SUB VENDOR LIST

2.00.00 ACCEPTANCE CRITERIA FOR SUB VENDORS

2.01.00 **For all Mechanical, Electrical, Control and Instrumentation**

2.01.01 **For Class I Items:**

a) Acceptance criteria:

Contractor to furnish documentary evidence to show that similar type of Equipment/
Component/ System (as the case may be), that has been supplied by the Contractor/Sub-vendor or their associate/collaborator for 500 MW or higher size unit and the same has been operating satisfactorily for two years as on date of request from main Contractor but not later than one year after the date of award of EPC package unless otherwise specified in the respective clause. The documentary evidence shall be in the form of Performance certificates furnished by the end user with relevant supporting documents. .

b) Acceptance criteria:

Contractor to furnish documentary evidence to show that similar or higher capacity of respective Equipment/component/ system (as the case may be) has been supplied by the Contractor/Sub-vendor or their associate/collaborator and the same has been operating satisfactorily for two years as on date of request from main Contractor but not later than one year after date of award of EPC package unless otherwise specified in the respective clause. The documentary

evidence shall be in the form of Performance certificates furnished by the end user with relevant supporting documents.

2.01.02 **For Class II Items:**

a) Acceptance Criteria:

Contractor to furnish documentary evidence to show that similar type Equipment/Component/ System (as the case may be) has been supplied by the vendor for 500MW or higher size unit. The documentary evidence shall be in the form of Material Receipt Certificate or Site Inspection Report or any other documentary evidence from the end user for having received the material by the end user.

b) Acceptance criteria :

Contractor to furnish documentary evidence to show that similar or higher capacity of respective Equipment/Component/ System (as the case may be) has been supplied by the vendor. The documentary evidence shall be in the form of Material Receipt Certificate or Site Inspection Report or any other documentary evidence from the end user for having received the material by the end user.

The component/equipment / system covered under Class I and Class II are furnished below for Mechanical, Electrical, Control and Instrumentation.

MECHANICAL ITEMS
i) Class I items: Items for which Performance certificates shall be furnished for approval of Category-II sub vendors during detail engineeringas stipulated above in Cl. No. 2.01.01.

H	**Cooling Tower**	
1	Nozzle for distribution system	2.01.01 (a/b)
2.	CT Fans	2.01.01 (a/b)
3.	Gearbox	2.01.01 (a/b)

MECHANICAL ITEMS
Class II items: The documentary evidence for approval of Category II sub vendors shall be in the form of Material Receipt Certificate or Site Inspection Report etc. from the End user for having received the material by the end user as stipulated above in Cl. No. 2.01.02.

G	**Cooling Tower**	
1	Tower Fill	2.01.02 (a/b)
2	Drift eliminator	2.01.02 (a/b)
3	Sluice gate valve	2.01.02 (a/b)

COOLING TOWER - CONSOLIDATED SUB-VENDOR LIST (CLASS-I)			
SL. NO	**EQUIPMENTS / SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
H.	**COOLING TOWER**		
1.	NOZZLE FOR DISTRIBUTION SYSTEM	1. COOLDECK INDUSTRIES PVT. LTD., 2. HAMMON, INDIA. 3. M M AQUA TECHNOLOGIES LTD., 4. PAHARPUR,	1. CALCO, INDIA 2. HAMONSHRIRAM COTTRELL PVT. LTD., 3. KAUSHIKMOULDING, INDIA. 4. NEEL KAMAL LTD., 5. NILKAMAL LTD.
2.	CT FANS	1. PAHARPUR,	1. AEROTECH, 2. AMALGAMATED, INDIA 3. COFIMCO, INDIA 4. HAMONSHRIRAM COTTRELL PVT. LTD., 5. HOWDEN 6. MAYA, INDIA 7. PARAQ, INDIA 8. SPANCRETE,
3.	GEARBOX	1. BONFIGLIOLI, INDIA 2. ELECON, INDIA 3. GREAVES 4. PREMIUM TRANSMISSION LTD, INDIA 5. SHANTI GEARS, INDIA	1. BREVINI, INIDA 2. ESENPRO, INIDA 3. MAGTORQ BANGALORE, INIDA 4. MOVENTAS, MULTINATIONAL 5. NEW ALLENBERRY WORKS, 6. PAHARPUR, 7. ROSSI GEARMOTORS (INDIA) PVT. LTD, INIDA 8. SIEMENS (FLUNDER) GERMANY, INIDA 9. SIEMENS FLENDER, INIDA/GERMANY 10. SEW EURODRIVEGMBH& CO. , INDIA

COOLING TOWER - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)

SL. NO	EQUIPMENTS / SYSTEM	ACCEPTABLE SUB VENDORS (CATEGORY – I)	BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)
H.	**COOLING TOWER**		
1	TOWER FILL	1. COOLDECK, INDIA 2. ENEXIO INDIA, INDIA 3. MM AQUA, INDIA 4. PAHARPURCOOLING TOWERS LTD., INDIA	1. HEWITECH GMBH & CO. KG, INDIA 2. NEEL KAMAL LTD., 3. NILKAMAL LTD., 4. BRENTWOOD,
2	DRIFT ELIMINATOR	1. HAMON COOLING SYSTEM PVT. LTD. 2. M M AQUA TECHNOLOGIES LTD., 3. PAHARPUR COOLING TOWERS LTD, INDIA 4. SUPERPLAST COMPANY, 5. COOLDECK INDUSTRIES PVT. LTD., 6. ENEXIO	1. BRENTWOOD, 2. HEWITECH GMBH & CO. KG, INDIA
3	SLUICE GATE VALVE	1. FOURESS ENGINEERING, 2. H.SARKAR, INDIA 3. HAWA ENGINEERS, 4. JASHENGG, INDIA. 5. KBL, INDIA 6. LEADER VALVES	1. A.V. VALVES LTD., 2. ATAM VALVES, 3. CANLE VALVES, 4. DURGA, 5. EQUAL, 6. FLOW LINK, INDIA 7. FLUIDLINE VALVES, 8. INTERVALVEPOONAWALLA, 9. MACMET, INDIA 10. MECGALE, INDIA. 11. MICON VALVES (INDIA), 12. NITON VALVES INDUSTRIES, 13. NSSL PRIVATE LTD., 14. ORBINOX, INDIA 15. OSWAL INDUSTRIES, 16. R&D MULTIPLES, INDIA 17. SAP INDUSTRIES, 18. SK INDUSTRIES (SHREE KRISHNA), INDIA 19. STEEL STRONG VALVES, 20. TRILLIUM FLOW TECHNOLOGIES, 21. V.K. VALVES 22. VALTECH INDUSTRIES

CIRCULATING WATER SYSTEM - CONSOLIDATED SUB-VENDOR LIST (CLASS-I)			
SL. NO	**EQUIPMENTS / SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
F.	**CIRCULATING WATER SYSTEM**		
1.	CONCRETE VOLUTE PUMP	1. FLOW SERVE, INDIA 2. FLOW SERVE, SPAIN 3. JYOTI PUMP, INDIA 4. KBL, INDIA 5. WPIL, INDIA	1. ANDRITZ PUMP, AUSTRIA 2. ANDRITZ PUMP, CHINA 3. ANDRITZ PUMP, INDIA 4. BHEL 5. CHANGSHA PUMP, CHINA 6. LEO GROUP PUMP (HUNAN) CO.LTD, CHINA 7. MITSUBISHI HEAVY INDUSTRIES, JAPAN
2.	VERTICAL TURBINE PUMP	1. FLOW SERVE, INDIA 2. FLOW SERVE, SPAIN 3. JYOTI PUMP, INDIA 4. KBL, INDIA 5. WPIL, INDIA	1. ANDRITZ PUMP, AUSTRIA 2. ANDRITZ PUMP, CHINA 3. ANDRITZ PUMP, INDIA 4. BHEL 5. CHANGSHA PUMP, CHINA 6. LEO GROUP PUMP (HUNAN) CO.LTD, CHINA 7. MITSUBISHI HEAVY INDUSTRIES, JAPAN
3.	RUBBER EXPANSION JOINT (2000 NB & ABOVE)	1. CORI ENGINEERS PVT LTD, INDIA 2. D.WREN INDUSTRIES LTD. INDIA 3. SRMEXOFLEXPVT LTD, INDIA	1. APHRODITE POLYPRENEPVT LTD, INDIA 2. BHEL 3. PRECISE ENGINEERS LTD. INDIA
4.	CW SUPPLY AND RETURN PIPING	1. RATNAMANI METALS & TUBES LTD.,, AHEMEDABAD 2. WELSPUN CORP LIMITED,, MUMBAI	1. ALTEC FABRICATORS, TRICHIRAPALLI 2. ARCELORMITTAL NIPPON STEEL, HAZIR 3. CAPACITE STRUCTURES LTD., MUMBAI 4. EXCEL INDUSTRIES., HYDERABAD 5. JINDAL SAW LTD.,, NEW DELHI 6. MEGHA ENGINEERING, HYDERABAD 7. SG HEAVY ENGINEERING PVT LTD, PALGHAR

CIRCULATING WATER SYSTEM - CONSOLIDATED SUB-VENDOR LIST (CLASS-I)

SL. NO	EQUIPMENTS / SYSTEM	ACCEPTABLE SUB VENDORS (CATEGORY – I)	BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)
5.	ELECTRO HYDRAULIC ACTUATOR (POWER PACK) FOR BUTTERFLY VALVES	1. ROTORK INDIA	1. AIRA INDIA 2. BOSCH REXROTH (INDIA) LIMITED, AHMEDABAD 3. HENGEHUN CHINA 4. HYDAC (INDIA) PVT. LTD, MUMBAI 5. PARKER HAANNIFIN (INDIA) PVT. LTD., MUMBAI 6. ROTEXINDIA 7. SEHUCK INDIA 8. YUKEN INDIA LTD., DELHI
6.	BUTTERFLY VALVES (2000NB & ABOVE)	1. AUDCO, INDIA 2. ADVANCE VALVE, INDIA 3. BDK, INDIA 4. BANKIM COMPANY, INDIA 5. BHEL 6. DEL VALVE, INDIA 7. FOURESS, INDIA 8. HAWA ENGINEERS, INDIA 9. H SARKAR& COMPANY, INDIA 10. INTERVALVE, INDIA 11. KEYSTONE, INDIA 12. KIRLOSKAR BROS. LTD, INDIA 13. LARSEN & TOUBRO LIMITED, INDIA 14. R&D MULTIPLES INDIA PVT. LTD, INDIA 15. SAUNDERS (CRANE), INDIA 16. TYCO, INDIA	1. ADAMS, INDIA, 2. AMPO POYAM VALVES, INDIA 3. BRAY CONTROL, INDIA 4. CRANE, INDIA 5. INSTRUMENTATION LIMITED, INDIA 6. TYCO/ PENTAIR, INDIA
7.	STOP LOG GATE	1. GMWENGG. PVT LTD. 2. JASHENGG. WORKS 3. MACMET 4. TRIVENI ENGINEERING & INDUSTRIES LTD 5. SHREE TRIMURTHI	1. BANGALORE HYDRO ENGINEERS & CONSULTANTS PRIVATE LIMITED 2. HINDUSTAN ENGINEERING WORKS 3. HINDUSTAN ENGINEERS LTD

CIRCULATING WATER SYSTEM - CONSOLIDATED SUB-VENDOR LIST (CLASS-I)			
SL. NO	**EQUIPMENTS / SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		TECHNOLOGIST PVT LTD.	4. INDO ASIATIC 5. MECGALE PNEUMATICS PVT LTD 6. SREESARAVANA ENGINEERING BHAVANI (P) LIMITED 7. PRADEEP STRUCTURES 8. REDFAB 9. BSBK ENGG 10. PARCHURE ENGINEERS PVT LTD.
8.	COARSE SCREEN	1. GMWENGG. PVT LTD. 2. JASHENGG. WORKS 3. MACMET 4. MECGALE PNEUMATICS PVT LTD 5. TRIVENI ENGINEERING & INDUSTRIES LTD 6. SHREE TRIMURTHI TECHNOLOGIST PVT LTD.	1. BANGALORE HYDRO ENGINEERS & CONSULTANTS PRIVATE LIMITED 2. HINDUSTAN ENGINEERING WORKS 3. HINDUSTAN ENGINEERS LTD 4. INDO ASIATIC 5. SREESARAVANA ENGINEERING BHAVANI (P) LIMITED 6. PRADEEP STRUCTURES 7. REDFAB 8. BSBK ENGG 9. PARCHURE ENGINEERS PVT LTD.

COMMON TO ALL ABOVE PACKAGES - CONSOLIDATED SUB-VENDOR LIST (CLASS I)			
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		8. VARAT PUMP & MACHINERY PVT LTD, KOLKATA 9. FLOWCON ENGINEER INDIA PRIVATE LIMITED,COIMBATORE 10. WPIL LTD. INDIA 11. JYOTI PUMPS LTD. INDIA 12. FLOW MORE INDIA 13. MATHER & PLATT INDIA 14. SULZER INDIA INDIA 15. WEIR MINERALS (INDIA) PVT LTD., BANGALORE 16. XYLEM INDIA 17. MAXFLOW PUMPS INDIA PVT LTD, MANESAR	
ii)	Positive displacement pumps		1.ALEKTON ENGG.INDUSTRIES P.L 2. ALLWEILER INDIA PVT.LTD. 3. U.T.PUMPS & SYSTEMS PVT. LTD.
iii)	Submersible pumps	1. SU MOTORS PVT. LTD., MUMBAI INDIA 2. DARLING PUMPS PVT. LTD, INDOR INDIA 3. FLOWMORE LTD., GHAZIABAD INDIA 4. VARAT PUMP AND MACHINERY PVT. LTD., HOWRAH INDIA 5. WPIL LIMITED, THANE INDIA 6. KIRLOSKAR BROTHERS LTD. INDIA 7. JYOTI PUMPS LTD. INDIA 8. MATHER & PLATT INDIA 9. KISHOR PUMP INDIA 10.SULZER INDIA INDIA 11.SAM TURBO INDIA 12.XYLEM INDIA AHMEDABAD INDIA	1. MODY PUMPS (INDIA) PRIVATE LIMITED, THANE INDIA 2. AQUA MACHINERIES (P) LTD., AHMEDABAD INDIA 3. JASCO PUMP PVT. LTD.,
iv)	Sump pumps a. Centrifugal type b. Screw type	1. SAM TURBO, COIMBATORE 2. KISHORE PUMPS, PUNE 3. SU MOTORS, MUMBAI 4. FLOWMORE PUMP, GAZIABAD 5. DARLING PUMP, INDORE 6. KIRLOSKAR BROTHERS LTD. (KBL) 7. KSB	1. MCNALLY SAYAJI, BANGALORE 2. AQUA MACHINERY, AHMEDABAD 3. VARTAK PUMPS 4. MAXFLOW 5. DOWELL ENGINEERS,/NEYVELI 6. XYLEM INDIA

COMMON TO ALL ABOVE PACKAGES - CONSOLIDATED SUB-VENDOR LIST (CLASS I)			
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		8. VARAT PUMP & MACHINERY PVT LTD/KOLKATA. 9. WPIL LTD. INDIA 10. JYOTI PUMPS LTD. INDIA 11. MATHER & PLATT INDIA 12. SULZER INDIA INDIA 13. MODY PUMPS (INDIA) PRIVATE LIMITED, THANE INDIA	
13	FANS		
i)	Centrifugal Fan	1. PATEL AIR TEMP, AHMEDABAD 2. FLAKT, KOLKATA 3. CB DOCTOR 4. KRUGER INDIA 5. CITIZEN INDIA	1. MARATHAN ELECTRIC, KOLKATA 2. S.K. SYSTEMS, DELHI 3. DUSTVEN, BANGALORE 4. EBMNADI INDIA 5. NICOTRA INDIA
14	HEAT EXCHANGER: i) Plate Type Heat Exchanger for DMCW (SG & TG)	1. KELVION INDIA PVT. LTD., PUNE INDIA 2. ALFA LAVAL, INDIA / SWEDEN/KOREA 3. IDMC LIMITED, ANAND, INDIA 4. SONDEX HEAT EXCHANGERS INDIA PVT. LTD., VADODARA, INDIA 5. TRANTER INDIA PRIVATE LIMITED, PUNE,INDIA	1. DKT CO. LTD, INDIA 2. HISAKA, KOREA 3. ABACAS, INDIA 4. MYTEC, KOREA 5. FUNKE, INDIA 6. L&T
15	BUTTERFLY VALVE LARGE DIA (450NB AND BELOW 2000NB)	1. ADVANCE VALVE, INDIA 2. AUDCO,INDIA 3. BHEL, INDIA 4. CRANE , INDIA 5. FOURESS, INDIA 6. HAWA ENGINEERS, INDIA 7. IL, INDIA 8. INTERVALVE, INDIA 9. LARSEN & TOUBRO LIMITED, INDIA 10. SAUNDERS (CRANE) , INDIA 11. R&D MULTIPLES PVT. LTD INDIA 12. KRILOSKAR BROS. LTD,INDIA	1. ADAMS, INDIA 2. BRAY CONTROLS , INDIA 3. PENTAIR , INDIA 4. TRILLUM FLOW (WEIR BDK)

COMMON TO ALL ABOVE PACKAGES - CONSOLIDATED SUB-VENDOR LIST (CLASS I)			
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
16	MS PIPE (OTHER THAN CW SUPPLY AND RETURN PIPING) 450 NB AND ABOVE	1. JINDAL SAW LTD.,, NEW DELHI 2. RATNAMANI METALS & TUBES LTD.,, AHEMEDABAD 3. WELSPUN CORP LIMITED,, MUMBAI 4. ARCELORMITTAL NIPPON STEEL, HAZIRA 5. SURYA ROSHNI LTD, BAHADUR GARH 6. JCO GAS PIPE LTD., CHHINDWARA	1. ASIAN MILLS PVT LTD, AHMEDABAD 2. CAPACITE STRUCTURES LTD., MUMBAI 3. LALIT PIPES AND PIPES LIMITED, NAVI MUMBAI 4. MEGHA ENGINEERING, HYDERABAD 5. MUKAT TANKS AND VESSELS PVT LTD, MUMBAI 6. SG HEAVY ENGINEERING PVT LTD, PALGHAR 7. TOPWORTH PIPES & TUBES PVT.LTD.,, NAVI MUMBAI
17	MAIN PLANT IA/SA COMPRESSOR	1. ATLAS COPCO (INDIA) LTD. 2. CHICAGO PNEUMATIC SALES 3. ELGI EQUIPMENTS LTD 4. ELGI SAMSUNG (CENTRIFUGAL TYPE) 5. INGERSOLL RAND (INDIA) LIMITED 6. KIRLOSKAR PNEUMATIC COMPANY 7. KOBELCO COMPRESSORS INDIA PVT LTD	1. AERZENER MACHINEN FABRIK GmbH 2. CICB CHEMICON P LTD 3. FS COMPRESSORS INDIA PVT. LTD. 4. FS ELLIOTT 5. HITACHI

COMMON TO ALL ABOVE PACKAGES - CONSOLIDATED SUB-VENDOR LIST (CLASS II)			
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
7	Manual Hoist	1. REVA INDUSTRIES INDIA PRIVATE LIMITED, FARIDABAD 2. TRACTEL TIRFOR INDIA PVT.LTD., NEW DELHI 3. EDDY CRANES PRIVATE LIMITED, MUMBAI 4. TUOBRO FURGUSON [INDIA]PVT.LTD., KOLKATA 5. TECHNO INDUSTRIES,/AHMEDABAD 6. UNIVERSAL HOIST-O FABRIK,/MUMBAI 7. HERCULES HOISTS LTD. 8. BRADY & MORRIS ENGINEERING CO. LTD. 9. TUOBRO FURGUSON (INDIA) P 10. TRACTEL TIRFOR INDIA PVT. 11. TECHNO INDUSTRIES 12. UNIVERSAL HOIST-O-FABRIK 13. TECHNO INDUSTRIES INDIA 14. ANUPAM INDUSTRIES LTD INDIA 15. ELECTROMECH INDIA 16. WMI INDIA 17. FAFECO INDIA 18. ACME INDIA 19. DEMAG INDIA 20. KONE INDIA INDIA 21. WH BRADY INDIA 22. UNICON INDIA 23. ALFA CRANES INDIA 24. AVON CRANES INDIA 25. GLOBAL TECHNOLOGIES INDIA 26. TISCO GROWTH INDIA 27. ROCKWELL HOISTO INDIA 28. TUOBROFURGUSON (INDIA) PVT. LTD. INDIA	1. MELTECH CRANES PVT LTD.,MUMBAI 2. MANGLA HOISTS PRIVATE LIMITED, NEW DELHI 3. BAKELITE ELECTRICAL MFG. CO PVT LTD 4. UNIQUE INDUSTRIAL HANDLERS INDIA 5. JAPS PROJECTS INDIA 6. ENDEAVOUR INDIA 7. CENTURY INDIA 8. CRANETECH EQUIPMENT INDIA 9. ELEQUIP INDIA 10. SUNITCONCRANES INDIA 11. SMACO / YCUBE INDIA 12. CRANEX LTD INDIA 13. RMS ENGINEERS INDIA 14. TRANSPADEENGNRS. PVT. LTD INDIA 15. MILLARS INDIA 16. DYNAMECH CRANES AVON CRANE INDIA 17. LEAP LIFTING MACHINES PVT LTD INDIA 18. NAMSUNG MACHINARY INDIA 19. POWER BUILD P LTD INDIA

COMMON TO ALL ABOVE PACKAGES - CONSOLIDATED SUB-VENDOR LIST (CLASS II)			
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		29. BRADDY& MORRIS INDIA 30. SAFEX INDIA 31. LIFTING EQUIPMETS AND ACCESSORIES INDIA 32. GRIP ENGINEERS PVT. LTD, HYDERABAD 33. INDEF INDIA 34. ARMSEL MHE PVT LTD., BANGALORE 35. HERCULES HOISTS LTD., MUMBAI 36. CENTURY CRANE ENGINEERS PVT LTD, FARIDABAD 37. CONSOLIDATED HOISTS PVT LTD.,PUNE 38. LIFTING EQUIPMENT INDIA	
8	Thermal Insulation	1. LLOYDS INSULATION, INDIA 2. MINWOOL ROCKFIBRE, BHILAI 3. THERMOCARE, RAJNANDGAON 4. MURUGAPPA MORGAN, CHENNAI 5. MINSULATE MANUFACTURING COMPANY, JAMSHEDPUR 6. GOENKA ROCKWOOL (INDIA) PVT LTD.,/RAIPUR (C.G) 7. HEINRICH TAPP GMBH - GERMANY 8. EUGEN ARNOLD GMBH - GERMANY 9. POLYBOND INSULATION PVT.LTD.,/BHILAI 10. SHREERAM EQUITECH PVT. LTD., DURG 11. ROCKWOOL INDIA PVT. LTD.	1. DHANBAD ROCKWOOL INSULATION PVT LTD 2. IIG INDUSTRIEISOLIERUNGEN GMBG GREMANY 3. ADVANCE THERMAL CORP USA 4. IZOLACE BERAN S.R.O. CZECH REPUBLIC 5. ADVANCE THERMAL SOLUTIONS FLORIDA USA 6. ADARSH INSULATION 7. HI-TEC ROCKFIBRE PVT LTD //RAJNANDGAON. 8. JAMSHEDPUR MINERAL WOOL MFG.CO./JAMSHEDPUR 9. LION INSULATION PRIVATE LIMITED/KOLAR ROAD, BHOPAL 10. PUNJSTAR INSULATION FIBRE/BHILAI 11. INDO BELL INSULATIONS LTD. KOLKATA 12. SHREE ENGINEERS INDORE 13. ALLIED INSULATIONS (INDIA) 14. ENERGY SAVING AND ALLIED PRODUCTS 15. SUDHIR TRADING COMPANY 16. SHREE CERAMIC FIBRES PVT. LTD.

COMMON TO ALL ABOVE PACKAGES - CONSOLIDATED SUB-VENDOR LIST (CLASS II)			
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		COIMBATORE 6. TEMSONN VESSELEX, NOIDA & MANESAR 7. GEM, COIMBATORE 8. UNITED ENGINEERING WORKS, NASHIK 9. UNITED ENGINEERS INDIA 10. INTEGRATED ENGINEERS INDIA 11. ABACUS HEAT TRANSFER INDIA 12. ECO CONTROL SYSTEM INDIA 13. MACABER BEEKEY INDIA 14. INDURE INDIA 15. UTTAM FABRICATORS INDIA 16. BANSHIWALA ENGINEERING SERVICES INDIA 17. PRANJAL PROJECTS INDIA 18. TEMASMEVESELEX INDIA	
17	SHEAVE PULLEY	-	-
18	SLUICE GATES	1. JASH ENGG. WORKS,INDIA 2. MACMET,INDIA 3. GMW,INDIA	1. MECGALE,INDIA
19	STOP LOG GATE	1. GMW,INDIA 2. JASH ENGG. WORKS,INDIA 3. MACMET,INDIA 4. TRIVENI ENGINEERING & INDUSTRIES LTD	1. MECGALE,INDIA 2. MECGALE PNEUMATICS PRIVATE LIMITED 3. HINDUSTAN ENGINEERING WORKS 4. HINDUSTAN ENGINEERS LTD 5. BANGALORE HYDRO ENGINEERS & CONSULTANTS PRIVATE LIMITED 6. SREE SARAVANA ENGINEERING BHAVANI (P) LIMITED

COMMON TO ALL ABOVE PACKAGES - CONSOLIDATED SUB-VENDOR LIST (CLASS II)			
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
20	COARSE SCREEN/TRASH RACK	1. GMW,INDIA 2. JASH ENGG. WORKS,INDIA 3. MACMET,INDIA 4. TRIVENI ENGINEERING & INDUSTRIES LTD	1. MECGALE,INDIA 2. MECGALE PNEUMATICS PRIVATE LIMITED 3. HINDUSTAN ENGINEERING WORKS 4. HINDUSTAN ENGINEERS LTD 5. BANGALORE HYDRO ENGINEERS & CONSULTANTS PRIVATE LIMITED 6. SREE SARAVANA ENGINEERING BHAVANI (P) LIMITED
21	DIAPHRAGM VALVE		1. DRESSER 2. FLOW TECH 3. KITAMURA VALVE 4. NEWCON VALVE 5. NIPPON DAIYO 6. PROCESS CONTROL 7. RICHER 8. SAUNDERS VALVES
22	CPVC VALVES		1. ASTRAL 2. BHAVANA POLYMERS 3. CEPEX 4. FINEFLOW DURO 5. FIP 6. GORGE FISHER 7. KATARIA 8. KISAN IRRIGATION 9. ORI PLAST 10. PRINCE 11. PURE WATER 12. SIGNET 13. SPAN CORPORATION. 14. SUDHAKAR PIPE INDIA
23	HDPE PIPES		1. INDIA FLEX 2. KATARIA INDUSTRIES PVT. LTD. 3. MANDHANA POLYMERS 4. MANJEERA 5. NARMADA PIPES

COMMON TO ALL ABOVE PACKAGES - CONSOLIDATED SUB-VENDOR LIST (CLASS II)			
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			6. PACIFIC INDUSTRIES 7. PARIXIT INDUSTRIES 8. REASELACK PIPES 9. SUDHAKAR 10. VARUNA 11. WIIK & HOEGLUND
24	UPVC PIPES		1. PRINCE 2. SUPREME 3. APOLLO PIPES 4. CENTURION 5. KISSAN 6. PREMIER 7. TRUBORE
25	CPVC PIPES		1. ASTRAL 2. BHAVANA POLYMERS 3. CEPEX 4. FINEFLOW DURO 5. FIP 6. GORGE FISHER 7. KATARIA 8. KISAN IRRIGATION 9. ORI PLAST 10. PRINCE 11. PURE WATER 12. SIGNET 13. SPAN CORPORATION. 14. SUDHAKAR PIPE INDIA
26	H2 AND CO2 CYLINDER		1. BPCL,INDIA 2. EVEREST IKANTO CYLINDERS,INDIA 3. MKC,INDIA 4. RAMA,INDIA
27	EXTERNAL COATING & WRAPPING MATERIAL FOR BURIED STEEL PIPING.	1. IWL INDIA LIMITED,INDIA	1. AR LAMINATORS,INDIA 2. MP TAR PRODUCTS,INDIA
28	INTERNAL COATING MATERIAL FOR MS PIPE	1. ASIAN PAINTS,INDIA 2. SHALIMAR PAINTS,INDIA	1. JOTUN PAINTS,INDIA 2. MP TAR PRODUCTS,INDIA
29	AXIAL FANS (OTHER THAN ID, PA & FD FAN)	1. ALMONAROD (P) LIMITED,INDIA	1. AIR CONTROL & CHEMICAL ENGINEERING COMPANY

ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-I)

