-engineered toilets (separate for men and women), drinking water fountains/tanks, canteen, crèche for women workers shall be planned and established at the beginning of the project itself. These facilities shall be distributed over the plant area to enable easy access by the construction workers and staff and shall be marked on the plant layout. Suitable treatment for toilet discharge, like bio digesters etc shall be planned and conventional septic tanks / soak pits etc shall be avoided.

i) Proper lighting of all construction / erection areas. Bidder shall erect adequate number of high lighting masts in main plant, offsite, office and store areas for lighting during night. DG sets of adequate capacity shall be provided for emergency backup. The street lighting along the roads shall also be prioritized along with road construction. The construction power ring main shall be planned and erected immediately after the award.

j) Well planned and coordinated storage and movement of plant, equipment and construction materials. System wise / agency wise storage / laydown areas shall be planned and marked on the plant layout at the beginning itself. Bidder shall ensure that all its agencies comply to the areas allocated to

them and follow the designated storage and movement plans. Adequate covered storage shall be constructed for storage of critical equipments like switchgears, MCCs, insulation etc.

k) Proper access control for construction workers, staff and visitors. Bidder shall ensure that suitable electronic based gate pass system is in place from start of project itself to keep record and track of all workers, staff and visitors entering/exiting the plant premises shift wise on daily basis.

l) Compliance to all safety requirements as specified in this document. Bidders shall establish a safety centre at the start of the project itself. It shall have a 24X7 manned safety control room in addition to a permanent safety equipment display room, separate training / lecture hall with AV facilities for safety training, store room with adequate stock of specified safety equipment, a first aid room and other amenities. Bidder shall install 25 Nos. CCTV cameras at all strategic locations in the plant area which shall be linked to the safety control room."

m) Compliance to all environment and other conditions stipulated by the concerned statutory authorities while according clearance / NOC (No objection certificate) to the project. Bidder shall ensure adequate sprinkling of water by deploying water tankers to prevent the fugitive dust nuisance during construction.

n) Development of suitable landscape & green belt areas and rainwater harvesting within the plant premises. Bidder shall plan to develop the landscape & green belt areas and rainwater harvesting from the start of the project itself. The landscape and rain water harvesting plan shall be finalized immediately after award of work and suitable work plan with priority and schedule shall also be finalized thereafter. Top soil before excavation shall be suitably preserved and stacked for landscape and green belt development.

o) Provision of adequate shelters, water supply, sanitation and lighting in construction workers and staff camps. No camps for workers and staff shall be permitted within the plant premises and Bidder shall make separate arrangement outside the plant premises for locating and development of camps for construction workers and staff. The designated areas shall be suitably developed with infrastructure like roads, drains, water supply and sewerage and shall be free from water logging. Suitable low cost shelters will be provided for the workers. Complete area shall be secured by fencing and shall be provided adequate area lighting. Suitable waste disposal, shopping and recreation facilities will be developed in these camps.

Bidder shall ensure that due importance is given to site management as discussed above and a detailed work plan considering the above aspects is finalized immediately after the award. A senior level executive shall be identified who shall be responsible for implementation of the work plan. Suitable format for progress reporting on site management plan shall be developed and made part of the project progress report. The progress on implementation of above work plan shall be reviewed along with project progress in the monthly project review meetings with Employer. In case the progress on site management plan is unsatisfactory, and in the opinion of Employer, bidder's actions on site management aspects is not adequate, Employer may get the relevant work executed through a separate agency

and deduct the expenses incurred from Bidder's bill along with overheads in line with GCC.

p) If Employer decides to retain or withhold any amount from the Contractor, the Employer shall clearly articulate and share with contractor, the reasons and justifications for the retention or withholding of funds. Additionally, specific conditions for releasing the withheld amount shall also be established and communicated at the time of withholding. Upon rectification of the identified issues or deficiencies by the Contractor to the satisfaction of the Employer, the Employer shall promptly release the withheld amount. The release shall be made in accordance with the terms and conditions specified in the contract agreement.

36.06.00 **QUALITY CONTROL ROOM**

Bidder to refer clause no 1.01.00 -G of section IV -Part-A.

36.07.00 Welder Training Center -Contractor shall setup a small welding training center 3 -4 welding booths equiped with GTAW & SMAW setup in a pota cabin/suitable enclosed space to train & hone skill of high pressure welders who are giving high rate of welding defect.

36.08.00 **SMART STORAGE AREA/YARD MONITORING**

Bidder to refer clause no 1.01.00 -F of section IV -Part-A.

37.00.00 FIELD OFFICE RECORDS

The Contractor shall maintain at his Site Office up-to- date copies of all drawings, specifications and other Contract Documents and any other supplementary data complete with all the latest revisions thereto. The Contractor shall also maintain in addition the continuous record of all changes to the above Contract Documents, drawings, specifications, supplementary data, etc. effected at the field and on completion of his total assignment under the Contract shall incorporate all such changes on the drawings and other Engineering data to indicate as installed conditions of the equipment furnished and erected under the Contract. Such drawings and Engineering data shall be submitted to the Employer in required number of copies.

38.00.00 CONTRACTOR'S MATERIALS BROUGHT ON TO SITE

38.01.00 The Contractor shall bring to Site all equipment, components, parts, materials, including construction equipment, tools and tackles for the purpose of the Works under intimation to the Employer. All such goods shall, from the time of their being brought vest in the Employer, but may be used for the purpose of the Works only and shall not on any account be removed or taken away by the Contractor without the written permission of the Employer. The Contractor shall nevertheless be solely liable and responsible for any loss or destruction thereof and damage thereto.

38.02.00 The Employer shall have a lien on such goods for any sum or sums which may at any time be due or owing to him by the Contractor, under, in respect of or by reasons of the Contract. After giving a fifteen (15) days' notice in writing of his intention to do so, the Employer shall be at liberty to sell and dispose of any such goods, in such manner as he shall think fit including public auction or private treaty

and to apply the proceeds in or towards the satisfaction of such sum or sums due as aforesaid.

38.03.00 After the completion of the Works, the Contractor shall remove from the Site under the direction of the Employer the materials such as construction equipment, erection tools and tackles, scaffolding etc. with the written permission of the Employer. If the Contractor fails to remove such materials, within fifteen (15) days of issue of a notice by the Employer to do so then the Employer shall have the liberty to dispose off such materials as detailed under as specified at clause no 38.02.00- of this chapter and credit the proceeds thereto to the account of the Contractor.

39.00.00 PROTECTION OF PROPERTY AND CONTRACTOR'S LIABILITY

39.01.00 The Contractor shall be responsible for any damage resulting from his operations. He shall also be re-sponsible for protection of all persons including members of public and employees of the Employer and the employees of other Contractors and Sub- Contractors and all public and private property including structures, building, other plants and equipments and utilities either above or below the ground.

39.02.00 The Contractor will ensure provision of necessary safety equipment such as barriers, sign - boards, warning lights and alarms, etc. to provide adequate protection to persons and property. The Contractor shall be responsible to give reasonable notice to the Employer and the Employers of public or private property and utili-ties when such property and utilities are likely to get damaged or injured during the performance of his Works and shall make all necessary arrangements with such Employers, related to removal and/or replacement or protection of such property and utilities.

40.00.00 PAINTING

For painting refer Part-A, sub section-III, Section VI of Technical specification.

Painting for structures shall conform to the painting specification specified in Part-B under Civil.

Painting for piping shall conform to the painting specification given in Part-B of the respective chapter.

Painting for Electrical equipments/systems shall conform to the painting specification given in Electrical portion of Part-A and Part-B of technical specifications.

41.00.00 INSURANCE

41.01.00 In addition to the conditions covered under the Clause entitled "Insurance" in Section General Conditions of Contract (GCC), the following provisions will also apply to the portion of works to be done beyond the Contractor's own or his Sub-Contractor's manufacturing Works.

41.02.00 **Workmen's Compensation Insurance**

This insurance shall protect the Contractor against all claims applicable under the Workmen's Compensation Act, 1948 (Government of India). This policy shall also cover the Contractor against claims for injury, disability disease or death of his or his Sub-Contractor's employees, which for any reason are not covered under the Workmen's Compensation Act, 1948. The liabilities shall not be less than the following:

Workmen's Compensation - As per Statutory Provisions

	Employee's Liability	-	As per Statutory Provisions

41.03.00 **Comprehensive Automobile Insurance**

This insurance shall be in such a form to protect the Contractor against all claims for injuries, disability, disease and death to members of public including the Employer's men and damage to the property of other arising from the use of motor vehicles during on or off the Site operations, irrespective of the Ownership of such vehicles. The liability covered shall be as herein indicated:

Fatal Injury	:	Rs.100, 000 each person
	:	Rs.200, 000 each occurrence
Property Damage	:	Rs.100, 000 each occurrence

41.04.00 **Comprehensive General Liability Insurance**

41.04.01 The insurance shall protect the Contractor against all claims arising from injuries, disabilities, disease or death of members of public or damage to property of others, due to any act or omission on the part of the Contractor, his agents, his employees, his representatives and Sub-Contractors or from riots, strikes and civil commotion. This insurance shall also cover all the liabilities of the Contractor arising out of the Clause entitled "Loss of or Damage to Property; Accident or Injury to workers; Indemnification" in Section General Conditions of Contract (GCC).

41.04.02 The hazards to be covered will pertain to all the Works and areas where the Contractor, his Sub-Contractors, his agents and his employees have to perform work pursuant to the Contract.

41.05.00 The above are only illustrative list of insurance covers normally required and it will be the responsibility of the Contractor to maintain all necessary insurance coverage to the extent both in time and amount to take care of all his liabilities either direct or indirect, in pursuance of the Contract.

42.00.00 UNFAVOURABLE WORKING CONDITIONS

The Contractor shall confine all his field operations to those works which can be performed without subjecting the equipment and materials to adverse effects during inclement weather conditions, like monsoon, storms, etc. and during other unfavorable construction conditions. No field activities shall be performed by the Contractor under conditions which might adversely affect the quality and efficiency thereof, unless special precautions or measures are taken by the Contractor in a proper and satisfactory manner in the performance of such Works and with the concurrence of the Employer. Such unfavorable construction conditions will in no way relieve the Contractor of his responsibility to perform the Works as per the schedule.

43.00.00 PROTECTION OF MONUMENTS AND REFERENCE POINTS

The Contractor shall ensure that any finds such as relic, antiquity, coins, fossils, etc. which he may come across during the course of performance of his Works either during excavation or elsewhere, are properly protected and handed over to the Employer. Similarly the Contractor shall ensure that the bench marks, reference points, etc., which are marked either with the help of Employer or by the Employer shall not be disturbed in any way during the performance of his Works. If, any work is to be performed which disturb such reference, the same shall be done only after these are transferred to other suitable locations under the direction of the Employer.

The Contractor shall provide all necessary materials and assistance for such relocation of reference points etc.

44.00.00 WORK & SAFETY REGULATIONS

44.01.00 General

i) The contractor shall comply with all the requirements of "The Building and Other Construction Workers (Regulation of Employment & Conditions of Service) Act," 1996 and its Central Rule 1998 / State Rules and any other statutory requirements as applicable.

ii) The Contractor shall follow NTPC Safety Rules as specified in GCC with respect to safety in construction & erection.

iii) The contractor shall have the approved Safety, Health and Environment (SHE) Policy in respect of Safety and health of Building Workers and it shall be circulated widely and displayed at conspicuous place in Hindi and local language understood by the majority of the workers. A copy of the safety policy should be submitted to Engineer in charge.

iv) Thecontractor shall submit the safety plan comprising of methods to implement the Safety Policy/ Rules, Risk assessment and ensuring Safety at work areas, Safety audits, inspections and its compliance, Supervision and responsibility to ensure Safety at various levels, Safety training to employees and workers, review of Safety and accident analysis, ensure Health and Safety Procedures to prevent accidents for approval as per the format of Safety plan as annexed at Annexure - III.

Bidder shall furnish the Safety Plan, duly filled in as per EMPLOYER's Format.

The above proposed "Safety Plan" shall be further discussed/ finalized at Site, in line with the NTPC safety rules, and shall be approved by Project Manager/ Head of Project before start of work at Site.

v) The Contractors shall ensure proper safety of all the workmen, materials, plant and equipment belonging to him or to the Employer or to others, working at the Site.

vi) All equipments used in construction and erection by the contractor shall meet BIS / International Standards and where such standards do not exist, the Contractor shall ensure these to be absolutely safe. All equipments shall be strictly operated and maintained by the contractor in accordance with manufacturer's operation manual. The contractor should also follow Guidelines / Rules of the Employer in this regard.

vii) The Contractors shall provide suitable latest Personal Protective Equipments of prescribed standard to all their employees and workmen according to the need. The Engineer I/c shall have the right to examine these safety equipments to determine their suitability, reliability, acceptability and adaptability. The contractor should also ensure these before their use at worksite.

viii) The Contractor shall provide safe working conditions to all workmen and employees at his workplace including safe means of access, railings, stairs, and ladders, scaffolding, work platforms, toe boards etc. The scaffoldings

shall be erected under the control and supervision of an experienced and competent person. For erection of scaffolds, access, work platforms etc. shall be good and the contractor shall use standard quality of material.

ix) The Contractor shall follow and comply with all the Safety Rules, standards, code of practices of NTPC and relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment as may be prescribed from time to time without any protest or contest or reservation. In case of any unconformity between statutory requirement and the Safety Rules of the Employer referred above, the latter shall be binding on the Contractor unless the statutory provisions are more stringent. As and when required he can refer / obtain copy of NTPC safety documents as stated above.

x) The contractor shall have his own arrangements with nearby hospitals for shifting and treatment of sick and injured.

The medical examination of the workers employed in hazardous areas shall be conducted as per Rule 223 0f The Building and Other Construction Worker (Regulation of Employment and Condition of Service) Central Rule 1998 Their health records shall be maintained accordingly and to be submitted to Engineer I/c when asked for. If any worker found suffering from occupational health hazard, the worker should be shifted to suitable place of working and properly treated under intimation to Engineer I/c. The medical fitness certificate to be submitted to Engineer (I/c).

xi) First Aid boxes equipped with requisite articles as specified in the Rule 231 of The Building and Other Construction Worker (Regulation of Employment and Condition of Service) Central Rule 1998 shall be provided at construction sites for the use of workers. Training has to be provided on first aid to workmen & office bearers working at site.

44.01.01 **Emergency Action Plan**

The contractor shall prepare an emergency action plan approved by his competent authority to handle any emergency occurred during construction work. Regular mock drills shall be organized to practice this emergency plan. The Emergency Action Plan should be widely circulated to all the employees and suitable infrastructure shall be provided to handle the emergencies.

44.01.02 **Scaffolding**

The contractor shall take all precautions to prevent any accidental collapse of scaffolding or fall of persons from scaffolding. The contractor should ensure that scaffolding are designed by a competent person and it erection and repairs should be done under the expert supervision. The scaffolding shall meet the required strength and other requirements for the purpose for which the scaffold is erected. The material used for scaffold should conform to the BIS / International standards.

44.01.03 **Opening**

The contractor shall ensure that there is no opening in any working platform/any floor of the building, which may cause fall of workers or material. Whenever an opening on a platform/any floor of the building is unavoidable, the opening should be suitably fenced and necessary measures for protection against falling objects or building workers from such platform are taken by providing suitable safety nets, safety belts or other similar means.

44.01.04 **Explosives**

The contractor shall take all precautions while handling, using, storing or transporting of all explosives. Before usage of any explosive necessary warning / danger signals be erected at conspicuous places to warn the workers and general public. The contractor should strictly ensure that all measures and precautions required to be complied for use, handling, storing or transportation of explosives under the rules framed under the Explosives Act, 1884.

44.02.00 **Fencing of Machinery**

The contractor shall provide suitable fencing or guard to all dangerous and moving parts of machinery.

The contractor shall not allow any of the employees to clean, lubricate, repair, adjust or examine during machinery in motion, which may cause injury to the person.

44.03.00 **Carrying of Excessive Weight by a Worker**

The worker shall not be allowed to lift by hand or carry over his head, back or shoulder more than the maximum limit set by the prescribed rules for the construction Workers.

44.04.00 **Dangerous and Harmful Gases / Equipment**

The contractor shall ensure that the workers are not exposed to any harmful gases during any construction activity including excavation, tunneling, confined spaces etc.

The contractor should not allow any worker to go into the confined space unless it is certified by Engineer (I/c) to be safe and fit for the entry to such work place. Proper record and work permits should be followed to carry out such works.

44.05.00 **Overhead Protection**

The contractor shall ensure that any area exposed to risk of falling materials, articles or objects is roped off or cordoned off or otherwise suitably guarded from inadvertent entry of any person.

Wherever there is a possibility of falling of any material, equipment or construction workers while working at heights, a suitable and adequate safety net should be provided. The safety net should be in accordance with BIS Standards.

44.06.00 **Working at Heights**

All working platforms, ways and other places of construction work shall be free from accumulations of debris or any other material causing obstructions and tripping.

Wherever workers are exposed to the hazard of falling into water, the contractor shall provide adequate equipment for saving the employees from drowning and rescuing from such hazards. The contractor shall provide boat or launch equipped with sufficient number of life buoys, life jackets etc. manned with trained personnel at the site of such work.

Every opening at elevation from ground level through which a building worker, vehicle, material equipment etc. may fall at a construction work shall be covered and/or guarded suitably by the contractor to prevent such falls.

Wherever the workers are exposed to the hazards of falling from height, the contractor shall provide full harness safety belts fitted with fall arresting systems to all the employees working at higher elevations and life line of 8 mm diameter wire

rope with turn buckles for anchoring the safety belts while working or moving at higher elevations. Safety nets shall also be provided for saving them from fall from heights and such equipment should be in accordance with BIS standards. Wherever there is a possibility of falling of any material, equipment or construction workers while working at heights, a suitable and adequate safety net should be provided. The safety net should be in accordance with BIS Standards.

The contractor shall provide standard prefabricated ladders on the columns where the workers are required to use them as an access for higher elevations till permanent staircase is provided. The workers shall be provided with safety belts fitted with suitable fall arresting system (fall arrestors) for climbing/getting down through ladders to prevent fall from height.

44.07.00 **Handling of Hazardous Chemicals**

The Contractor will notify well in advance to the Engineer I/c of his intention to bring to the Site any container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals which may involve hazards. NTPC shall have the right to prescribe the conditions, under which such container is to be stored, handled and used during the performance of the works and the Contract shall strictly adhere to and comply with such instructions. The Engineer I/c shall have the right at his sole discretion to inspect any such container or such construction plant / equipment for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its use. No claim due to such prohibition shall be entertained by NTPC and NTPC shall not entertain any claim of the Contractor towards additional safety provisions / conditions to be provided for / constructed.

Further, any such decision of the Engineer I/c shall not, in any way, absolve the Contractor of his responsibilities and in case, use of such a container or entry thereof into the Site area is forbidden by NTPC, the Contractor shall use alternative methods with the approval of the NTPC without any cost implication to the NTPC or extension of work schedule.

Where it is necessary to provide and / or store petroleum products or petroleum mixtures and explosives, the Contractor shall be responsible for carrying-out such provision and / or storage in accordance with the rules and regulations laid down in Petroleum Act 1934, Explosives Act 1948, and Petroleum and Carbide of Calcium Manual published by the Chief Inspector of Explosives of India. All such storage shall have prior approval of the Engineer I/c. In case any approvals are necessary from the Chief Inspector (Explosives) or any statutory authorities, the Contractor shall be responsible for obtaining the same.

The Contractor shall be fully responsible for the safe storage of his and his Sub-contractor's radio-active sources in accordance with BARC/DAE (Bhabha Atomic Research Centre/ Department of Atomic Energy, Govt. of India) Rules and other applicable provisions. All precautionary measures stipulated by BARC/DAE in connection with use, the contractor would take storage and handling of such material.

The contractor shall provide suitable personal protective equipments to the workers who are handling the hazardous and corrosive substances including alkalis and acids.

As a precautionary measure the contractor should keep the bottles filled with distilled water in cupboard / Boxes near work place for emergency eye wash by worker exposed to such hazardous chemicals.

44.08.00 **Eye Protection**

The contractor shall provide suitable personal protective equipment to his workmen depending upon the nature of hazards and ensure their usage by the workers engaged in operations like welding, cutting, chipping, grinding or similar operations which may cause injuries to his eyes.

44.09.00 **Excavation**

The contractor shall take all necessary measures during excavation to prevent the hazards of falling or sliding material or article from any bank or side of such excavation which is more than one and a half meter above his footing by providing adequate piling, shoring, bracing etc. against such bank or sides.

Adequate and suitable warning signs shall be put up at conspicuous places at the excavation work to prevent any persons or vehicles falling into the excavation trench. No worker should be allowed to work where he may be stuck or endangered by excavation machinery or collapse of excavations or trenches.

44.10.00 **Electrical Hazards**

The contractor should ensure that all electrical installations at the construction work comply with the requirements of latest electricity acts / rules.

The contractor shall take all adequate measures to prevent any worker from coming into physical contact with any electrical equipment or apparatus, machines or live electrical circuits which may cause electrical hazards during the construction work. The contractor shall provide the sufficient ELCBs / RCCBs for all the portable equipments, electrical switchboards, distribution panels etc. to prevent electrical shocks.

The contractor should ensure use of single / double insulated hand tools or low voltage i.e., 110 volts hand tools.

The contractor should also ensure that all temporary electrical installations at the

construction works are provided with earth leakage circuit breakers.

44.11.00 **Vehicular Traffic**

The contractor should employ vehicle drivers who hold a valid driving license under the Motor Vehicles Act, 1988.

44.12.00 **Lifting Appliances, Tools & Tackles, Lifting Gear And Pressure Plant & Equipment etc.**

The contractor shall ensure all the lifting appliances, tools & tackles including cranes etc., lifting gear including fixed or movable and any plant or gear, hoists, Pressure Plant and equipment etc. are in good condition and shall be examined by competent person and only certified shall be used at sites. Periodical Examination and the tests for all lifting / hoisting equipment & tackles shall be carried out. A register of such examinations and tests shall be properly maintained by the Contractor and will be promptly produced as and when desired by the Engineer I/c or by the person authorized by him.

44.13.00 **Excessive Noise, Vibration**

The contractor shall take adequate measures to protect the workers against the harmful effect of excessive noise or vibration. The ambient noise should not exceed the limits prescribed under the concerned rules, Noise Pollution (Regulation and

Control) Rules, 2000. Generally for brownfield projects background noise is in the range of 58-60 DB, however it shall be responsibility of contractor to collect and measure the latest noise data at site.

44.14.00 **Electrical Installations**

44.14.01 The Contractor shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to the Employer or other contractors under any circumstances, whatsoever, unless expressly permitted in writing by the Engineer I/c to handle such fuses, wiring or electrical equipment.

Before the Contractor connects any electrical appliances to any plug or socket belonging to the other contractor or the NTPC, he shall

i) Satisfy the Engineer I/C that the appliance is in good working condition;

ii) Inform the Engineer I/C of the maximum current rating, voltage and phases of the appliances;

iii) Obtain permission of the Engineer I/C detailing the sockets to which the appliances may be connected.

The Engineer I/C will not grant permission to connect until he is satisfied that:

The appliance is in good condition and is fitted with suitable plug; having earth connection with the body.

Wherever armored / metallic sheathed multi core cable is used, the same armored / sheathed should be connected to earth.

iv) No repair work shall be carried out on any live equipment. The Engineer I/c must declare the equipment safe and a permit to work shall be issued by the NTPC / contractor as the case may be to carry out any repair / maintenance work. While working on electric lines / equipments whether live or dead, suitable type and sufficient quantity of tools will have to be provided by the contractor to electricians / workmen / Officers.

v) The contractor shall employ necessary number of qualified, full time Electricians / Electrical Supervisors to maintain his temporary electrical installation. The installations are provided with suitable ELCBs and RCCBs wherever required.

44.15.00 **Safety Organisation**

44.15.01 The contractor shall employ full time safety officer(s) as per requirement stipulated in NTPC Safety Rules, exclusively to supervise safety aspects of the equipments and workmen, who will coordinate with the NTPC Safety Officer. Further requirement of safety officers, if any, shall be guided by Rule 209 of The Building and Other Construction Worker (Regulation of Employment and Conditions of Service) Central Rule 1998. In case the work is being carried out through subcontractor, the employees / workmen of the sub-contractor shall also be considered as the contractor's employees/workmen for the above purpose.

44.15.02 The name and address of such Safety Officer of the Contractor will be promptly informed in writing to the EIC with a copy to the Project Safety Officer before he starts work or immediately after any change of the incumbent is made during currency of the Contract.

44.16.00 **Reporting of Accident and Investigation**

In case any accident occurs during the construction / erection or other associated activities undertaken by the Contractor thereby causing any near miss, minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to the Engineer I/C, NTPC Safety Officer with a copy to NTPC Head of Project in the prescribed form and also to all the authorities envisaged under the applicable laws.

44.17.00 **Right to stop Work**

44.17.01 The Engineer I/C shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and / or property, and / or equipments. In such cases, the contractor shall be informed in writing about the nature of hazards and possible injury / accident and he shall comply to remove shortcomings promptly. The Contractor after stopping the specific work can, if felt necessary appeal against the order of stoppage of work to the Project Manager within 3 days of such stoppage of work and decision of the Project Manager in this respect shall be conclusive and binding on the Contractor.

44.17.02 The Contractor shall not be entitled for any damages / compensation for stoppage of work, {Sub-Clause XVIII (I)} due to safety reasons and the period of such stoppage of work shall not be taken as an extension of time for Completion of the Facilities and will not be the ground for waiver of levy of liquidated damages.

44.18.00 **Fire Protection**

The contractor shall provide sufficient fire extinguishers at place /s of work. The fire

extinguishers shall be properly maintained as per relevant BIS Standards. The employees shall be trained to operate the fire extinguishers / equipment.

44.19.00 **Penalties**

I If any contractor worker found working without using the safety equipment like safety helmet, safety shoes, safety belts, etc. or without anchoring the safety belts while working at height the Engineer I/c shall have the right to regulate the payment in accordance with provisions of GCC. Further such defaulting worker shall be sent out of the workplace immediately and shall not be allowed to work on that day. Engineer I/c / Safety Officer of NTPC will also issue a notice in this regard to the contractor.

II If two or more fatal accidents occur at same NTPC site under the control of contractor during the period of contract and he has

(1) not complied with keeping adequate PPEs in stock or

(2) defaulted in providing PPEs to his workmen

(3) not followed statutory requirements / NTPC safety rules

(4) been issued warning notice/s by NTPC head of the project on nonobservance of safety norms

(5) not provided safety training to all his workmen, the contractor can be debarred from getting tender documents in NTPC for two years from the date of last accident.

The contractor shall submit the accident data including fatal / non-fatal accidents for the last 3 years where he has undertaken the construction activities Projects-wise

	along with the tender documents. If the information given by the contractor found incorrect, his contract will be liable to be terminated.
44.20.00	The Contractor will make available minimum quantity of all safety equipments and safety PPEs of required specifications as per suggestive list included bidding documents as a part of "List of minimum T & P". Further Contractor will ensure availabilitty of additional requirement for individual worker and safety equipment as per site requirement during execution of the contract till its completion.
44.21.00	The Contractor shall abide by the following during Construction and Erection activities: I. Chain pulley block shall not be used for loads more than 2 (Two) tonne. II. Hydra shall not be used for material transport. III. Cage shall necessarily be provided to Monkey ladders of height more than 4 m. IV. Fencing shall be provided to all Electrical Distribution boards and transformers etc.
44.22.00	Contractor shall ensure following regarding implementation of Safety:
a)	Two Tier Safety Monitoring System: **Separate Safety Consultancy contract** shall be awarded by NTPC for assisting and guiding overall Plant Safety during Construction. The safety consultant shall induct and engage manpower required as per specific requirements of project. **For Construction safety**, Contractor shall engage certified safety team in consultation with NTPC Safety team /safety Consultant for each package/area.
b)	Risk level of different area of plant shall be evaluated by NTPC Safety & Safety consultant. Based on the severity of risk level, total project area shall be categorized into different safety zones and each zone will be identified with different color coding.
c)	Dedicated Project Safety Manager of Safety Consultant will be deployed. Contractor to deploy area/ system wise safety representative for each system/ area of project e.g. SG area, TG Main Power House area and similarly in other BOP Systems.
d)	The Safety Officer can stop work of any contractor if safety rules are violated.
e)	There should also be safety clearance in Quarterly RA bills in addition to the clearances being presently taken from HR and Quality dept.
f)	PPEs, scaffoldings, safety nets, testing tools etc. should be monitored by NTPC Safety Manager to control and maintain the uniformity of Quality for Safety equipment/ PPEs.
g)	There should be 24/7 Safety Control room equipped with IP Camera, AI Input alarms and proper communication system for monitoring safety. All CCTV

	footage shall be available to control room. Drone based safety monitoring shall be done during day. The safety control room shall be operated & managed by NTPC through safety consultant.
h)	Safety management plan for the Project must be submitted for approval before start of work.
i)	In line with the Project Planning, Safety planning will be done jointly by Project Team and Consultants.
j)	Availability of Fire Tender shall be ensured by contractor before start of construction work.
k)	**Number of Safety Stewards**: Each area (e.g. SG, TG, etc.) should have minimum 5 safety Stewards from Main Agency and 5 from the sub agency.
l)	Contractor should provide scaffolding material, pipes, clamps, boards and scaffolding of standard quality.
m)	Uses of Safety net, Fire blankets and fall arrester shall be adequate.
n)	Construction Elevators shall be used during erection phase.
o)	Material transport through Hydra shall be avoided.
p)	Good Quality and new PPEs and tools and machinery shall be used.
q)	All Agency /Sub Agency will deploy Safety manpower after getting approval from Head of safety Consultant.
r)	Contractor Safety officer shall take approval of JSA /HIRA of each area from Safety consultant. Before Start of work in a particular area, concerned Safety consultant clearance is must.
s)	Inspect the site to ensure it is a hazard-free environment & promotes safe practices at the job site.
t)	Verifies that injury logs and reports are completed and submitted to NTPC.
u)	Receives reports from and responds to orders issued by NTPC and Labor inspectors.
v)	Serve as primary contact for project site incident and injury notification, investigation, and follow-up.
w)	Organize and maintain necessary project safety documentation.
x)	Training Setup to be created for giving basic education of Safety to workers.
y)	Safety Park and work simulation facility to be created at site.
z)	Health Check Up facility of workers.
aa)	Vendor Safety circle (with max 25 nos person) and monthly safety award to be created.
bb)	24/7 first aid center (common for all agency) and expenditure on contribution basis which is decided by NTPC safety department.
45.00.00	**FOREIGN PERSONNEL**
45.01.00	The Contractor shall submit to the Employer data on all personnel he proposes to bring into India from abroad for the performance of the Works under the Contract, at least sixty (60) days prior to their departure to India. Such data will include for each

	person the name, his present address, his assignment and responsibility in connection with the works, and a short resume of his qualification, experience etc. in relation to the work to be performed by him.
45.02.00	Any person unsuitable and unacceptable to the Employer shall not be brought to India. Any person brought to India, if found unsuitable or unacceptable by the Employer, the Contractor shall within a reasonable time make alternate arrangements for providing a suitable replacement and repatriation of such unsuitable personnel.
45.03.00	No person brought to India for the purposes of the works shall be repatriated without the consent of the Employer in writing, based on a written request from the Contractor for such repatriation giving reasons for such an action to the Employer. The Employer may give permission for such repatriation provided he is satisfied that the progress of work will not suffer due to such repatriation.
45.04.00	The cost of passports, visas and all other travel expenses to and from India, incurred by the Contractor shall be to his account. The Employer will not provide any residential accommodation and/or furniture for any of the Contractor's personnel including foreign personnel and Contractor shall make his own arrangements for such facilities in the area allotted at Site, to him by the Employer for that purpose.
45.05.00	The Contractor and his expatriate personnel shall respect all Indian Acts, Laws, rules and regulations and shall not in any way interfere with Indian political and religious affairs and shall conform to any other rules and regulations which the Government of India and the Employer may establish from time to time, on them. The Contractor's expatriate personnel shall work and live in close co-operation and coordination with their co-workers and the community and shall not engage themselves in any other employment neither part-time nor full-time nor shall they take part in any local politics.
45.06.00	The Employer shall assist the Contractor, to the extent possible, in obtaining necessary permits to travel to India and back, by issue of necessary certificates and other information needed by the Government agencies.
46.00.00	**FOUNDATION DRESSING & GROUTING FOR EQUIPMENT/ EQUIPMENT BASES**
46.01.00	The surfaces of foundations shall be dressed to bring the top surface of the foundations to the required level, prior to placement of equipment/equipment bases on the foundations.
46.02.00	All the equipment/ equipment bases, shall be grouted and finished by bidder as per these specifications unless otherwise recommended by the equipment manufacturer.
46.03.00	The concrete foundation surfaces shall be properly prepared by bidder by chipping, grinding as required to bring the top of such foundation to the required level, to provide the necessary roughness for bondage and to assure enough bearing strength.
46.04.00	**Grout** The grout for equipment foundation shall be high strength grout having a minimum characteristic compressive strength of 60 N/mm2 at 28 days. The grout shall be ready mix non-shrink, chloride - free, cement based, free flowing, non-metallic grout

as recommended by equipment manufacturer. The ready mix grout shall be of reputed make as approved by the Employer.

The Grout shall have good flowability even at very low water/ grout powder ratio.

The Grout shall have characteristics of controlled expansion to be able to occupy its original volume to fill the voids and to compensate for shrinkage. Grout shall be of pre-mix variety so that only water needs to be added before use.

The mixing of the Grout shall conform to the recommendations of the manufacturer of the Grout.

46.05.00 **Placing of Grout**

46.05.01 After the base has been prepared, its alignment and level has been checked and approved and before actually placing the grout, a low dam shall be set around the base at a distance that will permit pouring and manipulation of the grout. The height of such dam shall be at least 25mm above the bottom of the base. Suitable size and number of chains shall be introduced under the base before placing the grout, so that such chains can be moved back & forth to push the grout into every part of the space under the base.

46.05.02 The grout shall be poured either through grout holes if provided or shall be poured at one side or at two adjacent sides to make the grout move in a solid mass under the base and out in the opposite side. Pouring shall be continued until the entire space below the base is thoroughly filled and the grout stands at least 25 mm higher all around than the bottom of the base. Enough care should be taken to avoid any air or water pockets beneath the bases.

46.05.03 In addition to the above, recommendations of Grout manufacturer shall also be followed.

46.06.00 **Finishing of the Edges of the Grout**

The poured grout should be allowed to stand undisturbed until it is well set. Immediately thereafter, the dam shall be removed and grout which extends beyond the edges of the structural or equipment base plates shall be cut off, flushed and removed. The edges of the grout shall then be pointed and finished with 1:2 cement mortar pressed firmly to bond with the body of the grout and smoothened with a tool to present a smooth vertical surface. The work shall be done in a clean and scientific manner and the adjacent floor spaces, exposed edges of the foundations, and structural steel and equipment base plates shall be thoroughly cleaned of any spillage of the grout.

46.07.00 **Checking of Equipment After Grouting**

After the grout is set and cured, the Contractor shall check and verify the alignment of equipments, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings, etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during such post grouting check- up and verifications. Such pre and post grout records of alignment details shall be maintained by the Contractor in a manner acceptable to the Employer.

47.00.00 SHAFT ALIGNMENTS

All the shafts of rotating equipment shall be properly aligned to those of the matching equipments to as perfect an accuracy as practicable. The equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment. The vibration level of rotating equipments measured at bearing housing shall conform to Zone A of ISO 10816. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.

48.00.00 DOWELLING

All the motors and other equipment shall be suitably doweled after alignment of shafts with tapered machined dowels as per the direction of the Employer.

49.00.00 CHECK OUT OF CONTROL SYSTEMS

After completion of wiring, cabling furnished under separate specification and laid and terminated by the Employer, the Contractor shall check out the operation of all control systems for the equipment furnished and installed under these specifications and documents.

50.00.00 COMMISSIONING SPARES

50.01.00 It will be the responsibility of the Contractor to provide all commissioning spares including consumable spares required for initial operation till the Completion of Facilities. The Contractor shall furnish a list of all commissioning spares within 60 days from the date of Notification of Award and such list shall be reviewed by the Employer and mutually agreed to. However. such review and agreement will not absolve the Contractor of his responsibilities to supply all commissioning spares so that initial operation do not suffer for want of commissioning spares. All commissioning spares shall be deemed to be included in the scope of the Contract at no extra cost to the Employer.

50.02.00 These spares will be received and stored by the Contractor atleast 3 months prior to the schedule date of commencement of initial operation of the respective equipment and utilised as and when required. The unutilised spares and replaced parts, if any, at the end of successful completion of guarantee tests shall be the property of the Contractor and he will be allowed to take these parts back at his own cost with the permission of Employer.

51.00.00 CABLING

51.01.00 All cables shall be supported by conduits or cable tray run in air or in cable channels. These shall be installed in exposed runs parallel or perpendicular to dominant surfaces with right angle turn made of symmetrical bends or fittings. When cables are run on cable trays, they shall be clamped at a minimum intervals of 2000mm or otherwise as directed by the Employer.

51.02.00 Each cable, whether power or control, shall be provided with a metallic or plastic tag of an approved type, bearing a cable reference number indicated in the cable and conduit list (prepared by the Contractor), at every 5 meter run or part thereof and at both ends of the cable adjacent to the terminations. Cable routing is to be done in such a way that cables are accessible for any maintenance and for easy identification.

51.03.00 Sharp bending and kinking of cables shall be avoided. The minimum radii for PVC insulted cables 1100 V grade shall be 15 D where D is the overall diameter of the cable. Installation of other cables like high voltage, coaxial, screened,

compensating, mineral insulated shall be in accordance with the cable manufacturer's recommendations. Wherever cables cross roads and water, oil, sewage or gaslines, special care should be taken for the protection of the cables in designing the cable channels.

51.04.00 In each cable run some extra length shall be kept at a suitable point to enable one or two straight through joints to be made, should the cable develop fault at a later date.

51.05.00 Control cable terminations shall be made in accordance with wiring diagrams, using identifying codes subject to the Employer's approval. Multicore control cable jackets shall be removed as required to train and terminate the conductors. The cable jacket shall be left on the cable, as far as possible, to the point of the first conductor branch. The insulated conductors from which the jacket is removed shall be neatly twined in bundles and terminated. The bundles shall be firmly but not tightly tied utilising plastic or nylon ties or specifically treated fungus protected cord made for this purpose. Control cable conductor insulation shall be securely and evenly cut.

51.06.00 The connectors for control cables shall be covered with a transparent insulating sleeve so as to prevent accidental contact with ground or adjacent terminals and shall preferably terminate in Elmex terminals and washers. The insulating sleeve shall be fire resistant and shall be long enough to over pass the conductor insulation. All control cables shall be fanned out and connection made to terminal blocks and test equipment for proper operation before cables are corded together.

52.00.00 EQUIPMENT DELIVERY AND ERECTION

52.01.00 General Requirements

(a.) This part covers Contractor's responsibilities for packing, shipping, ware-housing and the installation of all equipment and materials furnished and installed under this specification.

(b.) The Contractor shall submit for Employer's approval draft manual for Equipment Delivery and Erection (EDE Manual) covering detailed instructions, write up, technical data, drawings, check-lists, documentation formats for all activities after equipment manufacture upto installation of equipment. This manual shall cover general instructions for all equipment and specific instructions for individual equipment wherever required and shall include at least the following:

(1.) Instructions for packing, shipping, receiving handling, ware-housing and storage.

(2.) Instructions for location and installation of equipment furnished by this specification.

(3.) Installation drawings for field mounted equipment, panels, cubicles and other equipment covered under this specification.

(4.) Instruction relating installation of piping/ tubing, support and routing drawings of impulse pipes/signal tubes and tube/cable trays.

(5.) Check lists and quality assurance hold points.

(6.) Format for all related documentation.

(c.) The EDE Manual shall conform to the requirements of this specification, all applicable codes and standards, recommendations of equipment

manufacturers and accepted good engineering practices and shall be subject to Employer approval during detailed engineering.

(d.) The Contractor shall ensure that all work under this part shall be performed as per the requirements of this specification, Employer approved EDE Manual and drawing/documents approved by the Employer during detailed engg.

52.02.00 **Crating**

(a.) All equipment and materials shall be suitably coated, wrapped, or covered and boxed or crated for moist humid tropical shipment and to prevent damage or deterioration during handling and storage at the site.

(b.) Equipment shall be packed with suitable desiccants, sealed in water proof vapour-proof wrapping and packed in lumber of plywood enclosures, suitably braced, tied and skidded. Lumber enclosures shall be solid, not slatted.

(c.) Desiccants shall be either silica gel or calcium sulphate, sufficiently ground to provide the required surface area and activated prior to placing in the packaging. Calcium sulphate desiccants shall be of a chemical nature to absorb moisture. In any case, the desiccant shall not be of a type that will absorb enough moisture to go into solution. Desiccants shall be packed in porous containers, strong enough to withstand handling encountered during normal shipment. Enough desiccant shall be used for the volumes enclosed in wrapping.

