

Singareni (1x800MW) EPC Package Amendment 01

S.No.	Specification Reference				Existing	Read as
	Part	Sub Sec	Page No	Clause No		
1	VI-B	E 01	2 OF 13	1.01.02 (h)	Boroscopy examination shall be carried out for those headers which will be interconnected with other headers by welding.	Boroscopy examination of all headers shall be carried out to check presence of any foreign material.
2	VI-B	E 01	3 of 13	1.01.03(i)	Nil	Austenitic Stainless-Steel tubes & coils shall be Solution Heat Treated, Stored, preserved and handled so as to avoid Stress Corrosion Cracking due to Chloride contamination.
3	VI-B	E 01	6 of 13	1.01.10(g)	Following test shall be carried out on assembled units of Steam Generator Startup Drain Recirculation Pump: - Type Test: i) Tests to establish unit functioning of pump at temp and pressure. ii) Hot standstill and start up tests.	Type test shall be carried out in line with Engineering technical specifications.
4	VI-B	E 01	8 of 13	1.02.03(d)	Fans: Induced Draft, Forced Draft and Primary Air fans and GR fans (d) Full range performance test shall be carried out on one fan of each type and size as per BS 848, Part-1.	Fans: Induced Draft, Forced Draft and Primary Air fans and GR fans: (d) Full range performance test shall be carried out on one fan of each type and size as per BS 848-1:2007 / BS EN ISO 5801:2008.
5	VI-B	E 01	8 of 13	1.02.03(d)	Nil	Fans: Seal air Fan, Scanner air fans: All Fans performance test shall be carried out at the manufacturer's works under as near actual site conditions as possible.
6	VI-B	E 01	9 of 13	1.02.06(c)	(C) All pumps including spare cartridges shall be subjected to performance test at the manufacturer's works under as near site conditions as possible and strip down examination after the test.	(C) All pumps including spare cartridges shall be subjected to performance test at the manufacturer's works under as near site conditions as possible. Strip down examination shall be carried out in case of any abnormal sound during performance test of pump.

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7	VI-B	E 04	2 of 5	1.07.04	Nil	Each pump shall be subjected to a performance test at the manufacturer's works under as near actual site conditions as possible.
8	VI-B	E 04	3 of 5	1.09.06	Nil	Trail assembly & run test of Vacuum Belt Filter system shall be carried out at shop
9	VI-B	E 04	3 of 5	1.11.04	Nil	Assembled agitators shall be subjected to run test at the manufacturer's works.
10	VI-B	E 04	4 of 5	1.13.04	Performance test shall be carried out on each blower as per technical specification/ Relevant standard	Performance test shall be carried out on each Oxidation blower as per technical specification/ relevant standard at the manufacturer's works under as near actual site conditions as possible.
11	VI-B	E-04	5 of 5	1.17.00	BOROSILICATE LINING: Borosilicate block shall conform to NTPC data sheet and to be tested as per Relevant applicable standard	Borosilicate block, Adhesive & Primer materials shall conform to NTPC data sheet and to be tested as per relevant applicable standard
12	VI-B	E-60			Indicative Sub-vendor list for QA.	Indicative Sub-vendor list for QA is attached.

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S. No.	SPECIFICATION REFERENCE				Instead of	Read as
	SEC/ PART	Sub- Section	Clause No.	PA GE NO.		
1	VI	B	E-59, Clause 4.0 (b)	2 of 6	<p>PURCHASE AND SERVICE</p> <p>b) Structural steel (plates and rolled sections i.e. channels, beams & angles) conforming to IS 2062 and Reinforcement steel conforming to IS 1786 supply if in the scope of the contractor shall be procured from Primary Steel Producers (Refer NOTE below). Currently, Primary Steel Producers acceptable are SAIL, JSW Steel Ltd, Jindal Steel & Power, Tata steel Ltd. (for Reinforcement steel/TMT bars), RINL (for long products/Rolled sections and Reinforcement steel/TMT bars), Arcelormittal Nippon Steel India Ltd. (for Flat products/ Steel Plates), ESL Steel Ltd. (for Reinforcement steel/TMT bars) and JSW Ispat Special Products Ltd. (for long products/Rolled sections and Reinforcement steel/TMT bars). Subsequently, if any new Primary Steel Producer/s are proposed during execution of contract, the same may be considered for acceptance subject to meeting the following qualifying requirements:</p> <p>i) The proposed supplier should be a Primary Steel Producer, having a minimum production capacity of one million tons per annum (MTPA).</p> <p>ii) The proposed supplier should be a regular manufacturer of Steel Plates and / or Rolled Sections and / or Reinforcement Steel for the last two years as on date of submission of proposal.</p>	<p>PURCHASE AND SERVICE</p> <p>b) Structural steel (plates and rolled sections i.e. channels, beams & angles) conforming to IS 2062 and Reinforcement steel conforming to IS 1786 supply if in the scope of the contractor shall be procured from the Steel Producers (Refer NOTE below). Currently, Steel Producers acceptable are:</p> <ol style="list-style-type: none"> 1. SAIL, 2. JSW Steel Ltd, 3. Jindal Steel & Power, 4. RINL (for long products/Rolled sections and Reinforcement steel/TMT bars), 5. JSW Ispat Special Products Ltd. (for long products/Rolled sections and Reinforcement steel/TMT bars). 6. Arcelormittal Nippon Steel India Ltd. (for Flat products/ Steel Plates), 7. Tata steel Ltd. (for Reinforcement steel/TMT bars), and 8. ESL Steel Ltd. (for Reinforcement steel/TMT bars) <p>Subsequently, if any new Steel Producer/s are proposed by the main contractor during execution of contract, the same may be considered for acceptance subject to meeting the following qualifying requirements:</p> <p>i) The proposed supplier should be a Steel Producer, having a minimum production capacity of one million tons per annum (MTPA).</p> <p>ii) The proposed supplier should be a regular manufacturer of Steel Plates and / or Rolled</p>

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				<p>iii) The proposed supplier should also be a registered licensee with Bureau of Indian Standards for BIS: 1786/2062 at the time of submission of proposal. NOTE: The "Primary Steel Producer" shall mean Steel Producer of any capacity, irrespective of process route, starting their operations from iron making using iron ore, virgin or processed, with necessary refining facilities and rolling/processing facilities, at a single location or else in multiple locations provided that the entire gamut of iron & steel production, from iron making to finished steel production, is owned by the same company or its subsidiary company(ies). Provided that the iron making capacity is sufficiently matching the steel making capacity. Further, downstream units should use material from the upstream units of the same company or its subsidiaries.</p> <p>In case of non-availability of certain steel section/s i.e. Angle smaller than 100x100x10 mm, MS flats, rounds, square bars and chequered plate from above acceptable primary steel producers, an option is given to the Main contractor to source these sections directly from SAIL Conversion/Wet Leasing agent subject to the conditions given at point no. A) below:</p> <p>A) Approval conditions for procurement of structural steel sections through SAIL Conversion/Wet Leasing agent:</p>	<p>Sections and / or Reinforcement Steel for the last two years as on date of submission of proposal. iii) The proposed supplier should also be a registered licensee with Bureau of Indian Standards for BIS: 1786/2062 at the time of submission of proposal. NOTE: "The "Steel Producer" shall mean Steel Producer of any capacity, irrespective of process route, starting their operations from iron making using iron ore, virgin or processed, with necessary refining facilities and rolling/processing facilities, at a single location or else in multiple locations provided that the entire gamut of iron & steel production, from iron making to finished steel production, is owned by the same company or its subsidiary company(ies). Provided that the iron making capacity is sufficiently matching the steelmaking capacity. Further, downstream units should use material from the upstream units of the same company or its subsidiaries."</p> <p>A) Approval conditions for procurement of structural steel sections through SAIL Conversion/Wet Leasing agent: In case of non-availability of certain steel sections such as angel 100X100X10 mm or smaller size, MS flats, rounds bars, square bars and chequered plate from NTPC acceptable steel producers (non-availability to be established by supporting documents), an option is given to the Main contractor to source these sections directly from SAIL approved Conversion/Wet Leasing agent subject to the conditions given below: 1. The validity of BIS License of the finished sections shall be ensured by the Main contractor.</p>
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				<p>1. Main Contractor to ensure continuity of BIS license of the manufacturer for the sections being manufactured for Employer supply.</p> <p>2. Billets shall be procured from Employer approved Main Steel Producers. Proper records for traceability from raw material to final product shall be maintained.</p> <p>3. 100% chemical analysis of the raw material (Billets) shall be carried out as per IS: 2830. Testing of one sample per 40 MT for each type of section or part thereof shall be carried out as per IS: 2062 on finished product.</p> <p>4. Each lot of delivery of finished product shall be accompanied with co-relatable Manufacturer's Test Certificate (MTC). MTC of finished sections shall be correlated with original MTC for Billets received from Main Steel Producer and Manufacturer Test Report of chemical analysis of Billets mentioned at point no.3. MTC of finished sections shall include the reference of MTC for Billets from Main Steel Producer.</p> <p>5. Employer will have access to carry out the surveillance checks for in-process stage.</p> <p>6. In case of any defects are seen in the material, Main Contractor will replace the material without any cost implication to Employer.</p> <p>In case of non-availability of certain size/s of steel tubes conforming to IS:1161 and Hollow (square and rectangular) steel sections conforming to IS: 4923 from above acceptable primary steel producers, the same may be sourced from BIS approved sources having</p>	<p>2. Billets shall be procured from Owner acceptable Steel Producers. Proper records for traceability from raw material to final product shall be maintained.</p> <p>3. Testing of one sample per 40 MT for each type of section/size or part thereof shall be carried out as per IS: 2062 on finished product for physical and chemical properties. The sampling and testing for physical and chemical tests on finished product at Conversion/Wet Leasing agent shall be mandatorily witnessed by main contractor with prior consent of Owner.</p> <p>4. Each lot of delivery of finished product shall be accompanied with co-relatable Manufacturer's Test Certificate (MTC). MTC of finished sections shall be correlated with original MTC for Billets received from NTPC acceptable Steel Producers.</p> <p>5. Owner will have access to carry out the surveillance checks for in-process stage.</p> <p>6. In case of any defects are seen in the material, Main Contractor will replace the material without any cost implication to Owner.</p> <p>B) Approval conditions for procurement of Steel tubes conforming to IS: 1161 and Hollow (square and rectangular) steel sections conforming to IS: 4923 from BIS approved sources: Steel tubes conforming to IS:1161 and Hollow (square and rectangular) steel sections conforming to IS: 4923 shall be sourced from BIS approved sources having valid BIS license subject to complying and ensuring the following conditions by Main contractor:</p> <p>1. The validity of BIS License of the finished sections shall be ensured by the Main contractor.</p> <p>2. Raw materials shall be procured from Owner acceptable Steel Producers.</p>
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				<p>valid BIS license subject to the conditions given at point no. B) below:</p> <p>B) Approval conditions for procurement of Steel tubes conforming to IS: 1161 and Hollow (square and rectangular) steel sections conforming to IS: 4923 from BIS approved sources:</p> <ol style="list-style-type: none"> 1. Main Contractor to ensure continuity of BIS license of the manufacturer for the sections being manufactured for Employer supply. 2. Raw materials shall be procured from Employer approved Main Steel Producers. 3. 100% chemical analysis of the raw material (steel) shall be carried out as per IS: 228. Testing of samples of steel tubes and hollow sections from each lot shall be carried out as per IS: 1161 & IS: 4923 respectively on finished product. 4. Each lot of delivery of finished product shall be accompanied with co-relatable Manufacturer's Test Certificate (MTC). 5. Employer will have access to carry out the surveillance checks for in-process stage. 6. In case of any defects are seen in the material, Main Contractor will replace the material without any cost implication to Employer. <p>The specific methodology to be followed for above procurement through conversion route/BIS approved sources route shall be subject to approval by Employer in advance.</p>	<ol style="list-style-type: none"> 3. Testing of samples of steel tubes and hollow sections from each lot shall be carried out as per IS: 1161 & IS: 4923 respectively on finished product. 4. Each lot of delivery of finished product shall be accompanied with co-relatable Manufacturer's Test Certificate (MTC). 5. Owner will have access to carry out the surveillance checks for in-process stage. 6. In case of any defects are seen in the material, Main Contractor will replace the material without any cost implication to Owner. <p>The specific methodology to be followed for Procurement of Structural Steel and Reinforcement Steel through Conversion route/BIS approved sources shall be subject to approval by NTPC in advance.</p>
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		Project/परियोजना : SINGARENI THERMAL POWER PROJECT STAGE-II (1X800 MW) Package/पैकेज: EPC Package Supplier/आपूर्तिकर्ता: Contract No./अनुबंध सं.:				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब-वेंडर के अनुमोदन सहित मर्दों की सूची			DOC. NO./दस्तावेज सं.: CS-
									REVISION NO : 05
									DATE/ तिथि : 01.04.2024
									SUB-SYSTEM उप-प्रणाली: QA-SG(MECH)
S. N. क्र.सं.	Item / मर्द	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedu le क्यूपी उप.अनु सूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी
1	RAPH	I			REFER SUB QR ITEM LIST Refer Note 1				STATIC COMPONENTS, ROTATING COMPONENTS, GUIDE/SUPPORT BEARINGS-NTPC APPROVED VENDORS
2	FD, PA & ID FANS	I			REFER SUB QR ITEM LIST Refer Note 1				STATIC, ROTATING COMPONENTS AND BLADES - NTPC APPROVED VENDORS
3	COAL MILL	I			REFER SUB QR ITEM LIST Refer Note 1				MILL COUPLING, PGB, GRINDING ROLLS, BULL RING SEGMENTS, MILL HOUSING, SEPARATOR AND OTHER MAIN COMPONENTS - FROM NTPC APPROVED SOURCES
4	ESP	I			REFER SUB QR ITEM LIST Refer Note 1				COLLECTING ELECTRODE, EMITTING ELECTRODE - NTPC APPROVED VENDORS
5	GRAVIMETRIC COAL FEEDERS	I			REFER SUB QR ITEM LIST Refer Note 1				
6	RECIRCULATION PUMP	I			REFER SUB QR ITEM LIST Refer Note 1				
7	AUXILIARY BOILER	I			REFER SUB QR ITEM LIST Refer Note 1				
8	ESP SUPPORT STRUCTURE (AUTO WELDED COLUMNS & ROOF BEAMS)	I			NTPC APPROVED SOURCES		A		REFER BOILER STRUCTURE LIST

		\$			VALLOUREC & MANNESMANN TUBES	FRANCE, GERMANY	A		CS & AS T-11, T-22, T-23, T-91, T-92
		\$			TENNARIS GLOBAL SERVICES SA, URUGUAY	DALMINE, ITALY	A		CS & AS T-11, T-22
		\$			TENNARIS GLOBAL SERVICES SA, URUGUAY	SILCO, ROMANIA	A		CS & AS T-11, T-22, T-23, T-91
		\$			TENNARIS GLOBAL SERVICES SA,URUGUAY	NKK TUBES, JAPAN	A		CS & AS T-11, T-22, T-91
		\$			MAHARASHTRA SEAMLESS LTD	RAIGAD	A		CS HOT FINISHED OD:21.0 MM TO 168.3 MM WT: 2.0 MM TO 20.0 MM COLD FINISHED OD:19.0 MM TO 88.9 MM WT: 1.0 MM TO 12.0 MM
		\$			IBF S.P.A	ITALY	A		CS & AS T-11, T-12, T-22, T-91
		\$			JFE STEEL CORPORATION	JAPAN	A		CS & AS T-11, T-22, T-23, T-91, T-92

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9	SEAMLESS TUBES	\$			TUBOS REUNIDOS INDUSTRIAL, S.L.U	SPAIN	A		CS & AS T-11, T-22, T-23, T-91, T-92
		\$			JINDAL SAW LIMITED	NASHIK	A		CS & AS T-11, T-12, T-22 HOT FINISHED OD: 33.4 MM TO 168.3 MM WT: 3.5 MM TO 21.95 MM COLD FINISHED OD: 6.0 MM TO 140.0 MM WT: 0.8 MM TO 15.0 MM
		\$			REMI METALS GUJARAT LTD	BHARUCH	A		CS & AS T-11, T-12, T-22 HOT FINISHED OD: 28.6 MM TO 177.8 MM WT: 3.0 MM TO 28.0 MM COLD FINISHED OD: 9.0 MM TO 127.0 MM WT: 1.6 MM TO 20.0 MM
		\$			WAYMAN GORDAN	USA	A		CS,T11,T12,T22,T91
		\$			BENTELER STEEL/TUBE GMBH	GERMANY	A		CS,T-11, T23, T-22, T-91 & T-92
		\$			HEAVY METALS & TUBES LTD	AHMEDABAD	A		CS HOT FINISHED UP TO OD: 76.2 MM AND WT:12.0 MM
		\$			PRODUCTOS TUBULARES,	SPAIN	A		CS & AS T-11, T-22. T-23. T-91
		\$			ISMT	AHMEDNAGAR,B ARAMATI	A		CS, T11, 12, 22 HOT FINISHED OD: 38.0 MM TO 273.0 MM WT: 3.5 MM TO 40.0 MM COLD FINISHED OD: 18.0 MM TO 140.0 MM WT: 1.5 MM TO 15.0 MM
		\$			NIPPON STEEL & SUMITOMO METAL CORPORATION	JAPAN	A		CS, T-11, T-22, T23, T-91, & T-92
		\$			BENTELER STEEL/TUBE GMBH	GERMANY	A		CS, T-11, T23, T-22, T-91 & T-92
		\$			BHEL SSTP	TRICHY	A		CS, T-11, T-12, T-22 & T91 (OD 21.30 TO 133 MM & WALL THICKNESS 2MM TO 14MM (HOT FINISHED / COLD DRAWN SIZE)
		I			M/s Heavy Metals & Tubes	MEHSANA GUJARAT	A		CS & AS up to T91 (1. SA 213 T91 CDS: OD 19.05-76.2mm & WT 1.65-16.15mm 2. SA 213 T91 HFS: OD 26.7-76.2mm & WT 3.05-12mm 3. SA 335 P91 CDS & HFS: OD 76.2-127mm & WT 3.5-21mm)

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10	SEAMLESS TUBES(RIFFLED)	\$			SALZGITTER MANNESAMANN PRECISION	FRANCE	A		CS
11	SEAMLESS TUBES(SS)	\$			KOBE SPECIALITY STEEL CO LTD	JAPAN	A		SS304, SS347H
		\$			SMST	ITALY	A		SS304, 347H, SUPER 304
		\$			TUBACEX	SPAIN	A		SS304, 347H, SUPER 304
		\$			PASCO SPL STEEL CO.	SOUTH KOREA	A		SS304, 347H, SUPER 304
		\$			NIPPON STEEL & SUMITOMO METAL CORPORATION	JAPAN	A		SS 304, SS347H, SUPER 304 OD UP TO 114.3 MM
		I			M/s TUBACEX	VALSAD	A		347H, SUPER 304H (OD 33.4 to 76.2 mm & WT 3.5 to 14.1mm. 347H : OD 26.7 to 31.8mm & WT 7.2 to7.8mm)
		I			M/S CHANDAN STEEL LTD	VALSAD	A		347H, SUPER 304H (OD 33.4 to 76.2 mm & WT 3.5 to 14.1mm. 347H : OD 26.7 to 31.8mm & WT 7.2
		I			M/S RATNAMANI METALS AND TUBES LT	MEHSANA	A		SUPER 304H (OD 33.4 to 76.2 mm & WT 3.5 to 14.1mm) , SS 347H (OD 26.7 to 31.8mm & WT 7.2 to 7.8mm
		\$			TENNARIS GLOBAL SERVICES SA, URUGUAY	DALMINE, ITALY	A		CS & AS P-11, P-22, P-91
		\$			TENNARIS GLOBAL SERVICES SA, URUGUAY	SILCO, ROMANIA	A		CS & AS T-11, T-22, T-91 UPTO DIA 159 MM
		\$			TENNARIS GLOBAL SERVICES SA,URUGUAY	NKK TUBES, JAPAN	A		CS & AS T-11, T-22, T-91
		\$			VALLOUREC & MANNESMANN TUBES	FRANCE, GERMANY	A		CS & AS P-11, P-22, P-91. P-92
		\$			TUBOS REUNIDOS INDUSTRIAL, S.L.U	SPAIN	A		CS & AS P-11, P-22, P-91

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12	SEAMLESS PIPES	\$			ISMT	AHMEDNAGAR, BARAMATI	A		CS, T11, 12, 22 HOT FINISHED OD: 38.0 MM TO 273.0 MM WT: 3.5 MM TO 40.0 MM COLD FINISHED OD: 18.0 MM TO 140.0 MM WT: 1.5 MM TO 15.0 MM
		\$			REMI METALS GUJARAT LTD	BHARUCH	A		CS & AS T-11, T-12, T-22 HOT FINISHED OD: 28.6 MM TO 177.8 MM WT: 3.0 MM TO 28.0 MM COLD FINISHED OD: 9.0 MM TO 127.0 MM WT: 1.6 MM TO 20.0 MM
		\$			VALCONVY TRUB CHOMUTOV,	CZECH REPUBLIC	A		CS & P-12 & P-22
		\$			ARCELORMITTAL TUBULAR PRODUCTS ROMAN S.A	ROMANIA	A		CS
		\$			WAYMAN GORDAN	USA	A		CS & AS P-11, P-22, P-91
		\$			MAHARASHTRA SEAMLESS LTD	RAIGAD	A		CS HOT FINISHED OD:219.1 MM TO 355.6 MM WT: 6.35 MM TO 35.1 MM COLD FINISHED OD:19.0 MM TO 88.9 MM WT: 1.0 MM TO 12.0 MM
		\$			PRODUCTOS TUBULARES,	SPAIN	A		CS & AS P-11, P-12, P-22, P-91
		\$			NIPPON STEEL & SUMITOMO METAL CORPORATION	JAPAN	A		CS & AS P-11, P-22, P-91 & P-92
		\$			TENNARIS GLOBAL SA, URUGUAY	NKK TUBES, ITALY	A		P-91, P-22, P-11, P12, CS
		\$			JINDAL SAW LIMITED	NASHIK	A		CS, T11, 12, 22 HOT FINISHED OD: 33.4 MM TO 168.3 MM WT: 3.5 MM TO 21.95 MM COLD FINISHED OD: 6.0 MM TO 140.0 MM WT: 0.8 MM TO 15.0 MM
		\$			IBF S.P.A	ITALY	A		P-92, P-91, P-22, P-11, P12, CS
		\$			JFE STEEL CORPORATION	JAPAN	A		P-92, P-91, P-22, P-11, P12, CS
		\$			BHEL SSTP	TRICHY	A		CS
		\$			BENTELER STEEL/TUBE GMBH	GERMANY	A		P-11, P-22, P-91, P-92 UP TO OD 160 MM
\$			RINGMILL SPA	ITALY	A		CS OD UP TO 914 MM & WT UP TO 102 MM & AS P-91		
\$			FORGIATURA MORANDINI SRL	ITALY	A		CS & AS P-11, P-22, P-91 & P-92		

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13	PLATES AND ROLLED SECTION (CS & AS EXCLUDING CS- IS:2062 GRADES)	\$			INDUS STEEL	BELGIUM	A		CS-SA515 AS UP TO GR-91
		\$			ILSENBURGER GROBBLECH	GERMANY	A		CS-SA 299, SA515, BS EN 10025, AS UP TO GRADE 91
		\$			DILLINGER-GTSVENTES	GERMANY	A		CS-SA 299, SA515, BS EN 10025, A36, AS UP TO GRADE 91
		\$			SIJ ACRONI D.O.O., SLOVENIA	SLOVENIA	A		CS- SA515, BS EN 10025, A36, AS UP TO GRADE 91
		\$			THYSSENKRUPP	GERMANY	A		CS- SA515 BS EN 10025 A36, AS UP TO GRADE 22
		\$			INDUSSTEEL LOIRE	FRANCE	A		CS-SA 299, SA515; AS UP TO GRADE 22
		\$			ARCELLOR MITAL NIPPON STEEL (Formerly ESSAR Steel)	HAZIRA	A		CS- SA515, BS EN 10025, A36, AS GRADE 12 &22
		\$			VOESTALPINE GROBBLECH GMBH	AUSTRIA	A		CS- SA515 BS EN 10025 A36, AS UP TO GRADE 22
		\$			SAIL	BHILAI/SALEM	A		CS- SA515 BS EN 10025 A36, AS UP TO GRADE 22
		\$			NIPPON STEEL	JAPAN	A		CS- SA515 BS EN 10025 A36, AS UP TO GRADE 22
		\$			POSCO	SOUTH KOREA	A		CS- SA515 BS EN 10025 A36, AS UP TO GRADE 22
		\$			REINER BRACH GMBH & CO.	GERMANY	A		CS- SA 299 SA515 BS EN 10025 A36, AS UP TO GRADE 22
		\$			UTTAM VALUE STEEL LTD	WARDHA	A		ALLOY STEEL PLATES AS PER A-204 & A-387 UPTO THICKNESS OF 40MM FOR STRUCTURAL STEEL APPLICATION , IN NON-PRESSURE PARTS.
14	PLATES & ROLLED SECTION (CS-IS 2062 STRUCTURAL STEEL GRADES)	\$			REFER TO SUB-VENDORS MENTIONED IN THE TECHNICAL SPECIFICATIONS clause 4.0 of QA-Civil chapter (E-59), Section-VI/ Part-B		A		
		\$			OUTOKUMPU	SWEDEN	A		SS PLATES UP TO 20 MM THK
		\$			INDUSSTEEL	BELGIUM	A		GRADE-304,309,310,316

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15	PLATES(SS)	\$			JSL STAINLESS	JAIPUR	A		LINER SS 304
		\$			INDUSSTEEL LOIRE	FRANCE	A		GRADE-304,309,310,316
		\$			SAIL	BHILAI/SALEM	A		GRADE-304,309,310,317
		\$			COLUMBUS STAINLESS STEEL	SOUTH AFRICA	A		GRADE-304,309,310,318
16	SEPARATOR & STORAGE TANK	I			ALSTOM	USA	A		
		I			BHEL	TRICHY	A		
		I			GE INDIA	DURGAPUR	A		
		I			DOOSAN	SOUTH KOREA	A		
		I			L&T-MHPS BOILERS PVT LTD	HAZIRA	A		
17	HEADERS AND SUCTION MANIFOLDS	I			ALSTOM	USA	A		
		I			BHEL	TRICHY	A		
		I			GE INDIA	DURGAPUR	A		
		I			DOOSAN	CHENNAI	A		
		I			DOOSAN VINA	VIETNAM	A		
		I			L&T-MHPS BOILERS PVT LTD	HAZIRA	A		
18	SPIRAL WATER WALLS	I			BHEL	TRICHY	A		
		I			GE INDIA	DURGAPUR	A		
		I			ALSTOM	USA	A		
		I			DOOSAN	CHENNAI	A		
		I			DOOSAN VINA	VIETNAM	A		
		I			DOOSAN	SOUTH KOREA	A		
19	TUBULAR PRODUCTS(COILS & PANELS) EXCLUDING SPIRAL WALLS	I			GE INDIA	DURGAPUR	A		
		I			BHEL	TRICHY	A		
		I			ALSTOM	USA	A		
		I			DOOSAN	CHENNAI	A		
		I			DOOSAN VINA	VIETNAM	A		

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		I			L&T-MHPS BOILERS PVT LTD	HAZIRA	A		
		I			MHI	JAPAN	A		
20	CRITICAL PIPING /PCP (MS, CRH, HRH, FW) AND BOILER PIPING	I			BHEL	TRICHY, THIRUMAYAM	A		
		I			GE INDIA	DURGAPUR	A		
		I			DOOSAN	SOUTH KOREA	A		
		I			BHR	GERMANY	A		
		I			DEE DEVELOPMENT	PALWAL	A		
		I			BENTEC	USA	A		
		I			L&T PIPING CENTRE	HAZIRA	A		
		I			SEONGHWA IND CO LTD	SOUTH KOREA	A		
21	MISC HP PIPING EXCLUDING CRITICAL PIPING(CS, AS UP TO GRADE 91)	I			BHEL	TRICHY	A		
		I			GE INDIA	DURGAPUR	A		
		I			DOOSAN	SOUTH KOREA	A		
		I			BHR	GERMANY	A		
		I			DEE DEVELOPMENT	PALWAL	A		
		I			BENTEC	USA	A		
		I			L&T PIPING CENTRE	HAZIRA	A		
		I			SEONGHWA IND CO LTD	SOUTH KOREA	A		
		I			PAL ENGG	YAMUNANAGAR	A		
22	MISC HP PIPING EXCLUDING CRITICAL PIPING(CS, AS UP TO GRADE 22)	I					A		ABOVE MENTIONED PIPING VENDORS ARE ALSO ACCEPTABLE
		I			ISGEC	YAMUNANAGAR	A		UP TO GRADE 22
		I			UNITECH MACHINES LTD	SAHARANPUR	A		ONLY FOR CS GRADE
		I			BEND JOINTS PVT LTD	BHOPAL	A		ONLY FOR CS GRADE
		I			SEAM INDUSTRIES PVT LTD	NAGPUR	A		ONLY FOR CS GRADE
		I			S&G	PALWAL	A		CS & AS UP TO GRADE 22 (EXCEPT BOILER PIPING & CRITICAL PIPING)
		I			FLASH FORGE	VISAKHAPATNA M	A		ONLY FOR CS GRADE

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23	MIXING SPHERES	I			GE INDIA	DURGAPUR	A		
		I			BHEL	TRICHY	A		
		I			ALSTOM	USA	A		
		I			DOOSAN	SOUTH KOREA	A		
24	COAL BURNER ASSY & SOFA/OFA PORT/AA PORT	I			ALSTOM	USA	A		
		I			BHEL	TRICHY	A		
		I			DOOSAN	SOUTH KOREA	A		
		I			L&T-MHPS PVT LTD	HAZIRA	A		
		I			DEE DEE ENGINEERING ENTERPRISES	TRICHY	A		
25	AIR COOLED OIL GUN ASSEMBLY	I			BHEL	TRICHY	A		
		I			SIGMA POWER	TRICHY	A		
		I			DOOSAN	SOUTH KOREA	A		
26	HFO/LFO PUMPS	I			ALEKTON	CHENNAI	A		
		I			UT PUMPS	FARIDABAD	A		
		I			ROTO PUMPS LTD.	GREATER NOIDA	A		
		I			ALLWEILER INDIA PVT.LTD.	GERMANY	A		
		I			BOURMANN	GERMANY	A		
		I			TUSHACO PUMPS PVT LTD/ALLWEILER INDIA PVT.LTD.	DAMAN	A		
		I			LEISTRITZ PUMPEN GmbH	GERMANY	A		
		I			KRAL	AUSTRIA	A		
27	SOOT BLOWERS(LRSB, WALL DESLAGGER, ROTARY BLOWER, TEMP PROBE)	I			BHEL	TRICHY	A		
		I			CLYDE BERGMANN	NOIDA	A		UNDER THE SUPERVISION OF M/S CLYDE BERGMANN, GERMANY
		I			CLYDE BERGEMANN	GERMANY	A		

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		I			DIAMOND POWER SPECIALITY LTD	SCOTLAND	A		
		I			DAIEYOUNG MACHINERY	KOREA	A		
28	ELECTRIC HOIST WITH TROLLEY, UNDERSLUNG CRANE (MAIN BOUGHT OUT ITEMS LIKE HOOK, MOTORS AND CRITICAL C&I ITEMS TO BE FROM NTPC APPROVED SOURCES)	I			CONSOLIDATED HOISTS	SATARA	A		EOT CRANES UPTO 40 MT & HOISTS ABOVE 35 MT
		I			REWA INDUSTRIES	FARIDABAD	A		EOT CRANES UPTO 25 MT
		I			GRIP ENGINEERS	HYDERABAD	A		HOIST UPTO 40 MT
		I			POWER BUILD PVT LTD,	V V NAGAR	A		HOIST UPTO 10 MT
		I			UNIVERSAL HOIST	THANE	A		HOIST UPTO 20 MT
		I			ARMSEL MHE PVT LTD	BANGALORE	A		UP TO 20 MT
		I			ANUPAM INDUSTRIES	VITHAL, UDYOGNAGAR	A		EOT CRANES UPTO 50 MT
		I			TRACTOR TRIFOR	FARIDABAD	A		HOIST UPTO 35 MT
		I			CONSOLIDATED HOISTS	PUNE	A		HOISTS UPTO 20 MT
		I			DYNAMECH CRANES	THANE , MUMBAI	A		UP TO 20 MT
		I			HERCULES HOIST LTD.	MUMBAI	A		HOIST UPTO 30 MT
		I			NAMSUNG MACHINERY	SOUTH KOREA	A		UP TO 25 MT
		I			CENTURY CRANES	PALWAL	A		EOT CRANES UP TO 30 MT
		I			MUKUND	PUNE	A		Size limitation
		I			Mangla Hoist	Greater Noida	A		UPTO 10 MT
29	LP CONDENSATE PUMP	I			ITT GOULD	USA	A		
		I			FLOW SERVE	USA	A		
		I			SULZER	NAVI MUMBAI	A		
		I			CLYDE PUMPS	GHAZIABAD	A		
		I			PUMPSense FLUID ENGG. PVT. LTD	HOWRAH	A		
30	SCANNER AIR FAN	I			ANDREW YULE CO. LTD	NADIA	A		
		I			ACCEL	AHMEDABAD	A		
		I			PATEL AIRTEMP (I) LTD	GANDHINAGAR	A		
		I			BHEL	RANIPET	A		
		I			CB DOCTOR(IMM)	AHMEDABAD	A		
		I			AIROCHEM ENGINEERING COMPANY	KOLHAPUR	A		
		I			FLAKEWOOD INDIA	CHENNAI	A		

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		I			TLT ENGG. PVT. LTD.,	MEHSANA	A		
31	SEAL AIR FAN	I			CB DOCTOR & CO.	AHMEDABAD	A		
		I			ACCEL	AHMEDABAD	A		
		I			TLT INDIA PVT. LTD.,	MEHSANA	A		
		I			PATEL AIRTEMP (I) LTD.,	GANDHINAGAR	A		
		I			BHEL	RANIPET	A		
		I			ANDREW YULE CO. LTD.,	KALYANI NADIA	A		
		I			FLAKTWOOD	SWEDEN	A		
		I			FLAKEWOOD INDIA	CHENNAI	A		
		I			DRAFT AIR/CHICAGO BLOWERS	AHMEDABAD	A		
		I			REITZ INDIA	CHENNAI	A		
		I			Howden Solyvent (India) Pvt. Ltd	Kanchipuram	A		
I			NADI AIR TECH P LTD	CHENNAI	A				
32	FURNACE MAINTENANCE PLATFORM(SKY CLIMBER)	I			NY SKYMAN INT. SA	BELGIUM	A		
		I			NV SKCLIMBER EUROPE SA	BELGIUM	A		
		I			DAEO PRECISION IND CO LTD	SOUTH KOREA	A		
33	QUICK ERECT FURNACE SCAFFOLDING	II			BSL	UK	A		
		II			INSTANT UPRIGHT	IRELAND	A		
		II			EASTMAN IMPEX	LUDHIANA	A		CARBON STEEL SCAFFOLDING
		II			BSL	HARIDWAR	A		
		II			ARUFASE	SPAIN	A		
		I			FLEXATHERM EXPANLLOW PVT LTD	VADODARA	A		
		I			FLEXICAN BELLOWS & HOSES PVT LTD	VADODARA	A		
		I			KAY ENGINEERING WORKS	TRICHY	A	MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)	

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34	METALLIC EXPANSION JOINT FOR DUCTS	I			RAVI STRUCTURALS	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)
		I			MARUTI FABRICATORS	TANJORE	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)
		I			K B TECHNOLOGIES	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)
		I			AURORA SHAPERS	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)
		I			FLEXICAN DURGA FAB(P) LTD	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)
		I			SRI DURGA STRUCTURALS	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)
		I			REGIONAL ENGINEERING ENTERPRISES	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)
		I			SRI RANGA INDUSTRIES	TANJORE	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)
		I			ANNAI VAILANKANNI ENGINEERING INDUSTRIES	TANJORE	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)
		I			ANNAI VAILANKANNI FABRICATORS UNIT-II	TANJORE	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)
		I			ANNAI VAILANKANNI FABRICATORS UNIT-II	TRICHY	A		MANUFACTURE OF STRAIGHT PIECES ONLY (CORNER PIECES FROM NTPC APPROVED SOURCES.)
35	METALLIC EXPANSION JOINT FOR PIPES	I			METALLIC BELLOWS	CHENNAI	A		UP TO 2200 NB
		I			LONESTAR	CHENNAI	A		UP TO 2200 NB
		I			FLEXICON BELLOWS & HOSES	VADODARA	A		UP TO 2200 NB

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		I			FLEXATHERM EXPANLLOW PVT LTD	VADODARA	A		UPTO 2000 NB
36	LIGHT BONDED MINERAL WOOL	II			PUNJSTAR INSULATION FIBRE COMPANY	BHILAI	A		
		II			SHREERAM EQUITECH	DURG	A		
		II			GOENKA ROCKWOOL (INDIA) LTD	RAIPUR	A		
		II			LLOYDS INSULATION	BHILAI	A		
		II			THERMOCARE ROCKWOOL PVT LTD	RAJNANDGAON	A		
		II			MINWOOL ROCK FIBRES LTD	RAJNANDGAON	A		
		II			LAPINUS ROCKWOOL LTD	GWALIOR	A		
		II			ROCKWOOL INDIA	MEDAK AP	A		
		II			DHANBAD ROCKWOOL INSULATION PVT LTD	DHANBAD	A		
		II			MINSULATE MFG CO. LTD	JAMSHEDPUR	A		
		II			POLYBOND PROJECTS PVT LTD	DURG	A		
		II			HI-TECH ROCK FIBRE LTD	RAJNANDGAON	A		
		II			ROCKWOOL INDUSTRIES	BHILAI	A		
		II			JAMSHEDPUR MINERAL WOOL	JAMSHEDPUR	A		
					ROXUL ROCKWOOL	DAHEJ	A		
					LION INSULATION	GUNA MP	A		
		I			BHEL	TRICHY	A		
		I			MID AMERICA	USA	A		
		I			MANNESMANN	GERMANY	A		
		I			ITT	GERMANY	A		
		I			PIPE SUPPORTS	UK / THAILAND	A		
		I			UNISON	SOUTH KOREA	A		
		I			PIPE HANGER SUPPORTS PVT LTD	TANJAVORE	A		
		I			GILLARDINI	ITALY	A		
		I			LISEGA	GERMANY	A		
		I			WOOKWANG	SOUTH KOREA	A		

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37	CLH & VLH	I			BERGEN PIPE SUPPORTS INDIA	CHITTOR	A		CLH UP TO C8-32 RANGE(MAXIMUM LOAD 39.70T). IN CASE OF CLH BEYOND THE RANGE OF C7-27(OFF SUPPLIER CATALOGUE) THE SAME SHALL BE SOURCED FROM M/S PIPE SUPORTS, UK/THAILAND.
		I			SANWA TAKI	JAPAN	A		
		I			MH	SPAIN	A		
		I			BROWICK	UK	A		
		I			CARPENTER PATTERSON	UK	A		
		I			CARPENTER PATTERSON INDIA PVT LTD	VELLORE	A		MAXIMUM LOAD: 23877 KG AND MAXIMUM DISPLACEMENT: 220 MM AND UNDER THE SUPERVISION OF M/S CARPENTER PATERSON, UK.
		I			AAA SUPPORTS PVT LTD	VADODARA	A		MAXIMUM LOAD: 1.5MT AND MAXIMUM DISPLACEMENT: 250MM
		I			CARPENTER & PATTERSON	RANIPET	A		SUBJECT TO CONDITIONS AND THE INVOLVEMENT OF THEIR PRINCIPALS
		I			VELAN INC.	CANADA	A		SINGLE STAGE DRAIN VALVES (FORGED), SIZE UPTO 50MM NB, CLASS UPTO 2680 FOR POWER CYCLE PIPING APPLICATION.
		I			LEADER VALVES LTD.	JALANDHAR	A		CC NRV UP NB 800, 150# FOR STG PKG.
		I			BHEL	TRICHY	A		
		I			CRESCENT VALVES	MUMBAI	A		UPTO NB 300 CL 600
		I			VELAND VALVE CORP.	USA	A		GATE V/V 2-34" CL 900-4500 CAST STEEL GATE V/V 18-48" CH50-800
		I			VELAN	UK	A		1) GLOBE V/V 1/4"-2" C14500 (2) BONNETLESS GLOBE V/V 1/2-2.5" CI 150-500)
		I			L&T VALVES	COIMBATORE	A		UP TO CLASS 4500 & GRADE 91
		I			L&T VALVES	KANCHIPURAM	A		Conventional Valves including main steam stop valve Material grade up to SA217 C12A & SA182 F92 and class upto 4500 CL