H	**HT AND LT MOTOR AND ACTUATORS**		
1.	HT MOTORS	1. ABB 2. BHEL 3. CROMPTON GREAVES 4. CG POWER INDUSTRIAL SOLUTIONS 5. JYOTI 6. KEC 7. KIRLOSKAR ELECTRICL CO. LTD 8. SIEMENS 9. WEG 10. MARATHON 11. TMEIC	1. ABB, FINLAND 2. ASIR ROBICON, ITALY 3. BBL 4. BHARAT BIJLEE 5. CONVERTEAM , FRANCE 6. GE 7. HHI 8. HYOSUNG, KOREA 9. HYUNDAI HEAVY INDUSTRIES (HHI), KOREA 10. HYUNDAI, KOREA 11. IJLIN ELECTRIC, KOREA 12. JEUMONT ELECTRIC 13. NANYANG ELECTRIC MACHINE LTD.CO, CHINA 14. NANYANG, CHINA 15. SEC ELECTRIC MACHINERY , CHINA 16. SHANGHAI ELECTRIC, CHINA 17. SHANGHAI SHANGDIAN ELECTRIC MACHINE LTD.CO, CHINA 18. SIEMENS LTD,GERMANY 19. TD POWER 20. TECO ELECTRIC & MACHINERY, TAI-WAN 21. TECO, TAIWAN 22. TMEIC, JAPAN 23. TOSHIBA-MITSUBISHI 24. WEG, BRAJIL 25. XEMC, CHINA 26. XIAN ELECTRICAL MOTOR, CHINA

ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-I)

SL. NO	EQUIPMENTS/SYSTEM	ACCEPTABLE SUB VENDORS (CATEGORY – I)	BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)
2.	LT MOTORS (AC & DC)	1. ABB 2. ALSTOM 3. BHEL 4. BHARAT BIJLEE 5. CROMPTON GREAVES 6. CG POWER & INDUSTRIAL SOLUTION LTD 7. JYOTI 8. KEC 9. KIRLOSKAR ELECTRIC CO. LTD 10. LAXMI HYDRAULICS MARATHON 11. SIEMENS 12. TMEIC 13. WEG	1. ABB, SWEDEN 2. BALDOR, USA 3. BENN ELECTRICALS PVT LTD 4. CEMP, ITALY 5. DALIAN, CHINA 6. DAZHONG, CHINA 7. FUJI ELECTRIC, INDIA/BRAZIL 8. HAVELLS 9. HEM INDUSTRIES 10. HINDUSTAN 11. HYOSUNG, KOREA 12. HYUNDAI HEAVY INDUSTRIES (HHI), KOREA 13. HYUNDAI, KOREA 14. INTEGRATED ELECTRIC CO . KAWA-MATA, JAPAN 15. LDW, GERMANY 16. LEROY SOMER, CHINA 17. LEROY SOMER, FRANCE 18. NGEF 19. NORD 20. POWER HOUSE 21. PRECISION ENGINEERING WORKS 22. TECO, TAIWAN 23. TIPM, JAPAN 24. TOSHIBA-MITSUBISHI 25. TMEIC,JAPAN 26. TRIDENT POWERCRAFT 27. WEG, BRAZIL 28. WINKLEMAN, GERMANY 29. XEMC, CHINA
3.	LT MOTORS (FLAMEPROOF)	1. ABB 2. BHARAT BIJLEE 3. BHEL 4. CROMPTON GREAVES 5. CG POWER & INDUSTRIAL SOLUTION LTD 6. JYOTI 7. KEC 8. LAXMI HYDRAULICS 9. MARATHON 10. SIEMENS	1. ABB, SWEDEN 2. ALSTOM 3. CEMP, ITALY 4. FUJI ELECTRIC, INDIA/ JAPAN 5. HAVELLS 6. HEM INDUSTRIES 7. HYOSUNG, KOREA 8. HYUNDAI HEAVY INDUSTRIES (HHI), KOREA 9. INTEGRATED ELECTRIC CO 10. KAWAMATA, JAPAN

ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-I)

SL. NO	EQUIPMENTS/SYSTEM	ACCEPTABLE SUB VENDORS (CATEGORY – I)	BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)
		11. WEG	11. KIRLOSKAR ELECTRIC CO LTD 12. LDW, GERMANY 13. LHP 14. NGEF 15. NORD 16. PRECISION ENGINEERING WORKS 17. TECO, TAIWAN 18. TIPM, JAPAN 19. TMEIC, INDIA/ JAPAN 20. WEG,BRAZIL
4.	ELECTRICAL ACTUATORS	1. ABB 2. ANTRIEB TECHNIK 3. AUMA 4. LIMITORQUE INDIA LTD 5. NIPPON 6. ROTORK CONTROL (INDIA) LTD 7. SIEMENS	1. ABB, GERMANY 2. AUMA (I) PVT. LTD, GERMANY 3. AUMA RIESTER GmbH &Co., Germany 4. CONTROLS & SWITCHGEARS (C&S) 5. DREHMO, GERMANY 6. EMERSON, INDIA/ USA 7. ENERTORK, VIETNAM 8. FESTO 9. FLOWSERVE 10. FORBES MARSHALL (ARCA) 11. HAROLD BECK, USA 12. HENGCHUN 13. IL 14. LIMITORQUE (I) LTD, USA 15. LIND CO, USA 16. NIPPON GEAR, JAPAN 17. QUALITY PRECISION 18. ROTEX 19. ROTORK CONTROLS, UK 20. SIEMENS, GERMANY 21. SIPOS AKTRORIK GMBH, GERMANY 22. SUDHIR SWITCHGEARS PVT LTD 23. WEIR BDK VALVES- A UNIT OF WEIR, FRANCE
5.	VARIABLE FREQUENCY DRIVE (VFD) / VVFD	1. ABB 2. BHEL 3. GE 4. HITACHI HI-REL 5. POWER ELECTRONICS 6. ROCKWELL AUTOMATION 7. SCHNEIDER ELECTRIC	1. ALLEN BRADLEY 2. AMTECH 3. AMTECH ELECTRONICS INDIA LIMITED 4. ANSALDO (NIDEC), ITALY 5. ANSALDO, ITALY 6. BRUSH ELECTRIC

ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-I)

SL. NO	EQUIPMENTS/SYSTEM	ACCEPTABLE SUB VENDORS (CATEGORY – I)	BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)
		8. SIEMENS	7. BUSH ELECTRIC 8. CARRIER MIDEA INDIA PVT LTD 9. CGL 10. CONTROL INFOTECH LIMITED 11. CONTROL TECHNIQUE, UK 12. CONTROL TECHNIQUES INDIA PVT.LTD. 13. CONVERTEAM (GE), FRANCE 14. CONVERTEAM (GE), INDIA 15. DANFOSS 16. DANFOSS INDUSTRIES PVT LTD 17. DELTA 18. DYNASPEDE INTEGRATED 19. EMERSON 20. EUROTHERM (SCHNEIDER ELECTRIC), INDIA/ UK 21. EUROTHERM, INDIA 22. FUJI ELECTRIC INDIA PVT LTD 23. FUJI ELECTRIC SYSTEMS CO. LTD., 24. FUJI ELECTRIC SYSTEMS, JAPAN 25. FUJI ELECTRIC, JAPAN 26. GEMCO CONTROLS LTD 27. HI-REL ELECTRONICS LTD. 28. HITACHI 29. HITECHI 30. INGETEAM TECHNOLOGIES, SPAIN 31. KIRLOSKA 32. LARSEN & TOUBRO (L&T) 33. LENZE AC TECH 34. MEGATECH CONTROLS LTD 35. MOTORS AND DRIVES, LLC 36. NELCO 37. NEXTGEN AUTOMATION PVT. LTD./ C.D. AUTOMATION PVT. LTD. (SIEMENS MAKE) 38. NIDEC 39. PARKER HANNIFIN INDIA PVT LTD 40. POWERTECH 41. SERVO TECH 42. STOCK 43. TELAWNE 44. TMEIC

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
J	**LIGHTING FIXTURES**		
1.	LIGHTING FIXTURES (LED)	1. BAJAJ 2. CROMPTON GREAVES 3. GE 4. HAVELLS 5. HPL ELECTRIC & POWER PVT. LTD 6. INSTA POWER 7. SURYA ROSHNI LIM-ITED 8. SYSKA 9. PYROTECH ELECTRON-ICS PVT. LTD. 10. NESSA ILLUMINATION TECHNOLOGIES PVT. LTD 11. PHILIPS 12. WIPRO	1. APEX LUMINAIRES (P) LIMITED 2. AVAIDSTECHNOVATORSPVT. LTD. 3. BALIGA 4. C&S ELECTRIC LTD 5. CANARA LIGHTING INDUSTRIES LTD 6. CONTROL DEVICES 7. ELEXPRO ELECTRICALS PVT. LTD. 8. ENSAVE DEVICES PRIVATE LIMITED 9. EVERGREEN ENGG. CO. 10. GLOSTAR ELECTRICALS 11. GOLDWYN 12. HALONIX 13. JASPER ENGINEERS PRIVATE LIMITED 14. K.C.FIXTURES 15. FORUS ELECTRIC PVT LTD 16. HALONIX TECHNOLOGIES PVT LIMITED 17. TRANSRAIL LIGHTING LTD 18. MIKA ENGINEERS 19. NEEV LUMINARIES 20. PHIAMANG LIGHTING 21. R.K.LIGHTING 22. SHAKTI ENTERPRISES 23. VINTUS SYSYTEM

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
2.	LIGHTING FIXTURES (FLAME PROOF)	1. BAJAJ 2. CROMPTON GREAVES 3. GE 4. HAVELLS 5. PHILIPS 6. WIPRO	1. AJMERA 2. BALIGA ELECTRICALS 3. C&S 4. CGL 5. FCG 6. FLEXPRO 7. GELTRONIX 8. HALONIX 9. J B INDUSTRIES 10. KHERAJ 11. PYROTECH 12. SPECTRUM 13. SUDHIR SWITCHGEAR 14. SURYA ROSHNI

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
E.	**CABLE TRAYS AND ITS ACCESSORIES**		
1.	CABLE TRAYS	1. INDIA ELECTRICALS SYNDICATE 2. INDIANA 3. INDUSTRIAL PERFO-RATION (INDIA) PVT. LTD. 4. JAMNA METAL COM-PANY 5. PATNY SYSTEMS (P) LTD 6. TECHNO FAB MANU-FACTURING LTD, 7. RATAN	1. ADVANCE POWER PRODUCTS 2. AM - TECH ENGINEERING SERVICES 3. AMTECH 4. ANAND UDYOG 5. APT ENGINEERING 6. ASPG INFRASTRUCTURES PVT. LTD.,MEERUT 7. ASSOCIATED POWER STRUCTURES PVT LTD 8. A-SUNG 9. AV ENGG, 10. CHEMIN CONTROLS AND INSTRUMENTATION, 11. DEBASISH INDUSTRIES 12. DONGSUNG 13. ELCON 14. ERCON COMPOSITES

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			15. EROS METAL WORKS (P) LTD. 16. FEEDERS LLOYD CORPORATION LIMITED 17. GEE DEE PACKAGES PVT LTD, MYSORE 18. GLOBE INDUSTRIES 19. GRAM ENGG 20. HIND RUNWAYS 21. INAR PROFILE PVT LTD 22. INDEANA ENGINEERING 23. INDIA ELECTRIC SYNDICATE 24. INDIANA CABLE TRAYS 25. INDIANA GRATINGS 26. INDIANA GROUP 27. INDMARK FORMTECH PVT LTD 28. INNOSPACER ENGNEERING TECHNOLOGIES 29. K P BUILDCON 30. KANADE ANAND UDYOG 31. M.J.ENGINEERING 32. MAHAVEER ENGINEERING 33. MAHESHWARI ELECTRICAL 34. MAHESHWARI ELECTRICAL MFRS. PVT. LTD., 35. MJ ENGINEERING WORKS (P) LIMITED,DELHI 36. NAMDHARI INDUSTRIAL TRADERS PVT LTD 37. NEHA POWERTECH 38. OMKARESHWAR 39. PARMAR METAL PVT. LTD. 40. PASSIVE INFRA 41. PASSIVE INFRA PROJECTS PRIVATE LIMITED 42. PENTAX FERRO INCORPORATE 43. PRAMMEN INDUSTRIES 44. PREMIER POWER PRODUCTS PVT LTD 45. R.K. ENGINEERING WORKS 46. RABI ENGG 47. RATAN ENGINEERING 48. RATAN PROJECTS & ENGINEERING, 49. RUKMANI

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			50. RUKMANI ELECTRICAL & COMPONENTS PVTLTD 51. SARAL INDUSTRIES 52. SHIVA ENGINEERING WORKS,KOLKATA 53. SHRUTI INDUSTRIES 54. SILVERLINE POWER INFRA 55. STEELITE 56. STEELITE ENGG. 57. SUMIP COMPOSITES PVT. LTD., 58. SUMIT COMPOSITE (FRP) 59. SUN ENGINEERING,PUDDUKOTTAI 60. T.R.G 61. TECH - UP ENGINEERING PVT LTD.,,TIRCHY 62. TECHNO 63. TECHNO ENGG COMPANY 64. TECHNO FAB 65. TRG ENGINEERING INDUSTRIES,CHENNAI 66. UNITECH FABRICATORS and ENGINEERS PVT LTD 67. VATCO 68. VATCO ELEC-POWER PVT. LTD.
2.	CABLE SUPPORT STRUCTURES	1. AMTECH 2. ENCORP 3. HIND RUNWAYS 4. INAR PROFILES LTD. 5. INDIANA GRATINGS 6. INDUSTRIAL PERFORATION 7. JAMNA METAL 8. MAHAVEER ENGINEERING 9. MAHESHWARI ELECTRICAL 10. NEHA POWERTECH 11. PATNY SYSTEMS (P) LTD. 12. PREMIER POWER PRODUCTS 13. RABI ENGINEERING	1. AM - TECH ENGINEERING SERVICES,PUNE 2. EROS INFRASTRUCTURES PVT. LTD. 3. INDMARK FORMTECH PVT. LTD. 4. JAGANNATHAN ENGINEERING WORKS 5. NAMDHARI INDUSTRIAL TRADERS PVT. LTD 6. NEHA POWERTECH 7. PARMAR METALS PVT.LTD. 8. PENTAX FERRO INCORPORATE 9. RATAN PROJECTS & ENGINEERING CO. PVT.LTD. 10. RUKMANI ELECTRICAL & COMPONENTS PVT LTD 11. SARAL INDUSTRIES 12. TJSV STEEL FABRICATION & GALVANIZING (INDIA) LIMITED 13. VINFAB ENGINEERS INDIA PVT. LTD. 14. VSP ENTERPRISES PVT. LTD.

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		WORKS 14. RATAN POWER PRO-JECTS 15. SHRUTI INDUSTRIES 16. STEELITE ENGG. 17. UNITECH FABRICA-TORS & ENGINEERS PVT.LTD. 18. VATCO	
F.	**ILLUMINATION SYSTEM**		
1.	HIGH MAST WITH LED FITTINGS	1. BAJAJ ELECTRICALS LIMITED 2. CROMPTON GREAVES 3. CONSUMER ELECTRI-CALS LIMITED, 4. M I K A E N G I N E E R S , 5. TRANSRAIL LIGHTING LIMITED 6. WIPRO ENTERPRISES PVT LTD	1. AVAIDS 2. AVAIDSTECHNOVATORSPVT. LTD. 3. BP PROJECTS 4. C&S ELECTRIC LTD 5. CGL 6. CONTROL DEVICES 7. FORUS ELECTRIC PVT LTD 8. GE 9. HALONIX TECHNOLOGIES PVT LIMITED 10. HAVELLS 11. INSTAPOWER LIMITED 12. JASPER ENGINEERS PRIVATE LIMITED 13. PHIAMANG LIGHTING, CHINA 14. PHILIPS 15. PYROTECH 16. SKIPPER 17. SURYA ROSHNI 18. SYSKA 19. TRANSRAIL 20. TRANSRAIL LIGHTING LTD 21. UTKARSH INDIA LIMITED
G.	**MISC. ITEMS**		

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
1.	POWER JUNCTION BOX	1. AJMERA 2. BALIGA 3. BCH ELECTRIC LTD 4. BHARTIA INDUSTRIES 5. C&S ELECTRIC 6. CONCORD CONTROLS 7. ELECTRONIC AUTO-MATION 8. FCG 9. GE 10. GEC 11. HAGER 12. HAVELLS 13. HENSEL ELECTRIC IN-DIA PVT LTD 14. HONEYWELL 15. INDO-ASIAN 16. JYOTI 17. L&T 18. PYROTECH 19. RAAS CONTROLS 20. RISHABH 21. SCHNEIDER ELECTRIC 22. SIEMENS 23. SIMCO 24. SPACEAGE 25. SUB KLEW 26. TECNIK 27. TELEMECHANIQUE 28. VAISHNO ELECTRICALS	1. BHARTIA INDUSTRIES 2. CONCORD CONTROLS 3. CONTROL DEVICES 4. CUBIC CONTROL SYSTEMS 5. CYCLO ELECTRIC DEVICES & SERVICES CO 6. DYNASPEDE INTEGRATED SYSTEMS PVT LTD., 7. ELECON PERIPHERALS LIMITED 8. ELECTRONIC AUTOMATION 9. ELKTRISCHEN POWER GEARS 10. FCG 11. GEMCO CONTROLS LTD 12. HI POWER CONTROLS, 13. HI-TECH SERVICES, 14. JASPER ENGINEERS PVT LTD 15. JOLLY ENGINEERING INSUSTRIES 16. NITYA ELECTRO CONTROLS 17. ORVEEM INDUSTRIES, 18. PATNY SYSTEMS PRIVATE LTD 19. POSITRONICS PRIVATE LIMITED 20. POWER & PROTECTION 21. POWERTECH SWITCHGEARS (I) PVT LTD 22. PRAMMEN INDUSTRIES 23. PRIMA AUTOMATION (INDIA) PVT LTD 24. PRIYADARSHINI ENTERPRISES 25. RAAS CONTROLS 26. RISHABH 27. RYB SWITCHGEAR 28. S.B. POWER SYSTEMS, 29. SAMCON INDUSTRIAL CONTROLS PVT LTD 30. SARAVANA SWITCHGEARS 31. SHRENIK & COMPANY 32. SUB KLEW 33. SWITCHING CIRCUITS 34. TECHNOFINE 35. TECNIK 36. TTS SYSTEMATIX PVT LTD, 37. UNILEC ENGINEERS LIMITED

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			38. VEE VEE CONTROLS PRIVATE LIMITED 39. VRL AUTOMATION ENGINEERING
2.	PUSH BUTTON	1. AJMERA 2. BALIGA 3. BCH ELECTRIC LTD 4. BHARTIA INDUSTRIES 5. C&S 6. CONCORD CONTROLS 7. ELECTRONIC AUTO-MATION 8. FCG 9. GE 10. GEC 11. HAGER 12. HAVELLS 13. HENSEL ELECTRIC IN-DIA PVT LTD., 14. HONEYWELL 15. INDO-ASIAN 16. JOLLY ENGG. 17. JYOTI 18. L&T 19. PYROTECH 20. RAAS CONTROLS 21. RISHABH 22. SCHNEIDER ELECTRIC 23. SIEMENS 24. SIMCO 25. SPACEAGE 26. SUB KLEW 27. TECHNOFINE 28. TECNIK 29. TELEMECHANIQUE 30. VAISHNO ELECTRICALS	1. BHARTIA INDUSTRIES 2. C & S ELECTRIC LTD,NOIDA 3. CONTROL DEVICES 4. CUBIC CONTROL SYSTEMS 5. CYCLO ELECTRIC DEVICES & SERVICES CO. 6. DYNASPEDE INTEGRATED SYSTEMS PVT LTD 7. ELECON PERIPHERALS LIMITED 8. ELECTRONIC AUTOMATION 9. ELKTRISCHEN POWER GEARS 10. FCG 11. GEMCO CONTROLS LTD., 12. HI POWER CONTROLS 13. HI-TECH SERVICES, 14. INDO-ASIAN 15. JASPER ENGINEERS PVT LTD,NOIDA 16. NITYA ELECTRO CONTROLS 17. ORVEEM INDUSTRIES 18. PATNY SYSTEMS PRIVATE LTD. 19. POSITRONICS PRIVATE LIMITED 20. POWER & PROTECTION 21. POWERTECH SWITCHGEARS (I) PVT LTD 22. PRAMMEN INDUSTRIES 23. PRIMA AUTOMATION (INDIA) PVT LTD, 24. PRIYADARSHINI ENTERPRISES 25. RYB SWITCHGEAR 26. S.B. POWER SYSTEMS 27. SAMCON INDUSTRIAL CONTROLS PVT LTD SARAVANA SWITCHGEARS 28. SHRENIK & COMPANY 29. SWITCHING CIRCUITS 30. TECNIK 31. TTS SYSTEMATIX PVT LTD 32. UNILEC ENGINEERS LIMITED

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			33. VEE VEE CONTROLS PRIVATE LIMITED 34. VRL AUTOMATION ENGINEERING
3.	LOCAL CONTROL PAN-ELS	1. C&S ELECTRIC 2. HAVELL 3. CONTROL & SCHE-MATIC 4. GE 5. PYROTECH 6. RITTAL 7. SCHNEIDER 8. SIEMENS	1. ADLEC POWER 2. ANAND POWER 3. CONTROL & SWITCHGEAR 4. CONTROL DEVICES 5. ELECON PERIPHERALS LIMITED 6. ELKTRISCHEN POWER GEARS 7. EMCONS 8. HINDUSTAN CONTROL &EQUIPMENT 9. HI-TECH SERVICES 10. HPL 11. JAKSON 12. JASPER 13. JOLLY ENGG. 14. KHOKHAR ELECTRICALS PVT. LTD.,NOIDA 15. L&T 16. MAKTEL 17. MEDITRON 18. POSITRONICS 19. POSITRONICS PRIVATE LIMITED 20. POWER CONTROL EQUIPMENTS 21. RSI 22. STELMEC LIMITED 23. SWITCHING CIRCUIT 24. SYSTEM INFOTECH 25. TENCO SYSTEMS AND SWITCHGEAR PVT LTD 26. TRICOLITE 27. UNILEC 28. VIDYUT CONTROL 29. VOLTECH MANUFACTURING CO LTD

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
4.	MS ROD	1. JINDAL STEEL 2. RINL 3. SAIL 4. TATA STEEL	1. AXIS ELECTRICALS 2. ELECTRO MAC INDUSTRIES 3. INDIAN PERFORATION 4. INDIANA 5. JAMNA METALS 6. K P BUILDCON 7. KANADE ANAND UDYOG PVT. LTD 8. MAHAVIR STEEL INDUSTRIES LIMITED 9. OMKAR GRATINGS 10. PRIMERE 11. R SQUARE 12. RATAN PROJECTS & ENGINEERING CO. PVT. LTD. 13. SUN VIJAY 14. TAMRA 15. TECHNO FAB MFG. LTD 16. VATCO
5.	GS FLAT	1. AXIS ELECTRICALS 2. ELECTRO MAC INDUS-TRIES 3. INDIAN PERFORATION 4. INDIANA 5. JAMNA METALS 6. K P BUILDCON 7. KANADE ANAND UDYOG PVT. LTD 8. OMKAR GRATINGS 9. PREMIER POWER PRODUCTS (CAL) PVT. LTD. 10. R SQUARE 11. RATAN PROJECTS & ENGINEERING CO. PVT. LTD. 12. RUKMANI ELECTRICAL & COMPONENTS PVT. LTD. 13. TAMRA 14. TECHNO FAB MFG. LTD 15. VATCO	1. AARPEE & ASSOCIATES 2. AXIS ELECTRICALS 3. DEBASISH INDUSTRIES 4. ELECTRO MAC INDUSTRIES 5. INAR PROFILES, 6. INDIA ELECTRICALS SYNDICATE 7. INDUSTRIAL PERFORATION (INDIA) PVT. LTD 8. MAHAVEER ENGINEERING 9. PATNY SYSTEMS PRIVATE LTD 10. POWERTRAC INDUSTRIES LIMITED, 11. PREMIER POWER PRODUCTS (CAL) PVT. LTD. 12. RABI ENGINEERING WORKS PVT LTDRATAN PROJECTS & ENGINEERING CO. PVT. LTD. 13. SARAL INDUSTRIES, 14. SHIVA ENGINEERING WORKS, 15. SILVERLINE POWER INFRASTRUCTURE PVT LTD, 16. UNITECH FABRICATORS & ENGINEERS PVT LTD 17. VATCO ELEC-POWER PVT LTD.,

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		16. VIJAY TRANSMISSION PVT LTD	
6.	GS STRIP	1. AXIS ELECTRICALS 2. ELECTRO MAC INDUS-TRIES 3. INDIAN PERFORATION 4. INDIANA 5. JAMNA METALS 6. K P BUILDCON 7. KANADE ANAND UDYOG PVT. LTD 8. OMKAR GRATINGS 9. PREMIER POWER PRODUCTS (CAL) PVT. LTD. 10. R SQUARE 11. RATAN PROJECTS & ENGINEERING CO. PVT. LTD. 12. RUKMANI ELECTRICAL & COMPONENTS PVT. LTD. 13. TAMRA 14. TECHNO FAB MFG. LTD 15. VATCO 16. VIJAY TRANSMISSION PVT LTD	1. AARPEE & ASSOCIATES 2. DEBASISH INDUSTRIES 3. INAR PROFILES 4. INDIA ELECTRICALS SYNDICATE 5. INDUSTRIAL PERFORATION (INDIA) PVT. LTD 6. MAHAVEER ENGINEERING, 7. PATNY SYSTEMS PRIVATE LTD 8. POWERTRAC INDUSTRIES LIMITED, 9. RABI ENGINEERING WORKS PVT LTD, 10. RUKMANI ELECTRICAL & COMPO-NENTS PVTLTD 11. SARAL INDUSTRIES 12. SHIVA ENGINEERING WORKS 13. SILVERLINE POWER INFRASTRUCTURE PVT LTD 14. UNITECH FABRICATORS & ENGINEERS PVT LTD 15. VATCO ELEC-POWER PVT LTD
7.	LOCAL PUSH BUTTON STATION	1. ABB 2. C & S ELECTRIC LTD 3. JASPER ENGINEERS PVT.LTD. 4. JOLLY ENGG. 5. L&T 6. PYROTECH 7. SCHNEIDER 8. SIEMENS	1. AJMERA 2. BALIGA 3. BCH EELCTRIC LTD 4. BENTEX 5. BHARTIA INDUSTRIES 6. CONCORD CONTROLS 7. CONTROL DEVICE 8. CUBIC CONTROL SYSTEMS,BANGALORE 9. CYCLO ELECTRIC DEVICES & SERVICES CO.,BANGALORE

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			10. DYNASPEDE INTEGRATED SYSTEMS PVT LTD.,,HOSUR 11. ELECMECH 12. ELECON PERIPHERALS LIMITED,ANAND 13. ELECTRONIC AUTOMATION 14. ELKTRISCHEN POWER GEARS,BANGALORE 15. FCG 16. GE 17. GEC 18. GEMCO CONTROLS LTD.,,FARIDABAD 19. HAGER 20. HAVELLS 21. HENSEL 22. HENSEL ELECTRIC INDIA PVT LTD.,,BANGALORE 23. HI POWER CONTROLS,BANGALORE 24. HI-TECH SERVICES,BARODA 25. HONEYWELL 26. HULASI 27. INDO-ASIAN 28. INDUSTRIAL CONTROL APPLIANCE 29. JACKSON 30. JYOTI 31. NITYA ELECTRO CONTROLS 32. ORVEEM INDUSTRIES, 33. PATNY SYSTEMS PRIVATE LTD 34. POSITRONICS 35. POSITRONICS PRIVATE LIMITED 36. POWER & PROTECTION 37. POWERTECH SWITCHGEARS (I) PVT LTD 38. PRAMMEN INDUSTRIES 39. PRIMA AUTOMATION (INDIA) PVT LTD, 40. PRIYADARSHINI ENTERPRISES 41. RAAS CONTROLS 42. RISHABH 43. RYB SWITCHGEAR 44. S.B. POWER SYSTEMS 45. SAMCON INDUSTRIAL CONTROLS PVT LTD

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			46. SARAVANA SWITCHGEARS 47. SCHNEIDER ELECTRIC 48. SHRENIK & CO 49. SHRI TULSI SWITCHGEAR 50. SIMCO 51. SPACEAGE 52. SUB KLEW 53. SWITCHING CIRCUIT 54. TECHNIC 55. TECHNOFINE 56. TECNIK 57. TELEMECHANIQUE 58. TTS SYSTEMATIX PVT LTD, 59. UNILEC ENGINEERS LIMITED 60. VAISHNO ELECTRICALS 61. VEE VEE CONTROLS PRIVATE LIMITED 62. VIDHUT CONTROLS 63. VRL AUTOMATION ENGINEERING
8.	TTB	1. CONTROL DYNAMICS 2. DAV 3. JVS 4. L&T 5. NELSTER	--
9.	EXHAUST FANS	1. BAJAJ 2. CROMPTON 3. FLAKT 4. USHA	1. ADVANCE_VENTILATION 2. ALMONAROD 3. C DOCTOR 4. CB_DOCTO 5. CGL 6. DUVENT 7. GEC 8. GEC ALSTOM 9. HAVELLS 10. HYDERABAD_POLUTION_CONTROL 11. INDUSTRIAL FAN 12. ICEBERG 13. KHAITAN 14. KIRLOSKAR AAF 15. KRUGER 16. MARATHON 17. NADI AIR TECHNICS 18. NICOTRA