(d.) Review by the Employer of the Contractor's proposed packaging methods shall not relieve the Contractor of responsibility for damage or deterioration to the equipment and materials specified.

(e.) All accessory items shall be shipped with the equipment. ; Boxes and crates containing accessory items shall be marked so that they are identified with the main equipment. The contents of each box and crates shall be indicated by markings on the exterior.

(f.) All boxes, crates, cases bundles, loose pieces, etc. shall be marked consecutively from No.1 upward throughout all shipments from a given port to completion of the order without repeating the same number.

(g.) An itemized list of contents shall be enclosed inside each case and one other copy securely fastened to the outside of the case in a tin or light weight sheet metal envelope or pocket. The lists shall be plainly marked and placed in accessible locations to facilitate receipt and inspection. The packing list shall indicate whether shipment is partial or complete and shall incorporate the following information on each container, etc., according to its individual shipping number:

a) Export case markings
b) Case number
c) Gross weight and net weight in Kilograms
d) Dimensions in centimeters
e) Complete description of material

(h.) Packaging or shipping units shall be designed within the limitations of unloading facilities and the equipment which will be used for transport. Complications involved with ocean shipment and the limitations of ports, railways and roads shall be considered. It shall be the Contractor's

responsibility to investigate these limitations and to provide suitable packaging to permit safe handling during transit and at the job site.

(i.) Electrical equipment, control and instrumentation shall be protected against moisture and water damage. All external gasket surfaces and flange faces, couplings, motor pump shafts, bearing and like items shall be thoroughly cleaned and coated with rust preventive compound as specified above and protected with suitable wood, metal or other substantial type covering to ensure their full protection.

(j.) Equipment having antifriction or sleeve bearings shall be protected by weather tight enclosures.

(k.) Coated surfaces shall be protected against impact, abrasion, discolouration and other damage. Surfaces which are damaged shall be repaired.

(l.) All exposed threaded parts shall be greased and protected with metallic or other substantial type protectors. All female threaded openings shall be closed with forged steel plugs. All pipings, tubing, and conduit equipment and other equipment openings shall be sealed with metallic or other rough usage covers and tapped to seal the interior of the equipment piping, tubing, or conduit.

(m.) Provisions shall be made to ensure that water does not enter any equipment during shipment or in storage at the plant site.

(n.) Returnable containers and special shipping devices shall be returned by the manufacturer's field representative at the Contractor's expense.

(o.) While packaging the material, care shall be taken for the limitation from the point of view of availability of railway wagon sizes in India.

52.03.00 **Factory Assembly**

(a.) Instrument enclosures shall be supplied and erected completely in the factory with instrument, air supply and blow down piping with necessary valves, fittings, etc. and also all electrical wiring between the instruments and the enclosure terminal blocks. Control panel and cubicles shall also be fully wired in the factory. Control panel mounted equipments are to be dismounted from the panels before shipment and individually packed for shipment. Electronic control modules of the plug-in type are to be removed from equipment racks after factory checkout are individually packed for shipment. Other equipment shall be fully assembled at the factory, except for necessary shipping splits in panels.

(b.) All separately packaged accessories items and parts shall be shipped with the equipment. Containers for separately packaged items shall be marked so that they are identified with the main equipment. An itemized packing slip, indicating what is in that carton only, shall be attached to the outside and inside of each container used for packing.

A master packing slip covering all accessories items for a given piece of equipment which are shipped in separate containers, shall be attached to one container.

52.04.00 **Equipment Installation**

(a.) **General Requirements**

(1.) The Contractor shall furnish all construction materials, tools and equipment and shall perform all work required for complete installation of all equipments furnished under this specification.

(2.) Contractor shall prepare detailed installation drawings for each equipment furnished under this specification for Employer's approval. Installation of all equipment/systems furnished by this specification shall be as per Employer's approval.

(3.) Erection procedures not specified herein shall be in accordance with the recommendations of the equipment manufacturers. The procedures shall be acceptable to the Employer.

(4.) The Contractor shall coordinate his work with other suppliers where their instruments and devices are to be installed under specifications.

(b.) **Installation Materials**

All materials required for installation, testing and commissioning of the equipment shall be furnished by the Contractor.

(c.) **Regulatory Requirements**

All installation procedures shall confirm with the accepted good engineering practice and with all applicable governmental laws, regulations and codes.

(d.) **Cleaning**

All equipment shall be cleaned of all sand, dirt and other foreign materials immediately after removal from storage and before the equipment is brought inside the power plant building or to other installation sites. All piping and tubes shall be air blown.

(e.) **Equipment Assembly**

Equipment installed under these specifications shall be assembled if shipped unassembled. The equipment shall be dismantled and reassembled as required to perform the installation and commissioning work described in these specifications.

(f.) **Equipment Setting**

Field mounted instruments and accessories shall be bracket or sub panel mounted on the nearest suitable firm steel work or masonry. The brackets, stands, supports and other miscellaneous hardware required for mounting instruments and accessories such as receiver gauge, air set, valve manifold, purge-meter etc. shall be furnished and installed. No field mounted instruments shall be installed such that it depends for support or rigidity on the impulse piping or on electrical connection to it.

Indicating type field mounted instruments shall be installed in such a way that centre of indicating dial shall be about 1600-1800mm from operating floor level. Non-indicating type field instruments shall be installed such that operating handle of manifold block / isolating cock comes within 1600 mm from operating floor level.

(g.) **Free-Standing Equipment**

Free-standing Cabinets shall be attached to the floor, concrete equipment bases or supporting steel as indicated on the manufacturer's drawings and the Employer's Plant Arrangement Drawings. The cabinets shall be shimmed for proper alignment before bolting them to the floor. Adjacent enclosures shall be shimmed to maintain mutually level appearance before they are attached to floor. Vibration dampening mounts shall be installed between supporting structures and panels when specified.

(h.) **Non-free Standing Equipment**

(1.) Non-free standing local enclosures and cabinets shall be mounted in accessible locations on columns, walls, or stands in locations as indicated on the Employer's Plant Arrangement Drawings. Bracket and stands shall be fabricated as required to install the local enclosures and cabinets in a workman like manner.

(2.) Rough edges and welds on all fabricated supports shall be ground smooth. The supports shall be finished with two coats of primer and two coats of paint as specified in this part.

(i.) **Equipment Location**

(1.) All individual items of equipment not located in cabinets or on panels and racks are located approximately according to the floor elevation and the nearest building column designated by the Employer.

(2.) Solenoid valves not located in enclosures or mounted on valves shall be mounted in easily accessible protected locations near the components with which they are associated.

(3.) All brackets, stands, supports and other miscellaneous hardware required for mounting devices shall be furnished and installed.

(4.) Thermometers shall be installed in the process lines and ducts as required and adjusted for ease in reading.

(5.) Permanent temperature wells on the main steam, hot reheat and cold reheat piping shall not be installed until steam blowing has been completed. Temporary temperature wells shall be installed in the main and reheat steam piping during steam blow and discarded after completion.

(6.) Any required adapting hardware such as pipe bushings, nipples, drilled caps and the like shall be provided for complete installation of control devices into process connections.

For location of C&I related equipment/devices, the requirement specified elsewhere in the technical specification may be referred.

(j.) **Installation of Field Mounted Instruments and Devices**

The Contractor shall submit installation drawings for all field mounted equipment furnished under this specification for Employer's approval. These drawings shall meet the requirements of this specification, installation drawings, applicable codes and standards and recommendations of manufacturers of instruments/devices. All installation work under this specification shall be strictly as per installation drawings approved by the Employer during detailed engineering stage.

In addition to above relevant Portion as specified elsewhere in technical specification may be referred.

(k.) **Piping Connections**

(1.) All equipment having piping connections shall be levelled, aligned and wedged in place but shall not be grouted or bolted prior to the initial fitting and alignment of connecting piping. All equipment shall, however, be grouted or bolted to its foundation prior to final bolting or welding of the connection piping.

(2.) All flanged joints shall be checked and retightened after approximately 10 days of operation at normal operating temperature.

(l.) **Equipment Checkout**

(1.) All equipment shall be cleaned after installation. Equipment subject to pressure differentials shall be checked for leakage.

(2.) After erection, all equipment having moving parts, having electrical apparatus, or subject to pressure differentials shall be trial-operated.

(m.) **Defects**

(1.) All defects in erection shall be corrected to the satisfaction of the Employer and the Project Manager. The dismantling and reassembly of Contractor furnished equipment to remove defective parts, replace parts, or make adjustments shall be included as a part of the work

under these specifications.

(2.) The removal of control and instrument equipment in order to allow bench calibration, if required, and the re-installation of the said equipment after calibration shall also be included as a part of the work under these specifications.

(n.) **Equipment Protection**

(1.) All equipment to be erected under these specifications shall be protected from damage of any kind from the time of contract award until commissioning of each unit.

(2.) The equipment shall be protected during storage as described herein.

(3.) Equipment shall be protected from weld spatter during construction.

(4.) Suitable guards shall be provided for protection of personnel on all exposed rotating or moving machine parts. All such guards with necessary spares and accessories shall be designed for easy removal and maintenance.

(5.) Equipment having glass components such as gauges, or equipment having other easily breakable components, shall be protected during the construction period with plywood enclosures or other suitable means. Broken, stolen, or lost components shall be replaced by the Contractor.

(6.) Machine finished surfaces, polished surfaces, or other bare metal surfaces which are not to be painted, such as machinery shafts and couplings shall be provided temporary protection during storage and

constructional periods by a coating of a suitable non- drying, oily type, rust preventive compound.

53.00.00 WELDING - SPECIAL REQUIREMENTS

If the manufacturer has special requirements relating to the welding procedures for welds at the terminals of the equipments to be performed under separate specifications, the requirements shall be submitted to the Project Manager in advance of commencement of erection work.

54.00.00 DEVIATIONS DISPOSITIONING:

Any deviation to the contract and employer approved documents shall be properly recorded in the format prescribed by NTPC. All the deviations shall be brought to the knowledge of employer's representative for suitable dispositioning.

55.00.00 NON-DESTRUCTIVE TESTING (NDT):

The contractor shall record results of NDTs carried out at site in the format acceptable to employer. All the radiographs & its report duly signed & correlated to the job shall be handed over to the employer. Sensitivity of all the test equipment shall be compatible to the job & acceptance norms agreed.

Computed RT shall be used as an advanced Engineering Practice. Main contractor to ensure minimum 10% computed radiography of weld joint to be performed in construction phase for scope agreed in FWS for boiler pressure parts. Main contractor to ensure the transfer & storage of these records in Server

55.01.00 Sub contracting of NDT & PWHT / SR Agencies- NDT & PWHT / SR contract shall be directly awarded by the main contractor to their approved NDT & PWHT / SR agencies .

56.00.00 TESTING EQUIPMENT & FACILITIES:

Contractor shall provide the testing equipment and facilities necessary to carry out tests & inspections.

ANNEXURE-I

STANDARD CHECKLIST

COMMISSIONING/TESTING ESSENTIAL PRE-REQUISITE

1. MECHANICAL

(A.) **VALVES**

(1.) MANUALLY OPERATED VALVE
(2.) ELECTRICALLY OPERATED VALVE
(3.) PNEUMATICALLY ACTUATED VALVE
(4.) HYDRAULICALLY ACTUATED VALVE
(5.) SAFETY VALVE
(6.) ELECTROMATIC RELIEF VALVE
(7.) STEAM TRAP
(8.) BUTTERFLY VALVE (ELECTRICALLY OPERATED)
(9.) BUTTERFLY VALVE (MANUALLY OPERATED)
(10.) BUTTERFLY VALVE (FOUR WAY-ELECTRICAL)
(11.) NON-RETURN VALVE (INCLUDING HYDRAULIC/PNEUMATIC FCNRVS)
(12.) THREE WAY CONTROL VALVE
(13.) RELIEF VALVE
(14.) DIFFERENTIAL PRESSURE REGULATING VALVE
(15.) FLOAT OPERATED VALVES

(B.) TANKS AND PRESSURRE VESSELS

(1.) TANKS (METAL) UPTO 20 M2
(2.) TANKS (LARGE STORAGE)
(3.) PRESSURE VESSEL (BELOW 17 BARS)
(4.) AIR RECEIVER
(5.) PRESSURE VESSEL-ACCESS DOOR
(6.) TURBINE MAIN OIL TANK

(C.) PUMPS

(1.) PUMP LOW PRESSURE CENTRIFUGAL (MOTOR DRIVEN)
(2.) PUMP UP TO 350 HP (260 KW)
(3.) PUMP SUMP INSTALLATION
(4.) GEAR PUMP/SCREW PUMP

(D.) PIPE WORK SYSTEM

(1.) STEAM SERVICES

(2.) WATER SERVICES
(3.) OIL/FIRE RESISTANT FLUID SYSTEM
(4.) AIR SERVICES (COMPRESSOR)
(5.) HIGH PRESSURE SERVICES
(6.) CONSTANT LOAD SUPPORT
(7.) SPRING SUPPORTS
(8.) HANGERS AND OTHER SUPPORTS

(E.) STRAINER AND FILTER
(1.) STRAINER/FILTER BASKET TYPE
(2.) STRAINER ROTARY (LOW PRESSURE)
(3.) FILTER & STRAINERS CENTRIFUGAL SEPARATORS
(4.) FILTER & STRAINER Y-TYPE
(5.) FILTER & STRAINER (PLATE TYPE)
(6.) PURIFIER
(7.) FILTER-COMPRESSED AIR LINE

(F.) HEAT EXCHANGER
(1.) HEAT EXCHANGER (GENERAL)
(2.) HEAT EXCHANGER-OIL/WATER
(3.) ROTARY AIR HEATER

(G.) FANS AND COMPRESSORS
(1.) FANS-NON-PRESSURE LUBRICATED
(2.) FANS-AXIAL FLOW PRESSURE LUBRICATED
(3.) COMPRESSORS-GENERAL
(4,) DAMPERS & GATES

(H.) CRANES AND ELEVATORS
(1.) AUXILIARY OVERHEAD/GANTRY CRANE
(2.) TRAVEL SUPPORT STRUCTURE FOR CRANE
(3.) LONG TRAVEL & CROSS TRAVERSE MOTION OF CRANE
(4.) MAIN AUX. HOIST MOTION (CRANE)
(5.) ELECTRIC HOIST

(I.) POWER TRANMISSION
(1.) POWER TRANSMISSION GEAR BOX
(2.) BEARING
(3.) FLUID COUPLINGS

2. ELECTRICAL

(1.) SWITCHYARD

(2.) POWER TRANSFORMERS, LT INDOOR TRANSFORMERS, OUTDOOR TRANSFORMERS.

(3.) BATTERY CHARGERS, DC BATTERIES, DG SETS, STATION LIGHTING, OVERHEAD LINES.

(4.) MV BUS DUCTS

(5.) D.C. MOTOR

(6.) HV SQUIRREL CAGE INDUCTION MOTOR

(7.) 415 V SQUIRREL CAGE INDUCTION MOTOR

(8.) MOTOR OPERATED ACTUATORS

(9.) LT SWITCHGEARS/MCC

- (I.) STANDARD CHECLISTS FOR ALL TYPES OF RELAYS USED IN SWITCHGEARS PROTECTION SYSTEM
- (II.) PT CARRIAGE AND CUBICLES
- (III.) CABLE/BUS DUCT/BUS BARS
- (IV.) CONTRACTOR MODULE
- (V.) SWITCH FUSE MODULE
- (VI.) MASTER PANEL OF LUBE OIL PANEL
- (VII.) FEEDER PANEL OF LUBE OIL PANEL
- (VIII.) SPACE HEATER AND CABLE MODULE
- (IX.) CONTROL TRANSFORMER MODULE
- (X.) HT CIRCUIT BREAKER
- (XI.) 415 V CIRCUIT BREAKER

(10.) POWER CABLE

(11.) CONTROL CABLE

(12.) AUXILIARY CABLE

(13.) D.C. CABLE

(14.) EXPLOSION PROOF ELECTRICAL EQUIPMENT

(15.) JUNCTION BOX

(16.) CONTROL TRANSFORMER MODULE

(17.) BRUSH GEAR ASSEMBLY

(18.) AUX. CONTROL AND RELAY PANEL DESK

(19.) INDICATING INSTRUMENT

(20.) RECORDING INSTRUMENT

(21.) INTEGRATING INSTRUMENT

3. CONTROL & INSTRUMENTATION

(A.) CONDUCTIVITY ANALYSING EQUIPMENT INCLUDING TEST PROCEDURES

(B.) PH ANALYSER INCLUDING TEST PROCEDURE

(C.) SILICA ANALYSER

(D.) LEVEL SWITCH (FLOAT ACTUATED)

(E.) LEVEL SWITCH (ELECTRODE TYPE)

(F.) LEVEL SWITCH (DISPLACER ACTUATED)

(G.) TRANSMITTER (FLOAT OPERATED PNEUMATIC OUTPUT) INCLUDING TESTING PROCEDURE

(H.) LEVEL INDICATOR (FLOAT/PULLEY TYPE)

(I.) LOCAL TEMPERATURE INDICATORS INCLUDING TEST PROCEDURE

(J.) RESISTANCE THERMOMETER ELEMENT INCLUDING TEST PROCEDURE

(K.) THERMOCOUPLE ELEMENT AND CONNECTING CABLE

(L.) THERMOCOUPLE AND RESISTANCE THERMOMETER CONVERTOR/TRANSMITTER INCLUDING TEST PROCEDURES.

(M.) TEMPERATURE SWITCH/THERMOSTAT INCLUDING TEST PROCEDURES

(N.) COLD JUNCTION BOXES

(O.) ZENER BARRIER

(P.) O2 ANALYSER

(Q.) O2 IN HYDROGEN INCLUDING TEST PROCEDURES

(R.) PRESSURE AND VACUUM GAUGE

(S.) PRESSURE AND VACUUM SWITCH INCLUDING TEST PROCEDURE

(T.) DIFFERENTIAL PRESSURE TRANSMITTER INCLUDING TEST PROCEDURE

(U.) DIFFERENTIAL PRESSURE SWITCH INCLUDING TEST PROCEDURE.

(V.) FLOW INDICATOR (VARIABLE AREA)

(W.) ORIFICE PLATE

(X.) TURBINE FLOW TRANSMITTER

(I.) FLOW SWITCH

(II.) WEIR

(III.) NOZZLE

(IV.) FLOW INDICATOR (PNEUMATIC INPUT) INCLUDING TEST PROCEDURE

(V.) FLOW INTEGRATOR (PNEUMATIC INPUT) INCLUDING TESTPROCEDURE

(VI.) FLOW INDICATOR (FLOAT OPERATED) INCLUDING TEST PROCEDURE

(VII.) VENTURI (FLUID)

(VIII.) FLOW SWITCH (MAGNETIC TYPE)

(IX.) AVERAGING INLET

(X.) LIMIT SWITCHES

(Y.) TURBINE SUPERVISORY MEASURING SYSTEM

(Z.) POSITION MEASUREMENT AND INDICATION INCLUDING TEST PROCEDURES

(AA.) TACHOMETER

(BB.) VIBRATION MEASUREMENT

(CC.) DIGITAL INDICATOR

(DD.) MOVING COIL INDICATOR INCLUDING TEST PROCEDURE

(EE.) RECORDER INCLUDING TEST PROCEDURE

(FF.) FLAME SCANNER

(GG.) ELECTRICAL AUTO MANUAL CONTROL STATION

(HH.) PUSH BUTTON MODULE

(II.) ALARM ANNUNCIATOR EQUIPMENT INCLUDING TEST PRO

(JJ.) TEST PROCEDURE FOR ELECTRONIC MODULES OF DDCMIS

KK.) THERMO CONTROL VALVE

(LL.) TEST PROCEDURE FOR ADJUSTMENT OF MODULATING CONTROLLER - PID TERMS

(MM.) TEST PROCEDURE INDICATING CONTROLLER-ELECTRICAL INPUT AND PNEUMATIC OUTPUT

Note: The items which are not part of this specification may be considered as not applicable.

ANNEXURE-II

BRIEF WRITE UP ON THE CONTENTS OF TESTING SCHEDULE / COMMISSIONING SCHEDULE

Testing Schedules should be designed to ensure that the plant area, equipment or apparatus are tested and commissioned and will operate as per the employer's specifications and good engineering practices.

Testing Schedule/Commissioning Schedule is required to be of a standard format in order to maintain consistency of presentation, content and reporting.

Testing Schedule/Commissioning Schedule should contain the following sections to make the document a self-contained one:

1. Plant Details/Design data
2. Testing Objective/Proposals
3. State of the Plant
   a) Erection Status with respect to Mech. Elect and C&I
   b) Availability of the services required
   c) Safety requirements as per Manufacturer's
4. Test method including completion/acceptance criteria
5. Results
6. Appendix
   a) Testing Programme
   b) Mech/Elect/C&I -Plant item completing list
   c) List of Drawing/documents required for carrying out the testing.

ANNEXURE - III

SAFETY PLAN

01. Safety Policy of the Contractor to be enclosed:
02. When was the Safety Policy last reviewed:
03. Details of implementation procedure / methods to implement Safety Policy / Safety Rules:
04. Name, Qualification, experience of Safety Officer
05. Review of Accidents Analysis Method, Methods to ensure Safety and Health:
06. Unit executive responsible to ensure Safety at various levels in work area:
07. List of employees trained in safety employed before execution of the job. Give the details of training:
08. Safety Training Targets, Schedules, methods adopting to providing safety training to all employees:
09. Details of checklist for different jobs / work and responsible person to ensure compliance (copy of checklist to be enclosed):
10. Regular Safety Inspection Methods and Periodicity and list of members to be enclosed:
11. Risk Assessment, Safety Audit by Professional Agencies, Periodicity:
12. Implementation of Recommendations of Audit / Inspections. Procedures for implementation and follow up:
13. Provision for treatment of injured persons at work site:
14. Review of overall safety by top Management and Periodicity:
15. System for Implementation of Statutory legislations:
16. Issue of PPEs to employees, Periodicity / stock on hand etc:

Signature

Head of the Organisation with date & stamp

ANNEXURE-IV

Health Safety and Environment (HSE) Policy and HSE Management Manual

1. INTRODUCTION

1.1 Background

NTPC safety policy and various safety requirement has already been indicated in the site regulation and safety section of GCC. This document shall be supplementary to above document and shall be read in conjunction with site regulation and safety section of GCC. In case of any contradiction, the stringent of the two requirements (in the opinion of the employer) shall prevail.

NTPC being India's largest power utility and a responsible corporate entity, the statement of policy on health and safety at work sets out the commitment of NTPC to manage health and safety effectively, and what shall be achieved by NTPC, the Contractor and any appointed sub- contractor.

NTPC, the Contractor and any appointed sub-contractor is committed to provide and maintain a safe and healthy workplace for all staff, and to provide the information, training and supervision needed to achieve this.

All involved parties are committed to protect the fundamental rights of all appointed workers and feel obliged to create a sound worker-management relationship as a key ingredient in a sustainable and successful project execution.

All involved parties will have to assume the responsibility for H&S procedures, and need to be made aware of their responsibilities and to comply with NTPC's H&S Policy.

The following requirements are mandatory for each worker in maintaining a safe and healthy workplace through:

- Being involved in the workplace H&S System;
- Sticking to correct procedures and equipment;
- Wearing protective clothing and equipment whenever required;
- Reporting any pain or discomfort as soon as possible;
- Ensuring that all accidents and incidents are reported;
- Helping new workers, trainees and visitors to the workplace understand the right safety procedures and why they exist;
- Telling the responsible managers immediately of any H&S concerns;
- Keeping the work place tidy to minimise the risk of any accidents.

The aim of all the stake holders is to achieve the following goals:

- Zero fatalities of workers, visitors or the public;
- Zero accidents and incidents of workers, visitors or the public;
- Zero harmful, hazardous or dangerous situations or occurrences;
- Zero environmental concerns or impacts;
- Continuous improvement of the health & safety performance at site under practical conditions.

1.2 Definition of Occupational Health & Safety

Since 1950, the International Labour Organization (ILO) and the World Health Organization (WHO) have shared a common definition of occupational health. It was adopted by the Joint ILO/WHO Committee on Occupational Health at its first session in 1950 and revised at its twelfth session in 1995 and is defined as follows:

Occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job.

"The main focus in occupational health is on three different objectives:

- the maintenance and promotion of workers' health and working capacity;
- the improvement of working environment and work to become conducive to safety and health and
- the development of work organizations and working cultures in a direction which supports health and safety at work and in doing so also promotes a positive social climate and smooth operation and may enhance productivity of the undertakings.

The concept of working culture is intended in this context to mean a reflection of the essential value systems adopted by the undertaking concerned. Such a culture is reflected in practice in the managerial systems, personnel policy, principles for participation, training policies and quality management of the undertaking."

Workers safety has to be understood as the practice of an employer using preventative measures to prevent hazards to the employees' personal safety. This practice includes creating plans and procedures for employees and managers in the workplace. In addition, workplace safety involves creating policies and keeping emergency materials available for employee and manager use while at a work site.

1.3 Purpose of the H&S Management Manual

The present H&E Management Manual shall delineate the Health and safety Requirements, incl. policies and guidelines, and outline the roles and responsibilities of the different parties involved in the implementation and oversight of Health, Safety and Environment Measures to ensure community, worker and public health and safety during construction.

The H&S Management Manual considers the applicable national occupational health, safety and welfare legislation as well as guidelines and standards established by the relevant Ministries and Authorities.

The H&S Management Manual other than Site Regulation and Safety provisions provided in Bidding Documents takes the following applicable IFC Performance Standards (PS) into account:

- PS 2: Labour and Working Conditions, dated January 1, 2012
- PS 3: Resource Efficiency and Pollution Prevention, dated January 1, 2012
- PS 4: Community, Health, Safety and Security, dated January 1, 2012.

The H&S Management Manual includes the Occupational Health & Safety Requirements and arrangements that are mandatory for the Contractor for consideration and implementation.

In case the provisions in Site Regulation and Safety provisions provided in Bidding Documents are superior than the provisions indicated in this manual, the provisions provided in Site Regulation and Safety provisions provided in Bidding Documents shall prevail.

The defined H&S Standards are part of the contractual obligations, and no changes are possible without a prior written approval by NTPC.

1.4 Content of the H&S Management Manual

The H&S Management Manual contains an outline of the required H&S Organization at site and to be implemented by the Contractor.

It describes the overall H&S Management required for the organization of a safe and healthy working environment for the workers and to ensure that the public will not be affected by the construction activities. In addition to the organizational arrangements roles and responsibilities of the required H&S Staff of the Contractor are defined.

Attention is paid to the need for training to be implemented by the Contractor. It starts with the evaluation of training needs and defines the requirement of developing a training schedule as well as workers and visitorinduction.

Communication procedures are addressed and needed H&S Reporting is specified for the entire construction period.

As one of the most important subjects, the entire risk management process is comprehensively described, specifying the risk management process, the hierarchy of control and the safe system of work.

Reporting and monitoring procedures are developed for the fulfillment bythe Contractor and the standards for PPE are included.

The H&S Management Manual shall highlight the entire H&S Management System and also provide information on the H&S Standards to be followed by the Contractor.

2. HEALTH & SAFETY MANAGEMENT SYSTEM

An H&S Management System is implemented for the Project. The management system comprises of different components to be developed bythe Contractor.

That the Contractor must implement human resource policies and procedures that set out the approach to manage workers consistent with the requirements of IFC PS 2 as well as the applicable national laws and standards.

2.1 Health & Safety Management Manual

Contractor will implements this H&S Management Manual in order to delineate the Project's H&S Requirements, Policies and Guidelines as well as to outline the roles and responsibilities of the different parties involved in the implementation and oversight of measures to ensure community, worker and public health and safety during construction.

2.2 Contractor's H&S Plans

All Contractors shall establish an effective project specific H&S Plan. TheH&S Plan will be subject of NTPC's written approval. The H&S Plan shall be submitted by the Contractor not later than 4 weeks prior to any commencement of works at site.

Any work at site, incl. mobilization to the site will not be allowed to commence until NTPC deems the Contractor's H&S plan to be suitableandsufficient.

The H&S Plan shall describe how health and safety will be managed at site, incl. mobilization and transport to the site, and how the specified H&S Standards will be applied in practice. In

addition the Contractor shall ensure adequate communication of these requirements throughout the supply chain,its supervision, and the workers themselves.

The H&S Plan shall specify the management arrangements for carrying outthe work including but not limited to:

- Overview of the project;
- Clearly identified risks associated with the scope of works;
- Program and milestones;
- Site management and organization;
- Key contractors and sub-contractors;
- Communication, Cooperation and Co-ordination;
- Site security;
- Traffic management;
- Welfare facilities and provision;
- Arrangements for supervision of contractors on site;
- Arrangements for information, instruction and training includinginduction;
- Management of hazards on site;
- Arrangements for identification of hazards, assessment of risk and production of Method Statements;
- Arrangements for hazardous undertakings e.g. confined space, work at height, hot work, excavations, cofferdams etc.;
- Permit to work system;
- Site rules;
- Arrangements for managing plant and equipment;
- Management or lifting operations;
- Management of temporary works;
- Arrangements for monitoring and auditing etc.;
- Requirements as defined by relevant statutory planning authorities e.g.traffic, noise, working hours etc.;
- Incident & accident investigation.

The H&S Plan shall also consider the site rules outlining the H&S Requirements for all workers. The site rules shall include but should not belimited to:

- Site access;
- Access to and transport on the site;
- Entering and leaving the site;
- Use of mobile phones;
- Smoking;
- PPE requirements;
- General behaviour;
- Transport to the site;
- Vehicle traffic within the site area;
- Access to the site and Working Areas;
- Restricted areas.

The H&S Plan shall consider related plans and the corresponding direct and indirect H&S Requirements. This refers especially to the following related plans and assessments:

- Hazardous materials and waste management plan;

A checklist for the review and approval of project specific H&S Plans shall be developed prior to the construction contract. The checklist shall define the minimum requirements to be met by the Contractor.

2.3 Contractor's H&S Procedures

The Contractor is requested to develop workplace specific H&S Procedures. In this matter, it should be noted that procedures are similar to method statements probably better known by Contractors. The required content of H&S Procedures is described below.

H&S Procedures are part of the Project framework for effective H&S Management. The H&S Policy states the intention to provide a safe andhealthy workplace, and states the H&S goals of a workplace.

Specific health & safety workplace procedures shall address particular issues or hazards and the measures how to control those identified hazards. The procedures should be used together with other hazard control measuresto eliminate or reduce the risks of accidents and incidents and illness and/orinjuries at the working place.

H&S Procedures shall be developed for the following activities expected to apply during construction:

- Site access control and site security procedure;
- Health & safety protection at transmission line worksites;
- Isolation and lock-out;
- Use of hazardous chemicals;
- Simultaneous activities;
- Live line work;
- Shift work, shift rotation and fatigue;
- X-ray and NDT;
- Risk assessment;
- Job Safety Analysis;
- Working at height;
- Working in confined spaces;
- Use of personal protective equipment;
- Excavation works;
- Hot works;
- Welding;
- Emergency response procedure;
- Evacuation procedure (if applicable);
- First aid;
- Working in water (if applicable);
- Use of electrical equipment;
- Work on high voltage.

This checklist shall define the minimum requirements to be met by the Contractor.

2.4 Contractor's Safe Work Instructions

Safe work instructions shall be developed by the Contractor identifying the health and safety issues that may arise from use of the machinery and equipment. The safe work instruction must be based on the H&S Plan.

A safe work instruction should identify:

- the hazard associated with the use of a specific tool or equipment;
- the required control measures to be checked to ensure a safe use of aspecific tool or piece of equipment;
- the specific training and/or qualification required;
- the personal protective equipment to be worn.

Safe work instructions do not replace the requirement for a risk assessment,preparation of a workplace procedure, the need of a permit to work or the need for training.

A risk assessment of the equipment must be performed before developing safe work instruction procedures to identify the hazards and risk controls.

A checklist for the review and approval of project specific Safety Work Instructions will be developed by the PIC prior to the first construction contract. The checklist will define the minimum requirements to be met bythe Contractor.

2.5 Contractor's H&S Forms

The Contractor must develop forms like checklists for risk assessment etc. to support the support the use of workplace procedures, instructions, audits etc.

These forms must be attached to the respective documents, and must be read in closed conjunction with the corresponding document(s).

The checklists shall be subject of an update and revision in case improvements or needed changes were found suitable and required.

The checklists must be subject of project documentation, in the same wayand considering the same procedure that is applicable for the project documentation in general.

H&S Forms have to comprise the following subjects as a minimum:

- Contractor Audit Questionnaire
- Basic Risk Assessment
- Permit to Work
- Workplace Inspection Checklist
- Accident/Incident Report/Investigation
- Fire Risk Assessment
- Hazardous Substance Risk Assessment
- Ladder Inspection Checklist.

The forms to be used by the Contractor must include all pertinent information. Additional forms like inspection checklists, workplace inspection checklists might be necessary and should be prepared by the Contractor and are subject of approval by NTPC.

2.6 Contractor's Grievance Management System

2.6.1 Workers Grievance Management System

The Contractor must implement a grievance management system to enable the workers to raise complaints and to inform about non-compliances with the implemented H&S

Management System. The grievance management system should provide the possibility to issues complaints in case of discrimination and/or the non-consideration of equal opportunities.

The grievance management system shall consider the possibility to contact directly a member of the H&S Staff. The contacted staff members must take a note of the reported complaint or non-compliance and must report it to thesite manager and the H&S Manager.

The H&S Management is requested to solve a complaint or non-compliancewithin 3 working days. In case the problem could not be solved an action procedure specifying the needed activities together with a final deadline until the problem is expected to be solved must be prepared and submitted to NTPC.

The Contractor is requested to provide the possibility for the workers to notify a complaint or non-compliance in a confidential way.

2.6.2 Public Grievance Management System

The grievance management system shall also be open for public complaints.

A respective procedure must be developed by the Contractor for review and approval. The grievance management system for the public must consider areporting procedure to the local authority to demonstrate to the administrative body that the complaint was identified, noted, managed and solved.

The responsible authorities at the community level must be identified by the Contractor 4 weeks prior to the start of the construction activities or 4 weeksprior to the mobilization to the site.

The reporting procedure should be discussed and agreed upon together with the administrative body and specific attention should be paid to any specific requirements to be announced by the authority. The contact with the authority should be established by having a face-to-face meeting. This meeting should be attended by an H&S Representative of the Contractor.

2.7 H&S Committee

It shall be governed by site regulation and safety requirement as stipulated in GCC

3. ROLES, RESPONSIBILITIES AND ACCOUNTABILITY

It shall be governed by site regulation and safety requirement as stipulated in GCC

3.2.1 Child Labour

The contractor shall not deploy any person below the age of 18 years.

3.2.2 Pregnant Woman

Pregnant employees have the following four major prerogatives:

- paid time off for antenatal care
- maternity leave
- maternity pay
- protection against unfair treatment, discrimination or dismissal.

In addition, the contractor must not change a pregnant employee's contract terms and conditions without agreement. If this will be done by a contractor, it has to be handled as a breach of contract.

It's illegal for contractor to refuse to give pregnant employees time off for antenatal care or refuse to pay their normal rate for this time off.

The following rights shall be considered:

- Pregnancy-related illnesses
  If the employee is off work for a pregnancy-related illness in the 4 weeks before the expected date of birth of the child, maternity leave and statutory maternity pay by the employer has to start automatically.
- Compulsory maternity leave
  In case the employee does not take statutory maternity leave, they musttake 4 weeks off after the child is born.
- Telling the contractor about the pregnancy
  Employees are obliged to inform their contractor about the pregnancy at least 15 weeks before the beginning of the week of the expected date ofbirth or, in case of unawareness of the pregnancy during this timeframe,the contractor must be told as soon as possible.

  Employees must also tell the contractor when they want to start their statutory maternity leave and pay.
- Health and safety for pregnant employees
  After the receipt of information about the pregnancy of an employee, theemployer should assess the risks to the woman and her baby.

  Risks could be caused by:

  - heavy lifting or carrying
  - standing or sitting for long periods without adequate breaks
  - exposure to toxic substances
  - long working hours
  - vibration and mechanical shocks
  - extreme heat
  - noise
  - ionising radiation
  - non-ionising (electromagnetic) radiation
  - carbon monoxide
  - lead
  - polychlorinated Byphenyls
  - organic solvents
  - pesticides and herbicides
  - tobacco smoke.

The MSDS to be provided together with each chemical substance to be in use or to be delivered at the construction site, storage area etc. should highlight the category.

Where there are risks, the contractor should take reasonable steps to removethe risks or by offering the employee different work or work places or by changing the working hours by the adaption of sufficient breaks.

In case the contractor can't remove any risks, the contractor must suspend theemployee on full pay and without any reduction.

Pregnant worker who think they're at risk but their employer disagrees should report to NTPC's H&S Manager during a site audit.

The contractor is obliged to inform every pregnant employee about theirrights in writing and this information must be recorded.

Apart from above, all the provisions of Maternity Benefit Act, 1961 as applicable from time to time, shall be complied with by the contractor.

4. TRAINING

It shall be governed by site regulation and safety requirement as stipulated in GCC

5. HEALTH & SAFETY REPORTING

5.1 Contractors Reporting Obligations

Independent from the general requirement and contractual obligations to implement a reporting scheme with respect to the progress, construction schedule and project reporting in general, the Contractor will be obliged to implement an H&S Reporting.

The H&S Reporting should provide an overview of the H&S Performancewithin a particular timeframe and with specific topics as mentioned below:

The H&S Reports should be submitted to NTPC Project Manager

5.1.1 Health & Safety Performance

5.1.1.1 Weekly Reports

The Contractor shall prepare weekly H&S reports. The weekly reports shall be submitted by close of business on the first working day after a completedworking week, e.g. the reporting timeframe is from Monday to Saturday and the respective following working day is the upcoming Tuesday, if not a public holiday.

The weekly reports shall comprise of the following information with respect to the reporting timeframe:

- Originator
- Name of the project
- Activities performed
- Health occurrences
- Safety occurrences
- Resulting accidents, incidents or dangerous situations
- Undertaken measures.

5.1.1.2 Monthly Reports

The Contractor shall prepare monthly H&S reports. The monthly reports shall be submitted by close of business of the last working day of the first working week after the reporting timeframe, e.g. the reporting timeframe is from 1st of January until 31 of January and the due day of the submission ofthe report is the Friday of the first working week in February, if not a publicholiday.

The weekly reports shall comprise of the following information with respect to the reporting timeframe:

- Originator
- Name of the project
- Activities performed
- Health occurrences
- Safety occurrences

- Resulting accidents, incidents or dangerous situations
- Investigation results
- Undertaken measures
- Lessons learned
- Informed authorities and resulting obligations/conditions
- Results of workplace inspections.

5.1.2 **Hazards Reporting**

The H&S Staff of the contractor is requested to undertake workplace inspections. In case that hazards and risks are identified during workplace inspections, it is needed that the identified hazard or risk has to be solved immediately and without delay during the inspection.

In case that the problem could not be solved, a written report has to be prepared and issued to the H&S Manager or site manager highlighting:

- a description of the problem;
- the reason why it could not be solved during the inspection;
- the needed action;
- the responsible person;
- the associated hazards and risks;
- the deadline until the problem must be solved.

The occurrence must be reported in the monthly H&S Report.

Any other reporting requirements with respect to H&S, e.g. audit reports,weekly and monthly H&S Reports, remain unchanged.

6. HEALTH & SAFETY RISK MANAGEMENT

The risk management process with specifically requested forms requires a careful document administration and control. The Contractor should be aware that the documents resulting from the risk management process, in particular, the risk assessments, permits to work and job safety analysis, must be available during construction site audits and/or exemplary as part of a monthly report.

6.1 Risk Management Process

Risk management is the identification, assessment and prioritization of risks to avoid impacts on workers and the public.

The Contractor has to implement a suitable and appropriate risk management process to enable his site staff to prevent any non-compliances resulting in critical, harmful or dangerous situations followed by incidents, accidents or fatalities.

Alternatively suggested risk management processes shall be provided in theH&S Plan.

6.2 Hierarchy of Control

The first part of evaluating the risk stage, consideration must be given how likely each hazard could cause harm. When the potential for harm has been decided, the existing control measures should be identified. In this course, each step of the activity has to determine what control measures might already in place. When evaluating a risk it is imperative to check the

applicable legislation and to ensure that everything required by law is in place or has to be done.

When considering current controls and further required control measures, the general principles of control should be applied:

Eliminate

- It has to be checked if the risk associated with the hazard could be eliminated.

Reduce

- It has to be assessed if the possible amount of the hazard or the exposure to the hazard could be reduced.

Isolate

- It must be evaluated if the hazard could be isolated. Isolating is the principle of preventing the contact with the hazard.

Control

- It must be assessed if a safe system of work, permit to work and/or procedures are in place to control the hazard to prevent that some bodybecomes injured.