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38	CONVENTIONAL VALVES (GATE, GLOBE & CHECK)	I			TRILLIUM FLOW	HUBLI	A		UPTO NB 300 & CL-600, FORGED UPTO NB 50 CL 800
		I			FOURESS ENGG. INDIA LTD.,	THANE	A		(1) 10"X600 # GATE/GLOBE/CHECK VALVES (2) 16"X300# GATE/GLOBE/CHECK VALVES (3) 24"X150# GATE/GLOBE/CHECK VALVE (4) 2"X800 # FS GATE/GLOBE/CHECK (LIST) AS PER BS5352 (B) GATE GLOBE/CHECK VALVES FOR 700# TO 1500#
		I			NITTON VALVES INDIA PVT. LTD.,	AURANGABAD	A		(1) GATE VALVE: UPTO36" CLASS 600 WCB/WCC (2) GLUBE VALVE: UPTO 16" CLASS 300 WCB/WCC (3) CHECK VALVE : UPTO 12" CLASS 600 WCB/WCC & WC6
		I			SAMSHIN LTD.,	SOUTH KOREA	A		(1) GATE - 450 NB 3900 SPL CL SA 217 C12A (GR 91) (2) GLOBE (CAST) - 200 NB 3900 SPL, CL FOR SA 217C12 (G 91) (3) GLOBE (FORGED GR 92) - 50 NB 4500 CL GR SA182 F 92 (4) CHECK (CAST) - 200 NB 3500 SPL CL FOR SA 217C12A (GR91) (5) CHECK (FORGED GR 92) - 50 NB 4500 CL GR SA 182 F 92 (5) ANGLE (FORGED80 NB)
		I			TOA VALVE ENGGINERINING INC.	JAPAN	A		CONVENTIONAL VALVES (1) GATE VALVES UPTO SIZE 16", CLASS 4500 UPTO C12A/F91 (2) GATE VALVES UPTO SIZE 26" CLASS 2500 UPTO C12A (3) CHECK VALVES UPTO SIZE 14" CLASS 2500 UPTO C12A (4) GLOBE VALVES UPTO SIZE 3" CLASS 4500 UPTO C12A (5) GLOBE VALVES UPTO SIZE 10" CLASS 1500 & 4" CLASS 2500 UPTO F91

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		I			FOURESS ENGG. INDIA LTD.	THANE	A		(1) 10"X600 # GATE/GLOBE/CHECK VALVES (2) 16"X300# GATE/GLOBE/CHECK VALVES (3) 24"X150# GATE/GLOBE/CHECK VALVE (4) 2"X800 # FS GATE/GLOBE/CHECK (LIST) AS PER BS5352 (B) GATE GLOBE/CHECK VALVES FOR 700# TO 1500#
		I			BABCOCK VALVES	SPAIN	A		(1)CAST GATE VALVE (CS) VALVE CLASS UPTO 2500SPL & SIZE UPTO 10" (2)CAST GLOBE VALVE (CS) CLASS UPTO 2500SPL & SIZE UPTO 3 INCH (3) FORGED GLOBE VALVE (CS) CLASS UPTO 1500 & SIZE UPTO 1" (4) FORGED GLOBE VALVE (CS) CLASS UPTO TO 800 & SIZE UPTO 1.5"
		I			FORBES MARSHALL PVT LTD	PUNE	A		CONVENTIONAL VALVES :CAST GATE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 10 INCH CAST GLOBE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 3 INCH
		I			BABCOCK WILCOX ESPANOLA	SPAIN	A		CONVENTIONAL VALVES -CAST GATE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 10 INCH CAST GLOBE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 3 INCH
		I			HP VALVES OLDENZAAL B V	NETHERLAND	A		CONVENTIONAL VALVES -CAST GATE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 10 INCH CAST GLOBE VALVE (CS) CLASS UP TO 2500SPL & SIZE UP TO 3 INCH
		I			Aruna Industrial Products Pvt. Ltd.	MADURAI	A		REFER APPROVAL CONDITION

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39	SAFETY VALVES(SPRING TYPE)	I			DRESSER INDUSTRIES	USA	A		
		I			SAMPELL AG	GERMANY	A		
		I			TYCO (PENTAIR VALVES & CONTROLS	USA	A		
		I			FUKUI SEISAKUSHO CO LTD	JAPAN	A		
		I			RIENEKE GMBH	GERMANY			HYDRAULIC TYPE
		I			BOPP & REUTHER	GERMANY	A		HYDRAULIC TYPE
		I			MIEWA CORPORATION	JAPAN	A		(1) SAFETY VALVE SIZE 1/2" TO 6" & 150 TO 4500 CLASS
		I			BHEL	TRICHY	A		
		I			Anderson Greenwood Crosby Sanmar Ltd. (earlier PENTAIR SANMAR LTD)	PUDUKOTTAI	A		AUX STEAM SYSTEM: UP TO 6" SIZE AND CLASS UP TO 600
I			FAINGER LESER VALVES P LTD	AURANGABAD	A		SIZE(INELT/OULET): 200/300 MM APPLICABLE TO MAX DESIGN TEMPERATURE:474 DEG C & PRESSURE:47 KG		
40	ELECTROMATIC RELIEF VALVE (ERV)	I			VALVES TECHNOLOGIES	USA	A		(A) 1.5"X3" CLASS 3100- F91 MATERIAL (B) 2.5"X4", CLASS 1500-F91 MATERIAL
		I			FUKUI SEISAKUSHO CO LTD	JAPAN	A		
		I			SAMPELL AG	GERMANY	A		
		I			DRESSER INDUSTRIES	USA	A		
		I			MIEWA CORPORATION	JAPAN	A		SIZE UPTO 65MM & UPTO 4500 CLASS
41	PLUG VALVE	I			FLOW SERVE INDIA CONTROLS	KANCHIPURAM	A		SIZE: 25 TO 300 MM, CLASS 150 & 300
		I			3Z CORP.	SOUTH KOREA	A		
		I			HAWA VALVES	MUMBAI	A		UP TO 10" SIZE AND 300 CLASS

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		I			M/S. BHEL	TIRUCHIRAPALLI	A		MAIN & AUX COLUMNS, CEILING GIRDERS, BUILT-UP BEAMS
		I			CAPACITE	WADA, PALGHAR	A		(WELDED & BOLTED TYPE)BOILER PRIMARY STRUCTURES (CEILING GIRDER, MAIN COLUMNS, AUX. COLUMN, BOXES, BUCKSTAY, BRACING, MILL BAY STRUCTURE APH SUPPORT STRUCTURE ETC.)
		I			SALEM AUTOMECH (INDIA) PVT. LTD.,	SALEM	A		BOILER STRUCTURES, I.E. CEILING GIRDER
		I			DIAMOND ENGINEERING (CHENNAI) PVT LTD., CHENNAI	KANCHIPURAM	A		FABRICATION OF BOILER STRUCTURES -AWB UNIT-2 FABRICATION OF BOILER STRUCTURES-CEILINER GIRDER, AWB, COLMNS ETC. - BOILER STURCTURES- FABRICATION, TRIAL ASSEMBLY, BLASTING(AWB, COLUMNS, CEILING GIRDER ETC.)
		I			SALEM AUTOMECH UNIT-I & UNIT-II	SALEM	A		CEILING GIRDERS
		I			QUALITY ENGG.WORKS	TRICHY	A		CEILING GIRDERS
		I			INDOFAB	TRICHY			CEILING GIRDERS
		I			SANTHI ENGG. UNIT-II	PUDUKKUDI	A		CEILING GIRDERS
		I			MASTERFAB UNIT-II	DEVARAYANERI	A		CEILING GIRDERS
		I			ARCEOR MITTAL DHAMM PROCESSING PVT LTD	RANIPET	A		(WELDED & BOLTED TYPE)BOILER PRIMARY STRUCTURES (WITHOUT CEILING GIRDER) I.E.MAIN COLUMNS, AUX. COLUMN, BOXES, BUCKSTAY, BRACINGS, MILL BAY STRUCTURE, APH SUPPORT STRUCTURE ETC.)

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		I			JSW SEVERFIELD STRUCTURES LTD	BELLARY	A		(WELDED & BOLTED TYPE) BOILER PRIMARY STRUCTURES (WITH OUT CEILING GIRDER) I.E. MAIN COLUMNS, AUX. COLUMN, BOXES, BUCKSTAY, BRACINGS, MILL BAY STRUCTURE, APH SUPPORT STRUCTURE ETC.)
		I			ATMASTCO (P) LTD	DURG	A		(WELDED & BOLTED TYPE) BOILER PRIMARY STRUCTURES (WITHOUT CEILING GIRDER) I.E.MAIN COLUMNS, AUX. COLUMN, BOXES, BUCKSTAY, BRACINGS, MILL BAY STRUCTURE, APH SUPPORT STRUCTURE ETC. DUCTS)
		I			ANG INDUSTRIES	SITARGANJ	A		FABRICATION AND SUPPLY WELDED TYPE BOILER STRUCTURES I.E. MAIN COLUMNS (PLUS AND BOX), AUTO WELDED BEAMS AND BRACINGS.
		I			INDIANA GRATINGS PVT LTD	PURANDAR	A		FACTORY FABRICATED CIVIL STRUCTURE POWER HOUSE (TG BUILDING) STRUCTURAL ITEM (MAX SINGLE PIECE SIZE UPTO 15MT) (WELDED & BOLTED TYPE)
		I			ESSAR HEAVY ENGINEERING SERVICES, (A UNIT OF ESSAR PROJECTS INDIA LTD)	SURAT	A		FABRICATION AND SUPPLY OF BUCKSTAYS
		I			SIMPLEX ENGINEERING & FOUNDRY WORKS PVT LTD	BHILAI	A		(WELDED & BOLTED TYPE) BOILER PRIMARY STRUCTURES (WITH OUT CEILING GIRDER) I.E. MAIN COLUMNS, AUX. COLUMN, BOXES, BUCKSTAY, BRACINGS, MILL BAY STRUCTURE, AP
		I			SIMPLEX ENGG & FOUNDRY WORKS	UNIT 2, BHILAI	A		CEILING GIRDERS

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42	BOILER STRUCTURE & FABRICATION ITEMS(MAIN & AUX COLUMNS, CEILING GIRDERS, BUILT-UP BEAMS, BRACINGS & BUCKSTAY), COAL BUNKER	I			SEAM INDUSTRIES LIMITED	NAGPUR	A		WELDED STRUCTURE UPTO 15T.FABRICATION AND SUPPLY OF BUNKERS & BUNKER STRUCTURES, BUCKSTAYS AND DUCTS.
		I			SHIVAM HITECH STEELS PVT. LTD	BHILAI	A		HORIZONTAL BRACE/CIRCULAR HOLLOW SECTION ,BUCKSTAY,DUCTS
		I			ENESTEE ENGINEERING LTD.,	NAGPUR	A		FABRICATION & SUPPLY OF BUNKERS & BUNKER STRUCTURES ,BUCKSTAY,DUCTS
		I			SSV ENGINEERS PVT. LTD.,	PUNE	A		COAL SILOS, BUCKSTAY, DUCTS
		I			ALLIANCE INTEGRATED METALIKS LTD.,	RAJPURA	A		BOILER PRIMARY STRUCTURES (EXCLUDING CEILING GIRDER)
		I			TECHNOFAB MANUFACTURING LTD.	CHENNAI	A		FABRICATION AND SUPPLY OF BUNKER, BUNKER STRUCTURE, TP'S & CONVEYER GALLERIES,DUCTS
		I			BABY ENGINEERING PVT. LTD.,	THUVAKUDI	A		BOILER PRIMARY STRUCTURES (EXCLUDING CEILING GIRDER) (WELDED & BOLTED TYPE)
		I			COREFAB PROJECTS PVT LTD.,	BHILAI	A		FABRICATION & SUPPLY OF BOILER PRIMARY STRUCTURES - MAIN & AUX. COLUMNS, BUILT UP BEAM, BUCKSTAYS, BRACINGS, MILL BAY STRUCTURE AND APH SUPPORT STRUCTURE (EXCLUDING CEILING GIRDERS),DUCTS (WELDED & BOLTED TYPE)
I			MIURA INFRASTRUCTURE PVT. LTD	BHILAI-	A		BOILER PRIMARY STRUCTURE - MAIN & AUX. COLUMNS, BUILT UP BEAMS, BOXES, BUCKSTAY, BRACINGS, MILL BAY STRUCTURE, APH SUPPORT STRUCTURE (EXCLUDING CEILING GIRDERS) UPTO MAXIMUM SINGLE PIECE WEIGHT OF 30 MT (WELDED & BOLTED TYPE)		

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		I			METALFAB HIGHTECH PVT LTD.	NAGPUR	A		FABRICATION AND SUPPLY OF BUCKSTAYS ,DUCTS,(WELDED & BOLTED TYPE), COAL BUNKER
		I			WHEELS INDIA LTD.	WARDHA	A		MANUFACTURING OF WELDED TYPE STRUCTURES I.E. AUTOWELDED BEAMS BRACING AND COLUMNS (UPTO 15T) ,BUCKSTAY,DUCTS(WELDED & BOLTED TYPE)
		I			NOVOTECH PROJECTS (I) PVT LTD	KOLKATA	A		BUNKER STRUCTURE, TPS & TRESTLES
		I			JINDAL STEEL & POWER LTD. (JSPL)	RAIGARH	A		PRIMARY STRUCTURE & CEILING GIRDER (WELDED & BOLTED TYPE)
		I			AJANTHA FABRICATOR WORKSUNIT-II	PUDUKKOTTAI	A		BOILER PRIMARY STRUCTURES- COLUMNS, BEAMS, BRACINGS AND CEILING GIRDERS (WELDED & BOLTED TYPE)
		I			FEEDERS LIOYDS	SIKANDRABAD	A		PRIMARY STRUCTURE - MAIN COLUMNS, AUX COLUMNS, BUILT UP BEAMS, BOXES, BUCKSTAY (WELDED & BOLTED TYPE)
		I			L&T HEAVY FORGING & SPECIAL STEEL	HAZIRA	A		CEILING GIRDER
		I			VASAN INDUSTRIES	PUDUKKOTTAI	A		BOILER PRIMARY STRUCTURES(WELDED AND BOLTED TYPE)
		I			REGIONAL ENGINEERING WORKS	THUVVAKKUDY	A		BOILER PRIMARY STRUCTURE(WELDED AND BOLTED TYPE)
		I			VRINDA ENGINEERS	PANAGARH, WB	A		COAL BUNKERS
		I			GREAT INDIA FABRICATORS	YAMUNANAGAR	A		BOILER PRIMARY STRUCTURES EXCLUDING CEILING GIRDER(WELDED AND BOLTED TYPE), LIMITATIONS AS PER APPROVAL CONDITIONS
		I			Goodluck Steel Tubes	Sikenderabad	A		Buckstay
		I			GEW	Sikenderabad	A		Buckstay

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		I			JSPL	Angul	A		Boiler Primary Structure (Excluding Ceiling Girder)
		I			L&T Limited ECC Workshop	Kanchheepuram	A		Boiler Primary Structure (Excluding Ceiling Girder)
		I			JSPL	Raipur	A		Primary Structure -Ceiling Girder -Sub to approval condition
		I			Steel Infra Solutions Private Limited(SISCOL)	Bhilai	A		Boiler Primary Structure (Excluding Ceiling Girder) and column directly supporting ceiling girders-Sub to approval condition

43	ELECTRO FORGED GRATINGS	II			INDIANA GRATINGS PVT. LTD	PUNE	A		
		II			KARDEANAND UDYOG	PUNE	A		
		II			PREMIER POWER PRODUCTS LTD	HOWRAH	A		
		II			BHOLA RAM STEEL PVT. LTD	PATNA	A		
		II			PINAX STEEL INDUSTRIES PVT LTD	PATNA	A		
		II			GREATWELD STEEL GRATING PVT. LTD	PUNE	A		
		II			VIN FAB ENGG. PVT LTD.,	MUMBAI	A		
		II			Ratan Project & Engineering	Howrah	A		

44	TANKS & VESSELS(IBD, CBD, FLASH TANK ETC)	I			KPHE	SOUTH KOREA	A		
		I			SV TANKS & VESSELS	MUMBAI	A		
		I			PROGEN SYS TECH LTD	CHENNAI	A		UP TO 4 KSC PR
		I			FAB TECH	PUNE	A		
		I			UNITECH MACHINES LTD	SAHARANPUR	A		UP TO 10 KSC PR
		I			SEAM IND P LTD	NAGPUR	A		UP TO 10 KSC PR
		I			SHAKTI HI TECH CONST PVT LTD	CHENNAI	A		UP TO 10 KSC PR
		I			SOUTHERN HEAVY ENGG & FAB PVT LTD	CHENNAI	A		UP TO 10 KSC PR
		I			ALTECH INFRASTRUCTURE(I) PVT LTD	ALWAR	A		UP TO 16 KSC PR
		I			SEAM INDUSTRIES PVT LTD	NAGPUR	A		UP TO 16 KSC PR

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45	SOOT BLOWER PRESSURE REDUCING VALVES & BLOCK	I			REFER QA C&I LIST				
46	FITTINGS(GRADE 91/92)	I			PETROL RACCORD SPA	ITALY	A		FORMED AND FORGED FITTINGS 91/92 GRADE
		I			BOKOYOUNG METAL CO.	SOUTH KOREA	A		FORGED FITTINGS AS PER SA-182 F92 GRADE (REDUCERS, NOZZLE, HALF COUPLING ETC.)
		I			TF TECH CO. LTD	SOUTH KOREA	A		FORGED FITTINGS AS PER SA-182 F92 GRADE (REDUCERS, NOZZLE, HALF COUPLING ETC.)
		I			FLASH FORGE	VIZAG	A		P91 FORMED/FORGED UPTO DIA 273MM & THICK 30MM
		I			BGH EDELSTAHL SIEGEN GMBH	GERMANY	A		MANUFACTURE AND SUPPLY OF FORGED FITTINGS OF CS, AS AND SS GRADES
		I			ERNE FITTINGS GMBH	AUSTRIA	A		P-91 FORMED
		I			GAM RACCORDI SPA	ITALY	A		P-91 FORMED
		I			TECHNO FORGE SPA	ITALY	A		P-91 FORMED
		I			MEGA SPA	ITALY	A		92 GRADE FITTINGS (FORGED)
		I			BASSI LUIGI SPA	ITALY	A		P-91 FORGED/WELDED
		I			IBF SPA	ITALY	A		FORMED AND FORGED FITTINGS/P92 GRADE
		I			ALLIED INT. (TACTUBI RACCORDI SPA, VIA ROMA 150, 29027 PODENZANO)	ITALY	A		P-91 FORMED
		I			BRUCK STRASSE 16 ENSHEIM	GERMANY	A		P-91 FORGED/WELDED
		I			SUNGKWANG BEND CO. LTD.,	SOUTH KOREA	A		FITTINGS OF P91 AND OF MTERIAL OTHER THAN P91 OF BOILER
		I			TK CORPN. FORGITAL	S KOREA	A		FORMED FITTINGS (ELBOW, TEES, REDUCERS ETC.) OF 92 GRADE.
I			FORGITAL	ITALY	A		MANUFACTURING AND SUPPLY OF GRADE 91 FORTGINGS (HOLLOW FORGINGS/MATCHING PIECES WITH 508MM DIA X 75MM THICKNESS STUBS WITH OD 245MM.		

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		I			DEE DEVELOPMENT	PALWAL	A		GRADE 91 WITH SIZE/TYPE LIMITATIONS
		I			CHW FORGE	GHAZIABAD	A		GRADE 92 WITH SIZE/TYPE LIMITATIONS
		I			FORGIATURA MORANDINI SRL	ITALY	A		GRADE 92 FORGED FITTINGS(REducers, TEES & Y-PIECES)
		I			BHARAT FORGE, PUNE	PUNE	A		GRADE 92 FORGED FITTINGS(REducers, TEES & Y-PIECES)
		I			BOKYOUNG METAL CO.LTD	SOUTH KOREA	A		GRADE 92 FORGED FITTINGS(REducers, NOZZLE, HALF COUPLING)
		I			VIAR SPA	ITALY	A		SEAMLESS FORGED Y-PIECE UP TO GRADE 91
		I			DEE DEVELOPMENT	PALWAL	A		GRADE 92 WITH SIZE/TYPE LIMITATIONS
		I			Goodluck Engineering Co.	Dadri	A		Forged Fittings (91/92 grade)
47	AUX PRDS SYSTEM (INCLUDING CONTROL VALVE)	I			REFER C&I LIST				
48	CHEMICAL DOSING SYSTEM (SKID ASSY) FOR SG SCOPE INCLUDING AUX BOILER	I			POWER PIPING	TRICHY	A		
		I			V K PUMPS	MUMBAI	A		
		I			MILTON ROY	CHENNAI	A		
		I			TECHNO CONSULTANTS	MUMBAI	A		
		I			POSITIVE METERING SYSTEM	NASIK	A		
		I			PSI ENGG SYSTEM	CHENNAI	A		
		I			Prorites Equipments Pvt. Ltd.	Pune	A		LP Chemical Dosing System (NaOH/Ammonia/Hydrazine)

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49	SG CW BOOSTER PUMP/ ECW PUMP	I			KBL	WADI	A		
		I			WPIL LTD	GHAZIABAD	A		
		I			SAM TURBO	COIMBATORE	A		
		I			KSB	PUNE	A		
		I			BEST & CROMPTON ENGG LTD	CHENNAI	A		
		I			JYOTI LTD	BARODA	A		
		I			FLOWMORE	GHAZIABAD	A		
50	COAL BUNKER	I			REFER BOILER STRUCTURE LIST		A		REFER BOILER STRUCTURE LIST
51	LUBE OIL SYSTEM FOR MILLS	I			LINCOLN HELIOS	BANGALORE	A		
		I			T A HYDRAULICS	HYDERABAD	A		
		I			CENLUB INDUSTRIES	FARIDABAD	A		
		I			BHEL	HYDERABAD	A		
		I			BIJUR DELIMON INDIA PVT LTD	PUNE	A		
		I			UNIQUE ENGINEERING ENTERPRISE P LTD	HYDERABAD	A		
		I			SOUTHERN LUB	BANGALORE	A		
52	CERAMIC LINED BEND COAL PIPES	I			BHEL EDN	BANGALORE	A		
		I			BMW	HATHRAS/ROURK EE	A		
		I			CARBORANDUM UNIVERSAL	HOSUR	A		
		I			BHEL IP	JAGDISHPUR	A		

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53	KNIFE EDGE GATE VALVES AT MILL OUTLET AND BURNER INLET	I			GALAXY CONTROLS PVT LTD	CHENNAI	A		UP TO SIZE 26'
		I			ORBINOX INDIA PVT LTD	COIMBATORE	A		UP TO SIZE 30"
		I			BRAY CONTROLS	CHENNAI	A		UP TO SIZE 28"
		I			JASH ENGG LTD	INDORE	A		UP TO SIZE 30"
54	VIS FOR FANS	I			GERB	BANGALORE	A		
55	LOS FOR FD, PA & ID FANS	I			PSI ENGG	CHENNAI	A		
		I			CENLUB	FARIDABAD	A		
		I			LINCOLN HELIOS	BANGALORE	A		
		I			BHEL	RANIPET	A		
		I			SOUTHERN LUBRICATION	BANGALORE	A		
I			TA HYDRAULICS	HYDERABAD	A				
56	GATES AND DAMPERS	I			BACHMANN	FARIDABAD	A		
		I			FOURESS INDIA	BANGALORE	A		
		I			INDIRA DAMPERS	RANIPET	A		
		I			KAMAL ENGG	YAMUNANAGAR	A		
		I			BACHMANN	CHENNAI	A		GUILLOTINE GATE(2700 MM HEIGHT)
		I			DAMPER TECHNOLOGY INDIA PVT LTD	COIMBATORE	A		
I			Flexatherm Expanlow Pvt.Ltd	Block No-400/B, Karjan, Vadodara	A		Gates & Dampers(Flow Area/Cross-sectional area upto 5600mm X 5600mm)		
57	PA Fans	I			Bharat Heavy Electrical Limited	Ranipet	A		Sub-QR item: Project specific approval required from NTPC Engineering
		I			L&T- Howden Private limited	Hazia	A		
		I			TLT-Turbo GmBH	Germany	A		
		I			Howden	Denmark	A		
58	ID Fans	I			Bharat Heavy Electrical Limited	Ranipet	A		Sub-QR item: Project specific approval required from NTPC Engineering
		I			TLT Turbo GmBH	Germany	A		
		I			L&T Howden Private Limited	Hazira	A		
		I			Howden	Denmark	A		

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59	FD Fan	I			Bharat Heavy Electrical Limited	Ranipet	A		Sub-QR item: Project specific approval required from NTPC Engineering
		I			L&T Howden Private Limited	Hazira	A		
		I			TLT-Turbo GmBH	Germany	A		
		I			Howden	Denmark	A		
60	Coal Pulverisers	I			BHEL	Hyderabad	A		Sub-QR item: Project specific approval required from NTPC Engineering
		I			L&T MHPS Boilers Pvt. Ltd.(LMB) (Incl. Manufacturing Facility of L&T)	Hazira	A		
		I			Loesche Energy system India pvt ltd.	Chennai	A		
		I			Doosan Heavy Industries & Construction Co. Ltd	South Korea	A		
61	Raw Coal Feeders	I			Bharat Heavy Electricals Limited	Trichy	A		Sub-QR item: Project specific approval required from NTPC Engineering
		I			Schenck Process (Stock Redler India Private Limited, India)	Bengaluru	A		
		I			Merrick Industries Pvt. Ltd., India	Bengaluru	A		
		I			Yamato Scale	Japan	A		
		I			FLSmith	Haryana	A		
62	Boiler Start Up Drain Re-Circulation Pump	I			Torishima Pump Mfg Co. Ltd.,	Japan	A		Sub-QR item: Project specific approval required from NTPC Engineering
		I			Hayward Tyler Limited	UK	A		
		I			KSB AG	Germany	A		
63	Air Pre-Heaters	I			Bharat Heavy Electricals Limited	Ranipet	A		Sub-QR item: Project specific approval required from NTPC Engineering
		I			L&T Howden Private Limited	Hazira	A		
		I			Arvos India Pvt.LTd.	Chennai	A		

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64	Auxiliary Boiler	I			ISGEC John Thompson (IJT)	Yamuna Nagar	A		Sub-QR item: Project specific approval required from NTPC Engineering
		I			Thermax Babcock & Wilcox Ltd.	Pune	A		
		I			Bharat Heavy Electricals Limited & BHEL (HVPB)	Trichy, Vizag	A		
65	ESP	I			Bharat Heavy Electricals Limited	Ranipet	A		Sub-QR item: Project specific approval required from NTPC Engineering
		I			Larsen & Toubro Limited	India	A		
		I			GE Power India	India	A		
Main Contractor approved sources for Boiler & ESP package									
1	ALUMINIUM CLADDING	III			Main Contractor approved sources				
2	NON IBR PIPING / LP PIPING - PRESSURE UP TO 10 KSC	III			Main Contractor approved sources				
3	CASTABLE REFRACTORY	III			Main Contractor approved sources				
4	POURABLE INSULATION	III			Main Contractor approved sources				
5	STEEL STRUCTURE FOR DUCTS, FURNACE ENCLOSURE, GUIDE, STAIRS & LADDERS, HANDRAILS, PLATFORMS	III			Main Contractor approved sources				
6	SILENCERS	III			Main Contractor approved sources				
7	COAL PIPES & BENDS (WITHOUT CERAMIC LINERS)	III			Main Contractor approved sources				

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8	FITTINGS(CS, SS & AS UP TO GRADE 22)	III			Main Contractor approved sources				
9	ELECTRIC HOIST WITH TROLLEY, UNDERSLUNG CRANE < 05 TON CAPACITY	III			Main Contractor approved sources				
10	DUCTS	III			Main Contractor approved sources				
11	AIR RECEIVER TANK	III			Main Contractor approved sources				
12	COUPLING FOR FANS	III			Main Contractor approved sources				
13	SCAPH	III			Main Contractor approved sources				
14	HP/LP/OXYGEN DOSING SYSTEM	III			Main Contractor approved sources				
15	CE & DE SUSPENSION ASSEMBLY WITH RAPPING(MECHANICAL) MECHANISM	III			Main Contractor approved sources				
16	PERFORATED GD PLATE/SCREEN	III			Main Contractor approved sources				
17	ESP SUPPORT STRUCTURE (COLUMNS & ROOF BEAMS MANUFACTURED FROM ROLLED SECTIONS), CASING	III			Main Contractor approved sources				
18	ESP- MECH SAFETY INTERLOCK	III			Main Contractor approved sources				
19	HANGER & SUPPORTS(OTHER THAN CLH & VLH) RIGID HANGERS	III			Main Contractor approved sources				

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20	SNUBBERS	III			Main Contractor approved sources				
21	Oil Preheater	III			Main Contractor approved sources				
FGD Package									
1	Booster Fan	I			REFER SUB QR ITEM LIST Refer Note 1				
2	Slurry Recirculation Pump	I			REFER SUB QR ITEM LIST Refer Note 1				
3	Oxidation Air Blower	I			REFER SUB QR ITEM LIST Refer Note 1				
4	Wet Limestone Grinding Mills	I			REFER SUB QR ITEM LIST Refer Note 1				
5	Slurry Pumps	I			REFER SUB QR ITEM LIST Refer Note 1				
6	Agitators (Vertical and Horizontal)	I			REFER SUB QR ITEM LIST Refer Note 1				
7	Vacuum Belt Filter	I			REFER SUB QR ITEM LIST Refer Note 1				
8	Dampers & Gates	I			REFER TO BOILER PACAKAGE LIST				
9	Knife Edge Gate Valve	I			REFER TO BOILER/MILL PACAKAGE LIST				
10	Electric Hoist > 10MT	I			REFER TO BOILER PACAKAGE LIST				
11	Hangers & Supports	II			REFER TO BOILER PACAKAGE LIST				
12	C276 and Titanium Claded plates/sheets	II			NTPC APPROVED SOURCES				
13	Titanium & C276 Plates/Sheets (Raw material)	II			Main Contractor approved sources				
14	Hydrocyclones	II			NTPC APPROVED SOURCES				

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15	Insulation / Cladding, Mineral Wool / Piping Insulation	II			REFER TO BOILER PACAKAGE LIST				
16	Carbon steel Plates	S			REFER TO SUB-VENDORS MENTIONED IN THE TECHNICAL SPECIFICATIONS SEC-VI, PART-B				
17	FGD Structure (Column / Beams) (Other than BOP area)	II			Main Contractor approved sources				
18	Spray Nozzle (Absorber)	II			Main Contractor approved sources				
19	Borosilicate Lining (Raw Material)	II			Main Contractor approved sources				
20	Epoxy Primer and Adhesive for Borosilicate Lining	II			Main Contractor approved sources				
21	M.S. Rubber Lined Piping	II			Main Contractor approved sources				
22	Mist. Eliminator (PP/PVC) Including Supports	II			Main Contractor approved sources				
23	Spray Header / Poly propylene Plate / FRP Piping & Fittings	II			Main Contractor approved sources				
24	Absorber Tank including Nozzle and Turrets	II			Main Contractor approved sources				
25	Seal Air Fan for Damper	III			Main Contractor approved sources				
26	Absorber Accessories and Shop Fabricated Items, if any	III			Main Contractor approved sources				
27	Tanks other then Absorber Tank	III			Main Contractor approved sources				
28	Ducts, Support Structure, Platform, Stairs, Fasteners, Wet Dry Interface etc.	III			Main Contractor approved sources				
29	Casing / Hopper / Chute / Silo (Other than BOP)	III			Main Contractor approved sources				

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30	PEB / Pre-Fabricated-Structure for Shed / Super Structure (Trestle / Gallery) / Structure for Transfer Tower / Crusher House / Silo / Belt etc. / Technological Structure / Secondary Support Structure / Platform Structure etc)	III			Main Contractor approved sources				
31	Manual Hoist	III			Main Contractor approved sources				
32	Application of Rubber Lining of Tanks/ Pipes	III			Main Contractor approved sources				
33	Pipes (IS: 1239 / IS: 3589) & MS Fitting (Other than BOP)	III			Main Contractor approved sources				
34	Strainer	III			Main Contractor approved sources				
35	Spray Nozzle (Atomizing / Emergency Quenching)	III			Main Contractor approved sources				
36	Metallic/Non-Metallic Expansion Joints	III			Main Contractor approved sources				
37	Expansion Joints for Piping	III			Main Contractor approved sources				
38	Rubber / Glass Flake Lining Material	III			Main Contractor approved sources				
39	Electric Hoist Upto 10T	III			Main Contractor approved sources				
40	Lagging / Al Cladding (Other than BOP)	III			Main Contractor approved sources				
41	HDPE Piping & Fitting	III			Main Contractor approved sources				
42	Handrail / Monorail	III			Main Contractor approved sources				
NOTE -1 : For final Sub-QR approval , document required to be submitted as per Sub-QR requirements given in the specification (to be taken up with NTPC Engineering).									
NOTE-2: Vendors under 'A' are approved and accepted by NTPC with/without conditions in the past. Similar conditions as the case may be for the vendor shall be applicable for this project and tied up in the quality plan.									
NOTE-3: Pre-despatch inspection for Alloy/SS Grades needs to be tied up by Main contractor or Third-party inspection agency as required.									
NOTE-4 : (\$) Review of Mill TC for Raw Material to be done by NTPC and shall be included in the QP of corresponding equipment.									
NOTE-5: Raw Material for 91 and above Grade Material Fittings to be from NTPC approved sources as per Raw Material vendor List.									
NOTE-6:For Motorized/Pneumatic actuated valves the suppliers for actuators shall be from NTPC approved list, Refer NTPC C&I list.									
LEGENDS/ संकेतिका									

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SYSTEM SUPPLIER/SUB-SUPPLIER APPROVAL STATUS CATEGORY /प्रणाली आपूर्तिकर्ता / सब-वेंडर की स्वीकृति की स्थिति की श्रेणी (SHALL BE FILLED BY NTPC एनटीपीसी द्वारा भरा जाएगा)									
A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter “A” in the list along with the condition of approval, if any./ इन मर्दों के लिए प्रस्तावित वेंडर एनटीपीसी को स्वीकार्य है। अनुमोदन की शर्त, यदि कोई हो, के साथ-साथ पत्र “क”									
DR – For these items “Detailed required” for NTPC review. To be identified with letter “DR” in the list. एनटीपीसी द्वारा इन मर्दों की समीक्षा के लिए “विस्तृत ब्योरे की आवश्यकता” होगी। सूची में “DR” पत्र में इंगित किया जाना चाहिए।									
QP/INSPN CATEGORY: क्यूपी / निरीक्षण की श्रेणी:									
CAT-I / श्रेणी- I: For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC इन मर्दों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है और एनटीपीसी द्वारा अंतिम स्वीकृति भौतिक निरीक्षण के दौरान उपलब्ध गवाह के आधार पर दी जाएगी।									
CAT-II / श्रेणी- II: For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved QP. इन मर्दों के लिए गुणवत्ता योजनाओं									
CAT-III/ श्रेणी-III : For these items Quality control to be exercised as per Main contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of Conformance (COC) by Main Contractor.									
UNITS/WORKS इकाइयाँ / कार्य: Place of manufacturing/ निर्माण का स्थान Place of Main Supplier of multi units/works/बहु- इकाइयाँ / कार्यों के मुख्य सप्लायर का स्थान.									

SITE ERECTION AGENCY

S. N. क्र.सं.	Item / मद	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedu le क्यूपी उप.अनु सूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी
1	Boiler & Aux. (Pressure parts, Structures & Rotating Equipment)				DOWEL ERECTORS PVT. LTD.	CHENNAI	A		NOTE-7
					POWER MECH PROJECTS PVT. LTD.	VIJAYWADA	A		NOTE-7
					BRIDGE & ROOF	KOLKATA	A		NOTE-7
					KARPARA PROJECTS ENGG. PVT. LTD.	SURAT	A		NOTE-7
					IOTEP	MUMBAI	A		NOTE-7
					SUNIL HI-TECH ENGG.	NAGPUR	A		NOTE-7
					TATA PROJECTS LIMITED	HYDERABAD	A		NOTE-7
					TEXCEL ENGINEERS	CHENNAI	A		NOTE-7
					PCP INTERNATIONAL LTD.	CHANDIGARH	A		NOTE-7

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S. N. क्र.सं.	Item / मर्द	QP/ Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedu le क्यूपी उप.अनु सूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी
					INDWELL CONSTN. LTD.	VIJAYWADA	A		NOTE-7
					EDAC ENGG. LTD.	CHENNAI	A		NOTE-7
					LARSEN & TUBRO LTD.	MUMBAI	A		NOTE-7
					BHAWANI ERECTORS	KARUNAGAPAL LY	A		NOTE-7
					ESSAR PROJECTS (I) LTD.	MUMBAI	A		NOTE-7
					GOLDEN EDGE ENGG. PVT. LTD.	NEW DELHI	A		NOTE-7
					INDWELL CONSTR LTD.	VIJAYWADA	A		NOTE-7
					POWER MECH PROJECTS PVT. LTD	VIJAYWADA	A		NOTE-7
					TEXCEL ENGINEERS	CHENNAI	A		NOTE-7
					BRIDGE & ROOF	KOLKATA	A		NOTE-7
					KARPARA PROJECTS ENGG. PVT. LTD.	SURAT	A		NOTE-7
					SUNIL HI-TECH ENGG.	NAGPUR	A		NOTE-7
					IOTEP	MUMBAI	A		NOTE-7
					PCP INTERNATIONAL LTD.	CHANDIGARH	A		NOTE-7
					LARSEN & TUBRO LTD.	MUMBAI	A		NOTE-7
					EDAC ENGG. LTD.	CHENNAI	A		NOTE-7
					TATA PROJECTS LTD.	HYDERABAD	A		NOTE-7
					BHAWANI ERECTORS	KERALA	A		NOTE-7
					DOWEL ERECTORS	CHENNAI	A		NOTE-7
					GOLDEN EDGE ENGG.	NEW DELHI	A		NOTE-7
					BROTHERS ENGG. & ERECTORS	VIJAYAWADA	A		NOTE-7

		Project/परियोजना : SINGARENI THERMAL POWER PROJECT STAGE-II (1X800 MW) Package/पैकेज: EPC Package Supplier/आपूर्तिकर्ता: Contract No./अनुबंध सं.:				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब-वेंडर के अनुमोदन सहित मर्दों की सूची			DOC. NO./दस्तावेज सं.: CS-
									REVISION NO : 05
									DATE/तिथि : 01.04.2024
									SUB-SYSTEM उप-प्रणाली: QA-SG(MECH)
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3	ESP				POWER MECH PROJECTS	VIJAYAWADA	A		NOTE-7
					BRIDGE & ROOF	KOLKATA	A		NOTE-7
					BHAVANI ERECTORS PVT. LTD.	KERLA	A		NOTE-7
					L&T LTD.	MUMBAI	A		NOTE-7
					PCP INTERNATIONAL LTD.	CHANDIGARH	A		NOTE-7
					SUNIL HI-TECH	NAGPUR	A		NOTE-7
					DOWEL ERECTORS PVT. LTD.	CHENNAI	A		NOTE-7
					INDWELL CONSTR. LTD.	VIJAYAWADA	A		NOTE-7
					KARPARA PROJECTS ENGG.	SURAT	A		NOTE-7
					TEXCEL ENGINEERS PVT. LTD.	CHENNAI	A		NOTE-7
					TATA PROJECTS LTD.	HYDERABAD	A		NOTE-7
					IOTEP	MUMBAI	A		NOTE-7
					EDAC	CHENNAI	A		NOTE-7
					ZILLION	NEW DELHI	A		NOTE-7
			GOLDEN EDGE ENGG. PVT.LTD.	DELHI	A		NOTE-7		
			P E ERECTORS	KOLKATA	A		NOTE-7		

LEGENDS TO SITE ERECTION AGENCY LIST:

A -	For these items proposed vendor is acceptable to NTPC. To be indicated with letter "A" in the list alongwith the condition of approval, if any. The same conditions shall be applicable here as well.
DR -	For these items "Detailed required" for NTPC review. To be identified with letter "DR" in the list.