	ELECTRICAL - CONSOLIDATED SUB-VENDOR LIST (CLASS-II)		
SL. NO	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			19. ORIENT 20. PATEL AIR TEMP 21. PATEL_AIR 22. POLAR 23. PYROTECH 24. SARLA(SITAL) 25. SK_SYSTEM 26. SUVIDHA 27. WOLLAQUE 28. WOLTER
10.	CEILING FANS	1. BAJAJ 2. CROMPTON GREAVES 3. USHA	1. ANCHOR 2. GEC 3. GREAT WHITE 4. HAVELLS 5. KHAITAN 6. LUMINOUS 7. ORIENT 8. ORPAT 9. POLAR 10. PYROTECH
11.	WELDING RECEPTACLES	1. AJMERA 2. ANCHOR 3. BCH ELELCTRIC LTD 4. CGL 5. C & S ELECTRIC LTD 6. EX-PROTECTA 7. PYROTECH 8. SAKTHI & CROWN 9. SCHNEIDER 10. SHRENIK & COMPANY 11. SUDHIR SWITCHGEAR	1. BEST & CROMPTON ENGG. LIMITED, 2. CONTROL DEVICES 3. CYCLO ELECTRIC DEVICES & SERVICES CO 4. ELECON PERIPHERALS LIMITED 5. HENSEL ELECTRIC INDIA PVT LTD 6. MEDITRON 7. NEPTUNE INDIA LTD 8. SAKTHI ELECTRICALS

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – I)			
SL NO.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
33	Hydrazine Analyzer	1. ABB 2. EMERSON 3. FORBES MARSHALL 4. HACH 5. ORION 6. YOKOGAWA	1. DKK 2. DR. THIEDIG 3. E&H 4. HONEYWELL 5. METTLER-TOLEDO 6. SWAN 7. TELEDYNE 8. THERMO ORION 9. WTW
34	TDS and Turbidity Analyzer	1. ABB 2. EMERSON 3. FORBES MARSHALL 4. HACH 5. ORION 6. YOKOGAWA	1. DKK 2. DR. THIEDIG 3. E & H 4. HONEYWELL 5. METTLER-TOLEDO 6. SWAN 7. TELEDYNE 8. THERMO ORION 9. WTW
35	Chlorine Leak Detector	1. HUSAINI ENGINEERS 2. IEC FABCHEM	1. PERFECT CHLORO 2. PERFECT ENGINEERING 3. W&T
36	Hydrogen purity Analyzer & leak detector	1. ABB 2. EMERSON 3. YOKOGAWA	1. ADAGE AUTOMATION 2. SIEMENS 3. E-ON
37	Smart Positioners	1. ABB 2. SIEMENS 3. EMERSON (FISHER ROSEMOUNT) 4. SMAR 5. YAMATAKE 6. YOKOGAWA	1. AUMA 2. DRESSER MASONEILAN 3. FLOW SERVE 4. FORBES MARSHALL 5. FOX BORO 6. KOSO 7. KSB MILL CONTROLS 8. LESLIE 9. LIMITORQUE 10. MASOLENIEN 11. MASONEILAN 12. MESTO 13. MOORE 14. PRUSS 15. TYCO SAMPELL 16. YOUNT TECH
38	Smart Transmitter (P, L, F, DP)	1. ABB 2. EMERSON	1. AUTROL 2. BALDOTA CONTROL &

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – I)			
SL NO.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		(ROSEMOUNT) 3. HONEYWELL 4. SIEMENS 5. YOKOGAWA	EQUIPMENTS 3. CHEMTROLS 4. CHINO CORPORATION 5. DRESSER MASONEILAN 6. ENDRESS + HAUSER 7. FOXBORO 8. FUJI ELECTRIC 9. KHRONE 10. LAXSONS AUTOMATION 11. LEVCON 12. MAGNETROL 13. NIVELCO 14. PUNE TECHTROL 15. SBEM 16. SMAR 17. TOSHNIWAL INDUSTRIES 18. VEGA 19. YAMARI 20. YAMATAKE
39	Temperature Transmitter	1. ABB 2. EMERSON (ROSEMOUNT) 3. ENDRESS+HAUSER 4. HONEYWELL 5. SIEMENS 6. YOKOGAWA	1. AUTROL 2. BALDOTA 3. CAMILLE –BAUR 4. FORBES MARSHALL 5. FOXBORO 6. FUJI ELECTRIC 7. INOR 8. KHRONE MARSHAL 9. MOORE INDUSTRIES 10. M-SYSTEM 11. OMEGA 12. P & F 13. PYROTECH 14. SMAR 15. TEMFLO SYSTEMS 16. TEMPSENS INSTRUMENTS 17. TOKYO KEISO 18. TOSHNIWAL INDUSTRIES 19. WIKA 20. YAMARI 21. YAMATAKE
40	Thermocouples/ Metal Temperature Thermocouples /RTDs	1. ABB 2. BAUMER TECHNOLOGIES 3. DETRIV INSTRUMENTATION	1. ALTOP INDUSTRIES 2. ELEIND ENGINEERING 3. EPHY MESS 4. EXOTHERM INSTRUMENTS 5. GAUGES BOURDON

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – I)			
SL NO.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		4. EMERSON (ROSEMOUNT) 5. GENERAL INSTRUMENTS CONSORTIUM 6. GOA INSTRUMENTS INDUSTRIES 7. HERAUS SENSOR 8. MINCO 9. OKAZAKI 10. PYRO ELECTRIC INSTRUMENTS 11. SIEMENS 12. TECHNO INSTRUMENTS 13. TEMPSENS INSTRUMENTS 14. TOSHNIWAL INDUSTRIES 15. WIKA INSTRUMENTS 16. YAMARI	6. INDUSTRIAL INSTRUMENTATION 7. ITALCOPPIE SENSORI 8. JINDAL ELECTRONICS 9. NESSTECH INSTRUMENTS 10. PRECISION MASS PRODUCTS 11. RUBY ENTERPRIESES 12. THERMAL INSTRUMENT 13. THERMO ELECTRIC INSTRUMENTATION 14. THERMO ENGINEERING 15. THERMO SENSOR 16. TM TECHNOMATIC 17. WISE CONTROL
41	Level Transmitters (Acoustic type – 3 D)	1. EIP ENVIRO 2. APM 3. APM (EIP ENVIRO)	1. ABB 2. ACOUSTIC MONITORING INTERNATIONAL 3. BHEL 4. E & H 5. EIP TECHNOLOGIES 6. EMERSON 7. HONEYWELL 8. INSTROTECH (PTY) 9. MAGNETROL 10. PROCON ENGINEERING 11. RECTUSON
42	Level Transmitters (Displacer Type)	1. CHEMTROL SAMIL 2. CHEMTROLS 3. D.K.INSTRUMENT 4. DRESSER MASONEILAN 5. DRESSER 6. FISHER 7. LEVCON 8. MAGNETROL 9. PUNE TECHTROL 10. SBEM 11. V AUTOMAT	1. ABB 2. BAUMER 3. BLISS ANAND 4. ECKARDT AG 5. EMERSON 6. ENDRESS + HAUSER 7. EVCON INSTRUMENTS 8. FUJI ELECTRIC 9. GAUGES BOURDON 10. HONEYWELL 11. LEVELSTATE 12. MIL CONTROLS 13. NAKATIYA 14. OMEGA

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – I)			
SL NO.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			6. HONEYWELL 7. OVAL 8. RHEONIK MESSTECHNIK 9. TOSHNIWAL
46	Magnetic Flowmeter	1. ABB 2. EMERSON 3. ENDRESS + HAUSER 4. KROHNE MARSHALL 5. SIEMENS 6. YOKOGAWA	1. ADEPT FLUIDYNE 2. E&H FLOWTECH 3. ELECTRONET EQUIPMENTS 4. HONEYWELL 5. OMEGA 6. VEGA
47	Parshall Flume type Flow Transmitter		1. BM TECHNOLOGIES 2. HAWK
48	Ultrasonic Flow Transmitter	1. ABB 2. EMERSON 3. ENDRESS & HAUSER 4. FUJI ELECTRIC 5. GE 6. SIEMENS 7. YOKOGAWA	1. ADEPT FLUIDYNE 2. CHEMTROLS 3. CHEMTROLS ENGG 4. DURAG 5. ELECTRONET EQUIPMENTS 6. FLASH FORGE 7. FLEXIM FLEXIBLE INDUSTRIEMESSTECHNIK 8. FORBES MARSHALL 9. GMBH 10. HONEYWELL 11. KROHNE 12. MICROMOTION 13. NIVO CONTROL 14. NIVUS 15. OMEGA 16. ROCKWIN FLOWMETER 17. SBEM 18. SICK 19. TELEDYNE 20. TOSHNIWAL INDUSTRIES
49	Instrumentation Cables (including Triad cable)	1. ADVANCE CABLE 2. CCI 3. CMI 4. CORDS CABLE 5. DELTON CABLES 6. ELKAY TELELINKS 7. HABIA CABLES 8. INCAB 9. KEC 10. KEI INDUSTRIES	1. APAR INDUSTRIES 2. ASSOCIATED FLEXIBLES & WIRES 3. BELDEN 4. BHANSALI CABLES & CONDUCTORS 5. BROOKS CABLES 6. CHANDRESH CABLES 7. FINOLEX 8. GEMSCAB

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – I)			
SL NO.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		11. LAPP 12. NICCO 13. PARAMOUNT 14. POLYCAB 15. SPECIAL CABLES 16. T C COMMUNICATION 17. THERMO CABLES 18. TORRENT 19. UNIVERSAL CABLE	9. GENERAL INSTRUMENTS 10. GLOSTER CABLES 11. GOVIND CABLE 12. GOYOLENE FIBRES 13. GOYOLETIONAL 14. GUPTA POWER INFRASTRUCTURE 15. IMT CABLES 16. INCOM 17. INDUSTRIAL INSTRUMENTATION 18. KERPEN CABLES 19. LEONI CABLE 20. MANOJ CABLES 21. MANSFIELD CABLE 22. NANGALWALA INDUSTRIES 23. NE FIBRES 24. PAGODA CABLES 25. POWER CABLE INDUSTRIES 26. R.J.INDUSTRIAL CORPORATION 27. RASHI CABLES 28. RAVIN CABLES 29. RELIANCE 30. RR CABLE 31. RR KABEL 32. SBEE CABLES 33. SERVEL INDIA 34. SHIVA PRIYA CABLES 35. SIECHEM 36. SRIRAM CABLES 37. SUYOG 38. TCL 39. TEMPSENS 40. TEW & C 41. THERMO ELECRTA 42. TOSHNIWAL 43. UDEY PYRO CABLES 44. ULTRACAB 45. UNIFLEX CABLES (APAR INDUSTRIES) 46. URJA 47. VIKAS
50	Thermocouple cables	1. ADVANCE CABLE TECHNOLOGIES 2. CORDS CABLE	1. BELDEN 2. CCI 3. CMI

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – I)			
SL NO.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		3. DELTON CABLES 4. GEMS CAB 5. GOYOLENE FIBRES 6. KEI INDUSTRIES 7. KERPEN CABLES 8. LAPP 9. NICCO 10. PARAMOUNT COMMUNICATIONS 11. POLYCAB 12. T C COMMUNICATION 13. THERMO CABLES 14. TOSHNIWAL INDUSTRIES 15. UDEY PYRO CABLES 16. UNIVERSAL CABLE	4. ELKAY TELELINKS 5. FINOLEX 6. GENERAL INSTRUMENTS 7. GUPTA POWER INFRASTRUCTURE 8. HABIA CABLES 9. INCAB 10. INCOM 11. INDUSTRIAL INSTRUMENTATION 12. KEC (RPG) 13. LEONI CABLE 14. MANSFIELD CABLES COMPANY 15. POWER CABLE INDUSTRIES 16. R.J.INDUSTRIAL CORPORATION 17. SIECHEM 18. SPECIAL CABLES 19. SUYOG ELECTRICALS 20. TCL 21. TEMPSENS 22. TEW & C 23. THERMO ELECRTA 24. TORRENT 25. UNIFLEX CABLES (APAR INDUSTRIES)
51	Fibre optic cables	1. AKSH FIBRE 2. BELDEN 3. BIRLA ERICSSON 4. DIGILINK 5. D-LINK 6. FINOLEX 7. HFCL 8. KEC INTERNATIONAL 9. LAPP CABLES 10. POLYCAB 11. RPG CABLES	1. AKSH OPTIFIBER 2. APAR INDUSTRIES 3. CORNING 4. GUPTA POWER 5. IIJIN CABLE 6. JIANGSU TONGGUANG 7. LENOX-HITECH 8. LEONI CABLES 9. MOLEX 10. POWER CABLE INDUSTRIES 11. PRESTON 12. R&M 13. RAYCHEM 14. SCHNEIDER 15. SCHNEIDER-DIGILINK 16. SPECIAL CABLES 17. TERRACOM 18. TYCO/AMP 19. UNIFLEX CABLES

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – II)			
S.No.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			8. PALOALTO 9. SOPHOS
11	Flow Switch	1. CHEMTROLS 2. D K INSTRUMENT 3. E & H 4. KROHNE MARSHAL 5. LEVCON 6. MAGNETROL 7. SWITZER 8. V AUTOMAT	1. ABB 2. ASHCROFT 3. ASHCROFT (NAGANO) 4. AUXITROL 5. DANFOSS 6. DELTA CONTROLS 7. DWYER INST 8. EMERSON 9. GAUGES BOURDON 10. HONEYWELL 11. MERICOID 12. MERIUM 13. SUNAG CORPORATION 14. UNIVERSAL FLOW METER 15. WIKA 16. YOKOGAWA
12	Flow Meters (Other than Class I items)	1. ABB 2. BOPP & REUTHER 3. BROOKS 4. E & H 5. EMERSON 6. EUREKA 7. FUJI 8. GE 9. HONEYWELL 10. KROHNE MARSHALL 11. YOKOGAWA	1. B.K.EQUIPMENTS 2. BLISS ANAND 3. BOPP & ROUTHER 4. CHEMTROLS 5. DURAG 6. FLUIDYNE 7. GIC 8. GREENBANK ENGERY 9. INSTRUMENT ENGINEERS 10. INSTRUMENTATION ENGINEERS 11. MANAS MICROSYSTEMS 12. MICRO PRECISION 13. OVAL 14. RHEONIK MESSTECHNIK 15. ROCKWIN FLOWMETER 16. SCIENTIFIC DEVICES 17. SICK 18. SIEMENS 19. SIGMA INSTRUMENTS 20. TELEDYNE 21. TOSHNIWAL CORPORATION 22. TOSHNIWAL HYVAC 23. V. AUTOMAT
13	Junction Boxes	1. BALIGA 2. BCH ELETRIC	1. ARHAM HI-TECH 2. C & S ELECTRIC

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – II)			
S.No.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		3. CHEMIN 4. CONTROL DEVICES 5. DEVI POLYMERS 6. ELECTRO MECHANICAL 7. HENSEL ELECTRIC 8. JASPER 9. K.S. INSTRUMENTS 10. PHOENIX 11. PYROTECH 12. RITTAL 13. SAJAS ELECTRICALS 14. SHRENIK & COMPANY 15. SUCHITRA INDUSTRIES	3. COTMAC 4. CUBIC CONTROL SYSTEMS 5. CYCLO ELECTRIC DEVICES & SERVICES 6. DYNASPEDE INTEGRATED SYSTEMS 7. ELECON PERIPHERALS 8. ELKTRISCHEN POWER GEARS 9. ELMEX 10. EMECON CONTROLS 11. EXCEITEC 12. EXPROTECTA 13. FICOM ENGINEERING 14. FLEXPRO ELECTRICALS 15. FORBES MARSHALL 16. GEE DEE PACKAGES 17. GEMCO CONTROLS 18. HENSLE 19. HI POWER CONTROLS 20. HI-TECH SERVICES 21. HULASI METALS 22. JINDAL ELECTRONICS 23. JOLLY ENGINEERING 24. KEY ELECTRICALS 25. KHODAY CONTROL 26. MANISHA COMPOSITEK 27. NITYA ELECTRO CONTROLS 28. ORVEEM INDUSTRIES 29. PATNY SYSTEMS 30. POLYTECH ENTERPRISES 31. POSITRONICS 32. POWER & PROTECTION 33. POWERTECH SWITCHGEARS 34. PRAMMEN INDUSTRIES 35. PRIMA AUTOMATION 36. PRIYADARSHINI ENTERPRISES 37. RMG ELECTROMECH 38. RUBY ENTERPRISES 39. RYB SWITCHGEAR 40. S.B. POWER SYSTEMS 41. SAMCON INDUSTRIAL CONTROLS 42. SARAVANA SWITCHGEARS 43. SCG EX D TECH 44. SUDHIR SWITCHGEAR 45. SWITCHING CIRCUITS 46. TECHNO GRIP

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – II)			
S.No.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			47. TRIJAL ELECTRIKALS 48. TTS SYSTEMATIX 49. UNILEC ENGINEERS 50. VEE VEE CONTROLS 51. VENKAT ELECTRONICS 52. VICTORY STANDARD 53. VRL AUTOMATION ENGINEERING 54. WAGO 55. WEIDMULLER
14	Erection Hardware including pipe, fittings, manifold etc.,	1. ASTEC 2. AURA INC 3. BALDOTA 4. BHARAT HEAVY ELECTRICALS 5. EXCEL HYDRO-PNEUMATICS 6. FLOWTECH 7. HP VALVES & FITTINGS 8. HYDAIR 9. INDIAN SEAMLESS METAL TUBES 10. ISMT 11. JINDAL SAW 12. MAHARASHTRA SEAMLESS 13. METPRESS ENGINEERING 14. MICRO PRECISION PRODUCTS 15. PARKER 16. PRECISION ENGG 17. PRIME ENGINEERS 18. RATNAMANI METALS & TUBES 19. SANDVIK 20. SUMITOMO 21. SWAGELOK	1. ADITYA ENGINEERING 2. ARCELLOR CONTROLS 3. ARYA CRAFTS & ENGINEERING 4. AURO 5. BALIGA 6. DK TECH 7. DYNA FLUID VALVES AND FLOW CONTROL 8. FLUID CONTROLS 9. GENERAL INSTRUMENTS 10. HAMLET 11. HEAVY METAL AND TUBES 12. HYLOK 13. INSTRUMENTATION LIMITED 14. MAXIM TUBES COMPANY 15. MBM TUBES 16. MET LOK HYDRO PENUMATICS 17. NAV DURGA FORGING AND FITTINGS 18. PANAM ENGINEERS 19. PAUL INDUSTRIES 20. PMT ENGINEERS 21. SALZGITTER MANNESMANN 22. SANDEEP INDUSTRIES 23. SHUBHLAXMI METALS AND TUBES 24. SUPER TECHNICAL (PARKER MAKE) 25. SURAJ STAINLESS 26. TPS TECHNITUBE ROHREN WERKE 27. TROUVAY AND CAUVIN 28. TUBACES 29. TUBACEX PRAKASH

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – II)			
S.No.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			30. V.K. INDUSTRIES 31. VELURIC & MANESSMANN 32. VIKAS INDUSTRIAL PRODUCTS 33. VIPAL ENTERPRISES
15	Laptop	1. DELL 2. HP 3. LENOVO	1. COMPAQ 2. FUJITSU 3. IBM 4. SIEMENS
16	Laser Printers	1. CANON 2. EPSON 3. HP	1. BROTHERS 2. DELL 3. GENICOM 4. IBM 5. KYOCERA 6. LEXMARK 7. LIPI 8. PITNEY BOWES 9. SAMSUNG 10. SEIKO 11. TVSE 12. WIPRO 13. XEROX
17	Level Switches (Float , Displacer Type, Capacitance) & Level Gauges (All Types)	1. ABB 2. CHEMTROLS 3. CHEMTROLS SAMIL 4. D.K.INSTRUMENTS 5. EIP 6. EMERSON 7. ENDRESS +HAUSER 8. GAUGES BOURDON (GIC) 9. KHRONE 10. LEVCON 11. LEVEL STATE 12. MAGNETROL 13. NIVO CONTROLS 14. PUNE TECHTROL 15. ROSEMOUNT 16. SBEM 17. SIEMENS 18. SIGMA INSTRUMENTS 19. SOLATRON 20. V.AUTOMAT 21. YARWAY	1. ASHCROFT 2. ASIAN INDUSTRIAL VALVES 3. BAUMER 4. BELL CONTROLS 5. BK EQUIPMENT 6. BLISS ANAND 7. BUNKABOEKI KOGYO 8. DEMPA KOGYO 9. DEMPER KOGYO 10. FLOW STAR ENGINEERING 11. HITROL 12. IGEMA 13. INDFOSS 14. KEYSTONE 15. KUBLER 16. KUEBLER (WIKA) 17. MASONELIN 18. NAKATIYA 19. NIHON KLINGAGE 20. NISAN SCIENTIFIC 21. PLACKA 22. PRATOLINA INSTRUMENTS 23. PROTO CONTROLS

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – II)			
S.No.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			24. PYROELECTRIC 25. SAMIL INDUSTRY 26. TECNOMATIC 27. TOKOIO KEISO 28. TOSHNIWAL INDUSTRIES 29. TRANDUCER & CONTROL 30. UNI KLINGER 31. WAREE 32. WIKA
18	Level Switches (RF type)	1. ASHCROFT (NAGANO) 2. E&H 3. EIP ENVIRO 4. LEVCON 5. MAGNETROL 6. NIVO CONTROL 7. SBEM 8. V.AUTOMAT 9. VEGA	1. D.K.INSTRUMENTS 2. DELTA CONTROL 3. FLOW STAR ENGINEERING 4. HITROL 5. HYDRASTEP (DELTA MOBREY) 6. IGEMA 7. JAY 8. NAGANO 9. PUNE TECHTROL 10. SEOJIN INSTECH 11. SHREE ELECTRON 12. SOR
19	Level Switches (Conductivity type)	1. E & H 2. EIP ENVIRO LEVEL CONTROLS 3. EMERSON 4. HITECH 5. IGEMA 6. LEVELSTATE SYSTEMS 7. PUNE TECHTROL 8. RAMAN INSTRUMENTS 9. SBEM 10. SOLATRON MORBREY 11. YARWAY	1. ASHCROFT (NAGANO) 2. BHEL 3. D K INSTRUMENT 4. DELTA CONTROL 5. FLOWSTAR ENGINEERING 6. GIC 7. HITROL 8. HYDRASTEP (DELTA MOBREY) 9. MAGNETROL 10. NAGANO 11. SEOJIN INSTECH 12. SOR 13. TOKYO KEISO 14. V- AUTOMAT
20	LIE / LIR	1. CHEMIN 2. FORBES MARSHALL 3. INSTRUMENTATION LTD 4. PRAMMEN 5. PYROTECH ELECTRONICS 6. RITTAL	1. AJMERA 2. ASTEC AUTOMATION 3. ASTECH 4. AVOUSIC CONTROLS (ACOUSTIC CONTROL) 5. BCH 6. C&S

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – II)			
S.No.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		7. SAJAS ELECTRICALS	7. ERCON COMPOSITES 8. INDUSTRIAL CONTROL APPLIANCES 9. KEMROCK 10. MANISHA 11. MIRAJ INSTRUMENTATION 12. NASAN 13. PANAM ENGINEERS 14. POSITRONICS 15. POSITRONIX 16. PROCON INSTRUMENTATION 17. SHYAM MACHINE TOOLS 18. SUJAL 19. SUMIP COMPOSITES 20. SYSPRO 21. TRINITY TOUCH
21	LIU/Optical Link	1. D-LINK	1. AMP 2. CORNING 3. DELTAFULL 4. DIGI-LINK 5. DIGISOL 6. MOLEX 7. PANDUIT 8. TYCO
22	Media Converters	1. MOXA	1. AVEONET 2. BLACK BOX 3. CTC UNION 4. PERLE
23	Panels/ cabinets (DCS,PLC,CEMS,SWAS)	1. EMERSON 2. LARSEN & TOUBRO (L&T) 3. PYROTECH 4. RITTAL 5. SCHNEIDER 6. FORBES MARSHALL 7. SIEMENS	1. ABB 2. ADAGE AUTOMATION 3. ANALYSER INSTRUMENTATION 4. ANALYSER INSTRUMENTS 5. BALIGA-STALH 6. CHEMIN CONTROLS 7. CHEMTROLS INDUSTRIES 8. CONTROL PANELS 9. COTMAC 10. CREATIVE INSTRUMENTS 11. ELEMECH 12. ENDRESS + HAUSER 13. EX-PROTECTA 14. FLOWLINE INSTRUMENTATION 15. HOFMANN

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – II)			
S.No.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
			16. MITSUBISHI/ MELCO 17. POSITRONICS 18. POSITRONIX 19. RSI SWITCHGEAR 20. SICK 21. STEAM EQUIPMENTS 22. YOKOGAWA
24	Pressure Gauges/DP Gauge	1. A.N.INSTRUMENTS 2. ASHCROFT 3. BAUMER 4. BUDENBERG 5. GAUGES BOURDON 6. GENERAL INSTRUMENTS CONSORTIUM (GAUGES BOURDON) 7. GOA THERMOSTATIC INSTRUMENTS 8. H.GURU 9. MANOMETER 10. PRECISION MASS 11. PYRO ELECTRIC 12. SWITZER 13. WIKA	1. ASHCROFT (NAGANO) 2. ASHCROFT (MASS) 3. BUDENBERG (WIKA) 4. CHEMTROLS 5. GOA INSTRUMENT INDUSTRIES 6. KONICS 7. FORBES MARSHALL 8. MINCO INDIA FLOW ELEMENTS (GIC) 9. NAGANO KEIKI 10. NESSTECH INSTRUMENTS 11. NEW SCIENTIFIC REPAIRS & TRADING 12. PRECISEMEASURE CONTROLS 13. PRESSURE & TEMP.CONTROL 14. PROTECH CONTROL 15. SBEM 16. TEMPSENS 17. THERMAL INSTRUMENT 18. US GAUGE 19. WALCHANDNAGAR INDUSTRIES 20. WAREE INSTRUMENT (BAUMER) 21. WINTERS 22. WISE
25	Pressure & Differential Pressure Switches, Temperature Switches	1. ASHCROFT 2. BARKSDALE 3. CELLA 4. GAUGES BOURDON (GIC) 5. GENERAL INSTRUMENTS 6. GORGEION 7. HERION 8. INDFOS (SWITZER) 9. SOR	1. ASHCROFT (NAGANO) 2. BAUMER 3. BOLL & KIRCH FILTERBAU 4. CELLA (WIKA) 5. DELTA CONTROL 6. DRESSER (ASHCROFT) 7. HYDAC 8. IMI NORGREN HERION 9. ITI BARTON 10. ITT BARTON 11. KAUSTUBHA UDYOG

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – II)			
S.No.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		10. SWITZER 11. TRAFAG CONTROLS 12. UNITED ELECTRIC 13. WIKA	12. KONICS 13. NAGANO KEIKI 14. NEODYNE 15. NESSTECH 16. PRECISION MASS 17. SIEMENS 18. SMC 19. VASU TECH 20. WAAREE INSTRUMENTS 21. WISE CONTROL
26	Proximity sensor/switch	1. FORBES MARSHALL /SHINKAWA 2. GE BENTLEY NEVADA 3. MEGGITT / VIBROMETER 4. PEPPERL+FUCHS 5. ROCKWELL	1. AG SYSTEMS 2. BRUEL AND KJAER 3. EMERSON 4. IFM 5. JAYASHREE ELECTRON 6. PROVIBTECH 7. SKF 8. TIFENBACH
27	Rotameter	1. EUREKA 2. FLOW STAR 3. IEPL 4. PLACKA INSTRUMENTS 5. SAMIL 6. SCIENTIFIC DEVICES 7. INSTRUMENTATION ENGINEERS	1. BROOKS 2. EUREKA INDLEQUIPMENT 3. FLUIDYNE INSTRUMENTS 4. GAUGES BOURDON 5. TANSA EQUIPMENTS 6. TIPL 7. TOKOYO KEISO 8. TRAC 9. TRANSDUCER & CONTROL 10. V-AUTOMAT
28	Server Station/ Engineering/Operator Work Stations	1. DELL 2. HP	1. COMPAQ 2. FUJITSU 3. IBM-LENOVO 4. SIEMENS
29	Solenoid Valves	1. ASCO 2. AVCON 3. HERIONNORGREN 4. ROTEX	1. BUSCHJOST 2. IMI NORGREN HERION 3. MULLER CO-AX AG 4. SCHOVILL DUNCAN 5. SCHRADER
30	Temperature Gauges	1. A.N.INSTRUMENTS 2. ASHCROFT 3. BAUMER 4. BUDENBERG 5. DRESSER (ASHCROFT) 6. GAUGES BOURDON	1. ALTOP INDUSTRIES 2. BUDENBERG (WIKA) 3. FORBES MARSHALL 4. GOA INSTRUMENT INDUSTRIES 5. JINDAL ELECTRONICS

CONTROL & INSTRUMENTATION - CONSOLIDATED SUB-VENDOR LIST (CLASS – II)			
S.No.	**EQUIPMENTS/SYSTEM**	**ACCEPTABLE SUB VENDORS (CATEGORY – I)**	**BIDDER TO FURNISH CREDENTIALS (CATEGORY – II)**
		7. GENERAL INSTRUMENTS CONSORTIUM 8. GOA THERMOSTATIC INSTRUMENTS 9. H.GURU 10. PRECISION MASS 11. PYRO ELECTRIC 12. WAREE INSTRUMENT 13. WIKA	6. KONICS 7. MINCO INDIA FLOW ELEMENTS (GIC) 8. NAGANO KEIKI 9. NESSTECH INSTRUMENTS 10. NUOVA FIMA 11. PRESSURE & TEMPERATURE CONTROL 12. TEMPSENS INSTRUMENTS 13. THERMAL INSTRUMENT 14. US GAUGE 15. WALCHANDNAGAR INDUSTRIES 16. WINTERS 17. WISE CONTROL
31	GIU	1. ROCKWELL 2. SCHNEIDER	1. ADVANCE TECH CONTROLS 2. DIGITAL INSTRUMENTS & CONTROL 3. REDLION 4. SSM INFOTECH SOLUTIONS
32	Bottom Ash Hopper Camera	1. HONEYWELL	1. ADTECH 2. CEPL 3. COEN BHARAT 4. DIAMOND POWER 5. DURAG 6. EUTECH SCIENTIFIC ENGINEERING 7. FIRE EYE 8. FLIR 9. FORNEY CORPORATION 10. HI-TECH SYSTEMS & SERVICES 11. IMAGE SENSING TECHNOLOGY 12. LENOX INSTRUMENT 13. LTTS 14. LUCENT (DELTA KAMERASYSTEME) 15. MIRION 16. NETWARE 17. PIPER GMBH 18. SAMHOI 19. SERTEL ELECTRONICS 20. SOBOTTA 21. TECHFAB SYSTEMS 22. TEMPSENS

QUALITY PLAN

General points related to Quality Assurance:

1	The inspection & testing of the cooling towers & its various components shall be as per quality plans approved by the purchaser/ Customer. Bidder shall submit the quality plans based on the guidelines given in specification & quality plans enclosed herein. The customer hold points of BHEL/ Customer/Customer nominated agency shall be marked in the QP at the contract stage, in the event of order & inspection/ testing shall be carried out as per same apart from various test certificates/ inspection records etc.
2	Equipments for which quality plan is not covered in the specification, bidder shall submit QP's for same on the basis of similar guidelines & submit for approval in the event of order.
3	Purchaser / Customer or their authorized representatives shall have the right to inspect at any stage of manufacture & construction, all materials, components & workmanship & testing of material. The bidder shall provide all facilities for inspection & testing without any extra cost to the purchaser/ Consultant.
4	The contractor/ manufacturer shall conduct the following minimum specific tests to ensure that the equipment shall conform to the requirements of specification and in full compliance with the requirements spelt out in applicable codes and standards
4.1	Material identification and testing of gear reducers, regulating valve assemblies, screen assemblies, fan blades and hubs, all supporting structural assemblies, fill supports, all nuts and bolts, sluice valves, fan shafts, fills packs, gear sets, nozzles and all other applicable components constituting each cooling tower.
4.2	Oil leakage and oil temperature rise, backlash, noise level & amperage at full load torque with reduced speed shall be checked for each gear reducer assembly.
4.3	Dynamic balancing of drive shaft assembly and all other rotating components.
4.4	Measurement of proof strength and contour for each fan blade.
4.5	Static balancing test, checking of fan blade moment weight and blade track variation of fan blades, with checking of pitching and blade tip variation at site.
4.6	Complete assembly of drive shaft, Fan hub and Fan blades shall be statically balanced at Site
4.7	Visual, dimensional checking of all components of each cooling tower.
4.8	Material testing of all components, hydrostatic testing of all pressure parts at a pressure and duration in compliance with this specification, static and dynamic balancing tests of all rotating components such as pump shaft, line shaft, impeller etc. and complete performance testing as minimum for each sludge pump in each cooling tower.
4.9	Tests for hoists, chain pulley blocks and all other lifting tackle shall be carried out as per relevant Indian/ equivalent international standards.
5	Any other tests deemed necessary for safe, reliable and satisfactory operation of the equipment.