Personal Protective Equipment

- As a final result of running through the hierarchy of control, the supply of personal protective equipment is the final result of controlling the hazard. The provision of PPE must not be the first and final stage of risk mitigation.

6.3 Safe System of Work

6.3.1 Risk Register

The Contractor is requested to develop and prepare a risk register. A risk register is a document that summarizes and defines the possible risks resulting from a particular activity, in the present case from particular construction or construction related activities. The concept of a risk registerrecognises that risk elements arising from proposed or actual activities fall into one of following three categories:

- Risks which are deemed to have a low risk and do not need to be managed;
- Risks that have a medium or high risk and will need to be managed;
- Risks which have an extreme risk and therefore the activity should probably not proceed.

The risk register records details all the risks identified for the construction phase and associates them in terms of likelihood of occurring and seriousness of impact.

The risk register to be prepared should identify:

- a description of each risk and its potential consequences;
- factors that may impact upon the likelihood and severity of the risk;
- an assessed risk ranking, such as
  - low,
  - medium
  - high or
  - very high;

- whether the risk ranking is acceptable or not;
- actions and controls that currently exist to mitigate risks

The definition of the risks from low to very high is explained in the following risk ranking table:

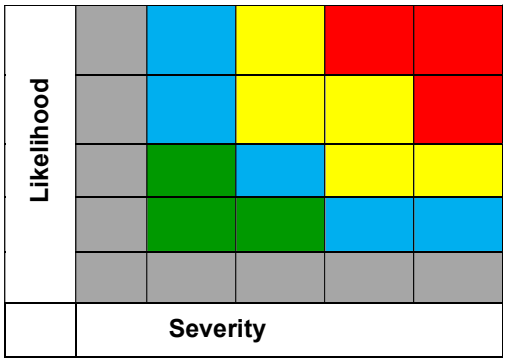

Table 6-1: Risk ranking table

It is recommended to develop the risk register at the beginning stage before start of a construction site by following the following steps:

- Identification of potential risks;
- Identification of the consequences;
- Identification of the likelihood and severity that the risk would result in adverse consequences;

Where risks have been ranked as medium, high or very high, mitigation measures must be addressed:

- **Medium (Risk ranking 3 to 4):** Mitigation actions to reduce the likelihood and severity should be identified and appropriate actions mustbe endorsed.

- **High (Risk ranking 6 to 9):** If uncontrolled, a risk event at this level may have a significant impact for the actions and tasks at a construction site as a whole. Mitigating actions need to be very reliable and should be approved and monitored by the Contractor. Even with mitigating actions in place, the construction site staff potentially exposed to that risk shouldbe advised of identified or potential risks which have been graded at this level.

- **Very High (Risk ranking 12 to 16):** Activities and projects with unmitigated risks at this level should be avoided or terminated. Mitigation actions of these types of risks may outweigh the benefits of the execution method. This is because risk events graded at this level have the potential to have significant adverse effects with the potential to cause serious accidents and incidents resulting in fatalities.

It needs to be identified if any risk mitigation procedures are in place.

If it is found that there are none, procedures must be developed consideringthe following:

- Planned actions:
  Reduction the likelihood a negative risk will occur and/or reduce theseriousness should it occur (What should you do now?)

- Contingency actions:
  Planned actions to reduce the immediate seriousness of a negative risk when it does occur. (What should you do when?)
- Recovery actions:
  Planned actions taken once a negative risk has occurred to allow you to move on. (What should you do after?)
- Risk Transfer:
  e.g. through assignment of contractual responsibilities or insurance.
- Actions:
  Necessary to ensure the realisation of opportunities (positive risks).

A risk register for every single construction site must be developed by the responsible Contractor considering as well the tasks and activities to be undertaken and execute by sub-contractors. The risk register has to be prepared by a competent and experienced group of engineers and workers approx. 4 weeks before mobilization to the site and start of any works at site even if they deemed to be of general nature and without having a risk potential. The risk register has to consider as well every transportation activity to the construction site.

The risk register will be subject of review and approval by NTPC.

6.3.2 **Risk Assessment**

The Contractor is requested to undertake a risk assessment for all activities assessed to be of a medium, high or very high risk.

The risk assessment has to be carried out with the participation of the staff experienced with the tasks and activities and the equipment:

- the responsible H&S Manager or a H&S Supervisor
- the foreman for the execution of the activity
- the worker(s) asked to undertake the activity.

The risk assessment has to be performed prior to the execution of the activity and it must be done in written. The written risk assessment must be documented and stored in the project file.

The risk assessment has to be undertaken in a simple and comprehensive way, understandable by each participant.

6.3.3 **Permit to Work**

It shall be governed by site regulation and safety requirement as stipulated in GCC

Stage 1- Highlight Potential Hazards:

Worker(s) and the foreman guided by the H&S Advisor highlight potential hazards of a task and identify all necessary safety measures. The hazard identification must consider all required electrical and mechanical equipment. Stage 1 has to be carried out in writing.

Work is not permitted to commence until Stage 4.

Stage 2-Application of Permit:

The Foreman applies for permission to start work on a prescribed form and submit the application to the H&S Advisor only when all requirements and conditions

described in the permit to work have been fulfilled. The Foreman has to indicate in the written permit to work that risk assessment was conducted. The risk assessment must be attached to the permit to work.

Stage 3-Evaluation of Permit:

The H&S Advisor will evaluate and verify that all safety conditions specified in the permit to work have been fulfilled and are adequate described. He may also recommend additional measures in the permit to work when necessary. He will need to inspect the location of work wherethe permit to work has been applied for, with the Foreman during this process.

Only when all safety requirements and conditions stated in the permit to work are fulfilled, the H&S Advisor will then endorse the permit to workform and forward to the Health & Safety Manager.

Stage 4-Approval of Permit:

The H&S Manager may approve and issue the permit to work only when heis satisfied that:

- Proper evaluation of risk and hazards for the work concerned has beenconducted;
- No incompatible work will be carried out in the same time and locationof the permit to work, which may pose a risk to the persons at work;
- All reasonably practicable safety measures have been taken and all persons involved in the work have been informed of the work hazardsunder the PTW;
- All electrical and mechanical equipment is demonstrable checked and in safe conditions.

A work permit is valid for one working day and for the specified working time. In case the tasks could not be finalised within the validity of the permitto work, the permit to work must be renewed before commencement of work on the day the work may continue.

The permit to work form must include at least the following information:

- Originator
- Date
- Description of task activity
- Duration of the task
- Needed equipment
- Security certificates of equipment
- Risk Assessment
- Already implemented mitigation measures
- Further mitigation measures
- Needed training or induction
- Approved by
- Date and time of approval.

6.3.4 Job Safety Analysis (JSA)

The Contractor has to undertake a JSA which is a procedure to integrate safety and health principles and practices into a particular job operation. In aJSA, each basic step of the job related hazards has to be identified and recommendations have to be provided to choose the safest way to do the job.

For conducting a JSA four main steps have to be considered:

- selecting the job to be analyzed
- breaking the job down into a sequence of steps
- identifying potential hazards
- determining preventive measures to overcome these hazards.

The Contractor must provide a specific methodology for conducting a JSA .

7. EMERGENCY RESPONSE

7.1 Emergency Response Procedures

An emergency is a serious, unexpected, often dangerous situation that requires immediate action. The emergency procedure is the strategy of actions to be outlined in the emergency response plan to response to anemergency event.

This could include, but not limited to rescue:

- from working at height;
- in confined spaces, shafts and tunnels;
- from fire & smoke, etc.

7.2 Emergency Response Plan (ERP)

The Contractor has to develop an ERP for review and approval by NTPC.

The ERP has to consider at least the following information and instruction for an adequate management of emergency situations:

- Result of a risk assessment to determine the most probably emergencysituation;
- Identification of suitable emergency response procedures, such as:
  - Determination of safe evacuation areas;
  - Determination of safe evacuation routes;
  - Determination of accurate and suitable fire fighting equipment;
  - Determination of fire brigade;
  - Training and induction of emergency response procedure.

Note: Specific attention should be paid to the investigation of the nearest hospital or first aid station. The contact numbers of the hospital or first aid station together with at least one contact of a medically examined staff team member of the hospital or first aid station must be included in the ERP in case of injuries at night-time hours or during weekends or during bank holidays.

7.3 First Aid at Site

It shall be governed by site regulation and safety requirement as stipulated in GCC

7.4 Fire Protection and Control

The Contractor shall undertake a suitable and adequate fire risk assessmentfor whatever is applicable under the scope of work of the respective construction contract.

The Contractor shall ensure that the necessary fire prevention, protection and control measures are installed and maintained. This shall commenceduring mobilisation and updated accordingly.

The Contractor shall nominate certain of his employees who shall be trainedin fire fighting duties. Nominated fire fighting personnel shall be available at all times during ongoing works on site.

7.4.1 **Fire Prevention, Protection & Control**

The following requirements apply with respect to fire prevention, protection& control and must be considered wherever applicable:

- Adequate and suitable means for extinguishing fire shall be provided andmaintained.
- All stocks of inflammable substances shall be kept in a fire resisting storeor in a safe place outside any occupied building.
- Provided that no such store shall be so situated as to endanger the meansof escape from the workplace or from any part thereof in the event of a fire occurring in the store.
- Chemical fire-extinguishers shall be freshly charged at intervals not greater than those specified by the manufacturers, or otherwise once annually, and tested by the application of such hydraulic pressure thereto as shall be suited to the type of extinguisher tested, at intervals of not more than four years; and the dates of recharging the extinguisher and thelast hydraulic test shall be clearly marked on the body of the extinguisheror on a tab securely attached thereto.
- Install a temporary or permanent water supply with sufficient flowvolume and duration to supply the standpipes, hose stations, and sprinkler systems, before the construction of the facility to be protected. In permanent structures under contract in which standpipes are installed, connect the standpipe to the water supply, install the standpipe concurrently with construction of the structure, and maintain the standpipe in operable condition for fire protection use. Provide the standpipes with fire department connections on the outside of the structure, conspicuously marked, and located in an accessible location atstreet or road level.
- No fire, flame, open light or other agent likely to ignite volatile and inflammable substances shall be allowed or used in any part of a workplace in which volatile and inflammable substances are used.
- No person shall smoke in any part of a workplace where volatile and inflammable substances are used, and a notice prohibiting smoking shall be posted in a conspicuous place in every such part of the workplace.
- Inform workers of the fire hazards of the materials and processes to which they are exposed. Brief new workers on the parts of the plan that isessential for their protection and emergency evacuations.
- Provide additional training for personnel assigned tasks that require themto remain in a facility during a fire emergency.
- When working in potentially explosive atmospheres, safe non-electric tools and apparatus suitable for the use in such areas shall be employed.
- No plant, tank or vessel which contains or has contained any explosive orinflammable substance shall be subjected to any welding, brazing or soldering operation, or to any cutting operation which involves the application of heat, until all practicable steps have been taken to remove the explosive or inflammable substance and any fumes arising there from, or to render them non-explosive or non-inflammable; and if any plant, tank or vessel has been subjected to any such operation as aforesaid, no explosive or inflammable substance shall be allowed to enter the plant, tank or vessel until the metal has cooled sufficiently to prevent any risk of igniting the substance.

7.4.2 Means of Fire Escape

Every workplace shall have adequate means of escape in case of fire.and must be properly maintained and kept free from obstruction.

7.4.3 Fire Alerts

The Contractor has to set up a system to alert workers on site and the public in the neighbourhood. This should be a permanent installed fire alarm (which must be tested on a weekly basis), a klaxon, an air horn or a whistle,depending on the size and complexity of the site.

Any warning needs to be distinctive, audible above other noise andrecognizable by everyone in case of fire.

8. HEALTH, SAFETY MANAGEMENT & MEASUREMENT

8.1 Noise Management

The Contractor is requested to develop a working noise monitoring plan to identify those areas at site where noise levels are occurring in a harmful range.

Generally, a reasonable mitigation measure, of more importance than wearing hearing protection devices, is the reduction of noise levels to a levelas low as reasonable possible. Avoidance has always the priority in comparison to passive reduction.

Noise levels must be kept below 80 dB (A) wherever possible. In case of exceeding this value, hearing protections must be provided to the workers and warning signs must be installed.

The noise monitoring must be repeated every week in case that the location of the construction site remains unchanged. In case of a change of the site, the noise monitoring has to be undertaken after implementation of site arrangements.

In case that a construction site could not be demarked in detail, the noisemonitoring has to be done for different activities.

The following table provides the standards, exposure times and need forpersonal protective equipment.

dB(A)	Exposure time[1)]		Need for PPE	Comment
	hours	minutes		
80	25	24	No	
85	8	0	No	
86	6	21	Yes	Suitable hearing protection must be provided. The hearing protection must be able to insulate the noise level to a value of 89 dB(A) or below.
87	5	2	Yes	
88	4	0	Yes	
89	3	10	Yes	
90	2	31	Yes	
95	0	47	Yes	
100	0	15	Yes	
105	0	4	Yes	

110	0	1	Yes

Table 8-1: Noise standards, exposure times and need for PPE

1) Applicable to a 8h-working-shift

Source: US Department of Health and Human Services, Occupational Noise Exposure, page 18, dated June 1998.

Contractor shall ensure at a construction site that adequate measures are taken to protect workers against the harmful effects of excessive noise or vibration at such construction site and the noise level in no case exceeds the limits laid down in BOCW act. Additionally, compliance of The Noise Pollution (Regulation and Control) Rules, 2000) is to be ensured by the agency w.r.t ambient noise level.

8.2 Air Quality Management

The air quality at site could be affected by different emissions resulting from combustion engines or resulting from the generation of dust during dryweather conditions.

Emissions from combustion engines are difficult to reduce. Some efforts notto affect the air quality are the switch-off of machines whenever possible and to limit the number of machines and equipment to a level as low as reasonable possible. The Contractor is requested to consider these recommendations during the construction phase.

Considering this requirement, the Contractor must undertake all necessary actions to reduce the generation of dust to the lowest possible levels. Project specific measures shall be included in the H&S Plan.

Mitigation measures to prevent increased dust generation include using

dust-suppressing water spray in areas of active earthmoving and on unpaved roads, using aggregate-covered access roads to minimize dust emissions and minimizing the areas of exposed soil or cleared of vegetation. Truck beds should be covered with a tarp or similar material to minimize dust during the transport.

Mitigation measures during project activities to prevent increased air emissions would include using requiring emission control devices on equipment, maintaining properly tuned engines, avoiding unnecessary idling, using electric motors instead of internal combustion engines, usinglow-sulfur diesel fuel where available, preparing asphalt away from populated areas.

8.3 Pre-employment Health Assessment

Pre-employment health checks for construction site workers shall be mandatory. These checks shall ensure that in no case the state of health ofemployed workers can be impaired by possible pre-existing diseases. TheContractor shall deploy a suitable experienced medic and appropriate materials and premises for these checks.

Workers shall be checked, and all the results shall be analysed, before hisfirst workday, in order to mitigate any risk.

Therefore, the Contractor shall provide the abovementioned medical staff and material during the entire year. Usage of hospital capacities is an often used option to fulfil these

requirements, where those capacities are available. Only personnel with appropriate health condition with respect totheir particular job shall be employed.

All workers who are subject to an exposure to occupational health risksshall undergo periodic medical surveillance. This would be required forworkers:

- exposed to noise levels exceeding 85dB(A);
- exposed to hazardous materials, e.g. chemicals;
- carrying heavy loads.

In addition to the pre-employment health checks and periodic medical surveillance, the Contractor shall enable the site workers to pass an exit medical check after finishing their jobs on site. The exit medical check shallbe provided to all workers who worked more than 3 months constantly on the construction site.

All pre-employment, periodic or exit health checks must be documented foreach worker. The assessment records must be kept confidential and for the use by the project management only. The workers will have the right to askfor the results of the health checks.

The workers will have the right to decline any pre-employment, periodic or exit medical checks. In this case they will not have the possibility to apply for any compensation in case of health interferences resulting from their work activities in connection to existing diseases.

All pre-employment, periodic or exit health checks must be provided to the workers free of charge. The application for a health check must not result in a negative treatment of the respective worker.

The Contractor must ensure that any health checks requiring specific facilities, equipment or medical staff will be available at the constructionsite or in a reachable distance to travel.

8.4 Covid-19 Prevention

Contractor shall take all necessary measures related to Covid-19 prevention as per guidelines issued by Government authorities as well as NTPC guidelines (if any).

8.5 Health Surveillance

8.5.1 **Management of Alcohol and Drugs**

Smoking shall be prohibited at all times at the construction site, at worker's camp and at storage and fabrication areas. This includes the operating or use of all electrical or manual work equipment.

Smoking shall be restricted to clearly defined and highly visible areas, only.

The presence and consumption of non prescription drugs and alcohol is strictly prohibited at all areas.

Drug and, especially, alcohol testing shall be arranged after weekends and especially for workers appointed for works consisting of potentially high-risk activities. The drug and alcohol test shall be undertaken in case of indications of a respective consumption.

Until the result of the test is public, the worker(s) must refrain from anywork at site.

In case of a positive test result, the worker has to be expelled from the sitewithout any undue delay until the completion of the project.

9. PERSONAL PROTECTIVE EQUIPMENT

It shall be governed by site regulation and safety requirement as stipulated in GCC

10. INCIDENT & ACCIDENT MANAGEMENT

It shall be governed by site regulation and safety requirement as stipulated in GCC

11. HEALTH & SAFETY REVIEWS

11.1 MCA H&S Audits and Reviews

Prior to commencement of the main construction phase, NTPC will conduct a pre-construction phase H&S Review to ensure that all the necessary arrangements are in place and suitable for the work being undertaken at that time. This will include compliance with this H&S Standards document, the project H&S Plan and country specific legislation.

NTPC will conduct site specific H&S Reviews on a regular basis and formal H&S Audits of the Contractor and its supply chain. Formal H&S Audits will be conducted at least, every 6 months. The duration of this audit will be a minimum of 1 day and will require the full co-operation of the Contractors project management team.

In addition to H&S Reviews to be undertaken by NTPC, it is possible thatfurther H&S Audits and Reviews will be carried out by relevant stakeholders i.e. Ministry of Labour or Ministry of Health etc.

The Contractor is obliged to provide any necessary support to the stakeholders to enable them to undertake their tasks and duties and to allowthe access to the sites for undertaking the audits and reviews.

11.2 Contractors Health & Safety Review Programme

The Contractor shall implement an H&S Review Programme applicable for his construction site(s) that shall include a systematic evaluation of the implemented management system, compliance with this H&S Standards document, and the project H&S Plan and local legislative requirements.

11.2.1 Contractors H&S Audits

H&S Construction Site Audits must be undertaken on a monthly basis. Theaudits should be performed by the Site Manager, the H&S Manager and theH&S Advisor.

The audits should comprise the construction site itself, material andequipment storage areas, workshop areas and accommodation areas(Worker's camp area).

These audits shall be recorded and the results should be slipped into the monthly H&S Reports. A copy of the audit report must be attached to themonthly report.

11.2.2 Contractors H&S Inspections

H & S Inspections must be carried out on specific work areas and work places associated with the project on a weekly basis but independent thereofif they are assessed as medium or high risk areas or workplaces according to the risk register. The results of the inspections must be considered in the weekly H&S reports to be submitted to NTPC. A copy of the H&S Inspection report must be attached to the weekly report. The H&S

Inspections shall be executed by the H&S Manager together with the H&S Advisor.

11.2.3 Contractors Health & Safety Surveys

H & S Surveys shall be conducted by the Contractors' H&S Advisor on a daily basis. The date and time of the surveys must be documented but the results must not be recorded in a written report but significant findings mustbe communicated to the H&S Manager.

11.2.4 Contractors Management Surveys

Management surveys to be undertaken by the Contractors General Manager or his representatives shall be conducted at least every 3 months. The surveys must not be done by the responsible Site Manager, H&S Manager or H&S Advisor of the particular construction site. The results shall be recorded.

11.3 Reporting

The results of H&S Audits and H&S Inspections must be recorded and the reports must be submitted to NTPC within 3 working days after finalisation of the audit or inspection respectively. Forms to be used for theaudits and audit reports respectively, inspections and surveys will be provided by NTPC.

The reports must include all relevant subjects according to the purpose of the H&S Reviews, but at least the results and the needed corrective actions.

An reporting schedule for each particular construction site must be developed by the Contractor and should be submitted to NTPC for reviewand approval.

11.4 Corrective Actions

The H&S Review reports must include the need for corrective actions. The list corrective actions must include the following information:

- Identified risks and non-compliances;
- Needed corrective actions;
- Needed personal and material resources;
- Responsible person;
- Date for latest finalisation.

The effectiveness of the corrective actions will be subject of NTPC'sH&S Audits.

11.5 Compliance Reviews

One week after the implementation of the corrective actions, the H&S Manager is requested to undertake a compliance review. After observation of the full compliance of the corrective actions, the H&S Manager has to report the finalisation to NTPC.

12. SITE H&S REQUIREMENTS

It shall be governed by site regulation and safety requirement as stipulated in GCC.

13. **STAYING & FOOD ARRANGEMENT FOR WORKERS**

The contractor may consider providing hygienic food, beverages and refreshments during period of Project construction which may enhance the productivity level of the workers.

The contractor shall also arrange quarters in workers habitat area for accommodation of workers during period of stay at SIPAT STPP. The proper cleaning and hygiene shall be maintained in quarters. The random checks for hygiene and cleanliness shall be done by Employer and any violation on cleanliness shall not be acceptable. Employer may take action for the same as deemed fit.

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NTPC SAFETY RULES

FOR CONSTRUCTION AND ERECTION OF POWER PLANTS

INTRODUCTION:

NTPC Limited is a Maharatna organization taking lead in realizing the power dreams of the Nation with a vision "To be one of the World's largest and best power utilities, Powering India's growth". Safety is one of the prime concerns of NTPC and it always strives towards accident free construction, erection, commissioning, operation and maintenance of its power projects. In this process, NTPC has already formulated Safety policy and guidelines for smooth execution of all its project activities.

In order to strengthen the existing Safety Rules for Construction and Erection and thereby curbing the chances of accidents in Construction & Erection works at various projects of NTPC, the existing safety rules have been revised for strict implementation. These Safety Rules lay down the safety requirements for safe execution of project activities, responsibilities of the contracting agencies, and all concerned involved in Construction and Erection.

A. RESPONSIBILITIES OF CONTRACTORS FOR IMPLEMENTATION OF SAFETY RULES:

The Safety Rules for Construction & Erection as outlined hereunder, while setting out a broad parameter of safety norms, are not exhaustive. The contractor and his agencies are advised to refer to the following statutory provisions as amended from time to time for details and strict compliance therewith.

FOR GREENFIELD PROJECTS:

(a) Building and Other Construction Workers (regulation of employment and conditions of service) Act, 1996 (briefly referred to as BOCW Act),
(b) Building and other construction workers (regulation of employment and conditions of service) Central Rules, 1998 (briefly referred to as BOCW Rules) as adopted by the various State Governments,

FOR EXPANSION, MODIFICATION, ALTERATION AND, OR CONSTRUCTION ACTIVITY WITHIN AN EXISTING PLANT OPERATING AS PER APPROVED SITE PLAN UNDER THE FACTORIES ACT;

(a) Factories Act, 1948,
(b) Factories Rules, as adopted by the various State Governments
(c) BOCW Act
(d) BOCW Rules

The contractor is also required to ensure compliance with all the relevant Acts/Rules in addition to above.

It shall be incumbent on the contractor to ensure that the requirements of safety, statutory or otherwise specified, are fully met. Thus the onus of implementation of the norms so prescribed shall squarely rest with the contractor concerned or, on his behalf, his sub-contractor or any other agency deployed by him, indemnifying NTPC from all the liabilities that may arise out of any failure to comply with the above mentioned Acts/Rules or any contravention thereof by the contractor or any other sub-agency on his behalf.

Safety cannot be ensured solely through Rules and Regulations or Codes. It is the responsibility of the Contracting Agency to ensure that basic safety principles are incorporated in the planning stage of their mobilization, execution, installation of machines, equipment, storage, etc., and initiate and maintain *safety programs*. It is desirable to have a planned programme and secure adequate cooperation of senior management, EICs, sub-contracting agencies, supervisory personnel and workers involved to ensure the implementation of the provisions of these Rules in true spirit so as to achieve the ultimate goal of *accident prevention*.

It shall also be the responsibility of the contracting agency to provide amenities and safety requirements on each construction job in order to reduce or to eliminate hazards of construction activities and also to provided necessary *first aid* facilities as well as Ambulance van (in case of major agencies) for prompt transportation of injured persons to a physician or hospital.

It is also mandated that the authorized representative of NTPC, namely, the Engineer-in-charge, may, at his convenience, exercise such superintendence, supervision and, or control as may be deemed necessary, but this shall not absolve the contractor of his basic responsibility for strict compliance with the norms, standards and, or legal provisions as applicable under the Factories Act/Rules and the Building and other construction (regulation of employment and conditions of service) Act/Rules.

Section wise checklist of provisions of BOCW Act/Rules is given hereunder for ready reference of the contractor. (This list has been prepared in chronological order with primary importance to **S**ection of Act and secondary importance to **R**ules)
S - Refers relevant **S**ections in BOCWA
R - Refers relevant **R**ules in BOCWR

Sl. No.	ITEMS	RELEVANT SECTIONS / RULES IN BOCWA AND BOCWR AND RBOCWR
1	Registration of establishment	S – 7, R – 23 to 27
2.	Display of registration certification at workplace	R – 26 (5)
3.	Hours of work	S – 28 R – 234 to 237
4.	Register of overtime	S – 28; S – 29 R – 241(1) Form XXII
5.	Weekly rest and payment at rest	R – 235
6.	Night shift	R – 236
7.	Maintenance of workers registers and records	S – 30 R – 238
8.	Notice of commencement and completion	S – 46 R – 239
9.	Register of persons employed as building workers	R – 240
10.	Muster roll and wages register	R – 241(1) (a); Form XVI and XVII
11.	Payment of wages	R – 248
12.	Display of notice of wages regarding	R – 249
13.	Register of damage or loss	R – 241(1)(a); Form XIX, XX, XXI
14.	Issue of wages book	R – 241(2)(a); Form XXIII
15.	Service certificate for each workers	R – 241(2)(b); Form XXIV
16.	Display an abstract of BOCWA and BOCWR	R – 241(5)
17.	Annual return	R – 242; Form XXV
18.	Drinking water	S – 32
19.	Latrines and Urinals	S – 33 R - 243
20.	Accommodation	S – 34
21.	Creches	S – 35
22.	First-aid boxes	S – 36 R – 231 and Schedule III
23.	Canteens	S – 37 R – 244
24.	Food stuff and other items served in the canteens	R – 245
25.	Supply of tea and snacks in work place	R – 246
26.	Food charges on no loss no profit basis	R - 247
27.	Delhi BOCW welfare Board Rules	R – 250 to 296
28.	Safety committee	S – 38 R – 208

29.	Safety officer	S – 38 R – 209 and Schedule VII
30.	Reporting of accidents and dangerous occurrences	S – 39,R – 210
31.	Procedure for inquiry in to the causes of accidents	R – 211
32.	Responsibility of employer	S - 44 R – 5
33.	Responsibility of Architects, Project engineer and Designers	R – 6
34.	Responsibility of workmen	R – 8
35.	Responsibility for payment of wages and compensation	S – 45
36.	Penalties and Procedures	S – 47; S – 55
37.	Excessive noise, vibration etc.	R – 34
38.	Fire Protection	R – 35
39.	Emergency action plan	R – 36
40.	Fencing of motors	R – 37
41.	Lifting of carrying of excessive weight	R – 38
42.	Health, Safety and Environmental Policy	R – 39
43.	Dangerous and Harmful Environment	R – 40
44.	Overhead protection	R – 41
45.	Slipping, Tripping, Cutting, Drowning and Falling Hazards	R – 42
46.	Dust, Gases, Fumes, etc.	R – 43
47.	Corrosive substance	R – 49
48.	Eye Protection	R – 45
49.	Head Protection and other protection apparel	R – 46; R – 54
50.	Electrical Hazards	R – 47
51.	Vehicular traffic	R – 48
52.	Stability of structure	R – 49
53.	Illumination	R – 50; R – 124
54.	Stacking of materials	R – 51
55.	Disposal of debris	R – 52
56.	Numbering and marking of floors	R – 53
57.	Lifting appliances and gears	R – 55 to 81
58.	Runways and Ramps	R – 82 to 85
59.	Working on or adjacent to water	R – 86 & 87

60.	Transport and earthmoving equipment's	R – 88 to 95
61.	Concrete work	R – 96 to 107
62.	Demolition	R – 108 to 118
63.	Excavation and Tunneling works	R – 119 to 168
64.	Ventilation	R – 153
65.	Construction, repair and maintenance of step roof	R – 169 to 171
66.	Ladders and Step ladders	R – 172 to 174
67.	Catch platform and hoardings, chutes, safety belts and nets	R – 175 to 180
68.	Structural frame and formworks	R – 181 to 185
69.	Stacking and unstacking	R – 186 & 187
70.	Scaffold	R – 188 to 205
71.	Cofferdams and Caissons	R – 206 to 211
72.	Explosives	R – 212 & 213
73.	Piling	R – 214 to 222
74.	Medical Examination for building and other construction worker, Crane operator an Transport vehicle drivers	R – 81; R – 223(a)(iii) and Schedule
75.	Medical examination for occupational health hazards	R – 233(a)(iv)
76.	Charging of workers for Medical Examination	R – 223(b)
77.	Occupational health centres and Medical officers	R – 225 and Schedule X & XI
78.	Ambulance van & room	R – 226 & 227 and Schedule IV & V
79.	Stretchers	R – 228
80.	Occupational health service for building workers	R – 229
81.	Medical examination for occupational health hazards	R – 223(a)(iv)
82.	Emergency care services and emergency treatment	R – 232
83.	Panel of experts and agencies	Central Rule 250
84.	Power of inspectors	Central rule 251

B. RESPONSIBILITIES AND DUTIES OF WORKERS

(a) It shall be the responsibility of the worker to comply with the requirements of safety as laid down for him and the group of workers to which he belongs and fully cooperate in the discharge of the responsibility that has been assigned to the contractor.
(b) If he discovers any defects in the lifting appliance, lifting gear, lifting device or those concerning any transport equipment or other construction equipment or tools as well as the physical work conditions, he will report such defects promptly to his employer or NTPC Engineer or other person in authority;
(c) No building worker shall, unless duly authorized or in case of absolute necessity, remove or interfere with any fencing, guards, gangways, gear, ladder, hatch covering, life saving appliances, lighting or other things whatsoever required and provided for safety and health. If any of the aforesaid things is removed, the persons engaged in the work shall restore such thing at the end of the period during which its removal was necessary;
(d) Every worker shall use only means of access provided in accordance with the approved norms and no person shall authorize or order another to use such means of access or method other than those approved;
(e) Workers shall use such means of access and egress for going to and exiting from the workplace as provided.

SECTION - I
SAFETY MANAGEMENT

1.0 SAFETY MANUAL AND SAFETY POLICY:

1.1 The Safety policy of the contracting agency should reflect the commitment of the concerned agency towards safety and health of the workers specified for the particular site.

1.2 The Contractor shall have Safety Plan detailing the safety norms evolved through Safety Policy and Job Safety Analysis (JSA) or Hazard Identification & Risk Assessment (HIRA) of all package activities and constitute a Safety management program. Contracts shall also ensure POWRA (point of work risk assessment) before start of any activity.

1.3 The safety management programme in the form of Safety Manual shall give details of provisions proposed by the agency w.r.t. Job Safety Analysis (JSA) or Hazard Identification and Risk Assessment (HIRA) to ensure safety of the employees and elimination of health hazards. The Safety Manual including safety policy duly signed by the head/senior executive of the agency shall be submitted to the concerned Engineer-Incharge(EIC), NTPC before start of their project activities at site.

1.4 Each contracting agency shall have facilities for conducting the above safety management programme, commensurate with magnitude of the work under contract.

2.0 APPOINTMENT OF SAFETY OFFICER/SAFETY SUPERVISOR:

2.1 Each contracting Agency shall provide a sufficient number of qualified, suitable and experienced persons to manage all safety related matter on Site relating to the works. Irrespective of manpower employed by the agency whether temporary, casual, probationer, regular or permanent or on contract, Agency shall deploy a qualified Safety Officer/executive, responsible for carrying out the safety management programme before start of the work.

2.2 The safety officer shall create an organization, commensurate with the project activities, consisting of other staff as required for suitable deployment.

2.3 The schedule of requirement of safety personnel is given below.

No. of Workers	**No. of Safety Supervisors**	**No. of Safety Officers**
Up to 100	1	1
101 to 250	2	1
251 to 500	4	1
501 to 1000	6	2
1000 to 2000	6+ One additional supervisor up to every additional 250 workers	3
2000-3000	10+ One additional supervisor up to every additional 250 workers	4
3000-4000	14+ One additional supervisor up to every additional 250 workers	5
Above 4000	18 + One additional supervisor up to every additional 250 workers	5 + one safety officer up to addition 1000 workers

2.4 The qualification and experience of the safety personnel should meet the following criteria.

a) Safety Supervisor: (i) Possesses recognized degree in any branch of Engineering. OR
(ii) Diploma in any branch of Engineering with at least one year construction experience.

b) Safety Officer/Safety Executive: Qualification as given under BOCW Act/rules and minimum experience of three years.

2.5 In case contractor fails to employ the required safety professionals, the department may at the cost and risk of the contractor deploy additional/required safety professionals. The cost incurred towards this shall be deducted from contractor's bill at following the rates or actual whichever is higher.

I. Safety Engineer	Rs. 1500/day.
2. Safety Supervisor	Rs. 1000/day.

3.0 MEETING FOR SAFETY AFTER AWARD OF THE CONTRACT:

Representatives of contracting agency along with safety Officer/executive shall meet the concerned EIC of the particular activity prior to start of construction activities for the purpose of discussing safety standards and requirements applicable to the work under contract. The person representing the agency should be a responsible person for all their site activities.

4.0 PERSONAL PROTECTIVE *EQUIPMENT:*

4.1 The contracting agency should ensure sufficient inventory of personal protective equipment (PPEs) prior to initial mobilization as specified in the Bidding Documents. After identifying the need of the required PPEs for various activities performed at the site, an additional inventory of approx. 20% of required PPEs should be maintain during the execution of the work. A PPE plan shall be prepared which gives fair idea regarding issue of PPEs to various personnel as per the following 'PPE Selection Matrix'.

4.2 **Mandatory PPEs:** Wearing of Safety Helmet, Safety Shoes and reflective jacket is mandatory for all work at site and it should be ensured that all employees and project visiting personnel shall invariably wear safety helmet, safety shoes & reflective jacket.

PPE Matrix (apart from mandatory PPEs, i.e., Safety Helmet & Safety Shoes)

Activity	Type of Protection						Remarks, if any
	Hand	Eye	Ear	Body	Respiratory	Others	
Gas Welding & Cutting	LG	WG	-	LA	*SCBA/ OLBA	-	* for confined space
Electric Arc Welding	LG	HMWS	-	LA	*SCBA/ OLBA	-	* for confined space

Rigging	CG	SG	-				--
Working at Height	-	SG	-	DLFBH	-	*FAS	* for vertical columns
Grinding & Chipping	CG	FS / SG	-	LA	-	-	--
Working in High Noise	-	-	EP / EM	-	-	-	--
Handling of Cement Concrete	RG	SG	-	-	DM	-	
Blasting	CG	SG	EP*	-	-	-	* at noise area
Excavation	CG	SG	-	-	DM	-	*Gum boot in place of Safety shoe for foot
Chemical Handling	PVCG	CSG	-	PVCA	-	-	*Full body rubber suit with hood
Electrical and C&I	ERG*	SG	-	-	-	-	*For high voltages
Sand/shot blasting	CG	-	EP/ EM	CA	SAMH	-	

ABBREVIATIONS: *FS: Face Shield, CSG: Chemical splash goggles, HMWS: Helmet mounted welder's shield, GB: gum boot, DLFBH: Double lanyard full body harness, SG: Safety goggles, DM: Dust mask, SAMH L Supplied air mask/hood, EP/EM: Ear plug/Ear Muff, CG: Cotton hand gloves, LG: Leather hand gloves, LA: Leather apron, RG: Rubber gloves, PVCG: PVC Gloves, PVCA: PVC Apron, SCBA: Self-contained breathing apparatus, WG: Welding goggles, ERG: Electrical Rubber Gloves. OLBA : Online breathing apparatus*

4.3 The above-mentioned PPEs should be made available with contractor at site and issued to the concerned workers on the day of employment. All PPEs shall comply with ISI standards with valid test certificates.

4.4 At least two breathing apparatus sets (complying requirement as per IS: 10245) shall be provided at each site where excavation/tunneling works and Welding/ Cutting operations in confined areas are being carried out, to rescue the victims under exposure to harmful gases/vapors, if any.

5.0 SAFETY COMMITTEE:

5.1 *Safety committee* shall be formed within each contracting agency comprising of worker representatives with equal no. of management representatives as per the provisions of BOCW Act/rules. This committee in each agency shall meet at least once in every month. The safety officer of the concerned agency shall coordinate these meetings. NTPC Safety officer shall be special invitee for Safety Committee meetings. The safety committee functioning shall be in line with the provisions of BOCW Act/Rules.

5.2 Apart from the above, each agency shall organize safety meetings every day before start of day's work to educate & motivate the workers about the necessity of safety. Case study of accident/ incident can be shared in these meetings.

5.3 The contractor shall also regularly organize safety meetings for all job supervisors/foremen.

5.4 Weekly meeting with agencies' Safety Officers to be organized by safety department of NTPC and minutes to be recorded, circulated and compliance status to be checked on regular basis.

6.0 SAFETY MESSAGE PROPAGATION:

6.1 Contracting agencies shall arrange for display of safety hoardings depicting suitable safety cartoons/messages/ cautionary notices at appropriate places of project site to remind the workers to perform their duties safely. Minimum one safety message board/hoarding of appropriate size for every 10 workers to be provided and maintained by the concerned agency.

6.2 Apart from safety hoardings, each agency should maintain a safety bulletin board at all their work locations. Such safety bulletin boards should depict the activities being planned for the day, good practices, permit details etc.

6.3 Safety suggestion boxes shall be kept at each contractor's office at site for obtaining safety suggestions from the workers. Best suggestions should be implemented and may be rewarded suitably to encourage the workers for safety.

7. COMPETENCY OF EMPLOYEES:

7.1 Throughout the course of the contract, persons employed by agency shall be physically fit, qualified/experienced to perform their assigned duties/ jobs.

7.2 Employees shall not, knowingly be permitted to work in a manner that their ability or alertness is so impaired because of fatigue, illness or any other reason, that it may expose them and or others to injury.

7.3 No worker, vehicle operator shall be less than 18 years of age. And the vehicle operator shall have a valid license as per requirements of Motor Vehicle Act.

7.4 Contractor shall comply with all applicable state/central laws and codes related to employment of operators for Hoist, Shovel, Crane, Tractor, Bull-dozer, any other howling heavy equipment/vehicle.

8.0 SAFETY INDUCTION AND TRAINING :

8.1 Each worker deployed by the agency shall be given 2-days induction training which shall include the medical examination and instructions related to particular job, fire fighting, first-aid and reporting of accidents. All employees shall be given safety training as per BOCW Act/Rules.

8.2 The contracting agency shall also impart job specific skill based safety training to all its employees (Minimum one day) on various related safety topics using internal/external safety professionals/consultants as per the matrix given below. Record of such trainings and attendance particulars shall be maintained in a register for ready reference to statutory authorities/engineer-in charge.

TRAINING MATRIX:

Name of topic	**Executives**	**Super visors**	**Skilled Workmen**	**Other Workers**
Safety Induction	Y	Y	Y	Y
Accident_ Causes, factors, cost	Y	Y	Y	-
Industrial hazards & Accident Prevention	Y	Y	Y	-
Investigating, reporting, records	Y	Y	-	-
Personal Protective Equipment	-	Y	Y	Y
Construction Safety & Role of Supervisory personnel	-	Y	-	-
Permit to Work (PTW)	-	Y	Y	y
Statutory Provisions (BOCW Act/Rules, Factories Act 1948 etc.)	Y	Y	y	y
Material handling	-	y	Y	Y
Emergency Management	Y	Y	Y	-
Electrical Safety	-	Y	Y	-
Fire safety	Y	Y	Y	Y
First Aid & CPR (cardio pulmonary resuscitation)	-	Y	Y	Y (Selected)
Safety in Welding & Cutting	-	-	Y	-
Safety Audit	Y	Y	-	-
Safety in Lifting Tools & Tackles	-	Y	Y	y
Safety in Working at height	-	Y	Y	Y
Safety in Confined space work	-	Y	Y	Y
Defensive Driving	-	Y*	Y*	Y*

*for construction vehicle operators, helpers & crane operators Y=Yes

9.0 ID PASS

9.1 CLIMS (Contract Labor Information Management System) will be the criterion for entering or gate pass system if implemented at site.