		Project/ परियोजना : SINGARENI THERMAL POWER PROJECT STAGE-II (1X800 MW) Package/ पैकेज: EPC Package Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब-वेंडर के अनुमोदन सहित मर्दों की सूची			DOC. NO./ दस्तावेज सं.: CS-
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Note - 7	<p>a)The Main Contractor is required to ensure that all the requirements of contract including requirements regarding the deployment of Erection Agency in connection with the work schedule for the subject project and package are met.</p> <p>b) Organizational, financial & technical aspects of this sub-contractor shall be taken care of by Main Contractor before award of the jobs. Mobilization of manpower, tools & tackles etc. to suit the requirements of site to meet the project schedule shall be tied up by Main Contractor in agreement with NTPC Site (Head-Execution).</p>								
NOTE 8:	<p>MAIN CONTRACTOR WILL FOLLOW THEIR STANDARD PROCEDURE, CORPORATE GUIDELINES AND SHALL COMPLY WITH CIRCULARS/INSTRUCTIONS ETC. ISSUED BY GOVT./RELEVANT STATUTORY BODIES WHILE TENDERING. HOWEVER FOR NEW VENDOR, MAIN CONTRACTOR SHALL TAKE APPROVAL FROM NTPC PRIOR TO ORDER PLACEMENT.</p>								

Project/परियोजना :SINGARENI THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:CS-		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 16.04.2024 PAGE/ पृष्ठ :			
S. N. क्र.सं.	Item / मद	QP / Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी
1	AIR BLOWERS -LOBE TYPE ≥ 10 KW (< 10 KW , CAT-II, MAIN CONTRACTOR APPROVED SOURCE)	I			SWAM PNEUMATIC	NOIDA	A		
					EVEREST BLOWERS PVT LTD	BAHADURGARH	A		UP TO 40 HP (APPROX 1600 CUM/HR)
					KAY INTERNATIONAL	SONEPAT	A		UP TO 4800 CUM/HR
					KULKARNI POWER TOOLS	SHIROL	A		UP TO 2500CUM/HR
					USHA COMPRESSORS	AHMEDABAD	A		UP TO 60 HP (APPROX 2000CUM/HR)
2.A	EOT CRANE & ELECTRIC HOIST >5 MT	I (> 10T) / III (>5T UP TO 10T)			REVA INDUSTRIES	FARIDABAD	A		UP TO 60 MT
					EDDY CRANE	PUNE	A		UPTO 10 MT
					CONSOLIDATED HOIST	SATARA /PUNE *	A		SATARA UP TO 60 MT HOIST,*PUNE FOR ELECTRIC HOIST UPTO 15 MT
					ELECTROTHERAPHY	RISHRA	A		UPTO 15 MT FOR ELECTRIC HOIST ONLY
					HERCULES HOIST	RAIGAD	A		UPTO 15 MT FOR ELECTRIC HOIST ONLY
					TUBRO FERGUSSON	KOLKATA	A		UP TO 20MT FOR EOT, UP TO 5 MT FOR FOR ELECTRIC HOIST
					PRAYAS ENGG (PBL)	V V NAGAR	A		UPTO 10 MT FOR ELECTRIC HOIST ONLY
					ALPHA SERVICES	ALWAR	A		SINGLE GIRDER EOT CRANE & ELECTRIC HOIST UPTO 15 MT ONLY. GEARBOX FROM NTPC APPROVED SOURCES FOR EOT CRANE.
					CENTURY CRANE ENGINEERS PVT. LTD	BALLABHGARH	A		UP TO 60 MT EOT CRANE
					ARMSEL	BANGALORE	A		UPTO 10 MT EOT & UPTO 15 MT ELECTRIC HOIST
					TRACTEL TIRFOR	PALWAL	A		UPTO 15 MT FOR ELECTRIC HOIST AND UPTO 10 MT FOR EOT
					MILLARS INDIA	KARAMSAD	A		UP TO 25 MT
					AVON CRANES	GURGAON	A		UP TO 25 MT
					GRIP ENGINEERS	HYDERABAD	A		50 MT (GEARBOX FROM NTPC APPROVED SOURCES FOR EOT CRANE).
					GRIP ENGINEERS	FARIDABAD	A		UPTO 60 MT ELECTRIC HOIST ONLY
					UNIVERSAL HOIST O FABRIK	THANE	A		CRANE 08 MT & HOIST 60 MT
					TECHNO INDUSTIES	AHMEDABAD	A		UP TO 60 MT
		MEGA CRANE INDIA PVT LDT	COIMBATORE	A		UP TO 10 MT			
		MANGALA HOIST	GR NOIDA	A		UP TO 55 MT EOT CRANE & EL HOIST 20 MT			
		CRANEX	GHAZIABAD	A		UP TO 140 MT FOR EOT ONLY			
2.B	GANTRY CRANE >5T	I (> 10T) / III (>5T UP TO 10T)			REVA INDUSTRIES	FARIDABAD	A		UP TO 60 MT
					UNIQUE INDUSTRIAL HANDLERS PVT LTD	NASHIK	A		UP TO 165 MT
					ANUPAM INDUSTRIES LTD.	ANAND	A		UP TO 60MT
					SMACO ENGINEERING PVT. LTD	THANE	A		UP TO 60MT
					MANGLA HOIST	GREATER NOIDA	A		UP TO 10MT
		CB DOCTOR VENTILLATOR PVT LTD	AHMEDABAD	A		up to 50000 CMH			

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3	FAN- AXIAL TYPE ≥ 10KW (< 10 KW , CAT-II, MAIN CONTRACTOR APPROVED SOURCE) MOTOR FROM NTPC ACCEPTED SOURCE	II			HOWDEN SOLYVENT FLAKT INDIA PVT LTD,	CHENNAI	A		up to 125000 CMH			
					C DOCTOR &CO PVT LTD	KOLKATA	A		up to 50000 CMH			
					KRUGER VENTILATION INDUSTRIES (I) PVT LTD	SHAHPUR, THANE	A		Up to 6000 CMH			
					NADI AIRTECHNICS PVT LTD	CHENNAI	A		Up to 15000 CMH			
					ADVANCE VENTILATION PVT LTD	KUNDALI. SONEPAT	A		up to 40000 CMH			
					SK SYSTEMS PVT LTD	KUNDALI PHASE-II, SONEPAT, HARYANA	A		up to 50000 CMH			
					Patel Airflow	Ahemdabad	A		up to 40000 CMH			
4	PIPES-MS- (BLACK/ GI) AS PER IS IS:3589 >1000NB	I			ALMONAROD (P) LIMITED	CHENNAI	A		Up to 14000 CMH			
					STEEL AUTHORITY OF INDIA LIMITED	ROURKELA	A					
					WELSPUN	ANJAR	A		SAW UPTO 2600 NB			
					WELSPUN	BHARUCH	A		SAW UPTO 1300 NB			
					MAN INDUSTRIES	INDORE	A		SAW UPTO 1400 NB			
					SAMSHI	VADODARA	A		SAW 450 TO 2540 NB			
					MUKAT TANKS & VESSELS	TARAPUR	A		SAW 200 TO 1200 NB			
					MUKAT PIPES	RAJPURA	A		SAW UPTO 1800 NB			
					LALIT PIPES AND PIPES LTD	THANE	A		SAW 350 TO 1400 NB			
					RATNAMANI	CHATRAL	A		SAW 600 TO 2600 NB			
					RATNAMANI	KUTCH	A		SAW 400 TO 3600 NB			
					PSL HOLDINGS LIMITED	DAMAN	A		SAW 450 TO 1600 NB			
					PSL INTERNATIONAL LTD.	CHENNAI	A		SAW 450 TO 1600 NB			
					PSL LIMITED	KUTCH	A		SAW 450 TO 1600 NB			
					PSL LIMITED	VISAKHAPATNAM	A		SAW 450 TO 1600 NB			
					JCO PIPES	CHHINDWARA	A		SAW UPTO 1600 NB			
					SURYA ROSHNI	ANJAR	A		SAW UP TO 2032 OD			
					JINDAL SAW LTD	BELLARY	A		SAW UP TO 3632 OD , THICKNESS 16 MM			
			5	PIPES & FITTINGS-GRP	I			CAPACITE STRUCURES PVT LTD	THANE	A		406.4 MM TO 3874 MM OD
								EPP COMPOSITES PVT LTD	RAJKOT	A		UP TO 900MM
		GRAPHITE INDIA				NASIK	A		UP TO 1000MM			
		SHRIRAM SEPL COMPOSITES LTD				CHENNAI	A		UP TO 1100MM			
		BALAJI FIBER REINFORCE PVT LIMITED				VADODARA	A		UP TO 650MM			
		MEGHA FIBRE GLASS INDUSTRIES PVT LTD	MEDAK	A		UP TO 900MM						
6	SERVICE VESSEL-CPU & OTHER PR VESSELS >= 10 BAR WORKING PRESSURE	I			DRIPLEX WATER ENGINEERING INTERNATIONAL PVT LIMITED	BHADARBAD	A					
					BGR ENERGY SYSTEMS LTD (ENVIRONMENTAL ENGG. DIV.)	PONNERI	A		UPTO 3000MM DIA & THICKNESS UPTO 28 MM			
					ISHAN EQUIPMENTS PRIVATE LIMITED	VADODARA	A		UPTO 2900 MM DIA & THICKNESS UPTO 28 MM			
					JASMINO POLYMERTECH PVT LTD	TALOJA	A		DIA 2800MM, THICKNESS 25MM DESIGN PRESSURE UP TO 47.5 KSC			
					MAHIMA UDYOG	HARIDWAR	A		DIA UP TO 2900 MM , THICKNESS UPTO 29 MM			

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					SV Fabricators	Navi Mumbai	A		
					BELCO POLLUTION CONTROL PVT LTD	GREATER NOIDA	A		UPTO 3200MM DIA & THICKNESS UPTO 30 MM
7	PUMPS- HORIZONTAL & VERTICAL CENTRIFUGAL -UP TO 300KW	(≥10KW & < 90 KW CAT-II , ≥ 90 KW CAT-I)			KIRLOSKAR BROTHERS LTD	KIRLOSKARWADI	A		
					WILO MATHER & PLATT	PUNE	A		
					WILO MATHER & PLATT	KOLHAPUR	A		
					SAM TURBO	COIMBATORE	A		FLOW UP TO 1500 CUM/HR AND POWER RATING UP TO 425 KW
					FLOWMORE LTD	GHAZIABAD	A		
					BEST AND CROMPTON	CHENNAI	A		
					JYOTI LTD	VADODARA	A		
					WPIL	GHAZIABAD	A		
					KISHORE PUMPS	PUNE	A		UPTO 500M3/HR ONLY RUBBERLINED PUMPS ALSO
					GRUNDFOS PUMPS INDIA PVT LTD	CHENNAI	A		HORIZONTAL UP TO 30 KW ONLY AND VERTICAL UP TO 45 KW ONLY (FOR APPLICATIONS WHERE NPSH IS NOT REQUIRED)
					SINTECH PRECISION	GHAZIABAD	A		HORIZONTAL UP TO 400 KW MOTOR RATING AND VERTICAL UP TO 30 KW MOTOR RATING
					KSB	PUNE	A		
					KSB	NASHIK	A		
					FLOWSERVE INDIA CONTROLS PVT LTD	COIMBATORE	A		HOIZONTAL CENTRIFUGAL PUMP UP TO 75 KW ONLY
8	PUMPS -VT -UP TO 300KW	I			FLOWMORE LTD	GHAZIABAD	A		
					KIRLOSKAR BROTHERS LIMITED	KIRLOSKARWADI	A		
					WPIL LTD	KOLKATA	A		
					WPIL LTD	GHAZIABAD	A		
					JYOTI LTD	VADODARA	A		
					XYLEM WATER SOLUTIONS INDIA PVT LTD	VADODARA	A		
					FLOWSERVE INDIA CONTROLS PVT LTD	COIMBATORE	A		UP TO 1025 KW
					SINTECH PRECISION	GHAZIABAD	A		
9.A	VALVE-DUAL PLATE CHECK > 600MM OR CLASS > 300 (VALVE- DUAL PLATE CHECK UP TO 600MM & CLASS 300: CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			ADVANCE VALVE PVT LTD	GR. NOIDA	A		DUAL PLATE CHECK VALVES CI UPTO 1000 NB CLASS 125, DUPLEX SS UP TO 600NB CLASS 600.
					LEADER VALVES	JALANDHAR	A		UP TO 900MM CLASS 150 , SS 200NB CLASS#300
					R & D MULTIPLE	VALSAD	A		CI/ CS UP TO 800NB PN 10

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9.B	VALVE-BALL > 100 MM OR CLASS > 800; (VALVE- BALL UP TO 100 MM & CLASS 800:CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			SWIMS TECHNOLOGIES	HUBLI	A		SS BALL VALVES UP TO 500MM AND CLASS #600, CS BALL VALVES UP TO 250 MM AND CLASS# 900, CS/ SS BALL VALVES UP TO 100 MM AND CLASS # 1500.
					MICRO FINISH VALVES PVT. LTD.	HUBLI	A		400NB CLASS#600 AND UP TO 600NB CLASS#300
					FLOW CHEM INDUSTRIES	KALOL	A		100NB CLASS#600,200NB CLASS#300, 50 NB CLASS#800
					L&T VALVES LIMITED	COIMBATORE	A		UPTO 150NB, CLASS #150/300, AND UPTO 50NB, CLASS #800
					PRECISION ENGG CO VALVES PVT LTD	NASIK	A		FCS UP TO 50NB CLASS 800, CCS UP TO 400NB CLASS 150.
					WELLCAST INDUSTRIES	AHMEDABAD	A		SIZE 150 NB & PR CLASS 150
					A V VALVES	AGRA	A		size up to 250 NB & Class 150
					BELGAUM AQUA VALVE PVT LTD	BELGAON	A		FCS UP TO 50NB CLASS 800, CCS UP TO 200NB CLASS 150.
9.C	VALVE-BUTTERFLY > 600MM OR CLASS>150 (VALVE- BUTTERFLY UP TO 600MM & CLASS 150::CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			G M ENGINEERING PRIVATE LTD	RAJKOT	A		UP TO 400 NB AND CLASS #600
					INTERVALVE POONAWALA LTD	PUNE	A		SGI / CI / D2 1400MM PN10, SGI / CI 1000MM PN16,CS/SS 500MM PN16, SS 400MM CLASS#300, MS FABRICATED UPTO 2000NB, PN 6
					SWIMS TECHNOLOGIES	HUBLI	A		CI/ DI BUTTERFLY VALVE UP TO 1000MM AND PN16 AND UP TO 1800MM AND PN10,CCS UP TO 1050MM CLASS 150 AND UP TO 1800MM AND PN16 SS - UP TO 400NB PN-16 ,FABRICATED 800MM CLASS#150.
					PENTAIR VALVES	HALOL	A		FOR SS UP TO 500 NB PN-10, CI- UP TO 900NB PN-10, UP TO 500NB PN-16, 450MM CLASS#300., MS FABRICATED UPTO 2800NB, PN6.
					FOURES ENGINEERING	BANGALORE	A		CAST SGI/CI/ MS FABRICATED- UP TO 1200 PN-10, UP TO 350 PN-16 ,2400 MM PN6/CLASS150 SS - UP TO 300NB PN-10,MS FABRICATED UPTO 2700NB CLASS # 75
					KIRLOSKAR BROTHERS LTD	KIRLOSKEWADI	A		CAST SGI/CI/CS 1400 MM PN16 , SS 300 MM PN16 , 1800MM CLASS 150, MS FABRICATED 900 NB PN40,MS FABRICATED 2800NB, PN6.
		R & D MULTIPLE	VALSAD	A		CAST SGI/CI/MS FABRICATED- UP TO 1800 MM PN-10/CLASS # 75, ,1100MM PN25,1400MM CLASS#150 ,MS FABRICATED UPTO 2800NB CLASS # 75			

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11	EXPANSION JOINT < 1600NB: CAT-II & MAIN CONTRACTOR APPROVED SOURCES)	I			SRM EXOFLEX PVT LTD	KOLKATA	A		UPTO 2800 MM
12.A	DRIFT ELIMINATOR-PVC	I			Cooldeck	Daman	A		
		I			PAHARPUR COOLING TOWER LIMITED	SAHIBABAD	A		
		I			MM Aqua	Gurgaon	A		
12.B	FILLS (Trickle Grid /Moduler/Splash)	I			Enexio Power cooling solutions , PAHARPUR COOLING TOWERS LTD	Thiruvallur(TN) SAHIBABAD	A		NF20
13	FAN ASSEMBLY-COOLING TOWER	I			PAHARPUR COOLING TOWERS LTD	BHASA	A		WITH SOLID FAN BLADES 288" AND 336 " DIA, WITH FOAM CORED FAN BLADES WITH 10METERS AND 10.97 METERS
					PAHARPUR COOLING TOWERS LTD	KOLKATA	A		60" TO 288" FAN DIA
					M/s MAYA FANS AIR ENGG PVT LTD,	DEWAS	A		60" TO 288" FAN DIA
					AMALGAMATED INDUSTRIAL COMPOSITES PVT LTD	NASHIK	A		UP TO 11 METER FAN DIA
14	GEAR BOX -COOLING TOWER	I			PAHARPUR COOLING TOWERS LTD	SAHIBABAD	A		
					PAHARPUR COOLING TOWERS LTD	KOLKATA	A		
					NEW ALLENBERRY WORKS	KOLKATA	A		
					ELECON ENGINEERING	VALLABH VIDYANAGAR	A		
15	DRIVE SHAFT-CARBON FIBRE -COOLING TOWER	II			PREMIUM ENERGY TRANSMISSION LTD.	FALTA	A		
					M/S EUROFLEX TRANSMISSION (INDIA) PVT LTD	HYDERABAD	A		
					PAHARPUR COOLING TOWERS LTD	SAHIBABAD	A		
					M/s AMALGAMATED INDUSTRIAL COMPOSITES PVT LTD	NASHIK	A		
16	DRIVE SHAFT SS-COOLING TOWER	II			NORTH STREET COOLING TOWERS	GHAZIABAD	A		
					PAHARPUR COOLING TOWERS LTD	SAHIBABAD	A		
					PAHARPUR COOLING TOWERS LTD	KOLKATA	A		
					NORTH STREET COOLING TOWER	GHAZIABAD	A		
17	PUMP-CW PUMP	I			KIRLOSKAR BROTHER'S LIMITED	KIRLOSKARWADI			BOTH CV & VT TYPE VT Upto 43000 CUM/H and VT Upto 30000 CUM/H
					WPIL LTD	KOLKATA	A		BOTH CV & VT TYPE
					FLOWSERVE INDIA CONTROLS PVT LTD	COIMBATORE	A		CV TYPE ONLY
					FLOWMORE LTD	GHAZIABAD	A		VT TYPE ONLY
					XYLEM WATER SOLUTIONS INDIA PVT LTD	VADODARA			
		A		VT TYPE ONLY					
		A		VT TYPE ONLY.					
18	ELECTRO HYDRAULIC ACTUATOR FOR CW PUMP DISCHARGE BUTTERFLY VALVE	I			BOSCH REXROTH (INDIA) PVT LTD	SANAND	A		HYDRAULIC POWER PACK AND HYDRAULIC CYLINDER (320 MMM BORE DIA) , ACCUMUATOR FORM OLAYER (21/C, KIADB, PHASE-I, KUMBALGOD INDUSTRIAL AREA, BANGALORE)

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	DISCHARGE BUTTERFLY VALVE				HYDAC (INDIA) PVT. LTD	COIMBATORE	A		HYDRAULIC POWER PACK-HYDAC COIMBATORE, HYDRAULIC CYLINDER - HYDAC BANGLORE, ACCU MULATOR HYDAC BHIWANDI ,THANE- MUMBAI
19	IMPELLER CASTING - CW PUMP	II			ISGEC	MUZAFER NAGAR	A		FINISHED CASTING UP TO 4.0 MT APPROX
					THE KOLHAPUR STEEL LTD,	KOLHAPUR	A		FINISHED CASTING UP TO 4.0 MT APPROX
					WESTERN PRECICAST PVT LTD	SANGLI	A		FINISHED CASTING UP TO 3.5 MT APPROX
					HINDUSTAN UDYOG LIMITED	NAGPUR	A		FINISHED CASTING UP TO 3.0 MT APPROX
					HI-MET CORPORATION	S.KOREA	A		FINISHED CASTING UP TO 3.0 MT APPROX
					TULIP CASTING	KOHLAPUR	A		WEIGHT UPTO 3.0 MT , DIA 1600 MM
					MATHER FOUNDRY LTD	UK	A		FINISHED CASTING UP TO 3.6 MT APPROX
20	SHAFT-FORGING -CW PUMP	II			GORADIA SPECIAL STEELS LTD	KHAPOLI	A		
					BHARAT FORGE	PUNE	A		
					CFFP,BHEL	HARIDWAR	A		UP TO DIAMETER 290MM AND LENGTH APPROX. 3000MM, GRADE SS410
21	THRUST BEARING FOR CW PUMP	I			MICHEL	BANGLORE	A		
					KMP	GREATER NOIDA	A		
22	DELUGE VALVE WITH TRIMS	I			HD FIRE	THANE/JALGAON	A		
					CARRIER	GURGAON	A		FOR PISTON TYPE DELUGE VALVE ONLY
23	INERT GAS EXTINGUISHING SYSTEM	II			ANSUL	USA	A		
					KIDDE (GINGEKERR)	UK	A		
					NAFFCO	UAE	A		
					MINIMAX Gmbh & Co. KG	GERMANY	A		
					TOTAL WALTHER	GERMANY	A		
					NOHMI BOSAI	JAPAN	A		
24	ALARM VALVE WITH TRIMS	II			HD FIRE	THANE	A		
					HD FIRE	JALGAON	A		
25	FOAM SYSTEM(BLADDER TYPE)	I			HD FIRE	JALGAON	A		
					FIRETECH	RATNAGIRI	A		
26	FIRE TENDER	I			WADIA BODY BUILDERS	AHEMDABAD	A		
					AAREL INDUSTRIES	INDORE	A		
					AMBALA COACH	AMBALA	A		
					VIJAY FIRE	UMBERGAON	A		
					MARATHON ELECTRIC MOTOR(I) LTD	KOLKATA	A		UP TO 50000 CMH
					HOWDEN SOLYVENT FLAKT INDIA PVT LTD,	CHENNAI	A		UP TO 200000 CMH
					ALMONAROD (P) LIMITED	CHENNAI	A		UP TO 60000 CMH
					PATEL AIRFLOW	VATWA, AHMEDABAD	A		UP TO 250000 CMH
					CB DOCTOR VENTILATOR PVT LTD	AHMEDABAD	A		UP TO 150000 CMH

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27	CENTRIFUGAL FAN (≥10KW), (< 10 KW , CAT-II, MAIN CONTRACTOR APPROVED SOURCE), MOTOR FROM NTPC ACCEPTED SOURCE	I			WOLTER VENTILATORS INDIA (P) LTD	BHIWADI,	A		UP TO 200000 CMH
					C DOCTOR &CO PVT LTD	KOLKATA	A		UP TO 250000 CMH
					SUVIDHA AIR ENGINEERS	AHMEDABAD	A		UP TO 190000 CMH
					SUBURBAN INDUSTRIAL WORKS PVT. LTD	KOLKATA	A		UP TO 100000 CMH
					KRUGER VENTILATION INDUSTRIES (I) PVT LTD	THANE	A		UP TO 90000 CMH
					SOLYVENT FLAKT	KOLKATA	A		UP TO 200000 CMH
					ADVANCE VENTILATION PVT LTD	SONEPAT	A		UP TO 250000 CMH
28	DIESEL ENGINE	I			SK SYSTEMS PVT LTD	SONEPAT	A		UP TO 250000 CMH
					CUMMINS	PUNE	A		Up to 2000 KVA
29	3 LPE COATED PIPE	I			PERKINS	AURANGABAD	A		UP TO2000 KVA DG SET
					SAIL	ROURKELA	A		
					RATNAMANI	KUTCH	A		UP TO 1100 NB
					JINDAL SAW LTS	BELLARI	A		UP TO 1219 MM
30	PLATE HEAT EXCHANGER	I			ArcelorMittal Nippon steel India Ltd	HAZIRA	A		UP TO 910 MM
					PSL LTD	KUTCH/ VIZAC	A		UP TO 1100 NB
					TRANTER INDIA	PUNE	A		HT PLATES & GASKETS FROM TRANTER SWIDEN/USA.HT PLATES FROM HISKA JAPAN
					ALPHA LAVAL	SATARA	A		HT PLATES & GASKETS FROM ALPHA LAVAL SWIDEN
31	DI(Ductile Iron) PIPE & FITTINGS	I			IDMC	ANAND	A		HT PLATES & GASKETS FROM SONDEX DENMARK
					SONDEX INDIA	VADODARA	A		HT PLATES FROM SONDEX DENMARK/INDIA (MODEL S188)
					JINDAL SAW(J161)	KUTCH	A		UP TO DN 900 CLASS K7 & K9
32	AIR COPMPRESSOR: OIL FREE CENTRIFUGAL COMPRESSOR	I			JAI BALAJI(J156)	BARDWAN	A		UP TO DN 900 CLASS K7 & K9
					ELETRO STEEL	KOLKATA	A		
					INGERSOLL RAND INDIA	AHEMDABAD	A		Capacity Upto 60 NM3/Minute @ Pr 8 bar
33	OIL FREE SCREW TYPE AIR COMPRESSORS	I			KIRLOSKAR PNEUMATIC COMPANY LTD	PUNE	A		Capacity up to 45.3 Nm3/min and pressure rating up to 9.3 kg/cm2
					ATLAS COPCO	BELGIUM (ASSEMBLING & TESTING AT ATLOS COPCO , PUNE.	A		Capacity Upto 64.9 NM3/Minute @ PR 8.6 KG/CM2 and 100 NM3/Minute @ PR 4 KG/CM2
					INGERSOL RAND INDIA	AHMEDABAD	A		UPTO MODELSH 300 (36 NM3/MIN) . AIR ENDS FROM GHH RAND - GERMANY & OTHER COMPONENTS FROM IR'S GLOBAL SOURCES ASSEMBLY & TESTING AT INGERSOL-AHMEDABAD
					ELGI	COIMBATORE	A		UPTO 2830 CFM, AIR ENDS FROM HITACHI- JAPAN. ASSEMBLY AND TESTING AT ELGI COIMBATORE.
					AERZEN MACHINES	VADODARA	A		6520 M3/Hr @ 2.58 bar

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		I			KIRLOSKER PNEUMATIC COMP LTD	PUNE	A		FLOW CAPACITY 45.3 NM3/MIN , AND PRESSURE RATING 9.3 KG/CM2
34	AIR DRYER	I			SUMMITS HYGRONICS	COIMBATORE	A		FOR REFRIGERANT DRYER, 11893 M3/HR , REGENERATIVE DRYERS BLOWER REACTIVATED TYPE 2123 M3/HR AND REGENERATIVE DRYERS HOC TYPE 5820 M3/HR
					MELLCON ENGRS PVT LTD	GR NOIDA	A		Refrigerant type 7285 m3/hr & REGENERATIVE DRYERS HOC TYPE 2548 M3/HR
					DELAIR INDIA LTD	GURGAON	A		Refrigerant type 7500 m3/hr & REGENERATIVE DRYERS HOC TYPE 3000 M3/HR
					SUMESH PETROLEUM ATLAS COPCO	VADODARA BELGIUM(ASSLY & TESTING AT PUNE)	A		100 CFM(169 M3/HR) & 7 KG/CM2 MODEL UP TO FD1200
					INDCON	DELHI	A		Regenerative dryer2500 m3/hr HOC & DECICANT TYPE
					TRIDENT PNEUMATIC PVT LTD	COIMBATORE	A		Refrigerant type 10000 m3/hr & REGENERATIVE DRYERS BHR TYPE 1000 M3/HR
35	SCREW CHILLER	II			KIRLOSKAR CHILLER	PUNE	A		UP TO 350TR
					DAIKIN	NEEMRANA	A		UP TO 185 TR
					KIRLOSKAR CHILLER PVT LTD	PUNE	A		Up to 350TR
					BLUE STAR (COMPRESSOR FROM HANBEL-TAIWAN)	WADA	A		SCREW CHILLER UP TO 282TR
36	Mettalic Expansion Bellows	II			MB METTALIC BELLOWS	CHENNAI	A		
					SUR Industries	KOLKATA	A		
					LONE STAR	CHENNAI	A		
37	Conveying Compressor (Reciprocating)	I			KIRLOSKAR PNEUMATICS	PUNE	A		
					INGERSOLL RAND	AHMDABAD	A		
					ATLAS COPCO(CHICAGO PNEUMATIC BRAND)	PUNE	A		
38	ALLOY CAST IRON PIPE, FITTINGS AND LINER	III			CRAWLEY & RAY	KOLKATA	A		
					ALLIED FOUNDRIES	BELGAUM	A		
					PARAMOUNT CASTINGS	NAGPUR	A		
					NORTHERN ALLOY	BHAVNAGAR	A		
					MENON METALLIK	KOLHAPUR	A		
					KOLHAPUR STEEL	KOLHAPUR	A		
					AQUA ALLOY	KOLHAPUR	A		
					MARTO PEARL	HYDERABAD	A		
					R.R.L	HOWRAH	A		
					CONCAST ENGINEERING	BURDWAN, WB	A		
					NATRAJ IRON & CASTINGS	DHANBAD	A		
					ETA Manufacturers Private Limited	Bahadurpur	A		

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					ABHIPRIYA BUSINESS	PANT NAGAR	A		
					MELCO	FARIDABAD	A		
					MACAWBER BEEKAY	KESHWANA	A		
39	DRY ASH UNLOADING CHUTE	III			MINING AND MATERIAL HANDLING EQUIPMENT	KOLKATA	A		
					DCL	HYDERABAD	A		
					FLAKT	KOLKATA	A		
					ORIENT FANS (ACCO)	KOLKATA	A		
					THERMAX	PUNE	A		
					RIECO	PUNE	A		
40	BAG FILTER / SILO VENT FILTER	II			MELCO	FARIDABAD	A		
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		
					MACAWBER BEEKAY	KESHWANA	A		
					TAP ENGINEERING	KANCHEEPURAM	A		
					KAKATI KARSHAK	HYDERABAD	A		
41	VACUUM PUMP [WATER SEAL RING TYPE]	I			AEROMATIC	AHEMDABAD	A		Size Upto 200 MM , Capacity 3924 m3/hr
					DECCAN MECHANICAL & CHEMICAL	BARAMATI	A		
					ENVIRO ABRASION	PUNE	A		CAST BASALT LINERS FROM SCHOLTEN GmbH-GERMANY
42	BASALT LINE PIPE & FITTING	I			TURBO ENGINEERS	COIMBATORE	A		CAST BASALT LINERS FROM KALENBORN - GERMANY/POLAND OR EUTIT - Czech Republic
					GOENKA CAST ENGINEERING(I) PVT LTD	DURG	A		UP TO 350 NB
					BMW STEEL	ROORKEE	A		UP TO 550 NB
					BRAY CONTROLS INDIA PVT LTD, VAAS KNIFE GATE VALVE DIVISION	CHENNAI	A		UPTO PN 10 RATING
43	SLURRY DUTY KNIFE GATE VALVE	II			FOURESS ENGINEERING	BANGALORE	A		UPTO PN 10 RATING
					ORBINOX	COIMBATORE	A		UPTO PN 16 RATING
					WEIR MINERALS	BANGALORE	A		UPTO 12" PN 10 RATING
					BRAY CONTROLS INDIA PVT LTD, VAAS KNIFE GATE VALVE DIVISION	CHENNAI	A		
44	FLY ASH DUTY KNIFE GATE VALVE	II			FOURESS ENGINEERING	BANGALORE	A		
					ORBINOX	COIMBATORE	A		
					JASH SCHUTTE	INDORE	A		
					ELECTROSTEEL	CHENNAI	A		UPTO 450 NB
45	CAST IRON PIPE	III			KESORAM	KOLKATA	A		UPTO 350 NB
					IISCO	KULTI	A		
					KAPILANSH DHATU UDYOG	NAGPUR	A		APPROVED UPTO 300 NB.
					KUSHA LAVA	VIJAYWADA	A		FOR NON STD. SIZE
					SAM INDUSTRIAL PUMPS	COIMBATORE	A		
46	ASH SLURRY PUMP	I			WEIR MINERALS	AUSTRALIA	A		MANUFACTURING AT WEIR MINERALS BANGALORE
					MELCO	FARIDABAD	A		
47	AIR LOCK FEEDER VESSEL / BOTTOM ASH OVERFLOW TANK/MIXING TANK/COARSE ASH TANK/ AIR OIL CONVERTOR TANK, AIR INTAKE VALVE	III			MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		AIR OIL TANK- ASANSOLE , AIR INTAKE VALVE - KUMARDUBHI
					MACAWBER BEEKAY	KESHWANA	A		
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		

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48	BOTTOM ASH HOPPER / BUFFER HOPPER/DUST COLLECTOR	III			MELCO	FARIDABAD	A		ONLY FOR BUFFER HOPPER AND DUST COLLECTOR
					Nirman Fabricators	Ranchi	A		BA Hopper, BA Intermediate Silo and Fly ash surge hopper and support structures for these items
					MACAWBER BEEKAY	KESHWANA	A		
49	CLINKER GRINDER	I			MELCO	FARIDABAD	A		
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		
					L&T	KANSBAHAL	A		
					MACAWBER BEEKAY	KESHWANA	A		
50	FLY ASH HOPPERVALVE/ASH INTAKE VALVE/FLY ASH DIFFUSER / DRIVE ARRANGEMENT FOR CLINKER GRINDER	II			MELCO	FARIDABAD	A		
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		
					L&T	KANSBAHAL	A		
					MACAWBER BEEKAY	KESHWANA	A		
51	FLUIDIZING PAD / FLUSHING APPARATUS	III			MELCO	FARIDABAD	A		
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		
					L&T	KANSBAHAL	A		
52	FLY ASH STORAGE SILO/HCSO SILO	II			MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		
					MACAWBER BEEKAY	KESHWANA	A		
					MELCO	FARIDABAD	A		
53	FEED SUMP / VACUUM BREAKER	I			MELCO	FARIDABAD	A		
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		
					MACAWBER BEEKAY	KESHWANA	A		
54	FLY ASH HEADER VALVE/BRANCH HEADER VALVE / AIR INTAKE VALVE /EQUALISING VALVE /PLUG GATE FOR SUMP ISOLATION	II			MELCO	FARIDABAD	A		
					MCNALLY SAYAJI	KUMARDHUBI	A		
					L&T	KANSBAHAL	A		
					MACAWBER BEEKAY	KESHWANA	A		
55	HYDROMIX DUST CONDITIONER/ROTARY FEEDER/ROTARY VALVE	I			MELCO	FARIDABAD	A		
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		
					MACAWBER BEEKAY	KESHWANA	A		
					L&T	KANSBAHAL	A		
56	JET PUMP / JETTING NOZZLE	I			EXONENTIAL ENGINEERING	PUNE	A		UP TO 325 TPH
					MELCO	FARIDABAD	A		JET PUMP / JETTING NOZZLE
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		JET PUMP / JETTING NOZZLE
					L&T	KANSBAHAL	A		JET PUMP
57	COLLECTOR TANK / AIR WASHER / WETTING HEAD / SURGE / SETTLING TANK	III			MACAWBER BEEKAY	KESHWANA	A		JET PUMP / JETTING NOZZLE
					MELCO	FARIDABAD	A		
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		
58	PLATE VALVE AT DYKE END	II			MELCO	FARIDABAD	A		
					MCNALLY SAYAJI	ASANSOL/KUMARD HUBI	A		

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					MACAWBER BEEKAY	KESHWANA	A		
50	STACKER RECLAIMER & RECLAIMER	I			MCNALLY	KUMARDHUBI / ASA	A		
					L&T	KANCHEEPURAM	A		
					THYSSENKRUPP	PUNE	A		
					ELECON	V V NAGAR	A		
					TRF	JAMSHEDPUR	A		
					SANDVIK	PUNE	A		
					PROMAC	BANGALORE	A		
					THYSSENKRUPP	HYDERABAD	A		
60	WAGON TIPPLER & SIDE ARM CHARGER	I			ELECON	V V NAGAR	A		
					FAMAK S.A. (IN ASSOCIATIONWITH MBE-ASAN	POLAND	A		
					L & T	KANSBAHAL	A		
					THYSSENKRUPP	PUNE	A		
					TRF	JAMSHEDPUR	A		
					PROMAC	BANGALORE	A		
61	APRON FEEDER WITH DRIBBLE CONVEYOR (1600 TPH R	I			THYSSENKRUPP	HYDERABAD	A		UPTO 2400 TPH
					L&T	KANSBAHL	A		UPTO 2200 TPH
					ELECON	VV NAGAR	A		UPTO 2200 TPH
					TRF	JAMSHEDPUR	A		UPTO 2400 TPH Extended Warranty of 3 years over & above of contractual warranty on parts other than the parts treated as consumables
					Steeltech	Atgaon, Pune	A		
62	RING GRANULATOR	I			MCNALLY SAYAJI	KUMARDHUBI	A		UPTO 2200 TPH
					PENNSYLVANIA CRUSHERCORPORATION	USA	A		UP TO 1760 TPH
					AMERICAN PULVERISER	USA	A		UPTO 1875 TPH
					THYSSENKRUPP	PUNE	A		UP TO 2035 TPH
					TRF	JAMSHEDPUR	A		UP TO 1800 TPH TRF shall give extended warranty of 5 years over & above Contractual Warranty
					L&T	KANSBAHAL	A		UP TO 1750 TPH
					ELECON	V V NAGAR	A		UP TO 1750 TPH
					MCNALLY SAYAJI	KUMARDHUBI	A		UPTO 1000 TPH
63.A	VIBRATING SCREEN FEEDER	I			TECHNO VIBRAZIONI	ITALY	A		UPTO 1875 TPH
					ELECON	V V NAGAR	A		UP TO 1320 TPH
					GENERAL KINEMATICS	USA	A		UP TO 2000TPH
					THYSSENKRUPP	PUNE	A		UP TO 2035 TPH
					TRF	JAMSHEDPUR	A		UP TO 1800 TPH TRF shall give extended warranty of 5 years over & above Contractual Warranty
					MCNALLY SAYAJI	KUMARDHUBI	A		UPTO 1210 TPH
					TECHNO VIBRAZIONI	ITALY	A		UPTO 1875 TPH

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63.B	VIBRATING FEEDER	I			ELECON	V V NAGAR	A		UP TO 1750 TPH	
					GENERAL KINEMATICS	USA	A		UP TO 2000TPH	
					THYSSENKRUPP	PUNE	A			
					TRF	JAMSHEDPUR	A			UP TO 1800 TPH TRF shall give extended warranty of 5 years over & above Contractual Warranty
					MCNALLY SAYAJI	KUMARDHUBI	A			UPTO 1210 TPH
					INTERNATIONAL COMBUSTION	NAGPUR	A			
					Electro Zavod	Kolkata	A			UPTO 400TPH
64	TRAVELLING TRIPPER	I			Elektromag Joest	Vapi	A		UP TO 1750 TPH	
					BENGAL TOOLS	KOLKATA	A			
					THYSSENKRUPP	PUNE / HYDERABAD	A			
					ELECON	V V NAGAR	A			
					MBE	KUMARDHUBI	A			
					TRF	JAMSHEDPUR	A			
					MACAWBER BEEKAY	KESHWANA	A			
					HMTC	KOLKATA	A			
					L & T - MACNIL	CHENNAI	A			
					L & T	KANSBAHAL	A			
65	FABRIC BELTING(FR GRADE) / STEEL CORD BELTING(FR GRADE)/PIPE CONVEYOR STEEL CORD BELTING(FR GRADE)	I			L & T - EWL	KANCHEEPURAM	A			
					PHOENIX CONVEYOR BELT	KOLKATA	A		FABRIC BELT UPTO 2200 MM WIDTH, STEEL CORD BELT (FR GRADE UPTO 2400 MM WIDTH)	
					IMASS S.A	GREECE	A		FABRIC BELT UPTO 2400 MM WIDTH , STEEL CORD BELT (FR GRADE UPTO 2400 MM WIDTH)	
					MRF	CHENNAI	A		FABRIC BELT UPTO 1600 MM WIDTH	
					SEMPELTRAN NIRLON	MUMBAI	A		FABRIC BELT UPTO 1600 MM WIDTH	
					HINDUSTAN RUBBER	SILVASA	A		FABRIC BELT UPTO 1600 MM WIDTH	
					NORTHLAND RUBBER	SONEPAT	A		FABRIC BELT UPTO 2200 MM WIDTH.	
					SOMI CONVEYOR	JODHPUR	A		FABRIC BELT UPTO 2000 MM WIDTH	
					RAVASCO TRANSMISSION LTD.	VAPI	A		FABRIC BELT UPTO 2200 MM WIDTH	
		ORIENTAL RUBBER	PUNE	A		PLANT-2 KARANDI: FABRIC BELT (UPTO 2400 MM WIDTH FR GRADE & UPTO 1800 MM WIDTH-HR Grade) , STEEL CORD BELT (FR GRADE UPTO 2000 MM WIDTH). PLANT-1 KOREGAON: FABRIC BELT UPTO 1600 MM WIDTH-HR Grade				

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					FORECH	CHENNAI	A		FABRIC BELT UPTO 2000 MM WIDTH , STEEL CORD BELT (FR GRADE UPTO 2200 MM WIDTH)
					CAMOPLAST	KOREA	A		STEEL CORD FR GRADE UPTO 2400 MM WIDTH
					YOKOHAMA	JAPAN	A		FABRIC BELT UPTO 2400 MM WIDTH , STEEL CORD BELT (FR GRADE UPTO 2400 MM WIDTH)
66	IDLERS	II			ELECON	V V NAGAR	A		
					MBE	KUMARDHUBI	A		
					KALI	KUMBAKONAM	A		
					AMPS	JAMSHEDPUR	A		
					A.ADAK	HOWRAH	A		
					BTL EPC	KOLKATA	A		
					V V N MFG	V V NAGAR	A		Upto 150 NB Dia
					THYSSENKRUPP	HYDERABAD / PUNE	A		
					PROMAC	BANGALORE	A		
					L & T - EWL	KANCHEEPURAM	A		
					ROLLWELL	HINDUPUR	A		
					TRF	JAMSHEDPUR	A		
67	PULLEYS	I			ELECON	V V NAGAR	A		
					PROMAC	BANGALORE	A		
					MBE	KUMARDHUBI	A		
					BTL EPC	KOLKATA	A		
					TNS HEAVY	CHENNAI	A		
					KALI	THIRUBUVANAM	A		
					THYSSENKRUPP	HYDERABAD / PUNE	A		
					L & T - EWL	KANCHEEPURAM	A		
					V V N MFG	V V NAGAR	A		Upto 800 NB Dia
					ROLLWELL	HINDUPUR	A		
					TRF	JAMSHEDPUR	A		
68	HELICAL GEARBOX	I			SHANTI GEARS	COIMBATORE	A		Upto size 560
					ELECON	V V NAGAR	A		
					SIEMENS (FLENDER)	KHARAGPUR	A		
					PREMIUM TRANMISSION LTD	PUNE/FALTA	A		Up to size 710 / 450
					SIEMENS (FLENDER)	GERMANY	A		
					M/s Bonfiglioli Transmissions Private Limited	CHENNAI	A		
					NEW ALLENBURY WORKS	KOLKATA	A		
69	PLANETARY GEARBOX	I			ELECON	V V NAGAR	A		
					SIEMENS (FLENDER)	GERMANY	A		
					MOVENTAS	GERMANY	A		
					DANA MOTION SYSTEMS ITALIA S.r.l	ITALY	A		(Earlier name - BREVINI)
					MAGTORQ	HOSUR	A		Upto 11 KW
					Power Build Pvt Ltd	Anand	A		For Stacker Reclaimer slew drive
					Rossi Gearmotors India Private Limited	COIMBATORE	A		Upto 11 KW
					M/s Bonfiglioli Transmissions Private Limited	CHENNAI	A		Upto 55 KW
					SEW EURODRIVE GMBH & CO.	GERMANY	A		
					FLUIDOMAT	DEWAS	A		Scoop type upto SC-1330
					PTL	AURANGABAD	A		SCOOP TYPE UPTO PST 1150