VOLUME: II-A

SECTION-VIII

QUALITY ASSURANCE REQUIREMENTS

1.00.00 QUALITY ASSURANCE PROGRAMME

1.01.00 To ensure that the equipment and services under the scope of Contract whether manufactured or performed within the Successful Contractor's works or at his Sub-Vendor's premises or at the Owner's site or at any other place or work are in accordance with the specifications, the Successful Contractor shall adopt suitable quality assurance programme to control such activities at all points, as necessary. Such programmes shall be outlined by the Successful Contractor and shall be finally accepted by the Owner/ Authorised representative after discussions before the award of contract. A quality assurance programme of the Successful Contractor shall generally cover the following:

a) His organisation structure for the management and implementation of the proposed quality assurance programme.

b) Documentation control system.

c) Qualification data for Contractor's key personnel.

d) The procedure for purchase of materials, parts, components and selection of Sub-Vendor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc.

e) System for shop manufacturing and site erection control including process controls and fabrication and assembly controls.

f) Control of non-conforming items and system for corrective actions.

g) Inspection and test procedure both for manufacture and all site related works.

h) Control of calibration and testing of measuring and testing equipments.

i) System for quality audit.

j) System for indication and appraisal of inspection status.

k) System for authorising release of manufactured product to the Owner.

l) System for handling storage and delivery.

m) System for maintenance of records.

n) Furnishing of quality plans for manufacturing and field activities detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment/component as per format enclosed at Annexure-I to this section.

2.00.00 GENERAL REQUIREMENTS - QUALITY ASSURANCE

2.01.00 All materials, components and equipment covered under this specification shall be procured, manufactured and tested at all the stages, as well as Services provided for erection, commissioning and testing shall be as per a comprehensive Quality Assurance Programme. An indicative programme of inspection/tests to be carried out by the Contractor for some of the major items is given in the respective technical specification. This is however, not intended to form a comprehensive programme as it is the Contractor's responsibility to draw up and implement such programme and reviewed by by the Owner/Consultant. The detailed Quality Plans for manufacturing and field activities should be drawn up by the Contractor, separately in the format attached at Annexure-I and will be submitted to Owner/Owner's representative for review. Schedule of finalisation of such quality plans will be finalised before award.

2.02.00 Manufacturing Quality Plan will detail out for all the components and equipment, various tests/inspection, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by Contractor's Quality Control organisation, the relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/performance testing.

2.03.00 Field Quality Plans will detail out for all the equipment, the quality practices and procedures etc. to be followed by the Contractor's site Quality Control organisation, during various stages of site activities from receipt of materials/equipment at site.

After pipe lines have been laid and joined, the same shall be tested hydrostatically as specified in this section.

For Welded Joints, Non- Destructive Test (NDT) shall be performed as per relevant codes or mentioned elsewhere in the specification, whichever is stringent.

All the longitudinal and circumferential welded seams shall be subjected to chalk and kerosene test prior to hydraulic testing. This shall be done at the presence of the Owner. In addition to this, test coupons shall have to be provided for each longitudinal seams for mechanical tests (tensile and bend), if considered necessary by the Owner. The test coupons are to be broken in presence of the Owner. Contractor shall satisfy the Owner that work is being carried out in accordance with the specification drawings and other

conditions. Owner shall have full access to the Contractor's working area.

Contractor's scope of supply for fabrication, erection, cleaning, testing and commissioning of the piping systems installed by him shall include the following:-

All welding consumables like welding electrodes, filler rods and wires; gases like oxygen, acetylenes, argon, carbon-dioxide, propane, backing rings etc.

Films for radiographic examination of welds.

X-ray and Gamma -ray equipment including isotopes, dye penetrants, and other required non-destructive testing materials and equipment (all to be taken back by the Contractor after completion of work).

All heating and stress relieving equipment, thermocouples asbestos blankets, cables, temperature recorders, charts heat sensitive chalks and crayons etc. (All to be taken back by Contractor after completion of work).

All machinery, equipment tools and tackles as required for transportation handling, fabrication and erection (All to be taken back by Contractor after completion of work).

All equipment/ materials as required for cleaning, flushing, blowing out and hydro testing of the piping systems; these shall include but not be limited to pumps and compressors with prime movers, instruments, pipe work with supports, valves, strainers and other specialties, blanks, plugs, spool pieces, dummy plates, electrical accessories, etc. (All to be taken back by Contractor after completion of work).

All scaffolding materials and false work (To be taken back by Contractor after completion of work).

2.04.00 The Contractor shall also furnish copies of the reference documents/plant standards/acceptance norms/tests and inspection procedure etc., as referred in Quality Plans along with Quality Plans. These Quality plans and reference documents/standards etc. will be subject to Owner/Consultant approval without which manufacture shall not proceed. In these approved quality plans, Owner/ Consultant shall identify Customer Hold Points (CHP), test/checks which shall be carried out in presence of the Owner/Consultant and beyond which the work will not proceed without consent of Owner/ Consultant in writing.

All deviations to this specification, approved quality plans and applicable standards must be documented and referred to Owner/Consultant for acceptance and dispositioning.

2.05.00 The Contractor shall provide adequate notice to the Owner for inspection before the material is dispatched as per the provisions of the Contract. No material shall be despatched from the manufacturer's works before the same is accepted subsequent to pre-despatch final inspection or verification of records of tests/inspections or verification of certificate of compliance (as the case may

be) as per the approved Quality Plan by Owner/Consultant and duly authorised for despatch issuance of Material Despatch Clearance Certificate (MDCC).

2.06.00 All materials used or supplied shall be accompanied by valid and approved materials certificates and tests and inspection report. These certificates and reports shall indicate the sheet numbers or other such acceptable identification numbers of the material. The material certified shall also have the identification details stamped on it.

2.07.00 All the individual and assembled rotating parts shall be statically and dynamically balanced in the works.

Where accurate alignment is necessary for component parts of machinery normally assembled on site, the Contractor shall allow for trial assembly prior to despatch from place of manufacture.

2.08.00 Castings and forgings used for construction shall be of tested quality. Details of results of chemical analysis, heat treatment record, mechanical property test results shall be furnished.

2.09.00 All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section-IX/BS-4870 or other International equivalent standard acceptable to the Owner. However, all brazers, welders etc. employed on any part of the contract at site shall be qualified as per ASME Section-IX or BS-4871 or equivalent international standard approved by the Owner. Such qualification tests shall be conducted in presence of Owner/his authorised representative.

For welding of pressure parts and high pressure piping the requirements of IBR shall also be complied with.

Under no circumstances any repair or welding of castings be carried out without the consent of the Owner. Proof of the effectiveness of each repair by radiographic and/or other non-destructive testing technique, shall be provided to the Owner.

All pressure parts shall be subjected to hydraulic testing as per the requirements of IBR. Other parts shall be tested for one and half times the maximum operating pressure, for a period not less than thirty (30) minutes.

2.10.00 All non-destructive examination (NDT) shall be carried out in accordance with approved international standard. The NDT operator shall be qualified as per SNT-TC-IA (of American Society of non- destructive examination). Results of NDT shall be properly recorded and submitted for acceptance.

All welding procedures adopted for performing welding work shall be qualified in accordance with the requirements of Section-IX of ASME code or IBR as applicable. All welded joints for pressure parts shall be tested by liquid penetrant examination according to the method outlined in ASME Boiler and Pressure Vessel code. Radiography, magnetic particle examination and ultrasonic testing shall be employed wherever necessary/ recommended by the

applicable code. At least 10% of all major butt welding joints shall be radiographed or as specified elsewhere whichever is stringent. Statutory payments in respect of IBR approvals including inspection shall be made by Contractor. Contractor's scope and responsibility shall also include preparation and submission of all necessary documents in the specific formats and manner stipulated by the statutory bodies, coordination and follow up for above approvals.

2.11.00 All the Sub-Vendors proposed by the Contractor for procurement of major bought out items including castings, forgings, semi-finished and finished components/equipment list of which shall be drawn up as per the stipulation laid elsewhere in the specification. Quality Plans of the successful Sub-Vendors shall be discussed, finalised and accepted by the Owner/Consultant and form part of the Purchase Order between the Contractor and the Sub-Vendor.

2.12.00 All the purchase specifications for the major bought-out items, list of which shall be drawn as per the stipulation laid elsewhere in the specification.

Owner reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor's or their Sub-Vendor's quality management and control activities. The Contractor shall provide all necessary assistance to enable the Owner carry out such audit and surveillance.

Quality audit/acceptance of the results of tests and inspection will not prejudice the right of the Owner to reject equipment not giving the desired performance after erection and shall not in no way limit the liabilities and responsibilities of the Contractor in earning satisfactory performance of equipment as per specification.

2.13.00 Quality requirements for main equipment shall equally apply for spares and replacement items.

2.14.00 Repair/rectification procedures to be adopted to make any job acceptable shall be subject to the acceptance of the Owner.

2.15.00 For quality assurance of all civil works refer to the specifications for civil works.

3.00.00 QUALITY ASSURANCE DOCUMENTS

3.01.00 The Contractor shall be required to submit two (2) copies and two (2) sets of microfilms of the following Quality Assurance documents within three (3) weeks after despatch of the equipment:

a) Material mill test reports on components as specified by the specification.

b) The inspection plan with verification, inspection plan check points, verification sketches, if used and methods used to verify that the inspection and testing points in the inspection plan were performed satisfactorily.

c) Non-destructive examination results /reports including radiography interpretation reports.

d) Factory tests results for testing required as per applicable codes and standards referred in the specification.

e) Welder identification list listing welder's and welding operator's qualification procedure and welding identification symbols.

f) Sketches and drawings used for indicating the method of traceability of the radiographs to the location on the equipment.

g) Stress relief time temperature charts.

h) Inspection reports duly signed by QA personnel of the Owner and Contractor for the agreed inspection hold points. During the course of inspection, the following will also be recorded :

i) When some important repair work is involved to make the job acceptable.

ii) The repair work remains part of the accepted product quality.

i) Letter of conformity certifying that the requirement is in compliance with finalised specification requirements.

4.00.00 INSPECTION, TESTING AND INSPECTION CERTIFICATES

4.01.00 The Successful Contractor shall give the Owner fifteen (15) days written notice of any material being ready for testing for Indian supply and 1 month for FOB. Such tests shall be to the Successful Contractor's account except for the expenses of the Inspector. The Owner’s Inspector, unless the witnessing of the tests is virtually waived, will attend such tests within fifteen (15) days for Indian supply and 1 month for FOB of the date on which the equipment is notified as being ready for test/inspection failing which the Successful Contractor may proceed with test which shall be deemed to have been made in the Inspector's presence and shall forthwith forward to the Inspector duly certified copies of test reports in six (6) copies.

4.02.00 The Owner’s Engineer or Inspector shall within fifteen (15) days from the date of Inspection as defined herein give notice in writing to the Successful Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract. The Successful Contractor shall give due consideration to such objections and shall either make modifications that may be necessary to meet the said objections or shall confirm in writing to the Owner’s Engineer/Inspector giving reasons therein, that no modifications are necessary to comply with the contract.

4.03.00 When the factory tests have been completed at the Contractor's or sub-Vendor's works, the Owner/Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests but if the tests are not witnessed by the Owner/ Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the Owner/Inspector. Failure of the Owner/Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the works. The completion of these tests, or the issue of the certificates shall not bind the Owner to accept the equipment should it, on further tests after erection be found not to comply with the contract.

4.04.00 The Contractor shall furnish quarterly inspection programme indicating schedule dates of inspection at customer hold point and final inspection stages. Updated quarterly inspection plans will be made for each three consecutive months and shall be furnished before beginning of each calendar month.

ANNEXURE-I : FORMAT OF QUALITY ASSURANCE PROGRAMME

Name of Company/ Successful Contractor	NAME OF CONTRACT PACKAGE			QUALITY PLAN FOR						
	Package No. : _____ Contractor : _____			QP No. : _____ Date _____ Rev.No.: _____ Date _____						
Sl. No.	Component & Operation	Characteristics	Class	Type of Check	Quantum of Check	Reference Document	Acceptance Norm	Format of Record	Agency	Remarks

ANNEXURE-II: FORMAT OF MANUFACTURING QUALITY PLAN

MFGR.'s LOGO	MANUFACTURER'S NAME AND ADDRESS	MANUFACTURING QUALITY PLAN	PROJECT : PACKAGE : CONTRACT NO. : MAIN-SUPPLIER :
		ITEM : SUB-SYSTEM:	QP NO.: REV. NO.: DATE: PAGE: …. OF….

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
										M	C	L	
1.	2.	3.	4.	5.	6.	7.	8.	9.	D*	10.			11.

LEGEND: * RECORDS, INDENTIFIED WITH "TICK" (√) WILL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
** **M:** MANUFACTURER/SUB-SUPPLIER
C: SUPPLIER/NOMINATED INSPECTION AGENCY, L: OWNER
P: PERFORM **W**: WITNESS AND **V:** VERIFICATION. AS APPROPRIATE,

CHP: OWNER WILL IDENTIFIED IN COLUM "N"

DOC. NO.: REV……
CAT…..

MANUFACTURER/ SUB-SUPPLIER	MAIN-SUPPLIER	FOR OWNER USE			
SIGNATURE			REVIEWED BY	APPROVED BY	APPROVAL SEAL

MFGR.'s LOGO	SUPPLIER'S NAME AND ADDRESS	ANNEXURE – III: FORMAT OF FIELD QUALITY PLAN	PROJECT : PACKAGE : CONTRACT NO. : MAIN-SUPPLIER:
		ITEM : SUB-SYSTEM :	QP NO.: REV.NO.: DATE: PAGE: …. OF….

SL. NO	ACTIVITY AND OPERATION	CHARACTERISTICS / INSTRUMENTS	CLASS# OF CHECK	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D*	REMARKS
1.	2.	3.	4.	5.	6.	7.	8.	9.		10.

MANUFACTURER/ SUB-SUPPLIER	MAIN-SUPPLIER
SIGNATURE	

LEGEND: * RECORDS, INDENTIFIED WITH "TICK" (√) WILL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
LEGEND TO BE USED: CLASS # : A = CRITICAL, B=MAJOR, C=MINOR;
'A' WILL BE WITNESSED BY OWNER FQA, **'B'** WILL BE WITNESSED BY OWNER ERECTION / CONSTRUCTION DEPTT. AND **'C'** WILL BE WITNESSED BY CONTRACTOR (A & B CHECK WILL BE OWNER CHP STAGE)

FOR OWNER USE	DOC. NO.: REV……		
	REVIEWED BY	APPROVED BY	APPROVAL SEAL

FORMAT NO.:	1/1	Engg. Div. / QA&I

ANNEXURE-IV : FORMAT OF FIELD WELDING SCHEDULE

PROJECT : FWS NO :

CONTRACTOR : REV NO. :

PACKAGE : FIELD WELDING CODE :

SYSTEM : PAGE NO. :

Sl No.	Drawing No. for Weld Locations & Identification mark	Description of parts to be welded	Material specification	Dimensions	Process of Welding	Type of Weld	Electrode Filler Specification	WPS No.	Minimum Preheat Temperature	Heat Treatment Temperature [Holding Time in secs]	NDT Method Quantum	NDT Specification Number	Accep-tance Norm Ref.	Remarks

The Field Welding Schedule should be submitted for :

- Pressure Parts
- Tanks/Vessels
- Piping
- Heavy/Important Structural Steel
- Heat Exchangers
- Bus Ducts

ANNEXURE-V : FORMAT OF INSPECTION REQUEST FORM			
From :			
To :			
Attn :			
Dear Sirs, Items detailed below are ready for inspection. Please arrange inspection and confirm the date of inspection.			
1.	Purchaser	:	
2.	Project	:	
3.	Purchaser's order reference	:	
4.	Consultant's reference	:	
5.	Sub-order reference	:	
6.	Sub-contractor's name and full address	:	
7.	Place of Inspection (full address)	:	
8.	Contact person, telephone no., Mobile No. and email ID.	:	
9.	Description of item and quantity	:	
10.	Nature of inspection required	:	
11.	Proposed date(s)	:	
12.	Weekly holiday	:	
We confirm that the items have been fully inspected/tested by us at all stages, of inspection as per quality plan, and all material test certificates, QC records, test Reports, calibration records of measuring/testing instruments with tractability to national level are available with us.			

Thanking you and awaiting your confirmation.
Yours faithfully, Cc: Sub-contractor
Note : 1. Clear notice period (date of receipt to date of inspection of ..... days) 2. Weekly holidays for Purchaser: Sunday. 3. General Holidays : As per NLC IL / Odisha state government holidays towards local inspection.

COOLING TOWERS(IDCT)

SN	TESTS/CHECK / ITEMS / COMPONENTS	Material Test	WPS/PQR/Welder Qualification	Ultrasonic test	DPT/MPI	Balancing	Assembly Fit up	Dimension	RT	Hydraulic / Water Fill	Test as per relevant Std/ Approved Data Sheets	Other Tests
1	**GEAR BOX**						Y[1]	Y				Y[2]
1.1	Shaft and gear blanks	Y[a]		Y	Y[b]							
1.2	Gear Box Casing	Y[a]								Y		
2	**FAN ASSEMBLY**					Y	Y	Y				Y[3]
2.1	Fan hub	Y[a]	Y		Y[b]				Y[4]			Y[3]
2,2	Fan blades	Y[a]						Y				Y[3]
3A	**DRIVE SHAFT (SS) FOR FAN**	Y[a]	Y	Y	Y[b]	Y		Y				
3B	**CARBON FIBER DRIVE SHAFT**	SEE NOTE - 15										
4	**PVC FILL & DRIFT ELIMINATOR**	Y[5]					Y	Y			Y	Y[6]
5	**GATE/ GLOBE/ CHECK VALVES**	Y[a]			Y[b]		Y			Y	Y	Y[8]
6	**BUTTERFLY VALVES**				Y		Y	Y		Y	Y	Y[9]
6.1	Body (Cast) , Disc (Cast)	Y[a]			Y[b]			Y				
6.2	Body & Disc both fabricated	Y[a]	Y	Y	Y[b]			Y	Y[10]			
6.3	Shaft	Y[a]		Y[c]	Y[b]			Y				
7	**ROLLED & WELDED PIPES.**	Y[a]	**REFER NOTE – 11 FOR ALL CHECKS**									
8	**WRAPPING & COATING OF PIPES**	Y[12]						Y			Y	Y
9	**HOISTS & CHAIN PULLEY BLOCKS**	Y[a]	Y		Y		Y	Y			Y	Y[13]
10	**VENTILATION FANS**	Y[a]	Y	Y[c]	Y[b]	Y	Y	Y			Y	Y[14]
11	**FRP STRUCTURE**											
11.1	**Fibre Glass- Pultruded Structural Products**	See Note- 16 & 18										
11.2	**Fiber Glass- Reinforced Plastic Panels**	See Note 17 & 18										
11.3	**Fiber Glass- Reinforced Pipes**	The FRP pipes shall conform to CTI-154										

COOLING TOWERS(IDCT)

	Legend/ Notes:	
a.	One per Heat/Heat Treatment batch/Lot	
b.	On machined surfaces only of castings and forgings. Also 100% after root run/ back gauging for butt welds and 10% after final butt welds and fillet welds.	
c.	UT shall be done for shafts with Diameter 50 mm or above & Plates of Thickness 25 mm or above.	
1.	Blue Matching and Backlash of the gears shall be checked.	
2.	No load run test for 4 hours to check noise, vibration, oil leakage and temperature rise.	
3.	Proof load test, moment weight test on blades, blade track variation & tip clearances shall be checked. Galvanizing tests as per relevant IS.	
4.	10% RT on Butt welds of Fan Hub only (in case fabricated).	
5.	PVC material shall meet the requirements of CTI Bulletin STD-136. However impact test may be done as per ASTM-D-256 and Flammability test may be done as per ASTM-D-635 with extinguishing type PVC. Density & VICAT softening temperature tests shall also be conducted.	
6.	UV exposure shall be carried out on samples, at reputed third party laboratories as per ASTM -G26 method- C/standard specified in engineering portion of the specification for cooling tower. Impact test before and after UV exposure shall be conducted as per ASTM D-256.	
7.	--NA---.	
8.	Blue matching, Wear travel for Gate valves & reduced pressure test for Check valves shall be conducted as per relevant standards.	
9.	For POD of Butterfly Valves refer respective engineering section of the technical specification.	
10.	In case of fabricated construction of Butterfly Valves and companion flanges, UT on Plates of Thickness 20 mm or above for body and disc, and RT on 100% Butt welds shall also be carried out. Welders and WPS shall be qualified as per ASME section -IX. Stress reliving after complete welding shall be carried out as per ASME Section - IX	
11.	Tests	Quantum of Check
	WPS, PQR, Welder Qualification Test	100%
	DPT on root run	100% on pipes up to 1200 mm diameter
	DPT after back gauging	100% on pipes above 1200 mm diameter
	RT/ UT by TOFD Technique/PAUT	5% (covering 100% of `T'-joints)
	DPT on finished welds	10%
	Hydraulic Test	100%, Test pressure = 1.5 times the design pressure or 2 times the working pressure whichever is higher.
	Note:- After erection, the complete piping system shall be tested at 1.5 times, the design pressure or two times the maximum working pressure whichever greater. No leakage/seepage is acceptable. Butt weld joints which would not be hydro-tested shall be subjected to 100% RT test/ 100% UT by TOFD /PAUT Technique.	
12.	Spark test, adhesion test and material tests for primer & enamel and coal tar tapes as per AWWA-C-203.	

13.	Ropes shall meet relevant Code requirements. All motions & safety features shall be tested at Works. Full load & 25% overload test shall also be conducted at works. At site, Full load test shall be conducted with all motions and safety features.
14.	One Fan of each type & size will be performance tested as per corresponding Code, for Air Flow, Static pressure, Total pressure, Speed, Efficiency, Power Consumption, Noise, and Vibration & Temperature rise. Also, all fans shall be subjected to run test of 4 hours during which Noise, Vibration, Temperature rise & current drawn shall be measured.
15.	In case of Carbon Fiber Shaft, following checks are applicable a. Manufacturer Test Certificate for Carbon Fiber and Resin b. Dimensional Check, Run out Test and Dynamic Balancing Test on Finished Shaft c. Torsional Test on Drive Shaft Assembly along with flange as a type test to verify the factor of safety. d. Type test for bonding strength at joint between shaft & shaft flange. In case of proven design, test reports of the previous test conducted shall be reviewed. e. UV test for demonstrating the compliance with respect to requirement of UV ray stabilization. Acceptance criteria of the above tests shall be mutually discussed during pre-award discussions based on proven practices of the manufacturer or relevant standards as available
16.	The physical and mechanical properties of FRP pultruded sections as specified in CTI- Standard 137 shall be tested. Fire retardant property as specified shall be tested.
17.	The physical properties of FRP Panels as specified in CTI- Standard 131 shall be tested.
18.	The UV test on identified samples of FRP Pultruded Sections, FRP Panels and FRP Pipes shall be carried out.

LOW PRESSURE PIPING

PIPES, FITTINGS, BENDS, VALVES, COATING-WRAPPING, STRAINERS EXPANSION, JOINTS, TANKS, FASTENERS, LINING ETC.