9.2 The contractor shall ensure that all personnel working at site having a photo Identity card before they are engaged for any work and properly mentioned details like validity, Category/designation and work area etc. This ID card should be issued only after ensuring their screening test, medical fitness and safety induction training. Id card gate pass shall be indicated with 3 nos. of offence marks. With each offence the gate pass of concerned workmen/ supervisor will be punched giving on the spot indication of persons indulging in unsafe actions.

9.3 Drinking of Alcoholic beverages is strictly prohibited. Employees under the influence of any intoxicants, even to the slightest degree, shall not be permitted to remain at work. Each contractor should maintain 'breath analyzer' to determine the intoxicated workers at site.

10 SAFETY AUDIT

10.1 Internal Safety Audit once in every six months by the contracting agency and external safety audit as once in a year by third party shall be conducted, with prior intimation to EIC and NTPC Safety Deptt. The external auditing agency should be reputed safety institution or a certified Safety Auditor under any statutory legislation. The audit report along with time bound action plan should be submitted to Engineer-in-charge and NTPC Safety Dept.

10.2 Apart from above, Electrical Safety Audit shall be conducted quarterly by a team comprising of Electrical engineer, Safety representative of contractor and NTPC Electrical Erection representative covering the following and submit the report to EIC.

i) Electrical incidents investigation findings and remedial measures implemented.

ii) Adequacy of power supply requirements

iii) Power distribution system in place

iv) Updated electrical single line diagram including the IP44 DBs arrangement.

v) Electrical protection devices – ELCBs, O/L protections etc.

vi) Earth or ground connection and earth pit maintenance details

vii) Education and training of electrical personnel undertaken

viii) Any other point appropriate to the site conditions.

11. SAFETY BUDGET

Every contracting agency should clearly estimate and allocate a separate budget head for safety requirements every year and make the safety activity plan for the year and submit to NTPC EIC & Head of Safety. Budget allocations should be practically adequate to the site safety requirements and the details shall be intimated to the concerned EIC and safety deptt. before start of the work under the contract and subsequently, every year by 15th of April. Engineer-in Charge in consultation with Head of Safety shall review and monitor the effective utilization of allocated budget for safety related activities by the Contractor.

12. REPORTING AND INVESTIGATION OF ACCIDENTS AND DANGEROUS OCCURRENCES:

12.1 **Reporting of accidents:** Notice of any accident (the prescribed format is annexed to the manual) to a worker at the building or construction site that

(a) Causes loss of life; or

(b) Disables a worker from working for a period of **48 hours** or more immediately following the accident;

Shall forthwith be sent by Telegram, Telephone, Fax, Email or similar other means including special Messenger within **four hours** in case of **fatal accidents** and **72 hours** in case of **other accidents**, besides the Engineer-in-charge, to:

I. The Regional Labour Commissioner (Central);

II. The Board with which the worker involved was registered as a beneficiary;

III. Director General of Building and other construction (regulation of employment and conditions of service) Act/Rules; and

IV. The next of kin or other relative of the worker involved in the accident;

12.2 Further, notice of accident shall be sent in respect of an accident which

(a) Causes loss of life; or

(b) Disables the injured worker from work for more that 10 days to

(1) The Officer-in-charge of the nearest Police Station;

(2) The District Magistrate or, if the District Magistrate by order so desires, to

(3) The Sub-Divisional Magistrate;

12.3 Where any accident causing **disablement that subsequently results in death**, notice thereof in writing of such death, shall be sent the Authorities mentioned above within **72 hours** of such death.

12.4 In case of an accident causing minor injury, first-aid shall be administered and that resulting in disability of **48 hours or more**, the injured worker shall be given first-aid and immediately transferred to a Hospital or other place for medical treatment.

12.5 All near-miss accidents shall be reported to NTPC Engineer In-charge and Safety Officer as per prescribed format.

12.6 **Reporting of dangerous occurrences:** The following classes of dangerous occurrences shall be reported to the Inspector having jurisdiction, whether or not any disablement or death caused to the worker, namely:

(a) Collapse or failure of lifting appliances, or hoist, or conveyors, or similar equipment for handling of building or construction material or breakage or failure of rope, chain or loose gears; or overturning of cranes used in construction work;

(b) Falling of objects from height;

(c) Collapse or subsidence of soil, any wall, floor, gallery, roof or any other part of any structure, platform, staging, scaffolding or means of access including formwork;

(d) Contract work, excavation, collapse of transmission;

(e) Explosion of receiver or vessel used for storage at pa pressure than atmospheric pressure, of any gases or any liquid or solid used as building material;

(f) Fire and explosion causing damage to any place on construction site where building workers are employed;
(g) Spillage or leakage of any hazardous substance and damage to their container;
(h) Collapse, capsizing, toppling or collision of transport equipment;
(i) Leakage or release of harmful toxic gases at the construction site;
(j) In case of failure of a lifting appliance, loose gear, hoist or building and other construction work, machinery and transport equipment at a construction site, such appliances, gear, hoist, machinery or equipment and the site of such occurrence shall, as far as practicable, be kept undisturbed until inspected by the Authorities;

12.7 Every notice given for fatal accidents shall be followed by a written report to the concerned Statutory Authorities and the Engineer In-charge in the specified Form annexed as Schedule, under acknowledgement.

12.8 Incident / injury statistics shall be maintained by all agencies cause wise.

12.9 Investigation of accidents and dangerous occurrences

Besides reporting, it shall be the responsibility of the contractor to constitute a team (members as per the gravity of the incident) of responsible person to thoroughly investigate all incidents involving near-miss accidents, lost-time and reportable accidents and dangerous occurrences with a view to finding out the causative factor, taking remedial measures and fixing responsibility, and make a copy of the investigation report along with action-plan, specifying a definite time-frame for implementation of the findings, available to the Engineer in-charge forthwith.

13. MEDICAL AND FIRST AID AMENITIES:

13.1 It is the responsibility of each contracting agency to ensure the availability of suitable arrangements at their work site for rendering prompt and efficient First aid to injured persons.

13.2 Arrange one trained and certified first aid for every twenty workers in each shift.

13.3 Ambulance with proper equipment for prompt transportation of the injured persons to a physician or a hospital shall be provided before start of the work in cases where 500 or more than 500 workers are employed. For smaller contracts, where less than 500 workers are employed, Contractor shall have a tie-up with suitable Agency for providing Ambulance with proper equipment for prompt transportation of the injured persons to a physician or a hospital in case of an Accident / Emergency. Further, Contractor shall submit a proof of the same to EIC/Safety Officer of NTPC.

13.4 Deploy one full time construction medical officer (qualification as per Schedule XI of BOCW Central Rules -1998) for cases where 500 or more workers are employed (upto one thousand workers) and one additional construction medical officer for additional one thousand workers or part thereof. For smaller contracts, where less than 500 workers are employed, Contractor shall have a tie-up with suitable Hospital / Nursing home in the vicinity of the

Project/Site where work is being executed, for providing adequate medical treatment by qualified medical officers and nursing staff, as and when required. Further, Contractor shall submit a proof of the same to EIC/Safety Officer of NTPC.

Notwithstanding anything stated above, Contractor/Agency shall strictly comply with the requirements of relevant BOCW Act/ BOCW Rules/ Factory Act/Factory Rules/ any other statutory Act/Rules/Law with regards to providing suitable medical facilities to the workers.

In case contractor fails to employ the required construction medical officer alongwith Additional staff, corresponding payment for the same shall not be made and/or necessary action as per provisions of the Bidding documents shall be taken by NTPC.

13.5 Additional staff including one nurse, one dresser-cum compounder, one sweeper-cum-ward boy with each construction medical officer for full working hours

13.6 The Telephone nos. of Medical officer, Hospital(s) or ambulance shall also be conspicuously displayed at each work site.

13.7 First-aid kits as approved by medical officer shall be provided at accessible points in the ratio of at least one kit for every 50 employees.

13.8 **Health Management:** The site manager shall implement health examinations for the working personnel on a regular basis.

Types of health examination	Target	Frequency
General health examination	All workers	Annual
Occupational health examination (Audiometric, PFT, Vision etc.)	Worker engaging in noise, dust, vibration, harmful light generating work	Annual
Occupational health examination (Vision)	Personnel involved in operation of Cranes, heavy vehicles	Annual
Occupational health examination (Vertigo/Height pass)	Workers engaged at Height Works	At the time of induction training and every year

14. TESTING & EXAMINATION OF LIFTING, TOOLS, TACKLES, PRESSURE VESSELS AND OTHER EQUIPMENT:

14.1 All the lifting equipment, tools, tackles, pressure vessels etc. shall be tested & examined as per BOCW or Factories Act and rules made there under.

14.2 The records & certificates of such testing & examination shall be maintained and readily available for reference to statutory authorities/engineer-in-charge.

14.3 Proper color coding system should be maintained and marking should be done accordingly on all lifting tackles.

14.4 Regular testing of ELCBs and RCCBs by competent electrician must be ensured by agencies and record should be maintained.

15. EMERGENCY MANAGEMENT PLAN

15.1 The contractor shall ensure that an Emergency Management Plan is prepared to deal with emergencies arising out of:

a. Fire and explosion;
b. Collapse of lifting appliances and transport equipment;
c. Collapse of building, sheds or structure etc.;
d. Gas leakage or spillage of dangerous goods or chemicals;
e. Drowning of workers, sinking vessels, and
f. Landslides getting workers buried; floods, storms and other natural calamities.

15.2 While arrangements shall be made for emergency medical treatment and evacuation of the victim in the event of an accident or dangerous incident occurring, the chain of command and the responsible persons of the contractor with their telephone numbers and addresses for quick communication shall be adequately publicized and conspicuously displayed in the workplace.

15.3 It is also required that there is a tie-up with the hospitals and fire stations located in the neighborhood for attending to the casualties promptly and emergency vehicle kept on standby duty during the working hours for the purpose.

15.4 It shall be the responsibility of the contractor to keep the Local Law & Order Authorities informed and seek urgent help, as the case may be, so as to mitigate the consequences of an emergency. Prompt communication to NTPC, telephonically initially and followed by a written report, shall be made by the contractor.

16. ENFORCEMENT OF SAFETY CODE, SAFETY RULES & REGULATIONS:

The Engineer-In charge shall ensure that the contractor is exercising at all times, reasonable and proper precautions for the safety of people at works and complying with the provisions of current safety rules and laws according to safety code and relevant statutes of state/central governments. In case of negligence or default, the agency shall be penalized suitably as per penal provisions of NTPC Safety Rules.

17. WORK PERMIT SYSTEM

17.1 The Contractor shall implement Work Permit system, which is a formal written system used to control certain types of work that are potentially hazardous. A work permit is a document, which specifies the work to be done, and the precautions to be taken. Work Permits form an essential part of safe systems of work for many construction activities. They start the work

only after safe procedures have been defined and clearance taken from respective NTPC EICs. Permits to Work are usually required in high-risk areas as identified by the Risk Assessments.

17.2 Examples of high-risk activities include but are not limited to:

i) Entry into confined spaces
ii) Cutting & welding
iii) Working at Height along with checklist iv) Working on electrical equipment
v) Heavy lifting operations
vi) Removal of grating/ Handrail / floor opening
vii) Material Shifting

The copies of recommended formats for reference is given in annexure-IV.

17.3 The permit-to-work system should be fully documented, laying down:

i) How the system works
ii)The jobs it is to be used for;
iii) The responsibilities and training of those involved; and
iv) How to check its operation;

17.4 A Work Permit authorization form shall be completed with the maximum duration period not exceeding 12 hours.

17.5 A copy of each Permit to Work (PTW) shall be displayed near to work are (on PTW Display board) in close proximity to the actual works location to which it applies.

18. ACCESS TO AND FROM THE WORKPLACE

18.1 Safe, clean, well lit, unencumbered access and egress to and from work areas shall be maintained at all times in normal operating conditions.

18.2 The number and location of accesses and egresses from and to the workplace shall be adapted to the number of people likely to be present at any time, and therefore to evacuate from the workplace in case of emergency.

18.3 If access and egress to work areas are restricted due to operational conditions (e.g. access restricted due to pressure testing, etc.), alternative access and egress ways must be implemented, so far as is reasonably practicable. If this is not reasonably practicable, all concerned organizations and persons must be informed of the access restrictions, and work scheduling must be adapted in consequence.

18.4 Temporary access to height or into ground openings shall be of purpose made material such as scaffolds, stair cases/towers and ramps, which incorporate guardrails .

19. INTERFERENCE WITH MOVING VEHICLES AND PEDESTRIANS

19.1 The circulation of vehicles and pedestrians must be segregated by establishing restricted areas, one way routes where possible, pedestrian crossing zones and designated parking areas.

19.2 The appropriate measures must be implemented in order to prevent collision between pedestrians and vehicles at pedestrian crossings. This may include, but shall not be limited to:
- Mirrors;
- Lighting;
- Speed bumps before the crossing point.

19.3 Vehicle and pedestrian ways shall be physically separated with Hard-barriers, so far as is reasonably practicable, and be indicated with signs.

19.4 When it is not reasonably practical to implement a physical segregation, pedestrians must maintain safety distance of at least 2 meters from moving/operating vehicles at all times.

19.5 Traffic rules must be made visible through signage and traffic stops, consistent with those used on public

19.6 Roads as per road safety requirement.

19.7 All pedestrians on Project sites must wear high-visibility garments.

19.8 Pedestrians (including banksmen) must wear high-visibility garments in all areas where trucks and other vehicles (forklifts, cranes, etc.) maneuver. These areas must be clearly signaled / marked (floor painting, Hard-barriers, signs, etc.).Additional points:

19.9 Competent banksmen must be used for operations involving reversing or maneuvering where space or view is restricted.

19.10 Drivers must only operate vehicles they are competent to drive and must follow the established traffic routes and comply with all site rules.

19.11 The maximum driving speed on site is 15 km per hour.

19.12 Drivers and passengers must not get on or off moving vehicles.

19.13 When driving a forklift, forks must be lowered, the mast tilted back.

19.14 Smoking, eating, drinking, using a mobile phone or using earbuds or headphones when driving a vehicle is strictly prohibited.

19.15 When the vehicle is not in use, it must be ensured that:

- The engine is stopped and prevented from unauthorized use (e.g.: starter key removed), brake applied (and with wheels chocked for heavy vehicles);
- All raised parts are lowered to the ground or put in a safe position (cranes);
- It does not obstruct emergency exits, other routes, fire equipment or electricity panels.

20. HOUSEKEEPING

The contractor shall ensure that their work area is kept clean, tidy and free from debris generated by their activities. All debris/scrap should be stored in separate bins. The work areas must be cleaned on a daily basis and a full cleaning session of each area shall be conducted on a weekly basis. All equipment, materials and vehicles shall be stored in an orderly manner. Access to emergency equipment, exits, telephones, safety showers, eye wash stations, fire extinguishers, pull boxes, fire hoses, etc. shall not be blocked or otherwise disturbed, restricted or delayed.

21. STACKING AND STORAGE PRACTICE

Contractor Agency shall ensure stacked material is bonded on a stable and level footing capable of carrying the mass of the stack. Adequate clearances shall be provided between the sides of the stack and top to facilitate unimpeded access to service equipment like overhead wiring, cranes, forklifts and firefighting equipment, and hoses. Circular items shall be sufficiently choked with wedges not with odd bits of materials. Free-standing stacks of gunny bags and sacks such as Cement bags shall be stacked to prescribe safe stacking heights with layers formed for stable bonding, preventing slippage causing accidents. Stacking against walls shall not be permissible.

Contractor shall maintain the premises and surrounding areas in clean and clear manner with safe access and egress. There shall be sufficient and adequate storage racks, shelving, bins and pallets and material handling equipment to stack his construction materials such as Pipes, Structural and his construction enabling materials. Unwanted materials shall be promptly moved away for efficient material movement.

Any temporary store shed will be built in conformity with fire safety requirements. The stores must be provided with adequate lighting arrangement (Flame proof / intrinsically safe depending upon the Zone category) and must be equipped with sufficient fire extinguishing arrangement. “No Smoking” and other relevant signage must be displayed conspicuously at strategic locations and safety precautions must be strictly enforced.

All material should be kept at least 150mm above from the ground by providing wooden packing below. Maximum height of material stacking should not be greater than 3 meter. All loose material must be kept in wooden box or in sharp edge protected drum and material identification details to be displayed. Materials inside store room should be kept on scaffold rack.

Gas cylinder storage area must be 30m away from the hot work zone and separate storage facility must be available for empty and full cylinder with proper shed. Storage area must be design in a way that 6 meter distance between LPG/DA and oxygen maintained

22. CONFINED SPACES

All Confined Spaces belonging to Subcontractor shall be identified and clearly signed posted as a confined space forbidden to unauthorized Personnel at every entrance. A method for preventing entry must be established and maintained for all Confined Spaces. Physical prevention system (such as locks) is preferred.

Before commencing work in a Confined Space, the Subcontractor must obtain a Permit to Work from the relevant authority.

The following requirements shall be met at any time:

- Only competent and trained workers can participate to work in confined spaces (as a minimum as per local Law). A Confined Space Entry Log (or equivalent) must be used to identify the person inside the Confined Space at any time;
- Air Analysis tests must be carried out to determine if the Confined Space is oxygen deficient and/or contains flammable substances, toxic agents, carbon monoxide and/or harmful physical agents. The air shall be analyzed before starting work, during work and after work. Adequate ventilation must be provided;
- Working in the confined space without a watcher is strictly forbidden. An adequate means of communication is required and shall enable easy and clear communication:
- Between those inside the space,
- Between those inside the space and those outside,
- To summon help in case of emergency;
- Adequate emergency provisions must be in place. In particular, necessary rescue equipment must be ready, pre inspected and available. The arrangements need to be suitable and sufficient for the rescue of persons in the event of an emergency.

23. FIRE PROTECTION AND PREVENTION

Routine hot works should be described in the contractor Risk Control Plan .Non-routine hot works are submitted to daily hot works permits given by the relevant authority.

Full and unrestricted access to emergency exits, fire-fighting equipment, fire control and emergency vehicles shall be maintained at all times. The Subcontractor shall provide, install and maintain their own temporary fire protection against hazards they introduce to the Site (work areas, storage areas, and temporary facilities under their responsibilities).

Fire extinguishers shall be inspected at least annually by a certified person and visually inspected monthly and documented by the Contractor.

24. ELECTRICAL SAFETY

Personal authorization must be issued by Contractor Management (or formally designed delegates) likely to perform or supervise electrical works.

Without such an authorization validated by EIC, no Contractor's employee shall undertake electrical works.

No live work on high voltage or medium voltage is allowed. All high voltage and medium voltage electrical works must be performed on isolated equipment and only after verification of absence of voltage with suitable equipment. Low voltage and very low voltage live work is only allowed for measurement tests and checks of equipment. The below measures will be taken:

- Work practices must protect against direct or indirect body contact by means of tools or materials and be suitable for work conditions and the exposed voltage level
- A Lockout and Tagout procedure must be applied prior to commencing any electrical work. Prior to commencing works on isolated equipment, a verification of absence of voltage with suitable safety test equipment must be performed.
- Energized panels will remain locked with a specific key or tool whenever they are unattended and tagged with the signs and warnings indicating the presence of danger. If not reasonably practicable, a restricted area delimited with physical barriers and supported by warning signs must be implemented around the opened equipment.
- Only qualified electrical Contractor Personnel may enter substations and/or transformer vaults and only after being specifically authorized by NTPC EIC.
- All joints (Both terminal and intermediate) in cable should be made using lugs and joint area should be crimped using crimping tools.
- All temporary connection should be provided through 30mA ELCB/RCCB using 3 core double insulated cable and only 3 pin industrial plug top will be used for connection.
- Zero energy verification needs to be ensured before any electrical operation using only VAV before working on a live circuit which has been isolated
- Only industrial type DB to be used for connection and weather protection shed needs to be provided for every DB and shed height should not be less than man height.
- Double earthing protection must be provided for every electrical equipment and earthing value should be less than 1 Ohm
- Deployment of trained, experienced & licensed electrician as well as licensed electrical supervisor must be ensured at site as per Rule-45 of the Indian Electricity Rules, 1956 ;
- EIC May perform screening/ competency test for all contractor electrical professions i.e. electrical engineers and helpers. Selection/ rejection of the personnel who appear for the screening is sole discretion of EIC
- Electrical helper who will be engaged in helping the electrician/ engineer must have minimum ITI certificate to be eligible for working with him
- All PPE' s used while being involved in electrical work must be as per IS Standards available for electrical work

25. COMPRESSED GAS CYLINDERS

Gas cylinders shall be securely stored and transported, and identified and used in line with the safety Requirements as per Gas Cylinder Rules -2106.

Hose lines shall be adequately protected, inspected and tested for leaks in line with the safety Requirements. Flash back arrestor /NRV must be used at both ends of the hoses and all hose should be free from damage and fixed properly preferably using crimping clamps. Leakage test must be done before every use by soap solution and physical inspection of hose must be carried out regularly. Only trolley attached with wheel will be used for cylinder transportation in which cylinders must be kept secured with chain. Only Industrial type regulator fitted with two stage double dial pressure gauze is allowed to be used.

26. LIFTING OPERATIONS

The Contractor shall prepare a lifting plan, checked and submit for authorization by contractor's competent authorized persons prior to any lifting operation and formally communicated to all persons undertaking the work.

All persons preparing, issuing lifting plans and all persons involved in lifting operations must be subject to formal competence checks by the contractor to ensure necessary training, experience and qualification prior to commencing work. The Subcontractor must ensure that their nominated Lifting Leader has appropriate qualifications.

Contractor lifting plans include:

The lifting methodology, step by step

The risk analysis of the operation including consideration for weather conditions and work environments (e.g.: proximity of hazards and obstructions to the load, consideration for overturning, load integrity) where appropriate and consideration for simultaneous operations and the measures taken to avoid conflicting tasks in the lifting area

The identification of the designated lifting area, the fall zone and the control measures to prevent access such as barriers, signs, etc.

The description of the type, weight, size, shape and center of gravity of the load and the method used for slinging, attaching and detaching the load with the availability of approved lifting points on load when necessary

The list of the certified and inspected equipment and lifting accessories to be used

The composition of the team required to perform the task (crane driver, rigger, etc.) with the needed qualifications and description of their roles and responsibilities including the intended communication method

Any Heavy equipment (crane, winch machine, etc.) manufactured less than 15 years from the current year shall be only allowed to be used at our project Site's. Pre-safety Inspection of the equipment by safety deptt. shall be done before mobilizing the equipment at our project site.

The contractor must ensure that a competent operational leader is formally appointed to supervise each lifting operation. All lifting plans must clearly define the specific roles and responsibilities for each person involved (e.g.: crane drivers, lifting coordinators and riggers) and must be checked and issued prior to lifting operation. Clear communication channels must be formally established and maintained between everyone involved in a lift with only authorized person giving instruction to the operator.

Special permission needs to be taken from NTPC EIC for tandem lifting and for any non-routine lifting operations must strictly adhere to the guidelines described in corresponding Standard / Procedures / Directive.

No employee of the contractor shall be positioned under a suspended load or between a suspended load and fixed objects.

All lifting equipment and accessories must have valid manufacturers certificates or thorough examination records and be uniquely identified, marked with the safe working load, listed in a register and subject to formal regular inspection as per EHS requirements and shall have valid certificates from a competent authority. Inspection before use by the operator is mandatory. All lifting hooks must have latch. All cranes shall be fitted with Automatic Safe Load Indicator (ASLI) and Anemo Meter.

The contractor shall operate and maintain cranes and hoisting equipment in accordance with manufacturers' specifications and limitations and the safety Requirements. All defective, non-inspected or unidentified (safe working load / identification number) lifting equipment or accessories must be either removed from site or physically prevented from use.

27. LOCKOUT TAGOUT ("LOTO")

Prior to performing work on Machines or Equipment, the Subcontractor shall ensure that all energy sources are isolated and verify the absence of residual energy (e.g.: by using specific voltage detecting device for electricity).

At any time, the contractor shall follow the Site-specific LOTO and Permit to Work rules. The contractor must ensure that all of their affected Subcontractor Personnel receive the necessary training. Lockout/ Tagout must be implemented before servicing and maintenance is performed on Machines and Equipment, which could unexpectedly start-up, become energized, or release stored energy exposing persons to a risk of injury, unless the works undertaken are performed using alternative measures that provide effective protection.

Absence of residual energy must be verified using the suitable equipment or process adapted to the machine and the kind of energy to be checked before start of work. *The contractor must procure suitable VAV instrument for verification of absence of voltage before implementing LOTO all by themselves*.

When the contractor is in charge of LOTO, each authorized person must be issued with an individual lock with a unique key. The contractor shall secure areas where energy sources have been de energized, so as to prevent the access of unauthorized personnel and erect suitable signs. All affected Personnel shall be notified.

Once an item of electrical equipment has been energized, an item of mechanical plant and/or System has been erected and released for Commissioning, no work will be allowed on such item of Equipment or System unless a valid Permit to Work (PTW) has been obtained from the relevant authority.

28. MONTHLY SAFETY REPORT

Agency has to submit the monthly safety activity report in the form of Lead-Lag indictor to NTPC Safety Deptt. Sample format attached as annexure –IV.

29. In case the Contractor doesn't adhere to any of the provisions of the NTPC Safety Rules for Construction and Erection of Power Plants, corresponding payment for the provisions not adhered, shall not be made and/or necessary action as per provisions of the Bidding documents shall be taken by NTPC.

SECTION-II
1. Safety at workplace and equipment

1.0 GENERAL PROVISIONS:

1.1. Housekeeping:

a. The contractor shall be primarily responsible for maintaining Good housekeeping and safety standards in the workplace;
b. Loose materials that are not required for use shall not be placed or left behind so dangerously as to obstruct workplaces or passageways;
c. All projecting nails shall be removed or bent to prevent injury;
d. Equipment, tools and small objects shall not be left lying unattended or unsecured from where they could fall or cause a person to trip;
e. Scrap, waste or rubbish shall not be allowed to accumulate in the site as these combustibles can create serious fire hazards and affect safe working;
f. Workplaces and passageways that become slippery owing to spillage of oil or other causes shall be cleaned up or strewn with sand, ash or the like;
g. Portable equipment shall be returned after use to their designated storage place.

1.2. Means of access and egress shall consist of

a. Adequate and safe means of access and egress shall be provided in all workplaces;
b. The means of access and egress shall be maintained in a safe condition;

1.3 Lighting and ventilation

a. All practical measures shall be taken to prevent smoke, fumes etc. from obscuring any workplace or equipment at which any worker is engaged;
b. Adequate and suitable artificial lighting shall be provided where natural lighting is not sufficient as per IS 3646 (Part II). The artificial lighting so provided shall not cause any incidental any danger, including that of producing glare or disturbing shadows;
c. To prevent danger to health from air contamination by dust generated during grinding, cleaning, spraying or manipulation of materials as also to provide protection against dangerous gases, fumes, vapours, mist, etc. effective arrangements shall be made for ventilation;
d. Workers shall be provided with suitable respiratory protective equipment, if it is not technically possible to have uncontaminated air. To this end, a study by a competent person shall be made to decide on the due protection. Sufficient illumination at all times for maintaining safe working conditions shall be provided where building workers are required to work or pass, and for passageways, stairways and landings such illuminations shall not be less a than 0.5 foot candles at the floor level;
e. Where natural lighting is not adequate to prevent danger, adequate and suitable lighting shall be provided as per IS: 3646 – Part II;
f. Artificial lighting shall not cause any danger due to a brightness greater than 10 foot candles per square inch, except where the angle of inclination from the eye to the source or the part pf the fitting as the case may be exceeds 20^0, including that of producing glare or disturbing shadows;
g. Where necessary to prevent danger to health from air contamination by dust from the grinding, cleaning, spraying, or manipulating of materials or objects, arrangements shall be made to limit the concentration of the pollutants by thorough ventilation, and dust generated due to movement of earthmoving machinery and other construction equipment, by spray of water in the area from time to time;
h. Adequate ventilation by the circulation of fresh air shall be maintained in such places where the concentration of pollutants is likely to affect the health of the workers;

i. Special care shall be taken to ventilate the workplace where gas cutting, welding or other operations involving generation of dangerous fumes, vapours, mists, gases etc is likely;
j. Where it is technically not possible to eliminate dust or noxious or harmful fumes or gases sufficiently to prevent injury to the health of the workers, the contractor shall provide suitable respiratory equipment like dust mask or gas/fume mask or breathing apparatus or other suitable respiratory equipment.

1.4. Dangerous and harmful environment:

a. When an internal combustion engine exhausts into confined space or excavation or tunnel or any other workplace where neither natural ventilation nor artificial ventilation system is adequate to keep the carbon monoxide content of the atmosphere below fifty parts per million, adequate and suitable measures shall be taken at such workplace in order to avoid exposure of building workers to health hazards;

b. No building worker shall be allowed to enter any confined space or tank or trench or excavation wherein there is given off any dust fumes or other impurities of such nature and to such extent as is likely to be injurious or offensive to the building worker or in which explosives, poisonous, noxious or gaseous material or other harmful articles have been carried or stored or in which dry ice has been used as a refrigerant, or which has been fumigated or in which there is a possibility of oxygen deficiency, unless all practical steps have been taken to remove such dust, fumes or other impurities and dangers which may be present and to prevent any further ingress thereof, from such workplace or tank or trench or excavation;

c. No worker shall be allowed to enter any such space unless a responsible person has certified it safe and fit for the entry of such building workers.

1.5. Fumes/gases due to Welding and gas-cutting operations: When welding or cutting operations are carried out in a confined space:

a. Adequate ventilation, by means of exhaust fans or forced draught, as the condition may require, shall be constantly provided; otherwise enough quantity of air shall be circulated by means of air compressors to dilute the contaminant within permissible limits;

b. Workers shall take necessary precautions to prevent unburned combustible gas or oxygen from escaping inside a tank or vessel or other confined space;

c. Welding or cutting operations on any container that has held explosives or where inflammable gases may have been generated, shall be undertaken after the container has been thoroughly cleaned by steam or other effective means; and

d. Gas-test shall be carried out ensure that the confined space is completely free from combustible gases and vapours.

1.6. Dust, gases, fumes

a. Concentration of dust, gases or fumes shall be prevented by providing suitable means to control their concentration within the permissible limit so that they may not cause injury or create health hazard to a building worker;

b. For protection against such hazardous substances, besides efficient and effective means of control, personal protective equipment like dust masks, breathing apparatus, other respiratory appliances, goggles, as the case may be, shall be provided.

1.7. Excessive noise:

a. Adequate measures shall be taken against the harmful effects of an excessive noise;
b. Use of earplugs/muffs and anti-vibration gloves shall be ensured to protect the workers from the impact of exposure to such dangers;
c. The noise level in no case shall exceed as prescribed in the concerned Rules and exposure in excess of 115 dBA over the period of a quarter of an hour cannot be permitted:

1.8. Corrosive substances:

a. All corrosive substances, including alkalis and acids, shall be stored and used by a person dealing with such substances at a building or other construction work in such a manner that it does not endanger the building worker and suitable protective equipment shall be provided by the employer to a building worker during handling or use of such substances at a building or other construction work and in case of spillage of such substances on the building worker, immediate remedial measures shall be taken;

b. While protection of the body could be ensured by use of corrosion resistant apparel/overalls, suitable goggles, gloves, apron, gum boots etc. shall be made available to all concerned personnel;

c. To deal with an accidental spillage of a corrosive substance on the body of a worker, the facility of eyewash fountain or water shower, as the case may be, shall be installed, within the easy reach of the workplace.

1.9. Eye protection:

a. Suitable personal protective equipment for the protection of eyes shall be provided and used by the building worker engaged in operations like welding, cutting, chipping, grinding or similar operations which may cause hazard to his eyes;

b. Goggles or face shield or welding screen with suitable shade of glass/filters etc shall be provided for the protection of the eyes.

1.10. Overhead protection:

a. It shall be ensured that at the building or other construction site, overhead protection is erected along the periphery of every building under construction that shall be of fifteen meters or more in height when completed;

b. Overhead protection shall not be less than two meters wide and shall be erected at a height not more than five meters above the base of the building and the outer edge of such overhead protection shall be one hundred fifty millimeters higher than the inner edge thereof or shall be erected at an angle of not more than twenty degrees to its horizontal sloping into the building;

c. It shall be also ensured that at the building and other construction work that any area exposed to risk of falling material, articles or objects is roped or cordoned off or otherwise suitably guarded from inadvertent entry of persons other than building workers at work in such area.

1.11. Lifting and carrying of excessive weight:

a. No building worker lifts by hand or carries overhead or over his back or shoulders any materials, articles, tools or appliances exceeding in weight the maximum limits as set out in the following table unless aided by any other building worker or a mechanical device;

b. No worker aided by other workers, lift by hand or carry overhead or over their back or shoulders any materials, articles, tools or other appliances exceeding in weight the sum total of the maximum limits as prescribed in the concerned Rules, unless aided by a mechanical devices:

1.12. Protections against fall of persons –

a. All scaffolds/working platforms at height of two metres or more shall be fenced;
b. All guard-rails for the fencing of floor openings, gangways, elevated workplaces shall be made of sound material, good construction and possess adequate strength and be between 1 m and 1.5 m above platform level, consist of two rails (two ropes or chains may be used if they are sufficiently taut) and supporting stanchions;
c. Intermediate rails, ropes or chains shall be midway between the top and lower of edges of the top rail;
d. Sufficient number of stanchions or standard poles or uprights shall be maintained to ensure the required stability and resistance;
e. Guard-rails shall be free from sharp edges and be maintained in good repair;
f. Floor openings through which persons could fall, shall be guarded by covering or fencing;
g. If the means of protection is removed to allow the passage of persons or goods or other purpose, the same shall be replaced as soon as possible, while making temporary arrangements for reasonable degree of safety in the meanwhile;
h. Covers for floor opening shall be safe to walk on and if vehicles operate thereon it shall be safe for the same. This will require the contractor to have prior assessment of expected loads;
i. Cover for floor opening shall be secured by hinges, grooves, stops or other effective means against sliding, falling down or lifting out or any other inadvertent displacement;
j. Covers for any openings shall not constitute any hindrance to traffic and, as far as practicable, be flush with the floor;
k. If covers constitute as grids, the bars shall be spread not more than 5 cm apart;
l. Elevated workplaces at more than 2 m above the floor or ground shall be protected on all open sides by guardrails. It is commonly observed that fragile barricade tapes are used as a substitute of a strong and dependable fencing. This practice is prohibited. The barricade tapes can be used as markers/route guide only;
m. Elevated workplaces shall be provided with safe means of access and egress such as stairs, ramps or ladders according to suitability;
n. Persons employed at elevated workplaces or other situations at more than 2m from which they may fall, shall be protected by means of adequate safety nets, or platforms, or be secured by

safety belts with the lanyard properly anchored above the head level of the user. All possible effort shall be made to have strong and dependable mechanical arrangement.

1.13. Protection against fall of objects and materials:

a. Materials and objects such as scaffolding materials, waste materials or tools shall not be thrown up or down from heights, as they are liable to cause injury;
b. If materials and other objects cannot be safely lowered from heights, adequate precautions such as the provision of fencing, lookout men or barriers shall be provided to protect any person from injury.

1.14. Protection against entry of unauthorized persons:

a. Construction zones in the site and built up areas alongside main traffic routes shall be barricaded;
b. Unauthorized persons shall not be allowed access to construction sites and visitors shall be provided with the required protective equipment and it be ensured that they use them effectively.

1.15. Head protection and other protection apparel:

Every building worker who is required to –

a. Pass through or working within the areas where there is hazard of his being struck by falling objects or materials, shall be provided with safety helmets of the type approved and tested in accordance with the national standards;
b. Work in water or in wet concrete or in other similar work, shall be provided with suitable waterproof;
c. Work in rain or in similar wet condition, shall be provided with waterproof coat with hat;
d. Workers using or handling of alkalis, acid or other similar corrosive substances shall be provided with appropriate protective equipment in accordance with the approved standards;
e. Every building worker engaged in handling sharp objects or materials at a building or other constriction work, which may cause hand injury, shall be provided with suitable hand gloves in accordance with the approved standards.

1.16. Stability of structures:

a. No wall, chimney or other structure or part of a structure shall be left unsupported in such condition that it may fall, collapse or weaken due to wind pressure, vibration or due to any other reason. Entry of persons into such locations where tall structures are being built shall be regulated without a let up.

1.17. Safety of Structures and equipment and other safety concerns

a. Safety of structures like scaffoldings, platforms, gangways/walkways, towers, stairs, ladders, ramps, safety in excavation, formwork, falsework, demolition work, storage, handling and use of explosives, inflammable substances and hazardous materials, gas cutting and welding, use of electricity etc.; and equipment viz. construction machinery, crushers and batching plant, boiler and other pressure vessels, transport and material handling equipment, lifting appliances, vehicles etc., shall be operated and maintained as per approved norms and –
   i. They shall be made of sound material and of good construction, free from patent defects, provided with adequate safe guards, properly maintained, periodically inspected and strong enough to withstand safely the loads and stresses to which they may be subjected;
   ii. They shall carry enough factor of safety bearing in mind that the possibility of their abuse, which otherwise shall be prevented by constant and adequate supervision, cannot be ruled out altogether;
   iii. It is incumbent on the contractor to ensure that only competent and authorized persons operate the equipment or attend to electrical and mechanical systems and repair of faults or breakdowns etc.
b. Working in the confined space may involve certain serious hazards. Strict adherence to the conditions of Permit-to-work issued for the purpose is required;
c. Control of energy sources shall be ensured through Log-out/Tag-out practices.

1.18. Slipping, tripping, cutting, drowning and falling hazards:

a. The contractor shall keep all passageways, platforms and other places free from accumulations of dust, debris or similar material and from other obstructions that may cause tripping;

b. Any sharp projections or protruding nails or similar projections which may cause any cutting hazard to a building workers shall be removed or otherwise made safe by taking suitable measures;

c. No contractor shall allow any building worker at construction work to use the passageway, or a scaffold, platform or any other elevated working surface which is in slippery and dangerous condition and shall ensure that water, grease, oil or other similar substances which may cause the surface slippery, be removed or sanded/saw-dusted or covered with suitable material to make it safe from slipping hazard;

d. Wherever building workers are exposed to the hazarded of falling into water, they shall be provided with rescuing arrangement from such hazard and if it is considered necessary, well equipped boat or launch manned with trained personnel shall be provided by the contractor at the site of such work;

e. Every open side or opening into or through which a building worker, vehicle or lifting appliance or other equipments may fall at a building or other construction work shall be covered or guarded suitably to prevent such fall except where free access is necessary by reasons of their nature of the work;

f. Wherever building workers are exposed to the hazards of falling from height while employed on such work they shall be provided by the employer with adequate equipment or means for

saving them from such hazards, Such equipments or means shall be in accordance with the standards as laid down;

g. Whenever there is a possibility of falling of any martial, equipment or building worker at a construction site relating to a building or other construction work, adequate and suitable safety net shall be provided in accordance with the above stipulation;

2.0 SAFETY IN MATERIAL HANDLING AND WASTE DISPOSAL

2.1. GENERAL PROVISIONS:

a. All building materials stored in tiers shall be stacked, racked, blocked, interlocked or otherwise secured safely to prevent sliding, falling or collapse and in an orderly manner to avoid obstruction of any passageway at the place of work. Piles of materials shall be stored or stacked in such a manner as to ensure their stability;

b. Maximum safe load limits of floors within buildings and structures in kg/cm^2 shall be conspicuously posted in all storage areas, except for floor or slab on gradient. Maximum safe load shall not be exceeded. Material or equipment shall not be stored upon any floor or platform in such quantity as to exceed its safe carrying capacity;

c. Ailes and passageways shall be kept clear to provide for the free and safe movement of material handling equipment or persons. Such areas shall be kept in good repair;

d. When a difference in road or working levels exist, means such as ramps, blocking or grading shall be used to ensure the safe movement of vehicles between two levels;

e. Material stored inside buildings under construction shall not be placed within 2 m of any hoist way or inside floor openings nor within 3.2 m of exterior wall which does not extend above the top of material stored;

f. Persons employed required to work on stored material in silos, hoppers and similar storage areas shall be equipped with lifelines and safety belts;

g. Non-compatible materials shall be segregated in storage;

h. Bagged materials shall be stacked by stepping back the layers and cross-keeping the bags at least every 10 bags high;

i. Materials shall not be stored on scaffolds or runways in excess of supplies needed for immediate operations;

j. Bricks stacks shall not be more than 2.2 m in height. When a loose brick stack reaches a height of 1.3 m it shall be tampered back 5 cm in every foot of height above the 1.25 m level;

k. When masonry blocks are stacked higher than 2 m, the stack shall be tapered back on half block per tier above the 2 m level;

l. Material or equipment shall not be stored or placed so close to any edge of a floor or platform as to endanger the safety of persons below or working in the vicinity. Where stacking, unshackling, stowing or unstaring of construction material or article, or handling in connection therewith cannot be safely carried out unaided, reasonable measures to guard against accident or dangerous occurrences shall be taken by shoring or otherwise to prevent any danger likely to be caused by such handling;

m. Stacking of material or article shall be made on firm foundation not liable to settle and such material or article and shall not overload the floor on which such stacking is made;

n. The material or articles shall not be stacked against partition or walls o f a warehouse or stores unless it is known that such partition or the wall is of sufficient strength to withstand the pressure of such materials or articles;

o. The materials or articles shall not be stacked to such a height and in such a manner as would render the pile of such stack unstable and cause hazards to the building workers or the public in general;

p. Where the building workers are on stack exceeding one point five meters in height, safe means of access to the stack shall be provided;

q. All stacking or unshackling operations shall be performed under the supervision of a responsible person for such stacking or unstacking;

r. The stacking of construction materials or articles shall not be made near the site of excavation, shaft, pit or any other such opening;

s. Stacks that may lean heavily or become unstable or collapse are barricaded shall be avoided;

t. Structural steel, poles, pipe, bar stock and other cylindrical materials, unless racked, shall be stacked and blocked so as to prevent sliding, spreading or tilting.