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70	FLUID COUPLING (SCOOP AND TRACTION TYPE)	I			ELECON	V V NAGAR	A		Scoop type upto model ESC 760. 1. As part of Type test M/s Elecon will demonstrate Scoop tube in & Scoop tube out 1000 times on first coupling of each model. 2. M/s Elecon will conduct full load test for each type and model of coupling as per approved quality plan.
					VOITH	HYDERABAD	A		SCOOP TYPE UPTO SVNL 1330
71	SLEW RING	III			TITANUS	SOUTH AFRICA	A		
					IMO	GERMANY	A		
					SKF	FRANCE	A		
					ROTHE ERDE	GERMANY	A		
					LIEBHERR	GERMANY	A		
72.A	COAL SAMPLER SYSTEM	I			EAST MAN CRUSHER	KOLKATA	A		WITH JEFFREY CRUSHER AND EASTMAN MAKE CRUSHER
					ERIEZ MAG EUROPE LTD	UK	A		
					SIEVE TECHNIK	GERMANY	A		MANUFACTURING OF PRIMARY & SECONDARY SAMPLER AN BOTLLE COLLECTOR AT MULTOTEC SA
					THERMO RAMSAY INC	USA	A		
					ADVANCE SYSTEMS SAMPLING	KOLKATA	A		WITH JEFFREY CRUSHER AND ADVANCE MAKE CRUSHER
72.B	LIMESTONE SAMPLING SYSTEM	I			EAST MAN CRUSHER	KOLKATA	A		WITH JEFFREY CRUSHER AND EASTMAN MAKE CRUSHER
					ERIEZ MAG EUROPE LTD	UK	A		
					SIEVE TECHNIK	GERMANY	A		MANUFACTURING OF PRIMARY & SECONDARY SAMPLER AN BOTLLE COLLECTOR AT MULTOTEC SA
					THERMO RAMSAY INC	USA	A		
					ADVANCE SYSTEMS SAMPLING	KOLKATA	A		WITH JEFFREY CRUSHER AND ADVANCE MAKE CRUSHER
73	HYDRAULIC POWER PACK	I			EATON POWER	PUNE	A		
					BOSCH-REXROTH	AHMEDABAD	A		
					MAHA HYDRAULICS	CHENNAI	A		
					L & T HYDRAULICS	BANGALORE	A		EXCEPT FOR STACKER RECLAIMER
					Hydac	COIMBATORE	A		
74	HYDRAULIC CYLINDER	I			VELJAN	HYDERABAD	A		
					WIPRO	BANGALORE	A		
					EATON POWER	PUNE	A		
					L & T HYDRAULICS	BANGALORE	A		
					BOSCH-REXROTH	AHMEDABAD	A		
					Hydac	COIMBATORE	A		
75	HYDRAULIC MOTOR	I			POCLAIN HYDRAULICS	FRANCE	A		
					BOSCH-REXROTH AB (FORMERLY HAGGLUND)	SWEDEN	A		
					PARKER CALZONI	ITALY	A		
					MAHA HYDRAULICS	CHENNAI	A		UP TO 100 LITRE CAPACITY
					KAWASAKI	UK	A		

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76	HAMMER MILL CRUSHER FOR LIME STONE HANDLING SYSTEM	I			INTERNATIONAL COMBUSTION	NAGPUR	A		
					MCNALLY SAYAJI	BARODA	A		
					MCNALLY SAYAJI	KUMARDHUBI	A		
					ELECON	V V NAGAR	A		UP TO 1200 TPH
					THYSSENKRUPP INDUSTRIES INDIA	PUNE	A		
77	SHOP FABRICATED STRUCTURE (> 5T SINGLE PIECE) Fabricated Steel Structure (Single Piece upto 5 MT and Rolled Section-CAT-III)	I			ECOMAN	BARODA	A		UPTO 150TPH
					INDIANA GRATINGS PVT. LTD.	PUNE	A		
					JINDAL STEEL & POWER LTD.	RAIGARH	A		
					BABY ENGG. PVT. LTD.	TRICHY	A		
					REGIONAL ENGG. WORKS	TRICHY	A		
					AJANTHA FABS	MATHURA	A		
					CAPACITE STRUCTURES LTD.	THANE	A		
					MIURA INFRASTRUCTURE PVT. LTD.	BHILAI	A		
					SHIVAM HITECH STEELS PVT. LTD	BHILAI	A		
					TECHNOFAB MANUFACTURING LTD.	CHENNAI	A		
					JSW SEVERFIELD STRUCTURES LTD(JSSL)	BELLARY	A		
					ALLIANCE INTEGRATED METALIKS LTD(AIML)	RAJPURA	A		
					ATMASTCO PVT LTD	DURGAPUR	A		
					APEX BUILDSYS LTD	NAGPUR	A		
					COREFAB PROJECTS PVT LTD	BHILAI	A		
					KOTHARI CHEMICALS	BHILAI	A		
					FEDDERS LLOYD CORPORATION LTD	SIKANDRABAD	A		
					ARCELOR MITTAL DHAMM PROCESSING PVT LTD	RANIPET	A		
					ARTSON ENGINEERING	NASIK	A		
					ARTSON ENGINEERING	NAGPUR	A		
					HEAVY ENGINEERING WORKS	REWA, MP	A		
					ARCELORMITTAL NIPPON STEEL INDIA LTD	CHENNAI	A		
					TRIDENT FABRICATORS PVT LTD	ROURKELA	A		
					GREAT INDIA STEEL FABRICATORS	YAMUNA NAGAR	A		
					METALFAB HITECH	NAGPUR	A		
					SUPERTECH INDIA	G.NOIDA	A		
					GOODLUCK STEEL	SIKANDRABAD	A		
					BTL	KOLKATA	A		
					BTL	DURGAPUR	A		
					AMIYA COMMERCE	KOLKATA	A		
		NAMDHARI INDUSTRIAL	LUDHIANA	A					
		Ambabhawani Fab Engg Works LLP	Rainandgan	A					
		THYSSENKRUPP INDUSTRIES INDIA	HYDERABAD	A					
				REMI	TARAPUR	A		ERW UPTO 400 NB,SEAMLESS UP TO 200NB	
				RATNAMANI	MEHSANA	A		ERW UPTO 500 NB, SS SEAMLESS - OD up to 168.3, thickness up to 3.4 mm, as per ASTM SA 312 Grade-TP 304	

Project/परियोजना :SINGARENI THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE Package/ पैकेज : EPC Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:CS-		INDICATIVE LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL क्वालिटी प्लान तथा सब -वेंडर के अनुमोदन सहित मदों की सूची SUB-SYSTEM उप-प्रणाली: BOP SYSTEMS				DOC. NO./ दस्तावेज सं.: REV. NO.: DATE/ तिथि : 16.04.2024 PAGE/ पृष्ठ :			
S. N. क्र.सं.	Item / मद	QP / Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी
78	PIPE-SS ASTM A 312/ SS SEAMLESS	III			RATNAMANI	KUTCH	A		ERW UPTO 400 NB, SEAMLESS UPTO 50 NB ONLY, ARC WELDED UP TO 450NB
					BHANDARI FOILS & TUBES LIMITED	DEWAS	A		ERW UP TO 300NB
					APEX	BEHRORE	A		ERW UPTO 400 NB, SEAMLESS UPTO 50 NB.
					PRAKASH STEELAGE	SILVASA	A		ERW UP TO 203NB
79	PIPE-CS SEAMLESS ASTM A 106	III			SHUBHLAXMI METALS AND TUBES	UMBERGAON	A		SEAMLESS UP TO 150MM and ERW UP to 250 NB Sch 40S
					ISMT	AHMADNAGAR	A		UPTO 273 MM OD
					ISMT	BARAMATI	A		UPTO 273 MM OD
					REMI	BHARUCH	A		UPTO 177.8 MM OD
80	HCSD PUMP	I			MAHARASHTRA SEAMLESS	RAIGAD	A		UPTO 500 NB
					WEIR MINERALS	NETHERLANDS	A		
81	MOVABLE BARGE	II			ABEL	GERMANY	A		
					FELUWA	GERMANY	A		
82	Second Stage Conveyor and roll crusher for dry bottom ash system	I			CLEGHORN	HOWRAH	A		
					NALANDA ENGINEERING ENTERPRISE	HOWRAH	A		
					L&T	KANSBAHAL	A		
ITEM WITH MAIN CONTRACTOR / BIS APPROVED SOURCES.									
1	BRANCH PIPE , COUPLING & NOZZLE (SS & GM)	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE				
2	FIRE EXTINGUISHER	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE				
3	WATER MONITOR	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE				
4	PIPES-MS- (BLACK/ GI) AS PER IS:1239 & IS:3589 UPTO 1000 NB	II			(BIS MARKED, MANUFACTURERS WITH VALID BIS LICENSE)				
5	FIRE HOSE	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE				
6	HYDRANT VALVE	II			BIS APPROVED SOURCES WITH VALID BIS LICENSE				
7	PIPES FOR IDLERS IS 9295	III			BIS APPROVED SOURCES WITH VALID BIS LICENSE				
8	BLOWERS, CENTRIFUGAL FAN,AXIAL FAN <10 KW	II			MAIN CONTRACTOR APPROVED SOURCES				
9	CIO2 GENERATOR	II			MAIN CONTRACTOR APPROVED SOURCES				
10	PIPING FABRICATION -HP>300PSI	II			MAIN CONTRACTOR APPROVED SOURCES				
11	PUMP-METERING/DOSING	II			MAIN CONTRACTOR APPROVED SOURCES				
12	PUMP - PP- ACID/ ALKALI UNLOADING	II			MAIN CONTRACTOR APPROVED SOURCES				
13	PUMPS-SCREW TYPE	II			MAIN CONTRACTOR APPROVED SOURCES				
14	RUBBER LINING OF TANKS/ VESSELS/ PIPES/ VALVES/FITTINGS	II			MAIN CONTRACTOR APPROVED SOURCES				
15	RO PRESSURE TUBE	II			MAIN CONTRACTOR APPROVED SOURCES				
16	TUBE SETTLER MEDIA	II			MAIN CONTRACTOR APPROVED SOURCES				
17	WRAPPING & COATING MATERIAL -ANTI CORROSIVE TAPE	II			MAIN CONTRACTOR APPROVED SOURCES				
18	FAN CYLINDER SEGMENTS-FRP-COOLING TOWER	II			MAIN CONTRACTOR APPROVED SOURCES				
19	FILLS (PVC)	II			MAIN CONTRACTOR APPROVED SOURCES				

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S. N. क्र.सं.	Item / मद	QP / Insp. Cat. क्यूपी/ निरी. श्रेणी.	QP No. / क्यूपी. सं.	QP Sub. Schedule क्यूपी उप.अनुसूचि	Proposed sub-supplier/ प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी (NOTE-1)	Sub-supplier Details submission schedule/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी
20	SHAFT-CARDON TYPE-CW PUMP	II			MAIN CONTRACTOR APPROVED SOURCES				
21	DUST EXTRACTION SYSTEM	I			MAIN CONTRACTOR's APPROVED SOURCES				BOIs SHALL BE FROM NTPC APPROVED SOURCES
22	DUST SUPPRESSION SYSTEM (PLAIN WATER)	I			MAIN CONTRACTOR's APPROVED SOURCES				BOIs SHALL BE FROM NTPC APPROVED SOURCES
23	Horizonatal & Vertical Centrifugal Pumps (< 10 KW Motor rating)	III			MAIN CONTRACTOR's APPROVED SOURCES				
24	AXIAL & CENTRIFUGAL FAN(< 10 KW)	II			MAIN CONTRACTOR's APPROVED SOURCES				
25	DUST SUPPRESSION SYSTEM (DRY FOG)	I			MAIN CONTRACTOR's APPROVED SOURCES				BOIs SHALL BE FROM NTPC APPROVED SOURCES
Note-1	Items for which Sub-QR is envisaged, vendors are accepted subject to Sub-QR clearance from NTPC Engg.								
A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter "A" in the list along with the condition of approval, if any. / इन मदों के लिए प्रस्तावित वेंडर एनटीपीसी को स्वीकार्य है। अनुमोदन की शर्त, यदि कोई हो, के साथ-साथ पत्र "क" में इंगित किया जाए।									
DR – For these items "Detailed required" for NTPC review. To be identified with letter "DR" in the list. एनटीपीसी द्वारा इन मदों की समीक्षा के लिए "विस्तृत ब्यौरे की आवश्यकता" होगी। सूची में "DR" पत्र में इंगित किया जाना चाहिए।									
QP / INSPECTION CATEGORY:									
CAT-I / श्रेणी- I: For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी द्वारा अनुमोदित किया जाता है और एनटीपीसी द्वारा अंतिम स्वीकृति भौतिक निरीक्षण के									
CAT-II / श्रेणी- II: For these items the Quality Plans approved by NTPC. However no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved QP. इन मदों के लिए गुणवत्ता योजनाओं को एनटीपीसी									
CAT-III/ श्रेणी-III : For these items Quality control to be exercised as per Main contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of Conformance (COC) by Main Contractor.									
UNITS/WORKS इकाइयाँ / कार्य: Place of manufacturing/ निर्माण का स्थान Place of Main Supplier of multi units/works/बहु- इकाइयाँ / कार्यों के मुख्य सप्लायर का स्थान.									
FORMAT NO./ प्रारूप सं: QS-01-QAI-P-1B/F1-R0						Engg. Div. / QA&I			

		PROJECT :SINGARENI(1X800MW)				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL					REVISION NO : 00					
		PACKAGE : EPC									DATE :31.03.2024					
		CONTRACTOR:									SUB SECTION: QA-TG(MECH)					
		CONTRACT NO :														
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval_Status	SS Detail Sub.SCH	SS Approval SCH	Remark	Package Applicable	Provenness Clause (Refer Note-1)			
1	HP/IP Outer Casing Casting (1.25Cr & 2.25Cr)	I				Voestalpine	Austria	A								
						JCFC	Japan	A								
						JSW	Japan	A								
						GE	Poland	A								
						Kobe Steel	Japan	A								
						Starwire	Faridabad	A								
						Sande Stahlguss GmbH	Germany	A								
						ISGEC	Muzaffarnagar	A						Weight upto 38 T, 1.25 Cr Grade		
						LMB Heavy Casting Unit	Hazira	A								
						BHEL-CFFP	Haridwar	A								
2	HP/IP Inner Casing Casting including Turbine admission valves (9 Cr)	I				Voestalpine	Austria	A								
						JCFC	Japan	A								
						JSW	Japan	A								
						GE	Poland	A								
						Kobe Steel	Japan	A								
						Starwire	Ballabgarh	A						Weight Upto 38T		
						Sande Stahlguss GmbH	Germany	A								
						Gruppo Cividale	Italy	A						Weight Upto 20T		
						LMB Heavy Casting Unit	Hazira	A								
						BHEL-CFFP	Haridwar	A								
3	HP/IP Inner & Outer Casing including Turbine admission valves Machining	I				Sande Groditz	Germany	A								
						Acciaiera Fonderia Cividale S.p.A.	Italy	A					Weight Upto 38 T approx.			
						LMTG	Hazira	A								
						MHPS	Japan	A								
						FUZI ELECTRIC	Japan	A								
						ROSSEL DUSO	Venice	A								
						Toshiba works	Japan	A								
						TJPS	Chennai	A								
						GE	Sanand	A								
						BRUNO PRESEZZI	Italy	A								
4	HP/IP/LP Turbine shaft Forging	I				NUGO ROMANO	Italy	A								
						BHEL (HEEP)	Haridwar	A								
						Siemens	Germany	A								
						GMW	Germany	A								
						Sharp	Pune	A						HP/IP Inner Casing		
						BILFINGER MAS.GMBH	Austria	A						Previous Name:MCE		
						Haar Mechanische Fertigung GmbH & Co. KG	Germany	A						Turbine Valve machining		
						JCFC (Japan Casting & Forging Corp.)	Japan	A								
						SAARSCHMIEDE	Germany	A								
						JSW	Japan	A								
			Pacific Steel Mfg Co Ltd	Japan	A											
			Schmiedewerke Gröditz	Germany	A						For HP/IP					
			Buderus Edelstahl	Germany	A						For HP/IP					
			Cruesot Forge	France	A						For HP/IP					
			Kobe Steel	Japan	A						For HP/IP					
			Energomash	Ukraine	A						For HP/IP					
			Doosan Enerbility Co.Ltd.	S.Korea	A						For LP Rotor, Previous Name: M/s Doosan Heavy Industries & Construction Co. Ltd					
			Acciai Speciali terni SPA	Italy	A						Previous Name: SDF SRL					
			Siemens	Germany	A											
			Franco Tosi	Italy	A						HP/IP					
			BHEL (HEEP)	Haridwar	A											
			ROSSEL DUSO	Italy	A											
			BRUNO PRESEZZI	Italy	A						HP/IP					
			NUGO ROMANO	Italy	A											

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5	Turbine shaft machining	I				MCE MAP (Voist Alpine)	Austria	A			HP				
						GE	Poland/ Switzerland/ France/ Sanand	A							
						Toshiba	Japan	A							
						TJPS	Chennai	A							
						MHPS	Japan	A							
						LMTG	Hazira	A							
						FUZI ELECTRIC	Japan	A							
6	HP/IP/LP Stationary & Moving Blades Bar stock	I				Böhler	Austria	A							
						Bohler Schmiedetechnik	Germany	A							
						WELZEWERKE REVENE	Germany	A							
						DIODO	Japan	A							
						Hitachi	Japan	A							
						Starwire	Ballabhgarh	A							
						Gloria Material Technology Corp	Taiwan	A							
						Acciaierie Valbruna S.p.a.	Italy	A							
						BGH Edelstahl GmbH	Germany	A							
						Carpenter Technology Co.	USA	A							
						Daido	Japan	A							
						Sz-metal Ravne D.o.o.	Slovenia	A							
						Einsal	Germany	A							
						Walzwerke Einsal	Switzerland	A							
7	HP/IP/LP Stationary & Moving Blades Machining(From Bar)	I				Nichia Tanko Co Ltd	Japan	A			LP Blades				
						SET	Hungary	A							
						MHPS	Japan	A							
						Leistriz-Numberg	Germany	A							
						Energietechnik Einsal	Germany	A							
						Prawest	Germany	A					FOR LP STATIONARY BLADES		
						ZEMA	Italy	A					FOR LP STATIONARY BLADES		
						LMTG	Hazira	A							
						GE	Switzerland/ Germany/ Sanand	A							
						Enem Excel	Hyderabad	A							
						TJPS	Chennai	A							
						Toshiba	Japan	A							
						BHEL (HEEP)	Haridwar	A							
						Siemens	Germany	A							
8	IP Outer Casing Casting(Nodular Cast Iron)	I				QTPL	Bangalore	A			For Guide Blades				
						AZAD ENGG	Hyderabad	A							
						Friedrich Wilhelm-Huette Eisen	Germany	A							
						Ergocast Guss GMBH	Germany	A							
						Voestalpine	Austria	A							
9	LP Forged Blades(Drop)-Material	I*/II				MEUSELWITZ GUSS									
						EISENGIESSEREI GMBHH	Germany	A							
						Acciaieria Fonderia Cividale	Italy	A							
						MHPS	Japan	A							
						GE	Switzerland	A							
						Leistriz Turbinenkomponenten	Germany	A					For L1 stage(Last but one) blades		
						SMB SA	Switzerland	A							
10	LP Forged Blades(Drop) Machining	I				C-BLADE SPA	Italy	A							
						BOHLER	Austria	A							
						Fine Forge*	Hyderabad	A							
						PIETRO ROSA	Italy	A							
						MHPS	Japan	A							
						C Blade	Italy	A							
			Sumitomo (Manfg. by Sumiju Precision Forgings)	Japan	A										
			PIETRO ROSA	Italy	A										
			Leistriz Turbinenkomponenten	Germany	A										
			Bohler	Austria	A										

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						Toshiba	Japan	A					
						BHEL-HEEP	Haridwar	A					
						ALSTOM	Switzerland	A					
						AZAD ENGG	Hyderabad	A					
						Zollern	Germany	A					
						Consolidated Precision Product	Belgium	A			Previous Name:ESCO		
						Formetal (cismocisco)	Italy	A			For casting		
						Juergens	Germany	A			For casting		
						GE Power Systems	Germany	A					
						IPCL	Bhavnagar	A					
						EXCEL HITECH	Ghaziabad	A			For casting		
						AK ALLOYS	Ahmedabad	A					
						PTC	Lucknow/ Mehsana	A					
						AMBE ENGG-	Ghaziabad	A			For Machining only		
						Binder	Switzerland	A					
						Prime Hi-Tech Engineering Limited	Naidupet, AP	A					
						LMTG	Hazira	A					
						BHEL (HEEP)	Haridwar	A					
						SHARP	Pune	A					
						Shape Engg.	Haridwar	A					
						GE	Croatia/ Shahabad	A					
						D&N	Germany	A					
						KCP	Chennai	A					
						ISGEC(Weight upto 38T)	Yamunanagar	A					
						PT. Siemens Indonesia	Indonesia	A					
						GE Power sp. Z.o.o	Poland	A					
						L&T	Kansbahal	A					
						FWH Freidrich Wilhems-Hute GmBH	Germany	A					
						Heidenheimer Giessen GmBH	Germany	A					
						Pilsen Steel	Czech	A					
						Buderus Spezialguss GmBH	Germany	A					
						Metalodlew	Poland	A			Material EN-GJS-400-18 RT, up to 10.5 MT approx.		
						LMTG	Hazira	A					
						BHEL (HEEP)	Haridwar	A					
						TJPS	Chennai	A					
						MHPS	Japan	A					
						SHARP	Pune	A					
						LONE STAR	Chennai/ Cheyyar	A					
						Flexatherm Expanlow Pvt. Ltd.	Vadodara	A			Up to 2000NB		
						Hatec	Germany	A					
						Rohr-und Anlagenbau (ROBA)	Germany	A					
						Seonghwa	S Korea	A					
						Dee Development	Ballabhgarh	A					
						HKR	S Korea	A					
						Babylon	Germany	A					
						Eichhoff	Germany	A					
						LMTG	Hazira	A					
						Mech engineers	Valsad	A					
						MHPS	Japan	A					
						GE	Germany	A					
						Horst Thiele	Germany	A					
						Bosch Rexroth	Germany	A					
						Hydac	Germany/Bangalore	A					
						MOOG	Japan/Bangalore	A					
						Bosch Rexroth	Germany	A					
						Bosch Rexroth	Ahmedabad	A					

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		CONTRACT NO :											
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	Hydraulic Tower Rack cm					Hydac	Germany	A					
						Hydac	Coimbatore	A					
						Weir	USA	A					
						Cesare Bonetti	Italy	A					
19	Actuator & Valve For CRH-NRV & QC-NRV	I				BABCOCK	Spain	A					
						ADAMS	Germany	A					
						BHEL	Trichy	A			Upto 850NB & Class upto 900 special		
						SEMPELL	Germany	A					
						TPT	S Korea	A					
						Starwire	Ballabgarh	A			For INGOTS		
						Kolhapur Steel	Kolhapur	A					
						Silbitz Guss	Germany	A					
						StahlgussSaar	Germany	A					
						GE	Sanand	A					
						PMT	Pune	A					
						Wellbore	Ahmedabad	A					
						Bharat Forge	Pune	A					
						Indo air	Ahmedabad	A					
						Toshiba	Japan	A					
						GE	Germany	A			For Thrust Bearing		
						Kingburry	USA	A					
						Omega	Bhopal	A					
						Eurobearing	Italy	A					
21	TG Bearings	I				Miba Industrial Bearings Germany GmbH (Erstwhile John Crane Bearing)	Germany	A					
						BHEL (HEEP)	Haridwar	A					
						Wuakesha Bearing	UK	A					
						Euro Bearings	Faridabad	A					
						Kingsburry	USA	A					
						Allweiler	Germany	A					
						ABB	Switzerland	A					
						Bosch Rexroth	Germany/ Switzerland	A					
						Toshiba	Japan	A					
						Ebara Yoshikura Hydrotec Ltd.	Japan	A					
						Bosch Rexroth	Germany /Switzerland	A					
						Allweiler	Germany	A					
						Leistriz	Germany	A					
						MITTEN MANUFACTURING, INC	USA	A					
						PARKER HANIFIN	Japan	A					
						Allweiler	Daman	A					
						Facet	Spain	A			Coalescer Type		
						Pall Corporation	USA	A			For control fluids		
						Alfa Laval	Pune	A			Centrifuge Type		
						Hilliard	USA	A			Coalescer Type		
						Kaydon Filtration	USA	A			Coalescer Type		
						Westfalia Separator India Pvt.Ltd.	Germany/ Bangalore	A					
						Rotring	Germany	A					
						Rockfin Group	Poland	A					
						Hydac	Germany	A					
25	Duplex Oil Filter With Oil Changeover Valve	I				Boll & Kirch	Germany	A					
						Rockfin	Poland	A					
						BHEL Piping Center	Chennai	A					
						BHEL, Power Plant Piping Unit	Thirumayam	A			Up to grade P92		
						BHEL	Trichy	A			Up to grade P92		
						Unitech	Saharanpur	A					
						Bend Joints	Bhopal	A			Up to grade P22		

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26	Turbine Integral Piping	I				Pal Engineering	Yamunanagar	A			Up to Grade P91			
						Seonghwa	S Korea	A						
						L&T Piping Center	Hazira	A						
						Gujarat Infrapipes Private Limited	Vadodara	A				Up to grade P22		
						Dee Development	Ballabgarh	A				Up to grade P92, Size OD 219.1 X WT 58 mm		
27	Oil Module including Central Lubrication System	I				Kelag	Switzerland	A						
						VDL Delmas	Germany	A						
						Hydac India Pvt. Ltd.	Coimbatore	A						
						AEL	Germany	A						
						Flenco	Italy	A						
						Hydac	Germany	A						
						King Dynamics	Switzerland	A						
						Southern Lubrication	Bangalore	A						
28	Thermal Insulation	II				ENPRO	Pune	A						
						Eugen Arnold GmbH	Germany	A						
						Heinrich Tapp GmbH	Germany	A						
						Lloyds Insulation	India	A						
						Minwool Rock Fibre	Bhilai	A						
						Thermocare	Rajnandgaon	A						
29	Condenser (water cooled) (Sub QR Item)	I				Dhanbad Rockwool Insulation	Dhanbad	A						
						Minsulate Manufacturing Co.	Jamshed	A						
						MHI	Japan	A						
						THERMAL ENGG INTERNATIONAL (TEI)	USA	A						
						TJPS	Chennai	A						
						TOSHIBA CORPORATION LTD	Japan	A						
						LMTG	Surat	A						
30	Condenser Fabricator (water cooled)	I				BHEL	Haridwar	A						
						ABFPL	Sanand	A						
						GE	Switzerland	A						
						ISGEC	Yamunanagar	A						
						GE Power india Ltd.	Durgapur	A						
31	Condenser (Air cooled) (Sub QR Item), if applicable	I				Godrej & Boyce Manufacturing Company Ltd.	Mumbai	A						
						TEMA India Ltd.,	Thane	A						
						SPX Dry Cooling	Belgium	A						
32	HP Heaters (Sub QR Item)	I				Enexio Germany GmbH	Germany	A						
						TOSHIBA CORPORATION LTD	Japan	A						
						TJPS	Chennai	A						
						SPX Heat Transfer Inc. (Erstwhile Yuba Heat Transfer)	USA	A						
						GE	France	A						
						ABFPL	Sanand	A						
						BHI	S Korea	A						
						THERMAL ENGG INTERNATIONAL	USA	A						
						HOLTEC	USA	A						
						L&T	Hazira	A						
33	LP/HP Heater Fabricator	I				BHEL	Hyderabad	A						
						ISGEC	Yamunanagar	A						
						Godrej & Boyce Manufacturing Company Ltd.	Mumbai	A						
						TEMA India Ltd.,	Thane	A						
						TOSHIBA CORPORATION LTD	Japan	A						
						TJPS	Chennai	A						
						SPX Heat Transfer Inc. (Erstwhile Yuba Heat Transfer)	USA	A						

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34	LP Heaters (Sub QR Item)	I				GE	Switzerland	A						
						ABFPL	Sanand	A						
						BHI	S Korea	A						
						THERMAL ENGG INTERNATIONAL	USA	A						
						BHEL	Hyderabad/ Haridwar	A						
						L&T	Hazira	A						
35	Condensate Extraction Pump (CEP) (Sub QR Item)	I				HOLTEC	USA	A						
						KSB	Chinchwad, Pune	A						
						BHEL	Hyderabad	A						
						SULZER Pumps	Mumbai	A						
						Clyde Pumps India Pvt. Ltd.	Ghaziabad	A						
						GARDNER Denver/Nash	Germany	A						
36	Condenser Air Evacuation Pumps (Sub QR Item)	I				GARDNER Denver/Nash	Pune	A						
						Tsurumi pumps	Japan	A						
						Edwards	UK	A						
						TJPS	Chennai	A						
						BHEL	Hyderabad	A						
						BGR	Chennai	A						
37	Deaerator (Sub QR Item)	I				Godrej	Mumbai	A						
						ISGEC	Yamunagar	A						
						Altech	Bhiwadi	A						
						TEMA India Ltd.,	Mumbai	A						
						Bharat Heavy Plate & Vessel Ltd.	Vishakhapatnam	A						
						BGR Energy System Ltd.	Chennai	A						
39	Booster Pump	I				KSB	Germany	A						
						KSB	Pune	A						
						Sulzer Pumps	Mumbai	A						
						Sulzer	UK	A						
						Flowserve	Switzerland	A						
						FLOWSERVE	Coimbatore	A						
						Flowserve	Spain	A						
						Hitachi	Japan	A						
						Ebara Corporation	Japan	A						
						MHI	Japan	A						
						BHEL	Hyderabad	A						
40	Boiler Feed Pump (BFP) (Sub QR Item)	I				Ebara Corporation	Japan	A						
						Flowserve	Spain	A						
						KSB	Germany	A						
						KSB	Pune	A						
						Mitsubishi Heavy Industry	Japan	A						
						HITACHI PLANT TECHNOLOGY	Japan	A						
						BHEL	Hyderabad	A						
						Sulzer Pumps	Mumbai	A						
41	Drive Turbine for BFP	I				SULZER	UK	A						
						Siemens	Germany	A						
						Hitachi	Japan	A						
						GE Thermodyne	France	A						
						GE India Industrial Pvt. Ltd.	Pune	A						
						Toshiba	Japan	A						
						TJPS	Chennai	A						
						Power machines(Kaluga)	Russia	A						
						BHEL	Hyderabad	A						
						MHI	Japan	A						
						Skoda	Czech republic	A						

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42	HP Bypass Valves (Sub QR Item)	I				CCI	Sweden/ Switzerland/ Czech Republic	A					
						CCI	Chittor,AP	A					
						Bomafa	Germany	A					
						Bomafa	Ahmedabad	A					
43	LP Bypass Valves (Sub QR Item)	I				CCI	Sweden/ Switzerland/ Czech Republic	A					
						CCI	Chittor,AP	A					
						BOMAFABA	Ahmedabad	A					
						Welland & Tuxhorn	Germany	A					
44	Condensor On-load Tube cleaning system (COLTCS) (Sub QR Item) (as applicable)	I				BOMAFABA	Germany	A					
						GEA BGR	Chennai	A					
45	Hydraulic Coupling for BFP	I				Multitex Filtration	Greater Noida	A					
						Voith	Hyderabad	A					
46	Hangers & Supports; Pipe Support components including Spring Hangers	I				Voith	Germany	A					
						Pipe Support	Chennai	A					
						Liseqa	Germany	A					
						Liseqa	Ahmedabad	A			Load upto to 100KN		
						Seonghwa	S Korea	A					
						Pipe supports	UK	A					
						GILLARDINI	Italy	A					
						BERJEN	Chittor,AP	A					
						NHK SPRING	Japan	A					
						Yamashita Seisakusho Co. Ltd	Japan	A					
						MHI	Japan	A					
						SANWA TEKKI CORPORATION	Japan	A					
						CARPENTER AND PETERSON	UK	A			CLH Upto 30 T AND VLH Upto 32 T		
						CARPENTER & PATERSON INDIA PRIVATE LTD.	Vellore	A			CLH Upto 23.8T & VLH Upto 20.7T		
			AAA Supports Private Limited	Vadodara	A			For VLH and Rigid supports Max. Load 25 MT					
47	Metallic Expansion Joint	I				Carpenter & Patterson	USA/Thailand	A					
						Lonestar	Chennai	A			For size up to NB9200		
						Flexicon	Vadodara	A			For size upto 2200NB		
						Witzemann	Germany	A					
						Munro & Miller	UK	A					
						Flexatherm	Vadodara	A			For size upto 8000NB		
						Bird Precision	UK	A					
						Metallic Bellows	Chennai	A			For size up to 1600 NB		
						M B Metallic Bellows	Chennai	A			For size upto 2200NB		
						Athulya Bellows and Engineering Pvt. Ltd	Vadodara	A			For size up to NB 3400		
48	HP Piping -Fabrication (Based on Design and Drawings of Qualified Vendor)	I				HKR	S Korea	A					
						BHR	Germany	A					
						Seonghwa	S Korea	A					
						Finow	Germany	A					
						TOSHIBA	Japan	A					
						BHEL	Piping Center, Chennai &Thirumayam	A					
						L&T	Hazira	A					
						Dee development	Ballabhgarh	A					
						Bendtec	USA	A					
						Wyman-Gordon	USA	A					
			Sumitomo	Japan	A								
			Tenaris	Italy	A								

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49	HP Pipes and Fittings (Mills)	II				V&M	Germany	A								
						V&M	France	A								
						IBF	Italy	A								
						SUNGWANG BEND	S Korea	A					UP TO 24INCH IN CS/AS MATERIAL			
						Productos Tubulares	Spain	A								
						JFE	Japan	A								
						Bentler	Germany	A								
						TK CORPORATION	S Korea	A						UP TO 24INCH IN CS MATERIAL		
						TUBOS REUNIDOS	Spain	A								
50	Elastomer Large Bellows or Flexibles Rubber Bellows	I				MEGA	Italy	A								
						Petrol Raccord,	Italy	A				For Fittings Only				
						Benkan Japan KK	Japan	A								
						Cori Engineers Pvt. Ltd.	Chennai	A					UP TO 24INCH IN CS MATERIAL			
						SRM Ecoflex	Kolkata	A					UP TO 2700 NB			
						KSB	Germany	A					UP TO 2700 NB			
						Nasosenergomash	Ukraine	A								
						Sulzer Pumps	Mumbai	A								
						KSB	Pune	A								
51	Heater Drains Recovery Pumps (Drip Pump)	I				Hyundai	S Korea	A								
						KBL	Pune	A								
						Flowserve	Coimbatore	A								
						GEA-BGR	Chennai	A								
						Multitex	Gr.Noidea	A								
						Remi	Tarapur,India	A					SS			
						Apex	Alwar	A					SS (up to 150NB)			
						Ratnamani	Ahmedabad	A					SS			
						ISMT	India	A					CS (up to 400 NB)			
53	LP Pipes & Fittings (CS & SS)	I				Maharashtra Seamless Ltd.	Maharashtra	A								
						Tube Products Incorporate	Ahmedabad	A				CS (up to 400 NB)				
						TK Corporation	S Korea	A				CS (up to 400 NB)				
						Dee development	Palwal	A								
						Jindal Saw	India	A					CS (up to 400 NB)			
						Tata	India	A					ERW			
						Surya	India	A					ERW			
						JINDAL PIPES LTD	India	A					ERW			
						WELSPUN	India	A					ERW			
						Lalit Pipes & pipes Ltd.,	Thane	A					EFW Pipes			
						Ratnamni Metals and Tubes Ltd.,	Gandhinagar	A					EFW Pipes			
						Fouress Engg. *	Bangalore	A					upto 2600 NB			
						IL *	Palakkad	A					upto 2200 NB			
						BHEL *	Bhopal, India	A								
			54	Butterfly Valves (* Also for steam services)	I				Kriloskar Bros. Ltd	Pune	A					
						L&T	Chennai	A								
						Trillium Flow	Hubli	A								
						Tyeo	Halol	A								
						L&T	Coimbatore	A								
						Nengfa Weiye Tieling Valve Joint Stock Co. Ltd.	China	A								
						Intervalve	Pune	A								
						L&T	Chennai/Coimbatore	A								
						Velan	Canada/Coimbatore	A								
						KSB	Germany/Coimbatore	A								
						ToA	Japan	A								
						Fouress Engg	Aurangabad	A								
						Trillium Flow	Hubli	A								

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55	Valves (gate/ globe/check) for LP application	I				Crane	USA	A							
						Samshin	S Korea	A							
						KBL	Pune	A							
						Weir	UK	A							
						Leader	Jalandhar	A							
						BHEL	Trichy	A							
						Pentair (Tyco Sempell)	Trichy	A							
						HP Valves(Key Valves Technology)	Netherlands	A							
						IL	Palakkad	A							
						Steel Strong	Mumbai	A							
56	HP Feedwater Heaters Automatic (String Bypass) Isolation Valves	I				KSB	Germany	A							
						Tyco Sempell	Germany	A							
						Strack	Germany	A							
						BHEL	Trichy	A							
						Weir Valves & Controls UK Ltd.	UK	A							
57	Water Steam Cycle HP Valves	I				KSB	Germany /Coimbatore	A							
						L&T	Chennai	A							
						L&T	Coimbatore	A							
						Velan	Coimbatore	A					up to 2inch, #4500 (up to P92 grade)		
						HP Valves	Netherlands	A					Previous Name:Key Valves Technology		
						Weir Valves & Controls UK Ltd.	UK	A							
						BHEL	Trichy	A							
						Crane	USA	A							
						Samshin	S Korea	A							
						Pentair(Tyco Sempell)	Germany	A							
58	Safety Valves	I				Velan	Canada	A							
						ToA	Japan	A							
						Tyco	USA	A							
						BHEL	Trichy	A							
						Dresser	USA	A							
						Tyco	USA	A							
						Babcock	Spain	A							
						Flainger	Germany	A							
						Bopp & Reuther	Germany	A							
						Flainger	Nasik	A							
59	Forged Seel Valves up to 2" , Class 800 (FCS/FSS)	I				Reineke	Germany	A							
						Valve Technology	USA	A							
						KSB	Coimbatore	A							
						Leader	Jalandhar	A							
						L&T	Chennai	A							
						Velan	Canada	A							
						Fouress Engg	Ahmadnagar	A							
						Trillium Flow	Hubli	A							
						Velan	Canada	A							
						Steel Strong	Mumbai	A							
60	Condenser Tubes(SS Welded)	I				L&T	Coimbatore	A							
						Plymouth	USA	A							
						Ratnamani	Kutchh	A							
						Neotiss Limited	Medak,AP	A					Remarks:Formerly Vallourec Heat exchanger Tubes Ltd/ CST Valinox Ltd.		
						REMI Edilstahl Tubulars Ltd.	Tarapur	A							
						Shin han Metal	S Korea	A							
						Valtimat	France	A							
						Nippon Steel Corp.	Japan	A							
						Ratnadeep Metal & Tubes Ltd	Mehsana	A							
						Maxim Tubes	Gandhinagar	A							
			Jindal SAW	Mathura	A										
			Scholler Werke GmbH	Germany	A										
			Plymouth	USA	A										

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61	HP/LP Heater tubes	I				Ratnamani	Kutchh	A							
						Ratnamani	Mehsana	A							
						Valtimat	France	A							
						Nippon Steel Corp.	Japan	A							
						Scholler Werke	Germany	A							
						Heavy Metals and Tubes	Gandhinagar	A							
						Shin han Metal	S Korea	A						LP Heater	
						Apex	Alwar	A						LP Heater	
						Ratnadeep Metal & Tubes Ltd	Mehsana	A						LP Heater	
						REMI Edelstahl Tubulars Ltd.	Tarapur	A							
			Nootiss Limited	Medak,AP	A						Remarks:Formerly Vallourec Heat exchanger Tubes Ltd/ CST Valinox Ltd.				
62	TG Hall Eot Cranes along with Lifting Beam(Sub-QR Item)	I				FAFECO	Vadodara/Mumbai/Pune	A			Vadodara upto 150MT, Mumbai upto 200MT,Pune-200T				
						Mukand	Thane	A				upto 300MT			
						WMI Konecranes	Pune	A				upto 300MT			
						Anupam Industries	V U Nagar	A				upto 300MT			
						Unique Industries Handlers	Nasik	A				upto 300MT			
						CRANEX	Ghaziabad	A				upto 140MT			
						HEC	Ranchi	A				upto 265MT, Main Contractor to ensure availability of Load/Overload testing facility at Shop.			
63	Hydrogen Generation Plant(if applicable) (Sub-QR Item)	I				Proton Energy Systems	USA	A							
						MVS ENGINEERING LIMITED	New Delhi	A				Bi-polar type, 2x6NM3/Hr			
						SUKAN ENGG. PVT. LTD	Mumbai	A				Bi-polar type, 2x6NM3/Hr			
						Eastern Electrolyzer Limited	Noida	A				Bi-polar type, 2x6NM3/Hr			
						Teledyne Energy System Inc.	USA	A							
						AIROX NIGEN EQUIPMENTS LTD	Ahmedabad	A				Bi-polar type, 2x6NM3/Hr			
						Electrolyser Corporation	Canada	A							
			BOC	Kolkata	A										

Main Contractor Approved Sources(Note-3)

1	Turbine Bearing Pedestal	I				Main Contractor Approved Sources							
2	Chemical Dosing System	I				Main Contractor Approved Sources							
3	Vapour Exhauster With Motor	II				Main Contractor Approved Sources							
4	Drain Cooler & Misc Tanks	II				Main Contractor Approved Sources							
5	Oxygen/NAOH Dosing System	II				Main Contractor Approved Sources							
6	Misc Items like Internals of equipments(if not covered in MQP) & Consumables like paints, gaskets etc.	III				Main Contractor Approved Sources							

Site Erection Agency

1	Erection Agency for Turbine,Generator & Auxiliaries including ACC System					NTPC Approved Agency							
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NOTE - 1 : For final Sub-QR approval , document required to be submitted as per Sub-QR requirements given in the specification.