	Tests/Check / Items / Components	Material Test	DPT/MPI / RT	Ultrasonic Test	WPS/ WQS/PQR	Hydraulic / Water Fill Test	Pneumatic Test	Assembly Fit up	Dimensions	Functional/operational Test	Other Tests	All Tests as per relevant Std	REMARKS
1	Pipes & Pipe Fittings	Y[a]	Y[b]			Y1			Y			Y	
2	Diaphragm Valves	Y[a]				Y[5]			Y		Y[6]		
3A	Cast Butterfly Valves (Low Pressure)					Y		Y	Y	Y	Y[7]		
	Body	Y[a]	Y[b]										
	Disc	Y[a]	Y[b]										
	Shaft	Y[a]	Y	Y[c]									
3B	Fabricated Butterfly Valves	**REFER NOTE 14**											
4	Gate/ Globe/Swing Check / Ball Valves	Y[a]	Y[b]	Y[c]		Y[5]	Y	Y	Y	Y	Y[8]		
5	Dual Plate Check Valves	Y[a]	Y[b]	Y[c]		Y	Y	Y	Y	Y	Y[4]		
6	Rolled & Welded Pipes and Mitre Bends	Y[a]	Y[3]		Y	Y[3]			Y		Y[3&15]	Y	
7	Coating & Wrapping of Pipes	Y[2]									Y[2]		
8	Tanks & Vessels	Y[a]	Y[b]		Y	Y			Y		Y[16]		
9	Strainers	Y[a]	Y[b]		Y #	Y					Y[11]		#For Fabricated Strainer
10	Rubber Expansion Joints	Y[a]				Y[12]		Y	Y		Y[13]		
11	Internal Lining of Pipes	Y[a]							Y		Y[9]		
12	Site Welding		Y[10]		Y	Y							

NOTES (MEANING OF SUPERSCRIPTS)

a	One per heat/heat treatment batch/lot.
b	On machined surfaces only for castings and on butt welds.
c	For shaft/spindles > or = 40 mm
1	100% Hydraulic test shall be carried out. Weld joints not subjected to hydraulic test due to some unavoidable reasons, shall be subjected to 100% RT/PAUT.
2	Spark Test, Adhesion Test and Material Test for primer and enameled & Coal Tar Tapes as per AWWA-C-203-91/ IS-10221 & IS 15337 as applicable.
3	Followings are the testing requirements for fabrication of pipes at site

TESTS	**QUANTUM OF CHECKS**
WPS, PQR, Welder Qualification Test	100% Welders and WPS shall be qualified as per ASME- section IX
DPT on root run	100% for pipes up to 1200 mm diameter
DPT after back gauging	100% for pipes above 1200 mm diameter
RT / UT by (TOFD/PAUT) Technique	5% (100% of T Joints)

LOW PRESSURE PIPING

	DPT on finished butt weld joints	10%
	Hydraulic Test	100%, 1.5 times the design pressure or 2 times the working-pressure whichever is higher.
4	Dry Cycle Test on Dual Plate Check valve spring for one lakh Cycles shall be carried out as a type test. If Dry Cycle test carried out earlier for same material & diameter, Test report shall be reviewed.	
5	Seat Leakage Test for Actuator Operated Valves, shall be done with by closing the valves with actuator.	
6	Tests on rubber parts shall be conducted per batch of rubber mix for tensile, Elongation, hardness, adhesion, spark test, bleed resistance test. In addition, type test for 50,000 cycles of each type of diaphragm shall also be conducted.	
7	Hydraulic Test of Body, Seat and disc-strength shall be carried out in accordance with governing design standard in presence of owner / owner's representatives. Actuator operated valves shall be checked for Seat Leakage by closing the valves with actuator. For Proof of Design Test refer respective chapters of engineering portion in the technical specification.	
8	Blue matching, wear travel for gates, valves, pneumatic seat leakage, and reduced pressure test for check valves shall be done as per relevant standard. Maximum allowable vacuum loss is 0.5 mm of Hg abs. for valves to be tested for vacuum operation for internal pressure 25 mm of Hg abs. for a period of 15 minutes. Fire safe test for ball valve shall be done wherever specified. In case of already carried out, the test report shall be submitted for review and acceptance by owner / owner's representatives. Valves shall be offered for hydro test in unpainted condition.	
9	Tensile, Elongation, Hardness, Specific Gravity, Lining Thickness, Humidity Check, Pipe temperature check, Adhesion Test and Holiday Detection Test etc as per applicable standard shall be done for all lining material and application.	
10	10% of welds (Root and finished welds) shall be subjected to DPT. (100% DPT for compressed air line and boiler & deaerator fill line.).	
11	Pressure drop across the strainer for each type and size as a special test shall be carried out. In case of already carried out, the test report shall be submitted for review and acceptance by owner / owner's representatives.	
12	During hydraulic and vacuum tests at 25mm Hg abs in 3 positions, the change in the circumference of arch should not be more than 1.5%. 24 hrs after the test permanent set in dimension should not exceed 0.5%.	
13	Tests on rubber for tensile, elongation, hardness, hydraulic stability check as per ASTM D 471, ozone resistance test as per ASTM D 1149/IS 3400 Part 20 aging test and adhesion strength of rubber to fabric, rubber to metal adhesion shall be carried out.	
14	In addition of all tests as indicated for Cast Butterfly valve being applicable for fabricated butterfly valves, following test shall be done for Fabricated Butterfly Valve: a. UT as per ASTM A-435/IS 11630 & IS 4225 on plate material for body and disc shall be carried out for plate thickness 25mm and above. b. 100% RT and DPT as per ASTM, Section-VIII, Division-I, on butt joins of body and disc. 10% DPT on other welds shall be done. c. Post weld heat treatment as per ASME, Section-VIII, Division-I on butt joints of body and disc. d. Welders and WPS shall be qualified as per ASME- section IX	
15	Maximum number of segments in segmental flanges shall be four (04) only. All butt weld joints in the segmental flanges shall be examined by RT/UT. Segmental flanges exceeding 37.5 mm thickness shall be stress relieved as per norms of ASME Section VIII after welding.	
16	For pressure vessel welds RT shall be done as per design code requirements.	

All Valves shall be offered for inspection in unpainted condition.

No repair welding is permitted on Cast Iron / Alloy Cast Iron Castings.

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-Q-006, REV-02	DATE: 17.04.2020
		PROJECT:		PO NO.:	DATE:
		ITEM: AC ELECT. MOTORS UPTO 55KW (LV (415V))	SYSTEM:	SECTION: II	SHEET 1 of 2

S. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9		**			
					M	C/ N				D	M	C	N	
1.0	ASSEMBLY	1.WORKMANSHIP	MA	VISUAL	100%	-	MFG. SPEC.	MFG. SPEC.	LOG BOOK		P	-	-	
		2.DIMENSIONS	MA	VISUAL	100%	-	MFG. DRG./ MFG. SPEC.	MFG. DRG./ MFG. SPEC.	LOG BOOK		P	-	-	
		3.CORRECTNESS COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	MA	VISUAL	100%	-	MFG.SPEC./	MFG.SPEC.	LOG BOOK		P	-	-	
2.0	PAINTING	1.SHADE	MA	VISUAL	SAMPLE	-	MFG. SPEC/ APPROVED DATASHEET	MFG. SPEC/ APPROVED DATASHEET	LOG BOOK	✓	P	V	-	
3.0	TESTS	1.ROUTINE TEST INCLUDING SPECIAL TEST	MA	VISUAL	100%	-	IS-325 / IS-12615/ APPROVED DATA SHEET	IS-325 / IS-12615/ APPROVED DATA SHEET	TEST/ INSPN. REPORT	✓	P	V *	-	* NOTE -1
		2.OVERALL DIMENSIONS & ORIENTATION	MA	MEASUREMENT & VISUAL	100%	-	APPROVED DRG/ DATA SHEET	APPROVED DRG/ DATA SHEET	TEST/ INSPN. REPORT	✓	P	V *	-	* NOTE -1 & NOTE-2

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
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Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	RITESH KUMAR JAISWAL	RITESH KUMAR JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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		3.NAMEPLATE DETAILS	MA	VISUAL	100%	-	IS-325 / IS-12615 / APPROVED DATA SHEET	SAME AS COL. 7	TEST/ INSPN. REPORT	✓	P	V	-	
4.0	PACKING	SURFACE FINISH & COMPLETENESS	MA	VISUAL	100%	100%	AS PER MFG. STANDARD / (#)	AS PER MFG. STANDARD / (#).	INSPC. REPORT	✓	P	W	-	(#) REFER NOTE-8

NOTES:
1. Routine tests on 100% motors shall be done by the vendor. However, BHEL/ Customer shall witness routine tests on random samples. The sampling plan shall be mutually agreed upon.
2. For exhaust/ventilation fan motors of rating up to 1.5 KW, only routine test certificates shall be furnished for scrutiny.
3. In case test certificates for these tests on similar type, size and design of motor from independent laboratory are available, the same is valid for 5 years.
4. BHEL reserves the right to perform repeat test, if required.
5. After packing and prior to issue MDCC, photographs of items to be despatched shall be sent to BHEL for review.
6. In case of any changes in QP commented by customer at contract stage, same shall be carried out by bidder without any implication to BHEL/ Customer.
7. Project specific QP to be developed based on customer requirement.
8. For export job, BHEL technical specification for seaworthy packing to be followed.
9. Packing shall be suitable for storage at site in tropical climate conditions.
10. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) indicated in QP shall be referred.

LEGENDS:
*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
** **M:** SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **B:** MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **C:** CUSTOMER,
P: PERFORM, **W**: WITNESS, **V:** VERIFICATION, AS APPROPRIATE
MA: MAJOR, **MI**: MINOR, **CR:** CRITICAL
D: DOCUMENTATION

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BIDDER/ SUPPLIER	
Sign & Date	
Seal	

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		CUSTOMER :		QP NO.: PE-QP-999-Q-007, REV-04	
		PROJECT:		PO NO.:	
		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))	SYSTEM:	SECTION: II	SHEET 1 OF 9

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY			
1	2	3	4	5	6		7	8	9	*	**			
					M	C/N				D	M	C	N	
1.0	RAW MATERIAL & BOUGHT OUT CONTROL													
1.1	SHEET STEEL, PLATES, SECTION, EYEBOLTS	1.SURFACE CONDITION	MA	VISUAL	100%	-	-	FREE FROM BLINKS, CRACKS, WAVINESS ETC	LOG BOOK		P	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	-	MANUFACTURER'S DRG./SPEC	MANUFACTURER'S DRG./SPEC	LOG BOOK		P	-	-	
		3.PROOF LOAD TEST (EYE BOLT)	MA	MECH. TEST	SAMPLE	-	MANUFACTURER'S DRG./SPEC	MANUFACTURER'S DRG./SPEC	TEST REPORT		P/V	-		
1.2	HARDWARES	1.SURFACE CONDITION	MA	VISUAL	100%	-		FREE FROM CRACKS, UN-EVENNESS ETC.	TEST REPORT		P	-	-	
		2.PROPERTY CLASS	MA	VISUAL	SAMPLES	-	MANUFACTURER'S DRG./SPEC	MANUFACTURER'S DRG./SPEC	TC		P/V	-	-	PROPERTY CLASS MARKING SHALL BE CHECKED BY THE VENDOR
1.3	CASTING	1.SURFACE CONDITION	MA	VISUAL	100%	-	MANUFACTURER'S DRG./SPEC	FREE FROM CRACKS, BLOW HOLES ETC.	LOG BOOK		P/V	-		
		2.CHEM. & PHY. PROP.	MA	CHEM & MECH TEST	1/HEAT NO.	-	MANUFACTURER'S DRG./SPEC	MANUFACTURER'S DRG./SPEC	TC		P/V	-		HEAT NO. SHALL BE VERIFIED
		3.DIMENSIONS	MA	MEASUREMENT	100%	-	MANUFACTURER'S DRG.	MANUFACTURER'S DRG.	LOG BOOK		P/V	-		
1.4	PAINT & VARNISH	1.MAKE, SHADE, SHELF LIFE & TYPE	MA	VISUAL	100% CONTINUOUS	-	MANUFACTURER'S DRG./SPEC	MANUFACTURER'S DRG./SPEC	LOG BOOK		P/V	-		

BHEL					
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Sign & Date	
Seal	

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MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:17.04.2020
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	PROJECT:		PO NO.:	
	ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))	SYSTEM:	SECTION: II	SHEET 2 OF 9

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY			
1	2	3	4	5	6		7	8	9	*	**			
					M	C/N				D	M	C	N	
1.5	SHAFT (FORGED OR ROLLED)	1. SURFACE COND.	MA	VISUAL	100%	-	-	FREE FROM VISUAL DEFECTS	LOG BOOK		P	-	-	VENDOR'S APPROVAL IDENTIFICATION SHALL BE MAINTAINED
		2. CHEM. & PHYSICAL PROPERTIES	MA	CHEM. & PHYSICAL TESTS	1/HEAT NO. OR HEAT TREATMENT BATCH NO	-	MANUFACTURER'S DRG./ SPEC.	MANUFACTURER'S DRG./ STD.	TC		P/V	-		
		3. DIMENSIONS	MA	MEASUREMENT	100%	-	MANUFACTURER'S DRG./ SPEC.	MANUFACTURER'S DRG.	LOG BOOK		P/V	-		
		4.INTERNAL FLAWS	CR	ULTRASONIC TEST	100%	-	ASTM-A388	MANUFACTURER'S STD.	INSPECTION REPORT	✔	P/W	V	-	FOR DIA OF 55 MM & ABOVE
1.6	SPACE HEATERS, CONNECTORS, TERMINAL BLOCKS, CABLES, CABLE LUGS, CARBON BRUSH TEMP. DETECTORS, RTD, BTD'S	1. MAKE & RATING	MA	VISUAL	100%	-	MANUFACTURER'S DRG./STD.	MANUFACTURER'S DRG./STD.	INSPECTION REPORT		P/V	-	-	
		2. PHYSICAL COND.	MA	VISUAL	100%	-	MANUFACTURER'S DRG./STD.	NO PHYS. DAMAGE, NO ELECTRICAL DISCONTINUITY	INSPECTION REPORT		P/V	-	-	
		3.DIMENSIONS (WHEREVER APPLICABLE)	MA	MEASUREMENT	SAMPLE	-	MANUFACTURER'S DRG./ STD	MANUFACTURER'S DRG. / STD.	INSPECTION REPORT		P/V	-	-	
		4.PERFORMANCE/ CALIBRATION	MA	TEST	100%	-	MANUFACTURER'S DRG./ STD	MANUFACTURER'S DRG. / STD.	TEST REPORT		P/V	-	-	

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		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))	SYSTEM:	SECTION: II	SHEET 3 OF 9

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY			
1	2	3	4	5	6		7	8	9	-	-			
					M	CN				D	M	C	N	
1.7	OTHER INSULATING MATERIALS LIKE SLEEVES, BINDINGS CORDS, PAPERS, PRESS BOARDS ETC.	1. SURFACE COND. ETC.	MA	VISUAL	100%	-	-	NO VISUAL DEFECTS	TEST REPORT		P/V	-	-	
		2.DIMENSION(BORE DIA, WALL THICKNESS, BDV AS RECEIVED, BDV AFTER FOLDING AT 180°	MA	TEST	SAMPLE	-	MANUFACTURER'S STD.	MANUFACTURER'S STD.	LOG BOOK AND OR SUPPLIER'S TC		P/V	-	-	
1.8	SHEET STAMPING (PUNCHED)	1. SURFACE COND.	MA	VISUAL	100%	-	-	NO VISUAL DEFECTS (FREE FROM BURS)	LOG BOOK		P	-	-	
		2.DIMENSIONS INCLUDING BURS HEIGHT	MA	MEASUREMENT	SAMPLE	-	MANUFACTURER'S DRG. .	MANUFACTURER'S DRG.	LOG BOOK		P/V	-	-	
		3. ACCEPTANCE TESTS	MA	ELECT. & MECH TESTS	SAMPLE	-	MANUFACTURER'S DRG./ STD.	MANUFACTURER'S DRG./ STD.	TC		P/V	-	-	
1.9	CONDUCTORS	1. SURFACE FINISH	MA	VISUAL	100%	-	-	FREE FROM VISUAL DEFECTS	LOG BOOK		*P/V	-	-	* MOTOR MANUFACTURER TO CONDUCT VISUAL CHECK FOR SURFACE FINISH ON RANDOM BASIS (10% SAMPLE) AT HSI WORKS AND MAINTAIN RECORD FOR VERIFICATION BY
		2.ELECT. PROP, & MECH. PROP	MA	ELECT. & MECH.TEST	SAMPLES	-	MANUFACTURER'S DRG./ SPEC.	MANUFACTURER'S / SPEC.	TC & VENDOR'S TEST REPORTS		P/V	-	-	

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		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))	SYSTEM:	SECTION: II	SHEET 4 OF 9

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY			
1	2	3	4	5	6		7	8	9	-	-			
					M	C/N				D	M	C	N	
		3.DIMENSIONS	MA	MEASUREMENT	SAMPLES	-	MANUFACTURER'S DRG./ SPEC.	MANUFACTURER'S / SPEC.	LOG BOOK		P/V	-	-	
1.10	BEARINGS	1.MAKE & TYPE	MA	VISUAL	100%	-	MANUFACTURER'S DRG./ APPROVED DATASHEET	MANUFACTURER'S DRG./ APPROVED DATASHEET	LOG BOOK		P/V	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	-	APPROVED DATASHEET	APPROVED DATASHEET/ BEARING MANUF'S CATALOGUES	LOG BOOK		P/V	-	-	
		3.SURFACE FINISH	MA	VISUAL	100%	-	-	FREE FROM VISUAL DEFECTS	LOG BOOK		P/V	-	-	
1.11	SLIP RING (WHEREVER APPLICABLE)	1.SURFACE COND.	MA	VISUAL	100%	-	-	FREE FROM VISUAL DEFECTS	LOG BOOK		P	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	SAMPLE	-	MANUFACTURER'S DRG	MANUFACTURER'S DRG	LOG BOOK		P	-	-	
		3.TEMP.WITH-STAND CAPACITY	MA	ELECT.TEST	SAMPLE	-	MANUFACTURER'S STD./ APPROVED DATASHEET	MANUFACTURER'S STD./ APPROVED DATASHEET	LOG BOOK		P/V	-	-	
		4.HV/IR	MA	-DO-	100%	-	MANUFACTURER'S STD./ APPROVED DATASHEET	MANUFACTURER'S STD./ APPROVED DATASHEET	LOG BOOK		P/V	-	-	
1.12	OIL SEALS & GASKETS	1.MATERIAL OF GASKET	MA	VISUAL	100%	-	MANUFACTURER'S DRG/SPECS	MANUFACTURER'S DRG./ SPECS.	LOG BOOK		P	-	-	
		2.SURFACE COND.	MA	VISUAL	100%	-	-	FREE FROM VISUAL DEFECTS	LOG BOOK		P	-	-	
		3.DIMENSIONS	MA	MEASUREMENT	SAMPLE	-	MANUFACTURER'S DRG	MANUFACTURER'S DRG	LOG BOOK		P	-	-	

BHEL					
ENGINEERING			QUALITY		
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Seal	

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MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:17.04.2020
	CUSTOMER :		QP NO.: PE-QP-999-Q-007, REV-04	
	PROJECT:		PO NO.:	
	ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))	SYSTEM:	SECTION: II	SHEET 5 OF 9

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY			
1	2	3	4	5	6		7	8	9	*	**			
					M	C/N				D	M	C	N	
2.0	IN PROCESS													
2.1	STATOR FRAME WELDING (IN CASE OF FABRICATED STATOR)	1.WORKMANSHIP & CLEANNESS	MA	VISUAL	100%	-	MANUFACTURER'S DRG	GOOD FINISH	LOG BOOK		P/W	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	100%	-	MANUFACTURER'S DRG	MANUFACTURER'S DRG	LOG BOOK		P	-	-	
2.2	MACHINING	1.FINISH	MA	VISUAL	100%	-	-DO-	GOOD FINISH	LOG BOOK		P	-	-	
		2.DIMENSIONS	MA	MEASUREMENT	100%	-	MANUFACTURER'S DRG	MANUFACTURER'S DRG	LOG BOOK		P	-	-	
		3.SHAFT SURFACE FLOWS	MA	PT	100%	-	MANUFACTURER'S STD./ ASTM-E165	MANUFACTURER'S STD./ APPROVED DATASHEET.	LOG BOOK	✔	P	V	-	
2.3	PAINTING	1.SURFACE PREPARATION	MA	VISUAL	100%	-	MANUFACTURER'S STD./APPROVED DATASHEET	MANUFACTURER'S STD./APPROVED DATASHEET	LOG BOOK		P	-	-	
		2.PAINT THICKNESS (BOTH PRIMER & FINISH COAT)	MA	MEASUREMENT BY ELCOMETER	SAMPLE	-	MANUFACTURER'S STD./APPROVED DATASHEET	MANUFACTURER'S STD./APPROVED DATASHEET	LOG BOOK		P	-	-	
		3.SHADE	MA	VISUAL	SAMPLE	-	MANUFACTURER'S STD./APPROVED DATASHEET	MANUFACTURER'S STD./APPROVED DATASHEET	LOG BOOK		P	-	-	
		4.ADHESION	MA	CROSS CUTTING & TAPE TEST	SAMPLE	-	MANUFACTURER'S STD./APPROVED DATASHEET	MANUFACTURER'S STD./APPROVED DATASHEET	LOG BOOK		P	-	-	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	HEMA KUSHWAHA	HEMA KHUSHWAHA	Checked by:	[illegible]	KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	[illegible] KUMAR JAISWAL	R K JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:17.04.2020
	CUSTOMER :		QP NO.: PE-QP-999-Q-007, REV-04	
	PROJECT:		PO NO.:	
	ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))	SYSTEM:	SECTION: II	SHEET 6 OF 9

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY			
1	2	3	4	5	6		7	8	9	*	**			
					M	C/N				D	M	C	N	
2.4	SHEET STACKING	1.COMPLETENESS	MA	MEASUREMENT	SAMPLE	-	MANUFACTURER'S STD.	MANUFACTURER'S STD.	LOG BOOK		P	-	-	
		2.COMPRESSION & TIGHTENING	MA	MEASUREMENT	100%	-	MANUFACTURER'S STD.	MANUFACTURER'S STD.	LOG BOOK		P	-	-	
2.5	WINDING	1.COMPLETENESS	CR	VISUAL	100%	-	MANUFACTURER'S STD.APPROVED DATASHEET	MANUFACTURER'S STD.APPROVED DATASHEET	LOG BOOK		P	-	-	
		2.CLEANLINESS	CR	VISUAL	100%	-	MANUFACTURER'S STD.APPROVED DATASHEET	MANUFACTURER'S STD.APPROVED DATASHEET	LOG BOOK		P	-	-	
		3.IR-HV-IR	CR	ELECT. TEST	100%	-	IS-325/IS-12615/IEC-60034 PART-1	IS-325/IS-12615/IEC-60034 PART-1	TEST/INSPC. REPORT	✔	P	V	-	
		4.RESISTANCE	CR	ELECT. TEST	100%	-	IS-325/IS-12615/IEC-60034 PART-1	IS-325/IS-12615/IEC-60034 PART-1	TEST/INSPC. REPORT	✔	P	V	-	
		5.INTERTURN INSULATION	CR	ELECT. TEST	100%	-	IS-325/IS-12615/IEC-60034 PART-1	IS-325/IS-12615/IEC-60034 PART-1	TEST/INSPC. REPORT		P	-	-	
2.9	IMPREGNATION	1.VISCOSCITY	MA	PHY. TEST	AT STARTING	-	MANUFACTURER'S STANDARD	MANUFACTURER'S STANDARD	LOG BOOK		P	-	-	
		2.TEMP. PRESSURE VACCUM	MA	PROCESS CHECK	CONTINUOUS	-	MANUFACTURER'S STANDARD	MANUFACTURER'S STANDARD	LOG BOOK		P	-	-	
		3.NO. OF DIPS	MA	PROCESS CHECK	CONTINUOUS	-	MANUFACTURER'S STANDARD	MANUFACTURER'S STANDARD	LOG BOOK	✔	P	V	-	THREE DIPS TO BE GIVEN

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	HEMA KUSHWAHA	HEMA KHUSHWAHA	Checked by:		KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	JITESH KUMAR JAISWAL	R K JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:17.04.2020
	CUSTOMER :		QP NO.: PE-QP-999-Q-007, REV-04	
	PROJECT:		PO NO.:	
	ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))	SYSTEM:	SECTION: II	SHEET 7 OF 9

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY			
1	2	3	4	5	6		7	8	9	-	-			
					M	C/N				D	M	C	N	
		4.DURATION	MA	PROCESS CHECK	CONTINUOUS	-	MANUFACTURER'S STANDARD	MANUFACTURER'S STANDARD	LOG BOOK	✔	P	V	-	
2.7	COMPLETE STATOR ASSEMBLY	1.COMPACTNESS & CLEANLINESS	MA	VISUAL	100%	-	MANUFACTURER'S STANDARD	MANUFACTURER'S STANDARD	LOG BOOK		P	-	-	
2.8	BRAZING/COMPRESSION JOINT	1.COMPLETENESS	CR	VISUAL	100%	-	MANUFACTURER'S STANDARD	MANUFACTURER'S STANDARD	LOG BOOK		P	-	-	
		2.SOUNDNESS	CR	MALLET TEST & UT	100%	-	MANUFACTURER'S STANDARD	MANUFACTURER'S STANDARD	TEST/INSPC. REPORT	✔	P	V	-	
		3.HV	MA	ELECT. TEST	100%	-	MANUFACTURER'S STANDARD	MANUFACTURER'S STANDARD	TEST/INSPC. REPORT	✔	P	V	-	
2.9	COMPLETE ROTOR ASSEMBLY	1.RESIDUAL UNBALANCE	CR	DYN. BALANCE	100%	-	MANUFACTURER'S SPEC./ ISO 1940	MANUFACTURER'S DWG.	LOG BOOK		P	-	-	
		2.SOUNDNESS OF DIE CASTING	CR	ELECT. (GROWLER TEST)	100%	-	MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	TEST/INSPC. REPORT	✔	P	V	-	
2.10	ASSEMBLY	1.ALIGNMENT	MA	MEAS.	100%	-	MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	LOG BOOK		P	-	-	
		2.WORKMANSHIP	MA	VISUAL	100%	-	MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	LOG BOOK		P	-	-	
		3.AXIAL PLAY	MA	MEAS.	100%	-	MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	LOG BOOK	✔	P	V	-	
		4.DIMENSIONS	MA	MEAS.	100%	-	MANUFACTURER'S DRG./ MANUFACTURER'S SPEC.	MANUFACTURER'S DRG./ MANUFACTURER'S SPEC.	LOG BOOK		P	-	-	
		5.CORRECTNESS, COMPLETENESS TERMINATIONS/ MARKING/ COLOUR CODE	MA	VISUAL	100%	-	MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	LOG BOOK		P	-	-	
		6. RTD, BTD & SPACE HEATER MOUNTING.	MA	VISUAL	100%	-	MANUFACTURER'S SPEC.	MANUFACTURER'S SPEC.	LOG BOOK	✔	P	V	-	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	HEMA KUSHWAHA	HEMA KHUSHWAHA	Checked by:		KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	JAISWAL	R K JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:17.04.2020
		CUSTOMER :		QP NO.: PE-QP-999-Q-007, REV-04	
		PROJECT:		PO NO.:	
		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))	SYSTEM:	SECTION: II	SHEET 9 OF 9

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY			
1	2	3	4	5	6		7	8	9	*	**			
					M	C/N				D	M	C	N	
3.0	TESTS	1.TYPE TESTS INCLUDING SPECIAL TESTS	MA	ELECT.TEST	1/TYPE/SIZE	1/TYPE/SIZE	IS-325/IS-12615/APPROVED DATASHEET	IS-325/IS-12615/APPROVED DATASHEET	TEST REPORT	✔	P	W"	-	" NOTE - 1
		2.ROUTINE TESTS INCLUDING SPECIAL TEST	MA	ELECT.TEST	100%	-	IS-325/IS-12615/APPROVED DATASHEET	IS-325/IS-12615/APPROVED DATASHEET	TEST REPORT	✔	P	V$	- -	$ NOTE - 2
		3.VIBRATION & NOISE LEVEL	MA	ELECT.TEST	100%	-	IS: 12075 / IEC 60034-14 & IS-12065	IS: 12075 / IEC 60034-14 & IS-12065	TEST REPORT	✔	P	V$	-	$ NOTE - 2
		4.OVERALL DIMENSIONS AND ORIENTATION	MA	MEASUREMENT & VISUAL	100%	100%	APPROVED DRG/DATA SHEET	APPROVED DRG/DATA SHEET &	TEST/INSPC. REPORT	✔	P	W	-	
		5.DEGREE OF PROTECTION	MA	ELECT. & MECH. TEST	1/TYPE/ SIZE	-	IEC 60034-5/IS-12615	APPROVED DATASHEET	TC	✔	P	V	- -	TC FROM AN INDEPENDENT LABORATORY, REFER NOTE-3
		6. MEASUREMENT OF RESISTANCE OF RTD & BTD	MA	ELECT. & MECH. TEST	100%	-	IS-325/IS-12615/IEC-60034 PART-1/IS: 12802	IS-325/IS-12615/IEC-60034 PART-1/IS: 12802	TC	✔	P	V$	-	$ NOTE - 2
		7. MEASUREMENT OF RESISTANCE, IR OF SPACE HEATER	MA	ELECT. & MECH. TEST	100%	-	IS-325/IS-12615/IEC-60034 PART-1	IS-325/IS-12615/IEC-60034 PART-1	TC	✔	P	V$	-	$ NOTE - 2
		8. NAME PLATE DETAILS	MA	VISUAL	100%	-	IS-325/IS-12615& DATA SHEET	IS-325/IS-12615 & DATA SHEET	TEST/INSPC. REPORT	✔	P	V$	-	$ NOTE - 2
		9.EXPLOSION FLAME PROOF NESS (IF SPECIFIED)	MA	EXPLOSION FLAME PROOF TEST	1/TYPE	-	IS 2148 / IEC 60079-1	IS 2148 / IEC 60079-1	TC	✔	P	V	-	TC FROM AN INDEPENDENT LABORATORY, REFER NOTE-3
		10. PAINT SHADE, THICKNESS & FINISH	MA	VISUAL & MEASUREMENT BY ELKOMETER	SAMPLE	SAMPLE	APPROVED DATASHEET	APPROVED DATASHEET	TC	✔	P	W$	-	SAMPLING PLAN TO BE DECIDED BY INSPECTION AGENCY $ NOTE - 2

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	HEMA KUSHWAHA	HEMA KHUSHWAHA	Checked by:		KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	ESH KUMAR JAISWAL	R K JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:17.04.2020
		CUSTOMER :		QP NO.: PE-QP-400-Q-007, REV-04	
		PROJECT:		PO NO.:	
		ITEM: AC ELECT. MOTORS 55 KW & ABOVE (LV (415V))	SYSTEM:	SECTION: II	SHEET 9 OF 9

Sl No.	Component & Operations	Characteristics	Class	Type of Check	Quantum Of check		Reference Document	Acceptance NORMS	FORMAT OF RECORD		AGENCY			
1	2	3	4	5	6		7	8	9	*	**			
					M	C/N				D	M	C	N	
4.0	PACKING	SURFACE FINISH & COMPLETENESS	MA	VISUAL	100%	100%	AS PER MANUFACT. STANDARD / (#)	AS PER MANUFACT. STANDARD / (#)	INSPC. REPORT	✔	P	W	-	(#): REFER NOTE-8

NOTES:

1 DEPENDING UPON THE SIZE AND CRITICALLY, WITNESSING BY BHEL SHALL BE DECIDED.

2 ROUTINE TESTS ON 100% MOTORS SHALL BE DONE BY THE VENDOR. HOWEVER, BHEL/CUSTOMER SHALL WITNESS ROUTINE TESTS ON RANDOM SAMPLES. THE SAMPLING PLAN SHALL BE MUTUALLY AGREED UPON.