2.2. LUMBER:

a. Used lumber shall have all nails withdrawn before stacking;

b. Lumber shall be stacked on level and solidly supported sills;

c. Lumber piles shall not exceed 6 m in height provided that lumber is handled manually, shall not be stacked more than 5 m height;

d. Lumber shall be so stacked as to be stable and self-supporting.

2.3. STACKING OF CEMENT AND BAGS CONTAINING OTHER MATERIALS:

a. The cement or other material in bags shall be stacked in a header and stature-wise in rows alternately in not more than 10 numbers and there will be circulation of space of at least 600 mm in between two such rows;

b. While removing bags from the stack pile the stability of such stack pile shall be ensured;

c. Bags containing cement or lime shall be stored on a firm ground;

d. The materials like bricks, tiles or blocks shall also be stored on a firm ground;

e. Reinforcing steel shall be stored according to its shape, size and length and stack of reinforcing steel kept as low as possible;

f. No pipe shall be stored on rack or in stack where such pipe is likely to fall by rolling;

g. The angle of repose shall be maintained where loose materials are stacked;

h. When dust laden material is to be stored or handled, measures shall be taken to suppress the dust produced by such storing or handling and suitable personal protective equipment supplied to and used by the building workers working for such storing or handling.

2.4. DISPOSAL OF DEBRIS AND WASTE MATERIAL:

a. It shall be ensured that debris is

i. Handled and disposed of by a method, which does not cause danger to the safety of a person and not allowed to accumulate so as to constitute a hazard;

ii. Kept sufficiently moist to bring down the dust under control;

iii. Not thrown inside or outside from any height of such building or other construction work;

b. Brought down by suitable means/chutes provided for the purpose and on completion of work, leftover building material, article or other substance or debris shall be disposed off as soon as possible to avoid any hazard to any traffic or person;

c. Whenever materials are dropped more than 6 m to any point lying outside the exterior walls of the building an enclosed chute of wood, or equivalent material shall be used;

d. When debris is dropped through holes in the floor without the use of chutes, the area where the material is dropped shall be completely enclosed with barricades not less than 1.1 m high and not less than 1.9 m back from the edge of the opening above. Signs warning of the hazard of falling material shall be posted at each level;

e. All scrap lumber, waste material and rubbish shall be removed from the immediate work area as the work progresses;

f. Disposal of waste material or debris as per the guideline issued by CPCB in compliance of Rule 10 sub-rule 1(a) of C & D Waste Management Rules, 2016).

g. All bio-degradable material shall be disposed off in the pit for making compost. Pellets can also be made from bio-degradable material

h. All solvent wastes, oil rags and flammable liquids shall be kept in fire resistant covered containers until removed from the work site.

2.5. HANDLING GAS CYLINDERS:

a. Gas cylinders shall not be lifted on bare slings. For lifting the cylinders, cage of suitable size shall be used and all cylinders shall be horizontally positioned in it. Such cage shall have fencing in such a way that there is no possibility of fall of cylinders from this cage.

2.6. RIGGING EQUIPMENT FOR MATERIAL HANDLING:

a. Rigging equipment for material handling shall be inspected prior to use in each shift as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service;

b. Rigging equipment shall not be loaded in excess of its recommended safe working load, as prescribed in the Indian standards;

c. Rigging equipment, when not in use, shall be removed from the immediate work area so as not to present a hazard to persons engaged in the area;

d. Special custom designed grabs, hooks, clamps, or other lifting accessories, for such units as modular panels, prefabricated structures and similar materials, shall be marked to indicate the safe working loads shall be proof tested prior to use 125% of their rated load;

e. Welded alloy steel chain slings shall have permanently affixed-durable identification standing size, grade, rated capacity and manufacturer.

2.7. FENCING OF MOTORS ETC

a. All motors, cogwheels, chains and friction gearings, flywheels, shafting and the other dangerous and moving parts of machinery (whether or not driven by mechanical power) and steam pipes shall be securely fenced and the fencing of dangerous parts of machinery not removed while such machinery is in motion or in use;

b. No part of any machinery which is in motion and which is not securely fenced, shall be examined, lubricated, adjusted or repaired except by a person skilled and trained for such examination, lubrication, adjustment or repairs and machine parts cleaned only when such machine is stopped;

c. When a machine is stopped for servicing or repairs, adequate measures shall be taken to ensure that such machine does not restart inadvertently and not only tag-out sign is required; it is also essential that an active system of isolating the power be applied.

2.8. PROTECTION AGAINST LIGHTNING

a. Where necessary, installations shall be protected against lightning, provided further that;

b. No bare conductors or bare current-carrying parts of equipment be permitted to be installed unless adequate precautions are taken to prevent direct pr indirect contact;

c. Only flame-proof equipment and conductors shall be installed at places where explosives or inflammable substances are stored, handled or used or where explosive atmosphere exits;

d. Persons competent and authorized only shall attend to electrical breakdowns and other operational faults and give or restore power to an equipment and such persons shall be easily identifiable by their dress or special helmet worn;

e. It will constitute a standard practice to switch off portable tools while shifting from one place to another or while leaving them behind unattended;

f. The contractor shall ensure that a system is in place to always keep tools well maintained.

2.9. VEHICULAR TRAFFIC

a. Whenever any building or other construction work is being carried on, or is located in close proximity to a road or any other place where any vehicular traffic may cause danger to building workers, it shall be ensured that such building or other construction work is barricaded and suitable warning signs and lights displayed or erected to prevent such danger and if necessary, a request in writing made to the concerned authorities to control such traffic;

b. All vehicles used at construction site shall comply with the requirements of the Motor Vehicles Act, 1988 (59 of 1988) and the Rules made hereunder;

c. The driver of a vehicle of any class or description operating at a construction site shall hold a valid driving license under the Motor Vehicles Act. 1988 (59 of 1988).

2.10. USE OF SAFETY BELT OR OTHER FALL ARREST SYSTEMS:

Wherever any work at a height of 3 m or more is carried out, use of a suitable fall arrest system is mandatory if the workplace has already not been provided with an otherwise reliable means of protection for preventing the fall of persons from that height, provided further that:

a. Safety belt, lanyard, life lines and devices for the attachment of such life lines shall conform to the approved standards;
b. Every building worker shall be supplied with safety belt and safety life lines for his protection and such building worker shall use such belts and life lines during the performance of his work;
c. All building workers using safety belt and safety life lines shall have the knowledge of safe use and maintenance of such belts and life lines and shall be supplied with necessary instructions for its use;
d. The responsible person for supervising the use of safety belts and safety lifelines shall inspect and ensure that such safety belts and lifelines are fit for use before taking them into use.

2.11. SAFETY NET AND ITS USE

a. Every safety net shall be of adequate strength, made of sound material and suitable for use and conform to the approved standards;
b. The responsible person for maintenance of safety nets and their use shall ensure safe fixing of such safety nets and provide such safety nets with suitable and sufficient anchorage so that the purposes for which such safety net is intended for use is served;
c. Use of multi-layer safety net to be ensured to avoid fall of material/objects.

2.12. STORAGE OF SAFETY BELTS AND NETS, ETC:

a. Proper arrangement shall be made for the safe storage of safety belts, safety lifelines and safety nets when they are not in use and are protected against mechanical damage, damages from chemicals and damages from biological agents.

2.13. SAFETY HELMETS AND SAFETY FOOTWEAR

a. The Engineer in-charge may declare whole or part of a site as the hardhat area and in such an eventuality it shall be the responsibility of the contractor to provide safety helmet of the approved quality to all personnel engaged in construction and erection work, including the visitors to the site;
b. Accordingly, wherever safety footwear is required for the safety of the personnel, the contractor shall provide the same of the approved type free of charge.

3.0 WELDING AND GAS CUTTING OPERATIONS

3.1 GAS WELDING:

3.1.1 GENERAL PROVISIONS:

a. All welders shall be provided with fire resistant protective clothing and equipment, such as fire resistant gauntlets and aprons, helmets and goggles with suitable filter lenses and its usage shall be ensured;
b. The welders shall not be allowed to wear clothing that is not free from grease, oil and other flammable material;
c. Adequate precautions shall be taken to protect persons working or passing near welding operations from dangerous sparks and radiation;
d. When welding or cutting is being done on materials containing toxic or harmful substances or liable to produce toxic or harmful fumes, adequate precautions shall be taken to protect workers from the fumes, either by
    i) Exhaust ventilation, or
    ii) Respiratory protective equipment;
    iii) Arrangement shall be made so that welding sparks do not fall down on the persons working below or material, which are combustible in nature and may be damaged with such sparks.
e. The oxygen pressure for welding shall always be high enough to prevent acetylene flowing back into the oxygen cylinder;
f. Acetylene shall not be used for welding at a pressure exceeding 1 atmosphere gauge;
g. Adequate precautions shall be taken to prevent:
    i) Fire being stated by sparks,
    ii) Slag or hot metal; and
    iii) Damage to fibre ropes from heat, sparks, slag or hot metal;
h. Precautions shall be taken to prevent flammable vapours and substances from entering the working area;

3.2. WELDING AT PLACES WITH FIRE RISKS:

a. Unless adequate precautions are taken, no welding or cutting operations shall be allowed near the place where combustible materials are stored, or near materials or plant where explosive or flammable dusts, gases or vapours are likely to be present or given off. If hot work permit system exists at the site, the same shall be followed;
b. Combustible materials and structures that cannot be removed from the vicinity of welding operations shall be shielded by asbestos or protected by other suitable means.

3.3. WELDING IN CONFINED SPACE:

When welding or cutting operations are being carried out in a confined space;

a. Adequate ventilation, by means of exhaust fans or forced drought as the condition may require, shall be constantly provided; otherwise enough quantity of air shall be flown in by means of compressors to dilute the pollutants;

b. No blow pipe shall be left unattended inside a tank or vessel or other confined space during meal break or other interruption of the work;
c. The worker shall take all necessary precautions to prevent unburned combustible gas or oxygen from escaping inside a tank or vessel or other confined space; and
d. When necessary to prevent danger, an attendant shall watch the welders from outside.

3.4. WELDING ON CONTAINERS FOR EXPLOSIVE OR FLAMMABLE SUBSTANCES:

Welding or cutting operations on containers in which they are explosives or flammable substances shall not be allowed;

i) Welding or cutting operations on any container that has held explosive or where flammable gases may have been generated, shall only be undertaken,
ii) After the container has been thoroughly cleansed by steam or other effective means; and
iii) Found by air tests to be completely free from combustible gases and vapours; or
iv) After the combustible gas in the container has been completely replaced by an inert gas or by water;
v) If an inert gas is used as laid down in clause 4.2.3, after the vessel has been filled with gas, the gas shall continue to flow slowly into it thorough out the welding or cutting operations;
vi) Before starting any welding operations on, or otherwise applying heat to, closed or jacketed containers or other hollow parts, such containers or parts shall be adequately vented in suitable manner.

3.5. GAS CYLINDERS

a. Gas cylinders shall be inspected, stored, handled and transported in conformity with the requirements of Gas Cylinders Rules, 1981;
b. When in use, cylinders shall be held in upright positions by straps, collars or chains;
c. Devices referred to in clause 6.2 shall be such that the cylinders can be rapidly removed in an emergency;
d. Welders shall not temper with or attempt to repair safety devices and valves on gas cylinders;
e. When acetylene cylinders are coupled, flash back arrestor shall be inserted between the cylinder and the coupler block, or between the coupler bock and the regulator;
f. Only acetylene cylinders or approximately equal pressure shall be coupled;
g. No gas shall be taken from a cylinder unless a pressure reducing regulator has been attached to the valve;
h. Only the right pressure reducing regulator shall be used for the gas in the cylinder;
i. Cylinder valves shall be kept free from gases, grease, oil, dusts and dirt;
j. Leaky cylinders charged with acetylene or liquefied fuel gas shall be taken into the open air at a safe distance from any open flame or sparks.

3.6 HOSE

a. Only hose especially designed for welding and cutting operations shall be used to connect an oxy-acetylene torch to gas outlet;
b. Hose lines for oxygen and for oxy-acetylene shall be of different colours and preferably of different size;
c. Hose connections shall be sufficiently light to withstand without leakage a pressure twice thee maximum delivery pressure of the pressure regulators in the system;

d. Care shall be taken that hose does not become kinked or tangled, stepped on or run-over or otherwise damaged;
e. Any length of hose in which a flashback has burned, shall be discarded;
f. No hose with more than one gas passage shall be used;
g. Only soapy water shall be used for testing hose for leaks.

3.7. TROCHES

a. When torches are being changed, the gases shall be shut off at the pressure reducing regulators and not by crimping hose;
b. Torches shall be lit with friction lighters or other safe source but not with matches.
c. Electric welding equipment:
d. Welding machines shall be controlled by a switch mounted on or near the machine framework that, when opened, immediately cuts off the power from all conductors supplying the machine;
e. Welding circuit shall be so designed as to prevent the transmission of high potential from the source of supply to the welding electrodes;
f. The maximum open circuit voltage shall be in accordance with Indian Standards;
g. Electrode conductors or cables shall not be excessive in length and shall not be longer that necessary to perform the work;
h. Return conductors shall be taken directly to work and securely connected mechanically and electrically to it or to the work bench, floor etc. and to an adjacent metallic object;
i. Cable shall be supported so as not to create dangerous obstruction;
j. Motors, generators, rectifiers and transformers in arc welding or cutting machines, and all current carrying parts, shall be protected against accidental contact with uninsulated live parts;
k. Ventilating slots in transformer enclosures shall be so designed that no live part is accessible through any slot;
l. Frames of arc welding machines shall be effectively earthed;
m. In hand-operated arc welding machines, cables and cable connectors used in arc welding circuits shall be effectively insulated on the supply side;
n. The outer surface electrode holders of hand-operated arc welding machines, including the jaw so far as practicable, shall be effectively insulated;
o. Electrode holders of hand-operated arc-welding machines shall, if practicable, be provided with discs or shields to protect the operator's hands from the heat of the arcs;
p. Only heavy-duty cable with unbroken insulation shall be used;
q. Circuit connections shall be waterproof;
r. When lengths of cable have to be joined, only insulated connectors shall be used on the earth line and the electrode holder line;
s. Connections to welding terminals shall be made at distribution boxes, socket outlets, etc. by bolted joints;
t. Welding terminals shall be adequately protected against accidental contact by enclosures, covers or other effective means;
u. Electrode holder shall
    i. Have adequate current capacity;
    ii. Be adequately insulated to prevent shock, short-circuiting or flashovers.

3.8. OPERATIONS

a. Arc welding and cutting operations that are carried on at places where persons other than the welders are working or passing shall be enclosed by means of suitable stationary or mobile screens;
b. Walls and screens of both permanent and temporary protective enclosures shall be provided to absorb harmful rays from the welding equipment and prevent reflection, and if necessary, be painted or otherwise treated for the purpose;
c. When arc welding is done in damp confined spaces;
    i) Electrode holders shall be completely insulated; and
    ii) The welding machines shall be outside the confined space;
d. Welders shall take adequate precautions
    i) To prevent any part of their body from completing an electric circuit
    ii) To prevent contact between any part of the body and the exposed part of the electrode, or electrode when in contact with metal; and
    iii) To prevent wet or damaged clothing, gloves and boots from touching any live part;
e. Welding circuits shall be switched off when not in use;
f. Electrodes shall only be inserted in the holder with insulating means such as insulating gloves;
g. Electrode and return leads shall be adequately protected against damage;
h. Live parts of electrode holders shall be inaccessible when they are not in use;
i. Electric arc-welding equipment shall not be left unattended with current switched on.

4.0 SAFETY IN THE USE OF ELECTRICITY

4.1. GENERAL PROVISIONS

a. Before commencement of any building or other construction work, adequate measures shall be taken to prevent any worker from coming into physical contact with any electrical equipment or apparatus, machines or live electrical circuit which may cause electrical hazard during the course of his employment and suitable warning signs shall be displayed and maintained at conspicuous places in Hindi and in local language understood by the majority of the building workers;

b. In workplaces where the exact location of underground electric power line is not known, the building workers using jack hammers, crow bars or other hand tools which may come in contact with a live electrical line shall be provided with approved insulated protective gloves and footwear;

c. As far as practicable, no wiring or cable, which may come in contact with water or which may be mechanically damaged or which may result in electric shock shall be left on ground or;

d. All electrical appliances and current carrying equipment used shall be made of sound material and adequately earthed;

e. All temporary electrical installations shall be provided with earth leakage circuit breakers;

f. It is required that all portable power-driven hand tools are provided with double insulation to secure a high degree of protection from electrical hazards;

g. Electrical installations shall comply with the requirements of any law for the time being in force, especially the Indian Electricity Act/Rules in particular with specific reference to the following:

   i) All parts of installations shall be of standard construction not lower, from the safety point of view, than the national standards, as applicable. All parts of electrical installations shall be so constructed, installed and maintained so as to prevent electrical fires, explosion and shock;

   ii) Earthing of metal work of electrical equipment, other than the parts which carry current, shall be provided and will conform to Electricity Act and IS: 3042 – 1966 (code of practice for earthing);

h. All parts of electrical installation shall be adequate size and characteristics for the work they may be called upon to do and in particular they shall:

   i) Be of adequate mechanical strength to withstand working conditions in construction operations; and

   ii) Be not liable to damage by water, dust or electrical, thermal or chemical action to which they me subjected to in construction operations;

i. All parts of electrical installations shall be so constructed, installed and maintained as to prevent the danger of electric shock; fire and external explosion;

j. It shall be made impossible for circuit breakers to be opened or closed inadvertently, by gravity or by mechanical impact;

k. Before operation of OCBs, oil level must be checked and the event of short, extra quantity must be filled;

l. Use of rubber gloves and rubber gum boots of tested quality where electric shock is likely to occur shall be provided, but these shall not be considered as providing adequate protection against the risk of electric shock in lieu of inbuilt safety arrangement in the system;

m. First-aid boxes, instruction for restoration of persons affected by electric shock shall be made;

n. Arrangement shall be made for sufficient number of CO_2/chemical powder type fire extinguishers/sand buckets etc.;

o. No electrical circuits shall ever be overloaded to the dangerous extent or beyond the rated capacity;

p. In confined areas, only 24 volt supply shall be used for every equipment, including hand-held portable tools and hand lamps;

q. All electrical appliances and outlets shall be clearly marked to indicate their purpose and voltage.

4.2. FUSES

a. Fuses shall bear markings indicating their rated current, whether they are of the fast or slow-breaking type and, as far as practicable, and their rated breaking capacity. Fuses as per need and of correct rating shall be used in the circuit;
b. Effective measures shall be taken to ensure that persons removing or inserting fuses will not be endangered, in particular by any adjacent live parts;
c. In case of blow of fuses only after finding out and correcting of the fault, new fuses shall be provided in the circuit.

4.3. SWITCHES

a. All switches shall be of enclosed type and so installed and earthed as to prevent danger in their operation;
b. Use of switches, which may connect or disconnect circuit through gravity, shall not be used.

4.4. MOTORS

a. All motors shall be equipped with a switch;
b. When a motor can be cut off from more than one place, where practicable, a stopping device shall be installed in the immediate vicinity of the motor;
c. Motors shall be so installed as to ensure that they can be adequately cooled;
d. Motors shall be effectively protected against over current;
e. Whenever the motors installed are in the open area where there is the possibility of fall of liquid corrosives or otherwise, it shall be suitably protected with covering;
f. Earthing shall be connected to all motors, generators etc. as prescribed in the Indian Electricity Rules, amended from time to time.

4.5. CONNECTIONS

a. At points where conductors are joined, branched or led into apparatus, they shall be:
   i. Mechanically protected, and
   ii. Properly maintained;

b. Conductors shall be joined, branched or led into an apparatus through junction boxes, bushings, glands or equivalent connecting devices;

c. Junction boxes or plug-out-socket couplings shall be used for joining cables wherever practicable;

d. When parts of conductors are joined together, or conductors are joined to one another or to an apparatus, the attachment shall be made by screwing, clamping, soldering, riveting, brazing, crimping, or equivalent means. Loose connections shall not be provided in any case;

e. Cable joints, junction boxes and connectors shall be protected as far as practicable, against traffic, fall of ground, water and other sources of damage;

f. Whenever armoured cables are joined, the junction boxes shall be bridged by a suitably conducive bond between the armouring of the cables.

4.6. TRANSPORTABLE AND PORTABLE ELECTRICAL EQUIPMENT:

a. The supply of electricity to portable apparatus shall not exceed 250v;

b. Hand-held and portable machines shall be equipped with a built-in switch to switch off power in case of emergency;

c. Hand-held electrically operated tools shall be provided with built-in switch to disconnect the circuit when the tool is not being used;

d. Portable electrical tools, unless flameproof, shall not be used in flammable or explosive atmosphere;

e. Only three-core cable shall be used for single-phase operated tools with the third core connected to earth

4.7. HAND LAMPS

a. Hand lamps shall be equipped with strong cover of glass or other transparent material;

b. Portable lamp holders shall have:

   i) All current –carrying part s enclosed;

   ii) Insulated handle; and

   iii) They shall operate at 24 v;

4.8. INSPECTION, MAINTENANCE

a. All electrical equipment shall be inspected before it is taken into use to ensure that it is suitable for its purpose of use;

b. At the beginning of every shift every person using electrical equipment shall make a careful external examination of the equipment and conductors for which he is responsible, especially flexible cables;

c. Periodic inspections, testing, maintenance of all electrical equipment is to be made and record of test of transformer oil and pit earthing shall be maintained;

d. Electrical conductors and equipment shall be repaired by the electrician only as far as practicable, no work shall be done live conductors or equipment;

e. Before any work is begun on conductors or equipment that does not have to remain live;

   i) The current shall be switched off;

   ii) Adequate precautions shall be taken to prevent the current from being switched on again;

   iii) The conductors or the equipment shall be tested to ascertain that they are dead;

   iv) The conductor and equipment shall be earthed and short-circuited; and

   v) Neighbouring live parts shall be adequately protected against accidental contact;

f. After work on conductors and equipment, the current shall only be switched on again on the orders of a competent person;

g. Electricians shall be provided with adequate tools, and person protective equipment, such as rubber gloves, mats etc.;

h. All conductors and equipment shall be considered to live unless there is certain proof to the contrary.

4.9. WORK IN THE VICINITY OF ELECTRICAL INSTALLATION

a. When work is to be done in the neighborhood of electrical conductors or installations, the contractor shall ascertain the voltage carried and the works shall not be allowed to reach to unsafe distance from them;
b. When any excavation is to be made or any bore-holed sunk, the contractor shall ascertain whether there are any underground conductors, in or in dangerous proximity to, the zone of operations;
c. No work shall be done in dangerous proximity to a conductor or an installation until it has been made dead;
d. Before work begins, work permit shall be obtained from the Engineer in-charge if live electricity lines/circuit are passing in close vicinity;
e. Before the current is restored, the contractor shall ensure that no work remain on the work site;
f. If conductor or an installation in the neighbourhood of which work is io be done can not be made dead, special precautions shall be taken and special instructions given to the workers so as to prevent danger by adequately enclosing or fencing;
g. If mobile equipment has to be employed in the neighbourhood of conductors or installations that cannot be made dead, its movement shall be so controlled as to keep it as a safe distance from them.

5.0 SAFETY IN THE USE OF HAND TOOLS AND POWER-OPERATED TOOLS

5.1 GENERAL PROVISIONS

a. All hands and power tools and similar equipment, shall be maintained in safe condition.

b. When power operated tools are designed to accommodate guards, they shall be equipped with such guards, when in use;

c. Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains and other reciprocating, rotating or moving parts of the equipment shall be similarly guarded;

d. Personnel using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, mists, vapours, or gases shall be provided with the particular personal protective equipment necessary to protect them from the hazards;

e. All hand-held powered platen sanders, grinders, grinders with wheels of 5 cm or less, routers, planers, laminate trimmers, nibblers, shears, scroll saws and jigsaws with blade shanks of 0.5 cm wide or less shall be equipped with only a positive **on-off control**.

f. All hand-held powered drills, tappers, fastener drivers, horizontal, vertical or angle grinders with wheels greater than 5 cm in diameter, disc sanders, belt sanders, reciprocating saws, saber saws and other operating powered tools shall be equipped with a momentary contact on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on.

5.2. HAND TOOLS

a. The contractor shall not issue or permit the use of unsafe hand tools;

b. Wrenches including adjustable pipe end and socket wrenches shall not be used when saws are sprung to the point that slippage occurs;

c. Impact tools such as drift pins, wedges and chisels shall be kept free of mushroomed heads;

d. The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight on the tools.

5.3. POWER OPERATED TOOLS

a. Electric power operated tools shall be either of the approved double-insulated type or shall be grounded;

b. The use of electric cords for hoisting or lowering loads shall not be permitted;

c. Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected;

d. Safety clips or retainers shall be securely installed or maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled;

e. All pneumatically riveting machine staplers and other similar equipment provided with automatic fastener feed, which operate at more than 7 kg/cm^2 pressure at the tool a safety device on the

muzzle to prevent the tool from ejecting the fasteners unless the muzzle is in contact with the work surface;

f. Compressed air shall not be used for cleaning purposes except when the pressure is reduced to less than 2 kg/cm^2 and that too with effective chip guarding. The 2 kg/cm2 pressure requirement does not apply to concrete form, mill scale and similar cleaning purposes;

g. The manufacturer's safe operating for hoses, pipes, valves, filters and other fittings shall not be exceeded;

h. Only personnel who has been trained in the operation of the particular tool shall be allowed to operate power-actuated tools;

i. The tool shall be tested each day before loading to see that the safety devices are in proper working condition. The method of testing shall be accordance with the manufacturer's recommended procedure;

j. Any tool found not in proper working order, or that which develops a defect during use, shall be immediately removed from service and not used until properly repaired;

k. Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any other person. Hands shall be kept clear of the open barrel end;

l. Loaded tools shall not be left unattended;

m. Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tiles, surface hardened steel, glass block, live rock, face brick or hollow tiles;

n. Driving into materials that can be easily penetrated shall be avoided unless backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side;

o. No fastener shall be driven into a palled area caused by an unsatisfactory fastening;

p. Only non-sparking tools shall be used in an explosive or flammable atmosphere;

q. All tools shall be used with the correct shield, guard or attachment as recommended by thee manufacturer.

5.4. ABRASIVE WHEELS AND TOOLS

a. All grinding machines shall be supplied with sufficient power to maintain the spindle speed at safe levels under all conditions of normal operation;

b. Grinding machines shall be equipped with suitable safety guards;

c. The maximum angular exposure of the grinding wheel periphery and sides shall not be more than 90^0, except that when the work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure shall not exceed 120^0. In either case, the exposure shall begin not more than 65^0 above the horizontal plane of the spindle. Safety guards shall be strong enough to withstand the bursting of the wheel;

d. Floor and bench-mounted grinders shall be work-rests, which shall be rigidly supported and readily adjustable. Such work-rests shall be kept at a distance not to exceed 5 mm from the surface of the wheel;

e. Cup type wheels used for external grinding shall be protected by either revolving cup guard or a band type guard;

f. When safety guards are required, they shall be mounted as to maintain proper alignment with the wheel and the guard and the guard and its fastening shall be adequate strength to retain the fragments of the wheel in case of accidental breakage. The maximum angular exposure of the grinding wheel periphery and sides shall not exceed 180^0;

g. Portable abrasive wheel used for internal grinding shall be provided with suitable safety flanges;

h. When safety flanges are required, they shall be used only with wheels designed to fit the flanges. Only safety flanges, of a type and design and properly assembled so as to ensure that the pieces of the wheel will be retained in case of accidental breakage, shall be used;

i. All abrasive wheels shall be closely inspected and ring tested before mounting to ensure that they are free from cracks or defects;

j. Grinding wheels shall fit freely on the spindle and shall not be forced on. The spindle nut shall be tightened only enough to hold the wheel in place;

k. All employees using abrasive wheels shall be protected by suitable eye protection equipment.

5.5. WOODWORKING TOOLS

a. All fixed power driven woodworking tools shall be provided with a disconnect switch that can either be locked or tagged in the **off-position**;

b. The operating speed shall be attached or otherwise permanently marked on all circular saws over 0.5 m in diameter or operating at over 3000 peripheral rpm. Any saw so marked shall not be operated at a speed other than that marked on the blade. When a marked saw is retensioned for a different speed, the marking shall be corrected to show the new speed;

c. Automatic feeding devices shall be installed on machines wherever the nature of the work will permit. Feeder attachments shall have the feed rolls or other moving parts covered or guarded so as to protect the operator from hazardous points;

d. All portable power driven circular saws shall be equipped with guards above and below the base plate or shoe. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to the covering position.

6.0 SAFETY IN THE USE OF LADDERS AND STAIRS

6.1. GENERAL ASPECTS OF SAFETY RELATED TO USE OF LADDERS

a. Every ladder or step-ladder used in building or other construction work shall be of good construction, made of sound material and of adequate strength for the purpose for which such ladder or step-ladder is used;
b. When a ladder is used as a means of communication, such ladder shall be lashed to a fixed structure so that while working on such ladder it does not slip;
c. A ladder or step ladder shall not stand on loose bricks or other loose packing and have a level and firm footing;
d. No ladder shall be used which has a missing or defective rungs or rungs, which depend for support solely on nails, spikes or other similar fixing.

6.2. MATERIALS FOR LADDERS

a. Shall be constructed with upright of adequate strength and are made of straight-grained wood, free from defects and having the grain of such wood running length wise;

b. Shall have rungs made of straight-grained wood free for defects and mortised or securely notched into the upright, reinforcing metal ties, if wedges shall not secure the tenors of such ladders;

c. Where it is required, in case of use of fixed ladders, sufficient foot-hold and hand-hold shall be provided for use by the building worker;

d. Every ladder shall be -

    i. Secured so as to prevent undue swaying;
    ii. Equally and properly supported on each of its upright;
    iii. So used as not to cause undue sagging; and
    iv. Placed as nearly as possible at an inclination of four in one;

e. The use of all ladders and stepladders shall conform to the approved standards;
f. Wooden ladders shall be constructed with uprights of adequate strength as well as rungs made of wood free from visible defects and having the grains of the wood in the ladders running lengthwise and rungs mortised or rebutted into the uprights;
g. Uprights and rungs of metal ladders shall have a cross-section adequate to prevent dangerous deflection, shall be equal and not less than 25 cm or more than 35 cm;
h. Rungs of metal ladders shall be kept clean so as to prevent them from becoming slippery;
i. Portable ladders shall not exceed 9 m in length;
j. Every ladder or run of ladders rising to a height exceeding 9 m shall be provided with an intermediate landing, providing further that the intervals between landings shall not exceed 9 m. The landings shall be of suitable size and protected by railings;
k. Defective ladders that cannot be satisfactorily repaired shall be tagged Not Fit For Use and destroyed;
l. Wooden ladders shall not be painted, but oiled or covered with clean varnish or other transparent preservatives;
m. Metal ladders shall be protected against corrosion by being coated with rust-proof paint or by other means unless they are made of non-corrosive metals;

n. Every ladder shall rise at least 1 m above the highest point to be reached and have one of the uprights continued to that height to serve as a hand-rail at the top;
o. Ladders shall not stand on loose bricks or other loose packing but have a level and firm footing so that they are equally supported on each upright;
p. Every ladder shall be securely fixed so that it cannot move from its top and bottom points of rest and if it cannot be secured at the top, it shall be securely fastened at the base and if fastening at the top is also impracticable, it shall have a man stationed at the foot holding the end to prevent it from slipping;
q. Where a run of two or more ladders connects different floors, the ladders shall be staggered and a protective landing with the smallest practicable opening shall be provided at each floor;
r. A ladder having only one upright or a missing or dangerously defective rung shall not be used;
s. When a ladder is placed in position, the distance between the foot of a ladder and the base of the structure against which it rests shall be about one-quarter of its length;
t. Workers using ladders shall leave at least one hand free for climbing up and down, face the ladder, avoid wearing slippery footwear and avoid carrying heavy or bulky loads;
u. A ladder shall not be placed in front of a door that opens towards it unless the door is fastened or locked or guarded;
v. A ladder shall not be placed against a window frame unless the ladder is fitted with a board at the top so that the applied load is safely distributed over the frame;
w. Metal ladders shall not be used in the vicinity of live electrical equipment;
x. Adequate means shall be provided to prevent displacement of the ladder set up in public thoroughfare or where persons, vehicles etc. may accidentally collide with it.

6.3. PORTABLE STEPLADDERS

a. The length of portable stepladders shall not exceed 6 m and their back legs shall be adequately braced;
b. Stepladders exceeding 1.5 m in length shall have two or more cross-ties;
c. The spread between the front and back legs shall be restricted by means of hinged metal flat bars or high-grade fibre or other effective means;
d. When in the open position, treads of stepladders shall be horizontal.

6.4. PORTABLE TRESTLE LADDERS

a. The height of the trestle ladders shall not exceed 5.5 m;
b. The spread between the front and back legs shall be restricted by means of hinged metal flat bars or high-grade fibre or other effective means;
c. The front and back legs shall be joined at the top by bolted steel hinges of adequate dimensions or other effective means;
d. Both legs of trestle ladders shall be equipped with sufficient number of steel crossties.

6.5. EXTENSION LADDERS

a. The length of extension ladders shall not exceed 15 m;
b. Extension ladders shall be equipped with an effective lock and guide brackets by which the ladder can be extended, retracted or locked in any position;

c. The rungs of overlapping sections shall coincide so as to form double treads and shall be equipped with one or more extension ropes;
d. Extension ropes shall be securely anchored and run over suitable pulleys.

6.6 MECHANICAL LADDERS

a. Mechanical ladder is that ladder, which is a mechanically extendable ladder, mounted on a wheeled frame;
b. Mechanical ladder shall be equipped with guard-rails and toe-boards and a cage of heavy-gauge steel mesh;
c. If mechanical ladder has no railed platform or cage, workers using it shall be secured by suitable safety belt;
d. Mechanical ladders shall not be moved, while a person is on them, unless they have specially designed to ensure that perfect stability is maintained during movement.

6.7. FIXED LADDERS

a. Uprights of fixed ladders shall be at least 40 cm and shall be set an angle of 15^0 to the vertical;
b. Clearance at the back of the rungs shall be at least 15 cm and no obstruction within 75 cm of the face of the ladder;
c. There shall be at least 7.5 cm clearance between the ladder and the nearest fixed object;
d. When it is necessary for a ladder to pass closely through a hole in a platform or a floor, the edges of the hole shall be padded so as to prevent injury to the users;
e. The length of the runs of fixed ladder shall not exceed 9 m;
f. Landing platform shall be provided for each 9 m or fraction thereof;
g. As far as practicable, runs shall be staggered;
h. Runs from which a person could fall from more than 6 m shall be enclosed in a cage of heavy-gauge mesh or hoops;
i. Fixed ladders shall be firmly bolted or welded in position.

6.8. STAIRS

a. Stairs shall be of adequate strength to withstand safely the loads that they will have to carry;
b. Stairs used for the purpose of construction work shall have a clear width of at least 60 cm;
c. Stairs made of perforated material shall not have openings exceeding 1.2 cm in width;
d. No step of a stairway shall depend for its support solely on nails, spikes, screws or other similar fixing;
e. No stairway with missing or dangerously defective steps shall be used;
f. Every stairway that is at an angle of less than 30^0 from the vertical shall be provided with a secure handhold at the top landing place, either by extending one upright for at least 1 m or by other effective means;
g. Movable and removable stairs shall be adequately secured in the position of use;
h. In all building structures permanent stairs shall be constructed as soon as practicable;
i. When work on a building has progressed to a height of more than 18 m above the ground and it has not been practical to construct the permanent stairs, sufficient number of stairs shall be provided to ensure safe access to the working levels.

7.0 SAFETY IN THE USE OF LIFTING APPLIANCES & GEARS

7.1. CONSTRUCTION AND MAINTENANCE OF LIFTING APPLIANCES:

All lifting appliances, including their parts and working gear, whether fixed or movable, and any plant or gear used in anchoring or fixing of such appliances -

a. Shall be of sound construction, sound material, and of adequate strength to serve the purpose for which these are to be used and all such appliances shall be free from patent defects, and
b. Maintained in good repair and working condition;
c. Every drum or pulley around which the rope of any lifting appliance is carried, shall be of adequate diameter and sound construction in relation to such rope;
    i. Any rope that terminates at the winding drum of lifting appliance shall be securely attached to such drum and at least three dead turns of such rope remain on such drum in every operating position of such lifting appliance;
    ii. The flange of a drum projects twice the rope diameter beyond the last layer of such rope and if such rope and if such projection is not available, other measures like anti-slackness guards shall be provided to prevent such rope from coming off such drum;
d. Every lifting appliance shall be provided with adequate and efficient brakes which shall be:
    i) Capable of preventing fall of suspended load (including any test load),
    ii) Effectively controlling such load while it is being lowered, acting without shock and shall be attached with shoes that can be easily removed for running and which shall be simple and have easily accessible means of adjustment;
e. Provided that nothing contained above shall apply to **steam-winch** that can be operated as safely as with brakes.

7.2. CONTROLS OF EVERY LIFTING APPLIANCE SHALL BE SO;

a. Situated that the driver of such appliance at his stand or seat has ample room for operating and has an unrestricted view of building or other construction work, as far as practicable, and that he remains clear of the load and the ropes, and that no load passes over him;
b. Positioned with due regard to ergonomic considerations for proper operation of such appliance;
c. Located that the driver of such appliance remains above the appliance and shall have upon them or adjacent to them clear markings to indicate their purpose and mode of operations;
d. Provided, where necessary, with a suitable locking device to prevent accidental movement or displacement and shall move, as far as practicable, in the direction of the resultant load movement;
e. Wherever automatic brakes are provided, they shall automatically come to the neutral position in case of power failure.

7.3. TEST AND PERIODICAL EXAMINATION

7.3.1 Test: all lifting appliances including all parts and gears thereof, whether fixed or movable, shall be tested and examined by a competent person before being taken into use for the first time or after it

has undergone any alteration or repairs liable to affect its strength or stability or after erection on a site and also once at least in every five years, in the manner as specified;

7.3.2. Examination: all lifting appliances shall be thoroughly examined by a competent person at least in every twelve months and where the competent person making such examination forms the opinion that the lifting appliance cannot continue to function safely, he shall forthwith give notice in writing of his opinion to the contractor.

7.4. AUTOMATIC LOAD INDICATOR

a. Cut-out shall be provided which automatically arrests the movement of the lifting parts of every crane if the load exceeds the safe working load, wherever possible;

b. Wherever the above provisions cannot be applied and if it is not possible to install an automatic safe load indicator, in that case, provision of a table showing the safe working loads at the corresponding inclinations or radii of the jib on the crane shall be considered sufficient.

7.5. INSTALLATION:

Fixed lifting appliances shall be installed by a competent person in a manner that

a. Such appliances cannot be displaced by the load, vibration or other influences;

b. The operator of such appliance is not exposed to danger from loads, ropes or drums;

c. The operator can either see over the zone of operation or communicate with all loading and unloading points by signal, or other communication system;

d. Adequate clearance is provided between parts or loads of lifting appliances and between the fixed objects such as walls and posts, or electrical conductors;

e. The lifting appliances; when exposed to wind loading, are given sufficient additional strength, stability and rigidity to withstand such loading safely;

f. No structural alterations or repairs are made on any part of the lifting appliances that affect the safety of such appliances without obtaining the opinion of the competent person to this effect.

7.6. WINCHES

a. Winches shall not be used if their control levers operate with excessive friction or play;

b. Double gear winches shall not be used unless a positive means of locking the gearshift is provided;

c. There shall be no load other than the fall and the hook assembly on the winch while changing gears on a two-gear winch;

d. Adequate protection shall be provided to the winch operator against abnormal weather;

e. Temporary seats or shelters for winch operators that may pose hazard to the winch operator or any other building workers shall not be allowed to be used;

f. Control levers shall be secured in the neutral position and, whenever possible, the power shall shut off if the winch is left unattended.