NOTE-2: Vendors under 'A' are approved and accepted by NTPC with/without conditions in the past. Similar conditions as the case may be for the vendor shall be applicable for this project and tied up in the quality plan.

NOTE-3: Main contractor approved sub vendors evaluated / assessed as per Main contractor Quality Management System is acceptable.

Note-4: The items not covered in the above list shall be mutually discussed & agreed for Item categorisation & sub-vendor control as per NTPC practise.

LEGENDS/ संकेतिका

* - Inspection category will be decided during vendor evaluation.

1.0 SYSTEM SUPPLIER / SUB SUPPLIER APPROVAL STATUS CATEGORY प्रणाली आपूर्तिकर्ता / सब-वेयर की स्वीकृति की स्थिति की श्रेणी

A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter "A" in the list along with the condition of approval, if any/ इन मंचों के लिए प्रस्तावित वेयर परदेगीको को स्वीकार्य है अनुमोदन की गई, , यदि कोई हो, के साथ-साथ पर "A" में दर्शाया गया है।

2.0 QP INSPECTION CATEGORY : स्वीकृति / निरीक्षण की श्रेणी:

CAT - I : For those items the Quality Plans are approved by Customer and final acceptance will be on physical inspection witness by Customer. इन मंचों के लिए गुणवत्ता योजनाओं को परदेगीको द्वारा अनुमोदित किया जाता है और परदेगीको द्वारा अंतिम स्वीकृति भौतिक निरीक्षण के दौरान उपलब्ध गवाह के आधार पर ही जाती।

CAT - II : For those items the Quality Plans are approved by Customer. However no physical inspection shall be done by Customer. The final acceptance by Customer shall be on the basis of review of documents. इन मंचों के लिए गुणवत्ता योजनाओं को परदेगीको द्वारा अनुमोदित किया जाता है। हालांकि परदेगीको द्वारा कोई भौतिक निरीक्षण नहीं किया जाएगा। परदेगीको द्वारा

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CAT - III :For these items Quality control to be exercised as per Main contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of Conformance (COC) by Main Contractor.													
UNITS/WORKS : Place of manufacturing- Place of main supplier of multi units/works.													

		Project/ परियोजना : SINGARENI THERMAL POWER PROJECT Package/ पैकेज : EPC PACKAGE Supplier/ आपूर्तिकर्ता: Contract No./ अनुबंध सं.:				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB-SUPPLIER APPROVAL इवालिटी प्लान तथा सब-सप्लायर के अनुमोदन सहित मदों की सूची			Doc. No./ दस्तावेज सं. - CS- REVISION NO : DATE/ तिथि :
						SUB-SYSTEM उप-प्रणाली: ELECTRICAL			
S. No. क्र.सं	Item / मद	QP/ Insp. Cat. क्पी/ निरी. श्रेणी.	QP No. / क्पी. सं.	QP Sub. Schedule क्पी उप.अनुसूचि	Proposed sub-supplier / प्रस्तावित उप आपूर्तिकर्ता	Place/ स्थान	Sub-suppliers approval status / category उप आपूर्तिकर्ता के अनुमोदन की स्थिति /श्रेणी	Sub-supplier Details sub sch/ उप आपूर्तिकर्ता के विवरण प्रस्तुतीकरण की सूची	Remarks/ टिप्पणी
1	GENERATOR	CAT I			BHEL	Haridwar	A		
					Siemens	Germany	A		
					GE	Sanand	A		
					MELCO	POLAND	A		
					LMTG	JAPAN	A		
					Hitachi	Hazira	A		
					Toshiba	Japan	A		
					TIPS	Chennai	A		
2	Power Transformers	CAT I			ABB	Sweden	A	Up to 765 KV Class	
					ABB	Vadodara	A	Up to 765 KV Class	
					Toshiba	Japan	A	Up to 765 KV Class	
					CG Power & Industrial Solutions Ltd	Mandideep	A	Up to 765 KV class	
					BHEL	Bhopal	A	Up to 400 KV Class	
					Siemens	Mumbai	A	Up to 400 KV Class	
					GE T&D India Limited	Naini	A	Up to 400 KV Class	
					GE T&D India Limited	Vadodara	A	Up to 765 KV Class	
					TELK	Angamally	A	Up to 400 KV Class	
3	Shunt Reactor	CAT I			ABB	Sweden	A	Up to 765 KV Class	
					ABB	Vadodara	A	Up to 765 KV Class	
					Toshiba	Japan	A	Up to 765 KV Class	
					CG Power & Industrial Solutions Ltd	Mandideep	A	Up to 765 KV class	
					BHEL	Bhopal	A	Up to 400 KV Class	
					Siemens	Mumbai	A	Up to 400 KV Class	
					GE T&D India Limited	Vadodara	A	Up to 765 KV Class	
					GE T&D India Limited	Naini	A	Up to 400 KV Class	
4	Auxiliary Oil Filled Transformers	CAT I			BHEL	Ihansi	A	Up to 220 KV Class	
					Indotech Transformers	Chennai	A	Up to 16 MVA, 11 KV Class	
					Kanohar	Meerut	A	Up to 16 MVA, 33 KV Class	
					Kirloskar Electric Company Limited	Mysore	A	Up to 16 MVA, 33 KV Class	
					Schneider	Vadodara	A	Up to 50MVA, 132 KV Class	
					Transformers & Rectifiers Ltd.	Ahmedabad	A	Up to 90 MVA, 132 KV Class	
					CG Power & Industrial Solutions Ltd	Malanpur	A	Up to 50MVA, 132KV Class	
					Voltamp	Savli	A	Up to 3.5 MVA, 33 KV Class	
					Shree Abhirami Engineering	Sri Perambudur	A	Up to 2.5MVA, 11KV Class	
					TESLA TRANSFORMERS INDIA LIMITED	Bhopal	A	Up to 9MVA, 11KV Class	
5	Dry Type Transformer	CAT I			ABB	Savli	A	Up to 8 MVA, 24 KV Class	
					Raychem	Pune	A	Up to 3.5 MVA, 33 KV Class	
					Toshiba	Hyderabad	A	Up to 2.0 MVA, 33 KV Class	
					BHEL	Ihansi	A	Up to 6.3 MVA, 33 KV Class	
					Kirloskar Electric Company Limited	Pune	A	Up to 4.0 MVA, 33 KV Class	
					Voltamp	Savli	A	Up to 3.25 MVA, 33 KV Class	
					Ames Impex	Mehsana Gujrat	A	Up to 1.6 MVA, 11 KV Class	
					Sudhir Power Ltd	Silvassa	A	Up to 1 MVA, 11 KV Class	
					Hammond Power Solutions	Hyderabad	A	Up to 95 KVA, 33KV Class	
6	OIP/RIP BUSHING				BHEL	Bhopal	A	Up to 400 KV class	
					Crompton Greaves Ltd	Nasik	A	Up to 400 KV class	
					Crompton Greaves Ltd	Aurangabad	A	Up to 245 KV Class (excluding GT)	
					ABB Ltd.	Vadodara	A	Up to 400 KV class	
					ABB Switzerland Ltd. MICAFIL Bushings	Switzerland	A	Up to 400 KV class	
					TELK	Angamaly	A	Up to 400 KV class	
					GE T&D India Limited	Hosur	A	Up to 400 KV class	
					Alstom-Passoni Villa	Italy	A	Up to 400 KV class	
					ABB Power Tech.Products	Sweden	A	Up to 400 KV class	
					Trench	France	A	Up to 400 KV class	
6.2	RIP Bushing	CAT I			ABB AB Components	Sweden	A	Up to 420 KV Class	
					ABB Micafil	Switzerland	A	Up to 420 KV Class	
					Inolytor	Russia	A	Up to 420 KV Class	
					HSP	Germany	A	Up to 420 KV Class	
					Yash High Voltage	Vadodara	A	Up to 145 KV Class	
7	INSULATING OIL	CAT I			Apar Industries	Rabale/Silvassa	A		
					Power Oil Petroleum Products	Silvassa	A		
					NYNAS NAPHTHENICS AB	SWEEDEN / USA	A		
					Kanden Engg Corp Ltd	Japan	A		
					Nynas Ltd	Hongkong	A		
					Rai Petro Specialities	Chennai/Silvassa	A		
					Savita Oil Technologies	Mumbai/ Silvassa	A		
8	ON LINE DGA ANALYZER	CAT III			GE Kelmen Ltd	UK	A		
					GE GRID SOLUTIONS LTD	LISBURN, UK	A		
					Serveron	USA	A		
					CIC	Vadodara	A	Approval Conditions apply	
					Morgan Scahffer	Canada	A		
9	CAPACITIVE VOLTAGE TRANSFORMER (CVT)	CAT I			ABB	VADODARA	A	UP TO 400KV	
					GE T&D	HOSUR	A	UP TO 765 KV	
					BHEL	JHANSI	A	UP TO 400KV	
					MEHRU ELECTRICALS	BHIWADI	A	UP TO 132 KV	
					CGL	NASHIK	A	UP TO 400KV	
10	HT Motor								
10.1	HT Motors (CW PUMP MOTOR)	CAT I			WEG	BRAZIL	A	UPTO 3405KW,11KV	
					HYOSUNG	S.KOREA	A	UPTO 2800KW,6.6KV	
					BHEL	BHOPAL	A		

			Precise	Mumbai	A		
			G&M	Baroda	A		CBCT Only
			Silkaans	Mumbai	A		
			Ind Coil	Mumbai	A		
			Pragati	Thane	A		
			Prayog	Pune	A		
			AE	Mumbai	A		
			Logicstat	Delhi	A		For control transformer only
			C&S Electric	Noida	A		For CT only
			Newtek	Aurangabad	A		For CT/PT/Control transformer
13	LT Switchgear - Floor mounted Fixed type indoor LT Switchgear Panel (MLDB)	CAT I					
			Switching Circuits	Kolkata	A		
			Hindustan Control & equipment Ltd	Kolkata	A		With fabrication & painting at unit II & MP Electrical Narendrapur
			Maktel	Vadodara	A		Prior Type Testing
			Iakson	Greater Noida	A		
			Vidvut Control	Gaziabad	A		
			Adlec Power	Rohad (Jhajjar)	A		
			Conquerent Control System	Manesar	A		Condition apply upto 1250A
			Control & Schematics	Hyderabad	A		
			Positronics	Vadodara	A		
			Schneider (formerly L&T)	Mumbai / Coimbatore/Ahmednagar	A		
			GE	Bangalore	A		
			C&S Electric	Noida/ Haridwar	A		
			Schneider	Nasik	A		
			Pyrotech	Udaipur	A		
			Siemens	Kalwa	A		
			Tricolite	Sahibabad/Manesar	A		
			Schneider	Vadodara	A		
			Nitya Electrocontrols	Noida	A		
13.1	LT Switchgear - Wall mounted fixed type indoor / outdoor LT Switchgear non compartmentalized Panel (Lighting panels / AC / DC Fuse boards etc.)Power Panel, Emergency Lighting Panel	CAT I					
			Control Devices	Kolkata	A		
			Iaspe	Noida	A		
			Havells	Faridabad	A		
			Novateur Electrical & distribution systems	Murthai	A		
			Avaid Technovator	Manesar	A		
			Switching Circuits	Kolkata	A		
			Hindustan Control & equipment Ltd	kolkata	A		With fabrication & painting at unit II & MP Electrical Narendrapur
			Maktel	Vadodara	A		
			Iakson	Greater Noida	A		
			Vidvut Control	Gaziabad	A		
			Adlec Power	Rohad (Jhajjar)	A		
			Conquerent Control System	Manesar	A		Condition apply upto 1250A
			Control & Schematics	Hyderabad	A		
			Positronics	Vadodara	A		
			L&T	Mumbai / Coimbatore/ Ahmednagar	A		
			GE	Bangalore	A		
			C&S Electric	Noida / HARIDWAR	A		
			Schneider	Nasik	A		
			Pyrotech	Udaipur	A		
			Siemens	Kalwa	A		
			Tricolite	Sahibabad/ Manesar	A		
			Nitya Electrocontrols	Noida	A		
			Saravana Switchgear	Bengaluru	A		
13.2	LT Switchgear - Floor mounted Fixed type indoor LT Switchgear Panel (MLDB)	CAT I					
			Switching Circuits	Kolkata	A		
			Hindustan Control & equipment Ltd	Kolkata	A		With fabrication & painting at unit II & MP Electrical Narendrapur
			Maktel	Vadodara	A		Prior Type Testing
			Iakson	Greater Noida	A		
			Vidvut Control	Gaziabad	A		
			Adlec Power	Rohad (Jhajjar)	A		
			Conquerent Control System	Manesar	A		Condition apply upto 1250A
			Control & Schematics	Hyderabad	A		
			Positronics	Vadodara	A		
			Schneider (formerly L&T)	Mumbai / Coimbatore/Ahmednagar	A		
			GE	Bangalore	A		
			C&S Electric	Noida/ Haridwar	A		
			Schneider	Nasik	A		
			Pyrotech	Udaipur	A		
			Siemens	Kalwa	A		
			Tricolite	Sahibabad/Manesar	A		
			Schneider	Vadodara	A		
			Nitya Electrocontrols	Noida	A		
14	MV Switchgear Panel	CAT I					
			BHEL	Bhopal	A		Upto 33KV
			Megawin	Salem	A*		Upto 33KV
			Schneider Electric India (Formerly L&T)	Ahmednagar	A		Upto 33KV
			Siemens	Mumbai	A		Upto 33KV
			ABB	Nasik	A		Upto 33KV
			Schneider	Vadodara	A		Upto 11KV
			Schneider (Salt lake works)	Kolkata	A		Upto 11KV
14.1	Fast Bus Transfer panel along with relay	CAT I					
			Aartech	Parwanoo	A		conditions apply
			ABB	Vadodara	A		conditions apply
			SEL	Delhi	A		conditions apply
15	LT VFD Control Panel	CAT I					

				Powertech	Sonepat	A		Upto 55 KW with following conditions: i) VFD from Schneider- France, upto 415V, 50KW. ii) Enclosure & bought out items shall be from NTPC acceptable makes & iii) Engineering support for integration will be provided by Schneider/ Authorized integrator of Schneider
				DANFOSS	Oragadam	A		(upto 690V, 1200kW), VFD drives with VFD sourced from Danfoss-Denmark/USA and Panel sourced from Rittal
				YASAKAWA	Japan	A		VFD from Yasakawa- Japan, Upto 415V, 132KW
				YASKAWA	BANGALORE	A		UPTO 415V, 315kW
				ROCKWELL AUTOMATION	SAHIBABAD	A		VFD from Rockwell(Allen Bradley)-USA, (Upto 415 V, 600 KW)
				ABB	BANGALURU	A		VFD from ABB-Finland, Upto 690V, 750 KW
				SIEMENS	NASIK	A		VFD from SIEMENS- Germany, Upto 690V,900KW
				SEIPL	Navi Mumbai	A		LT VFD upto 575KW, 690V
				AMTECH	GANDHINAGAR	A		UP TO 75KW RATING
				VACON	BANGALORE	A		VFD(NXP model) from VACON Finland, upto 400KW,415V and upto 900KW, 690V
15.1	MV VFD Control Panel	CAT I		HITACHI HI REL POWER ELECTRONICS PVT. LTD.	SANAND	A		up to 11 KV rating
				TMEIC INDUSTRIAL SYSTEMS INDIA PRIVATE LIMITED	TUMKUR	A		up to 11 KV rating
16	Fire sealing system - Type A Material supplier	CAT I						
				3M India	Bangalore	A		
				GE Silcon	USA	A		
				Hilti	Germany	A		
				DOW Corning	USA	A		
16.1	Fire sealing system - Type B Material supplier	CAT I						
				LLOYDS	Delhi	A		
				Signum	Nagpur	A		
				Vijay System Engineers Pvt Ltd	Valsad	A		
16.2	Executing Agency for Fire sealing system	CAT I						
				LLOYDS	Delhi	A		
				Signum	Nagpur	A		
				Vijay System Engineers Pvt Ltd	Valsad	A		
				3M India	Bangalore	A		
17	CURRENT TRANSFORMER	CAT I						
				Mehru Electrical	Bhiwadi	A		UP TO 132 KV
				GE T&D	Hosur	A		UP TO 765 KV
				ABB	Vadodara	A		UP TO 400KV
				GGL	Nasik	A		UP TO 400KV
				BHEL	Bhopal	A		UP TO 400KV
				BHEL	Ihansi	A		UP TO 220 KV
				Vishal Transformer	Meerut	A		UP TO 132 KV
				Heptacare	Meerut	A		UP TO 33KV
18	GIS	CAT-I						
				ABB/HITACHI ENERGY INDIA LIMITED	VADODARA	A		UPTO 400kV
				GE T&D	CHENNAI	A		
				HYOSUNG	S.KOREA	A		
				HYOSUNG T&D INDIA PVT LTD	PUNE	A		UPTO 400kV
18.1	CIRCUIT BREAKER	CAT I						
				GE T&D	KANCHIPURAM	A		UP TO 765 KV
				ABB	VADODARA	A		UP TO 400 KV
				SIEMENS	AURANGABAD	A		UP TO 400 KV
				BHEL	Hyderabad	A		UP TO 400 KV
				GGL	NASHIK	A		UP TO 400 KV
19	ISOLATOR	CAT I						
				GR POWER	HYDERABAD	A		UP TO 400KV
				HIVELM	CHENNAI	A		UP TO 400KV
				S&S POWER	PONDICHERRY	A		UP TO 400KV
				SIEMENS	HYDERABAD	A		UP TO 765 KV
				ELEKTROLITES	JAIPUR	A		UP TO 33 KV
				SWITCHEGEAR & STRUCTURALS	HYDERABAD	A		UP TO 765 KV
20	SURGE ARRESTOR	CAT I						
				GGL	NASIK	A		UP TO 400KV
				ELEKTROLITES	JAIPUR	A		UP TO 33 KV
				LAMCO	HYDERABAD	A		UP TO 400KV
				OBLUM	HYDERABAD	A		UP TO 765 KV
21	CLAMPS & CONNECTORS & WELDING SLEEVES	CAT I						
				ELCTROMECH TRANSTECH	KOLKATA	A		
				EXALT	MUMBAI	A		
				KLEMMEN ENGG	CHENNAI	A		
				MEGHA ENGG	CHENNAI	A		
				MILIND	MUMBAI	A		
				EMI	MUMBAI	A		
				NOOTAN ENGG	MUMBAI	A		
				TAG CORPORATION	CHENNAI	A		
				ITPL	MUMBAI	A		
				RASHTRA UDYOG	KOLKATA	A		
				Premier Power Products	Chennai	A		
				PEE VEE ENGG	BANGALORE	A		
21.1	ACSR CONDUCTOR	CAT I						
				APAR INDUSTRIES	SILVASSA	A		
				CABCON	KOLKATA	A		
				DIAMOND	VADODARA	A		
				GALAXY	SANGLI	A		
				GUPTA POWER INFRA	BHUBANESWAR	A		
				HIRA CABLES	HIRAKUD	A		
				ISK	SILVASSA	A		
				LUMINO	KOLKATA	A		
				SARAVATHY	BANGALORE	A		
				HIREN ALUMINIUM	SILVASSA	A		
				SMITA	GHAZIABAD	A		
				SASHI CABLES LTD	LUCKNOW	A		

21.2	ALUMINIUM TUBE	CAT I	Mahavir Transmission Limited	DEHRADUN	A	
			ALOM EXTRUSIONS UNIT-II	BALASORE	A	
			BANCO	VADODARA	A	
			CENTURY EXTRUSION	KOLKATA	A	
			HINDALCO	RENUKOOT	A	
			HINDALCO	ALUPURAM	A	
			JENDAL ALUMINIUM	BANGALORE	A	
			SUDAL	NASIK	A	
22	SUB STATION AUTOMATION SYSTEM (BCU, GRP, ENERGY METER, NUMERICAL RELAYS, SWITCHYARD PROTECTION)	CAT I	GE T&D	CHENNAI	A	
			ABB	PEENYA	A	
			SCHNEIDER	NOIDA	A	
			SIEMENS	KALWA/GOA	A	
			BHEL	BHOPAL	A	
23	AB Tariff energy meter	CAT I	SEMS	Udaipur/Solan	A	
			Elster	Mumbai	A	
			L&T	Mysore	A	For Model ER300P With CMS software.
24	SPV module	CAT I	BHEL	Bangalore	A	
			Warree	Surat	A	
			Emnvee	Bangalore	A	
			Vikram Solar	Parganas	A	
			Lanco Solar	Chattisgarh	A	
			Tata Power Solar	Bangalore	A	
			Alpex	Solan	A	
			Synergy	Durgapur	A	
			Photonix	Satara	A	
			HHV Solar	Bangalore	A	
25	Power Conditioning Unit (PCU)	CAT I	Schneider	Bangalore	A	Conditions apply
			ABB	Bangalore	A	Conditions apply
			Bongfiglioli	Germany	A	Conditions apply
			Fecon	Germany	A	
			AGG	Bangalore	A	Conditions apply
			Hitachi-Hirel	Gandhinagar	A	Conditions apply
			Hitachi-Hirel	Sanamadi	A	Conditions apply
			Yacon	Bangalore	A	Conditions apply
25.1	String Monitoring Box (SMB)	CAT II	Trinity Touch	Palwal	A	Conditions apply
			Hensel	Sriperumbudur	A	Conditions apply
			AGG	Bangalore	A	Conditions apply
			Statcon	Pilkhwa	A	Conditions apply
			Weidmuller	Spain	A	Conditions apply
25.2	EHV Cables	CAT I	Ibin Electric	South Korea	A	For 132KV & 220 KV only
			KEC International	Vadodara	A	Upto 220KV
			KEI Industries	Bhiwadi	A	Upto 132KV, 220KV
			Phelps Dodge	Bangkok	A	For 132 KV only
			LS CABLE & SYSTEM LTD	South Korea	A	Up to 400 KV
			LS CABLE & SYSTEM LTD	BHIWADI	A	Up to 132 KV
			Universal Cable Ltd.	Satna	A	Upto 132KV only
26	H.T. CABLE upto 33KV	CAT I	Apar Industries	Umbergaon	A	
			Gemscab	Bhiwadi	A	
			Gupta Power	Kashipur	A	
			Havells India Ltd.	Alwar	A	
			KEC International	Vadodara	A	
			KEI Industries	Bhiwadi	A	
			Krishna Electrical Industries Ltd	Gwalior	A	
			Polycab Wires Pvt. Ltd	Daman	A	
			Sri ram Cables	Bhiwadi	A	
			Tirupati Plastomatics	Jaipur	A	
			Torrent Cable Ltd	Nadaid	A	
			CMI	Baddi	A	
			Universal Cable Ltd.	Satna	A	
			Dynamic Cables	Reengus	A	
27	1.1 KV LT Power Cables (Type- XLPE Insulated, PVC sheathed (incl FRLS)	Refer Note-5	Advance Cable	Bengaluru	A	
			Apar Industries Ltd	Umbergaon	A	
			Cords Cables	Bhiwadi	A	
			CMI	Baddi	A	
			Delton Cable Ltd	Faridabad	A	
			Dynamic Cables	Jaipur	A	
			Gemscabs Industries	Bhiwadi	A	
			Gupta Power Cables	Khurda	A	
			Havells India Ltd.	Alwar	A	
			KEC International	Sivassa, Mysore	A	
			KEI Industries	Bhiwadi	A	
			Paramount Cable	Khushkhhera	A	
			Polycab Wires Pvt. Ltd	Daman	A	
			Ravin Cables	Pune	A	
			Special Cables	Rudrapur	A	
			Suyog Cables	Vadodara	A	
			Thermocables	Hyderabad	A	
			Tirupati Plastomatics	Jaipur	A	
			Torrent Cable Ltd	Nadlad	A	
			Universal Cable Ltd.	Satna	A	
			Ravi Industries	Sonepat	A	
28	LT Control Cable 1.1 KV, Type - PVC (incl FRLS)	Refer Note-5	Advance Cable	Bengaluru	A	
			Apar Industries Ltd	Umbergaon	A	
			Cords Cables	Bhiwadi	A	
			CMI	Faridabad	A	
			CMI	Baddi	A	
			Delton Cable Ltd	Faridabad	A	
			Elkay Teletink	Faridabad	A	
			Gemscabs Industries	Bhiwadi	A	
			Govoline Fibres (I) Ltd	Daman	A	
			Gupta Power Cables	Khurda	A	
			Havells India Ltd.	Alwar	A	
			KEC International	Sivassa, Mysore	A	
			KEI Industries	Bhiwadi	A	
			Paramount Cable	Khushkhhera	A	

				Polycab Wires Pvt Ltd	Daman	A			
				Ravin Cables	Pune	A			
				Special Cables	Rudrapur	A			
				Suyog Cables	Vadodara	A			
				Thermocables	Hyderabad	A			
				Tirupati Plastomatics	Jaipur	A			
				Torrent Cable Ltd	Nadad	A			
				Universal Cable Ltd.	Satna	A			
29	DC Batteries (Ni-Cd type BATTERY)	CAT I		HBL-Power System	Hyderabad	A		Up to 990 Ah with conditions	
				Soft India	Bangalore	A		8Ah to 990Ah- KPH type	
						A		10Ah to 1365 Ah- KPM type	
						A		11Ah to 1550Ah - KPL type	
30	BATTERY CHARGER (48V/110V/220V)	CAT I		Amararaja	Tirupati	A			
				HBL- Power System	Hyderabad	A			
				Chhabi electrical	Jalgaon	A			
				EXIDE	Kolkatta	A			OLD NAME: CHLORIDE POWER
				Statcon	Hapur	A		Up to 220 V, 850 A	
				Dubas	Bangalore	A		Up to 220 V, 800 A	
30.1	Battery Health Monitoring System	CAT I		EXIDE	Kolkatta	A			OLD NAME: CHLORIDE POWER
				HBL- Power System	Hyderabad	A			
				Exide	Kolkatta	A			
31	GI CABLE TRAYS AND ACCESSORIES (LADDER & PERFORATED TYPE), fitting & accessories including bends	Refer Note-6		Inar Profiles Ltd	Enkapalli (Vishakhapatnam)	A			
				Vatco	Mumbai	A		Galvanization at Sigma Mumbai	
				Indiana cable trays	Mumbai	A		Galvanization at Karamtara galvanizer- Mumbai	
				Industrial Perforation	Kolkatta	A		Galvanized and offered for inspection at Industrial Perforation Pvt Ltd, Ganganagar, Kolkatta, WB	
				Ratan Projects	Howrah	A		Galvanization at DMP Projects- Howrah	
				India Electric Syndicate	Kolkatta	A		Galvanization at BMW Industries/B,P Projects- Howrah	
				Steelite engg.	Mumbai	A			
				Premier Power Products	Howrah	A		Galvanising at Neha Galvaniser- Howrah	
				Indiana Gratings	Pune	A			
				M.J. Engineering	Okhla/ Bhiwadi	A			
				Maheshwari	Ghaziabad	A		Galvanization at NTPC approved Galvaniser.	
				T.R.G	Chennai	A		Galvanization at TM Radhakrishna Chetty & Co-Chennai	
				Amtech	Pune	A		Galvanization at B.G. Shirke - Pune	
				Kannade Anand Udyog	Mumbai	A		- Fabrication at their units: Plot No. 42, Morivali, MIDC, Thane & Plot No.: D-35 Anand Nagar MIDC, Addl. Ambernath ,Thane - Galvanization and offer the galvanized trays for inspection at: Plot No. D-34 Anand Nagar MIDC, Addl. Ambernath,Thane	
				Rukmani	Rajpur	A		Ladder type cable trays only	
				Passive Infra	Hasangarh (Rohtak)	A			
				Unitech Fabricators & Engineers	Howrah/ Hoogly	A			
				Patny System	Hyderabad	A			
				Rabi Engg	Kolkatta	A		Galvanizing from NTPC approved sources	
				MKSD Industries	Taloja	A		Galvanization from Encorp Power Trans- Palghar	
				Reliable Sponge	Kalunga	A			
				Pinax Steel	Patna	A			
				Rukmani	Hoogly	A		Galvanization at Rukmani Fab & Gal- Howrah	
				RMG Steels Pvt Ltd	Noida	A		Galvanizatio at Shivam Engineers and Fabricators, Ghaziabad	conditions apply
31.1	GI FLEXIBLE CABLE TRAY SUPPORT SYSTEM	Refer Note-6		Vatco	Mumbai	A		Galvanising at Sigma Mumbai	
				Inar profiles	Enkanalli	A			
				Industrial perforations	Kolkatta	A			
				Premier power products	Howrah	A		Galvanising at Neha Galvaniser- Howrah	
				Steelite engg.	Mumbai	A			
				Indiana gratings	Pune	A		Galvanising at Poona Galvaniser- Pune	
				Amtech	Pune	A		Galvanising at B.G. Shirke- Pune	
				Ratan Projects	Howrah	A		Galvanization at NTPC approved sources	
				Patny Systems	Hyderabad	A			
32	Galvanised Steel Structure	CAT II		Sangam Structural Ltd	Prayagraj	A		Galvanising at NTPC approved sources	
				RS Infraprojects	Ghaziabad	A			
				Anil Steels	Rohtak	A			
				Jamuna Metals	Delhi	A			
				Pioneer Fabricators	Meerut	A			
				Passive Infraprojects	Rohtak	A			
				PAVITRA INDUSTRIES	HYDERABAD	A		GALVANISATION TO BE DONE FROM QIRPREET GALVANIZERS HYDERABAD	
33	Elevator (Gear Type)	CAT I		Otis	Mumbai	A			
				Kone	Chennai	A		Gear Type and MRL Type	
				Techno	Ahmedabad	A		Gear Type and MRL Type	
				Omega	Ahmedabad	A			
				ECE	Ghaziabad	A			
				Semel Eltec	S Korea	A			
				Johnson	Nagpur	A			
34	IPBD	CAT I		BHEL	Rudrapur	A			
				C&S ELECTRIC	Haridwar	A			

35	SPBD	CAT I		BHEL	Rudrapur	A		
				C&S	Greater Noida	A		
				C&S	Haridwar	A		
				GODREJ & BOYCE MANUFACTURING COMPANY LTD	Bangalore	A		
				Powergear	Hindupur	A		
				Powergear	Chennai / Bangalore	A		
				KGS Enge	Chennai	A		
35.1	Air Insulated Non Segregated phase type LT busduct	CAT I		C&S Electric	G.Noida	A		
				C&S Electric	HARIDWAR	A		
				Unilec	Gurgaon	A		Upto 3200 A
				Stardrive	Chennai	A		
				Spaceage Swgr Ltd	Bawal	A		
				REEP	Chennai	A		
				Enpro	Chennai	A		
				Nitya Electrocontrols	Noida	A		
				PYROTECH ELECTRONICS PVT. LTD.	UDAIPUR	A		UPTO 4000A
35.2	Sandwiched type LT Busduct	CAT I		Godrej	Bangalore	A		
				Henikwon	Malaysia	A		
				C&S	HARIDWAR	A		
36	HVR Transformer & EC Panel	CAT I		ADOR Powertron	Pune	A		
				BHEL	Jhansi	A		
				HIND RECTIFIER PVT LTD	NASHIK	A		
37	Panel Type Hopper Heater	CAT I		HTD	USA	A		
				Hotoil EHS	USA	A		
				HTD HEAT TRACE(I) Pvt Ltd	Hyderabad	A		
				Thermon	USA	A		
				Thermonpads(Unit-II)	feedimetla	A		
				Thermon	Pune	A		
38	Neutral Grounding Transformer	CAT II		Pragati Electrical Pvt. Ltd.	Mumbai	A		
				Bharat Biljee Ltd.	Navi Mumbai	A		
				Prayog Electrical Ltd.	Pune	A		
				Andrew Yule	Chennai	A		
39	Rectifier Panel For Hydrogen Generation Plant	CAT I		RUTTONSHA INTERNATIONAL RECTIFIERS LTD	HALOL, GUJRAT	A		
				Hind Rectifier	MUMBAI/NASIK	A		
40	132 KV cable termination & straight through jointing kits	CAT I		Ilin	South Korea	A		
				ABB Kabeldon	Sweden	A		
				Pfisterer AG	Switzerland	A		
				Tyco Electronics Raychem GmbH	Germany	A		
41	Cable Termination kits and straight through jointing kits	CAT II		3M Electro & communication	Pune	A		Upto 33KV
				Raychem	Mumbai	A		Heat shrinkable type upto 33KV
				Hari consolidated	Delhi	A		Heat shrinkable type upto 33KV
42	Lighting Mast with raise & Lower Type Lantern Carriage / Polygonal Poles	CAT I		Bajaj	Pune	A		
				BP Projects	Kolkata	A		
				Skipper	Howrah	A		
				Transrail Lighting	Silvassa	A		
				AVAIDS TECHNOVATORS	Alwar	A		
42.1	Lighting poles- Tubular/ polygonal	CAT I		Main contractor approved sources having BIS Licensee/ ISI marked with CML Number				
42.2	Lighting fixtures with accessories (Filament type)	CAT I		Crompton	Mumbai	A		
				Bajaj Electricals	Mumbai	A		
				Philips	Noida	A		
				Wipro	Mumbai	A		
				Surva Roshni	Noida	A		
42.3	Lighting fixtures with accessories (LED type)	CAT I		Wipro	Pune	A		
				Surva Roshni	Noida	A		
				Bajaj	Mumbai	A		
				Philips	Noida	A		
				Pyrotech	Udaipur	A		
				Mika	Thane	A		
42.4	LED Aviation Obstruction Lights	CAT I		AVAIDS TECHNOVATORS	GURUGRAM	A		HIGH INTENSITY NON-LED TYPE
				Instapower	Roorkee	A		Medium and High Intensity
43	DG SET(ASSMEBLER & TESTING)	CAT I		Kohler	Singapore	A		Up to 1500 KVA, 11KV
				CLLS	Singapore	A		Up to 1250 KVA, 415 V.
				Powerica	Silvasa	A		Up to 2000 KVA, 415 V & 1500 KVA, 11 KV
				Sterling Generators Pvt Ltd	Silvasa	A		Up to 415 V 2000 KVA
				Supernova	Rajpur(Mehsana)	A		Up to 415 V 2000 KVA
				IAKSON	PHALTAN	A		Up to 415V 1750KVA
43.1	ALTERNATOR	CAT I		Kirtoskar Electric	Bangalore	A		415 V alternators
				Cummins Generator Technology (Stamford)	U.K	A		415 V & 11 KV alternators
				Lerov Somer	France	A		Up to 11KV alternator 3500 kW
				Marathan	USA	A		Alternators for up to 415 V, 1500 KVA DG SET
				Cummins Generator Technology (Stamford)	Ahmednagar	A		415 V Alternators up to 1600 KVA
				Toyto Denki Power System	Bangalore	A		11 KV, 1500 KVA
43.2	DG Set Control panel / Synchronising panel	CAT I		L&T	Mumbai / Coimbatore/ Ahmednagar	A		
				GE	Bangalore	A		
				Siemens	Mumbai	A		

				C&S Electric	Noida / HARIDWAR	A		
				Schneider	Nasik	A		
				Unilec	Gurgaon	A		
				Nitya Electrocontrols	Noida	A		
				Switching Circuits	Kolkata	A		
				Tricolite	Sahibabad / Manesar	A		
				Hindustan Control & equipment Ltd	Kolkata	A		With fabrication & painting at unit II & MP Electrical Narendrapur
				Maktel	Vadodara	A		
				Jakson	Greater Noida	A		
				Vidyut Control	Ghaziabad	A		
				Adlec Power	Rohad (Jhajjar)	A		
				Fvrotech	Udaipur	A		
				Anand Power Ltd.	Noida	A		
				Positronics	Vadodara	A		
				Control & Schematics	Hyderabad	A		
				Sterling Generators Pvt Ltd	Silvassa	A		
				Supernova	Rajpur	A		
	A- MAJOR COMPONENTS OF BHEL MAKE GENERATOR (AS PER OEM SPECIFIC DESIGN):=							
44	STATOR FRAME FABRICATION	CAT I		BHEL-HEEP	HARIDWAR	A		
44.1	STATOR FRAME MACHINING	CAT II		BHEL-HEEP	HARIDWAR	A		
45	SPRING BASKET	CAT II		BHEL-HEEP	HARIDWAR	A		
45.1	CORE BAR	CAT II		BHEL-HEEP	HARIDWAR	A		
45.2	FLUX TRAP	CAT II		BHEL-HEEP	HARIDWAR	A		
45.3	FLAT SPRINGS AND BASKET ASEMBLY	CAT II		BHEL-HEEP	HARIDWAR	A		STAMPINGS FROM BHEL CSU JAGDISHPUR
45.4	RIPPLE SPRING	CAT II		BHEL-HEEP	HARIDWAR	A		
45.5	TENSION BOLT FOR STATOR CORE (INSULATED)	CAT II		KREMPAL GMBH	GERMANY	A		
45.6	CORE PRESS RING	CAT II		BHEL-HEEP	HARIDWAR	A		
				BHEL-HEEP	HARIDWAR	A		
				Ratan Engineering	Rajasthan	A		
46	ETS MATERIAL	CAT II						
		II		THYSSEN KRUPP ELECTRICAL STEEL	NASIK	A		
		II		ARCELOR MITTAL INTERNATIONAL	LUXAMBOURG	A		
		II		THYSSENKRUPP MATERIAL TRADING	GERMANY	A		
		I		POSCO	RAIGARH	A		
		I		JSW	BELLARY	A		
		II		VOESTALPINE STAHL GMBH	AUSTRIA	A		
		II		ALLOVERZE	GERMANY	A		
47	STATOR LAMINATION	CAT II		BHEL-CSU	JAGDISHPUR	A		
48	BUS BAR CONNECTION TUBES	CAT II						
				LUVATA PORI	FINLAND	A		
				BUNT METAL	AUSTRIA	A		
				KME GERMANY GMBH & CO. KG	GERMANY	A		
48.1	CONNECTING BUS BAR SOLID COPPER CONDUCTOR (FOR STATOR BAR)	CAT I		BHEL	HARIDWAR	A		
49		CAT I						
		I		PEARL INSULATIONS	BANGLORE	A		
		I		MAHENDRA INDUSTRIES	BANGLORE	A		
		II		VONROLL	SWITZERLAND	A		
		II		GEBAUER & GRILLER	AUSTRIA	A		
		I		KAPSI ELECTRICAL POWER PRODUCT	BENGALURU	A		
49.1	HOLLOW SS CONDUCTOR (STATOR BAR)	CAT II						
		II		FINE TUBES LTD.	ENGLAND	A		
50	OVER HANG SUPPORT RING	CAT II						
				ROECHLING ENGINEERING PLASTICS	GERMANY	A		
				KOMPOZYTY	POLAND	A		
				POWER & COMPOSITE TECHNOLOGIES	USA	A		
51	WATER SUPPLY HOSE (INSULATED)	CAT I						
		II		DR SCHNABEL GMBH & CU KG LIMBURG	GERMANY	A		
		II		CRANE RESISTOFLEX	USA	A		
		I		MILIA INDUSTRIES LIMITED	CHENNAI	A		
51.1	WATER BOX FOR STATOR BAR	CAT I						
				MADRAS CUPPRUM	CHENNAI	A		
				INDIAN METAL	KOLKATA	A		
52	BAFFLE RING & BAFFLE RING CARRIER MACHINING	CAT I						
				BHEL-HEEP	HARIDWAR	A		
53	STATOR WINDING BAR	CAT I						
				BHEL-HEEP	HARIDWAR	A		
54	GENERATOR SHAFT FORGING	CAT II						
				BUDERUS EDELSTAHL	GERMANY	A		
				JSW	JAPAN	A		
				SAARSCHMIEDE	GERMANY	A		
				JCFC	JAPAN	A		
				PISC Energomashpetstal	Ukraine	A		
				Doosan Enerbility (DOOSAN HEAVY INDUSTRIES & CONSTRUCTION CO. LTD.	SOUTH KOREA	A		
				SDF-TURNI	ITALY	A		
				QFAR	ITALY	A		
54.1	GENERATOR SHAFT MACHINING	CAT I						
				BHEL-HEEP	HARIDWAR	A		
55	CURRENT CARRYING BOLTS FOR ROTOR	CAT II						
				BHEL HEEP	HARIDWAR	A		
56	SILVER BEARING COPPER HOLLOW STRIPS (ROTOR COIL)	CAT II						
				BUNT METAL	AUSTRIA	A		
				BOASHIDA SWISS METAL	SWITZERLAND	A		
57	ROTOR COIL FORMING	CAT II						