3 IN CASE TEST CERTIFICATES FOR THESE TESTS ON SIMILAR TYPE, SIZE AND DESIGN OF MOTOR FROM INDEPENDENT LABORATORY ARE AVAILABLE, THE SAME IS VALID FOR 5 YEARS.

4 BHEL RESERVES THE RIGHT TO PERFORM REPEAT TEST, IF REQUIRED.

5 AFTER PACKING AND PRIOR TO ISSUE MDCC, PHOTOGRAPHS OF ITEMS TO BE DESPATCHED SHALL BE SENT TO BHEL PURCHASE GROUP FOR REVIEW.

6 IN CASE , ANY CHANGES IN QP COMMENTED BY CUSTOMER AT CONTRACT STAGE SHALL BE CARRIED OUT BY BIDDER WITHOUT ANY IMPLICATION TO BHEL/ CUSTOMER.

7 PROJECT SPECIFIC QP TO BE DEVELOPED BASED ON CUSTOMER REQUIREMENT.

8 FOR EXPORT JOB, BHEL TECHNICAL SPECIFICATION FOR SEAWORTHY PACKING TO BE FOLLOWED.

9 PACKING SHALL BE SUITABLE FOR STORAGE AT SITE IN TROPICAL CLIMATE CONDITIONS.

10 LATEST REVISION/ YEAR OF ISSUE OF ALL THE STANDARDS (IS/ ASME/ IEC ETC.) INDICATED IN QP SHALL BE REFERRED.

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,

** M: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, B: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, C: CUSTOMER,

P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE

MA: MAJOR, MI: MINOR, CR: CRITICAL

D: DOCUMENT

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	HEMA KUSHWAHA	HEMA KHUSHWAHA	Checked by:		KUNAL GANDHI
Reviewed by:	PRAVEEN DUTTA	PRAVEEN DUTTA	Reviewed by:	JAISWAL	R K JAISWAL

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
	CUSTOMER:		QP NO.: PE-QP-999-509-E001, R3	DATE:
	PROJECT:		PO NO.:	DATE:
	ITEM: ABOVE GROUND EARTHING MATERIALS	SYSTEM: EARTHING		SHEET 1 OF 2

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					6		7	8	9	*	**		
			4	5	M	B				D	M	B	C
1	2	3											
1.0	RAW MATERIAL:													
1.1	MILD STEEL (FLATS & RODS) AS PER SPECIFICATION	1.CHEMICAL & PHYSICAL PROPERTIES	MA	VERIFICATION OF TC'S	100%	-	IS 2062	IS 2062	MILL TC	✓	P	V	-	REFER REMARKS AT SL. NO. 3.1
		2. DIMENSIONS	MA	MEASUREMENT	100%	-	IS 1730	IS 1730	QC RECORD	✓	P		-	
		3.SURFACE FINISH	MA	VISUAL	100%	-	IS 1079	IS 1079	QC RECORD	✓	P		-	
1.2	ZINC	1.CHEMICAL COMP.	MA	CHEM. TEST	SAMPLE	-	IS 209	IS 209	QC RECORD	✓	P	V	-	
2.0	IN PROCESS:													
2.1	CUTTING, DRILLING	1.DIMENSIONS	MA	MEASUREMENT	100%	-	IS 1730	IS 1730	QC RECORD	✓	P	V	-	
2.2	SURFACE PREPARATION	1. CLEANING, PICKLING, RINSING & FLUXING	MA	VISUAL	100%	-	IS 2629	IS 2629	QC RECORD	✓	P	-	-	
		2. SURFACE FINISH	MA	VISUAL	100%	-	IS 2629	IS 2629	QC RECORD	✓	P	-	-	
2.3	GALVANISING	1.TEMPERATURE OF BATH	MA	MEASUREMENT	CONTINUOUS	-	IS 2629	IS 2629	QC RECORD	✓	P	-	-	GALVANIZATION IS TO BE DONE AT GALVANIZATION PLANT LISTED IN ANNEXURE-1 TO QUALITY PLAN.
		2. DROSS	MA	VISUAL	PERIODIC	-	IS 2629	IS 2629	QC RECORD	✓	P	-	-	
		3.RATE OF IMMERSION	MA	VISUAL/ MEASUREMENT	100%	-	IS 2629	IS 2629	QC RECORD	✓	P	-	-	
		4. SURFACE FINISH	MA	VISUAL	100%	-	IS 2629	FREE FROM BURRS, ROUGHNESS, SLAG, FLUX, STAIN	QC RECORD	✓	P	-	-	
3.0	FINISHED ITEMS:													
3.1	MS FLATS	1. CHEMICAL COMP.	MA	CHEM. TEST	1 No./LOT/SIZE	-	IS 2026	IS 2026	LAB TC	✓	P	V	-	NOTE: SAMPLE FOR CHEMICAL TEST SHALL BE SELECTED BY BHEL& TESTING SHALL BE DONE AT NABL/ GOVT. APPD. LAB
		2. DIMENSIONS	MA	MEASUREMENT	IS 2500 (PART 1) LEVEL S-4	IS 2500 (PART 1) LEVEL S-4	IS 1730	IS 1730	INSPECTION REPORT	✓	P	W		

BIDDER/SUPPLIER	
Sign &Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Checked by:		MANOJ MEGWAL	Checked by:		Suman
Reviewed by:		Sandeep Lodhi	Reviewed by:	22.2.24	Hari

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
	CUSTOMER:		QP NO.: PE-QP-999-509-E001, R3	DATE:
	PROJECT:		PO NO.:	DATE:
	ITEM: ABOVE GROUND EARTHING MATERIALS	SYSTEM: EARTHING		SHEET 2 OF 2

Sl. No	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	**			REMARKS
					M	B				D	M	B	C	
1	2	3	4	5	6		7	8	9					
		3. SURFACE FINISH	MA	VISUAL	IS 2500 (PART 1) LEVEL S-4	IS 2500 (PART 1) LEVEL S-4	-	FREE FROM BURRS, ROUGHNESS, SLAG, FLUX, STAIN ETC.	QC RECORD	✓	P	W		
		4.MASS OF ZINC COATING	MA	CHEM. TEST	IS 4759	IS 4759	IS-6745	FLATS 5 MM THICK AND OVER 610 GM/SQ.M. FLATS UNDER 5 MM, BUT NOT LESS 2 MM 460 GM/SQ.M.	INSP. REPORT	✓	P	W	-	
		5.UNIFORMITY OF ZINC COATING	MA	CHEM. TEST	IS-4759	IS-4759	IS-2633	IS-2633	INSP. REPORT	✓	P	W	-	
		6. THICKNESS OF ZINC COATING	MA	MEASUREMENT	IS-4759	IS-4759	IS-4759	FLATS 5 MM THICK AND OVER=AVG 86 MICRON AND MINIMUM 75 MICRON. FLATS UNDER 5 MM THICK, BUT NOT LESS 2 MM =AVG 65 MICRON	INSP. REPORT	✓	P	W	-	
		7. ADHESION	MA	MECH. TEST	IS-4759	IS-4759	IS 2629	IS 2629	INSP. REPORT	✓	P	W	-	
	NOTE: ITEMS LIKE PIPES/ FLEXIBLE COPPER BRAID/ GI WIRE/ GS ROD/ SHIELDING MAST/ TEST LINK WILL BE CLEARED BASED ON COC (CERTIFICATE OF COMPLIANCE)													
4.0	PACKING	SURFACE FINISH & COMPLETENESS	MA	VISUAL	100%	100%	BHEL APPROVED DOC	BHEL APPROVED DOC	INSPC. REPORT	✓	P	V	-	

NOTES:

1 LATEST REVISION/ YEAR OF ISSUE OF ALL THE STANDARDS (IS/ASME/IEC ETC.) INDICATED IN QP SHALL BE REFERRED.

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION, D: DOCUMENTATION C CUSTOMER, P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE MA: MAJOR, MI: MINOR, CR: CRITICAL

** M: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, B: BHEL/ THIRD PARTY INSPECTION AGENCY,

BIDDER/SUPPLIER	
Sign &Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Checked by:		MANOJ MEENA	Checked by:		Suman
Reviewed by:		Sandeep Lodhi	Reviewed by:	22.2.24	Harish

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

BHEL	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO	DATE:
		CUSTOMER : -NA-		QP NO.: PE-QP-999-507-E005, REV. 04	DATE: 04.01.2024
		PROJECT: -NA-		PO NO.:	DATE:
		ITEM: CABLE TRAYS & ACCESSORIES	SYSTEM: CABLING		SHEET 1 of 3

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	* D	** M	B	C	
					M	B								
1.0 RAW MATERIAL														
1.1	HOT ROLLED CARBON STEEL SHEET	1 CHEM & PHY PROPERTIES	MA	VERIFICATION OF TCS	100%	100%	IS -1079	IS -1079	TC	√	P/V	V	-	
		2 DIMENSIONS	MA	MEASUREMENT	100%	-	IS-1730	IS-1730	QC RECORD		P	-	-	
		3 SURFACE FINISH	MA	VISUAL	100%	-	IS-1079	IS-1079	QC RECORD		P	-	-	
1.2	ZINC	CHEM COMP	MA	CHEM TEST	EACH HEAT	EACH HEAT	IS-209	IS-209	TC	√	P/V	V	-	
2.0 IN-PROCESS														
2.1	FABRICATION	1 DIMENSIONS	MA	MEASUREMENT	100%	100%	APPD DOCUMENT	APPD DOCUMENT	QC RECORD	√	P	V		
		2 WELDING QUALITY	MA	VISUAL	100%	100%	ASME SEC IX	ASME SEC IX	QC RECORD	√	P	V		Welding is to be done by qualified welders in accordance with ASME SEC IX article III WPS, PQR & WPQ to be reviewed during inspection
		3 SURFACE FINISH	MA	VISUAL	100%	100%	FREE FROM DEFECTS & SLAG	FREE FROM DEFECTS & SLAG	QC RECORD	√	P	V	-	
2.2	SURFACE PREPARATION	1 CLEANING, PICKLING & RINSING & FLUXING	MA	VISUAL	100%	-	IS 2629	IS 2629	QC RECORD		P/V	-	-	
		2 SURFACE FINISH	MA	VISUAL	100%	-	IS 2629	IS 2629	QC RECORD		P/V	-	-	

BIDDER/SUPPLIER		BHEL						FOR CUSTOMER REVIEW & APPROVAL			
Sign & Date		ENGINEERING			QUALITY			Doc No:			
Seal			Sign & Date	Name		Sign & Date	Name		Sign & Date	Name	Seal
		Checked by:	[signature]	MANOJ MEENA	Checked by:	[signature]	Mintoo	Reviewed by:			
		Reviewed by:	[signature]	ALKA KUTHIALA	Reviewed by:	[signature] 22/3/24	Harish	Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER : -NA-		QP NO.: PE-QP-999-507-E005, REV. 04	DATE: 04.01.2024
	PROJECT: -NA-		PO NO.:	DATE:
	ITEM: CABLE TRAYS & ACCESSORIES	SYSTEM: CABLING		SHEET 2 of 3

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D	**			
					M	B					M	B	C	
2.3	GALVANISING	1.TEMPERATURE OF ZINC BATH	MA	MEASUREMENT	CONTINUOUS	-	IS-2629	IS-2629	QC RECORD		P/V	-	-	Galvanization is to be done at galvanization plant listed in Annexure-I to quality plan
		2.DROSS	MA	VISUAL	PERIODIC	-	IS-2629	IS-2629	QC RECORD		P/V	-	-	
		3.RATE OF IMMERSION	MA	VISUAL	100%	-	IS 2629	IS 2629	QC RECORD		P/V	-	-	
		4. SURFACE FINISH	MA	VISUAL	100%	-	IS 2629	FREE FROM BURRS, ROUGHNESS, SLAG FLUX, STAIN ETC.	QC RECORD		P/V	-	-	
3.0 FINISHED ITEMS														
3.1	(CABLE TRAY, ACCESSORIES &)	1. DIMENSIONS	MA	MEASUREMENT	IS-2500 (PART 1) LEVEL S-4	IS-2500 (PART 1) LEVEL S-4	APPD.DRG	APPD. DOCUMENT	INSP.REPORT	√	P	W	-	
		2. SURFACE FINISH	MA	VISUAL	IS-2500 (PART 1) LEVEL S-4	IS-2500 (PART 1) LEVEL S-4	APPD. DRG	FREE FROM BURRS, SLAG, ROUGHNESS,FLUX, STAIN ETC.	INSP.REPORT	√	P	W	-	
		3.RIGIDITY (FOR TRAYS)	MA	DEFLECTION TEST	05 No./ LOT/	05 No./ LOT/	APPD. DRG	APPD. DOCUMENT	INSP.REPORT	√	P	W	-	600MM wide Ladder & perforated cable tray to be tested .Maximum deflection shall not exceed 7MM on mid span on uniform loading of 100KG/M

BIDDER/SUPPLIER	
Sign &Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Checked by:		MANAS MEENA	Checked by:		
Reviewed by:		HEMA KUSHWAHA	Reviewed by:	20/2/24	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO	DATE:
		CUSTOMER : -NA-		QP NO.: PE-QP-999-607-1.005, REV. 04	DATE: 04.01.2024
		PROJECT: -NA-		PO NO.:	DATE:
		ITEM: CABLE TRAYS & ACCESSORIES	SYSTEM: CABLING		SHEET 3 of 3

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY **			REMARKS
					M	B				D	M	B	C	
1	2	3	4	5	6		7	8	9					
3.0 FINISHED ITEMS														
		4 MASS OF ZINC COATING	MA	CHEM. TEST	IS-4759	IS-4759	IS-6745	APPD DOCUMENT	INSP REPORT	√	P	W	-	
		5 UNIFORMITY OF ZINC COATING	MA	CHEM. TEST	IS-4759	IS-4759	IS-2633	IS-2633	INSP REPORT	√	P	W	-	
		6 THICKNESS OF ZINC COATING	MA	PHYSICAL TEST	IS-4759	IS-4759	APPD DOCUMENT	APPD DOCUMENT	INSP REPORT	√	P	W	-	
		7 ADHESION	MA	MECH TEST	IS-4759	IS-4759	IS-2629	IS-2629	INSP REPORT	√	P	W	-	
		8 COUPLER PLATE	MA	VISUAL	100%	100%	APPD DOCUMENT	APPD DOCUMENT	INSP REPORT	√	P	W	-	Inspector to mention the total number of bags/bundles of coupler plates, nuts, bolts & washer in the inspection report.
		9 NUT & BOLT	MA	VISUAL	100%	100%	APPD DOCUMENT	APPD DOCUMENT	INSP REPORT	√	P	W	-	
		10 WASHER	MA	VISUAL	100%	100%	APPD DOCUMENT	APPD DOCUMENT	INSP REPORT	√	P	W	-	Further manufacturer shall attach the detail of total number of bags/bundles of the respective items with packing list.
		11 PACKING	MA	VISUAL	100%	100%	APPD DOCUMENT	APPD DOCUMENT	INSP REPORT	√	P	W	-	

NOTES:

1. LATEST REVISION/ YEAR OF ISSUE OF ALL THE STANDARDS (IS/ASME/IEC ETC.) INDICATED IN QP SHALL BE REFERRED.

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. D: DOCUMENTATION.

** M: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, B: BHEL/ THIRD PARTY INSPECTION AGENCY, C: CUSTOMER,

P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE. MA: MAJOR, MI: MINOR, CR: CRITICAL.

BIDDER SUPPLIER	
Sign & Date	
Seal	

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Checked by:			Checked by:		
Reviewed by:			Reviewed by:	22.8.24	

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER / BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO: PE-TS-XXX-507-E012	DATE:
	CUSTOMER: -NA-		QP NO.: PE-QP-999-507-E006, REV. 04	DATE:04.01.2024
	PROJECT: -NA-		PO NO.:	
	ITEM: CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	SYSTEM: CABLING		SHEET 1 OF 2

Sl No	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					6						**			
					M	B				D	M	B	C	
1	2	3	4	5			7	8	9					
1.0 RAW MATERIAL														
1.1	MILD STEEL SECTIONS (CHANNEL & ANGLES)	1. CHEM. & PHY PROPERTIES	MA	VERIFICATION OF TC's	100%	-	IS -2062	IS -2062	MILL TC	√	P/V	V	-	
		2 DIMENSIONS	MA	MEASUREMENT	100%	-	IS - 808	IS - 808	QC RECORD		P	-	-	
		3 SURFACE FINISH	MA	VISUAL	100%	-	IS-2062	IS-2062	QC RECORD		P	-	-	
1.2	ZINC	CHEM.COMP.	MA	CHEM TEST	EACH HEAT	-	IS-209	IS-209	TC	√	P/V	V	-	
2.0 IN-PROCESS														
2.1	CUTTING	1.DIMENSIONS	MA	MEASUREMENT	100%	-	Refer remarks	Refer remarks	QC RECORD	√	P	V	-	REFER NOTE-1
		2.SURFACE FINISH	MA	VISUAL	100%	-	-	FREE FROM DEFECTS & SLAG	QC RECORD	√	P	V	-	
2.2	SURFACE PREPARATION	1.CLEANING, PICKLING & RINSING & FLUXING	MA	VISUAL	100%	-	IS:2629	IS 2629	QC RECORD		P/V	-	-	
		2. SURFACE FINISH	MA	VISUAL	100%	-	IS.2629	IS 2629	QC RECORD		P/V	-	-	
2.3	GALVANIZING	1.TEMPERATURE OF ZINC BATH	MA	MEASUREMENT	CONTIN UOUS	-	IS-2629	IS-2629	QC RECORD		P/V	-	-	REFER NOTE-2
		2.DROSS	MA	VISUAL	PERIODI C	-	IS-2629	IS-2629	QC RECORD		P/V	-	-	
		3.RATE OF IMMERSION	MA	VISUAL	100%	-	IS 2629	IS 2629	QC RECORD		P/V	-	-	
		4. SURFACE FINISH	MA	VISUAL	100%	-	IS 2629	FREE FROM BURRS, ROUGHNESS, SLAG FLUX, STAIN ETC	QC RECORD		P/V	-	-	

BIDDER/SUPPLIER

Sign & Date

Seal

BHEL

ENGINEERING

	Sign & Date	Name
Checked by:	[illegible]	MANOJ MEENA
Reviewed by:	[illegible]	HEMA KUSHWAHA

QUALITY

	Sign & Date	Name
Checked by:	[illegible]	Mintoo
Reviewed by:	22/2/24	Harish

FOR CUSTOMER REVIEW & APPROVAL

Doc No:

	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER / BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO: PE-TS-XXX-507-E012	DATE:
	CUSTOMER: -NA-		QP NO.: PE-QP-999-507-E006, REV. 04	DATE:04.01.2024
	PROJECT: -NA-		PO NO.:	
	ITEM: CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)	SYSTEM: CABLING		SHEET 2 OF 2

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					6						**			
					M	B				D	M	B	C	
1	2	3	4	5			7	8	9					
3.0 FINISHED ITEMS														
3.1	**CABLE TRAY SUPPORT SYSTEM-WELDED(GALV)**	1 DIMENSIONS	MA	MEASUREMENT	IS-2500 (PART 1) LEVEL S-4	IS-2500 (PART 1) LEVEL S-4	IS - 808	IS - 808	INSP REPORT	√	P	W		REFER NOTE 1
		2 SURFACE FINISH	MA	VISUAL	IS-2500 (PART 1) LEVEL S-4	IS-2500 (PART 1) LEVEL S-4	-	FREE FROM BURRS, SLAG, ROUGHNESS,FLUX, STAIN ETC	INSP REPORT	√	P	W		
		3 MASS OF ZINC COATING	MA	CHEM TEST	IS-4759	IS-4759	IS-6745	610 gms/ Sq m	INSP REPORT	√	P	W		
		4 UNIFORMITY OF ZINC COATING	MA	CHEM. TEST	IS-4759	IS-4759	IS-2633	IS-2633	INSP REPORT	√	P	W		
		5 THICKNESS OF ZINC COATING	MA	PHYSICAL TEST	IS-4759	IS-4759	Refer remarks	Refer remarks	INSP REPORT	√	P	W		REFER NOTE 4
		6 ADHESION	MA	MECH TEST	IS-4759	IS-4759	IS-2629	IS-2629	INSP REPORT	√	P	W		
		7 PACKING	MA	VISUAL	100%	100%	BHEL APPD DOCUMENT	BHEL APPD DOCUMENT	INSP REPORT	√	P	√		

NOTES:

1. LENGTH OF ONE MEMBER OF CABLE TRAY SUPPORT SYSTEM-WELDED(GALV) SHALL BE 5.5 MTRS TO 6.5 MTRS
2. GALVANIZATION IS TO BE DONE AT BHEL APPROVED GALVANIZATION PLANTS LISTED IN ANNEXURE-I TO QUALITY PLAN
3. THICKNESS OF ZINC COATING SHALL BE 75 MICRONS (MINIMUM)) & 86 MICRONS (AVERAGE).
4. LATEST REVISION/ YEAR OF ISSUE OF ALL THE STANDARDS (IS/ASME/IEC ETC.) INDICATED IN QP SHALL BE REFERRED

LEGENDS:

*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. **D:** DOCUMENTATION
** **M:** SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **B** BHEL/ THIRD PARTY INSPECTION AGENCY, **C:** CUSTOMER.
P: PERFORM, **W:** WITNESS, **V:** VERIFICATION. AS APPROPRIATE MA MAJOR, MI: MINOR, CR: CRITICAL

BIDDER/SUPPLIER	BHEL					FOR CUSTOMER REVIEW & APPROVAL		
Sign &Date	ENGINEERING			QUALITY		Doc No:		
Seal		Sign & Date	Name		Sign & Date	Name		Sign & Date Name Seal
	Checked by:		MANOJ MEENA	Checked by:			Reviewed by:	
	Reviewed by:		HEMA KUSHWAHA	Reviewed by:	22/2/24		Approved by:	

	MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO	DATE:
BHEL		CUSTOMER :		QP NO.: PE-QP-999-558-E002, R-3	DATE:
		PROJECT:		PO NO.:	DATE:
		ITEM: DISTRIBUTION BOARD	SYSTEM:	SECTION:	SHEET 1 OF 4

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**		
					M	B/ C				D	M	B	C
1.0	Raw Material	(a)Material (b)Thickness (c) Surface Finish (d) Chemical Composition	MA	V/M	100%	100%	Manuf. Std / Approved Document	Manuf. Std / Approved Document	Test Certificate	√	P	V	-	
		Verification of make, type, Size & rating of component like indicating lamps, PB's, contactors, relays, switches etc.	MA	Visual	100%	100%	Approved drg. & Datasheet	Approved drg. & Datasheet	Test Certificate	√	P	V	-	Component to be of approved make.
	LIGHTING DISTRIBUTION BOARDS & LIGHTING PANELS													
2.0	Final Inspection	1 Dimensions	MA	Measurement	100%	10%	Approved drg./ Datasheet	Approved drg./ Datasheet	Insp. Report	√	P	W	-	
		2 Paint shade/ Paint Finish & thickness	MA	Visual/ measurement	100%	10%	Approved drg./ Datasheet	Approved drg./ Datasheet	Insp. Report	√	P	W	-	
		3 Verification of GA	CR	Visual	100%	100%	Approved drg.	Approved drg.	Insp. report	√	P	W	-	
		4 Verification of BOM	CR	Visual	100%	100%	Approved drg.	Approved drg.	Insp. report	√	P	W	-	
		5 Functional tests (incl. wiring cont.)	MA	Elect	100%	100%	Approved drg.	Approved drg.	Insp. report	√	P	W	-	
		6 HV/ IR/ HV	MA	Elect	100%	100%	App DataSheet	App DataSheet	Insp. report	√	P	W	-	

BHEL						BIDDER/ SUPPLIER	
ENGINEERING			QUALITY			Sign & Date	
	Sign & Date	Name		Sign & Date	Name	Seal	
Prepared by		Sh VENDRA SINGH	Checked by		MOTOO		
Reviewed by	22/2/24	DEMA KUSHWAHA	Reviewed by	22/2/24	HARISH KUMAR		

FOR CUSTOMER APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-558-E002, R-3	DATE:
	PROJECT:		PO NO.:	DATE:
	ITEM: DISTRIBUTION BOARD	SYSTEM:	SECTION:	SHEET 2 OF 4

NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY				REMARKS
					M	B/ C				D	M	S	C	
1	2	3	4	5	6		7	8	9					
		7. Degree of protection (including explosion proof if any)	MA	Scrutiny of type test certificates	1/rating	1/rating	IS 13947	IS 13947	Test certificate	√	P	V	-	
		7. Temperature rise test (for complete assembled LDB/ LP)	MA	Scrutiny of type test certificates	1/rating	1/rating	IS 13947	IS 13947	Test certificate	√	P	V	-	
.0	LIGHTING TRANSFORMER													
		1.Routine test	CR	Visual	100%	100%	IS 11171	IS 11171	Insp. report	√	P	V	-	
		a.) Type/ Rating	CR	Test	100%	100%	IS 11171	IS 11171	Insp. report	√	P	V	-	
		b). Winding/ Resistance	CR	Test	100%	100%	IS 11171	IS 11171	Insp. report	√	P	V	-	
		c). Voltage Ratio/ Vector	CR	Test	100%	100%	IS 11171	IS 11171	Insp. report	√	P	V	-	
		d) Z Volt/ Z Sckt	CR	Test	100%	100%	IS 11171	IS 11171	Insp. report	√	P	V	-	

BHEL					BIDDER/ SUPPLIER		FOR CUSTOMER APPROVAL			
ENGINEERING			QUALITY		Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal		Sign & Date	Name	Seal
Prepared by:		DEVENDRA SINGH	Checked by:		MINTOO		Reviewed by			
Reviewed by:		HEMA KUSHWAHA	Reviewed by:		HARISH KUMAR		Approved by			

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-558-E002, R-3	DATE:
	PROJECT:		PO NO.:	DATE:
	ITEM: DISTRIBUTION BOARD	SYSTEM:	SECTION:	SHEET 3 OF 4

S.NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	* D	** M	B	C	
					M	B/ C								
		e).Load Loss/ Current	CR	Test	100%	100%	IS 11171	IS 11171	Insp. report	√	P	V	-	
		f.) No Load Loss & No Load Current	CR	Test	100%	100%	IS 11171	IS 11171	Insp. report	√	P	V	-	
		g.) Source Withstand	CR	Test	100%	100%	IS 11171	IS 11171	Insp. report	√	P	V	-	
		h) Induced O/ V	CR	Test	100%	100%	IS 11171	IS 11171	Insp. report	√	P	V	-	
		2. Type Test	MA	Verification	------	1/Rating	IS 11171	IS 11171	Test Certificates	√	P	V	-	Type Test Certificate Clearance from BHEL/Customer
4.0	PACKING	As per BHEL Appd. Drg./Packing Procedure	MA	Visual	100%	100%	Appd. Packing Drg./ Packing procedure	Appd. Packing Drg./ Packing procedure	Insp. report	√	P	W	-	

NOTES: -

(A)	THE INSPECTION SHALL BE CARRIED OUT ONCE FOR THE MATERIAL OFFERED FOR INSPECTION IN ONE LOT. FOR SUBSEQUENT LOTS AGAINST THE SAME PROJECT, THE MATERIAL CAN BE ACCEPTED BASED ON CERTIFICATE OF COMPLIANCE FURNISHED BY THE VENDOR.
(B)	BHEL RESERVES THE RIGHT FOR CONDUCTING REPEAT TEST, IF REQUIRED.
(C)	AFTER PACKING AND PRIOR TO ISSUE OF MDCC, PHOTOGRAPHS OF COMPLETE MATERIAL (TO BE DISPATCHED) SHALL BE SENT TO BHEL-PURCHASE GROUP FOR REVIEW.
(D)	IN CASE THERE ARE ANY CHANGES IN QP COMMENTED BY CUSTOMER AT CONTRACT STAGE, THE SAME SHALL BE CARRIED OUT BY THE BIDDER

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	22/2/24	DEVENDRA SINGH	Checked by:		MINTOO
Reviewed by:		HEMA KUSHWAHA	Reviewed by:		HARISH KUMAR

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER APPROVAL			
Doc No			
	Sign & Date	Name	Seal
Reviewed by			
Approved by			

MANUFACTURER/BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-558-E002, R-3	DATE:
	PROJECT:		PO NO.:	DATE:
	ITEM: DISTRIBUTION BOARD	SYSTEM:	SECTION:	SHEET 4 OF 4

	WITHOUT ANY IMPLICATION TO BHEL/ CUSTOMER.
(E)	PROJECT SPECIFIC QP TO BE DEVELOPED BASED ON CUSTOMER REQUIREMENT.
(F)	~~FOR EXPORT JOB, PACKING SHALL BE AS PER BHEL SEAWORTHY PACKING SPECIFICATION.~~

LEGENDS:
*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,
** M: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, B: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, C: CUSTOMER,
P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE
MA: MAJOR, MI: MINOR, CR: CRITICAL