7.7. IN USE OF EVERY STEAM-WINCH

a. Measures shall be taken to prevent escaping steam from obscuring any part of the construction site or other workplace or from otherwise hindering or injuring any building worker;

b. Extension control levers which tend to fall off their own weight shall be counter-balanced;

c. Winch operators shall not be permitted to use the which control extension levers except for short handles on wheel type controls and that such levers shall be of adequate strength, secure and fastened with metal connections at the fulcrum and at the permanent control lever;

d. In use of every electric winch, no building worker shall be permitted to transfer, alter or adjust electric control circuits in case of any defect in such winch;

7.8. ELECTRIC WINCHES SHALL NOT BE USED FOR BUILDING WORK WHERE

a. The electromagnetic brake is unable to hold the load; or

b. One or more control points either hoisting or lowering are not operating properly.

7.9. BUCKETS:

It shall be ensured that tip-up buckets are equipped with a device that effectively prevents accidental tipping.

7.10. IDENTIFICATION AND MARKING OF SAFE WORKING LOAD:

a. Every lifting appliance and loose gear shall be clearly marked for its safe working load and identification by stamping or other suitable means;

b. Every derrick (**other than derrick crane**) shall be clearly marked for its safe working load when such derrick is used either in single purchase with lower block or in union purchases in all possible block positions;

c. The lowest angle to the horizontal, to which the derrick may be used, shall be legibly marked;

d. Every lifting appliance having more than one working load shall be fitted with effective means to enable the operator to determine safe working load at each point under all conditions of use;

e. Means to ascertain the safe working load for lifting gears under such conditions in which such gears may be used shall be provided to enable a worker using such gears and such means safely, which shall comprise:

   i) Marking of the safe working load in plain figures or letters upon the sling or upon a tablet or ring of durable material attached securely thereto in case of chain slings; and

ii) The means specified or notices so exhibited as can be easily read by any concerned building worker stating the safe working load for the various sizes of the wire rope slings used.

7.11 LOADING OF LIFTING APPLIANCES AND LIFTING GEARS

a. No lifting appliance, lifting gear or wire rope shall be used in an unsafe way and in such a manner as to involve risk to life of building workers and they are not loaded beyond their safe working load except for testing purposes under the direction of a **competent person** in the manner as specified in schedule;

b. No lifting appliance and lifting gear, or any other material-handling appliance shall be used if the Inspector having jurisdiction under the Building and Other construction (regulation of employment and conditions of service) Act/Rules is not satisfied with reference to a certificate of test or examination or to an authenticated record maintained as provided under the Rules or if in his view the lifting appliance, lifting gear or any other material handling appliance is not safe for use in building or other construction work;

c. No pulley block shall be used unless the safe working load and its identification are clearly marked on such block.

7.12. OPERATOR'S CAB OR CABIN SHALL

a. Be made of fire resistant material;

b. Have a suitable seat, a foot rest and protection from vibration;

c. Afford the operator an adequate view of the area of operation**;**

d. Afford the necessary access to working parts in the cab;

e. Afford the operator adequate protection against the weather;

f. Be adequately ventilated; and

g. Be provided with a suitable fire extinguisher.

7.13. OPERATION OF LIFTING APPLIANCES:

Operator of every crane or lifting appliance shall possess adequate skill and training in the operation of the particular lifting appliances, provided further that

a. No person under eighteen years of age shall be in control of any lifting machine, scaffold winch, or give signals to the operator;

b. Precaution shall be taken by the trained operator to prevent lifting appliance from being set in motion inadvertently;

c. The operation of lifting appliances shall be governed by signals in conformity with the approved standards;

d. The operator's attention shall not be distracted while he is working;

e. No crane, hoist, winch or other lifting appliance or any part of such crane, hoist, winch or other lifting appliance shall, except for testing purposes, be loaded beyond the safe working load;

f. During the hoisting operation, effective precaution shall be taken to prevent any person from standing or passing under the load in such operation;

g. Operator shall not leave lifting appliance unattended while power is on or the load is suspended to such appliance;

h. No person shall ride on a suspended load of any lifting appliance;

i. Every part of a load in course of being hoisted or lowered shall bee adequately suspended and supported to prevent danger;

j. Every receptacle used for hoisting bricks, tiles, slates or other material shall be suitably enclosed as to prevent the fall of any such material;

k. The hoisting platform shall be enclosed when loose material or loaded wheel barrows are placed directly on such platform or lowering such materials or wheel barrows;

l. No material shall be raised, lowered or slewed with any lifting appliance in such a way as to cause sudden jerks to such appliance;

m. In hoisting a barrow, any wheel of such barrow shall not used be as a means of support unless adequate steps have been taken to prevent the axle of such wheel from slipping out of its bearing;

n. Long objects like planks or girders shall be provided with tag line to prevent any possibility of danger while raising or lowering such objects;

o. During the process of landing or material, a building worker shall not be permitted to lean out into empty space for finding out the loading and unloading of such material;

p. When hoisting of load is done in an enclosed space, neither the lifting material nor the boom shall project outside the enclosed space;

q. Adequate steps shall be taken to prevent a load, in the course of being hoisted or lowered from coming into contact with any object to avoid any displacement of such load and appropriate appliances provided and used for guiding heavy loads when raising or lowering heavy loads to avoid crushing of hands of building workers during such raising or lowering of loads.

7.14. HOISTS

a. Hoist towers shall be designed according to the relevant national standards;

b. Hoist shafts shall be provided with rigid panels or other adequate fencing at the ground level on all sides of such shafts and at all other levels on all sides of the access to such shafts while the walls of hoist shafts, except at approaches, extend at least two meters above the floor or platform of access to such shifts;

c. Approaches to hoist shall be adequately lit and provided with gates that shall be guarded to maintain visibility at least of two meters height; and equipped with a device, which requires such gate to be closed before the platform of such hoist can leave the landing, and prevents the gate from being opened unless such platform is at the landing;

d. The guides of hoist platforms shall offer sufficient resistance to bending and to bucking in the case of jamming, by providing a safety catch;

e. Overhead beams and their supports are capable of holding the total maximum live and dead loads that such beams and supports will be required to carry, with a safety factor of at least five;

f. A clear space shall be provided –

   i. Above the highest stopping place of a cage or platform to allow sufficient unobstructed travel of such cage or platform in case of over-winding and

   ii. Below the lowest stopping place of such cage or platform;

g. Adequate covering shall be provided above the top of hoist shafts to prevent materials from falling into such shifts;

h. Outdoor hoist towers shall be erected on adequately firm foundations and securely braced, guyed and anchored;

i. A ladder way shall extend from the bottom to the top of every outdoor hoist tower in case no other ladder way exists within easy reach and such ladder way shall comply with the relevant national standards;

j. The rated capacity of a hoisting engine shall at least be one and a half times the maximum load that such engine will be required to move;

k. All gearing on a hoisting engine shall be securely enclosed;

l. Steam piping of hoisting engine shall be adequately protected against accidental contact of such piping with a building worker;

m. Electrical equipment of a hoisting engine shall be effectively earthed;

n. A hoist shall be provided with suitable devices to stop a hoisting engine as soon as the platform of such hoist reaches its highest stopping place;

o. A hoisting engine shall be protected by suitable cover against weather and falling objects;

p. A hoisting engine set up in a public thoroughfare shall be completely enclosed;

q. All exhaust steam pipes shall discharge steam in such a manner that the steam so discharged does not scald any person or obstruct the operator's view;

r. The motion of a hoist shall not be reversed without first bringing it to rest to avoid any harm from such reverse motion;

s. A hoist not designed for the conveyance of persons shall not be set in motion from the platform of such hoist;

t. Pawls and ratchet wheels of a hoist, requiring disengagement of such pawls from such ratchet wheels, before the platform of such hoist is lowered, shall not be used;

u. A platform of a hoist shall be capable of supporting such maximum load that such platform may carry with a safety factor of at least three;

v. A platform of a hoist shall be equipped with suitable safety gear which can hold such platform with its maximum load in case its hoisting rope breaks;

w. On platform of a hoist, the wheel barrows or truck shall be efficiently blocked in safe positions;

x. A cage of a hoist or platform where the building workers are required to enter into such cage or to go on such platform at landing levels, shall be provided with a locking arrangement to prevent such cage or platform from moving during the time a worker enters or leaves such cage or platform;

y. The sides of platform of a hoist which are not used for loading or unloading, shall be provided with toe-board and enclosures of a wire mesh or any other suitable means to prevent the fall of any part of a load from such platform, further provided that

   i. The platform of a hoist, which has any probability of falling of any part of a load from it, shall be provided with an adequate covering to prevent such fall;

   ii. The counter weights of a hoist consisting of an assemblage of several parts shall be so constructed that such parts shall be rigidly connected together;

   iii. The counter weights of a hoist shall run between guides;

   iv. At every level of work the building workers shall be provided with adequate platforms for performing such work;

   v. A legible notice in Hindi as well as in a local language shall be displayed in a conspicuous place of the platform of a hoist and that such notice shall state the maximum carrying capacity of such hoist in kilograms on the hoisting engine;

   vi. On a hoist authorized and certified for the conveyance of the persons on the platform or in the cage and such notice shall state the maximum number of persons to be carried on such hoist at one time;

   vii. On a hoist carrying goods and other materials such notice shall state that such hoist is not meant for carriage of persons.

7.15. FENCING AND MEANS OF ACCESS TO LIFTING APPLIANCES

a. Safe means of access shall be provided to every part of lifting appliances;

b. The operator's platform on every crane or tip driven by mechanical power shall be securely fenced and provided with safe means of access and where access to such platform is by a ladder, the sides of such ladder shall extend to a height reasonable beyond such platform or some other suitable handhold shall be provided in the platform;

c. The handling place on such platform shall be maintained free from obstruction and slipping; and

d. In case the height of such ladder exceeds six meters, the resting platforms shall be provided on such ladder at every six meters of its height and where the distance between last platform so provided and the top end of such ladder is more than two meters then on such top end.

7.16. RIGGING OF DERRICKS:

Every derrick shall have current and relevant rigging plans and any other information necessary for the safe rigging of such derrick and its gear.

7.17. SECURING OF DERRICK FOOT:

Appropriate measures shall be taken to prevent the foot of a derrick from being lifted out of its socket or supports.

7.18. CONSTRUCTION AND MAINTENANCE OF LIFTING GEAR

a. Every lifting gear shall be –

i. of good design and construction, sound material and adequate strength to perform the work for which it is used;

ii. free from patent defects; and

iii. properly maintained in good repair and working order;

b. Components of the loose gear, at the time of its use, shall be renewed if one of its dimensions at any point has decreased by ten per cent or more;

c. A chain shall be withdrawn from use when it is stretched and increased in length which exceeds five per cent of its length or when a link of such chain is deformed or is otherwise damaged or defects in the welds have appeared on it;

d. Rings, hooks, swivels and end links attached to a chain shall be of the same materials as that of such chain;

e. The voltage of electric supply to any magnetic lifting device shall not fluctuate by more than **plus** or **minus** 10%.

7.19. TEST AND PERIODICAL EXAMINATION OF LIFTING GEARS

a. A lifting gear shall be initially tested for the manufacturer by a competent person in a manner specified as per schedule annexed before taking into use or after undergoing any substantive alterations which renders its any part liable to affect its safety and such gear alter such test shall subsequently be retested for the use of its owner at least once in every five years;

b. A lifting gear in use shall thoroughly examined once at least in every twelve months by a competent person;

c. A chain in use shall be thoroughly examined at least once every month by a responsible person for its use;

d. Certificates of initial and periodical test and examinations of loose gears shall be obtained in the form annexed.

7.20. ROPES

a. No rope shall be used for building or other construction work unless -

i) It is of good quality and free from patent defects; and

ii) In the case of wire rope, it shall be tested and examined by a competent person in the manner annexed;

iii) Every wire rope of lifting appliance or lifting gear used for building or other construction work shall be inspected by a responsible person for such use, once at least in every there month;

b. Provided that after if any such wire is broken in such rope, the responsible person shall thereafter inspect it once at least in every month and ensure that;

c. No wire rope shall be used for building or other constructing work if in any length of eight diameters of such wires, the total number of visible broken wires exceed ten per cent of the total number of wires in such rope, or such rope shows signs of excessive wear, corrosion or other defects which in the opinion of the person who inspects it, is unfit for use;

d. Eye splices and loops of ropes for the attachment of hooks, rings and other such parts to wire rope shall be made with suitable thimble;

e. A thimble or loop splice made in any wire rope sling shall conform to the following standards, namely:

   i) Wire rope sling shall have at least three tucks with full strand of rope and two tucks with one-half of the wires cut out of each of such strand in all cased, such strands shall be tucked against the lay of the rope;

   ii) Protruding ends of such strands in any splice of wire rope slings shall be covered or treated so as to leave no sharp points;

   iii) A fiber rope or a rope sling shall have at least four tucks, tail of such tuck being whipped in a suitable manner; and

   iv) A synthetic fiber rope or rope sling shall have at least four tucks with full strands followed by further tuck with one-half filaments cut out of each of such strand and final tuck with one-halt of the remaining filaments cut out from such strands. Any portion of the splices containing such tucks, with reduced number of filaments, shall be securely covered with suitable tape or other materials;

   v) Provided further that nothing contained above shall apply where any other form of splice, which may be shown to be as efficient as the splice with above standards, shall be used.

7.21. HEAT TREATMENT OF LIFTING GEARS

a. All chains other than bridle chains attached to derricks and all rings, hooks, shackles and swivels used in hoisting or lowering of such derricks shall be effectively annealed under supervision of a competent person and at the following intervals, namely:

   i) Such chains, rings, hoods, shackles and swivels which are not more than twelve and a half millimeter of length annealed at least once in every six months; and

   ii) All other such chains rings hooks shackles and swivels shall be so annealed at least once in every twelve months;

b. Provided that the clause (a) above shall not apply to -

   i) Pitched chins, working on sprocket or sprocket wheels;

   ii) Rings, hooks and swivels permanently attached to pitched chains, pulley blocks or weighing machines, and

   iii) Hooks and swivels having ball bearings or other case hardened parts;

c. A chin or a loose gear made of high tensile steel or alloy steel shall be plainly marked with a mark indicating that it is so made;

d. No chain or loose gear made of high tensile steel or alloy steel shall be subjected to any form of heat treatment except where such treatment is necessary for the purpose of repair of such chain or loose gear and that such repair shall be made under the direction of the competent person;

e. That the wrought iron gear, the past history of which is not traceable, shall be suspected of being heat treated at incorrect temperature shall be normalized before using it on any building or other construction work.

7.22. CERTIFICATE TO BE ISSUED AFTER ACTUAL TESTING AND EXAMINATION ETC:

A competent person shall issue a certificate after actual testing or examination of the apparatus specified and record of such test or examination shall be maintained for inspection.

7.23. REGISTER OF PERIODICAL TEST, EXAMINATION AND CERTIFICATION THEREOF

a. A register in the form annexed shall be maintained and particulars of such test and examination of lifting appliances, lifting gears and heat treatment as required shall be entered in such register;

b. Certificate in respect of each of the following shall be obtained from a competent person:

   i) In cases of initial and periodical test and examination of the lifting appliances such as Winches, Derricks and their accessory gears, Cranes or Hoists and their accessory gears;

   (ii) In case of test, examination and re-examination of loose gears;

   (iii) In case of test and examination of wire ropes;

   (iv) In case of heat treatment and examination of loose gears;

   (v) In case of annual thorough examination of the loose gears, except where required particulars of such exemption have been enclosed in the register referred to in Form annexed and such certificates are attached to the register referred to as above and certificates kept at such construction site in case such register and certificate relate to lifting appliances, loose gear and wire ropes and

c. Produced on demand and retained for at least five years after the date of the last entry made in such register;

d. No lifting appliance or lifting gear in respect of which an entry is required to be made in register referred to above and certificate of test and examination are required to be attached in such register in the manner as specified, shall be used for building or other construction work unless the required entries have been made in such register and certificates.

7.24. VACUUM AND MAGNETIC LIFTING GEAR

a. No vacuum lifting gear, magnetic lifting gear or any other lifting gear where the load on it is held by adhesive power, shall be used while workers are performing operations beneath such gear;

b. A magnetic lifting gear used in connection with building or other construction work shall be provided with an alternative supply of power, such as batteries, which may come into operation immediately in the event of failure of the main power supply;

c. No building worker shall work within the swinging zone of the lifting gear or load or building or other construction material suspended to such lifting gear.

7.25. KNOTTING OF CHAINS AND WIRE ROPES:

No chain or wire rope with a knot in it shall be used in building or other construction work.

7.26. CARRYING OF PERSONS BY MEANS OF LIFTING APPLIANCES ETC.

a. No building worker shall be raised, lowered or carried by a power driven lifting appliance, except
   i. On the drive's platform in the cage of a crane; or
   ii. On as hoist; or
   iii. On an approved suspended scaffold;

b. Provided that a building worker may be raised, lowered or carried by a power driven lifting appliance:
   i. In circumstances where the use of a hoist or of a suspended scaffold shall not reasonably be practicable, or
   ii. On an aerial cableway or aerial ropeway, provided further that the following requirements are met:
   iii. That the appliance referred to above can be operated from one position only and that
   iv. Any winch used in connection with the appliance shall also comply with the requirements as laid down above.

c. The appliance referred to above shall not carry any person except:
   i. In a chair or cage,
   ii. In a skip or other receptacle at least three feet deep which shall be suitable for safe carriage of a person and any such chair, cage, skip or other receptacle shall be made of good construction, sound material, and adequate strength and properly maintained with suitable means to prevent any occupant therein from falling out of it and shall be free from any material or tools which may interfere with the handhold or foothold of such occupant or otherwise endanger him; and
   iii. Those suitable measures shall be taken to prevent the chair, cage skip or other receptacle from spinning or tipping in a manner dangerous to any occupant therein.

7.27. HOISTS CARRYING PERSONS

a. No building worker shall be carried with the help of a hoist unless it is provided with a cage which:
   i) Is so constructed as to prevent, when its gates are shut, any building worker carried by such hoist from falling out of it or from being trapped between any part of such cage and any fixed structure or other moving part of such hoist or from being struck by articles or materials falling down the hoist way on which such hoist is moving; and
   ii) Is fitted on each of its side from which access is provided to a landing place with a gate which has efficient interlocking or other devices to secure so that such gate cannot be opened except when such cage is at a landing place and that such cage cannot be moved away from any such place until such gate is closed;

b. Every gate in the hoist way enclosure of such hoist used for carrying persons shall be fitted with efficient interlocking or other devices to secure so that such gate cannot be opened except when the cage of such gate is at the landing place and that such cage cannot be moved away from the landing place until such gate is closed;

c. In every hoist used for carrying building workers there are provided with suitable and efficient automatic devices to ensure that the cage of such hoist comes to rest at a point above the lowest point to which such gave may travel.

7.28. ATTACHMENT OF LOADS

a. When a sling is used to hoist long materials, a lifting beam shall be used to space the sling legs for proper balance and when a load is suspended at two or more points with slings, the eyes of the lifting legs of such slings shall be shackled together and such shackled or eyes of the shackled slings shall be placed on the hook or the eyes of such lifting legs shall be shackled directly to the hoisting block, ball or balance beam, as the case may be;

b. Every container or receptacle used for raising or lowering stone, bricks tiles, slates or other similar objects shall be so enclosed with the hoist as to prevent the fall of such objects;

c. A loaded wheel barrows placed directly on a platform of a hoist for raising or lowering of such wheel barrows shall be so secured that such wheel barrows cannot move and such platform shall be enclosed to prevent the fall of the contents kept in such wheel barrows;

d. Landings of hoists shall be so designed and arranged that building workers on such hoist be not required to lean out into empty space for loading and unloading on any material from such hoist

7.29. TOWER CRANES

a. No person other than the operator trained and capable to work at heights shall be employed to operate tower cranes;

b. The ground on which a tower crane stands shall have adequate bearing capacity;

c. Bases for tower cranes and trucks for rail mounted tower cranes shall be firm and leveled and such cranes erected at a reasonably safe distance from excavations and operated within gradient limits as specified by the manufacturer of such cranes;

d. Tower cranes shall be sited where there is a clear space available for erection, operation and dismantling of such cranes;

e. Tower cranes shall be sited in such a way that the loads on such cranes shall not be handled over any occupied premises, public thoroughfares, railways or near power cables, other than construction works for which such cranes are used;

f. Where two or more tower cranes are sited and operated, every care shall be taken to ensure positive and proper communication between operators of such cranes to avoid any dagger or dangerous occurrences;

g. Tower cranes shall not be used for loading magnet, or demolition ball service, piling operation or other similar operations which could impose excessive load stresses on the crane structure of such cranes;

h. The instruction of the manufacturer of a tower crane and standard safe practices regarding such cranes shall be followed while operating or using such cranes.

7.30. QUALIFICATION OF OPERATOR OF LIFTING WINCHES AND OF SIGNALER ETC.

a. No person shall be employed to drive or operate a lifting appliance whether driven by mechanical power or otherwise or to give signals to driver of operator of such lifting appliance or to work as an operator of a rigger or derricks unless he is

i) Sufficiently competent and reliable;

ii) Possesses the knowledge of he inherent risks involved in the operation of lifting appliance;

iii) Medically examined periodically as specified and

iv) Is above eighteen years of age.

8.0 SAFETY IN THE USE OF TRANSPORT, EARTHMOVING EQUIPMENT & OTHER CONSTRUCTION MACHINERY

8.1 EARTHMOVING EQUIPMENT AND VEHICLES

a. All vehicles and earthmoving equipment shall be made of good material, proper design and sound constructional and be sufficiently strong for the purpose for which such equipment are properly used in accordance with standard safe operating practices;

b. Provided that the truck or trailer employed for transporting freight containers shall be of the size sufficient to carry the containers, without over hanging and provided with twist locks conforming to approved standards, at all the four corners of each of such use by an authority under the relevant law for the time being in force and is inspected by a responsible person, at least once in a month and record of such inspection shall be maintained:

c. All transport or earth moving equipment and vehicles shall be inspected at least once a week by a responsible person and in case any defend is noticed in such equipment or vehicle it shall be immediately taken out of use;

d. Power trucks and tractors shall be equipped with effective brakes, headlights and tail lamps and maintained in good repair and working order;

e. Side stanchions on power trucks and trailers for crying heavy and long objects shall be

   i. Of sound construction and free from defects;

   ii. Provided with tie chains attached to the top across the loads for preventing such stanchions from spreading out; and

   iii. Kept in position while loading and unloading;

   iv. Safe gangways provided for to and fro movement of building workers engaged in loading and unloading of lorries, trucks, trailers and wagons;

   v. Trucks and other equipment shall not be loaded beyond their safe capacity and carry workers engaged in loading and unloading of lorries, trucks trailers and wagons in an unsafe condition;

   vi. Handles of trucks shall be so designed as to protect the hands of the building workers working on such trucks, or such handles provided with knuckle guards;

   vii. No unauthorized person shall ride the transport equipment employed in such work;

   viii. A driver of a transport equipment shall maneuver such equipment under the direction of a signaler;

   ix. Adequate precaution such as isolating the electric supply or erecting overhead barriers of a safe height shall be taken when earth moving equipment or vehicles are required to operate in dangerous proximity to any live electric conductor;

   x. Vehicles and earth moving equipment shall not be left on a slope with the engine of such vehicles or equipment running;

xi. All earth moving equipment, vehicles or other transport equipment shall be operated only by such person who are adequately trained and possess such skills as required for safe operation of such equipment, vehicle or other transport equipment.

8.2. POWER SHOVELS AND EXCAVATOR

a. A shovel or an excavator whether operated by steam or electric or by internal combustion, shall be constructed, installed, operated, tested and examined as per approved standards;

b. Excavator equipped for use as a mobile crane shall be examined and tested in accordance with the requirements for such mobile cranes as laid down by the manufacturer; and

c. Fitted with an automatic safe working load indicator;

d. Buckets or grabs of power shovels shall be propped to restrict the movement of such buckets or grabs while being repaired or while the teeth of such buckets or grabs are being changed.

8.3. BULLDOZER

a. Operator of every such bulldozer before leaving the dozer shall take the following steps:

i) Apply the brakes;

ii) Lower the blade and sipper and

iii) Put the shift lever into neutral;

iv) Dozer left on level ground at the close of the work for which such bulldozer is used;

v) The blade of a bulldozer kept low when such bulldozer is moving uphill;

vi) The bulldozer blades not used as brakes except in an emergency.

8.4. SCRAPERS

a. A tractor and scraper shall be joined by safety line at the time of its operation;

b. The scraper bowls shall be propped while blades of such scraper are being replaced;

c. A scraper moving downhill shall not be left in gear.

8.5. MOBILE ASPHALT LAYERS & FINISHERS

a. A mixture elevator shall be located within a wooden or sheet metal enclosure with a window for observation, lubrication and maintenance;

b. Bitumen scoops shall have adequate covers;

c. When asphalt plants are working on public road, adequate traffic control shall be established on such road and the building workers working with such plant provided with reflective jackets;

d. A sufficient number of fire extinguishers shall be kept in readiness at such workplace where fire hazards may exist;

e. The materials shall be loaded on the elevator after the drying drain has warmed up of such elevator;

f. No open light shall be used for ascertaining the level of asphalt;

g. Inspection opening shall not be opened till there is a pressure in the boiler, which may cause injury to building workers.

8.6. PAVERS:

Pavers shall be equipped with guards suitable to prevent building workers from walking under the skip of such pavers.

8.7. Road rollers: Before a road roller is used on the ground, such ground shall be examined for its bearing capacity and general safety, especially at the edges of slopes such as embankment on such grounds and shall not be moved downhill with the engine out of gear.

8.8. GENERAL SAFETY IN RESPECT OF POWERED CONSTRUCTION MACHINERY

a. Every vehicle or earthmoving equipment shall be equipped with -

i) Silencers;

ii) Tail lights

iii) Power and hand brakes;

iv) Reversing alarm; and

v) Search light for forward and backward movement, which are required for safe operation of such vehicle or earthmoving equipment;

b. The cab of vehicle or earthmoving equipment shall bee kept at least one meter from the adjacent face of a ground being excavated;

c. When cranes of shovel are traveling, the boom of such crane or shovel shall be in the direction of such travel and the bucket or scoop attached to such crane or shovel raised and without load except when such traveling is downhill.

9.0 SAFETY IN THE PROVISION OF RUNWAYS AND RAMP

9.1. USE OF RUNWAYS AND RAMPS:

a. Runway or ramps shall not be less than 430 mm in width and constructed of not less than 25 mm thick planking or any other material of adequate strength to withstand the required load, supported substantially in relation to the span and braced with such runway or ramp, and design and construction of such runway or ramp shall be in accordance with the approved standards;

b. Every runway or ramp located more than 3 m above the floor or ground shall be on open sides and provided with a guardrail of adequate strength and height of not less than 1 m.

c. Use of runways and ramps by vehicles:

   i. All runways and ramps shall be of sound construction, strength and securely braced and supported;

   ii. Every runway or ramp for the use of transport equipment like trailers, trucks or heavier vehicles shall have a width of not less than 3.7 m and provide with timber curbs or any other material of adequate strength with not less than 200 mm by 200 mm in width placed parallel to, and secured to, the sided of such runway or ramp and such runways or ramps or ramps shall be designed in accordance with the approved standards.

9.2. SLOPE OF RAMPS:

Every ramp shall have a slope not exceeding one in four and the total rise of a continuous ramp used by building workers carrying material or using wheelbarrows shall not exceed 3.7 m, unless broken by horizontal landing of at least 1.2 m in length.

9.3. USE OF RUNWAYS OR RAMPS BY WHEELBARROWS, ETC.

a. Every runway or ramp used for wheelbarrows and carts or hand trucks shall not be less than 1 m width and constructed of not less than 50 mm thick planking, and supported and braced suitably for such use;

b. Every runway or ramp located more than 3 m above the floor or ground shall be provided on the open sides with suitable guardrails of adequate strength.

10. SAFETY IN HANDLING AND USE OF EXPLOSIVES

10.1 GENERAL PROVISIONS:

a. The use of explosives shall be carried out in a safe manner to avoid injury to any person and under the direct supervision of a responsible person;

b. No person other than authorized and competent one shall be allowed to handle and use explosives;

c. Before using any explosive, necessary warning and danger signals shall be erected, at conspicuous places of such use to warn the building workers and the general public of the danger involved in such use.

d. No person other than authorized and competent one shall be allowed to handle and use explosives.

e. Smoke, open lamps, other type of hot or heat producing items and sparks shall be prohibited in or near explosives magazines or while explosives are being handled, transported or used.

f. No person shall be allowed to handle or use explosives while under the influence of intoxicating liquors or dangerous drugs.

g. The explosives shall be accounted for at all times. No explosives or blasting agents shall be abandoned.

h. No fire shall be fought where the fire is in the imminent danger of contact with explosives. All employees shall be removes to a safe area and the fire area shall be guarded against intruders.

i. Employees authorized to prepare explosive charges or conduct blasting operations shall use every reasonable precaution including but not limited to visual and audible warning signals, flags, or barricades to ensure employee safety.

j. Due precautions shall be taken to prevent accidental discharge of electric blasting caps from current induced by induced voltage, lightning, adjacent power lines, dust storms, or other sources of extraneous electricity or otherwise. These precautions shall include:

k. Short-circuiting of detonators in holes, which have been primed and shunted until wired into the blasting circuit.

l. The suspension of all blasting operations and removal of persons from the blasting area during the approach and progress of an electric storm.

m. The prominent display of adequate signs, warning against the use of radio transmitters, on all roads within 1000 ft of blasting operations. Whenever adherence to the 1000 ft distance would create an operational handicap, a competent and expert person shall be consulted to evaluate the particular situation, and an alternative provided, which are adequately designed to prevent any premature firing of electric blasting of caps. A description of any such blasting shall be reduced to writing and shall be certified as meeting the purposes of this subdivision by the competent person consulted. The description shall be maintained at the construction site during the duration of the work, and shall be available for inspection.

n. Empty boxes and paper and fiber packing materials, which have previously contained high explosives, shall not be used again for any purpose, but shall be destroyed by burning at an approved location.

o. Explosives, blasting agents and blasting supplies that are obviously deteriorated or damaged shall not be used.

p. Delivery and issue of explosives shall only be made authorized persons into authorized magazines or approved temporary storage or handling areas.

q. Blasting operations in the proximity of overhead power lines, communication lines, utility services, or other services and structures shall not be carried on until the operators and/or owners have been notified and measures for safe control have been taken. In such situations controlled blasting shall be restored to.

r. All loading and firing shall be directed and supervised by competent persons thoroughly experienced in this field.

s. Loaded boreholes shall not be left unattended after the end of the shift.

t. Suitable and sufficient means of egress to ground level shall be provided in all cases of excavations, trenches, all other places where explosives are handled above or below ground level.

u. At an appropriate time before the final blasting warnings, workers in the area shall be removed to a designated safe place.

v. An unmistakable, audible, final warning shall be sounded one minute prior to the detonation of explosives; after completion, when the person in charge has established that safe conditions prevail, an “all clear” shall be sounded.

w. To prevent persons entering any danger zone during blasting operations notices shall be given to all concerned.

x. Notices referred above shall indicate:

   i. that explosives are in use;

   ii. the audible warning sound and the “all clear” and state when they will be sounded; and

   iii. the warning flags in use, including an “all clear” flag.

y. Precautions against lightning shall be provided in accordance with the Indian Electricity Act and Indian Explosives Act and Rules and regulations framed there under.

z. Package containing explosives shall not be dragged, dropped or handled roughly.

aa. Non-sparking tools shall be used to open keys.

bb. The explosives shall not be carried in the box or otherwise on any individual.

cc. Nothing shall be inserted in the open end of the blasting cap except fuses.

dd. Deteriorated or damages explosives shall not be used but shall be disposed or destroyed strictly in accordance with the approved methods and in the doing so the manufacturers or the appropriate authority's instructions shall be followed.

ee. lightning shall be in accordance with Indian Electricity Act/Rules

10.2. TRANSPORTATION OF EXPLOSIVES

a. Keep safe distance and to use non-sparking tools while opening packages containing explosives;

b. Stop the use of explosives and handling thereof while the weather conditions are not suitable for such use or handling;

c. Due precautions shall be taken to prevent accidental discharge of electric blasting caps from current induced by induced voltage, lightning, adjacent power-lines, dust storms or other sources of extraneous electricity or otherwise. These precautions shall include –

   i. Suspension of all blasting operations and evacuation of persons;

   ii. All warning signs shall be displayed within 200 m of blasting operations and in case putting up a sign at 200 m is impractical, the contractor shall consult the Engineer-in-charge for alternatives;

   iii. All loading and firing shall be directed and supervised by competent persons thoroughly experienced in the field;

   iv. To prevent persons entering any danger zone during blasting operations, notices shall be given to all concerned;

d. In addition to these provisions, all measures and precautions that are required to be observed for use, handling, storing or transportation of explosives under the Rules framed under the Explosives Act, 1884 (4 of 1884) shall be observed;

e. All the relevant statutory provisions, local laws and rules and regulations shall be complied with.

f. Where the magazine is located near the construction site and blasting operation continues daily, actual requirement of explosives shall be drawn from the magazine and transported to the site. Any leftovers shall be returned to the magazine each time after the blast. In case of work at scattered places and for a small duration, portable magazines shall be used and kept within a fence in safe place and properly guarded.

g. For carrying higher quantity (more than 5 kg of explosives) specially designed insulated containers shall be used. These containers shall be constructed of finished wood not less than 5cm thick or plastic not less than 6mm thick or pressed fibre not less than 10mm thick. There shall be no metal parts (not even nails, bolts, screws etc.) and the containers shall be provided with suitable non-conductive carrying device, such as rubber, leather or canvas handle or strap.

h. Vehicles to be used for transportation explosives shall be in good working condition and shall have a tight wooded or non-sparking metal (copper, brass and the like) floor with sides and

ends high enough to prevent the explosives from failing off the vehicle. In open bodied vehicles, the explosives shall be covered with a waterproof and fibre tarpaulin.

i. Electrical wiring in vehicle shall be fully insulated so as to prevent the danger of short-circuiting and at least two fire extinguishers of carbon dioxide type shall be carried. The vehicle shall be properly marked indicating adequate warning to the public in regard to the nature of cargo.

j. No metals except approved metal truck shall be allowed to come in contact with cases of explosives, metal, flammable, or corrosive substance shall not be transported with explosives. As far as possible, transportation of any material along with explosives shall be prohibited.

k. Smoking shall be prohibited in the vehicle carrying explosives.

l. No unauthorized person shall be allowed in the vehicle, carrying explosives.

m. Loading and unloading of explosives shall be done carefully.

n. Explosives and detonators or blasting caps shall not be permitted to be transported in the same vehicle.

o. Detonators and other explosives for blasting shall be transported to the site of work in the original containers or in securely locked separate non-metallic containers and shall not be carried loose or mixed with other materials.

10.3. STORAGE OF EXPLOSIVES AND BLASTING AGENTS

a. Explosives and related materials shall be stored in approved facilities.

b. Blasting caps, electric blasting caps, detonating primers, and primed cartridges shall not be stored in the same magazine with other explosives or blasting agents.

c. Smoking and open flames shall not be permitted within 50 feet of explosives and detonators storage magazine.

d. No Explosives or blasting agents shall be permanently stored in any underground area until the area has been developed to the point where at lease two modes of exit have been provided.

e. Permanent underground storage magazine shall be at least 300 feet from any shaft or other active under ground working area.

f. Permanent underground magazines containing detonators shall not be located closer than 50 feet to any magazine containing other explosives or blasting agents.

10.4. DRILLING AND LOADING

a. Before planning out the drilling operations for blasting purposes, nature of stratum and the over burden shall necessarily be examined to avoid possibilities of landslides after blasting.

b. The face or rock shall be carefully examined before drilling to determine the presence of unfired explosives**.** No attempt shall be made to drill at a site if un-detonated explosives are suspected. In such case the boreholes shall be thoroughly cleaned before a cartridge is

inserted. Wooden tamping rods (not pointed, but cylindrical throughout) shall be used in the charging the holes. The cartridge will be on the top.

c. The borehole shall be carefully checked for length, presence of water dust, etc. with a wooden temping pole or a measuring tape before loading.

d. Surplus explosives shall not be stacked near working areas during loading/unloading.

e. The line of detonating fuse extending into a borehole shall be cut from the spool before loading the remainder of the charge.

f. A bore shall not be loaded with explosives after springing (enlarging the hole with explosives) or upon completion of drilling without making sure it is cool and it does not contain any hot smoldering material. Temperatures in excess of 65^{o} C are dangerous.

g. A bore near another hole loaded with explosives shall not be sprung.

h. No force shall be used for inserting cartridges or any explosives into a bore hold or pass any obstruction in a borehole.

i. No force shall be used for inserting a blasting cap or an electric blasting cap into explosive. The cap shall be inserted into a hole made with a pickers designed for the purpose. A hitch of the electric blasting cap leading wire shall be made on the primer cartridge so as to prevent pulling out the electric blasting cap from the explosive charge. In case of fuse, the fuse shall be tied to the explosive cartridge so that the blasting cap is not pulled out. Care shall be taken so that the blasting cap is not pulled out. Care shall be taken so that the electric blasting cap, leading wire or the length of the fuse does not get damaged during loading of the charge.

j. No attempt shall be made to slit, drop, deform or abuse the primer.

k. Blasting caps or electric blasting caps shall not be connected to detonating fuse except by methods recommended by the manufacturers of caps.

l. Explosive cartridge shall not be cut, nor explosive removed from the cartridge for use.

m. Metallic devices of any kind shall not be used in tamping. Wooden tamping tools with not exposed metal parts except non-sparking metal connectors for jointed poled shall be used. Violent tamping shall be avoided. Primer shall not be tamped.

n. Care shall be taken to confine the explosives in the bore hold with sand, earth clay or other suitable combustible stemming material.

o. Kinking or injuring of fuse or electric blasting cap wires shall be avoided when tamping.

10.5. ELECTRICAL SHOT-FIRING CIRCUIT

a. In deciding the sizes of wires, fuses, circuits, blasting switches, etc., instructions issued by the manufacturers of these articles shall be followed, if they do not contradict with Indian Explosives Act or framed under it.

b. No person shall attempt to uncoil the wires and open out the short-circuited bare leading wires of the electric blasting cap during approach of dust storm or near any source of large

charge of static electricity or near a radio transmitter. The manufacturer of the cap or the Inspectorate of Explosives shall be consulted regarding the distance from the transmitter beyond which electric short firing shall be conducted.

c. Firing circuit shall be kept completely insulated from the ground of the other conductors, such as wires, rails, pipes or other paths or stray current.

d. There shall not be any electric live wires or cables of any kind near electric blasting caps or other explosives except at the time and for the purpose of firing the blast.

e. All electric blasting caps shall be tested singly and also when connected in a circuit in series using only an approved type of circuit continuity tester or ohmmeter.

f. No attempt shall be made to use in the same circuit either electrical blasting caps made by more than one manufacturer or electric blasting caps of different design or function even if made by the same manufacturers unless such use is approved by the manufacturers.

g. No attempt shall be made to fire a circuit of electric blasting caps with less than the minimum current specified by the manufacturer of that electric blasting cap.

h. Care shall be taken to ensure that all wire ends to be connected are bright and clean.

i. The electric cap wires or leading wires shall be kept short circuited until ready to fire.

j. When energy for blasting is taken from power circuits the voltage shall not exceed 220v. The wiring controlling arrangements shall conform to the following:

k. The blasting switch shall be strictly according to the specifications, externally operated double-throw switch, which when locked in the open position will short circuit and ground the leading wires. The switch shall be installed at the location where the firing is to be controlled.

l. A 'safety' switch of the same type as the blasting switch shall be installed between the blasting switch and the firing circuit and lead lines, at a distance not to exceed 180cm from the blasting switch.

m. Both the safety switch and the blasting switch shall be locked in the open position immediately after the shot and before any person is permitted to return to the blasting area. Key to the switches shall remain in the possession of the blaster at all times.

n. Rubber covered or other adequately insulated copper wires in good condition shall be used for firing lines and shall have solid cores of appropriate gauge. Sufficient firing line shall be provided to permit the blaster to be located at a safe distance from the blast. Single conductor lead lines shall be used.

o. Blasting operations in the proximity of overhead power lines, communication lines, utility lines, or other structures shall not be carried on until the operator or the owner, or both of such lines as been notified and precautionary measures deemed necessary, have been taken.

p. All holes loaded on a shift shall be fired on the same shift.

q. As far as possible, blasting shall be carried out using suitable exploder with 25 per cent excess capacity. Electric power from the mains shall be used only when it is absolutely necessary.