		II		MITSUBISHI ELECTRIC	JAPAN	A			
		I		RV ENGG	BALLABGARH	A			
77	STATOR CORE PUNCHING & SHIELD CORE PUNCHING	CAT I							
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		I		PITTI LAMINATION	HYDERABAD	A			
78	TENSION BOLT FOR STATOR CORE(INSULATED)(CORE BOLT)	CAT II							
		II		MITSUBISHI ELECTRIC	JAPAN	A			
79	LEAD BOX FABRICATION & MACHINING	CAT I							
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		I		LMTG	HAZIRA	A			
		I		JSPL	RAIPUR	A			
80	OVER HANG SUPPORT RING(RESin CONE)	CAT II							
		II		HITACHI CHEM	JAPAN	A			
		II		PCT	USA	A			
		II		ROCHLING	GERMANY/ France	A			
81	CORE TENSION BOLT (UNINSULATED) FOR STATOR (Core bolt)	CAT I							
		II		MITSUBISHI	JAPAN	A			
		I		STAR WIRE	BALLABGARH	A			
82	OVERHANG SLIDING SYSTEM (Part of stator winding Assembly)	CAT I							
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		I		LMTG	HAZIRA	A			
83	BUS RING FABRICATION (Phase Ring)	CAT I							
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		I		LMTG	HAZIRA	A			
84	RIPPLE SPRING	CAT III							
		III		MITSUBISHI ELECTRIC	JAPAN	A			
		III		AUGUST KREMPER	GERMANY	A			
85	SOLID COPPER CONDUCTOR (FOR STATOR BAR)	CAT I							
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		II		UNIMAC	JAPAN	A			
		I		MAHENDRA IND	BANGALORE	A			
		II		GEABUR AND GRILER	AUSTRIA	A			
		II		HITACHI MAGNET WIRE	JAPAN	A			
		I		PEARL INSULATION	BANGALORE	A			
		I		COSMOS	BANGALORE	A			
86	HOLLOW COPPER CONDUCTOR (STATOR BAR)	CAT I							
		II		UNIMAC	JAPAN	A			
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		II		ISOLA	SWITZERLAND	A			
		I		MAHENDRA INDUSTRIES	BANGALORE	A			
		I		PEARL	BANGALORE	A			
		I		COSMOS	BANGALORE	A			
87	TERMINAL BUSHING (CONDENSER TYPE) (Lead Bushing)	CAT II							
		II		EMIL HAFLEY(TRENCH)	SWITZERLAND	A			
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		II		TRENCH	SWITZERLAND	A			
88	SUPPORT BRACKET	CAT I							
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		I		LMB	HAZIRA	A			
89	CONNECTING BUS BAR (PHASE BELTS) FABRICATION	CAT II							
		II		SUMIKEI COPPER	JAPAN	A			
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		II		HITACHI CABLE	JAPAN	A			
		II		ORIENTAL COPPER	THAILAND	A			
90	INSULATING HOSES FOR STATOR (WATER SUPPLY HOSES)	CAT I							
		II		SAKURA RUBBER	JAPAN	A			
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		II		CRANE RESISTOFLEX	USA	A			
		II		DR SCHNABEL	GERMANY	A			
91	SHIELD PLATES / SHIELD CLAMPER	CAT I							
		III		MITSUBISHI ELECTRIC	JAPAN	A			
		I		RV ENGG	FARIDABAD	A			
		I		AK Multi metal	PUNJAB	A			CS Casting for Generator Bracket Hub of Bearing bracket, Ni-alloy casting for Generator Blower Shroud & Shield clamper, nodular cast iron casting for Shroud support.
92	STATOR WINDING ASSLY	CAT I							
		I		MITSUBISHI ELECTRIC	JAPAN	A			
		I		LMTG	HAZIRA	A			
93	GENERATOR SHAFT FORGING	CAT II							
				SAARSCHMIEDE	GERMANY	A			
				Buderus Edelstahl	GERMANY	A			
				JSW	JAPAN	A			
				SDF	ITALY	A			
				CRUIST FORCE	FRANCE	A			
				OMZ	RUSSIA	A			
				FORGE MASTER	UK	A			
				ICFC	JAPAN	A			
				PI SC energomash	Ukraine	A			
				SC Doosan	Romani	A			
94	GENERATOR ROTOR MACHINING	CAT I							
		II		MITSUBISHI ELECTRIC	JAPAN	A			

		II		NUGO ROMANO	ITALY	A		
		I		LMTG	HAZIRA	A		
95	ETS MATERIAL (Core material)	CAT I						
		I		THYSSON KRUPP	NASIK	A		
		II		NIPPON	JAPAN	A		
		II		IFE	JAPAN	A		
		I		POSCO	RAIGARH	A		
		I		JSW	BELLARY	A		
		II		MITSUBISHI	JAPAN	A		
96	RETAINING RING FORGING(MAT-CrMn 1818)	CAT II						
				SAARCSHMEDE	GERMANY	A		
				JSW	JAPAN	A		
				KOBE STEEL	JAPAN	A		
				FORTEH	FRANCE	A		
97	RETAINING RING MACHINING	CAT I						
		II		MITSUBISHI ELECTRIC	JAPAN	A		
		I		LMTG	HAZIRA	A		
98	SILVER BEARING COPPER HOLLOW STRIPS (ROTOR COIL)	CAT II						
				ORIENTAL COPPER	THAILAND	A		
				HITACHI CABLE	JAPAN	A		
				FURUKAWA ELECTRIC	JAPAN	A		
				KM EUROPA	GERMANY	A		
				OTOKUMPUTURI (Luvata)	FINLAND	A		
				GINDRE	FRANCE	A		
99	FIELD LEAD CORE BAR FOR ROTOR WITH D LEAD(RAW MATERIAL) (Field lead)	CAT II						
				ORIENTAL COPPER	THAILAND	A		
				BAOSHIDA SWISS METAL	GERMANY	A		
				KME	GERMANY	A		
				Agarwal industries (Fabrication)	Mandideep	A		
				Rachna Metals (Raw material)	GHAZIABAD	A		
				INDIAN METAL & ALLOY	KOLKATA	A		
				HITACHI CABLE	JAPAN	A		
100	CURRENT CARRYING BOLTS FOR ROTOR (Radial Lead)	CAT II						
				MITSUBISHI ELECTRIC	JAPAN	A		
101	ROTOR COIL FORMING	CAT I						
		II		MITSUBISHI ELECTRIC	JAPAN	A		
		I		LMTG	HAZIRA	A		
102	STATOR Coil Manufacturing	CAT I						
				MITSUBISHI ELECTRIC	JAPAN	A		
				LMTG	HAZIRA	A		
103	ROTOR SLOT WEDGES & DAMPER WEDGES FABRICATION & MACHINING (Rotor wedge & Damper bar)	CAT II						
				MITSUBISHI ELECTRIC	JAPAN	A		
				MURAKAMI	omavress	A		
				FIAY	ITALY	A		
				OTOKUMUPORI (LUVATA)	FINLAND	A		
				METALLURGICA MINOTI	ITALY	A		
				Damper Wedges - Gindre India Components Pvt. Ltd	Gurgaon	A		
104	ROTOR WINDING ASSLY (GEN) INCL ROTOR WEDGES (Rotor winding)	CAT I						
				MITSUBISHI ELECTRIC	JAPAN	A		
				LMTG	HAZIRA	A		
105	GENERATOR ROTOR-FINAL assembly & Balancing Process (Rotor final assembly & HSB)	CAT I						
				MITSUBISHI ELECTRIC	JAPAN	A		
				LMTG	HAZIRA	A		
106	COMPRESSOR BLADE ASLY ON ROTOR (Part of generator final assembly)	CAT I						
				MITSUBISHI ELECTRIC	JAPAN	A		
				LMTG	HAZIRA	A		
107	D LEAD (FL CORE BAR) & CONTACT BOLT FOR SLIP RING (Axial lead)	CAT II						
				MITSUBISHI ELECTRIC	JAPAN	A		
108	TUBES FOR CONNECTING BUS BAR (Phase ring tubes)	CAT II						
				ORIENTAL COPPER	THAILAND	A		
				ALCOBEX	JODHPUR	A		
				S H Copper	Japan	A		
				IPCL	BHAVNAGAR	A		
				HITACHI CABLE	JAPAN	A		
109	END SHIELD FABRICATION & MACHINING (Generator Bearing Bracket)	CAT I						
				MITSUBISHI ELECTRIC	JAPAN	A		For End Shield Fabrication Only
				SHAPE	HARIDWAR	A		
				MANIUNATH	BANGLORE	A		
110	BEARING SHELL(GEN& SLIP RING)-FORGING (part of generator Bearing)	CAT II						
				MITSUBISHI ELECTRIC	JAPAN	A		

				OMEGA THERMIT	BHOPAL	A			
				DUM DUM	KOLKATA	A			
				EURO BEARING	ITALY	A			
111	CENTERING RING FORGING (END PLATE)	CAT I							
		I		GOODLUCK	GHAZIABAD	A			
		II		NISHIMAKI IRON WORKS	JAPAN	A			
		I		BAY FORGE	CHENNAI	A			
112	BEARING SHELL (GEN & SLIP RING) M/C (Generator bearing)	CAT III							
				DSE	KOREA	A			
				DYM	KOREA	A			
				MITSUBISHI ELECTRIC	JAPAN	A			
				OMEGA THERMIT	BHOPAL	A			
				DUM DUM	KOLKATA	A			
				EURO BEARING	ITALY	A			
				WAUKESHA BEARING	USA	A			
113	INTERMEDIATE RING FORGING (Space ring forging)	CAT I							
				Good luck (For forging)	FARIDABAD	A			
				LMTG (For m/c)	Hazira	A			
114	PRIMARY WATER PUMP	CAT I							
				MATHER & PLATT	PUNE	A			
				KSB INDIA	Nasik	A			
				SULZER PUMPS	NAVI MUMBAI	A			
				EBARA SEISAKUSHO	JAPAN	A			
115	HYDROGEN DRIER	CAT I							
		I		JINDAL	ROORKEE	A			
		II		MITSUBISHI ELECTRIC	JAPAN	A			
116	TUBES FOR COOLERS (BRASS/COPPER TUBES) (GENERATOR) (Gas cooler tubes)	CAT I							
				ALCOBEX	JODHPUR	A			
				MULTIMETAL	KOTA	A			
117	PW PUMP & FILTER UNIT ASSEMBLY (SKID)	CAT I							
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		II		JIMC	KOREA	A			
		I		LMTG	HAZIRA	A			
		I		LINCOLN	PUNE	A			
118	PW COOLER & SEAL OIL COOLER	CAT I							
		I		ALFA LAVAL	PUNE	A			
		II		JIMC	KOREA	A			
		I		TRANSTER	PUNE	A			
119	SLIP RING FORGING & MACHINING	CAT II							
				LMTG (For machining)	Hazira	A			
				Good luck (For forging)	FARIDABAD	A			
120	DC LEAD ASSLY FOR SLIP RING (Slip ring lead)	CAT I							
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		I		LMTG	HAZIRA	A			
121	SLIP RING ASSLY (Part of Generator Final assembly)	CAT I							
				LMTG	HAZIRA	A			
122	SLIP RING SHAFT ASSLY	CAT II							
				MITSUBISHI ELECTRIC	JAPAN	A			
123	AIR COOLER FOR BRUSH GEAR (Slip ring fan)	CAT I							
				LMTG	Hazira	A			
124	SEAL OIL PUMP	CAT I							
		I		TUSHACO PUMP	DAMAN	A			
		II		KOSAKA LABORATORY	JAPAN	A			
		II		SHIMADZU	JAPAN	A			
125	FAN BLADE FORGING & MACHINING (Blade for slip ring fan)	CAT I							
		II		MURAKAMI SEISAKUSHO	JAPAN	A			
		I		STAR WIRE	BALLABHGARH	A			
		II		MITSUBISHI ELECTRIC	JAPAN	A			
		I		GOODLUCK ENGG	GHAZIABAD	A			
126	SEAL OIL VALVE RACK	CAT II							
				JIMC	KOREA	A			
127	SEAL OIL STORAGE TANK (LOOP SEAL TANK)	CAT I							
				JIMC	KOREA	A			
				Gujarat infra	Vadodara	A			
				Shree sarian	Vadodara	A			
128	HYDROGEN COOLER (Gas cooler)	CAT I							
				KITASHIBA ELECTRIC	JAPAN	A			
				ENERGEN	KOREA	A			
				GEA	GERMANY	A			
				LAXMI	BHOPAL	A			
129	CARBON BRUSH	CAT II							
				MORGAN	KOREA	A			
				MERSEN	BANGLORE	A			
				VIDYUT CARBON	HARDWAR	A			
				ASSAM CARBON	KOLKATA	A			
130	EXCITATION SYSTEM	CAT I							
				ALSTOM	FRANCE	A			
				ABB	SWITZERLAND	A			
				SIEMENS	AUSTRIA	A			
				BHEL	BANGLORE	A			
				MITSUBISHI ELECTRIC	JAPAN	A			
131	EXCITATION TRANSFORMER	CAT I							
				REFER SEPARATE LIST					
132	EXCITATION AC/DC BUS DUCT	CAT I							
				REFER SWITCHGEAR AND BUS DUCT LIST					

133	END WINDING VIBRATION SYSTEM	CAT II			IRIS	Canada	A		
					Vibro systems	Canada	A		
134	Rotor slot angle (Slot cell)	CAT II			PCT	USA	A		
					MITSUBISHI ELECTRIC	JAPAN	A		
					VON ROLLA ISOLA	FRANCE	A		
135	CENTRING RING & INTERMEDIATE RING MACHINING (End plate & space ring)	CAT I			MITSUBISHI ELECTRIC	JAPAN	A		
					Good luck (For forging only)	Faridabad	A		
					LMTG (For machining)	HAZIRA	A		
136	ROTOR FLUX MONITORING SYSTEM	CAT II			GE	USA	A		
					MITSUBISHI ELECTRIC	JAPAN	A		
					Vibro systems	Canada	A		
					IRIS	CANADA	A		
137	FIELD LEAD CORE BAR FOR ROTOR WITH D LEAD	CAT II			MITSUBISHI ELECTRIC	JAPAN	A		
138	Generator Blower shroud	CAT I			RV Casting	Faridabad	A	(M/C by LMTG)	
139	Bearing Bracket Hub casting	CAT I			VAISHNOV STEEL	MUZAFFAR NAGAR	A		
					LMTG HCU	Hazira	A		
140	Shroud support	CAT I			R V Casting	Faridabad	A	(M/C by LMTG)	
141	Blower hub Forging	CAT I			Goodluck	Gaziabad	A	(M/C by LMTG)	
142	Bore ring Forging	CAT I			CHW	Greater noida	A	(M/C by LMTG)	
143	Rotor & stator blade	CAT I			LMTG (for machining)	Hazira	A		
					Star wire (For Rotating blade raw material)	BALLABHGARH	A		
					As per NTPC approved list (For ST blade raw material also)		A		
144	Center wedge & end wedge machining	CAT I			Moldpro	Vadodara	A		
NOTE	1.CHECKS FOR STATOR CORE ASSLY, STATOR WINDING ASSEMBLY, ROTOR WINDING ASSLY.(GEN), GENERATOR ROTOR -FINAL, BEARING ASSEMBLY/SHAFT SEAL ASSEMBLY, EXCITER ASSLY (MAIN & PILOT)/ SLIP RING SHAFT ASSEMBLY WITH BRUSH GEARS, EXCITER TEST RUN, GENERATOR ASSEMBLY AT WORKS INCLUDING TERMINAL BUSHING & GENERATOR WORKS RUN TEST SHALL BE FINALIZED DURING DETAILED ENGINEERING/MQP FINALIZATION FOR THE RESPECTIVE OEMs. 2. For Raw Material/Components/Items of Generator which are not appearing in the above list, their OEM approved sources shall be tied up during Detailed Engineering/ MQP finalization.								
	C- MAJOR COMPONENTS FOR GE MAKE GENERATOR (AS PER OEM SPECIFIC DESIGN):								
145	Stator Frame with manhole cover (Fabrication & Machining)	CAT I			ALSTOM Power Sp. z o.o.	Poland	A		
					Alstom Bharat Forge Power Limited	Sanand	A		
					ISGEC	YAMUNA NAGAR	A		
146	Key Bar (Fabrication & Machining)	CAT I			Bright Steel	UK	A		
		II			Jordan Matcon	Poland	A		
		II			ALSTOM Power Sp. z o.o	Poland	A		
		II			Somet	Poland	A		
		II			Empaz	Poland	A		Only M/c
		I			Shiv Engineering	vadodara	A		Only M/c
		I			Alstom Bharat Forge Power Limited	Sanand	A		Only M/c
		I			Shape Engg	Haridwar	A		Only M/c
147	Dovetail for Stator (Aluminium key profile)	CAT II			Sapa Profiles Kft	Hungary	A		
					ALSTOM Power Sp. z o.o.	Poland	A		
					Somet	Poland	A		
148	End Pressure Plate (Laminated Press plate)	CAT II			ALSTOM Power Sp. z o.o.	Poland	A		
					Generpro	Sweden	A		
149	Stator Core Punching	CAT II			ALSTOM	France	A		
					ALSTOM Power Sp. z o.o.	Poland	A		
					Donako	Poland	A		
					Pitti Laminations	Hyderabad	A		
					BHEL	Jagdishpur	A		
150	Core Tension Bolt for Stator	I			Starwire	Ballabgarh	A		
		II			Boehler Ybbstal Profil	Austria	A		
		II			Energietechnik Essen	Germany	A		
		II			Empaz	Poland	A		
		I			Kalyani carpenter	Pune	A		
151	Insulation of Core Tension Bolt for Stator	CAT II			Empaz	Poland	A		
					ALSTOM Power Sp. z o.o.	Poland	A		
152	Solid Copper Conductor for Stator Bar	CAT I			VonRoll	Switzerland	A		
					Pearl	Bangalore	A		
					Cosmos	Bangalore	A		
					Mahindra	Bangalore	A		
					Geaber & Greuller	Austria	A		
153	Hollow Stainless Steel Conductor for Stator Bar	CAT II							

				Fine Tubes	UK	A		
154	Stator Bars	CAT I		Fischer	Austria	A		
155	Tubes for Connection Bus Bar	CAT II		ALSTOM Power Sp. z o.o.	Poland	A		
				KME	Germany	A		
				Luvata Pori	Finland	A		
156	Connection Bus Bar (Phase Connector)	CAT II		Multimetal	Jamnagar	A		
				PPU Wojtera	Poland	A		
157	Insulating Hoses for Stator (Water Supply Hoses)	CAT II		ALSTOM Power Sp. z o.o.	Poland	A		
				Dr. Schnabel	Germany	A		
				Siemens	Germany	A		
158	Winding Head Support Ring	CAT II		Crane Resistoflex	USA	A		
				Röchling Permali	Germany	A		
				Kompozyty	Poland	A		
				PCT	USA	A		
				Siemens	Germany	A		
159	Spring for Winding Head Assembly (Console)	CAT II		Texplas	Haridwar	A		
		CAT I		Wolfensberger	Switzerland	A		
160	Generator Shaft Forging	CAT II		R V Engg	Ballabgarh	A		
				Saarschmiede	Germany	A		
				Buderus	Germany	A		
				ISW	Japan	A		
				JCFC	Japan	A		
				SdF Terni	Italy	A		
				SUMITOMO	JAPAN	A		
				FORGEMASTER	UK	A		
161	Generator Shaft Machining	CAT I		OMZ	RUSSIA	A		
				Alstom (Switzerland) Ltd.	Switzerland	A		
162	Centering Ring Forging	CAT II		Alstom Bharat Forge Power Limited	Sanand	A		
				Bharat Forge	Pune	A		
				Schmiedewerk Stoss	Switzerland	A		
				FORGITAL SPA VELO D ASTICO LOCALITA	Italy	A		
163	Centering Ring Machining	CAT II		Bav Forge	Chennai	A		
				Alstom (Switzerland) Ltd.	Switzerland	A		
164	Retaining Ring FORGING (Mat.18-18Cr-Mn)	CAT II		Bharat Forge Limited	Satara	A		
				Energietechnik Essen	Germany	A		
				Saarschmiede	Germany	A		
165	Retaining Ring Machining	CAT II		JSW	Japan	A		
				Alstom (Switzerland) Ltd.	Switzerland	A		
				Alstom Bharat Forge Power Limited	Sanand	A		
166	Rotor Copper Profile	CAT II		Swissmetall	Switzerland	A		
				Wieland	Germany	A		
				Buntmetall	Austria	A		
167	Field Lead Core Bar for Rotor	CAT II		Swissmetall	Switzerland	A		
				Buntmetall	Austria	A		
				Wieland	Germany	A		
168	Radial Bolt for Rotor	CAT II		Alstom	Switzerland	A		
				Starwire	Ballabgarh	A		
				Atals	Hydrabad		only for Machining	
169	Rotor Coil Forming	CAT I		Alstom (Switzerland) Ltd.	Switzerland	A		
		CAT II		Alstom Bharat Forge Power Limited	Sanand	A		
		CAT I						
170	Rotor Slot Wedges & Damper wedges	CAT II		Swissmetall	Switzerland	A		
				Wieland	Germany	A		
				Luvata	Finland	A		
				Buntmetall	Austria	A		
171	Generator Rotor Final	CAT I		ALSTOM Power Sp. z o.o.	Poland	A		
				ALSTOM (Switzerland) Ltd.	Switzerland	A		
172	Hydrogen Blower	CAT II		FIMA	Germany	A		
172.1	Hydrogen Blower Assembly	CAT II		Alstom (Switzerland) Ltd.	Switzerland	A		
173	Terminal Bushing(Condenser type)	CAT II		Trench (Emily new name)	France	A		
				HSP	Germany	A		
174	Terminal Box Fabrication	CAT II		ALSTOM Power Sp. z o.o.	Poland	A		
				ISGEC	Yamunanagr	A		
174.1	Terminal Box Machining	CAT II		Shape Engg	Haridwar	A		
				ALSTOM Power Sp. z o.o.	Poland	A		
				Energy machines	Ahmedabad	A		
175	End Shield Fabrication	CAT I		ALSTOM Power Sp. z o.o.	Poland	A		
				Shape Engg	Haridwar	A		

175.1	End Shield Machining	CAT I		ISGEC	Yamunanagr	A		
				ALSTOM Power Sp. z o.o.	Poland	A		
				ISGEC	Yamunanagr	A		
				Energy Machines	Ahmedabad	A		
176	Seal Assembly (Ring & Housing)	CAT II		ALSTOM Power Sp. z o.o.	Poland	A		
177	Stator water cooler	CAT I		Alpha Laval	Sweden	A		
				GEA	Germany	A		
				TRANTER	Pune	A		
				IDMC Ltd	Anand	A		
178	Stator water cooling unit	CAT II		Rockfin	Poland	A		
179	Stator water cooling pump	CAT II		ALWELLER	GERMANY	A		
				KSB	Pune	A		
				Ebera	Japan	A		
				SULZER	Navi Mumbai	A		
180	Slip Ring Shaft Forging	CAT II		See Generator Forging Suppliers				
				Bharat forge	Pune	A		
				BAY FORGE	Chennai	A		
180.1	Slip Ring Shaft Machining	CAT II		Alstom (Switzerland) Ltd.	Switzerland	A		
				Euroflex Transmission(india) pvt. Ltd.	Hydrabad	A		
181	DC-Lead Assembly for Slip Ring	CAT II		Alstom (Switzerland) Ltd.	Switzerland	A		
181.1	Slip Ring Shaft Assembly	CAT I		Alstom (Switzerland) Ltd.	Switzerland	A		
				Euroflex Transmission(india) pvt. Ltd.	Hydrabad	A	Only M/c	
182	Seal Oil Pump	CAT I		Allweiler	Germany	A		
				Allweiler	DAMAN	A		
				UT PUMP	FARIDABAD	A		
183	Seal Oil Cooler	CAT I		GEA	Germany	A		
				Alpha Level	EUROPE	A		
				Alfa level	Satara	A		
				ALPHA LAVAL	Sweden	A		
				TRANTER	Pune	A		
184	Seal Oil Unit	CAT II		Rockfin	Poland	A		
185	Hydrogen Cooler	CAT I		GEA	Germany	A		
				Kelwion	Pune	A		
				Laxmi	Bhopal	A		
186	Hydrogen dryer(Refrigrant Type)	CAT I		lindal electrical	Roorkee	A		
				Melcon engg	G. NOIDA	A		
187	Copper connector between main rotor and slip ring shaft(radial stud)	CAT II		SWISS METAL	Switzerland	A		
				Pfisterer Sefag AG	Germany	A		
188	Carbon Brush & Holders	CAT III		Morgan	Germany	A		
				Vidhyut Carbon	Haridwar	A		
				National Carbon	Kolkata	A		
				G. Dietrich (belongs to CL)	Germany	A		
189	ETS Material	CAT I		Thyseen Krupp	NASIK	A		
		CAT I		Mitsubishi	Japan	A		
		CAT II		Arcelor	Luxemburg	A		
		CAT II		Salzgietter	Germany	A		
		CAT II		Alloverze	Germany	A		
		CAT I		JSW	BELLARY	A		
		CAT II		IFE	Japan	A		
190	Radial Leads (Slip Ring Shaft)	CAT II		Schmelzmetall AG	Switzerland	A		ALSO FOR SL NO 71
191	Connection Rod for main Rotor	CAT II		Weiland werke	Germany	A		
				Swiss Metal	Switzerland	A		
192	Excitation System	CAT I		Alstom Power Sp. z o.o	Poland	A		
				GE power	NOIDA	A		
193	GHM(Generator health monitoring system)	CAT I		GE Power	Noida	A		
194	Excitation AC-DC Bus duct	CAT I		Etacom	Belgium	A		for Cast Resin
				REEP	Chennai	A		
				C&S	NOIDA	A		
NOTE	1. CHECKS FOR STATOR CORE ASSLY, STATOR WINDING ASSEMBLY, ROTOR WINDING ASSLY (GEN.), GENERATOR ROTOR -FINAL BEARING ASSEMBLY/SHAFT SEAL ASSEMBLY, EXCITER ASSLY (MAIN & PILOT)/ SLIP RING SHAFT ASSEMBLY WITH BRUSH GEARS, EXCITER TEST RUN, GENERATOR ASSEMBLY AT WORKS INCLUDING TERMINAL BUSHING & GENERATOR WORKS RUN TEST SHALL BE FINALIZED DURING DETAILED ENGINEERING/MQP FINALIZATION FOR THE RESPECTIVE OEMS. 2. For Raw Material/Components/Items of Generator which are not appearing in the above list, their OEM approved sources shall be tied up during Detailed Engineering/ MQP finalization.							
	D- MAJOR COMPONENTS FOR TOSHIBA MAKE GENERATOR (AS PER OEM SPECIFIC DESIGN):							
195	STATOR FRAME WITH MAN HOLE COVER FABRICATION & MACHINING	CAT I		TOSHIBA	JAPAN	A		
				TIPS	CHENNAI	A		
196	KEY BAR FABRICATION AND MACHINING	CAT I		TOSHIBA	CHENNAI	A		
				Kalyani Carpenter (Material)	Pune	A		
				Punj Lloyd (Machining)	Gwalior	A		

197	KEY BAR ASSEMBLY	CAT I		TOSHIBA	JAPAN	A		
				TIPS	CHENNAI	A		
198	DOVETAIL FOR STATOR	CAT I		TOSHIBA	JAPAN	A		
				TIPS	CHENNAI	A		
199	END PRESSURE PLATE - Fabrication	II		TOSHIBA	JAPAN	A		
		I		TIPS	CHENNAI	A		
199.1	End Pressure Plate - Machining	CAT II		TIPS	CHENNAI	A		
				Sharp Engineering	Pune	A		
				N.S Engg	Hyderabad	A		
200	STATOR CORE PUNCHING	I		TIPS	CHENNAI	A		
		II		TOSHIBA	JAPAN	A		
201	TERMINAL BOX FABRICATION & MACHINING	II		TOSHIBA	JAPAN	A		
		I		TIPS	CHENNAI	A		
		I		Leo Prime	Chennai	A		
202	OVER HANG SUPPORT RING	CAT II		HITACHI CHEMICAL	JAPAN	A		
203	SOLID COPPER CONDUCTOR (FOR STATOR BAR)	CAT II		UNIMAC	JAPAN	A		
204	HOLLOW COPPER CONDUCTOR (FOR STATOR BAR)	CAT II		UNIMAC	JAPAN	A		HOLLOW CONDUCTOR (RAW MATERIAL FROM FURUKAWA-JAPAN)
205	TERMINAL BUSHING (CONDENSER TYPE)	CAT II		PASSONI & VILLA	ITALY	A		
				Trench	Switzerland	A		
				Toshiba	Japan	A		
206	CONNECTING BUS BAR (PHASE BELTS) FABRICATION	CAT II		SUMIKEI COPPER	JAPAN	A		
				Oriental Copper	Thailand	A		
				Hitachi Cable	JAPAN	A		
207	INSULATING HOSES FOR STATOR (WATER SUPPLY HOSES)	CAT II		SAKURA RUBBER	JAPAN	A		
				CRANE RESISTOFLEX	USA	A		
				MIL	Chennai	A		
208	GENERATOR SHAFT FORGING	CAT II		SAARCSHMIEDI	GERMANY	A		
				SDF ITALY	ITALY	A		
				JCF	JAPAN	A		
				JSW	JAPAN	A		
				BUDERUS EDESTAHL	GERMANY	A		
				Doosan	Korea	A		
208.1	GENERATOR SHAFT MACHINING	CAT I		TOSHIBA	JAPAN	A		
				TIPS	CHENNAI	A		
209	ETS MATERIAL	CAT II		NIPPON	JAPAN	A		
				JFE	JAPAN	A		
210	RETAINING RING FORGING (MAT-CrMn 18-18)	CAT II		SAARCSHMIEDI	GERMANY	A		
				JSW	JAPAN	A		
210.1	RETAINING RING MACHINING	CAT II		TOSHIBA	JAPAN	A		
				TIPS	Chennai	A		
211	SILVER BEARING COPPER HOLLOW STRIPS (ROTOR COIL)	CAT II		ORIENTAL COPPER	THAILAND	A		
212	FIELD LEAD CORE BAR FOR ROTOR WITH D LEAD	CAT II		KME	GERMANY	A		
				ORIENTAL COPPER	THAILAND	A		
				BAOSHIDA SWISS METAL	GERMANY	A		
213	CURRENT CARRYING BOLTS FOR ROTOR	CAT II		TOYO KOGYO	JAPAN	A		
				TOSHIBA	JAPAN	A		
214	ROTOR COIL FORMING	CAT II		TOSHIBA	JAPAN	A		
				TIPS	Chennai	A		
215	ROTOR SLOT WEDGES & DAMPER WEDGES FABRICATION & MACHINING	CAT II		MURUKAMI	JAPAN	A		
				FIAY	ITALY	A		
				TOSHIBA	JAPAN	A		
216	GENERATOR ROTOR -FINAL	CAT I		TOSHIBA	JAPAN	A		
				TIPS	Chennai	A		
217	MOLDED INSULATION RING (FAN NOZZLE RIM)	CAT I		PCT	USA	A		
		II		PERMALI WALACE	Bhopal	A		
218	FAN BLADE ASLY ON ROTOR	I		TOSHIBA	JAPAN	A		
		II		TIPS	Chennai	A		
219	D LEAD (FL CORE BAR)& CONTACT BOLT FOR SLIP RING	I		TIPS	Chennai	A		
		II		TOSHIBA	JAPAN	A		
220	END SHIELD FABRICATION & MACHINING	CAT I		SHAPE	HARIDWAR	A		
				TIPS	Chennai	A		
221	Bearing (CE & TE)	II		DSE	Korea	A		
		I		Omega Renk	Bhopal	A		
		II		DYM	Korea	A		
222	CENTERING RING FORGING	I		BAY FORGE	CHENNAI	A		
		II		MINATO KIRO	JAPAN	A		
		II		NISHIMAKI IRON WORKS	JAPAN	A		
		I		GOODLICK	GHAZIABAD	A		
223	SEAL ASSLY (RING & HOUSING)	CAT II		TOSHIBA	JAPAN	A		
224	SLIP RING SHAFT ASSLY			TOSHIBA	JAPAN	A		

		I		TIPS	Chennai	A			
		II		TOSHIBA	JAPAN	A			
225	FAN BLADE FORGING & MACHINING								
		II		MURAKAMI SEISAKUSHO	JAPAN	A			
		I		TIPS	Chennai	A			
		I		Azad	Hyderabad	A			
		II		TOSHIBA	JAPAN	A			
226	HYDROGEN COOLER	CAT II							
				ENERGYEN	KOREA	A			
				KITASHIBA ELECTIRC	JAPAN	A			
				Karnataka Gas Coolers	Bangalore	A			
227	AC/DC BUSDUCT	CAT I							
				SPACEAGE	GURGAON	A			
				REEP	CHENNAI	A			
				C&S ELETRIC	NOIDA/HARIDWAR	A			
228	EXCITATION TRANSFORMER (DRY TYPE)	CAT I							
				RITZ	GERMANY	A			UPTO 6 MVA
				BHEL	JHANSI	A			UPTO 6 MVA
229	EXCITATION SYSTEM	CAT I							
				TOSHIBA	JAPAN	A			
				ABB	Bangalore	A			
230	HYDROGEN DRIER	CAT I							
				JINDAL ELECTRONICS	ROORKEE	A			
				MELCON ENGG	GREATER NOIDA	A			
				SPAN MANUFACTURING CO PVT LTD	ROORKEE	A			

NOTE 1. CHECKS FOR STATOR CORE ASSLY, STATOR WINDING ASSEMBLY, ROTOR WINDING ASSLY (GEN.), GENERATOR ROTOR - FINAL, BEARING ASSEMBLY/SHAFT SEAL ASSEMBLY, EXCITER ASSLY (MAIN & PILOT) / SLIP RING SHAFT ASSEMBLY WITH BRUSH GEARS, EXCITER TEST RUN, GENERATOR ASSEMBLY AT WORKS INCLUDING TERMINAL BUSHING & GENERATOR WORKS RUN TEST SHALL BE FINALIZED DURING DETAILED ENGINEERING/MQP FINALIZATION FOR THE RESPECTIVE OEMS.
2. For Raw Material/Components/Items of Generator which are not appearing in the above list, their OEM approved sources shall be tied up during Detailed Engineering/ MQP finalization.

Items Identified as Main Contractor approved sources									
MC 1	Tabular Type Heater	CAT III							
MC 2	Interlocks for ESP	CAT III							
MC 3	Porcelain Bushing Insulators	CAT III							
MC 4	Continous Cast Copper Rod	CAT III							
MC 5	Unimpregnated Densified Wood	CAT III							
MC 6	Marshalling Box Components	CAT III							
MC 8	Air Cell	CAT III							
MC 9	Terminal Connector	CAT III							
MC 10	Oil Flow Indicator	CAT III							
MC 11	Pressure Relief Valve	CAT III							
MC 12	Magnetic Oil Level Gauge	CAT III							
MC 13	OTI/WTI (RTD Type)	CAT III							
MC 14	Off-Circuit Tap Changer	CAT III							
MC 15	Cooling Fan & Motor Assembly	CAT III							
MC 16	Silica Gel Breather	CAT III							
MC 17	Bushing Metal Parts	CAT III							
MC 18	Copper Conductor Bus Bar	CAT III							
MC 19	Copper Foil/Sheet for Dry Type Transformer	CAT III							
MC 20	Core cheese assembly for Bus Reactor	CAT III							
MC 21	Core Clamps & OLTC Bracket, Core/Tie Bolt, Rods & Nuts	CAT III							
MC 22	Epoxy Casting Material for Dry Type Transformer	CAT III							
MC 23	Fibre Glass Covered Copper Conductor for Dry Type Transformer	CAT III							
MC 24	Fibre Glass Sheet for Dry Type Transformer	CAT III							
MC 25	Gaskets	CAT III							
MC 26	Hardwares	CAT III							
MC 27	Motor for OLTC	CAT III							
MC 28	Sheet Metal Enclosure for Dry Type Transformer	CAT III							
MC 29	Steel Plate & Pipe	CAT III							
MC 30	Tank Fabrication up to 5 MVA	CAT III							
MC 31	Temperature Surveillance Unit for Dry Type Transformer	CAT III							
MC 32	Valves (for Radiator/Gun Metal/CI valves,etc.)	CAT III							
MC 33	Gas Collecting Device	CAT III							
MC 34	Networking of Numerical Relay	*(with Switchgear MOP)							
MC 35	Paint	CAT III							
MC 36	Copper for Copper Flats & Copper strips/flexibles	CAT III							
MC 37	OIL PURIFYING EQUIPMENT	CAT III							
MC 38	VACUUM PUMP WITH MOTOR	CAT III							
MC 39	ON LINE MOISTURE REMOVAL SYSTEM	CAT III							
MC 40	Oil Tanker (wheel mounted),10 kl.capacity	CAT III							
MC 41	POST INSULATOR	CAT II							
MC 42	DISC INSULATOR/ PIN INSULATOR	CAT II							
MC 43	FIBRE OPTIC CABLE	CAT I							
MC 44	EVENT LOGGER	CAT III							
MC 45	GPS TIME SYNCHRONISATION EQUIPMENT	CAT III							
MC 46	RELAY TEST KIT	CAT III							
MC 47	DISTURBANCE RECORDER	CAT III							
MC 48	OPERATIONAL ANALYSER WITH DCRM KIT	CAT III							
MC 49	FOTE	CAT II							
MC 50	OPGW	CAT II							
MC 51	LARGE VIDEO SCREEN (LVS)	CAT III							
MC 52	BELT WEIGHER	CAT II							
MC 53	WEIGH BRIDGE	CAT I							
MC 54	IN LINE MAGNETIC SEPARATOR / SUSPENDE MAGNET	CAT II							
MC 55	METAL DETECTOR	CAT II							
MC 56	CABLE REELING DRUMS	CAT II							
MC 57	PIANO SWITCHES	CAT III							
MC 58	PULL CORD / BELTSWAY / INDICATION SYSTEM	CAT II							

PROJECT: SINGARENI THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE		LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB- SUPPLIER APPROVAL			DOC NO	
PACKAGE: EPC PACKAGE					REV. NO.	
Main supplier:		SUB SYSTEM: CIVIL WORKS			DATE	
Contract No.: CS-0371-001-2						
SL. NO.	ITEM	QAP / INSP. CAT	PROPOSED SUB SUPPLIER	PLACE OF MANUFACTURING	APPROVAL STATUS / CATEGORY	REMARKS
1.	GALVANIZED STEEL STRUCTURES (LATTICE & PIPE) FOR SWITCHYARD AND TRANSMISION LINE	I	VIJAY TRANSMISSION LTD	RAIPUR	A	
			UNITECH POWER TRANSMISSION LTD	NAGPUR	A	
			ASSOCIATED POWER STRUCTURES	VADODARA	A	
			R.S. INFRAPROJECTS PVT. LTD	SURAJPUR	A	
			NEW MODERN TECHNOMECH	MAYURBHANJ (ORRISA)	A	
			GOOD LUCK STEEL TUBES	SIKANDRABAD	A	
			UNIQUE STRUCTURES & TOWERS LTD.	RAIPUR	A	
			VATCO ELEC-POWER PVT. LTD.	NAVIMUMBAI	A	GALVANISING AT SIGMA GALVANISER NAVI MUMBAI
			R.S. INFRAPROJECTS PVT. LTD	SIKANDRABAD	A	
			ADVANCE STEEL TUBE	SAHIBABAD	A	
			SANGAM STRUCTURES LTD.	ALLAHABAD	A	
			RELIABLE SPONGE PVT LTD UNIT III	KALUNGA	A	
			VSP ENTERPRISES PVT. LTD	SONEPAT	A	
SKIPPER LIMITED	UNIT-I: JANGALPUR, Howrah. Unit-II: ULUBERIA UNIT, Howrah. UNIT- III: BCTL, Howrah.	A	Proto type inspection at Unit-Bagnan, Howrah			

			RUKMANI ELECTRICAL & COMPONENT PVT. LTD	RAIPUR	A	
			ENCORP POWERTRANS PVT LTD	PALGHAR	A	
			RICHARDSON & CRUDDAS (1972) LTD	NAGPUR	A	
2.	COLOUR COATED METAL DECK & CLADDING/ROOFING SHEET (COIL)	I	TATA STEEL LIMITED	KHOPOLI, RAIGARH	A	
			TATA STEEL LIMITED	SAHIBABAD	A	
			TATA BLUESCOPE STEEL LTD	JAMSHEDPUR	A	AL-ZN COIL FOR CLADDING
			ESSAR STEEL LTD	PUNE	A	
			NATIONAL STEEL & AGRO INDUSTRIES LTD	DHAR	A	
			JSW STEEL COATED PRODUCTS LTD	KALMESHWAR (NAGPUR)	A	
			JSW STEEL COATED PRODUCTS LTD	TARAPUR, BOISAR	A	
			BHUSHAN POWER & STEEL LTD	SAMBALPUR (ODISHA)	A	
3.	CHIMNEY ELEVATOR (RACK AND PINION)	I	MEKASTER ENGG. & EQUIPMENT(P) LTD.	HALOL, GUJARAT	A	
			ALIKRAFT ENGINEERS PVT. LTD.	SAVIL (VADODARA)	A	
			AVON CRANES	GURGAON	A	
			UNIVERSAL CONSTRUCTION MACHINERY & EQUIPMENT LTD.	PUNE	A	
4.	HDPE LINER (GEOMEMBRANE)	I	CLIMAX SYTHETICS PVT. LTD.	VADODARA	A	
			SHIVALIK AGRO POLY PRODUCTS LTD.	PARWANOO	A	
			D P WIRES PVT. LTD.	RATLAM	A	
5.	ELECTROFORGED GRATING	II	INDIANA GRATINGS PVT. LTD	PUNE	A	
			KANADE ANAND UDYOG	THANE	A	
			PREMIER POWER PRODUCTS LTD	HOWRAH	A	

			BHOLA RAM STEEL PVT. LTD	PATNA	A	
			PINAX STEEL INDUSTRIES PVT LTD	PATNA	A	
			GREATWELD STEEL GRATING PVT. LTD	PUNE	A	
			ANKIT ELECTROGRATING	RAIPUR	A	
			SUTTATTI ENTERPRISES LTD.	PUNE	A	
			RATAN PROJECTS & ENGINEERING CO. PVT. LTD.	HOWRAH	A	
			VINFAB ENGINEERS INDIA PVT LTD. (For Galvanising) VINFAB GRATINGS (For Fabrication)	THANE	A	
6.	PROFILERS FOR COLOUR COATED METAL DECK & CLADDING/ROOFING SHEETS	II	MAIN CONTRACTOR APPROVED SOURCE	-	-	
7.	FABRIC EXPANSION COMPENSATOR (FOR CHIMNEY)	II	MAIN CONTRACTOR APPROVED SOURCE	-	-	
8.	MINERAL WOOL FOR THERMAL INSULATION (FOR CHIMNEY)	II	MAIN CONTRACTOR APPROVED SOURCE	-	-	
9.	STOP LOG GATES, TRASH RACK AND LIFTING BEAM	II	MAIN CONTRACTOR APPROVED SOURCE	-	-	
10.	HIGH PERFORMANCE MOISTURE COMPATIBLE CORROSION RESISTANT COATING SYSTEM	III	CECRI LICENSED SOURCES	-	-	
11.	BITUMEN	III	ALL GOVERNMENT REFINERIES	-	-	
12.	PTFE BEARING / ELASTOMERIC BEARING	III	MORTH / RDSO APPROVED VENDORS	-	-	
13.	CEMENT	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
14.	CI PIPES	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
15.	RCC PIPES	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
16.	CPVC/UPVC PIPES	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
17.	PVC WATER STOP	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	

18.	POLYTHENE WATER STORAGE TANKS	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
19.	CERAMIC / VITRIFIED TILES	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
20.	PARTICLE BOARDS, PLYWOOD, MDF	III	BIS APPROVED SOURCES HAVING VALID BIS LICENCE	-	-	
21.	FIRE PROOF DOORS	III	MAIN CONTRACTOR APPROVED SOURCES WITH VALID PROTOTYPE TEST REPORT FROM (CBRI/CPRI/GOV. LAB.)	-	-	
22.	CONSTRUCTION CHEMICALS/ADMIXTURE, WATER PROOFING COMPOUNDS AND GROUTS	III	MAIN CONTRACTOR APPROVED SOURCE	-	-	
23.	PAINT AND PAINTING SYSTEM	III	MAIN CONTRACTOR APPROVED SOURCE	-	-	
24.	HIGH SOLID CONTENT LIQUID APPLIED URETHANE BASED ELASTOMERIC MEMBRANE FOR WATER PROOFING	III	MAIN CONTRACTOR APPROVED SOURCE	-	-	
25.	INSTRUMENTATIONS (POROUS TUBE PIEZOMETER, SURFACE SETTLEMENT POINT, WATER LEVEL SOUNDER ETC.) FOR ASH DYKE	III	MAIN CONTRACTOR APPROVED SOURCE	-	-	
26.	FOUNDATION BOLTS	III	MAIN CONTRACTOR APPROVED SOURCE	-	-	

LEGENDS:

1. SYSTEM SUPPLIER/SUB-SUPPLIER APPROVAL STATUS CATEGORY (SHALL BE FILLED BY NTPC)

A – For these items proposed vendor is acceptable to NTPC. To be indicated with letter “A” in the list along with the condition of approval, if any.