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:	22/2/24	DEVENDRA SINGH	Checked by:	22/2/24	MINTOO
Reviewed by:	22/2/24	HEMA KUSHWAHA	Reviewed by:	22/2/24	HARISH KUMAR

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER APPROVAL			
Doc No.			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		QP NO.:PE-QP-999-558-E001, R05	DATE: 22.02.2024
	PROJECT:		PO NO.:	DATE:
	ITEM: LIGHTING FIXTURES, LAMPS & MISC. ITEMS	SYSTEM:STATION LIGHTING SYSTEM	SECTION: II	SHEET 1 OF 6

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	B/ C				D	M	B	C	

1.0 LED TYPE LIGHTING FIXTURES

A	**Bought out items / in-process checks**													
1.1	LED chip	LED chip efficacy	Major	Visual	Manufacturer Standard	-	LM 80 report	Approved GA drawing	LM 80 report	√	P/ V	V	V	At the time of final Inspection
		LED chip CRI & CCT	Major	Visual	Manufacturer Standard	-	LM 80 report	Approved GA drawing	LM 80 report	√	P/ V	V	V	At the time of final Inspection
		Reported TM21 (L80) lifetime of LED chip	Major	Visual	Manufacturer Standard	-	LM 80 report	Approved GA drawing	LM 80 report	√	P/ V	V	V	At the time of final Inspection
1.2	LED Driver	Compatibility with LED module / chip, controls & protection features	Major	Visual	Manufacturer Standard	-	Approved GA drawing	Approved GA drawing	Certificate of Compliance	√	P/ V	V	V	Certificate of Compliance by LED driver manufacturer / lighting fixture supplier that driver meets all requirements as per approved GA Drawing
		THD & pf check	Major	Electrical	Manufacturer Standard	-	Approved GA drawing	THD <10% and pf >=0.9	Inspection report	√	P/ V	-	-	Refer note No. 1

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by	22/2/24	MEET SAGAR SINGH RAJPAL	Checked by	22/02/24	Kundan			Reviewed by			
Reviewed by	22/2/24	HEMA KUSHWAHA	Reviewed by	22.02.24	Harish			Approved by			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		QP NO.:PE-QP-999-558-E001, R05	DATE: 22.02.2024
	PROJECT:		PO NO.:	DATE:
	ITEM: LIGHTING FIXTURES, LAMPS & MISC. ITEMS	SYSTEM:STATION LIGHTING SYSTEM	SECTION: II	SHEET 2 OF 6

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D	**			
					M	B/ C					M	B	C	
1.3	Castings	Freedom from defects	Major	Visual	Manufacturer Standard	-	Manufacturer Standard	Casting shall be free from any defects such as blow holes , surface blisters , cracks and cravities etc.	Inspection report		P/ V •	-	-	Refer note No. 1
1.4	Sheet metal forming and fabrication	Freedom from defects	Major	Visual	Manufacturer Standard	-	Manufacturer Standard	Manufacturer Standard	Inspection report		P/ V •	-	-	Refer note No. 1
1.5	Pre-treatment and powder coating	Pre-treatment process checks, Powder Coating finish, thickness , uniformity of coating and adhesion	Major	Visual, chemical & mech	Manufacturer Standard	-	Manufacturer Standard	Nominal coating thickness 50 microns or more	Inspection report	√	P/ V •	V		Refer note No. 1

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by	24.02.24	MEET SAGAR SINGH RAJPAL	Checked by		Kundan			Reviewed by			
Reviewed by	24/2/24	HEMA KUSHWAHA	Reviewed by	24/2/24	Harish Kumar			Approved by			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		QP NO.:PE-QP-999-558-E001, R05	DATE: 22.02.2024
	PROJECT:		PO NO.:	DATE:
	ITEM: LIGHTING FIXTURES, LAMPS & MISC. ITEMS	SYSTEM:STATION LIGHTING SYSTEM	SECTION: II	SHEET 3 OF 6

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	B/ C				D	M	B	C	
1	2	3	4	5	6		7	8	9		**			

B	Acceptance Tests on LED Lighting fixtures													
1	LED Lighting fixture	LED chip make	Major	Visual	-		Accepted type test reports (LM80) report	LM80 report	Certificate of compliance	√	V	V	V	
2		Constructional features including: Internal writing , terminal block, earthing terminal, safety chain (if applicable)	Major	Visual	1 Sample per type	1 Sample per type	Approved GA drawing	Approved GA drawing	Inspection report	√	P	W	W	
3		Degree of protection test in case of lighting fixtures having IP X4 and above rating.	Major	Mechanical	1 Sample per type	1 Sample per type	IS 10322	Approved GA drawing	Certificate of compliance	√	P	W	V	
4		Resistance to dust (applicable if IP5X and above)	Major	Optical	Manufacturer Standard	-	IS 10322	Approved GA drawing	Certificate of compliance	√	P/ V *	V	V	Refer note No. 1
5		Photometry check	Major	Optical	Manufacturer	-	LM79, IS 16106	Approved GA drawing	Certificate of	√	P/ V	V	V	Refer note No. 1

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	22/02/24	MEET SAGAR SINGH RAJPAL	Checked by:		Kundan			Reviewed by:			
Reviewed by:	22/2/24	HEMA KUSHWAHA	Reviewed by:	22/2/24	Hema			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		QP NO.:PE-QP-999-558-E001, R05	DATE: 22.02.2024
	PROJECT:		PO NO.:	DATE:
	ITEM: LIGHTING FIXTURES, LAMPS & MISC. ITEMS	SYSTEM:STATION LIGHTING SYSTEM	SECTION: II	SHEET 4 OF 6

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	B/ C				D	M	B	C	
					Standard				compliance		*			
6		Dimensions	Major	Visual	1 Sample per type	1 Sample per type	Approved GA drawing	Approved GA drawing	Inspection report	√	P	W	W	
7		LED driver: THD and pf check	Major	Electrical	1 Sample per type	1 Sample per type	Approved GA drawing	THD<10% and pf >= 0.9	Inspection report	√	P	W	W	At lighting fixtures supplier test lab.
8		LED driver: Precision current control check	Major	Electrical	1 Sample per type	1 Sample per type	Approved GA drawing	Approved GA drawing	Inspection report	√	P	W	W	
9		LED driver: Open circuit protection simulation check	Major	Electrical	1 Sample per type	1 Sample per type	Approved GA drawing	Approved GA drawing	Inspection report	√	P	W	W	
10		LED driver: short circuit protection simulation check	Major	Electrical	1 Sample per type	1 Sample per type	Approved GA drawing	Approved GA drawing	Inspection report	√	P	W	W	
11		LED driver: overload protection simulation check	Major	Electrical	1 Sample per type	1 Sample per type	Approved GA drawing	Approved GA drawing	Inspection report	√	P	W	W	
12		LED driver: surge protection	Major	Electrical	1 Sampl	1 Sampl	Approved GA drawing	Certificate of compliance	Certificate of	√	V	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by	24/02/24	MEET SAGAR SINGH RAJPAL	Checked by:	Kuldeep	Kuldeep			Reviewed by:			
Reviewed by	24/02/24	HEMA KUSHWAHA	Reviewed by:		Harish			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO :	DATE:
	CUSTOMER :		QP NO.:PE-QP-999-558-E001, R05	DATE: 22.02.2024
	PROJECT:		PO NO.:	DATE:
	ITEM: LIGHTING FIXTURES, LAMPS & MISC. ITEMS	SYSTEM:STATION LIGHTING SYSTEM	SECTION: II	SHEET 5 OF 6

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY **			REMARKS
1	2	3	4	5	6		7	8	9	D	M	B	C	
					M	B/ C								
		compliance check			e per type	e per type		that surge protection is provided.	compliance					
3.0 JUNCTION BOXES & RECEPTACLES														
A	**Acceptance Tests**													
1	**Acceptance Tests**	Dimensions	Major	MEASUREMENT	100%	-	Approved GA drawing	Approved GA drawing	Inspection report		P	V	-	Components shall be of approved Make
2		Paint Shade/ Thickness	Major	VISUAL/MEAS.	10%	-	Approved GA drawing	Approved GA drawing	Inspection report		P	V	-	At the time of final Inspection
3		HV/ IR	Major	ELECT.TESTS	100%	-	2KV AC FOR 1 MINUTE	2KV AC FOR 1 MINUTE	Inspection report		P	V	-	
4		Degree Of Protection	Major	TEST	1 Sample/Type	-	IS:2147	IS:2147	TEST CERT.	√	P	V	-	
5		Special tests if any, explosion proof etc.	Major	TEST	1 Sample/Type	-	IS:2148	IS:2148	TEST CERT.	√	P	V	-	
6		Operation Check	Major	TEST	10%	-	Approved GA drawing	Approved GA drawing	Inspection report		P	V	-	
7		Mechanical Interlock	Major	TEST	10%	-	Approved GA drawing	Approved GA drawing	Inspection report		P	V	-	
4.0 PACKING														
	PACKING	Soundness of Packing against transit damage	Major	Visual	100%	10%	Approved Packing procedure	Approved Packing procedure	Inspection report	√	P	W	-	

BHEL						BIDDER/ SUPPLIER	
ENGINEERING			QUALITY			Sign & Date	
	Sign & Date	Name		Sign & Date	Name	Seal	
Prepared by:	22/02/24	MEET SAGAR SINGH RAJPAL	Checked by:		Kundan		
Reviewed by:	22/2/24	HEMA KUSHWAHA	Reviewed by:		Harish		

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		S.C. NO	DATE:
		CUSTOMER :		QP NO.:PE-QP-999-548-E001, R05	DATE: 22.02.2024
		PROJECT:		PO NO.:	DATE:
		ITEM: LIGHTING FIXTURES, LAMPS & MISC. ITEMS	SYSTEM:STATION LIGHTING SYSTEM	SECTION: II	SHEET 6 OF 9

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
										*	**			
					M	B/ C				D	M	B	C	
1	2	3	4	5	6		7	8	9					

NOTES:

1. P/V"- means test will be performed either by lighting fixture supplier or their sub-vendor and verified by lighting fixture supplier
2. Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc) Indicated in QP shall be referred
3. Items like ceiling fans, emergency lighting unit, flexible conduit, 24V supply module, ladders, hume pipe, switchboxes, exit signs etc. Will be cleared based on COC (certificate of compliance)

LEGENDS:

*Records identified with "Tick"(√) shall be essentially included by supplier in QA Documentation.

** M: Supplier/ Manufacturer/ Sub-Supplier, B: Main supplier/ BHEL/ Third Party Inspection Agency, C: Customer,

P: Perform, W: Witness, V: Verification, as appropriate

MA: Major, MI: Minor, CR: Critical, D: Documentation

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW / APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc. No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by		MEET SAGAR SINGH RUPAL	Checked by					Reviewed by			
Reviewed by		HEMA KUSHWAHA	Reviewed by					Approved by			

भेल BHEL	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-558-E003, R02	DATE: 22.02.2024
		PROJECT:		PO NO.:	DATE:
		ITEM: PVC Wires	SYSTEM: STATION LIGHTING SYSTEM	SECTION: II	SHEET 1 OF 2

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					M	B/C				D	M	B	C	
1	2	3	4	5	6		7	8	9	*	**			
1.0 RAW MATERIAL/BOUGHT OUT ITEMS														
1.1	CONDUCTOR (COPPER)	1 PHYSICAL PROPERTIES	MA	PHYSICAL TESTS	SAMPLE/ BATCH	-	IS:8130	IS:8130	TEST CERT	✓	✓	V	-	
		2 ELEC. PROPERTIES	MA	ELECTRICAL TESTS	SAMPLE/ BATCH	-	IS:8130	IS:8130	TEST CERT	✓	✓	V	-	
1.2	PVC COMPOUND FOR INSULATION	1 MATERIAL PROPERTIES	MA	PHYSICAL TESTS	SAMPLE/ BATCH	-	IS 5831	IS 5831	TEST CERT	✓	P	V	-	
2.0 ROUTINE/ ACCEPTANCE TEST														
2.1		SURFACE DEFECTS	MA	VISUAL	IS 694 ANNEX A	-	IS:694	IS 694	INSP. & TEST REPORT FROM MANUF	✓	P/ V	V	-	
2.2		CONSTRUCTION OF WIRE	MA	VISUAL/ MEASUREMENT	IS 694 ANNEX A	-	IS-694 (TABLE 3) IS-8130 (TABLE-2) APPROVED DS	IS-694 (TABLE-3) IS-8130 (TABLE-2) APPROVED DS	INSP. & TEST REPORT FROM MANUF	✓	P/ V	V	-	
2.3	PVC WIRES	ROUTINE TESTS a) CONDUCTOR RESISTANCE TEST b) HIGH VOLTAGE TEST OR SPARK TEST	MA	CR	100%	-	IS 694/ IS 8130	IS 10810	TEST REPORT	✓	P/ V	V	-	
2.4		**ACCEPTANCE TESTS** a) ANNEALING TEST b) CONDUCTOR RESISTANCE TEST c) THICKNESS OF INSULATION	MA	CR	IS 694 ANNEX A	IS 694 ANNEX A	IS 694/ IS 8130	IS 10810	TEST REPORT	✓	P	V	-	

BHEL					BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL		
ENGINEERING			QUALITY		Sign & Date		Doc No.		
	Sign & Date	Name	Sign & Date	Name	Seal			Sign & Date	Name
Prepared by	22/02/24	MEET SAGAR SINGH RAJPAL	Checked	22.02.24 Suman			Reviewed by		
Reviewed by	23/2/24	HEMA KUSHWAHA	Reviewed	Harish 23.02.24			Approved by		

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO	DATE:
	CUSTOMER :		QP NO.: PE-QP-999-558-E003, R02	DATE: 22.02.2024
	PROJECT:		PO NO.:	DATE:
	ITEM: PVC Wires	SYSTEM: STATION LIGHTING SYSTEM	SECTION: II	SHEET 2 OF 2

SL NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					M	B/C				D	M	B	C
1	2	3	4	5	6		7	8	9				
		d) TENSILE STRENGTH AND ELONGATION AT BREAK OF INSULATION e) IR TEST f) HV TEST g) FLAMMABILITY TEST h) OXYGEN INDEX TEST i) TEMPERATURE INDEX j) HALOGEN ACID GAS (ONLY FOR FRLSH WIRE) k) SMOKE DENSITY (ONLY FOR FRLSH WIRE											
2.5		MARKING	MA	VISUAL	IS 694 ANNEX A	IS 694 ANNEX A	APPD DS	APPD DS	INSP. REPORT		P/ V	W	
3.0	PACKING												
	PACKING	SOUNDNESS OF PACKING AGAINST TRANSIT DAMAGE	MAJOR	VISUAL	100%	100%	BHEL APPROVED DOCUMENT	BHEL APPROVED DOCUMENT	INSPECTION REPORT		P	V	

NOTE: Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) indicated in QP shall be referred

LEGENDS

*RECORDS IDENTIFIED WITH TICK (√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.

** M SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER B MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY C CUSTOMER

P PERFORM W WITNESS V VERIFICATION AS APPROPRIATE

MA MAJOR MI MINOR CR CRITICAL D DOCUMENTATION

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by	23/02/24	MEET SAGAR SINGH RAJPAL	Checked by	23.02.24	Suman			Reviewed by			
Reviewed by	23/2/24	HEMA KUMAWAT	Reviewed by	23.02.24	Manch			Approved by			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-558-E001, R05	DATE: 22.02.2024
		PROJECT:		PO NO.:	DATE:
		ITEM: RIGID STEEL CONDUITS	SYSTEM: STATION LIGHTING SYSTEM	SECTION: II	SHEET 1 OF 2

SL NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY			REMARKS
					M	B/ C				D	M	B	C	
1	2	3	4	5	6		7	8	9	*	**	*		
1.0 RAW MATERIAL/BOUGHT OUT ITEMS														
1.1		HOT ROLLED STEEL STRIP	MA	VISUAL, MECH. & CHEMICAL	MFR STD	-	IS10748	IS10748	TEST CERT.	√	V	V	-	AS APPLICABLE
1.2		COLD ROLLED STEEL SHEET	MA	VISUAL, MECH. & CHEMICAL	MFR STD	-	IS513	IS513	TEST CERT.	√	V	V	-	AS APPLICABLE
2.0 ACCEPTANCE TESTS														
2.1		DIMENSIONS	MA	MEASUREMENT	IS 9537-II	IS 9537-II	IS:9537/ APPROVED DATA SHEET	APPROVED DATA SHEET	INSP. REPORT	√	P	W	-	
2.2		MECH. PROPERTIES												
		a) BENDING TEST	CR	MECH. TEST	IS 9537-II	IS 9537-II	IS 9537-II	IS 9537-II	INSP. REPORT	√	P	W	-	
		b) COMPRESSION TEST	CR	MECH. TEST	IS 9537-II	IS 9537-II	IS 9537-II	IS 9537-II	INSP. REPORT	√	P	W	-	
2.3	RIGID STEEL CONDUITS	GALVANISATION TEST												
		a) UNIFORMITY OF ZINC COATING	CR	CHEMICAL TEST	IS 9537-II	IS 9537-II	IS-2633/ APPD DS	IS-2633/ APPD DS	INSP. REPORT	√	P	W	-	
		b) MASS OF ZINC COAT.	CR	CHEMICAL TEST	IS 9537-II	IS 9537-II	IS-6745/ APPD DS	IS-6745/ APPD DS	INSP. REPORT	√	P	W	-	
		c) EPOXY THICKNESS	MA	VISUAL	IS 9537-II	IS 9537-II	APPD DS	APPD DS	INSP. REPORT	√	P	W	-	AS APPLICABLE
2.4		MARKING	CR	VISUAL	IS 9537-II	IS 9537-II	APPROVED	APPROVED	INSP.		P	W	-	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by	22/02/24	MEET SAGAR SINGH RAJPAL	Checked by	23.02.24	SUMAN			Reviewed by:			
Reviewed by	23/2/24	HEMA KUSHWAHA	Reviewed by	23/2/24	Harish			Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-558-E001, R05	DATE: 22.02.2024
		PROJECT:		PO NO.:	DATE:
		ITEM: RIGID STEEL CONDUITS	SYSTEM: STATION LIGHTING SYSTEM	SECTION: II	SHEET 2 OF 2

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9		**			
					M	B/C				D	M	B	C	
							DATA SHEET	DATA SHEET	REPORT					
3.0 PACKING														
	PACKING	SOUNDNESS OF PACKING AGAINST TRANSIT DAMAGE	MA	VISUAL	100%	100%	BHEL APPROVED DOCUMENT	BHEL APPROVED DOCUMENT	INSP. REPORT		P	V		

NOTE: Latest revision/ year of issue of all the standards (IS/ ASME/ IEC etc.) indicated in QP shall be referred.

LEGENDS:
*RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION.
** M: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, B: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, C: CUSTOMER.
P: PERFORM, W: WITNESS, V: VERIFICATION, AS APPROPRIATE
MA: MAJOR, MI: MINOR, CR: CRITICAL, D: DOCUMENTATION

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by	23/04/24	MEET SAGAR SINGH RAJPAL	Checked by	23.4.24	Sanjay			Reviewed by			
Reviewed by	23/4/24	HEMA KUSHWAHA	Reviewed by		Harish			Approved by			

LOAD TITLE	RATING (KW / A)		UNIT (U)/STN (S)	Nos.		VOLTAGE CODE*	FEEDER CODE**	EMER. LOAD (Y)	CONT.(C)/ INTT.(I)	STARTING TIME >5 SEC (Y)	LOCATION	BOARD NO.	CABLE		BLOCK CABLE DRG. No.	CONTROL CODE	REMARKS	LOAD No.
	NAME PLATE	MAX. CONT. DEMAND (MCR)		RUNNING	STANDBY								SIZE CODE	NOs				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

NOTES:
1. COLUMN 1 TO 12 & 18 SHALL BE FILLED BY THE REQUISITIONER (ORIGINATING AGENCY); REMAINING COLUMNS ARE TO BE FILLED UP BY PEM (ELECTRICAL)
2. ABBREVIATIONS : * VOLTAGE CODE (7):- (ac) A=11 KV, B=6.6 KV, C=3.3 KV, D=415 V, E=240 V (1 PH), F=110 V (dc): G=220 V, H=110 V, J=48 V, K=+24V, L=-24 V
: ** FEEDER CODE (8):- U=UNIDIRECTIONAL STARTER, B=BI-DIRECTIONAL STARTER, S=SUPPLY FEEDER, D=SUPPLY FEEDER (CONTACTER CONTROLLED)

भेल BHEL	LOAD DATA (ELECTRICAL)	JOB NO.		ORIGINATING AGENCY		PEM (ELECTRICAL)
		PROJECT TITLE		NAME		DATA FILLED UP ON
		SYSTEM / S	IDCT	SIGN.		DATA ENTERED ON
		DEPTT. / SECTION		SHEET 1 OF 1	REV. 00	DE'S SIGN. & DATE

Note: This is an indicative list of tests/checks. The manufacturer is to furnish a detailed quality plan indicating the Practices and Procedure adopted alongwith relevant supporting documents.

MEASURING INSTRUMENTS

Item Components / Sub System Assembly	Dimensions (R)	Make, Model, Type, Rating (R)	Process / Electrical connection (R)	Calibration (R)	Test as per standard(R)	Insulation Resistance (R)	IBR Certification (As applicable)(R)	Hydro Test(R)	Material Test certificate (R)	Degree of Protection Test
Pressure Gauge (IS-3624 and IS-3624)	Y	Y	Y	Y	Y					Y
Temperature Gauge (IS-2147)	Y	Y	Y	Y	Y					
Level Switch (IS-2147)	Y	Y	Y	Y	Y					Y

R-Routine Test A- Acceptance Test Y – Test applicable

PROCESS CONNECTION AND PIPING

Tests / Items	Visual & Dimensions ®	GA, BOM, Layout of component & construction feature, Paint Shade/thickness ®	Flattening,flaring,hydrotest,hardness check as per ASTM standard (A)	Component Ratings ®	Wiring ®	Make, Model, Type, Rating®	IR & HV ®	Review of TC for instrument/devices (R)	Accessability of TBs/Devices Illumination,grounding ®	Tubing ®	Leak/Hydro test(A)	Chemical/physical properties of material (A)	Proof pressure test,Dismantling & reassembly test,Hydrulic impulse and vibration test (R)	Tests as per standards & specification
Junction Box (IS-2147)	Y	Y*		Y		Y	Y							
Impulse pipes and tubes	Y		Y			Y						Y		
Socket weld fittings ANSI B-16.11	Y					Y						Y		Y
Compression fittings	Y					Y					Y	Y	Y	
Instrument valves & Valve manifolds	Y					Y					Y	Y		
*-applicable for painted junction boxes.														

®-Routine Test A-Acceptance Test Y – Test applicable

PAINTING REQUIREMENT

Sl no	Condition	Surface Preparation	Primer Coat	No. of Coats	DFT (in Microns)	Intermediate Coat	No. of Coats	DFT (in Microns)	Final Coat	No. of Coats	DFT (in Microns)	Total DFT
EXTERNAL SURFACE - OVER GROUND PIPING												
1	Clarified Water	Surface preparation shall be done by means of sand blasting, which shall conform to SSPC SA10/NACE 2/SA2½ Standard.	Primer coat shall consist of one coat (Minimum DFT of 100 Microns) of Epoxy Resin Based Zinc Phosphate Primer.			Intermediate coat (or under coat) shall consist of one coat (Minimum DFT of 100 Microns) Epoxy Resin Based Paint Pigmented with Titanium Dioxide.			Top coat shall consist of one coat (Minimum DFT of 75 Microns) of Epoxy Paint of approved shade and colour with glossy finish. Additional one coat (Minimum DFT of 25 Microns) of finish coat of Polyurethane shall be provided.			Total DFT of paint system shall not be less than 300 microns.
INTERNAL SURFACE (FOR PIPE 450 NB AND ABOVE)												
2	Clarified Water	Surface Preparation by Means of Sand Blasting Which Shall Conforms to SSPC SP10/NACE2/SA2½ Standard.	-	-	-	-	-	-	Internally coated with coal tar epoxy coating	With minimum two (2) coats.	250	Minimum 500 microns
BURRIED CW PIPING												
3	All underground pipe shall be provided with wrapping and coating as per IS- 10221 / anticorrosive protection Coal-tar tapes as per IS15337 (however, thickness shall be as per IS10221), along with Cathodic protection depending of soil resistivity. A minimum soil cover of 1.5 m shall be provided for underground pipes. Wherever road crossings are encountered for pipelines, RCC box culverts (or) RCC encasing with suitable design requirement considered in selection of piping like axle loads etc. along with the earth cover mentioned elsewhere in this specification.											

DOCUMENTATION REQUIREMENT

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID		
Sl. No.	**DOCUMENT TITLE**	
1	PQR CREDENTIALS	
2	COMPLIANCE SHEET (DULY SIGNED AND STAMPED)	
7	PERFORMANCE GUARANTEE SCHEDULE (DULY SIGNED AND STAMPED)	
3	GENERAL ARRANGEMENT DRAWING FOR COOLING TOWER, INCORPORATING ALL RELEVANT DIMENSIONS, COLD WATER CHANNELS / SLUDGE CHAMBER/ SCREENS/ GATES IN THE COLD WATER CHANNEL, STAIRCASE ETC.	
4	PUMPING HEAD CALCULATIONS	
5	THERMAL DESIGN CALCULATIONS	
6	TOWER PERFORMANCE CURVES	
8	TECHNICAL DEVIATION SCHEDULE (IF ANY)	
9	UNPRICED COPY OF THE PRICE SCHEDULE (INDICATING “QUOTED” FOR THE LISTED ITEMS).	
DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE		
Sl. No.	**DOCUMENT TITLE**	**SUBMISSION SCHEDULE**
A	**BASIC DRAWINGS / DOCUMENTS**	
1	GENERAL ARRANGEMENT OF INDUCED	6 WEEKS FROM LOI
2	GA OF C.W. BASIN OF COOLING TOWER	6 WEEKS FROM LOI
3	THERMAL DESIGN & FRICTION LOSS	6 WEEKS FROM LOI
4	CIVIL DESIGN BASIS OF IDCT	8 WEEKS FROM LOI
5	LAYOUT AND DETAILS OF FOUNDATION	15 WEEKS FROM LOI
6	GA OF FOUNDATION, POND WALL AND	15 WEEKS FROM LOI
7	METHODOLOGY STATEMENT FOR PILING	12 WEEKS FROM LOI
8	STRUCTURAL DESIGN OF 760 MM DIA. BORED	12 WEEKS FROM LOI
9	LOCATION OF BORED CAST IN SITU TEST	12 WEEKS FROM LOI
10	NUMERATION AND RC DETAILS OF TEST PILE	12 WEEKS FROM LOI
11	DESIGN CALCULATION OF SUB STRUCTURE	16 WEEKS FROM LOI
12	DESIGN CALCULATION FOR SUPER	16 WEEKS FROM LOI
13	ANALYSIS & DESIGN OF POND WALL, POND	15 WEEKS FROM LOI
14	LAYOUT AND DETAILS OF PILE/FOUNDATION	16 WEEKS FROM LOI

15	LAYOUT AND DETAILS OF POND FLOOR AND	16 WEEKS FROM LOI
16	R.C. DETAILS OF PILECAP/FOUNDATION, POND	16 WEEKS FROM LOI
B	**DETAILED DRAWINGS / DOCUMENTS**	
1	SCHEMATIC ARRANGEMENT OF FILL & FILL	21 WEEKS FROM LOI
2	SCHEMATIC ARRANGEMENT OF INTERNAL DISTRIBUTION SYSTEM FOR COOLING TOWER	21 WEEKS FROM LOI
3	SCHEMATIC ARRANGEMENT OF EXTERNAL HW DISTRIBUTION SYSTEM OF COOLING TOWER	30 WEEKS FROM LOI
4	SCHEMATIC ARRANGEMENT OF DRIFT	31 WEEKS FROM LOI
5	SCHEMATIC ARRANGEMENT OF MECHANICAL	31 WEEKS FROM LOI
6	TDS FOR DRIFT ELIMINATOR FOR IDCT	31 WEEKS FROM LOI
7	TDS FOR FILL FOR IDCT	31 WEEKS FROM LOI
8	TDS FOR DISTRIBUTION PIPES	31 WEEKS FROM LOI
9	GAD AND DATA SHEET OF DRIVE SHAFT ASSY.	31 WEEKS FROM LOI
10	SLUDGE PUMPS-GA & DATA SHEET .	42 WEEKS FROM LOI
11	CHAIN PULLEY BLOCKS-DATA SHEET AND GA	42 WEEKS FROM LOI
12	TDS FOR FAN MAINTENANCE FACILITIES FOR	42 WEEKS FROM LOI
13	GAD AND DATA SHEET FOR BFV'S	42 WEEKS FROM LOI
14	GA & TDS FOR CI GATE VALVE .	42 WEEKS FROM LOI
15	GAD AND DATA SHEET OF FAN ASSY FOR IDCT	31 WEEKS FROM LOI
16	GAD AND DATA SHEET OF GEARBOX FOR IDCT	31 WEEKS FROM LOI
17	R.C. DETAILS OF COLD WATER BASIN COLUMN	15 WEEKS FROM LOI
18	ANALYSIS & DESIGN OF PRECAST BEAMS	21 WEEKS FROM LOI
19	ANALYSIS AND DESIGN OF COLUMNS FOR	21 WEEKS FROM LOI
20	GA OF FILL SUPPORTING STRUCTURE	21 WEEKS FROM LOI
21	DETAILS OF DIAGONAL COLUMNS FOR	21 WEEKS FROM LOI
22	DESIGN OF LOWER TIER AND TIE BEAMS	21 WEEKS FROM LOI
23	DESIGN OF UPPER TIER BEAMS	21 WEEKS FROM LOI
24	R.C DETAILS OF TRANS BEAM AT ELIMINATOR	21 WEEKS FROM LOI
25	R.C DETAILS OF LONG BEAM AT ELIMINATOR	21 WEEKS FROM LOI
26	RC DETAILS OF END WALLS & PARTITION WALL	21 WEEKS FROM LOI
27	LAYOUT PLAN OF CT AT FANDECK LEVEL &	25 WEEKS FROM LOI
28	RC DETAILS OF FAN DECK SLAB	21 WEEKS FROM LOI
29	RC DETAILS OF LONG & TRANS BEAMS AT FAN	21 WEEKS FROM LOI
30	DETAILS OF ACCESS DOOR	25 WEEKS FROM LOI
31	RC DETAILS OF FAN CYLINDER	25 WEEKS FROM LOI
32	DETAILS OF C.W. OUTLET, HOIST SUPPORT	25 WEEKS FROM LOI
33	RC DETAILS OF PIPE SUPPORT	25 WEEKS FROM LOI
34	DESIGN CALCULATION FOR STAIRCASE FOR CT	25 WEEKS FROM LOI
35	ANALYSIS & DESIGN OF STAIRCASE	25 WEEKS FROM LOI