10.6. SHOT-FIRING WITH SAFETY FUSE

a. The fuse shall be carefully handled to avoid damaging the covering. In very cold weather the fuse shall be slightly warmed before using so as to avoid cracking the waterproofing.

b. Short fuse shall not be used. The length of a fuse shall not be less than 120cm. The rate of burning of the fuse shall be known and it would be necessary to make sure that it will take sufficient time in burning so as to enable all persons to reach a place of safety. The burning rate of the fuse shall not be more than 60 cm/min.

c. The fuse shall not be cut until the operation to insert the fuse into a blasting cap is ready. The fuse shall be cut off about 2.5 to 5 cm to ensure a dry end. It shall be cut squarely across with a clean and sharp blade. The fuse shall be seated lightly against the cap charge and care shall be taken to avoid twisting after it has been placed in position.

d. Blasting caps shall not be crimped by any means except by a cap crimper designed for the purpose. It shall be necessary to make sure that the cap is squarely crimped to the face.

e. The fuse shall be lighted with a fuse lighter designed for the purpose. If a match is used, the fuse shall be slit at the end and the match head held in then slit against the power core and then the match head rubbed against an abrasive surface to light the fuse.

f. The fuse shall not be lighted until sufficient stemming has been placed over the explosives to prevent sparks of live match heads from coming into contact with the explosives.

g. The explosives shall not be held in hands when lighting the fuse.

10.7. UNDERGROUND WORK

a. Only permissible explosives and in the manner as specified by the appropriate authority shall be used.

b. Excessive quantities of explosives shall not be taken underground at any time. Black blasting powder or pellet powder shall not be used with any other explosive in the same borehole.

10.8. BEFORE AND AFTER FIRING

a. Before firing, sufficient warning shall be given to enable the people working in the area to get off the danger zone. The danger zone shall be suitable cordoned off and flag men posted at important points.

b. No loose materials, such as tools, drilling implements etc. Shall be left on the rock surfaces to be blasted.

c. Blasting in the open shall be carried out during the fixed hours every day or on fixed days in the week. This information shall be amply publicized and the following precautions observed:

d. On the project sites, where blasting operations are carried out, daily blasting hours shall be clearly printed on the sign-boards on all the roads approaching that area.

    i. Road closing barriers should be provided to close the traffic on these roads, at least 400 meters away when the firing is to take place.

ii. The beginning of the firing shall follow loud sirens and similarly loud sirens shall succeed the completion of the firing.

e. The shot-firer shall not be allowed to return to the blasting site after firing, until at least 5 min have elapsed. In case of electric shot firing, the shot holes shall be examined after firing and in case of misfire no person shall be allowed to approach the blasting site for at lease 5 min. In case of shot firing with safety fuse, utmost care shall be taken to count the number to ensure that all the shots have fired and in the event of misfire, no person shall be allowed to approach the blasting site for at least 30 min. In any case, a careful inspection for the remaining un-detonated explosive shall be made after firing the shots. All misfired shot holes shall be cross-marked. No other person than those duly authorized shall approach the holes until one of the following operations has been performed in respect of each of the misfired holes:

f. If the misfire is due to a faulty cable or faulty electrical connection the defect shall be remedied and the shot fired.

g. The stemming shall be floated out by use of water or air jet from hose until the hole has been opened to within 60 cm of the charge, whereupon water will be siphoned or pumped out, then a fresh new charge placed and duly detonated. Or

i. A careful search shall be made of unexploded material in the debris of the charge.

ii. If a shift charge is unavoidable, the person in-charge of one shift before leaving the work shall inform the person relieving him for the next shift of any cases misfired and shall point out their position duly cross marked and also state clearly what action has to be taken in the matter.

Note: The rules are made considering statutory provisions and other National/International standards. However, if any statutory provision overruling these laws is made, the statutory provisions shall overrule the NTPC Rules.

11.0 SAFETY IN EXCAVATION & TUNNELING WORK

SAFETY IN EXCAVATION

11.1GENERAL PROVISIONS

a. Before undertaking any activity, the soil shall be tested and in case of availability of any explosive gas, necessary arrangements must be made to remove/dilute such gases and in case they are found to be toxic or poisonous, the workplace must be purged and continuous ventilation maintaining the contamination below the permissible level ensured;

b. The position of underground installations such as sewers, water pipes and electrical cables shall be verified and in case of their existence, they must be isolated;

c. If they cannot be isolated or removed or shutdown, they shall be fenced, hung up or otherwise protected. On every part likely to be visited by persons or where transport vehicles ply, the area shall be suitably fenced, guarded or barricaded to prevent fall of persons, vehicles or livestock into the excavated area;

d. Warning signs shall be erected and the in the night hours the area shall be illuminated to warn pedestrians and vehicular traffic;

e. Arrangements shall be made to prevent external vibrations due to rail/road traffic;

f. Blasting shall be carried out in accordance with the norms applicable in this regard. Special care shall be taken to control the impact of vibrations/tremor caused by blasting to protect excavations from cave-ins;

g. Arrangements shall be made to save other buildings/structures in the affected zone or in the vicinity of the area of excavation, from collapse;

11.2 SHORING AND TIMBERING

a. Site of excavations, where workers are exposed to danger from moving ground, shall be made safe by maintaining due slope not exceeding the angle of repose of different types of soil or otherwise by shoring, portable shields or other effective means;

b. All trenches in the soil, other than rock or hard compact soil more than 1.5 m deep into which men enter, shall be securely shored and timbered under the supervision of a competent person and only the trained workers shall be allowed to substantially alter or dismantle the shoring or timbering;

c. All struts, braces and walls in excavation shall be adequately secured so as to prevent their accidental displacement;

d. In all excavations in soft or fissured rock or hard soil exceeding 2 m in depth, except those which are sloped to within 1.5 m of the bottom into which men enter, shall be securely shored and timbered;

e. Where the sides of the excavations are sloped as outlined above, but not within the 1.5 m of the bottom, vertical sides shall be shored and the shoring shall extend at least 30 cm above the vertical sides. When open spaced sheathing is used, a toe-board shall be provided to prevent material rolling down the slope and falling into the excavated.

11.3. SHEATHING

a. The sheathing should be placed against the side of the trench so that length of each piece of sheathing is vertical. It should be held securely in place against the wales by ensuring that sheathing is kept firmly pressed against the wall of the trench. Where the trench excavated is loose, sandy or soft soil or soil which has been previously excavated or soil which is under hydrostatic pressure, each piece of sheathing shall be driven into the bottom of the trench so as to firmly hold it in place;

b. Where two or more pieces of sheathing are used one above another, the sheathing shall be so arranged that the lower pieces of sheathing shall overlap the lowest wales supporting the piece of sheathing next above it. These pieces of sheathing shall be firmly driven into the soil and securely supported by wales and struts, as the trench is made deeper.

11.4. WALES

a. The wales shall be parallel to the bottom or the proposed bottom of the trench. Each wale shall be supported on cleats spiked to the sheathing or by posts set on the wales next below it and in the case of the lowest wale on the bottom of the trench itself. Where necessary, wedges may be provided between a wale and the sheathing it supports so that roughly uniformity is given to all individual pieces of sheathing.

11.5. STRUTS

a. Struts shall be horizontal and at right angles to the wales or sheathing supported thereby. Struts shall be cut to the proper length required to fit in tightly between the wales. Where necessary, the struts shall be held securely in place by wedges, driven between the struts and the wales;

b. Struts shall be placed on cleats spiked or bolted to the posts supporting the Wales.

11.6. LOOSE SITE MATERIALS:

No loose material shall be kept very close to the excavation creating possibility of its fall into the excavated area. A safe distance of at least 1 m shall be maintained.

11.7. PLANT & MACHINERY:

Movement of vehicles and heavy equipment shall be kept at a distance least equal to the depth of the excavation or at least 6 m for excavation deeper than 6 m and the workers shall be provided with proper tools.

11.8. MEANS OF ACCESS

a. For trenches deeper than 1.5 m, safe means of access and egress shall be provided at intervals of every 15 m. Where it is not possible to provide safe means of access and egress as above, ladders shall extend from the bottom of the trench to at least 90 cm above the ground;

b. Walkways, runways and sidewalks shall be kept clear of excavated materials or other obstructions and no side walls shall be undermined-undercut unless it is capable of carrying a minimum live load of 125 lbs per square feet;

c. If planks are used for raising walkways, runways or sidewalks, they should be parallel to the length of the walk and fastened together against displacement;

d. Lone worker shall not be allowed to work in the excavated area.

11.9. INSPECTIONS:

A competent person shall make inspections every day and necessary measures shall be taken to safeguard against possible cave-ins or slide or collapse of the excavations.

11.10. NOTIFICATION OF INTENTION TO CARRY OUT EXCAVATION AND TUNNELING WORK

a. Within thirty days, prior to the commencement of such excavation or tunneling work, the contractor shall inform in writing the detailed layout plans, method of construction and schedule of such excavation or tunneling work to the Engineer in-charge of NTPC;

b. In case compressed air is used in such excavation or tunneling work or any work incidental to or required for such excavation or tunneling work, the technical details and drawings of all man-locks and medical-locks together with names and addresses of all construction medical officers duly qualified and so appointed by such contractor for the purpose of such excavation or tunneling work shall be sent to the Engineer in-charge.

11.11. PROJECT ENGINEER

a. The contractor undertaking any excavation or tunneling work shall appoint a Project Engineer for safe operation of such projects;

b. Such Project Engineer shall exercise overall control of the operations and the activities at such project and be responsible for carrying out the activities safely.

11.12. RESPONSIBLE PERSON

a. The contractor undertaking excavation or tunnel ling work at construction site of a building or other construction work shall appoint a responsible person for safe operation of such excavation or tunneling work;

b. The name and addresses of such responsible persons shall be forwarded to the Engineer in-charge;

c. Duties and responsibilities of the responsible person referred to above person shall include

   i. To carry out smoothly such excavation or tunneling work;

   ii. To inspect and rectify any hazardous situation relating to such excavation or tunneling work;

   iii. To take remedial measures to avoid any unsafe practice or conditions relating to such excavation or tunneling work.

11.13. WARNING SIGNS AND NOTICES

a. Suitable warning signs or notices, required for the safety of building workers carrying out the work of an excavation or tunneling, shall be displayed or erected at conspicuous places in Hindi

and in language understood by the majority of such building workers at such excavation or tunneling work;

b. Such warning signs and notices with regard to compressed air working shall include:

   i) The danger involved in such compressed air work;

   ii) Fire and explosion hazards;

   iii) The emergency procedures for rescue from such danger or hazards.

11.14. REGISTER OF EMPLOYMENT

a. The contractor shall ensure that at a construction site of a building or other construction work where an excavation or tunneling work is being carried on, a register of employment of building workers carrying out such excavation or tunneling work is maintained and produced on demand;

b. Periods of work of such excavation or tunneling work shall be maintained in a register on day-to-day basis and such register shall be produced on demand

11.15. ILLUMINATION

a. All contractors carrying out excavation or tunneling work at a construction site of a building or other construction work shall provide for emergency generators on such construction site to ensure adequate illumination at all work places where such excavation or tunneling work is being carried out;

b. In case of power failure, all workplaces where excavation or tunneling works are carried out shall be adequately illuminated

11.16. PNEUMATIC TOOLS:

Supply lines to pneumatic tools used within a tunnel are fitted with water trap or safety chain or safety wire, as the case may be.

11.17. STABILITY OF STRUCTURE DURING GENERAL EXCAVATION & TUNNELING:

The contractor shall ensure that where there is any doubt as to the stability of any structure adjoining the workplace or other areas to be excavated or where tunneling work is to be carried out –

a. The Project Engineer shall arrange for measures like underpinning, sheet piling, shoring, bracing or other similar means to support such structure and to prevent injury to any building worker working adjacent to such structure or damage to property or equipment adjacent to such structure;

b. Where any building worker engaged in excavation is exposed to hazard of falling or sliding material or article from any bank or side of such excavation which is more than 1.5 m above his footing, such worker shall be protected by adequate piling and bracing against such bank or side;

c. The excavation and its vicinity shall be checked by a responsible person after every rain, storm or other occurrences carrying hazards and in case a hazard is noticed at such checking, adequate protection against slides and cave-in to prevent such hazard shall be provided;

d. Temporary sheet piling installed for the construction of a retaining wall after excavation shall not be removed, except on the advice of the responsible person after an inspection carried out by such responsible person;

e. Where banks of an excavation are undercut, adequate shoring shall be provided to support the material or article overhanging such bank;

f. Excavated material shall not be stored at least 0.5 m from the edge of an open excavation or trench and the banks of such excavation or trench shall be stripped of loose rocks and other materials which may slide, roll or fall upon a building worker working below such bank;

g. Adequate and suitable warning signs shall be put-up at conspicuous places at the excavation work to avoid any person falling into the excavations or trenches;

h. The responsible person shall ensure at the excavation that no building worker is permitted to work where such building worker may be struck or endangered by the excavation machinery or material or article used in such excavation.

11.18. SAFE ACCESS AND EGRESS:

Ladders, staircases or ramps are provided, as the case may be, for safe access to and egress form excavation where the depth of such excavation exceeds one point 1.5 m and such ladders, staircases or ramps comply with the relevant national standards.

11.19. TRENCHES

a. A trench or excavation shall be protected against falling of a person by suitable measures if the depth of such trench or excavation exceeds 1.5 m and such protection shall be an improved protection in accordance with the design and drawing of a Professional Engineer, where such depth exceeds 4 m;

b. Where the depth of a trench requires two lengths of sheet piling, one above the other, the lower piling shall be set inside the bottom strings or wales of the upper piling and such sheet piling shall be driven down and braced as the excavation continues;

c. All metal sheet piles used in excavation or a trench shall be welded end-to-end and secured by other similar means.

11.20. POSITIONING AND USE OF MACHINERY:

Any machinery used in excavation and tunneling work shall be positioned and operated in such a way that such machinery will not endanger the operator of such machinery or any other person in the vicinity.

11.21. BREATHING APPARATUS:

Suitable breathing apparatus shall be provided to a building worker while working in compressed air environment for his use at excavation or tunneling work and such breathing apparatus shall be maintained in good working condition at all times.

11.22. SAFETY MEASURES FOR TUNNELING OPERATIONS

a. Where there is a danger of falling or sliding of material from the roof face or wall of a tunnel, adequate measures such as shoring, supporting by means of rock bolts, segments or steel sets shall be taken for the safety of building workers;

b. The excavated areas shall be made safe by use of suitably designed and installed steel sets, rock bolts or similar other safe means;

c. The responsible person shall examine and inspect the workplaces in a tunnel before the commencement of work in such tunnel and at regular intervals thereafter to ensure safety of the building workers in such tunnel;

d. The portal areas of a tunnel with loose soil or rock, likely to cause injury to a person shall be adequately protected with supports.

11.23. SURROUNDINGS OF A SHAFT

a. Surroundings of a shaft used in excavation or tunnel work shall be protected from being washed away by construction of sufficient height;

b. Where a building worker is required to enter a shaft at an excavation or tunneling work, safe means of access shall be provided for such entry;

c. Every shaft at excavation or tunneling work shall be provided with a steel casing, concrete piping, timber shoring or other materials of adequate strength for the safety of building workers working in such shaft;

d. Such casing and bracing shall be provided to shafts at an excavation or tunneling work according to the appropriate design for such casing and bracing;

e. A reinforced concrete raft and beam shall be provided around the opening of a shaft at an excavation or tunneling work if the ground surrounding such opening is unstable or unsafe.

11.24. LIFT FOR SHAFT:

Lift shall be provided for transport of building workers and materials or articles at an excavation or tunneling work required to descend more than 50 m in a shaft.

11.25. MEANS OF COMMUNICATION

Reliable and effective means of communication such as telephone or walkie-talkie shall be provided and maintained in working order for arranging better and effective communication at an excavation or tunneling work at the following locations, namely:

i. Working chamber of an excavation;

ii. Intervals of hundred meters along the tunnel;

iii. Working chamber side of a man lock near the door of such man lock;

iv. Interior or each chamber of a man lock;

v. Location conspicuous lock attendant's situation;

vi. A compressor plant;

vii. A first-aid station, and

viii. Outside the portal or the top of a shaft;

ix. Such number of bells and whistles shall be made available at all times at the locations as are necessary for the safety of persons at such locations.

11.26. SIGNALS:

The standard audio or video signals shall be used in excavation or tunneling work and conspicuously located or displayed near entrance to the workplace and in such other locations as may be necessary to bring such signals to notice of all building workers employed in such excavation or tunneling work.

11.27. CLEARANCES

a. The minimum lateral clearances of 0.5 m shall be maintained between any part of a vehicle and any fixture or any equipment used in an excavation or tunneling work after allowing the throw or swing of such fixture or equipment;

b. The overhead clearance for a locomotive drive at excavation or tunneling work shall not be less than 1.20 m above the seat of such driver and not less than 2 m above the platform where such driver stands or of any other dimension in accordance with the approved standard.

11.28. SHELTERS:

The adequate number of shelters for the safeguard of the building workers are provided where, in the course of working, they are liable to be struck by a moving vehicle or other material handling equipment in a tunnel.

11.29. USE OF INTERNAL COMBUSTION ENGINE:

No internal combustion engine shall be used underground in excavation or tunneling work unless such engine is so constructed that the air entering the engine gets cleared before entry and the engine emits no fumes or sparks.

11.30.INFLAMMABLE OILS:

Inflammable oils with the flash point below the working temperature that is likely to be encountered in a tunnel shall not be used in excavation or tunneling work.

11.31. COUPLING AND HOSES:

All high-pressure hydraulic hoses and couplings shall be adequately protected against any possible damage in excavation or tunneling work.

11.32. HOSE INSTALLATION:

All hydraulic lines and plants working at a temperature exceeding 750 c shall be protected by adequate insulation or otherwise against accidental human contact in excavation or tunneling work.

11.33. FIRE RESISTANT HOSES:

No fire hydraulic hoses other than fire resistant hydraulic hoses are used when hydraulically activated machinery and equipment are employed in tunnels.

11.34. FLAMEPROOF EQUIPMENT:

Only flameproof equipment of appropriate type as per approved standards shall be used where there is a danger of flammable or explosive atmosphere being prevalent inside the tunnel.

11.35. STORING OF OIL AND FUEL UNDERGROUND:

All oils, greases or fuels stored underground in excavation or tunneling work shall be kept in tightly sealed containers and in fire resistant areas at safe distances away from explosive and other flammable chemical and appropriate flameproof installation shall be used in such storage areas.

11.36. USE OF GASES UNDERGROUND

a. Petrol or liquefied petroleum gas or any other flammable substances shall not be used or stored inside the tunnel except with the prior approval of the Project Engineer;

b. After the use of the petroleum or liquefied petroleum gas, or highly inflammable substances, all remaining petroleum or liquefied petroleum gas or highly inflammable substances shall be removed immediately from such tunnel;

c. No oxy-acetylene gas shall be used in a compressed air environment in excavation or tunneling work.

11.37. WATER FOR FIRE FIGHTING

a. Adequate number of water outlets shall be provided on excavation or tunneling work and readily made accessible throughout the tunnel for fire fighting purposes and such water outlets shall be maintained for effective fire lighting;

b. All air locks shall be equipped with fire fighting facilities at excavation or tunneling work;

c. An audible fire alarm shall be provided to warn the building workers whenever a fire breaks out on an excavation or tunneling work;

d. Adequate number and types of fire extinguishers, in accordance with relevant national standards, shall be provided and made readily available to fight any outbreak of fire at an excavation or tunneling work;

e. Fire extinguishers with vaporizing liquids and high pressure carbon dioxide shall not be used in tunnels or other confined spaces;

f. The instructions regarding steps to be followed to fight outbreak of fire, at an excavation or tunneling work, written in Hindi or local language understood by the majority of the building workers employed on such excavation or tunneling work, shall be displayed at conspicuous and vulnerable places of such excavation or tunneling work.

11.38. FLOODING

a. Water tight bulkhead doors shall be installed at the entrance of a tunnel to prevent flooding during a tunneling work where more than one tunnel is driven from a shaft;

b. All necessary measures shall be taken to ensure that no building worker is trapped in any isolated section of a tunnel when any bulkhead door of such tunnel is closed;

c. Where there is likelihood of flooding or water rushing into a tunnel during a tunneling work, arrangements shall be made for immediate starting of water pumps to take out water of such flooding or water rushing and for giving alert signals to the building workers and other persons to keep them away from danger.

d. Airtight steel curtains shall be provided in areas liable to flooding at tunneling work and in case of descending tunnels, such curtains shall be provided in the top half of such tunnels to ensure the retention of pockets of air for rescue purpose.

11.39. REST SHELTERS

a. Where building workers employed in a compressed air environment in a tunneling work are required to remain at the work site for one hour or more after de-compression from pressure exceeding one bar, adequate and suitable facilities shall be provided for such building workers to rest;

    a. Every man-lock, medical-lock and any other facility inside these locks in a tunneling work shall be maintained in a clean state and in good repairs;

    b. A first-aid room shall be provided and readily available at a construction site of a tunneling work;

    c. Each man-lock attendant at the station shall be provided with a first-aid box.

11.40. PERMISSIBLE LIMIT OF EXPOSURE OF CHEMICALS

a. The working environment in a tunnel or a shaft in which building workers are employed shall not contain any of the hazardous substances in concentrations beyond the permissible limits;

b. The responsible person referred to shall conduct necessary test before the commencement of a tunneling work for the day and at suitable intervals as fixed by the Engineer in-charge, to ensure that the permissible limits of exposure are not exceeded and a record of such test shall be maintained and made available for inspection.

11.41. VENTILATION:

All working areas in a free air tunnel shall be provided with the approved ventilation system and the fresh air supplied in such tunnel shall not be less than 6 m^3 per minute for each building worker employed underground in such tunnel and the free air-flow movement inside such tunnel not less than 9 m^3 per minute.

11.42. AIR SUPPLY INTAKE POINT:

The air intake points for all air compression shall be located at places where such intake air does not get contaminated with dust, fumes, vapor and exhaust gases or other contaminants.

11.43. EMERGENCY GENERATORS

a. Every compressed air system in a tunnel shall be provided with emergency power supply system for maintaining continued supply of compressed air in such compressed air system, which shall be capable of operating air compressor and ancillary systems of such compressed air system;

b. The emergency power supply system shall be maintained and made readily available at all times.

11.45. AIR MAINS:

Every air-main supplying air to the working chamber, man-lock or medical-lock used at an excavation or tunneling work shall be protected against accidental damage and where it is not practicable to provide such protection, a stand-by air-main shall be provided.

11.46. BULKHEAD AND AIR LOCKS

a. A bulk head or air tight diaphragms retaining compressed air, when used within a tunnel or a shaft, shall be constructed to withstand the maximum pressure at 1.25 the maximum working pressure of such bulk head or diaphragm and such bulk head or diaphragm shall be tested before its each use by a responsible person to ensure that such bulk head or diaphragm is in proper working order;

b. Such responsible person shall keep the record of each test and such record shall be produced for inspection.

c. The bulk head or diaphragm shall be made of sound material of adequate strength, which shall be able to withstand the maximum pressure on which they are subjected to at any time of their use;

d. A bulkhead anchorage and air lick shall be tested at its work place at an excavation or tunneling work immediately after their installation at such place.

11.47. DIAPHRAGM:

All diaphragms, which are in the form of horizontal decks across a shaft used at excavation or tunneling work, shall be securely anchored

11.48.PORTABLE ELECTRICAL HAND TOOLS:

All portable electrical hand tools and inspection lamps used underground or in a confined space shall be operated at a voltage not exceeding 24 V.

11.49. CIRCUIT BREAKER

a. Adequate numbers of differential ground fault circuit breakers shall be installed for every electrical distribution system and its sub-systems used at an excavation or tunneling;

b. Work and the sensitivity of each of circuit breaker shall be adjusted in accordance with the requirement set out in accordance with the approved standards;

c. No semi-enclosed fuse unit shall be used in underground place.

11.50. TRANSFORMER:

The contractor shall ensure no transformer is used in any section of a tunnel under compressed air unless such transformer is of the dry type and conforms to the approved standards.

11.51. LIVE WIRES:

There shall be no exposed live wire in working areas at an excavation or tunneling work which are accessible to building workers other than those authorized to work on such live lines.

11.52. WELDING SETS:

All welding sets used in a tunnel shall be of adequate capacity and of suitable type, duly approved.

11.53. QUALITY AND QUANTITY

a. Every working chamber at an excavation or tunneling work where compressed air is used, the supply of such air shall be maintained at not less than 0.3 m^3 per minute per person working therein;

b. A reserve supply of compressed air shall be made available at all times for man-locks and medical locks used at a tunneling work;

c. The air supplied in a compressed air environment at a tunneling work shall be, as far as practicable, free from contaminants, namely, dust, fumes and other toxic substances.

11.54. WORKING TEMPERATURE:

The temperature in any working chamber at an excavation or tunneling work where building workers are employed shall not exceed 29^0 c and the arrangement shall be maintained for kipping records in which the temperatures measured by dry bulb and wet bulb inside such working chamber once in every hour and for producing such records for inspection on demand.

11.55. MAN-LOCKS AND WORKING IN COMPRESSED AIR ENVIRONMENT

a. Man-locks used at a tunneling work shall be of adequate strength, made of sound material and designed to withstand any pressure, internal or external, to which it may be subjected in the normal use or in an emergency;

b. Doors of man-locks at an excavation or tunneling work shall be made of steel and used at a tunneling work for keeping the work airtight and devices shall be provided for sealing the doors when such locks are under pressure. The anchorage of a man-lock used at tunneling work shall have adequate strength to withstand the pressure exerted by air on the man-lock. There shall be adequate room available for the workers for working in the man-locks;

c. Where work is carried out in any compressed air tunnel, a Man-lock in accordance with the approved standards shall be used;

d. Where a man-lock is used, safety Instructions in Hindi and in local language understood by majority of building workers employed there, shall be displaced at conspicuous places;

e. Except in an emergency, compression and de-compression operations shall be carried out in a man-lock and in an emergency any material-lock may be used;

f. A record of compression and de-compression shall be kept in writing and produced for inspection on demand;

g. Material lock shall be used with the permission of the Engineer in-charge where it is impracticable to install both the man-lock and the material-lock at;

h. The man-lock at tunneling work shall not be used for any purpose

i. other than compression or de-compression of building workers;

j. No de-canting of building workers at tunneling work shall be carried

k. out without prior approval of the Engineer in-charge except in an emergency;

l. In case a building worker collapses or is taken ill during his de-compression in a man-lock, the lock attendant of such man-lock shall raise the pressure to a level equal to the maximum pressure which that building worker was exposed to in the working chamber prior to such de-compression and such lock attendant shall immediately report the matter relating to such collapse to the medical lock attendant and medical officer on duty;

m. A building worker who had previously received training with a trained building worker to work in a compressed air environment at tunneling work shall be employed to work independently in such a compressed air environment;

n. A building worker who had undergone three de-compressions from a pressure exceeding one bar in a period of eight hours at tunneling work shall not be allowed to enter a compressed air environment except for the purpose of carrying out rescue work;

o. A building worker employed in a compressed air environment for a period of eight hours in a day at tunneling work shall not be employed again in such environment unless he has spent not less than twelve consecutive hours of rest at atmospheric pressure;

p. No building worker shall be engaged in a compressed air environment at a pressure, which exceeds three bars at a tunneling work unless prior permission, in writing, has been obtained from the Engineer in-charge;

q. No building worker shall be employed in a compressed air environment for more than fourteen consecutive days in a month;

r. A register of employment of all building workers in compressed air environment shall be maintained;

s. An identification badge shall be supplied to a building worker employed in compressed air environment;

t. The badge of a building worker shall contain particulars of his name, location of the medical-lock allotted to him for work, the telephone number of the Construction Medical Officer concerned for his treatment and the instructions in case of his illness of unknown and doubtful causes;

u. Record of all identification badges supplied to building shall be kept in a register;

v. Every building worker whose name appears in the register shall wear the badge supplied to him at all times during his duty hours;

w. Suitable warning signs shall be displayed in the compressed air for the prohibition of the following, namely:

    i) Use of alcoholic drinks;

    ii) Use and carrying of lighters, matches or other sources of ignition;

    iii) Smoking; and

iv) No entry to person who has consumed alcoholic drink

11.56. SAFETY INSTRUCTION:

All building workers employed in compressed air environment at tunneling work shall follow the instructions issued for their safety in the course of such employment.

11.57. MEDICAL-LOCK

a. A suitably constructed medical lock shall be maintained at tunneling work where building workers are employed in a working chamber at a pressure exceeding one bar;

b. Where more than one hundred building workers are employed in a compressed air working environment exceeding one bar at tunneling work, one medical-lock is provided for every one hundred building workers or part thereof and such medical lock shall be situated as near as possible to the main-lock used at such tunneling work.

12.0. SAFETY IN PILING WORK

12.1. GENERAL PROVISIONS

a. All pile driving equipment shall be of good design and sound construction, taking into account the ergonomic principles and properly maintained;

b. A pile driver shall be firmly supported on a heavy timber sill, concrete bed or other secured foundation;

c. In case a pile driver is required to be erected in dangerous proximity to an electrical conductor, all necessary precautions shall be taken to ensure safety;

d. The hoses of steam and air hammer shall be securely lashed to such hammer so as to prevent them from whipping in case of connection or break;

e. Adequate precaution shall be taken to prevent the pile driver from over turning and hammer from missing the pile;

f. A responsible person for inspecting pile-driving equipment shall inspect such equipment before taking it into use and takes all appropriate measures as required for the safety of building workers before commencing piling work by such equipment;

g. Where there is any question of stability of a structure for its adjoining areas to be piled, such structure shall be supported, where necessary, by underpinning, sheet pilling, shoring, and bracing or by other means to ensure safety and stability of such structure and to prevent injury to any person.

12.2. PROTECTION OF OPERATOR:

The operator of every pile driving equipment shall be protected from falling objects, steam, cinders or water by substantially covering or otherwise or by other means.

12.3. INSTRUCTION TO AND SUPERVISION OF BUILDING WORKERS WORKING ON PILE-DRIVING EQUIPMENT:

Every building worker working on a pile driving equipment shall be given instructions regarding safe work procedure to be followed in piling operation and shall be supervised by a responsible person throughout such work.

12.4. ENTRY OF UNAUTHORIZED PERSON:

The contractor shall ensure at a construction site of a buildings or other construction work that all piling areas where pile-driving equipment is in use are effectively cordoned off to prevent entry of unauthorized persons.

12.5. INSPECTION AND MAINTENANCE OF PILE DRIVING EQUIPMENT

a. Pile-driving equipment shall not be taken into use until it has been inspected by a responsible person and found to be safe for such use;

b. A responsible person for such inspection at suitable intervals to ensure safety to the building worker working on such equipment shall inspect pile driving equipment in use;

c. All pile lines and pulley blocks shall be inspected by a responsible person before the beginning of each shift of piling operations.

12.6. OPERATION OF PILE-DRIVING EQUIPMENT

a. Only experienced and trained building worker shall operate pile driving so as to avoid any probable danger from such operation;

b. Pile-driving operations shall be governed generally prevalent and accepted signals so as to prevent any probable danger from such operations;

c. Every building worker employed in pile driving operation or in the vicinity of such pile driving operation shall wear ear protection and safety helmet or hardhat and safety shoes;

d. Piles shall be prepared at a distance, at least equal to twice the length of the longest pile, from the place of pile-driving operations;

e. When a pile driver is not in use, the hammer of such pile driver shall be blocked at the bottom of the heads of such pile driver.

12.7. WORKING PLATFORM ON PILING FRAMES:

Where a structural tower supports the lead of a pile driver, leads at which it is necessary for the building workers to work and such platforms except on the hammer of such pile driver or lead sides of such platform and where such platforms cannot be provided with such railing and toe boards, a safety belt shall be provided to each such building worker.

12.8. PILE TESTING

a. The testing of pile shall be conducted under the supervision of a responsible person for such testing;

b. All practicable measures like displaying of waning notices, barricading the area and other similar measures shall be taken to protect the area where the pile testing is carried out;

c. Entry to a pile testing area shall be prohibited to general public to ensure safety.

12.9. PILING, SHORING AND BRACING

a. Planks used for sheet piling in excavation or tunneling work shall be of sound material with adequate strength;

b. Shores and braces used in excavation or tunneling work shall be of adequate dimensions and so placed as to be effective for their intended purposes;

c. Earth supported shores or braces used in excavation or tunneling work shall bear against a footing of sufficient area and stability to prevent the shifting of such shores or braces.

13.0. SAFETY IN THE ERECTION, USE AND DISMANTLING OF SCAFFOLDS

13.1. SCAFFOLD CONSTRUCTION

a. Every scaffold and every component thereof shall be of adequate construction, made of sound material and free from defects and safe for the purposes for which it is intended for use;

b. In case bamboo is used for scaffolding, such bamboo shall be of suitable quality, good condition, free from protruding knots and stripped off to avoid any injury to building workers during handling such bamboo;

c. All metal scaffolds used in building or other construction work shall conform to the approved standards;

13.2. SUPERVISION BY A RESPONSIBLE PERSON: No scaffold shall be erected, added, altered or dismantled except under the supervision of a responsible person.

13.3. Maintenance

a. The scaffold used in building or other construction work shall be maintained in good repairs and the measures taken against its accidental displacement or any other hazard;

b. No scaffold or part thereof shall be partly dismantled and allowed to remain in such a condition unless –

i) The stability or safety of the remaining portion of such scaffold has been ensured by a responsible person for the safety of such scaffolds;

ii) In case the remaining part of such scaffold cannot be used by the building workers, necessary warning notice written in Hindi and in a language understood by the majority of the building workers that such scaffold is unfit for use, shall be displayed at the place where such scaffold is erected.

13.4. STANDARDS, LEDGERS, PUTLOGS

a. Standards of a scaffold shall be plumb, where practicable, fixed sufficiently close together to secure the stability of such scaffold having regard to all the possible working situations and conditions for the intended use of such scaffold, spaced, as close as practicable, to ensure safety and stability of such scaffold;

b. Adequate measures are taken to, prevent displacement of a standard of a scaffold either by providing sole plate or a base plate, as necessary;

c. Ledgers of metal scaffold are placed at vertical intervals with due regard to safety and stability of such scaffold;

d. Bamboo ledgers are kept as nearly as possible and are placed and fastened to the standards of a scaffold with due regard to the stability of such scaffold.

13.5. WORKING PLATFORM

a. Working platform shall be provided around the face or edge of a building adjoining at every upper most permanent floor of such building under construction and at any level where construction work of such building is carried out;

b. A platform shall be designed to suit the number of building workers to be employed on each bay of a scaffold work on such platform and the materials or articles and tools to be carried with them in such bay;

c. The safe working load and the number of building workers to be employed in each bay of a scaffold shall be displayed for the information of all the building workers employed at such construction site.

13.6. BOARD, PLANK AND DECKING

a. Board, plank and decking used in the construction of a working platform shall be of uniform size and strength and shall be capable of supporting the load and number of building workers keeping in view the safety of such building workers;

b. Metal decking, which forms part of a working platform, shall be provided with non-skid surface;

c. No board or plank which forms the working platform shall be projected beyond its end support unless it is effectively prevented from tripping or lifting and board, plank or decking shall be fastened and secured;

d. At any one time, not more than two working platforms per bay, shall be used to support building workers or materials or articles at such bay;

e. Adequate measures shall be taken to prevent injury which may be caused by falling material and objects by using safety nets or other suitable means;

f. Concrete, other debris or materials shall not be allowed to accumulate at any platform on a scaffold;

g. Where a work is to be done at the end of a wall, working platform at such workplace shall be faced or, wherever practicable, at least 0.6 m beyond the end of such wall.

13.7. REPAIR OF DAMAGED SCAFFOLD

a. No building worker shall be permitted to work on a scaffold that has been damaged or wakened unless adequate safety measures have been taken to ensure the safety of such building worker;

b. Necessary warning signs shall be displayed at such places where repairs of scaffold are undertaken.

13.8. OPENING

a. There shall be no opening in any working platform except for allowing access to such working platform;

b. Wherever opening on a platform is unavoidable, necessary measures for protection against failing of objects or building workers from such platform shall be taken by providing suitable safety nets, belts or any other similar means;

c. Access from one working platform to another platform on a scaffold, if required, shall be provided with suitable and safe ladder for the use of building workers working on such platforms;

d. Every opening or shaft in the floor shall be provided with suitable means to protect the fall of a person or material by providing suitable fencing or railing of height not less than 900 mm.

13.9. GUARDRAILS: Every side of a working platform from which a person is liable to fall shall be provided with suitable and safe guardrails and toe board of adequate strength to prevent fall of any building worker, material or tools from such platform.

13.10. SCAFFOLD USED BY BUILDING WORKERS OF DIFFERENT EMPLOYERS

a. Where a scaffold or a part of a scaffold is used, which has previously been used by another employer for his building workers, such scaffold or part thereof shall be used only after its inspection and examination by a responsible person for ensuring that such scaffold or part thereof is safe and fit for such use;

b. If any rectification, alteration or modification in a scaffold or part thereof, needed to suit its use, shall be made in consultation with the responsible person.

13.11. PROTECTION AGAINST ELECTRIC POWER LINE:

The contractor shall ensure that all necessary and practical measures for protection are taken to prevent any building worker, working on a scaffold, from coming into contact with the electric wires or dangerous equipment.

13.12. SCREENING NET AND WIRE NETS:

Where a scaffold is erected in an area where the construction activities may pose hazards to pedestrians or vehicular traffic nearby from the falling of objects, wire nets or screening nets shall be used to envelope such scaffold.

13.13. TOWER SCAFFOLD

a. The height of every tower scaffold used in building or other construction work shall not be more than eight times the lesser to the base dimension of such scaffold;

b. A tower scaffold shall be lashed to a building or a fixed structure before being used by the building workers;

c. Any tower scaffold which can be moved or castered shall be –

   i) Constructed with due regard to the stability and, if necessary, adequately weighted at the base;

   ii) Used only on plain and even surface; and

   iii) Has casters provided with positive locking devices to hold such scaffold in position;

d. No building worker shall remain on board scaffold or leave behind tools and material when it is being shifted from one position to another position.

13.14. GEAR FOR SUSPENSION OF SCAFFOLD

a. Chains, ropes or lifting gears used for suspension of a scaffold shall be of adequate strength, made of sound material and suitable for the purpose of their use and maintained in good repairs;

b. Chains, wires, ropes or metal tubes used for the suspension of a scaffold shall be:

i) Properly and securely fastened to every anchorage point and to the scaffold ledgers of other main supporting members used for the support of such scaffold; and

ii) So positioned as to ensure stability of the scaffold.

13.15. TRESTLE SCAFFOLD AND CANTILEVER SCAFFOLD

a. No trestle scaffold shall be constructed with more than three tiers or if its working platform is more than 4.5 m above the ground or floor or other surface upon which such scaffold is erected;

b. Trestle scaffold shall be designed by professional engineer and shall have the approval of the Engineer in-charge before being taken into use.

c. No trestle scaffold shall be erected on a suspended scaffold;

d. No cantilever or jib scaffold shall be used unless it is adequately supported, fixed and anchored on opposite side of its support and have out triggers of adequate length and, where necessary sufficiently, supported and braced to ensure safety and stability of such scaffold;

e. No working platform resting on bearers let into a wall at one end and without other support shall be used unless such bearers are of adequate strength, braced through the wall and securely fastened on the other side.

13.16. SCAFFOLD SUPPORTED BY BUILDING

a. No part of a building shall be used as support or part of a scaffold unless such part of the building is made of sufficient strength and made of sound material to afford safe support;

b. Overhanging eaves gutters shall not be used for supporting scaffold;

c. Suspended scaffold shall be made of in accordance with the approved standards before being used by the building workers.

13.17. USE OF WINCHES AND CLIMBERS FOR SUSPENDED SCAFFOLD

a. No scaffold shall be raised or lowered by winches or climbers unless such scaffold is made of sound material, adequate strength and has been tested and certified safe for use of winches or climber by a competent person before being taken into use;

b. All suspended scaffolds counter-balanced by counter weights shall be of approved types before being taken into use for building or other construction work;

c. The working platform of a suspended scaffold shall be securely fastened to the building or structure as to be safe and to prevent such platform from swing;

d. The safe working load that a suspended scaffold can carry, shall be displayed where such scaffold is being used

13.18. SAFETY DEVICES FOR SUSPENDED SCAFFOLD

a. Every suspended scaffold, raised or lowered by the winches or climbers, shall be provided at each of its suspension point with a safety rope with automatic safety device mounted on each of such rope so that such safety rope with such automatic safety device support the platform of such

scaffold in the event of failure of the primary suspension wire ropes, winches, climbers or any part of the mechanism used for raising or lowering such suspended scaffold;

b. Provided that the clause (a) shall not apply -

i) Where the platform of such scaffold is supported at two independent suspension wire rope at or near each end of such platform so that in the event of failure of one of such suspension wire rope, the other wire rope is capable of sustaining the weights of such platform and its load and prevent it from tilting; or

ii) Where a system is incorporated which operates automatically to support the platform of such scaffold and its load in the event of failure of the primary suspension wire rope of such scaffold.

14.0. SAFETY IN THE ERECTION OF STRUCTURAL FRAME & FORMWORK

14.1. GENERAL PROVISION

a. The trained building worker under the direct supervision of a person, responsible for structural frame and formwork, shall be employed for erection of such structural frame or formwork, dismantling of building and structure and performance of and engineering work formwork, false work and shoring work;

b. Adequate measures shall be taken to guard against hazards arising from any temporary state of weakness or unsuitability of a structure.