DR – For these items “Details required” for NTPC review. To be identified with letter “DR” in the list.

2. QP/INSPN CATEGORY:

CAT-I: For these items the Quality Plans are approved by NTPC and the final acceptance will be on physical inspection witness by NTPC.

CAT-II: For these items the Quality Plans approved by NTPC. However, no physical inspection shall be done by NTPC. The final acceptance by NTPC shall be on the basis review of documents as per approved quality plan.

CAT-III: For these items the Quality control to be exercised as per Main Contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of conformance (COC) by Main Contractor.

UNITS/ WORKS: Place of manufacturing Place of Main Supplier of multi units/works.

NOTE 1: For the items placed in CAT-III for Civil Works, the review and final acceptance shall be done by NTPC-EIC/ FQA on the basis of MTC / certificate of conformance in line with Technical Specifications/FQP.

NOTE 2: Items for which Sub-QR is envisaged, vendors shall be considered for assessment subject to Sub-QR clearance from NTPC Engg.

		PROJECT : SINGAREN THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE PACKAGE : EPC PACKAGES CONTRACTOR: CONTRACT NO : CS-					LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00 DATE :01.04.2024 SUB SECTION: C&I	
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark	
1	AAQMS System	I				ACOEM Ecotech Industries Pvt Ltd	Pithampur	A			1. So2 ,Nox,CO,CO2 ,Ozone ,PM-10,PM-2.5 & multipoint calibrator will be from Ecotech Australia 2.Metrological sensor from Dynalab 3. Mercury analyser from LOA agreed sources 4.PI refer Note-07	
		I				Horiba India Pvt Ltd	Pune	A			1. So2 ,Nox,CO,CO2 ,Ozone & multipoint calibrator will be from Horiba Japan 2.PM-10,PM-2.5 ,TSP will be from Met One USA & metrological sensor from Spectrum USA 3. Mercury analyser from LOA agreed sources	
		I				Enviroment SA India Pvt. Ltd.	Mumbai	A			1.Analysers SO2,Nox,CO2 & SPM from Environment SA France, 2-Multipoint Calibrator From enviroment SA France 3-Metrological Sensor with interface unit from M/s LSI Lastem SRL, Italy	
		I				Thermo Fisher Scientific India Pvt. Ltd	Mumbai	A			1) Analysers (Sox,Nox,CO,SPM,RSPM ,Ozone) ,multi gas calibrator shall be sourced from their principle Thermo Environmental ,USA (Division of M/S Thermo fisher Scientific, USA) 2)Metrological sensors shall be sourced from M/S Metone Instruments USA	
		I				Chemtrol Engineering Ltd	Goa	A			1. Analysers from M/S Teledyne USA except Mercury analyser . 2.Metrological sensors & SPM analysers from Met one Instruments Inc USA 3.PI refer note-07	
2	Acoustic pyrometer System	I				Lucent Marcons Pvt Ltd (As a system Integrator of M/S Scientific Environmental Instruments, Inc. (SEI) USA)	Noida	A			1.Boiler watch processor control unit, acoustic sensor (Pizeo/Microphone with prefab cable) , Preamplifier , mapping software & analog output cards shall be from M/S SEI USA . 2. Enclosure ,OWS ,Waveguide ,Transition cone with flange , venturi , Tube box etc shall be from M/S SEI USA approved sources to be tiedup in MQP. 3. PI refer Note-07	
		I				Hi-Tech Systems & Services Ltd (As a system Integrator of M/S Bonenberg + Drescher GmbH, Germany)	Kolkata	A			1.All critical components are to be procured from M/S Bonenberg + Drescher GmbH, Germany 2.Standard indiginious components like Solenoid valve (Asco make) ,matching flange ,printer & monitor table shall be supplied by M/S Hi- Tech	
		II				Scientific Environment Instrument Inc (SEI)	USA	A			1.PCU ,Acoustic sensor ,Preamplifier mapping software shall be from SEI USA . 2. Enclosure ,OWS ,Waveguide ,Tube box etc shall be from SEI approved sources to be tiedup in MQP. 3.PI refer Note-07	
		II				Bonnenberg + Drescher GmbH,	Germany	A				
		II				STOCK Equipment Co	USA	A				
3	Addressable Detector (Multisensor , Photo & Heat Detectors Type), Interface units & Manual call points	II				Honeywell Life Safety-HIPL	Gurugram	A			Notifier Brand (Detector, Interface Module only)	
		II				Schrack	Austria	A				
		II				Autronica	Norway	A				
		II				Edwards	Mexico	A				
		II				Notifier	USA	A				
		II				Sheld Fire safety	UK	A				
		II				Jhonson Controls	USA	A			Simplex Brand	
4	Battery for 24VDC charger & UPS	Note-4				Hoppecke Batterien GmbH & Co Kg	Germany	A			For Lead Acid- Plante	
		Note-4				Exide	Kolkata	A			For Lead Acid- Plante	
		Note-4				SAFT India Ltd	Bengaluru	A			For Ni-Cd	
		Note-4				HBL Power	Hyderabad	A			For Ni-Cd ,Upto 990AH (H type)	
		Note-4				SAFT	France/Sweedn	A			For Ni-Cd	
		Note-4				Hoppecke Batterien GmbH & Co Kg	Germany	A			For Ni-Cd	
5	Blank Panels / Cabinets	III				Pyrotech Electronics Pvt. Ltd	Udaipur	A				
		III				Rittal India Private Ltd	Bengaluru	A				
		III				Hoffman	Bengaluru	A				
		III				BHEL	Bengaluru	A				
		III				BCH ELECTRIC LIMITED	Faridabad	A				
6	Boiler tube leak detection system (ASLD)	III				HI Tech System & services Ltd (System Integrator of Acoustic Monitoring International Inc. USA)	Kolkata	A			1.M/S Acoustic Monitoring International Inc. USA Make system Conditional as per approval letter 01/CQA/9573-102/Hi-tech-AMI dated 11.04.2013 2.PI refer Note-07	
		III				Raman Instruments (System Integrator of M/S Procon UK)	Delhi	A			1.M/S Procon UK Make system 2.PI refer Note-07	
		III				BHEL Ltd	Trichurapalli	A				
		III				Instrotech (PTY) Ltd	South Africa	A				
		III				Rectuson Co. Ltd	S.Korea	A				
		III				Procon Engineering	UK	A				

		PROJECT : SINGAREN THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE PACKAGE : EPC PACKAGES CONTRACTOR: CONTRACT NO : CS-				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00 DATE : 01.04.2024 SUB SECTION: C&I	
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark
		III				Acoustic Monitoring International Inc. (AMI)	USA	A			
7	CCTV System (IP Based)										
		III				Axis	Sweden	A			1.CCTV components will be of Axis communication AB.Sweden make & Video Management Software will be of Milestone Brand. 2.Other BOI items shall be from LOA approved sources & will be tied up during the finalization MQP.
		III				Bosch	Bengaluru	A			1.CCTV components will be of M/S Bosch make, and supplied through M/s Bosch, Bengaluru. 2.Other BOI items shall be from LOA approved sources & will be tied up during the finalization MQP.
		III				Pelco	USA	A			1.CCTV components will be of M/S Pelco, USA make 2.Other BOI items shall be from LOA approved sources & will be tied up during the finalization MQP.
		III				M/s Samridhhi Automations Pvt. Ltd (spash make)	Haridwar	A			1.CCTV components will be of M/S Samridhhi, Haridwar make. 2.Other BOI items shall be from LOA approved sources & will be tied up during the finalization MQP.
7A	CCTV System (IP Based) /System Integrators										
		I				Jonson Control India Pvt Ltd	Mumbai	A			M/S Pelco Make CCTV system
		I				Toshniwal Industrial Pvt Ltd	Ajmer	A			M/S Axis Make CCTV system
		I				L&T TECHNOLOGY SERVICES	Faridabad	A			M/S Samridhhi(spash) Make CCTV system
		I				Score Information Technologies Limited	Kolkata	A			M/S Bosch Make CCTV system
8	Control Desk										
		I				Pyrotech Workspace Solutions Pvt Ltd	Udaipur	A			BOI items like Mosaic tiles /Console items shall be as per LOA approved sources
		I				Cosmos Media Products Pvt Ltd	Greater Noida	A			1.BOI items like Mosaic tiles /Console items shall be as per LOA approved sources 2. H block should be from Knurr Germany .Solid acrylic surface should be procured from Du Pont/NTPC approved sources 3.Extruded Al profile structure should be procured from Hindalco (With Knurr design)
		I				Adarsha Control system Pvt Ltd	Bengaluru	A			1.BOI items like Mosaic tiles /Console items shall be as per LOA approved sources 2. Acrylic solid surface (ASS) should be procured from Du Pont /NTPC approved sources 3.wood works are to be done by M/S C K Furn Bangaluru
9	Control Valves										
9-A	Control Valves for Aux PRDS system including desuperheater										
		I				Instrumentation Limited	Palakkad (Kerala)	A			Up to A182F92 material with conditions as per approval letter
		I				Koso India Pvt limited	Nasik	A			Up to A182F92 material with conditions as per approval letter
		I				Bomafa Special Valve solutions Pvt ltd	Ahmedabad	A			Up to A182F92 material with conditions as per approval letter
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A			As per approval Ref: 02/CQA/SG/Tanda/MIL Dated 30.09.2015
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.MQP shall be vetted by M/S CCI -USA 2.Sources of major components like casting /forging and actuators shall be tied up during finalization of MQP
		II				Parcol SPA	Italy	A			
		II				Daume	Germany	A			
		II				HOLTER	Germany	A			
9-B	Control Valve for Start Up System										
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.The critical components of control valve i.e. Disk Stack (Drag technology) shall be sourced from CCI, USA/CCI S. Korea . 2.The positioner from NTPC approved sources & pneumatic actuators are sourced from CCI S.Korea 3.Control valve to be manufactured as per CCI USA design & drawing.
		I				KOSO India Pvt Ltd	Nasik	A			
		I				Emerson Process Management Ltd	Chennai	A			
		II				Dresser Produits industriels Industriels S.A.S	France	A			
		II				SEMPPELL AG	Germany	A			Up To size 20 Inches & 2500 ANSI Class
		II				Nihon Koso Co Ltd	Japan	A			
		II				HORA	Germany	A			
		II				CCI	S.Korea	A			
		II				Emerson (Fisher)	USA/France/Japan	A			
9-C	Control Valve for BFP Recirculation.										

		PROJECT : SINGAREN THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE PACKAGE : EPC PACKAGES CONTRACTOR: CONTRACT NO : CS-				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00 DATE :01.04.2024 SUB SECTION: C&I	
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.The critical components of control valve i.e. Disk Stack (Drag technology) shall be sourced from CCI, USA/CCI S. Korea . 2.The positioner from NTPC approved sources & pneumatic actuators are sourced from CCI S.Korea 3.Control valve to be manufactured as per CCI USA design & drawing.
		I				KOSO India Pvt Ltd	Nasik	A			
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A			Up to 10 Inches & 3400 ANSI class
		II				Dresser Produits industriels Industriels S.A.S	France	A			
		II				Nihon Koso Co Ltd	Japan	A			
		II				CCI	USA	A			
		II				Emerson (Fisher)	USA/France/Japan	A			
9-D	Control valve for feedwater flow Control										
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.The critical components of control valve i.e. Disk Stack (Drag technology) shall be sourced from CCI, USA/CCI S. Korea . 2.The positioner from NTPC approved sources & pneumatic actuators are sourced from CCI S.Korea 3.Control valve to be manufactured as per CCI USA design & drawing.
		I				KOSO India Pvt Ltd	Nasik	A			
		I				Emerson Process Management Ltd	Chennai	A			Control valve body assembly will be from Nippon Fisher Japan with IBR form III C certificates .
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A			1.Provision of straight type of brackets for linkage mechanism .2.Factory fitted strainer /diffuser type seat ring . 3.AFR with T connector for pneumatic connection to volume booster
		II				Dresser Produits industriels Industriels S.A.S	France	A			
		II				Nihon Koso Co Ltd	Japan	A			CONDITIONAL
		II				CCI	USA / Austria / S.Korea / Switzerland	A			
		II				Emerson (Fisher)	USA/France/Japan	A			
9-E	Control valves for Soot blower pressure reducing ,SH/ RH Attemperation.										
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			1.The critical components of control valve i.e. Disk Stack (Drag technology) shall be sourced from CCI, USA/CCI S. Korea . 2.The positioner from NTPC approved sources & pneumatic actuators are sourced from CCI S.Korea 3.Control valve to be manufactured as per CCI USA design & drawing.
		I				KOSO India Pvt Ltd	Nasik	A			
		I				Emerson Process Management Ltd	Chennai	A			
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A			
		I				GE Oil & Gas India Pvt Limited	Coimbatore	A			up to 2500 ANSI Class
		I				Flow Serve India Controls Pvt Ltd	Bengaluru	A			
		I				Instrumentation Limited	Palakkad (Kerala)	A			only for SH / RH
		II				Nihon Koso Co Ltd	Japan	A			
		II				Dresser Masonellan	USA	A			only for SH / RH/ up to 2500 class
		II				Dresser Produits industriels Industriels S.A.S	France	A			
		II				SPX Flow Technology	USA	A			only for SH / RH
		II				Leslie Controls Inc	USA	A			only for SH / RH
		II				Sempell AG (Tycoo group)	Germany	A			only for SH / RH
		II				CCI	USA/Sweden /S.Korea	A			
		II				Emerson (Fisher)	USA/France /Japan	A			
9-F	Control valve(Other application)										
		I				Mascot Valves Pvt Ltd	Ahmedabad	A			Up to size 12 inches & 900 ANSI class
		I				Control Component India PVT Ltd	Sricity (Andhra Pradesh)	A			Up to 2500 ANSI class
		I				KOSO India Pvt Ltd	Nasik	A			
		I				KSB MIL Controls Ltd	Thrissur (Kerala)	A			Up to 2500 ANSI class
		I				Emerson Process Management Ltd	Chennai	A			Up to 2500 ANSI class
		I				GE Oil & Gas India Pvt Ltd	Coimbatore	A			Up to size 10 inches & 900 ANSI class /Up to size 24 inches & 600 ANSI class
		I				Flow Serve India Controls Pvt Ltd	Bengaluru	A			Up to size 14 inches & 600 ANSI class
		I				Forbes Marshal Arca Pvt. Ltd.	Pune	A			Up to size 16 inches & 900 ANSI class
		I				Instrumentation Limited	Palakkad (Kerala)	A			Up to 2500 ANSI class
		I				Severn Glocon India Pvt Ltd	Chennai	A			Up to size 14 inches & 300 ANSI class
		I				M/s Unicorn Valves Pvt. Ltd.	Coimbatore	A			Up to size 18 inches & 300 ANSI class
		II				CCI	USA/Sweden /S.Korea	A			
		II				Nihon Koso Co Ltd	Japan	A			
		II				Emerson (Fisher)	USA/France /Japan	A			
		II				Leslie Controls Inc	USA	A			
		II				PARCOL S.P.A	Italy	A			
		II				Dresser Produits industriels Industriels S.A.S	France	A			
		II				HORA	Germany	A			
		II				Wellend & Tuxhorn	Germany	A			
		II				SPX Flow Technology	USA	A			
		II				Sempell AG (Tycoo group)	Germany	A			
9-G	Control Valve (Ceramic lined)										

		PROJECT : SINGAREN THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE PACKAGE : EPC PACKAGES CONTRACTOR: CONTRACT NO : CS-				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00 DATE :01.04.2024 SUB SECTION: C&I	
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark
		I				Samson Controls Pvt Ltd	Pune	A			1. For M/S Samson Cera Germany make valve Up to 10 inches size & 150 ANSI class 2. BOI shall be tied up at the time of finalisation of MQP
10	DDCMIS	I				ABB	Germany	A			
		I				SIEMENS AG	Germany	A			
		I				Emerson Process Management Asia Pacific Pvt Ltd	Singapore	A			
		I				Hitachi nest control system Pvt Ltd	Bengaluru	A			
		I				Honeywell Automation India Ltd	Pune	A			
		I				GE	France	A			
		I				SIEMENS	Gurugram	A			
		I				BHEL	Bengaluru	A			For MAX DNA System
		I				Yokogawa	Bengaluru	A			
		I				GE Power India Ltd	Noida	A			
		I				Toshiba	Japan	A			
		I				ABB	Bengaluru	A			
		I				M/s Emerson Electric Co. (India) Pvt Ltd.	Nashik	A			1.All assembly, testing and supply must be done by Emerson process management India pvt. Ltd at approved Nashik work address.
11	Dust Emission Monitor										
		III				Durag India Instrumentation Pvt Ltd	Bengaluru	A			1. For Durag Germany Make Extractive Type Dust density analyser 2. Other components shall be as per approval letter CQA/NTPC BARH STTP-I /D-263 / Durag India Instrumentation Pvt Ltd Bengaluru Dated 28.08.2019
		III				Sick India Pvt Ltd	Mumbai	A			1.For SICK AG Make Extractive Type Dust density analyser 2. Other components shall be as per approval letter CQA/NTPC BARH-I /S-907/M/S SICK India Pvt Ltd dated 28.08.2019
		III				Environment SA India Pvt Ltd	Navi Mumbai	A			1.For ENEVA UK Make Extractive Type Dust density analyser 2. Other components shall be as per approval letter No.: CQA/NTPC BARH-I /E-335 / M/S Environment SA India Pvt Ltd Dated 16.09.2019
		III				Land Instruments International	UK	A			For In Situ type /Optical Transceiver type
		III				Codel	UK	A			For In Situ type /Optical Transceiver type
		III				Durag Industrie Elektronik GmbH & Co KG	Germany	A			For In Situ type /Optical Transceiver type & Extractive Type
		III				Emerson Process Management	Ireland	A			For In Situ type /Optical Transceiver type
		III				SICK AG	Germany	A			For In Situ type /Optical Transceiver type & Extractive Type
		III				ENEVA	UK	A			For Extractive Type Dust density analyser
12	Electrical Actuators										
12-A	Electrical Actuator (With gear box if applicable)	II				Antrieb Technik Pvt Ltd	Chennai	A			For low torque applications only
		II				Auma	Bengaluru	A			
		II				Limitorque	Faridabad	A			Model no L120,SMBLY series, Gear Box T, HBC Series
		II				Rotork	Bengaluru	A			For low torque app (Up to 1000 Nm)
		II				Rotork Controls (India) Private Ltd	Chennai	A			For low torque app (Up to 1000 Nm) & High torque 4000 to 7000 Nm With integral starter for non critical applications
		III				Auma	Germany	A			
		III				Limitorque	USA	A			
		III				Rotork	UK	A			For low torque app (Up to 1000 Nm)
		III				Nippon gear	Japan	A			
		III				Drehmo GMBH	Germany	A			C Matic Series (DMC/DMCR)
12-B	Electrical Actuator- Non-Intrusive (With gear box if applicable)	I				Auma India Pvt Ltd	Bengaluru	A			Also acceptable for Field Bus based applicable
		I				Rotork Control	Chennai	A			Upto 630Nm
		III				Flowserve	USA	A			Also acceptable for Field Bus based applicable
		III				Bernard Controls	France	A			
		II				M/s Enertork Ltd.	South Korea	A			
12-C	Electrical actuator for ID/FD/PA Blade pitch JGV &SCOOP	III				Harold Beck & Sons Inc	USA	A			
		III				SIPOS Aktorik GmbH	Germany	A			
13	Electronics Transmitter (Pressure , DP and DP based Flow/Level)										
13-A	Electronics Transmitter (Pressure , DP and DP based Flow/Level)	III				ABB Ltd	Bengaluru	A			2600T & critical item from ABB Italy/ Their approved source;
		III				Emerson Process Management Ltd	Pawane	A			
		III				Siemens Ltd	Thane	A			Model:-SITRANS P
		III				Honeywell Automation India Ltd	Pune	A			
		III				Baldota Control and Equipment Pvt Ltd	Navi Mumbai	A			PT & DPT of LD 301 Series (SMAR)
		III				Yokogawa India Limited	Bengaluru	A			EJA-E 110,430,530 SERIES & all raw material and BOI under knocked down condition (sensor assembly as a single unit) shall be sourced from M/S Yokogawa Japan
		III				M/s Endress + Hauser India Automation Instrument Pvt Ltd	Aurangabad	A			
		III				Emerson (Rosemount)	USA	A			
		III				Yokogawa	Japan	A			

		PROJECT : SHIVAJI THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE PACKAGE : EPC PACKAGES CONTRACTOR: CONTRACT NO : CS-				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00 DATE : 01.04.2024 SUB SECTION: C&I	
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark
		III				ABB	Germany / Italy	A			2600T & critical item from ABB Italy/ Their approved source;
		III				Siemens	France	A			Sitrans P DSIII Series
		III				Fuji Electric	France	A			FCX -AIII SERIES
		III				Fuji	Japan	A			
13-B	Electronics Transmitter -Field Bus Based (Pressure , DP and DP based Flow/Level)										
		I				ABB India Ltd	Bengaluru	A			One no of Transmitter will be sent at DDCMIS supplier for function testing of field bus communication with DDCMIS during FAT
		I				Yokogawa India Limited	Bengaluru	A			EJA-E 110,430,530 SERIES & all raw material and BOI under knocked down condition (sensor assembly as a single unit) shall be sourced from M/S Yokogawa Japan
14	EQMS										
		I				SWAN	Hyderabad	A			1. Conductivity analyser, pH analyser and Temperature Transmitter will be of M/s ABB, UK make . 2. TSS analyser will be of M/s Daeyoon, South Korea make . 3. Oil in water analyser will be of M/s TriOs, Germany make. 4. Online BOD/COD analyser will be of M/s Shimadzu, Japan make . 5. Flow meter will be of M/s Khrono Marshall, Maharashtra make. 6. Data Aquisition System will be procured from Knowledge Lens, Karnataka.
15	Fiber optic cable										
		Note-3				U M Cables Ltd	Silvassa (Daman)	A			
		Note-3				KEC International Ltd	Mysore	A			
		Note-3				Apar Industries Limited	Valsad (Gujrat)	A			
		Note-3				HFCL	Goa	A			
		Note-3				Aksh Fibre	Bhiwadi (Raj)	A			
		Note-3				Finolex Cable Ltd	Goa	A			
		Note-3				Birla Cable Limited	Rewa	A			
		Note-3				R&M	Switzerland	A			
		Note-3				Molex	UK	A			
		Note-3				Corning	USA	A			
16	Fire alarm Panel										
		II				Toshniwal Industrial Pvt Ltd	Ajmer	A			1.M/S Notifier Make Fire alarm Panel 2.PI Refer Note-07
		II				Bosch Security system	Bengaluru	A			1.Detector , Hooter, MCP, Modules, Panel shall be M/s Bosch Make
		II				Notifier	USA	A			
		II				Autronica	Norway	A			
		II				Schrack	Austria	A			
		II				Edwards	Mexico	A			
		II				Shield Fire safety and security Ltd	UK	A			
		II				Jhonson Controls	Mexico	A			Simplex Brand
17	Flame Monitoring System (Scanner)										
		I				Lucent Marcons Pvt Ltd (System Integrator of M/S Forney Corporation USA)	Noida	A			1.Flame detector, amplifier ,light guide fiber optic , smart display programming unit , test kit & simulator will be supplied from M/S Forney Corporation USA 2.Other components like outer carrier ,IDD cable with connector , expander , Y connector with adapter gasket , fastners & signal isolators will be supplied from M/S Forney Corporation USA approved sources . 3.PI Refer Note-7
		I				HI Tech System & services Ltd (System Integrator of BFI Germany)	Kolkata	A			1.For BFI Germany make system 2. PI Refer Note-7
		II				Durag India Instrumentation Pvt Ltd	Bengaluru	A			For Durag Germany make system
		II				Forney Corporation	USA	A			
		II				BFI	Germany	A			
		II				Durag GmbH	Germany	A			
		II				Emerson (COEN)	USA	A			
		II				BHEL	Trichurapalli	A			
18	Flow nozzle assembly										
		I				Microprecision Product Pvt Ltd	Palwal	A			Up to Alloy steel material grade P-92 & other conditions as per approval letter
		I				Minco India Flow Elements Pvt. Ltd.	Goa	A			Up to size 26 Inches for Alloy steel/ Stainless steel pipe SA335 P-11, P -22 and SA 335 P-91 & other conditions as per approval letter
		I				Instrumentation Limited	Palakkad (Kerala)	A			Up to alloy steel grade P-92 subject to qualified WPS & other conditions as per approval letter
		I				Stamech controls (India) Pvt Ltd	Pune	A			Up to alloy steel grade P-92 subject to qualified WPS & other conditions as per approval letter
		II				SEIKO	Czech Republic	A			
		II				WISE Control	S.Korea	A			
		II				Technomatic	Italy	A			
19	Flue Gas Analyser (CO)										
		III				Forbes Marshall Pvt Ltd	Pune	A			For In situ type CO analyser
		III				ICE (Asia) Pvt Ltd	Mumbai	A			For In situ type CO analyser 1. CO analyser from Protea UK 2. Other components like, Mounting Flanges, tubing, fittings ,junction boxes, air purging system , calibration cylinders & cables will be supplied by ICE (Asia) Pvt Ltd 3.PI refer Note-7

		PROJECT : SINGAREN THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE PACKAGE : EPC PACKAGES CONTRACTOR: CONTRACT NO : CS-				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00 DATE :01.04.2024 SUB SECTION: C&I	
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark
		III				Sick India Pvt Ltd	Mumbai	A			For In Situ Type / CO analyser from SICK AG & Other components like .Protection tube ,Flanges ,tubing ,fittings ,junction boxes, solenoid valves & calibration cylinders will be supplied by M/S Sick India Pvt Ltd .
		III				Emerson Process Management Ltd	Pawane	A			For M/S Emerson Germany/ USA make Analyser
		III				Codel	UK	A			
		III				Land Instruments International	UK	A			
		III				Sick AG	Germany	A			For In Situ Type
		III				Envoirement SA	France	A			For Hot Extractive
		III				Fuji Electric	Japan	A			
		III				Servo max Group	UK	A			
		III				Siemens	Germany	A			
20	Flue Gas Analyser (CO2,SO2 and Nox)										
		III				Sick India Pvt Ltd	Mumbai	A			For In Situ Type SO2 analyser 1. Analyser will be from Sick AG Germany 2. Other components like ,Whether proof covers ,flanges ,purge air unit ,junction boxes ,cables ,PC ,remote display ,gas cylinders shall be supplied by M/s Sick India Pvt Ltd
		III				Emerson Process Management Ltd	Pawane	A			For M/s Emerson Germany/ USA make Hot Extractive SO2, NOx Analyser
		III				Envoirement SA	France	A			For Hot Extractive
		III				Fuji Electric	Japan	A			Hot Extractive Type For SO2 & Nox
		III				Siemens	Germany	A			Hot Extractive Type For SO2 & Nox
		III				Yokogawa Electric Corporation	Japan	A			IR-400 Series (Hot Extractive Type For CO2, SO2 & NOx)
		III				Servo max Group	UK	A			Hot Extractive Type For SO2 & Nox
		III				Sick AG	Germany	A			Hot Extractive Type For CO2, SO2 & NOx and In situ type for SO2 analyser
21	Flue Gas Analyser O2 Analyser (HT)										
		III				SECO	Chennai	A			
		III				Marathon Monitor	USA	A			
		III				Servo max Group	UK	A			
22	Flue Gas Analyser (O2 Analyser (LT))										
		III				Sick India Pvt Ltd	Mumbai	A			For In Situ Type 1. Analyser will be from Sick AG Germany 2. Other components like ,Whether proof covers ,flanges ,purge air unit ,junction boxes ,cables ,PC ,remote display ,gas cylinders shall be supplied by M/s Sick India Pvt Ltd
		III				Analysers Instruments Co Pvt Ltd	Kota	A			For In Situ Type 1.Main parts like Sample probe & Analyser will be supplied by M/s Enotec Germany. 2. Other components like auto calibration unit ,probe protector , enclosure panel & calibration kit will be supplied & integrated M/s AIC kota. 3.Pl refer Note-07
		III				Emerson Process Management Ltd	Pawane	A			For In Situ Type For M/s Emerson USA make Analyser
		III				ABB	Bengaluru	A			For In Situ Type For M/s ABB UK make Analyser
		III				Yokogawa India	Bengaluru	A			For In Situ Type For M/s Yokogawa Japan make Analyser
		III				Enotech GmbH	Germany	A			For In Situ Type
		III				Ametek	USA	A			For In Situ Type
		III				Yokogawa Electric Corporation	Japan	A			For In Situ Type
		III				Servo max Group	UK	A			For In Situ Type
		III				Sick AG	Germany	A			For In Situ Type
23	Continous Emission Monitoring system										
		I				Horiba India Pvt Ltd	Pune	A			Approval conditions as per approval letter no - CQA/NTPC Mauda-II / H-321 / M/S Horiba India Pvt Ltd Dated 03.10.2019
		I				Yokogawa India Ltd	Bengaluru	A			1. SO2,NOx & CO2 Analyser will be from M/S Yokogawa Electric Corporation Japan . 2.Other Conditional as per approval letter no Ref. No.-CQA/BARH-I / Y-023/ M/s Yokogawa India Ltd dated 21.05.2020
		I				Adage Automation Pvt Ltd.	Goa	A			For M/s Siemens Germany make SO2,NOx & CO2 Analysers
		I				Thermo Fisher Scientific India Pvt. Ltd	Pune	A			Approved only for Dilution Extractive Technique 1)Analyser (SO2,NOx,CO,CO2,Mercury) , sampling probe ,sample handling system ,umbilical cord etc to be supplied from M/S Thermo Fisher USA. 2) Other BOI shall be as per LOA approved sources
		I				Emerson Process Management India Pvt Ltd	Pawane	A			For M/s Emerson Germany make SO2,NOx & CO2 Analysers other conditions as per approval letter.
		I				Analysers Instruments Co Pvt Ltd	Kota	A			Analysers from Fuji Japan & other BOI shall be as per LOA approved sources .
		I				Envoirement SA India Pvt Ltd	Navi Mumbai	A			Hot Extractive Type / 1.Multipoint gas Analyzers MIR-9000 for SO2, NOx,CO2 & CO ,Probe ,Nafyon drier & heater for drier will be of M/S Environment SA France make. 2. Other components shall be as per the approval letter ref no CQA/NTPC Telangana/E-335/M/SEnvoirement SA India dated 12.02.2019
24	Furnace Flame viewing system (High Temperature CCTV Components)										
		III				Sertel Electronics Pvt. Ltd.	Chennai	A			Approved for Visible type only

		PROJECT : SHARADH THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE PACKAGE : EPC PACKAGES CONTRACTOR: CONTRACT NO : CS-				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00 DATE :01.04.2024 SUB SECTION: C&I	
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark
		III				Hi Tech System and Service (System Integrator of M/S Lenox USA)	Kolkata	A			1.M/S Lenox USA Make System 2.PI refer Note-07
		III				Durag India Instrumentation Pvt Ltd	Bengaluru	A			1. Complete Camera Assembly, IRIS Control etc. from Durag Germany 2.Other Component like chiller, video monitor, OFC ,Panel from M/S Durag Approved sources
		III				TLT Engg Pvt. Ltd. (System Integrator of M/S Diamond Power USA/ Sweden make system)	Kolkata	A			1.M/S Diamond Power USA/ Sweden make system 2.PI refer Note-07
		III				Toshniwal Industries (System Integrator of M/S Mirion UK make system)	Ajmer	A			1. M/S Mirion UK make system 2.PI refer Note-07
		III				Diamond Power	USA / Sweden	A			
		III				Durag GmbH	Germany	A			D-VTA-201
		III				Lenox	USA	A			
		III				Mirion	UK	A			
		III				Piper GmbH	Germany	A			
		III				Sabota GmbH	Germany	A			
25	H2 Gas Analyser										
		I				ABB India Ltd	Bengaluru	A			M/s ABB Germany /UK Make analyser
		I				Adage Automation Pvt. ltd	Goa	A			1.M/s Siemens, Garmany (Calomat 6) Make analyser 2. PI refer Note-07
		I				Yokogawa India ltd	Bengaluru	A			M/s Yokogawa Japan (Gas Densitybased) Make analyser
		I				SIEMENS	Gurugram	A			M/s Siemens, Garmany (Calomat 6) Make analyser
		III				GE Sensing EMEA	Ireland	A			Conductivity based
		III				ABB	UK	A			
		III				Emerson (Rosemount)	USA	A			
		III				Environment One Corporation	USA	A			Conductivity based
26	HEA ignitor										
		I				Durag India Instrumentation Pvt Ltd	Bengaluru	A			M/S Durag Germany make HEA Ignitor
		I				Hindustan Thermometers	Ambala	A			Conditional as per approval ref no 01/CQA/0270-102 dated 17.09.2012.Spark tip of their own make is also acceptable
		I				Fives combustion System Pvt Ltd	Vadodara	A			
		I				Boiler control Pvt Ltd	Pudukottai (Tamilnadu)	A			Approved for Aux Boiler package only
		III				Unison Industries	USA	A			
		III				Durag GmbH	Germany	A			
		III				Ignition system INC	USA	A			
		III				Tesi SPA	Italy	A			
27	High Temp. cable (PTFE/FEP)										
		II				Thermocables	Hyderabad	A			
		II				Tempsens	Udaipur	A			
		II				Habia cables	Sweden	A			
		II				Thermo Electrica BV	Netherland	A			
		II				Lapp cables	Germany	A			
		II				Kerpen cables	Germany	A			
		II				TEW & C	USA	A			
28	Impulse Pipes/Tubes										
		II				Maharashtra Seamless	Raigarh	A			For CS Pipes only
		II				Ratnamani Metals and Tubes	Gandhinagar	A			For SS only.
		II				Heavy Metals and Tubes	Gandhinagar	A			For SS & CS only.
		II				ISMT	Ahamadnagar	A			For CS/ AS upto Gr 22 Pipes only
		II				Nippon Steel & Sumitomo Metals corporation	Japan	A			
		II				TPS Tecnitube	Germany	A			
		II				Veluric & Manessmann	Germany	A			
		II				Trouvay and Cauvin	France	A			
		II				Sandvik	Sweden	A			For SS only
		II				REMI Edlestahl Tubulars Ltd	Palghar	A			
29	Instrument Cables (F,G & T/C Cables)										
		Note-2				Goylene Fibers (India) Pvt Ltd	Silvassa	A			F&G Type Cable
		Note-2				Temsens Instruments Ind Pvt Ltd	Udaipur	A			
		Note-2				Havells India	Alwar	A			F Type Cable
		Note-2				Paramount Communication Ltd	Khushkhera	A			
		Note-2				Polycab	Daman	A			
		Note-2				Delton	Faridabad	A			
		Note-2				KEI	Bhiwadi (Raj)	A			
		Note-2				Elkey Telelinks	Faridabad	A			
		Note-2				CORDS	Kaharani	A			
		Note-2				CORDS	Bhiwadi	A			
		Note-2				Nicco	Kolkata	A			
		Note-2				Universal Cable	Satna	A			
		Note-2				Thermocables	Hyderabad /Mahboobnagar	A			
		Note-2				Gupta Power Infrastructure Ltd.	Khurdha	A			
		Note-2				CMI	Faridabad	A			
		Note-2				Advance Cables Pvt Ltd	Bengaluru	A			F&G Type Cable
		Note-2				Gemsab Industries Ltd	Bhiwadi (Raj)	A			F&G Type Cable
		Note-2				Apar Industries Limited	Valsad	A			F&G Type Cable
		Note-2				Suyog Electricals Ltd	Halol (Gujrat)	A			
		Note-2				Special Cables Pvt Ltd	Rudrapur	A			
		Note-2				T C Communication	Ghaziabad	A			
		Note-2				TEW & C	USA	A			
		Note-2				Habia cables	Sweden	A			
		Note-2				Kerpen cables	Germany	A			
		Note-2				Lapp cables	Germany	A			
		Note-2				Thermo electra Bv	Netherland	A			
30	Intelligent Battery charger 24V DC / DCDB/BHMS										
		II				Chabbi Electricals	Jalgaon	A			Rectifier module, Controller module and Battery Health monitoring system shall be of M/s Vertiv make
		II				Eltek SGS Pvt Ltd	Gurugram	A			
		II				Vertiv Energy Pvt ltd	Pune	A			