36	DETAILS OF STAIRCASE	25 WEEKS FROM LOI
37	R.C. DETAILS OF ACCESS STAIRWAY	25 WEEKS FROM LOI
38	R.C. DETAILS OF GRDR PLINTH SUPPORTING	28 WEEKS FROM LOI
39	DESIGN CALCULATION FOR OUTLET, SLUDGE	25 WEEKS FROM LOI
40	ANALYSIS & DESIGN OF COLD WATER OUTLET	25 WEEKS FROM LOI
41	R. C. DETAILS OF CW OUTLET, EMBEDMENT	25 WEEKS FROM LOI
42	ANALYSIS & DESIGN OF DESLUDGE CHAMBER	25 WEEKS FROM LOI
43	R.C. DETAILS OF DRAIN SUMP AND DRAIN BOX	25 WEEKS FROM LOI
44	R.C. DETAILS OF MAIN HOT WATER DUCT	25 WEEKS FROM LOI
45	ANALYSIS & DESIGN OF PLATFORM	25 WEEKS FROM LOI
46	DETAILS OF INTERMEDIATE ACCESS/	25 WEEKS FROM LOI
47	DETAILS OF EXTERNAL TRESTLES FOR HOT	25 WEEKS FROM LOI
48	RC DETAILS OF INTERMEDIATE TIER BEAMS	25 WEEKS FROM LOI
49	DETAILS OF PRECAST BEAM AT DRIFT	25 WEEKS FROM LOI
50	NUMERATION AND RC DETAILS OF COLUMN BRACKETS SUPPORTING PRECAST GRID BEAMS	25 WEEKS FROM LOI
51	WIND TUNNEL TESTING : METHODOLOGY AND	25 WEEKS FROM LOI
52	DESIGN OF PEDESTALS FOR HOT WATER	25 WEEKS FROM LOI
53	DESIGN OF TEST SETUP ARRANGEMENT FOR	25 WEEKS FROM LOI
54	DESIGN OF INTERMEDIATE TIER BEAMS	25 WEEKS FROM LOI
55	DESIGN OF COLUMN BRACKETS	25 WEEKS FROM LOI
56	ANALYSIS & DESIGN OF MISCELLANEOUS ITEMS (STOP LOG GATES, TRASH RACKS, ETC)	25 WEEKS FROM LOI
57	DESIGN CALCULATION FOR STOP LOG GATE/	25 WEEKS FROM LOI
58	DETAILS OF SCREEN TRASH RACK AT OUTLET	42 WEEKS FROM LOI
59	DETAILS OF EXTERANL M.S. LADDER	25 WEEKS FROM LOI
60	PITOT TUBE INSTALLATION & PIT DETAILS FOR	30 WEEKS FROM LOI
61	CONTROL & OPERATION PHILOSOPHY	31 WEEKS FROM LOI
62	PG TEST PROCEDURE	50 WEEKS FROM LOI
63	QAP- DRIVES SHAFT FOR IDCT	37 WEEKS FROM LOI
64	QAP-GEARBOX FOR IDCT	37 WEEKS FROM LOI
65	QAP- SPLASH FILL FOR IDCT	37 WEEKS FROM LOI
66	QAP- PVC ELIMINATOR FOR IDCT	37 WEEKS FROM LOI
67	QAP- DESLUDGE PUMP	45 WEEKS FROM LOI
68	QAP- FAN FOR IDCT	37 WEEKS FROM LOI
69	QAP OF BF VALVE	37 WEEKS FROM LOI
70	QAP OF GATE VALVE/SLUICE VALVE	45 WEEKS FROM LOI
71	QAP OF HOT WATER MANIFOLD	45 WEEKS FROM LOI
72	ELECTRICAL LOAD LIST	10 WEEKS FROM LOI
73	CABLE SCHEDULE AND CABLE INTERCONNECTION	15 WEEKS FROM LOI

74	I/O LIST	15 WEEKS FROM LOI
75	INSTRUMENT CABLE SCHEDULE	15 WEEKS FROM LOI
76	INSTRUMENT SCHEDULE	15 WEEKS FROM LOI
77	CONTROL SCHEME/LOGIC DIAGRAM (TO BE IMPLEMENTED IN DDCMIS)	15 WEEKS FROM LOI
78	FIELD JB TERMINATIONS	15 WEEKS FROM LOI

MDL for IDCT shall be finalized after award of contract.

Note:
.BHEL / Customer comments on drgs/docs shall be furnished within 14 days of submission date. However, drgs/docs submitted shall be complete in all respects with revised drawing submitted incorporating all comments. Any incomplete drawing submitted shall be treated as non-submission with delays to bidder's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL for across the table discussions/ finalizations/ submissions of drawings.

DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT

Sl. No.	DOCUMENT TITLE
1	APPROVED DOCUMENTS
2	CALIBRATION CERTIFICATES
3	O&M MANUAL
4	ALL TEST CERTIFICATES

Schedule of Performance Guarantees

1	Total CW Pumping head permissible, viz. static head plus frictional losses plus residual pressure as below: - Static head w.r.t. FGL - Frictional losses within bidder's T.P. with 10% margin - 1 MWC residual pressure at the inlet center line of the hot water distribution pipe in IDCT.	
2	Guaranteed Cold water temperature at design capacity & parameters with the working cells (deg C)	
3.0	Guaranteed power consumption at inlet to motor terminals of fans, at design capacity and design conditions:	
3.1	Per fan motor (KW)	
3.2	Total for the working cells, per Cooling Tower (KW)	

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

COMPLIANCE CERTIFICATE	
1	It is hereby confirmed that the technical specification has been read and understood. We confirm compliance to the tender specification including any prebid clarification and amendments issued prior to techno-commercial bid opening without any deviation.
2	It is hereby declared that any technical submittals which was not specifically asked by BHEL in NIT shall not to be considered as part of bid and shall not be evaluated by BHEL.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

PRE QUALIFICATION REQUIREMENT (TECHNICAL)

Pre-Qualifying Requirements (Technical) of IDCT Package

Technical PQR
3.02.03.01: The Bidder should have designed, engineered, constructed and commissioned at least one (1) number Induced Draught Cooling Tower (IDCT) in RCC Construction of capacity not less than 13000m3/hr which should have been in successful operation for at least one (1) year. The reference Cooling Towers should be of the same type i.e. counter flow as is being offered by the bidder and of the same construction type i.e. RCC construction as being offered by the bidder. In case the reference cooling tower was designed by a party other than the bidder, the bidder shall employ a cooling tower Design Agency, who has independently designed an Induced Draught Cooling Tower of same type as being offered of capacity not less than 13,000 Cu.M/Hr in RCC construction and which should have been in successful operation for at least one (1) year. Further, if such design agency has not carried out the engineering activities by itself in respect of the system of the reference installation against which the design agency is seeking the qualification, then the engineering of the package shall be carried out by an Engineering firm who should have engineered an Induced Draught Cooling Tower of same type & construction as being offered of capacity not less than 13,000 Cu.M/Hr in RCC construction and which should have been in successful operation for at least one (1) year. In such a case, the bidder shall be required to furnish a letter of technical support from the Cooling Tower Design agency and Engineering firm (as applicable) for successful performance of Cooling Tower system. This letter of technical support should be submitted to Purchaser prior to the placement of order on approved bidder.
(OR) 3.02.03.02: The bidder should be a wholly or partially (with minimum 51% holding) held Indian subsidiary of a firm who in turn meets the requirements of clause 3.02.03.01 above. Further, the bidder on its own or along with its holding company should have executed/ be executing at least one contract involving design, engineering, construction and commissioning of at least one (1) number Induced Draft Cooling Tower in RCC Construction of capacity not less than 6500m3/hr. In such a case, the bidder should furnish a letter of technical support from Holding company for successful performance of Cooling Towers. This letter of technical support should be submitted to BHEL along with the bid.
(OR) 3.02.03.03: The bidder who has independently constructed RCC cooling towers can also participate along with it's Holding company/Collaborator/Associate who in turn meets the requirements of clause 3.02.03.01 above. In such a case, the bidder shall be required to furnish a Deed of Joint Undertaking executed by the bidder and it's Holding company/Collaborator/Associate for the successful performance of Cooling Tower. The Deed of Joint Undertaking (DJU) shall be submitted at the time of placement of order on the approved bidder. In case of award, Bidder and it's Holding company/ Collaborator/ Associate shall each be required to furnish an on-demand bank guarantee for INR 60 million (Sixty Million only) to NLC India Limited in addition to the contract performance security to be furnished by the bidder.

Notes:

"design by itself" means that tower(s) of reference plant must have been designed by the Bidder's own engineers. Tower(s) designed by Consultant/ collaborator/ associate of the Contractor shall not be considered.

General notes of the PQR are as under:

1. Bidder to submit supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.

2. Notwithstanding anything stated above, BHEL/Customer reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in overall interest of BHEL/Customer.

3. Consideration of offer shall be subject to customer's approval of bidder.

4. After satisfactory fulfilment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all other terms of the tender.

FORMAT FOR LETTER OF SUPPORT FOR SATISFACTORY PERFORMANCE OF COOLING TOWER FOR NLC TALABIRA THERMAL POWER PROJECT- (3X800MW)

TO

[The Purchaser Name & Address]

Sub: Letter of Technical Support submitted from …… (name of Design Agency*/ Engineering firm */ Holding Company*) undertaking the responsibility for satisfactory performance of .....(Name of the equipment/system)

Dear Sirs,

1. In accordance with the Award of the Contract by ……. (Name of the Contractor) to M/s. ……. (Name of the sub-contractor), we the aforesaid Design Agency*/Engineering firm */Holding Company*, (M/s.....) shall be fully responsible for the satisfactory performance of the .....(Name of the equipment/ system).
2. Further, the manner of achieving the objective set forth in point 1 above shall be as follows For .....(Name of the equipment/system):
   (a) We shall be fully responsible for design, engineering & commissioning and extending all necessary support for putting in to satisfactory operation and carrying out the Guarantee test for ..... (Name of the equipment / system*) to the satisfaction of the Purchaser.
   (b) We shall depute technical experts to Contractor's/Sub-Contractor work for supervision during manufacturing, assembly, inspection, as and when required by Purchaser. We shall participate in site erection, commissioning and final testing (as and when necessary) of the ....(Name of the equipment/ system).
   (c) We shall participate in Technical Co-ordination meetings (TCMs) from time to time, as and when required byPurchaser.
   (d) We shall promptly carryout all the corrective measures and shall promptly provide corrected design and shall undertake replacements, rectifications or modifications to the equipment/system* as and when required by Purchaser in case the equipment/system* fails to demonstrate successful performance as per contract at site.
3. We, the Design Agency*/Engineering firm */Holding Company* do hereby undertake and confirm that this Letter of Technical Support shall be valid for a period of seven (7) years or up to the end of warranty period of the contract.

Signature of the Authorised Representatives:

For M/s …….
(Design Agency*/Engineering firm */Holding Company*)
Name: …….....
Designation: …….
Date: …….
Common Seal of the Company

*: Strike off whichever is not applicable.

Signature of authorized signatory.....

Annexure to Sub QR for IDCT – Details of reference Cooling Tower

QR / PROVENNESSOF COOLINGTOWER

I.(A) Details of RCC Induced Draught Cooling Towers (as per clause 3.02.03.01 of Section-II, Vol-IIA of Contract Documents

In support of Sub-Qualifying Requirements of Clause 3.02.03.01 of Section-II, Vol-IIA of contract Document, we confirm that We/our Sub-contractor have designed, engineered, constructed and commissioned at least one (1) number of Induced Draft Cooling tower in RCC construction of capacity not less than 13,000 m³/h and which has been in successful operation for at least one (1) year.

We/our Sub-contractor further confirm that the reference cooling tower is of the same type, i.e. counter flow type cooling tower as is being offered by us/our sub-contractor.

The details of the reference cooling tower is furnished below:

Sl.	Description/Details PlantNo.	
1.	Description of Work and Name of Client	.....
2.	Location/AddressofthePlant/works	.....
3.	Address of the Client (including Contact Person Name, Telephone No, e-mail etc.)	.....
4.	No.of Cooling Towers	.....
5.	CapacityofeachCooling Tower(Cu.M/hr.)	.....
6.	Type of Cooling Towers	.....
7.	Type of Construction	.....
8.	Whether scope of works included	
	(a) Design of Cooling Towers by Contractor / its Sub-contractor	YES*/NO*
	(b) Engineering &Construction of Cooling towers	YES*/NO*
	(c) Commissioning of Coolingtowers	YES*/NO*
9.	Date of Commissioning of the Cooling tower	

Signature of authorized signatory.....

10. Certificate from client to substantiate Contractor's QR data is Enclosed at Annexure..... YES*/NO*

11. Whether the reference cooling tower at sl no:1 is designed by the Contractor/sub contractor YES*/NO*

12a. Whether the reference cooling tower at sl. No. 1 is got designed by contractor/ subcontractor. YES*/NO*

12b. Name of the Design agency of the reference Cooling tower

12c. Whether the reference cooling tower is Engineered by the design agency YES*/NO*

12d. Name of the Engineering firm who has engineered the reference cooling tower

13. Whether Documentary evidence certificate(s)from client enclosed for the above data YES*/NO*

14. We confirm to submit a letter of technicalsupportat the time of placement of order on our contractor.

- *Strike off whichever is not applicable.

Date :

Place :

(Signature).....

(Printed Name) .....

(Designation).....

(Common Seal) .....

(Contractor / Sub-Contractor)

Signature of authorized signatory.....

I.(B) Details of RCC Induced draught Cooling Towers (as per clause 3.02 .03.02 of Section-II, Vol-IIA of Contract Documents

In terms of clause no. 3.02.03.02 of Section-II, Vol-IIA, we/our sub-contractor confirm that, we/our sub-contractor a wholly or partially (with minimum 51% holding) held Indian subsidiary of a firm who in turn meets the requirements of clause 3.02.03.01of Sub-Section-II,Vol-IIA. Further, we/our sub-contractor either on its own or along with its holding company have executed / are executing at least one contract involving design, engineering, construction and commissioning of at least one (1) number Counter flow Induced Draught Cooling Tower in RCC Construction of capacity not less than 6500m3/hr.

We/our Sub-contractor further confirm that the reference cooling tower is of the same type, i.e. counter flow type cooling tower as is being offered by us/our sub-contractor.

We/our sub-contractor also enclose letter of technical support from holding company for successful performance of Induced Draught Cooling Towers as per the format enclosed.

The details of the reference cooling tower is furnished below:

Sl. No.	Description/Details	Plant
1.	Description of Work and Name of Client	.....
2.	Location / Address of the Plant / works	.....
3.	Address of the Client (including Contact Person Name, Telephone No, e-mail etc.)	.....
4.	No.of Cooling Towers	.....
5.	Capacity of each Cooling Tower (Cu.M/hr.)	.....
6.	Type of Cooling Towers	.....
7.	Type of Construction	.....
8.	Whether scope of works included	
	(a) Design of Cooling Towers by Contractor / its Sub-contractor YES*/NO* (Name of Designer)	
	(b) Engineering &Constructionof Cooling towers	YES*/NO*
	(c) Commissioning of Cooling towers	YES*/NO*
9.	Date of Commissioning of the Cooling tower	

Signature of authorized signatory.....

10. Certificate from client to substantiate Contractor's QR data is Enclosed at Annexure..... YES*/NO*

11. Whether the reference cooling tower at sl no.1 is designed by the Contractor's own engineers YES*/NO*

12. Whether the reference cooling tower atsl.No.1 is designed by Sub-contractor own engineers YES*/NO*

13. Whether Documentary evidence / certificate(s)from client enclosed for the above data Yes*/No*

14. We confirm to submit a letter of technical support at the time of placement of order on our sub-contractor

.....

- *Strike off whichever is not applicable.

Date:

Place:

(Signature).....
(Printed Name).....
(Designation).....
(Common Seal) .....

(Contractor / Sub contractor)

Signature of authorized signatory.....

I. (C) Details of Induceddraught Cooling Towers (as per clause 3.02.03.03 of Section-II, Vol-IIA of Bidding Documents

In support of Sub-Qualifying Requirements of Clause 3.02.03.03 of Section-II, Vol-IIA of Bidding Document, we confirm that We/our Sub-contractor have independently constructed RCC cooling towers and our Holding company*/Collaborator*/Associate* fulfils the requirements in Clause 3.02.03.01 of Section-II, Vol-IIA.

We shall furnish a Deed of Joint Undertaking executed by us/ our sub-contractor and Holding company/Collaborator/Associate for the successful performance of Cooling Tower, as per the format enclosed with the bidding documents. The Deed of Joint Undertaking (DJU) shall be submitted to purchaser along with an on demand bank-guarantee at the time of placement of order on the approved sub-contractor.

The details of the reference cooling tower is furnished below:

S.No.	Description	Details
1.	Description of Work and Name of Client	.....
2.	Location/Address of the Plant/works	.....
3.	Address of the Client (including Contact Person Name, Telephone No, e-mail etc.)	.....
4.	No. of Cooling Towers	.....
5.	Type of Construction	.....
6.	Details of ref cooling tower of Holding company /Collaborator/ Associate as per clause 3.02.03.01	
7.	Documentary evidence / Certificate from client to substantiate Bidder's QR data is enclosed at Annexure to this Attachment –II (a)	YES*/NO*

* Strike off whichever is not applicable.

Date:
Place:

(Signature).....
(Printed Name) .....
(Designation).....

(Common Seal) .....

(Contractor/ Sub contractor)

Signature of authorized signatory.....

FORM OF DEED OF JOINT UNDERTAKING TO BE PROVIDED FOR INDUCED DRAFT COOLING TOWER AS PER CLAUSE 3.02.03.03 OF TECHNICAL SPECIFICATIONS (SECTION -II / VOLUME IIA)

(ON NON-JUDICIAL STAMP PAPER OF APPROPRIATE VALUE)

DEED OF JOINT UNDERTAKING TO BE EXECUTED BY CONTRACTOR/ SUB-CONTRACTOR AND ITS HOLDING COMPANY/ SUBSIDIARY/ COLLABORATOR/ ASSOCIATEFOR SUCCESSFUL PERFORMANCE OFCOOLING TOWER MEETING THE REQUIREMENTS STIPULATED IN THE TECHNICALSPECIFICATION.

The DEED OF JOINT UNDERTAKING executed this …….. day of ……. Two thousand……. by M/s …… (CONTRACTOR/SUB CONTRACTOR) ……. (hereinafter called the CONTRACTOR/SUB CONTRACTOR, which expression shall include its successors, administrators, executors and permitted assigns)

AND

The DEED OF JOINT UNDERTAKING executed this …….. day of ……. Twothousand ……. by M/s …… (HOLDING COMPANY/SUBSIDIARY/COLLABORATOR/ASSOCIATE) a Companyincorporated under …….. having its RegisteredOffice at …… (hereinafter called the HOLDING COMPANY/SUBSIDIARY/COLLABORATOR/ASSOCIATE, which expression shall include its successors, administrators, executors and permitted assigns)

AND

in favour of NLC INDIA Ltd., A Government of India Enterprise, incorporated under the Companies Act, having its Registered Office at No.135, EVR PERIYAR HIGH ROAD, KILPAUK, CHENNAI – 600 010, INDIA ("Purchaser" which expression shall include its successors, administrators, executors and assigns).

WHEREAS, the Purchaser invited Bids for design, engineering, manufacture, supply, transportation tosite, construction, installation, testing, commissioning and conductance of guarantee tests for the EPCPackage for NLC Talabira Thermal Power Project (3X 800 MW) (hereinafter referred to as "Plant") vide its Bidding Document No. CO CONTS/0015K/NTTPP/EPC/e-conts/2020 dt.18.11.2020, which interalia include Cooling tower(s).

WHERAS M/s BHEL (Contractor) has submitted its proposal in response to the aforesaid invitation for Bid by the Purchaser for EPC package for NLC Talabira Thermal Power Project (3X 800 MW) against the Purchaser's bidding document no. CO CONTS/0015K/NTTPP/EPC/e-conts/2020 dt.18.11.2020 interalia including design, engineering, manufacturing, supply, transportation to site, installation, testing and commissioning (including trial operation and performance and guarantee test) of cooling tower(s).

AND WHEREAS vide
clause 3.02.03.03 of technical specifications (Section-II, Volume-IIA), it has been specified that Contractor/ sub-contractor who has independently constructed RCC cooling towers can also participate along with its Holding company/Subsidiary/Collaborator/Associate who in turn meets the requirements of clause 3.02.03.01 of TECHNICAL SPECIFICATIONS (SECTION-II, VOLUME-II-A).

Signature of authorized signatory.....

NOW THEREFORE, THIS DEED WITNESSETH AS UNDER:

1. We the Contractor/ sub-contractor and our Holding company/ Subsidiary/ Collaborator/ Associate, do hereby declare and undertake that we shall be jointly and severally responsible to the Purchaser for the successful performance of the Cooling tower(s).

2. In case of any breach of the Contract by the contractor /its sub-contractor, we the Holding company/Subsidiary/ Collaborator / Associate do hereby undertake, declare and confirm that we shall befully responsible for the successful performance of the cooling tower(s) and undertake to carry out all the obligations and responsibilities under this Deed of Joint Undertaking in order to discharge the Contractor/ sub-contractor obligations stipulated under the Contract. Further, if the Purchaser sustains any loss or damage onaccount of any breach of the Contract for the cooling tower, we undertake to promptly indemnify and pay such loss/damages caused to the Purchaser on its written demand without any demur, reservation, Contest or protest in any manner whatsoever. This is without prejudice to any rights of the Purchaser against the contractor/sub-contractor under the Contract and/or guarantees. It shall not be necessary orobligatory for the Purchaser to first proceed against the contractor/sub-contractor before proceeding against the Holding company/Subsidiary / Collaborator / Associate nor any extension of time or any relaxation givenby the Purchaser to the contractor/sub-contractor shall prejudice any rights of the Purchaser under this Deed ofJoint Undertaking to proceed against the Holdingcompany/Subsidiary / Collaborator / Associate. The liability of the contractor, his sub-contractor and the Holding company/ Collaborator / Associate shall be limited to an amount equal to 100% of the value of the contract** between the contractor and the sub-supplier for the equipments/systems.

3. Without prejudice to the generality of the Undertaking in paragraph 1 above, the manner of achieving the objective set forth in paragraph 1 above shall be as follows:

(a) We, Holding company/Subsidiary / Collaborator / Associate shall ensure that complete design, manufacturing, quality assurance and installation of the cooling tower(s) is carried out in line with drawings and procedures and shall be fully responsible for its compliance so as to ensure satisfactory, reliable, safe and trouble free performance of cooling tower(s).
Further, we, Holding company/Subsidiary / Collaborator / Associate shall extend our quality surveillance /supervision / quality control to the contractor/sub-contractor during Design, engineering, erection, commissioning and performance testing of cooling tower(s).
Further, Holding company/ Collaborator / Associate shall depute their technical experts from time to time to the contractor/sub-contractor works / Purchaser's project site as required by the Purchaser and agreed to by contractor/sub-contractor to facilitate the successful performance of the cooling tower(s) as stipulated in the aforesaid Contract.
Further, Holding company/Subsidiary / Collaborator / Associate shall ensure proper design, manufacture installation, testing and successful performance of the cooling tower under the said contract inaccordance with stipulations of Bidding Documents and if necessary, Holding company/Subsidiary /Collaborator / Associate shall advise the contractor/sub-contractor suitable modifications of design and implement necessary corrective measures to discharge the obligations under the contract.

(b) In the event the contractor/sub-contractor fail to demonstrate that the cooling tower(s) meet the guaranteed parameters and demonstration parameters as specified in the contract, Holding company/Subsidiary /Collaborator / Associate shall promptly carry out all the corrective measures related to engineeringservices at their ownexpense and shall promptly provide corrected design to the Purchaser.

(c) Implementation of the corrected design and all other necessary repairs, replacements, rectification or modifications to the cooling tower(s) and payment of financial liabilities and penalties and fulfilment of all other contractual obligations as provided under the contract shall be the joint and several responsibilities of the contractor/sub-contractor and Holding company/Subsidiary / Collaborator / Associate.

Signature of authorized signatory.....

4. We, the contractor/sub-contractor and Holding company/Subsidiary / Collaborator / Associate do hereby undertake and confirm that this Undertaking shall be irrevocable and shall not be revoked till ninety (90) days after the end of the warranty period of the last equipment covered under the Contract and further stipulate that the Undertaking herein contained shall terminate after ninety (90) days of satisfactory completion of such warranty period. In case of delay in completion of warranty period, the validity of this Deed of Joint Undertaking shall be extended by such period of delay. We further agree that this Undertaking shall be without any prejudice to the various liabilities of the Contractor including Contract Performance Security as well as other obligations of the Contractor in terms of the Contract.

5. The Contractor/sub-contractor will be fully responsible for the quality of all the equipment/main assemblies/components manufactured at their works or at their contractors' works or constructed at site, and their repair or replacement, if necessary, for incorporation in the Plant and timely delivery thereof to meet the completion schedule under the Contract.

6. In case of Award, in addition to the Contract Performance Security for the contract, Contractor/ sub Contractor and the Holding company/Subsidiary / Collaborator / Associate shall each be required to furnish an on demand bank guarantee in favour of the Purchaser as per provisions of the bidding documents. The value of such Bank Guarantee shall be equal to **INR 60 million (Indian Rupees Sixty Million only)** and it shall be guarantee towards the faithful performance/compliance of this Deed of Joint Undertaking in accordancewith the terms and conditionsspecified herein. The bank guarantee shall be unconditional, irrevocable and valid till ninety (90) days beyond the end of warranty period of the last equipment covered under the Contract. In case of delay in completion of the warranty period, the validity of this Bank Guarantee shall be extended by the period of such delay. The guarantee amount shall be promptly paid to the Purchaser on demand without any demur, reservation, protest or contest.

7. Any dispute that may arise in connection with this Deed of Joint Undertaking shall be settled as per arbitration procedure/rules mentioned in the Contract Documents. This Deed of Joint Undertaking shall beconstrued and interpreted in accordance with the Laws of India.

8. We, Holding company/Subsidiary / Collaborator / Associate and contractor /sub-contractor agree that this Undertaking shall form an integral part of the Contracts from the date of signing of this Deed of Joint Undertaking. We further agree that this Undertaking shall continue to been forceable till its validity.

9. That this Deed of Joint Undertaking shall be operative from the effective date of signing of this Deed ofJoint Undertaking.

IN WITNESS WHEREOF, Holding company/Subsidiary / Collaborator / Associate and contractor / sub-contractor through their authorised representatives, have executed these presents and affixed common seal of their respective companies, on the day, month and year first mentioned above.

WITNESS

.....

1. For M/s.....

(Holding company/Subsidiary / Collaborator / Associate)

Signature of authorized signatory.....

.....
(Signature of the Authorised representative)
Name .....
(Official Address)
Designation .....
Common Seal of the Company.....

WITNESS
.....

2. For M/s
.....
(*Sub-Contractor)

.....
(Signature of the Authorised representative)
Name .....
(Official Address)
Designation .....
Common Seal of the Company.....

WITNESS
.....

3. For M/s
.....
(Contractor)

.....
(Signature of the Authorised representative)
Name .....
(Official Address)
Designation .....
Common Seal of the Company.....

WITNESS
.....

4. For M/s
.....
(JV company/Subsidiary company)

.....
(Signature of the Authorised representative)
Name .....
(Official Address)
Designation .....
Common Seal of the Company.....

Note:

1) Power of Attorney of the executants of this DJU is to be furnished.
2) * Strike out, whichever is not applicable.
3) ** Copy of priced purchase order for the equipment shall be furnished by contractor.

Signature of authorized signatory.....