14.2. FORMWORK, FALSE WORK AND SHORING

a. Formwork and false work shall be so designed, constructed and maintained that such formwork and false work are able to support the load that may be imposed on them;

b. Such formwork shall be so erected that working platform, means of access, bracings, means of handling and stabilizing could easily be fixed with such formwork.

14.3. ERECTION OR DISMANTLING OF STEEL AND PREFABRICATED

a. Erection or dismantling of any pre-fabricated structure shall be made safe against danger by using appropriate means such as ladders, gangways or fixed platforms, buckets, boatswains chair or other appropriate means suspended from lifting appliances, safety harness, life lines, catch nets or catch platforms, power-operated mobile working platforms etc.;

b. The work of erection or dismantling of buildings or structures or formwork or false work or shoring or any other civil engineering work shall be carried out by trained building workers under the supervision of a person responsible for such work;

c. Steel or prefabricated structures shall be so designed and made that such structures can be safely transported or erected; and weight of each unit of such structures shall be clearly marked on such unit;

d. The design of each such part shall maintain stability of each part of the structures referred to in clauses above when erected, and to prevent danger, the design shall explicitly take into account –

   i) The relevant conditions and methods of attachment in the operations of stripping, transport, storing and temporary support during erection of such parts;

   ii) Safeguards, such as provision of railings with working platforms, and for mounting such railings and platforms easily on the structural steel or prefabricated parts;

e. The hooks and softer devices built in or provided on the structural steel or prefabricate parts that are required for lifting and transporting such parts shall be so shaped, dimensioned and positioned to withstand the stresses to which such hooks or other devices are subjected;

f. Prefabricated parts made of concrete shall not stripped or erected before such concrete has set and hardened sufficiently to the extent provided for in the plans, and such parts are examined by the responsible person for any sign of damage before their use;

g. Store-places shall be so constructed that –

   i) There shall be no risk of structural steel of prefabricated parts falling or overturning;

   ii) Storage conditions shall generally ensure stability and avoid damage having regard to the method of storage and atmospheric conditions; and

   iii) Racks shall be set on firm ground and designed so that units cannot move accidentally in such store-places;

h. Structural steel or pre-fabricated parts shall not be subjected to stresses prejudicial to their stability while they are stored or transported or raised or set down;

i. Tongs, clamps and other appliances for lifting structural steel and prefabricated part shall be:

   i) In such shape and dimensions as to ensure a secure grip without damaging and marked with the maximum permissible load in the most unfavourable lifting conditions; and

   ii) Structural steel or pre-fabricated parts shall be lifted by such methods and appliances that prevent them from spinning accidentally;

j. Structural steel or pre-fabricated parts shall be provided with railings and working platforms before raising such parts to prevent any danger of falling of building workers, materials or articles at the time of any work with such parts;

k. All reasonably practical measures shall be taken to avoid injury to building workers, building structure or equipment while structural steel or pre-fabricated parts are handled or stored or transported or raised or lowered;

l. Structures shall not be worked on during violent storms or high winds or any other such hazardous situation;

m. The risk of falling to which building workers, moving on high or sloping girders, may be exposed is limited by all means of adequate collective protection or by the use of a safety harness which shall be well secured to a sufficiently strong supports;

n. Structural steel parts, which are to be erected at a great height, shall, as far as practicable, be assembled on the ground;

o. When structural steel or pre-fabricated parts are being erected, a sufficiently extended area underneath the workplace shall be barricaded or guarded;

p. Steel trusses, which are being erected, shall be adequately shored, braced or guyed until they are permanently secured in position;

q. Structural members shall not be forced into place by the hoisting machine while any building worker is in such a position that he is likely to be injured by such operation.

14.4. FORMWORK

a. All formwork shall be properly designed keeping in view the safety of building workers, buildings or structures;

b. A responsible person for structural frame and formwork shall –

   i. Inspect and examine the material, timber, structural steel and scaffolding for its strength and suitability before being taken into use;

   ii. Lay-down procedures to cover all stages of such structural frame and formwork;

   iii. Supervise such structural frame and formwork;

   iv. Take all necessary steps or measure to correct any situation with a view to prevent accident or dangerous occurrence during performances of such structural frame and formwork.

14.5. DE-SHORING

a. When shoring is removed, sufficient props shall be left in place of such shoring to prevent any possible hazard; and

b. Deshoring shall be adequately braced and tied together with support to prevent any hazard.

15.0. SAFETY IN CONCRETE WORK

15.1. GENERAL PROVISIONS REGARDING USE OF CONCRETE

a. All construction with the use of concrete or reinforced concrete shall be based on plans including specification of steel and concrete and other material to be used in such construction –

   i. Giving technical details regarding methods for safe placing and handing of such materials and indicating the type, quality and arrangement of each part of a structure of such construction; and

   ii. Explaining the sequence of steps to be taken for completion of such construction;

b. Formwork and shores used for concrete work shall be structurally safe and properly braced or tied together so as to maintain position and shape of formwork or shores;

c. Formwork structure used shall have sufficient catwalks and other secure access for inspection of such structure if such structure is in two or more tiers;

d. No machinery or any object should fall below by using wire nets, screen nets etc.

15.2. PREPARATION AND POURING OF CONCRETE AND ERECTION OF CONCRETE STRUCTURE

a. A building worker handling cement or concrete shall –

   i) Wear close-fitting clothing, gloves, helmet or hardhat, safety goggles, proper footwear and respirator or mask to protect himself from danger in such handling;

   ii) Keep as much of his body covered as is required to protect himself from danger in such handling;

   iii) Take all necessary precautions to keep cement and concrete away from his skin in such handling;

b. Lime pits shall be fenced or enclosed and filled and emptied by such devices, which do not require workers to go into the pit;

c. Moving parts of the elevators, hoists screens bunkers, chutes, grouting equipment used for concrete work and of other equipment used for storing, transport and other handling ingredients of concrete shall be securely fenced to avoid contact of building workers with such moving parts;

d. Screw conveyors used for cement, lime and other dusty materials shall be completely enclosed.

15.3. BUCKETS

a. Concrete buckets used with cranes or aerial cableways shall be free from projections from which accumulations of concrete could fall;

b. Movements of concrete buckets shall be governed by signals necessary to avoid any danger by such movements.

15.4. PIPES AND PUMPS

a. A scaffolding carrying a pipe for pumped concrete shall be strong enough to support such pipe at a time when such pipe is filled with concrete or water or any other liquid and carry the combined load of the all the building workers who may be on such scaffold at such time, safely;

b. Every pipe for carrying pumped concrete shall be –

   i) Securely anchored at its end point and at each curve on it;

   ii) Provided near the top of such pipe with an air release valve;

   iii) Securely attached to a pump nozzle by a bolted collar or other adequate means;

c. The operation of concrete pumps shall be governed by standard signals;

d. Building workers employed around a concrete pump shall wear safety goggles;

15.5. MIXING AND POURING OF CONCRETE

a. The concrete mixture shall not contain any material, which may unduly affect the setting of such concrete, weaken such concrete or corrode steel used with such concrete;

b. When dry ingredients of concrete are being mixed in confined spaces such as silos –

   i) The dust shall be exhausted at the time of such mixing and

   ii) In case the dust the dust cannot be exhausted, as specified, the workers shall wear respirators at the time of such mixing;

c. When concrete is being tipped from buckets, building workers shall be kept out of the range of any kickbacks of such buckets;

d. Loads shall not be dumped or placed on settling concrete.

15.6. CONCRETE PANELS AND SLABS

a. All parts of a concrete panel or concrete slab shall be hoisted uniformly;

b. Concrete panels shall be adequately braced in their final positions and such bracings shall remain in such positions until such panels are adequately supported by other parts of the construction for which such panels are used;

c. Temporary bracings of concreter panels shall be securely fastened to prevent any part of such panels from falling when such panels are being moved.

15.7. STRESSED AND TENSIONED ELEMENTS

a. Building workers shall not stand directly over jacking equipment while stressing of concrete girders and beams is being done;

b. A pre – stressed concrete unit shall not bee handled except at points on such unit and by the devices specified for such work by the manufacture of such devices;

c. During transport, pre-stressed concrete girders or concrete beams shall be kept upright by bracing or other effective means;

d. Anchor fittings for pre-tensioned strands of pre-stressed concrete girders of concert beams are kept in a safe condition in accordance with the instruction of manufacturer of such anchor fittings;

e. Building workers shall not stand behind jacks or in line with tensioning elements and jacking equipment during tensioning operations of pre-stressed concrete girders of concrete beams;

f. Building workers do not cut wires of pre – stressed concrete girders or concrete beams under tension before such concrete used of such girder or beams is sufficiently hardened.

15.8. VIBRATORS

a. A building worker, who is in good physical condition, shall operate vibrators used in concreting work;

b. All practical measures shall be taken to reduce the amount of vibration transmitted to the operators working in concreting work and

c. When electric vibrators are used in concreting work

   i) Such vibrators shall be earthed;

   ii) The leads of such vibrators shall be heavily insulated; and

   iii) The current shall be switched off when such vibrators are not in use.

15.9. INSPECTION AND SUPERVISION

a. A person responsible for a concreting work shall supervise the erection of the formwork, shores, braces and other supports used for such concreting work, make a through inspection of every formwork to ensure that such formwork is safe, regularly inspect the formwork, shores, braces, reshores and other supports during the placing of concrete, keep all records of inspections referred to above at the workplace relating to such inspection and produce them for inspection upon the demand.

b. Any unsafe condition, which is discovered during the inspections, shall be remedied immediately.

15.10. BEAMS, FLOORS AND ROOFS

a. Horizontal and diagonal bracings shall be provided in both longitudinal and transverse direction as may be necessary to provide structural stability to formwork used in concreting work and shores used in such concreting work shall be properly seated on top and bottom and secured in their places;

b. Where shores used in concreting work rest upon the ground, base plates shall be provided for keeping such shores firm and in level;

c. Where the floor to ceiling height of a concreting work exceeds 9 m or where the formwork deck used in such concreting work is supported by shores constructed in two or more tiers, or where the dead, live and impact loads on the formwork used in such concreting work exceed 700 kilogram per m^2, the structure of such formwork shall be designed by a professional engineer in the relevant field and the specifications and drawings of such formwork kept at such construction site and produced on demand.

d. Where a professional engineer designs the structure of the formwork used in concreting work, such engineer shall be responsible for the supervision of construction and the stability of such structure.

15.11. STRIPPING

a. Stripping of formwork used in concreting work shall not commence until the concrete on such formwork is fully set, examined and certified to this effect by the responsible person and record of such examination and certification is maintained;

b. Stripped forms in concreting work shall be removed or stock piled promptly after stripping from all areas in which building workers are required to work or pass;

c. Protruding nail, wire ties and other formwork accessories not required for subsequent concreting work shall be pulled, cut or otherwise made safe.

15.12. RE-SHORING

a. Re-shoring used in concreting work shall be provided to a slab or beam for its safe support after its stripping or where such slab or beam is subjected to superimposed loads due to construction above such slab or beam;

b. The provisions applicable to shoring in a concreting work shall also be applicable to reshoring in such work or pass.

16.0. SAFETY IN CONSTRUCTION, REPAIR & MAINTENANCE OF STEEP ROOFS

16.1.WORK ON STEEP ROOFS:

All practicable measures shall be provided to protect the building workers against sliding when carrying outwork on steep roofs.

16.2. CONSTRUCTION AND INSTALLATION OF ROOFING BRACKETS

a. Roofing brackets shall be constructed to fit the pitch of steep roof and such brackets shall be used to provide level working platform;

b. Roofing bracket shall be secured in its place by nailing pointed metal projections attached to the underside of such bracket and securely driven into a steep roof on which it is used or secured by a rope passed over the ridgepole and tie of such roof.

16.3. CRAWLING BOARDS

a. All crawling boards used for work on steep roofs shall be of adequate strength, made of sound material and of the type approved for the purpose of their use;

b. Crawling boards shall be kept in good repairs and inspected by a responsible person before being taken into use;

c. Crawling boards shall be secured to a steep roof on which it is used by ridge hooks or other effective means;

d. A firmly fastened lifeline of adequate strength shall bee strung beside each crawling board throughout its length while using such crawling boards.

17.0. SAFETY IN CATCHES PLATFORMS, HOARDINGS & CHUTES

17.1. CATCH PLATFORM

a. Catch platform shall not be used for storage of material or as a working platform;

b. Catch platform shall at least be of 2 m wide and inclined so that the position of outer edge of such platform is 1500 mm higher than the inner edge;

c. The open end of catch platform shall be properly fenced to the height not less than 1 m.

17.2. HOARDINGS:

Hoardings shall be constructed when the Registering Authority / Assistant Labour Commissioner considers it necessary for protection of building workers and directs such employer to construct such hoardings**.**

17.3. CHUTES, ITS CONSTRUCTION AND USE

a. Wooden or metal chutes which are at an angle of more than 45^0 to the horizontal and used for the removal of materials shall be closed on all sides except at their openings used for receiving or discharging of materials or articles;

b. All openings of chutes except their top openings shall be closed when not in use;

c. Every chute –

   i. Shall be constructed of sound material, adequate strength and suitable for the purpose it is intended for use;

   ii. Exceeding 12 m in height shall be constructed in accordance with the design and drawings of professional engineer for such;

   iii. A suitable warning notice shall be displayed at conspicuous locations, written in Hindi and in a local language, at the discharge end of every chute;

   iv. Shall be cleared when debris has accumulated to a height, which can pose danger to building worker, but such clearance shall be done in no case less frequently than once a day.

18.0. SAFETY IN WORK ON OR ADJACENT TO WATER

18.1. TRANSPORT OF WORKERS BY WATER

a. When any building worker has to proceed to or from any workplace by water for purposes of carrying on a building or other construction work, proper measures shall be taken to provide for his safe transportation and vessels used for such purpose shall be in charge of a responsible person, properly equipped for safe navigation and maintained in good condition;

b. Maximum number of persons which can be safely carried in a vessel shall be marked plainly and conspicuously on such vessel and such number shall not be exceeded during use of such vessel for carrying persons;

c. Adequate protecting shall be provided to the building workers in such vessel from inclement weather;

d. Such vessel shall be manned by adequate and experienced crew;

e. In case the bulwarks of such vessel are lower than 60 cm from the level of the deck of such vessel, the open edge of such bulwarks shall be fitted with suitable fencing to a height of at least 1 m above such deck and the post and stanchions and similar parts used in such fencing shall not be spaced more than 2 m;

f. The number of life buoys on deck of such vessel shall at least be equal to the number of crew members of such vessel and shall not be less than two;

g. All life buoys on deck of such vessel shall be kept in good state of maintenance and so placed that if such vessel sinks then they will remain afloat and one of such buoys shall be within the immediate reach of the Steersman of such vessel and another is situated after part of such vessel; and

h. The position of the steersman of the vessel shall be such that he has a reasonably free view of all sides.

18.2. PREVENTION FROM DROWNING

a. Where, on or adjacent to the workplace of any contraction site, there is water into which a building worker employed for work on such site, in the course of his employment, may fall and has the risk of drowning, suitable rescue equipment shall be provided and kept in an efficient state of ready use and measures shall be taken to arrange for the prompt rescue of such building worker from the danger of drowning and where there is a special risk of such fall from the edge of adjacent land or from a structure adjacent to or above the water, or from floating stage on such water, secure fencing shall be provided near the edge of such land, structure or floating stage, as the case may be, to prevent such fall, and such fencing may be removed or allowed to remain unerected for the time and to the extent necessary for the access of building workers to such work or the movement of material for such work;

b. For handling rescue equipment, at least two persons knowing diving should be available at such sites.

19.0 SAFETY IN COFFERDAMS & CAISSONS

19.1 EVERY COFFERDAM AND CAISSON SHALL BE

19.1.1 Of good construction, sound material and of adequate strength, provided with adequate means for workers to reach safely at the top of such cofferdam or caisson in the event of an in rush of water and safe means of access to every place where workers shall be employed;

19.1.2 Work relating to construction, positioning, modification, dismantling of cofferdams or caissons shall be carried out under the supervision of a responsible person and inspected by the responsible person at the specified intervals;

19.1.3 A worker shall be allowed to work in a cofferdam or caisson after such cofferdam or caisson has been inspected and found safe by responsible person within such preceding period as approved and a record of such inspection maintained.

19.2 WORK IN COMPRESSED AIR IN A COFFERDAM OR CAISSON SHALL BE

19.2.1 Carried out in accordance with the procedure laid down;

19.2.2 Carried out by such building workers who have completed eighteen years of age and are medically examined and found fit for the work;

19.2.3 Carried out under the supervision of a responsible person;

19.2.4 If the work in cofferdam or caisson is carried out in shifts, a record of the time spent by each worker in each such shift for carrying out the wok shall be maintained in a register with particulars or time taken for the compression of such building worker, if any;

19.2.5 At every work site or project in a cofferdam or caisson, where workers are employed to work in compressed air environment, a construction medical officer assisted by a nurse or trained first-aid attendant, shall be available at all times and there shall be one standby reserve compressor to meet the emergency.

19.3 PRESSURE PLANT AND EQUIPMENT

19.3.1 Pressure plant and equipment for which it is used shall be –

19.3.2 Properly maintained in good repairs and working condition and fitted with a suitable safety valve or other effective device to provide maximum safe discharge pressure from being exceeded at any time; a suitable pressure gauge with a dial range not less than 1.5 time and not exceeding twice the maximum working pressure, easily visible and designed to show at all times, the internal pressure in kilogram per square centimeter and marked with the maximum safe working pressure, a suitable stop valve or valves by which the pressure plant or the system of the pressure plant may be isolated from the source supply of pressure or otherwise;

19.3.3 Every pressure plant or equipment shall be thoroughly examined by the competent person, externally, once in every period of six months; internally, once in every period of twelve months; and by hydraulic test, once in a period of four years.

20. SAFETY IN DEMOLITION WORK

20.1 PREPARATION

20.1.1 All glass or similar material or article in exterior openings shall be removed before commencing any demolition work and all water, steam, electric, gas and other similar supply lines put off and suitably capped and the concerned department of the appropriate authority informed and permission obtained wherever required before commencing;

20.1.2 Wherever it is necessary to maintain water, gas or electric line or power during such demolition, such line shall be so located or protected with substantial coverings so as to protect it from damage and to afford safety to the building workers and the general public.

20.2 PROTECTION OF ADJACENT STRUCTURES

20.2.1 Examination of walls etc. of adjacent structures –

i) During demolition process, the contractor shall examine the walls of all structures adjacent to the structure to be demolished to determine the thickness, method of support to such adjacent structures and;

ii) In case, such employer has reason to believe that any of such adjacent structure is unsafe or may become unsafe during such demolition process, he shall not perform demolition activity unless stability to such unsafe adjacent structu4e from collapsing has been taken. All roads and open spaces adjacent to the site of demolition work shall be closed or suitably protected by bracketing.

20.3 DEMOLITION OF WALLS, PARTITIONS, ETC.

20.3.1 Any demolition of walls or partitions shall be proceeded in a systematic manner as per the standard safe operating practices approved and all work above each tier of any floor beams shall be completed before the safety of the supports of such beam is impaired;

20.3.2 Masonry shall be neither loosened nor permitted to fall in such masses or volume or weight as to endanger the structural stability of any floor or structural supports;

20.3.3 No wall chimney or other structure or part of a structure shall be left unguarded in such a condition that it may fall, collapse or weaken due to wind pressure or vibration;

20.3.4 In the case of demolition of exterior walls by hand, safe footing shall be provided for the workers employed in, such walls or partitions, which are to be demolished by hand shall be not left standing more than one storey high above the uppermost floor on which persons are working.

20.4 **METHOD OF OPERATION:** The contractor shall ensure that debris, bricks and other materials or articles are removed by means of chutes, buckets or hoists and through openings in the floors.

20.5 **ACCESS TO FLOOR**

20.5.1 Safe access to and egress from every building shall be provided at all times in the course of demolition by means of entrances hallways, stairways or ladder runs which shall be so protected as to safeguard the workers using such means from falling material or articles;

20.5.2 Demolition of structural steel etc. shall be demolished column by column and tier by tier and every structural member, which is being demolished, shall not be under any stress, and such structural member shall be suitably lashed to prevent it from any uncontrolled swinging, dropping or falling or falling;

20.5.3 Large structural members shall not be thrown or dropped from the building, but carefully lowered by adopting suitable safe method;

20.5.4 Where a lifting appliance like a derrick is used for demolition, the floor on which such lifting appliance rests shall be completely planked over or supported and such floor shall be of adequate strength to sustain bearing load for such lifting appliance and its operation.

20.6 STORAGE OF MATERIAL OR ARTICLE

20.6.1 No materials or articles shall be not stored or kept on platform, floor or stairways of a building being demolished, provided that this clause shall not apply to the floor of a building when such floor is of such strength as to support safely the load to be superimposed by storing such material or articles;

20.6.2 No access to any stairway or passageway shall be affected or blocked by storing any material or article;

20.6.3 Suitable barricades shall be provided so as to prevent materials or articles from sliding or rebounding into any space used by the workers.

20.7 FLOOR OPENINGS:

Every opening used for the removal of debris from every floor which is not closed to access, except the top or working floor, shall be provided with an enclosure from such floor to its ceiling, or such opening is so barricaded that no building worker shall access to within a horizontal distance of 6.0 m from such opening through which debris is being dropped.

20.8 INSPECTION:

A person responsible for demolition work shall make continuous inspections during demolition process so as to detect any hazard resulting from weakened or deteriorated floors or walls or loosened materials or articles, and that no building worker shall be permitted to work where such hazard exist unless remedial measured like shoring or bracing shall be taken to prevent such hazards.

20.9 WARNING SIGNS, BARRICADES, ETC.

20.9.1 Barricades and warning sign shall be erected along every side throughout the length and breadth of a building or other construction work to be demolished to prevent unauthorized persons from entering into the during demolition operations;

20.9.2 During the demolition of an exterior masonry wall or a roof from a point more than 12 m above the adjoining ground level of such wall or roof, if persons below such wall or roof are exposed to falling objects, suitable and safe catch platform shall be provided and maintained at a level not more than 6 m below the working level except where an exterior built-up scaffold is provided for safe and adequate protection of such persons;

20.9.3 Suitable and standard warning signs shall be displayed or erected at conspicuous places or position at the workplace;

20.10 MECHANICAL METHOD OF DEMOLITION

20.10.1 The following requirements shall be fulfilled in case the mechanical method of demolition like use of swinging weight, clamshell bucket, power shovel, bulldozer or other similar mechanical methods are used for the purpose of demolition namely –

i) The building or structure or structure or remaining portion thereof shall be not more than 12 m in height;

ii) Where a swinging weight is used for demolition, a zone of such demolition having a radius of at least 1.5 times the height of the structure of portion thereof being demolished shall be maintained around the points of impact of such swinging weight;

iii) Where a clamshell bucket is being used for demolition, a zone of demolition shall be maintained within eight metres of the liner of travel of such bucket;

iv) Where other mechanical methods are being used to affect total or partial collapse of a building or other construction work, there shall be maintained, in the area into which the affected portion of such building or other construction work may fall, a zone of demolition at least 1.5 times the height of such affected portion thereof; and

v) No person other than building workers or other persons essential to the operation of demolition work shall be permitted to enter a zone of demolition, which shall be provided with substantial barricades.

21. FIRE EXTINGUISHERS & OTHER APPLIANCES OF FIRE FIGHTING

21.1 FIRE EXTINGUISHERS & OTHER MEANS OF PREVENTION AND PROTECTION

21.1.1 Every contractor shall have a fire protection and prevention plan developed and implemented keeping in view the following:

i) The specific work practices requiring fire control measures;

ii) Response measures to be taken in case of fire;

iii) Equipment required;

iv) Personnel requirements and responsibilities;

v) Schedules of daily and weekly inspection;

vi) Open flames and fires are prohibited in all underground construction;

vii) Readily visible signs to be posted in the fire prone/inflammable/explosive areas prohibiting smoking use of open flames and other hot work.

viii) A system of Permit-to-Work.

27.1.2 For the protection of the workers from the outbreak of fire, the contractor shall Provide, maintain and regularly inspect the Fire extinguishing equipment, which shall be sufficiently provided to extinguish any probable fire;

Suitability of portable fire extinguishers			
Class of fire	**Type of extinguisher**		
	Water	**DCP**	**CO_2**
A	**Yes**	**Yes**	**Yes**
B	**No**	**Yes**	**Yes**
C	**No**	**Yes**	**Yes**
D	**No**	**Yes**	**Yes**
Electrical	**No**	**Yes**	**Yes**

27.1.3 Ensure availability of an adequate supply of water at ample pressure;

27.1.4 Make available

i. Adequate number of trained persons required to operate the fire extinguishing equipment;

ii. Properly maintain Fire extinguishing equipment and inspect them at regular intervals of not less than once in a year by the responsible person and a record of such inspections maintained;

27.1.5 Portable fire extinguishers provided in the operator's cabin of earthmoving machinery, material handling systems, construction equipment etc. shall be regularly inspected, maintained and replenished/refilled;

27.1.6 The operators and the helpers of such equipment shall be trained in the methods operating the equipment and fighting the fire effectively;

27.1.7 All combustion engine power equipment shall be so located that the exhausts are well away from combustible material;

27.1.8 No smoking shall be allowed at or in the vicinity of operations, which constitute fire hazards and shall be conspicuously posted with No smoking or open flame **signs**;

27.1.9 In the flammable environment as described in IS: 9570, the electrical fittings and equipment shall be of flame proof type conforming to IS: 2206 & IS; 2148;

27.1.10 Arrangements shall be made to contain sparks generated during welding, cutting or other operations and spark shall not be allowed to fall down on combustible material kept below; All means of exit shall be kept free of obstruction at all times;

27.1.11 Appropriate type of fire extinguishers according to IS: 5698 shall be kept in fully charged condition at the places which have potential risk of fire;

27.1.12 The contractor shall educate his or his sub-contractors' men working in the vicinity of fire risk, on how to operate these equipment and know in particular circumstances which type of extinguishers is to be used;

27.1.13 The contractor shall take full responsibility for the upkeep and replenishment/refilling of the fixed and portable fire extinguishers.

APPENDIX

Annexure I

IMPORTANT INDIAN STANDARDS RELATED TO SAFETY

Personal Protection

IS: 1179-1967 Equipment for eye and face protection during welding
IS: 4770-1991 Rubber gloves for electrical purposes
IS: 8519-1977 Guide for selection of industrial safety equipment for body protection
IS: 8520-1977 Guide for selection of industrial safety equipment for eye, face & ear protection
IS: 8807-1978 Guide for selection of safety equipment for protection of arms and hands
IS: 1224-1985 Safety shoes
IS: 2925-1984 Safety helmets
IS: 8940-1978 Code of practice for maintenance and care of industrial safety equipment eye and face protection
IS: 8990-1978 Code of practice for maintenance and care of industrial safety clothing
IS: 10667-1983 Guide for selection of industrial safety for protection of foot and leg
IS: 816-1969 Code of practice for safety and health requirements in electric and gas welding and cutting operations
IS: 818-1968 Code of practice for safety and health requirements in electric and gas welding and cutting operations
IS: 7194-1994 Assessment of noise exposure during work for hearing conservation purposes

Civil Engineering Construction

IS: 2750- 1967(Part II) Steel scaffolds
IS: 875-1987 Structural safety of building: loading standards
IS: 4014-1967 Code of practice for steel tubular scaffolding
IS: 3696 Safety code of scaffolds and ladders
IS: 4138-1977 Safety code for working in compressed air
IS: 4912-1978 Safety requirements for floor and wall openings, railings and toe boards
IS: 7293-1974 Safety code for working with construction machinery
IS: 9944-1992 Recommendations on safe working load for natural and man-made rope slings
BS: 1129 Portable timber ladders, steps, Trestles & lightweight staging
BS: 1139 Metal scaffolds
BS: 5973 Code of practice for access & working scaffolds
BS: 5974 Code of practice for temporary installed scaffolds and access equipment
BS: 5975 Code of practice for falsework

Fire Protection

IS: 2190-1992 Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers
IS: 5896 Code of practice for selection, operation and maintenance of fire-fighting appliances

IS: 8433-1984 Code of practice for dissolved acetylene cylinders

Electrical

IS: 3043-1987 Code of practice for earthing
IS: 5424-1969 Rubber mats for electrical purposes
IS: 3646 (Part II) Artificial lightings
IS: 2148 & IS: 2206 Flame proof electrical fittings

Machinery

IS: 1860-1980 Code of practice for installation, operation and maintenance of electric passenger and goods lifts
IS: 1991-1987 Safety requirements for the use, care and protection of abrasive grinding wheels
IS: 5903-1970 Safety devices for gas cylinders
IS: 8216-1976 Guide for inspection of lift wire ropes
IS: 8964-978 Recommendations for safety conditions for woodworking machines
IS: 9474-1980 Principles of mechanical guarding of machinery
IS: 11461-1985 Code of practice for compressors safety
IS: 13367-1992 Code of practice for safe use of cranes

Annexure - II

BASIC STRUCTURE OF SAFETY PLAN

01- Safety Policy
02- When was the Safety Policy last reviewed
03- Details of implementation procedure / methods to implement Safety Policy / Safety Rules
04- Qualification & Experience of Safety Officers
05- Review of Accidents analysis - Methods to ensure safety & health and steps identified for prevention of accidents
06- Unit/site Executive responsible for ensuring safety at various levels in the workplace
07- List of Employees trained in safety at the commencement of execution of the job; details of training – its module and contents
08- Safety Training Targets, Schedules, Methods to be adopted for providing safety training to all employees
09- Details of checklists for different jobs/ work & responsible persons to ensure Compliance
10- Regular Safety Inspection Methods and Periodicity and the list of members authorized
11- Risk Assessment, Safety Audit by professional agencies, their Periodicity
12- Implementation of recommendations of Audit / Inspections. - Procedures for implementation & follow-up
13- Provision for treatment of Injured persons at work site
14- Review of overall safety by top Management and Periodicity
15- System for implementation of statutory provisions.
16- Issue of PPE to employees, Periodicity / stock on hand, etc.

Signature

Head of Organization

With Date & Stamp

Annexure - III

CONFINED SPACE WORK PERMIT

Date of Work :	Initiator:	Permit No.:
Description of work :		
Name of person supervising:	Dept./Function:	
Names of workmen involved in the job :		
1	2	
3	4	
Exact Location of Work:		
JSA Referance No.		
Job Instruction & Confirmation Sheet Ref. No		
Valid From : Time ……. Date: ……. To Time: ……. Date: …….		
Other relevant information (if any)		

Initiated by Engineer / Supervisor of Agency		Checked by Agency Safety Representative	
Name		Name	
Signature		Signature	
Date		Date	

Check list for Authorization of Work Permit

Minimum and Mandatory Precautions		Y/ N / NA
1	Permit form filled in completely?	
2	Have wind, atmospheric, and work area conditions (e.g. cold, hot, snow, poor lighting & Ventilation etc.) been considered throughout the job so that work can be done safely?	
3	All necessary Personnel Protective Equipment like Breathing Set, Waist Rope, Light Mounted Helmet etc. is put on by all the workmen?	
4	A lifeline, a rope tied on the safety belt of the person entering the confined space is provided?	
5	All practicable measures are taken to ensure that the atmosphere inside is not deficient in oxygen and does not contain flammable vapors and no hazardous gases like H2S. (Open at least 2 manholes & keep for 2 hours)?	
6	One fully trained person is stationed at ground level/outside to assist the inside workers and emergency contact No's available?	
7	All the workers trained for emergency?	

8	Safe means of access and egress provided?	
9	Is the suitable fire extinguisher available at work location?	
10	Are they Using only 24V lamps & working tools inside the confined space?	

Following additional precautions need to be taken before the start of the work

Permit Issued By:

	Approved by Principal Agency work in charge	Endorsed by Principal Agency HSE Dept
Name		
Signature		
Date		

Permit Close Out by: Name & Signature (Principal Agency)

Date :	Time :

Note: All extra information on preparation and precautions to be provided on the reverse side of this PTW.

HOT WORK PERMIT

Date of Work :	Initiator:	Permit No.:
Description of work :		
Name of person supervising:	Dept./Function:	
Names of workmen involved in the job :		
1	2	
3	4	
Exact Location of Work:		
JSA Referance No.		
Job Instruction & Confirmation Sheet Ref. No		
Valid From : Time ……. Date: ……. To Time: ……. Date: …….		
Other relevant information (if any)		

Initiated by Engineer / Supervisor of Agency		Checked by Agency Safety Representative	
Name		Name	
Signature		Signature	
Date		Date	

Exact location of work		
Relevant information		
Check list for Authorization of Work Permit		
Minimum and Mandatory Precautions		Y/ N / NA
1	Permit form filled in completely?	
2	Form filled in correctly and in full.	
3	Has the work area been inspected for any abnormalities - specify on wind, atmosphere, surroundings, etc.	
4	Are the necessary PPE provided and do the workmen know their use?	
5	Is the fitter, experienced and knowledgeable enough to carry out the job?	
6	Area has to be cleared of any flammables and combustible material.	
7	Electrical equipment to be protected and grounded.	
8	Are fire-fighting equipment - extinguishers, water, sand buckets etc, located nearby for ready in case of any mishap?	
9	Gas cylinders in upright state/ trolleys/ flash-back arrestors/ hose condition/ NRVs, etc.	
10	Is the area easily accessible?	

Additional precautions to be taken:		
This permit is valid only for one week. A fresh hot work permit has to be taken for continued works for the next week.		
Permit Issued By:		
	Approved by Principal Agency work in charge	Endorsed by Principal Agency HSE Dept
Name		
Signature		
Date		
Permit Close Out by: Name & Signature (Principal Agency)		
Date :		Time :
Note: All extra information on preparation and precautions to be provided on the reverse side of this PTW.		

PERMIT FOR LIFTING OF MATERIAL

Date of Work :	**Initiator:**	**Permit No.:**
Description of work:		
Name of person supervising:	**Dept./Function:**	
Names of workmen involved in the job :		
Exact Location of Work:		
JSA Reference No.		
Job Instruction & Confirmation Sheet Ref. No		
Valid From : Time ……. Date: ……. To Time: ……. Date: …….		
Other relevant information: (If any)		

Initiated by Engineer / Supervisor of agency		**Checked by Agency Safety Representative**	
Name		Name	
Signature		Signature	
Date		Date	

Check list for Authorization of Work Permit	
1	Details of type of crane(s) to be used?
2	Name of Lift Co-ordinator, Rigger/Crane Operator?
3	Adequate and suitable lifting gears available and in good condition
4	Have soil, wind, atmospheric, and work area conditions (e.g. cold, hot , snow, poor lighting & Ventilation etc.) been considered throughout the job so that work can be done safely?
5	Lifting Equipments, Lifting gears and Slings are tested and certified?
6	Are all operators trained, competent and healthy (Having Licenses / Experience Certificate)?
7	Are all the examinations and tests carried out on the equipment (Crane) and certified by competent persons?
8	Is the safe working load (SWL) marked on all lifting tools & tackles?
9	Lifting area cordoned off?
10	Tag lines provided to control the swing of load?
11	Load tied properly and secured against toppling and falling?
12	Signalman/Rigger is provided and competent?
13	Proper communication available between operator and rigger?
14	Is the vehicle for transportation adequate for the load?

Following additional precautions need to be taken before the start of the work:			
Permit Issue b By:			
Approved by Principal agency work incharge		**Endorsed by main agency HSE Dept**	
Name		Name	
Signature		Signature	
Date		Date	
Permit Close Out by: Name & Signature (Main agency)			
Date :		**Time :**	
Note: All extra information on preparation and precautions to be provided on the reverse side of this PTW.			

WORKING AT HEIGHT PERMIT

Date of Work :	Initiator:		Permit No.:
Description of work :			
Name of person supervising:		Dept./Function:	
Names of workmen involved in the job :			
1		2	
3		4	
Exact Location of Work:			
JSA Referance No.			
Job Instruction & Confirmation Sheet Ref. No			
Valid From : Time ……. Date: ……. To Time: ……. Date: …….			
Other relevant information			
Initiated by Engineer / Supervisor		Checked by Agency Safety Representative	
Name		Name	
Signature		Signature	
Date		Date	

Check list for Authorization of Work Permit		
Minimum and Mandatory Precautions		Y/ N / NA
1	Permit form filled in completely?	
2	Work area below is temporarily cordoned/barricaded	
3	The scaffold erected has pipes and clamps in good condition.	
4	Diagonal / lateral bracings pipes are provided to ensure stability	
5	Access ladder is provided to reach the work location	
6	Planks / sheet used in temporary platform are in good condition	
7	Planks / sheets are tied properly using binding wire	
8	Temporary platform is having temporary side railing	
9	Workers are wearing Helmet, Shoes & Safety belt in good condition.	
10	For Anchoring of safety belt at height rigid support / life rope line is provided	
11	Experienced workers are engaged for work	
12	Portable elect equip/fibre body checked for its healthiness including earthing	
13	The sling / pulley blocks / ropes are tested for fitness	

14	Workers are briefed on Safety Precautions to be taken	
	Power hand tools used at eight are connected through 30mA ELCB.	

Following additional precautions need to be taken before the start of the work

Permit Issued By:

	Approved by Principal Agency work in charge	Endorsed by Principal Agency HSE Dept
Name		
Signature		
Date		

Permit Close Out by: Name & Signature (Principal Agency)

Date :	Time :

Note: All extra information on preparation and precautions to be provided on the reverse side of this PTW.

Annexure - IV

DEFINITIONS

1. **Building or other construction work:** means the construction, alteration, repairs, maintenance or demolition, of or, in relation to, buildings, streets, roads, railways, tramways, airfields, generation, transmission and distribution of power, water works, oil and gas installations, electric lines, tunnels, bridges, viaducts, pipelines, towers, cooling towers and such other work as may be specified.

2. **Building worker:** means a person who is employed by a contractor to do any skilled, semi-skilled or manual, supervisory, technical or clerical work for hire or reward, whether the terms of employment be expressed or implied, in connection with any building or other construction work;

3. **Establishment:** means an establishment who or which employs building workers in any building or other construction work, and includes an establishment belonging to a contractor;

4. **Contractor:** means a person who undertakes to produce a given result for any establishment, other than a mere supply of goods or articles of manufacture by the employment of building workers or who supplies building workers for any work of the establishment, and includes a sub-contractor or any other agency engaged on his behalf;

5. **Employer:** in relation to an establishment, means the owner thereof that is the contractor himself.

6. **Competent Person:** means a person so approved by the Central Government who belongs to a testing establishment in India possessing adequate qualification, experience and skill for the purpose of testing, examination or annealing and certification of lifting appliances, lifting gears, wire ropes or pressure plant or equipment;

7. **Responsible Person:** means a person appointed by the employer to be responsible for the performance of specific duty or duties and who has sufficient knowledge and experience and the requisite authority for the proper performance of such duties;

8. **Danger:** means danger of accident or of injury or danger to health;

9. **Hazard:** means danger or potential danger;

10. **Hazardous substance:** means any substance, which due to its explosiveness, inflammability, radioactivity, toxic or corrosive properties and similar hazardous characteristics may Cause injury; or Affect adversely the human system; or Cause loss of life or damage to property or environment;

11. **Hazardous Process:** comprises roof work, steel erection, and work under and over water, demolition and work in confined space;

12. **National Standard:** means standards as approved by the Bureau of Indian Standards (BIS) and in the absence of such standards, the standards approved by the Central Government for a specific purpose;

13. **Lifting Appliance:** means a crane, hoist, derrick, winch, jack, pulley block or other equipment used for lifting materials, objects or building workers;

14. **Lifting gear:** means ropes, chains, hooks, slings and other accessories of a lifting appliance;

15. **Safe Operating Practice:** Means the practice followed in building and construction activities for the safety of workers and for safe operation of machinery and equipment used in such activities. Such practices shall conform to all or any of the following:

    Relevant Standards approved by BIS;

    National Building Codes;

    Manufacturer's instruction on safe use of equipment and machinery;

    Code of practice on safety in construction industry published by International Labour Organization .

16. **Safe working load**: in relation to an article of lifting gear or lifting appliance, means the load which is the maximum load that may be imposed on such article or appliance with safety in the normal conditions as assessed and certified by a competent person;

17. **Workplace**: means all places where building workers are required to be present or to go for work and which are under the control of an employer;

18. **Personal Protective Equipment (PPE):** are the protective devices made available for individual or collective use of the workers likely to be affected by the hazards of the workplace or process;

19. **Construction & Erection Manual (E&C) Rules**: all references to E&C Manual shall mean the Construction & Erection Rules that are detailed hereunder;

20. **Engineer in-charge**: All references to the Engineer in-charge shall mean the person in-charge of a building and construction of the NTPC.

21. **Interpretation of words not defined: words and expressions not defined or used in this Manual shall have the same meaning as generally assigned in common engineering practices**