		PROJECT : SINGAREN THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE PACKAGE : EPC PACKAGES CONTRACTOR: CONTRACT NO : GS-					LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00 DATE :01.04.2024 SUB SECTION: C&I
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark
31	Large Video Screen (LED Based)	I				Pyrotech Electronics Pvt Ltd	Udaipur	A			
		I				Delta India Electronics Pvt Ltd	Gurugram	A			
		I				Barco Electronics system (P) Ltd	Noida	A			
		I				Planner System Inc	USA	A			
32	Level switch- Conductivity type	II				Raman Instruments (System integrator of Delta Morbey/ Emerson Mobrey /Solartron -Mobrey)	Navi Mumbai	A			1.M/S Emerson (Morbey) UK system 2.PI refer Note-07
		II				HI Tech System & services Ltd (System Integrator of Levelstate systems Ltd ,UK)	Kolkata	A			1. M/S Levelstate UK System .Vessel from M/s Hi Tech 2.PI refer Note-07
		II				BHEL	Trichurapalli	A			
		III				Emerson -Mobrey (Solartron mobrey)	UK	A			
		III				Levelstate Systems Ltd	UK	A			
		III				Yarway	USA	A			
33	Local Instrument Enclosure/Rack	I				Pyrotech Electronics Pvt. Ltd	Udaipur	A			BOI from LOA approved sources
		I				Sajas electrical	Trichurapalli (Tamilnadu)	A			BOI from LOA approved sources
		I				Prammen	Puddukottai (Tamilnadu)	A			BOI from LOA approved sources
		I				Chemin C&I Pvt Limited	Puduchery	A			1- BOI from LOA approved sources 2.Fabrication at M/s LUFT tech India 3- Painting at M/s Supreme Coater & Fabricator
34	Master Slave Clock System	I				Signals and Systems Pvt. Ltd. (SANDS)	Chennai	A			
		I				Masibus	Gandhinagar	A			
		I				Sertel Electronics Pvt. Ltd.	Chennai	A			
		II				Hopf Elektronik GmbH	Germany	A			
		II				Hathway	USA	A			
		II				Mein Berg	Germany	A			
		II				Moser Baer AG	Switzerland	A			
35	Mercury Analyser	I				Analysar Instrument Co. Pvt Ltd (AIC)	Kota	A			1. Mercury Analyzer from PS Analytical UK 2.System integration & supply of components like, Enclosure with AC, calibration cylinders, PC will be done by M/s Analyser Instrument Co. Pvt Ltd (AIC) Kota . 3.PI refer Note-07
		III				Environment SA India Pvt Ltd	Navi Mumbai	A			1-Mercury analyzer with accessories will be from Mercury instruments GmbH Germany . 2- Other components like, sample line between probe to mercury analyzer will be supplied by M/s Environment SA India Pvt Ltd .
		III				Thermo Fisher Scientific India Pvt Ltd	Pune	A			1. Mercury Analyser shall be from Thermofisher USA 2. Other approval conditions are as per approved letter ref no 01/CQA/9578-001/Thermofisher dated 09/12/2016
		III				Durag India Instrumentation Pvt Ltd	Bengaluru	A			Analysar from M/s Verewa Umwelt Germany
		III				Mercury Instruments GmbH	Germany	A			
		III				SICK AG	Germany	A			
		III				Themofisher	USA	A			
		III				Lumax	Russia	A			For AAQMS System
36	PA System (IP Based)	III				BNA Technology Consulting Ltd.	Bengaluru	A			BOI shall be from LOA approved sources.
		III				Armtel	Russia	A			
		III				Zenitel	Norway	A			1.PA system active component , Proprietary item will be Zenitel Norway make 2.Other components & BOI shall be from LOA approved sources
		III				Commend International GMBH	Austria	A			
36A	PA System (IP Based)/System Integrators	III				Willstrong Solutions Pvt. Ltd	Greater Noida	A			note-7 For M/s Armtel Russia system Approval conditions as per approval letter no Patratu-QA/9585-001-102/VA-Willstrong Dated: 21.12.20
		III				Toshniwal Industries Pvt ltd	Ajmer	A			For M/s Commend Austria make system
		III				Aishan Technologies Pvt Ltd	Bengaluru	A			For M/s Zenitel Norway make system
		III				Haritasa Checkmate Electronics Pvt Ltd	Bengaluru	A			For M/s Commend Austria make system
		III				Netware Computer Pvt Ltd	New Delhi	A			For M/s Commend Austria make system
		I				M/S L&T Technology Services Limited	Faridabad	A			For M/s Commend Austria make system
37	PLC System	I				Emerson Automation solution Intelligent plateforms Pvt Ltd	Bengaluru	A			PLC modules from M/s Emerson USA & BOI shall be from LOA approved sources
		I				ABB India Ltd	Bengaluru	A			
		I				Schneider Electric system india Pvt Ltd	Chennai	A			PLC modules from M/s Schneider France & BOI shall be from LOA approved sources
		I				Rockwell	Sahibabad	A			
		I				Siemens	Nasik	A			
		I				Honeywell	Pune	A			PLC modules from M/s Honeywell ,S.Korea & BOI shall be from LOA approved sources
		I				Schneider Electric India Pvt Ltd	Bengaluru	A			PLC modules from M/s Schneider France & BOI shall be from LOA approved sources

		PROJECT : SHARHENT THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE PACKAGE : EPC PACKAGES CONTRACTOR: CONTRACT NO : CS-				LIST OF ITEMS REQUIRING QUALITY PLAN AND SUB SUPPLIER APPROVAL				REVISION NO : 00 DATE :01.04.2024 SUB SECTION: C&I	
Sr No	Item Description	QP Inspection Category	QP No	QP submission SCH	QP approval SCH	Proposed Sub Supplier	Country	SS Approval Status (Note-1)	SS Detail Sub.SCH	SS Approval SCH	Remark
37-A	PLC System Integrators										Note-11 and note-7
		I				Ladder Automation Solution Pvt Ltd	Gurugram	A			For M/s Honeywell make system
		I				Virtual Automation	Ranga Reddy (Telangana)	A			For M/s Schneider make system
		I				Cotmac Electronics Pvt Ltd	Pune	A			For M/s SIEMENS make system
		I				Tech-Masters	Hyderabad	A			For M/s Emerson make system
		I				Powertech Switchgear (I) Pvt Ltd	Sonepat	A			For M/s Schneider make system
		I				Unity Industrial Automation Pvt Ltd	Delhi	A			For M/s Rockwell make system
		I				EMCONS	Ranchi	A			For M/s Rockwell make system
		I				Divya Engineers	Chennai	A			For M/s SIEMENS make system
		I				M D Industries	Vadodara	A			For M/s Emerson make system
		I				Velox automation	Surat	A			For M/s SIEMENS make system
		I				Vision Comptel	Kolkata	A			For M/s Emerson make system
		I				Adaptive Engineering Private Limited	Ahmedabad	A			For M/s Schneider make system
		I				Greenwave Solutions Private Limited	Kolkata	A			For M/s Rockwell make system
		I				Dreamz Automation	Ghaziabad	A			For M/s SIEMENS make system
		I				Creative Robotics	Ghaziabad	A			For M/s Honeywell make system
		I				Kruti Techno Engineer Pvt Ltd	Chhapraula (GB Nagar	A			For M/s SIEMENS make system
		I				EDS Instruments & Systems Pvt Ltd	Chennai	A			For M/s Honeywell make system
		I				Delys Automation Technologies Pvt Ltd	Chennai	A			For M/s Emerson make system
		I				Hindustan Controls and Equipment Ltd	Kolkata	A			For M/s Emerson make system
		I				Vollkraft Engineering And Consultant (P) Ltd	Kolkata	A			For M/s Emerson make system
		I				SSM Infotech Solutions Pvt Ltd	Surat	A			For M/s Schneider make system
		I				Sun Industrial Automation & Solutions	CHENNAI	A			For M/s Schneider make system
		I				ARTEE FLOW CONTROL PVT LTD	ANKLESHWAR	A			For M/s Honeywell make system
		I				CSS AUTOMATION PVT. LTD	KOLKATA	A			For M/s Emerson make system
		I				ARMAX AUTOMATION PVT LTD	BANGALORE	A			For M/s ABB make system
		I				KAIZEN AUTOMATION	AHEMDABAD	A			For M/s Schneider make system
		I				ELECON PERIPHERALS LIMITED	ANAND	A			For M/s ABB make system
		I				M/s Skytech infinite Platform Private Limited	Bangalore	A			For M/s Emerson make system
38	Pneumatic Actuator Regulating (Power Cylinder HAD,CAD SADC & Burner Tilt)										
		I				Instrumentation Limited	Palakkad (Kerala)	A			
		I				Kelton	Cochin (Alleppy)	A			
		I				SMC Corporation India Private Ltd	Noida	A			Up to Bore size 12 inches
		I				IMI Norgren Herion Pvt Ltd	Noida	A			
		I				NELES INDIA PRIVATE LIMITED	Dombivli	A			
		II				Dong Woo Valve Control Co. Ltd	S.Korea	A			
		II				Shin Hwa Engineering Co. Ltd	S.Korea	A			
39	Radar type level transmitter										
		III				Limaco	Russia	A			High Frequency Type
		III				Emerson Process Management Ltd	Pawane	A			For M/s Emerson Singapore make
		III				Endress & Houser	Aurangabad	A			
		III				SIEMENS	Canada	A			
		III				B M Technology	Italy	A			For Non Contact type
		III				Magnetrol	Belgium	A			
		III				ABB	USA	A			K-Tech Brand
		III				Endress & Houser	Germany	A			
		III				Saab Rosemount	Sweden	A			
		III				Emerson Process Management	Singapore	A			Rosemount 3300 series for GW Radar & 5600 Series for Non-Contact type
		III				Endress & Houser	Germany	A			
		III				Vega Grieshaber KG	Germany	A			
40	Short Term Fire Proof cable										
		III				nVent Solutions limited	UK	A			
		III				Wrexham Mineral	UK	A			
		III				KME	Italy	A			
41	SWAS (Sampling Handling System and Dry Panel)										
		I				Emerson Process Management Ltd	Navi Mumbai	A			Analysers and Other BOI Componets from LOA agreed source
		I				Forbes Marshall	Pune	A			Analysers and Other BOI Componets from LOA agreed source
		I				SEPL	Pune	A			Analysers and Other BOI Componets from LOA agreed source
		I				YOKOGAWA INDIA LTD	Bangalore	A			Analysers and Other BOI Componets from LOA agreed source
42	Water Analyser (Chloride, Conductivity, Dissolved Oxygen,pH, Hydrazine, Concentration , Phosphate, Silica, Soddium,Turbidity, Total Iron, Degassed Cation Conductivity)										
		III				Emerson Process Management Pvt Ltd	Pawane	A			For Conductivity,pH, Dissolved Oxygen, Turbidity
		III				Mettlet Toledo India Pvt Ltd	Vasai	A			For pH Analyser (1. PH analyser from M/S Mettler Toledo GmbH Switzerland 2. Other components like, Housing, Panel mounting kit, Tubing's & easy clean mechanism will be supplied by M/s Mettler Toledo India Pvt Ltd)

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		III				Endress Hauser India Pvt. Limited	Mumbai	A			For pH Analyser (1. pH sensor with cable , analyser ,retract & cleaning assembly , electrolyte reservoir (As applicable) will be supplied from Principals of M/S Endress Hauser India Pvt. Limited. 2. Other components like, Flow through assembly shall be supplied from M/S Endress Hauser India Pvt. Limited approved sources.)
		III				Thermo Fisher Scientific	USA	A			For Chloride,Dissolved Oxygen,Hydrazine
		III				ABB	UK	A			For Chloride,Dissolved Oxygen,Hydrazine, Phosphate, Silica,Sodium,Turbidity
		III				Hach	USA	A			For Conductivity, pH,Concentration, Phosphate, Silica,Turbidity
		III				ABB	USA	A			For Conductivity, pH
		III				Yokogawa	Japan	A			For Conductivity
		III				Hach	Switzerland	A			For Dissolved oxygen, Hydrazine, Silica,Sodium
		III				Yokogawa	Japan	A			For pH
		III				Eutech Instrument PTE Ltd	Singapore	A			For Silica
		III				Orion	USA	A			For Sodium
		III				SWAN Analytische Instrumente AG	Hinwil /Switzerland	A			For pH Analyzer , Conductivity analyser ,Dissolve Oxygen analyser , silica Analyzer , Sodium Analyzer , Hydrazine analyser , Turbidity analyser
		I				Forbes Marshall Pvt Ltd	Pune	A			For Conductivity & pH analyser
		I				METTLER TOLEDO INDIA PVT LTD	Mumbai	A			For Chloride Analyser
43	Temp Transmitter										
43-A	Temp Transmitter										
		III				Endress & Houser	Aurangabad	A			
		III				Emerson Process Management Ltd	Pawane	A			For M/s Emerson Singapore make
		III				Yokogawa	Bengaluru	A			Make Yokogawa japan and calibration at Yokogawa Bangalore
		III				ABB	Bengaluru	A			For M/s ABB Germany make
		III				WIKA Instruments India Pvt Ltd	Pune	A			For M/s WIKA Germany make Model no T-32
		III				Honeywell Automation India Ltd	Pune	A			
		III				Yokogawa	Japan	A			
		III				Moore	USA	A			
		III				M System co Ltd	Japan	A			Model No-B3HU-0
		III				Emerson	U.S.A/Singapore/ Germany	A			
		III				ABB	Germany	A			
		III				Emerson Process Management	Germany	A			
43-B	Temp Transmitter -Field Bus based Single/Dual Input										
		I				ABB India Ltd	Bengaluru	A			One no of TT will be available at DCS supplier for function testing of field bus communication with DCS during FAT
44	Turbine supervisory Instruments along with vibration analysis system.										
		I				GE	Pune	A			For GE Bently ,USA make system
		I				Meggitt India Pvt ltd	Bengaluru	A			For Meggitt (Vibrometer) Switzerland make system
		I				Forbes Marshall	Pune	A			For Shinkawa Japan make system
		II				GE BENTLY	USA	A			
		II				SHINKAWA	JAPAN	A			
		II				MEGGITT	Switzerland	A			
45	Ultrasonic Type Flow Meter (for Stack)										
		III				Sick India Pvt ltd	Mumbai	A			For Sick AG Germany make
		III				Sick AG	Germany	A			
		III				Durag	Germany	A			
		III				Teledyne	USA	A			
46	Ultrasonic type level Transmitter										
		III				EIP Enviro	Noida	A			1-Ultrasonic level Tx shall be BM Technology Italy make 2-Required mounting arrangement , Testing, Calibration shall be carried out at M/s EIP Works.
		III				E & H	Aurangabad	A			
		III				Emerson Process Management Ltd	Pawane	A			Complete Instrument Transmitter & Probe to be procured from Mobrey UK , only intergration & configuration at Pawane works
		III				BM Technology	Italy	A			
		III				Siemens Miltronics	Canada	A			
		III				Niveco Process Control	Hungary	A			
		III				E & H	Germany	A			
		III				HAWK Measurement PTY Ltd	Australia	A			
47	UPS With ACDB										
		Note-5				Vertive Energy Pvt Ltd	Pune	A			Upto 125 KVA for 1 phase and 300 KVA for 3 Phase
		Note-5				Vertive Energy Pvt Ltd	Mumbai	A			Upto 160 KVA
		Note-5				Hitachi Hirel Power Electronics Pvt Ltd	Gandhinagar	A			Upto 200 KVA,
		Note-5				Fuji Electric Consul Neowatt Private Limited	Pune	A			Up to 100 KVA single phase
		Note-5				KELTRON	Trivendrum	A			
		Note-5				Merlin & Gerin	France	A			
		Note-5				Gutor	Switzerland	A			
		Note-5				AEG	Germany	A			
		Note-5				Fuji Electric	Japan	A			
48	Vibration Monitoring System										
		II				Sensonics Technology India	Kundli	A			For Sensonic UK system

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		II				BHEL	Bengaluru	A			1. Imported items like Vibration Monitors, Cross Connection Cables, Buffered Output Modules, and Piezoelectric Vibration Sensors, Eddy Current type Proximity Probe, Extension Cable and Signal Conditioner will be procured from Valmet Automation, Finland. 2. Indigenous items like Communication cables, networking components, blank panels, TB, OWS will be procured from NTPC approved sources.
		II				IRD Mechanalysis Ltd	Thane	A			Vibration sensors will be sourced from M/s Hansford UK ,however brand name of IRD and its logo is acceptable with suitable traceability of M/s Hansford, UK.
		II				Forbes Marshall Pvt Limited	Pune	A			VMS hardware , Sensors ,extention cables shall be shinkawa Japan make 2. All other BOI shall be from LOA agreed sources
		II				GE	Pune	A			For GE Bentley , USA Make
		II				Rockwell Automation	Sahibabad	A			For Rockwell USA make
		II				SKF	Pune	A			For SKF USA make
		II				Imageneous Engineering Pvt Ltd	Vadodara	A			1-For Meggitt Switzerland make 2- Refer note 7
		II				Shinkawa	Japan	A			
		II				GE	USA	A			Bentley Niveda brand
		II				Meggitt	Switzerland	A			
		II				Sensonic Limited	UK	A			
49	Wireless Solution (Microwave Tower Communication)										
		I				L&T Technology Services (LTTS)	Bengaluru	A			1- Wireless Product (Access Point, Antenna) shall be M/s Cambium UK Make 2- Other Item like Switch, Cat-6 Cable can be supplied from M/s LTTS approved sources meeting technical requirements.
		I				Lotus wireless technologies India Pvt Ltd	Visakhapatnam	A			
		I				Sheetal Wireless Technologies Pvt Ltd	Pune	A			
		III				Proxim Wireless Corporation	USA	A			BOI shall be as per approval letter
50	Field Bus Cable/ Profibus Cable- PA & DP type										
		I				LAPP India Pvt Ltd	Bangalore	A			
		I				M/s Thermo Cables Ltd	HYDERABAD	A			
51	Field bus components (Field bus modules ,segment protector ,surge protector & SS JB)										
		III				Phoenix Contact Inc	USA	A			Materiall will be allowed to dispatch from the vendor works as CAT-III item ,however all material except SS junction box will be available at DDCMIS supplier works for functional testing .
		III				Pepperl + Fuchs Pte Ltd	Singapore	A			Materiall will be allowed to dispatch from the vendor works as CAT-III item ,however all material will be available at DDCMIS supplier works for functional testing .
52	Stockyard Management System(Including 3D profiling scanner ,Thermal Imaging Camera, RTK GPS)										
		III				TSA	Brazil	A			For 3D profiling / Tripple-IN Germany make
		I				EIP Enviro	Noida	A			For 3D profiling / 1-Tripple-IN Germany make Laser Scanner and RPU along with software from TSA Brazil inline with the M/s TSA Letter. 2- Other item like ethernet cable, Ethernet Switch, Junction Box required for execution of 3D stockpile management system can be supplied by EIP Enviro
53	Perimeter Intrusion Detection System										
		III				Senstar	Canada	A			
54	Radar based Perimeter Surveillance System										
		III				Magos System Ltd	Israel	A			Third Party "Cyber Penetration report " shall be provided along with material TC/COC
55	Thermal Camera (PTZ)										
		III				FLIR Commercial Systems INC	USA	A			

Main Contractor approved sources (Note-12)

MC-1	Amonia Analyser	III				Main Contractor Approved Sources					
MC-2	Amonia leak detector	III				Main Contractor Approved Sources					
MC-3	Air Filter Regulator	III				Main Contractor Approved Sources					
MC-4	Anemometer	III				Main Contractor Approved Sources					
MC-5	Annunciator	III				Main Contractor Approved Sources					
MC-6	Battery Health Monitoring System	III				Main Contractor Approved Sources					
MC-7	Biofouling/ Deposit Monitor	III				Main Contractor Approved Sources					
MC-8	Coal bunker Level monitor	III				Main Contractor Approved Sources					
MC-9	Compression Fittings(SS)	III				Main Contractor Approved Sources					
MC-10	Condensing Pots	III				Main Contractor Approved Sources					
MC-11	Conduits /Pipe (GI)	III				Main Contractor Approved Sources					
MC-12	Conduits lead coated (Flexible)	III				Main Contractor Approved Sources					
MC-13	Copper tubing/Brass connectors	III				Main Contractor Approved Sources					
MC-14	Coriolios Type Mass Flow meter	III				Main Contractor Approved Sources					
MC-15	Coupling /Interposing Relays	III				Main Contractor Approved Sources					
MC-16	Density Indicator	III				Main Contractor Approved Sources					
MC-17	Desk for OWS/EWS/Printer/Server	III				Main Contractor Approved Sources					
MC-18	Digital Indicators	III				Main Contractor Approved Sources					
MC-19	Dust Sensor	III				Main Contractor Approved Sources					
MC-20	Dew point sensor/meter (H2)	III				Main Contractor Approved Sources					
MC-21	Flow Gauge	III				Main Contractor Approved Sources					
MC-22	Flow Indicator cum Totaliser	III				Main Contractor Approved Sources					

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MC-23	Flow Switch	III				Main Contractor Approved Sources					
MC-24	FRP Junction Box	III				Main Contractor Approved Sources					
MC-25	Furniture for control Room(Chair, Almira, Lock)	III				Main Contractor Approved Sources					
MC-26	Furnace exit gas temp probe	III				Main Contractor Approved Sources					
MC-27	Graphic Interface Unit	III				Main Contractor Approved Sources					
MC-28	Hand Held Callibrator	III				Main Contractor Approved Sources					
MC-29	Hart Management System	III				Main Contractor Approved Sources					
MC-30	Humidistat / Thermostat / Gyserstat / Airstat	III				Main Contractor Approved Sources					
MC-31	Instant Corrosion Rate Monitor & Portable Corrosion Meter	III				Main Contractor Approved Sources					
MC-32	Impact head type flow element	III				Main Contractor Approved Sources					
MC-33	Instrument Tube Fittings (Air)	III				Main Contractor Approved Sources					
MC-34	Instrument Valve	III				Main Contractor Approved Sources					
MC-35	IR Detector	III				Main Contractor Approved Sources					
MC-36	KVM Switch/Matrix KVM Switch	III				Main Contractor Approved Sources					
MC-37	Level gauge (Transparent & Reflex, Tubular type)	III				Main Contractor Approved Sources					
MC-38	Level Indicator (Float & Board type)	III				Main Contractor Approved Sources					
MC-39	Level switch - Float/Displacer Type	III				Main Contractor Approved Sources					
MC-40	Level Switch (RF Type)	III				Main Contractor Approved Sources					
MC-41	Level switch capacitance type	III				Main Contractor Approved Sources					
MC-42	Limit Switch	III				Main Contractor Approved Sources					
MC-43	Maintenance and Calibration Equipment	III				Main Contractor Approved Sources					
MC-44	Mini UPS-Type C configuration	III				Main Contractor Approved Sources					
MC-45	Orifice plate assembly	III				Main Contractor Approved Sources					
MC-46	On line carbon in Ash analyser	III				Main Contractor Approved Sources					
MC-47	Pitot Tube	III				Main Contractor Approved Sources					
MC-48	Pr./Vacuum/DP Gauges	III				Main Contractor Approved Sources					
MC-49	Press, DP, Vacuum Switch	III				Main Contractor Approved Sources					
MC-50	Printer (Dot Matrix/Inkjet / Laser)	III				Main Contractor Approved Sources					
MC-51	Psychrometer	III				Main Contractor Approved Sources					
MC-52	Pulse jet Controller	III				Main Contractor Approved Sources					
MC-53	Pulse Valve	III				Main Contractor Approved Sources					
MC-54	Residual Chlorine Analyser	III				Main Contractor Approved Sources					
MC-55	Rotameter	III				Main Contractor Approved Sources					
MC-56	Reverse Rotation Indicator	III				Main Contractor Approved Sources					
MC-57	Synchronising Relay	III				Main Contractor Approved Sources					
MC-58	Synchroscope	III				Main Contractor Approved Sources					
MC-59	Semaphore Indicators	III				Main Contractor Approved Sources					
MC-60	Sight Flow Indicator	III				Main Contractor Approved Sources					
MC-61	Smart Positioner	III				Main Contractor Approved Sources					
MC-62	Socket Weld Fittings	III				Main Contractor Approved Sources					
MC-63	Solenoid Valve	III				Main Contractor Approved Sources					
MC-64	Solid Mass Flow Meter	III				Main Contractor Approved Sources					
MC-65	Terminal Block (Cage and Clamp type)	III				Main Contractor Approved Sources					
MC-66	Temperature cum Humidity Indicator	III				Main Contractor Approved Sources					
MC-67	Temperature Element(Thermocouple , RTD & Thermowell)	III				Main Contractor Approved Sources					
MC-68	Temperature Gauge(With Thermowell)	III				Main Contractor Approved Sources					
MC-69	Temperature Switch	III				Main Contractor Approved Sources					
MC-70	Transducer	III				Main Contractor Approved Sources					
MC-71	Tube thickness Meter	III				Main Contractor Approved Sources					
MC-72	Voltmeter/ Wattherhour Meter	III				Main Contractor Approved Sources					
MC-73	Valve manifolds	III				Main Contractor Approved Sources					
MC-74	Electric to Pneumatic Converter	III				Main Contractor Approved Sources					
MC-75	Network components	III				Main Contractor Approved Sources					
MC-76	Isolator	III				Main Contractor Approved Sources					
MC-77	ORP Monitor /Analyser	III				Main Contractor Approved Sources					
MC-78	Ultrasonic Type Flow Transmitter	III				Main Contractor Approved Sources					
MC-79	Chlorine Leak detector	III				Main Contractor Approved Sources					
MC-80	Density Meter	III				Main Contractor Approved Sources					
MC-81	Electro Magenetic Flow meter	III				Main Contractor Approved Sources					
MC-82	Positive displacement Type Flow Meter	III				Main Contractor Approved Sources					
MC-83	Level Scanner (3 D)for Solid Application	III				Main Contractor Approved Sources					
MC-84	Mosaic tiles /Console items	III				Main Contractor Approved Sources					
MC-85	Electrical Control Panel (UCP/Backup)	III				Main Contractor Approved Sources					
MC-86	Electrical Indicating Instruments (Mosaic Compatible)	III				Main Contractor Approved Sources					
MC-87	OVS/EWS/Server	III				Main Contractor Approved Sources					
MC-88	Bio Matrix Reader	III				Main Contractor Approved Sources					
MC-89	ANPR	III				Main Contractor Approved Sources					
MC-90	UVSS	III				Main Contractor Approved Sources					
MC-91	Comd & Control System	III				Main Contractor Approved Sources					
MC-92	Access & Controllor Software	III				Main Contractor Approved Sources					
MC-93	IR LED based Illuminator	III				Main Contractor Approved Sources					
MC-94	ATB Bolloard	III				Main Contractor Approved Sources					
MC-95	Boom Barrier	III				Main Contractor Approved Sources					
MC-96	Touchless biometric recorder	III				Main Contractor Approved Sources					
MC-97	GPS Sensor based Vehicle Monitoring system	III				Main Contractor Approved Sources					
MC-98	10mp digital camera with tripod for photo capture	III				Main Contractor Approved Sources					
MC-99	2D GIS map application	III				Main Contractor Approved Sources					
MC-100	Audible alarm device	III				Main Contractor Approved Sources					
MC-101	CameraPoles	III				Main Contractor Approved Sources					
MC-102	Card Reader	III				Main Contractor Approved Sources					
MC-103	Door Frame Metal Detector -DFMD	III				Main Contractor Approved Sources					
MC-104	Door sensor	III				Main Contractor Approved Sources					
MC-105	Egress Switch	III				Main Contractor Approved Sources					
MC-106	EM LOCK	III				Main Contractor Approved Sources					
MC-107	Emergency exit / door override switch	III				Main Contractor Approved Sources					
MC-108	Emergency Siren /Hooter	III				Main Contractor Approved Sources					
MC-109	Flap barrier	III				Main Contractor Approved Sources					
MC-110	Flash Lights for covering perimeter area for clear view from PTZ in night time	III				Main Contractor Approved Sources					
MC-111	Geo fencing	III				Main Contractor Approved Sources					
MC-112	Glass Break switch at Emergency Exit	III				Main Contractor Approved Sources					
MC-113	Guard tour	III				Main Contractor Approved Sources					
MC-114	Half Height Tumstile	III				Main Contractor Approved Sources					
MC-115	Handheld Walkie - Talkie	III				Main Contractor Approved Sources					
MC-116	HHMD	III				Main Contractor Approved Sources					
MC-117	Long Range RFID Reader	III				Main Contractor Approved Sources					
MC-118	Monitors 24 Inch Full HD	III				Main Contractor Approved Sources					
MC-119	Network Panel	III				Main Contractor Approved Sources					
MC-120	Optical Time Domain Reflector-meter (OTDR) with all accessories	III				Main Contractor Approved Sources					
MC-121	Panic Button with Audible Alarm	III				Main Contractor Approved Sources					

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MC-122	Panic button/SOS button supportin SIP protocol	III				Main Contractor Approved Sources					
MC-123	RFID based Stickers	III				Main Contractor Approved Sources					
MC-124	Sliding Gate	III				Main Contractor Approved Sources					
MC-125	SMS gateway	III				Main Contractor Approved Sources					
MC-126	Storage Device (SAN/NAS/DAS) of 100 TB each	III				Main Contractor Approved Sources					
MC-127	Traffic Light	III				Main Contractor Approved Sources					
MC-128	Turnstile - half height	III				Main Contractor Approved Sources					
MC-129	SPIKE BARRIER	III				Main Contractor Approved Sources					
MC-130	CHAIN LINK FENCE	III				Main Contractor Approved Sources					
MC-131	X-ray Baggage Scanner	III				Main Contractor Approved Sources					
MC-132	Static Radio Set	III				Main Contractor Approved Sources					
MC-133	EPABX equipments	III				Main Contractor Approved Sources					
LEGENDS :											
1.0 SYSTEM SUPPLIER / SUB SUPPLIER APPROVAL STATUS CATEGORY											
A - For those items proposed vendor is acceptable to Customer. To be indicated with letter "A" in the list alongwith the condition of approval, if any.											
2.0 QP INSPECTION CATEGORY :											
CAT - I : For those items the Quality Plans are approved by Customer and final acceptance will be on physical inspection witness by Customer											
CAT - II : For those items the Quality Plans are approved by Customer. However no physical inspection shall be done by Customer. The final acceptance by Customer shall be on the basis of review of documents.											
CAT - III : For these items Quality control to be exercised as per Main contractor Quality Assurance System. The final acceptance by NTPC shall be on the basis of Certificate of Conformance (COC) by Main Contractor.											
UNITS/WORKS : Place of manufacturing- Place of main supplier of multi units/works.											
NOTE - 1 : A: Vendors to submit project specific documents as per Sub-QR requirements in case the Vendor is approved under collaboration agreement. B: In case approved sub vendor is offering product with latest model/series apart from earlier approved, vendors to submit project specific documents as per Sub-QR requirements.											
NOTE - 2 : For Instrument cable <= 1 KM inspection category CAT - III, For > 1 KM to <= 10 KM Inspection category CAT - II COC & FOR> 10 KM Inspection category CAT-I											
NOTE - 3 : For Fiber Optic cable <=10KM inspection category CAT - III & for > 10KM Inspection category CAT-II											
NOTE-4 : Batteries for UPS <= 10 KVA and batteries for intelligent battery charger 24 V DC <= 40 Amp inspection category CAT-III & for Batteries for UPS> 10KVA and batteries for intelligent battery charger 24 V DC > 40 Amp rating											
NOTE-5 UPS <= 10 KVA rating inspection category CAT-III & for > 10KVA rating inspection category CAT-I											
NOTE - 7 - EMPTY CABINETS, COMPUTERS, SIGNAL ISOLATOR/ MULTIPLIER and TB SHALL ALSO BE ACCEPTABLE FROM OWNER ACCPETED IN QP. IF THE TOTAL INTEGRATED PANEL AND FAT IS CONDUCTED INDEGENOUSLY											
NOTE-8 : For the C & I instrumnts mounted on the skid of the main item or supplied as a integral part of the main item, instrument to be supplied as per proven practice of the manufacturer meeting the Customer technical specification											
NOTE-9- This item is a bought out componenet of main equipments like DDCMIS ,PLC,TSL,CCTV ,PA system etc											
NOTE-10- For these controlled items, vendor shall be proposed for owner acceptance with-in the agreed contract schedule of the package											
NOTE-11 - Major Bought-Out-Items are to be procured from LOA approved sources & the same shall be finalized during the finalization of Manufacturing Quality Plan . MQP shall be duly vetted by OEM with their project specific authorisation letter .											
NOTE-12 : Main contractor approved sub vendors are acceptable those are evaluated / assessed as per Main contractor Quality Management System for vendor approval. Main contractor to inform the finally selected vendor to NTPC as soon as PO is placed for these items. In case of sub-QR Note-1 is also applicable.											

Disclaimer for Indicative Vendor List

- 1.1 Reasonable efforts have been made to collate the sub-vendors proposed by the various main contractors from time to time against different Projects/Packages and accepted by NTPC for various items. However, in case of error/omission, if any, and represented by the successful bidder this will be addressed during the execution of the contract based on the material evidence available with NTPC / Main Contractor.
- 1.2 The approved sub-vendor list drawn is not based on NTPC driven enlistment process but based on the sub- vendors proposed by various Main Contractors. As such, it is possible that some of the Suppliers/Manufacturers who may be involved in similar work/process may not be appearing in the list as such sub-vendors may not have been proposed by Main Contractors against NTPC Contracts.
- 1.3 In case the successful bidder chooses to propose additional sub-vendors with relevant experience after the award of the contract such sub-vendors will be considered in terms of Clause no: 19.1 of GCC, provided the proposals are received sufficiently in time: 90 days prior to ordering date of a Bought Out Items/Start of Manufacturing so as not to impede the progress of the contract.
- 1.4 Sub-vendors have been grouped under different categories of items. It is possible that an item characterized by certain specific features such as range and type required as per Main Contractor's design requirements may not be in the range of the listed sub-vendor's manufacturing process/capability. As such the main contractor to ascertain the vendor's capability to meet his specific requirements before considering a sub-vendor.

SINGARENI THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE	TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:	SUB-SECTION- E-60 INDICATIVE VENDOR LIST	Page 1 of 2
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- 1.5 It is to be noted by the bidders that any shortfall in contract performance attributable to the sub-vendor listed will not absolve the contractor from his contractual obligations in any manner.
- 1.6 The approval was granted based on the evaluation of relevant capabilities and facilities possessed by the sub-vendor at the time of evaluation. Also, some of the sub-vendors may not be active. As such, the successful bidder is to carry out his own due diligence before considering the listed sub-vendor for subletting: the current status of the sub-vendor, the continued availability of productive resources including Human Resources.
- 1.7 The list of sub-vendors is periodically revised to include new sub-vendors. Such a revision may also see a deletion of certain sub-vendors who may have been disqualified on grounds of inadequate performance or banned in line with NTPC's banning policy. The then current list will be shared with the successful bidder immediately on award.
- 1.8 In the post award during detailed engineering, Main contractor to take up with sub vendors and ensure/verify approval conditions of NTPC/Owner before placing the orders.

<p>SINGARENI THERMAL POWER PROJECT STAGE-II (1X800 MW) EPC PACKAGE</p>	<p>TECHNICAL SPECIFICATIONS SECTION VI, PART- B Bid Doc. No.:</p>	<p>SUB-SECTION- E-60 INDICATIVE VENDOR LIST</p>	<p>Page 2 of 2</p>
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TIGHTENING PROCEDURE HSFG BOLTS



Bharat Heavy Electricals Limited

Pub-2302

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**STANDARD HIGH STRENGTH FRICTION GRIP BOLTS, NUTS & WASHERS
METRIC SERIES TO BS 4395 (PART 1 & 2)**

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**STANDARD HIGH STRENGTH FRICTION GRIP BOLTS, NUTS AND WASHERS
METRIC SERIES TO IS 3757 IS 6623 AND IS 6649**

FIG. 11 CONNECTION BEING SNUG TIGHTENED

MECHANICAL PROPERTIES (BOLTS) METRIC SERIES TO B.S.4395(PART 1&2)

FIG. 12 COMPLETION OF SNUG TIGHTENING

MECHANICAL PROPERTIES (NUTS & WASHERS)

MECHANICAL PROPERTIES (BOLTS) IS 3757/ IS 1367

MECHANICAL PROPERTIES (NUTS TO IS 6623)-(1985)

**FIG.13 REMOVAL OF DRIFT PINS & FILING UP WITH BOLTS & SNUG
TIGHTENED**

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NUT ROTATION* FROM SNUG TIGHT CONDITION

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FIG. 16 FINAL TIGHTENING OF BOLT NO.12

INTRODUCTION

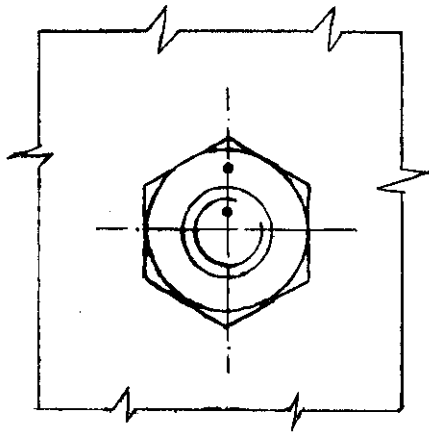
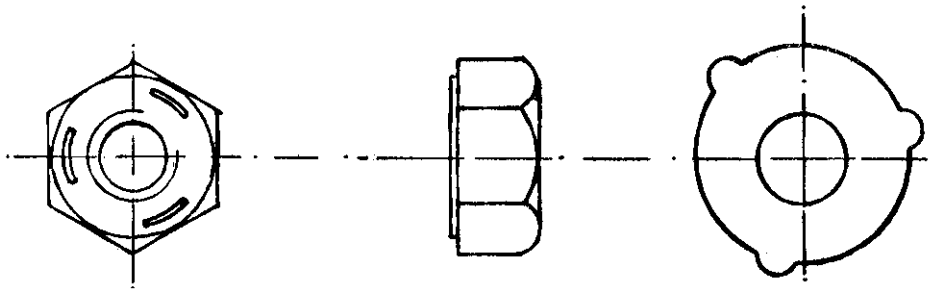
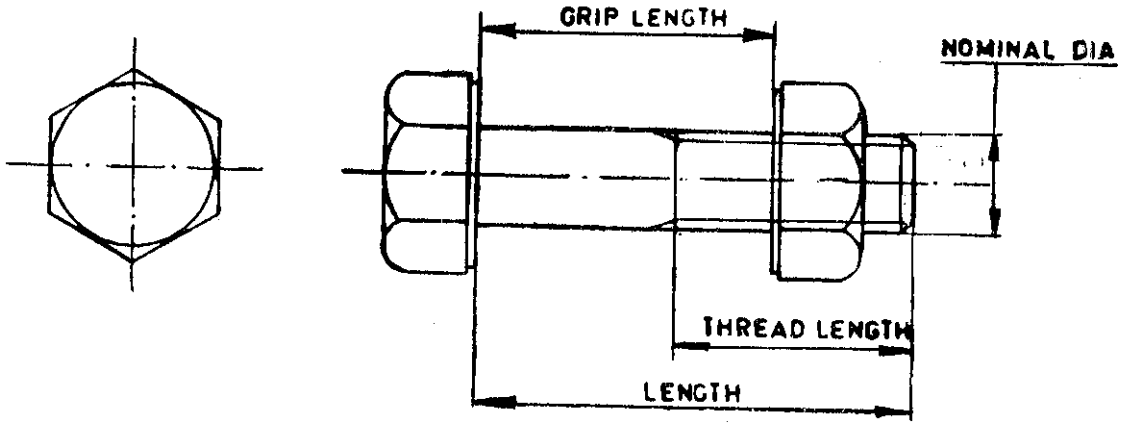
The use of High Strength Friction Grip bolts in Structural connections has several important advantages over conventional bolted and riveted joints. The HSFG bolted structural joints can have rigidity comparable to welded joints with less number of bolts as against ordinary bolted or riveted connections.

Unless the HSFG bolts are tightened to the required minimum shank tension or the clamping force, the designed strength of the connection will not be achieved.

This manual describes the method of tightening of High Strength Friction Grip bolts to the required minimum Shank Tension by PART TURN METHOD. An illustrative example is given in the annexures to explain the salient features of the tightening and inspection of a HSFG bolted joint

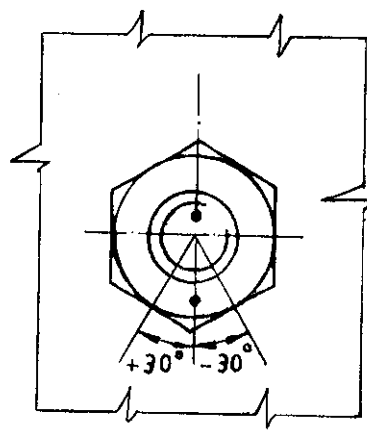
Any suggestion towards the improvement of this manual would be most welcome.

H. S. F. G. BOLT, NUT AND WASHER



1-A

AFTER SNUG TIGHTENING



1-B

AFTER FINAL TIGHTENING

Fig. 1 HSF G BOLT, NUT AND WASHER

TIGHTENING PROCEDURE FOR HSFG BOLTS

1. INTRODUCTION

In a friction grip joint, force is transferred by virtue of the friction between interfaces. To develop this friction, a normal load is applied to the joint by using high strength bolts **Tightened to Proof Load**.

- 1.1 The Friction Grip Principle, therefore, depends on tightening each high strength friction grip bolt (HSFG Bolt) to a **Minimum Shank Tension**, so that the specified clamping force on the components being joined shall be induced and thus enabling the applied load being transferred by friction between the joint faces rather than relying on the shear strength of the bolts. A high strength bolted joint is about $3\frac{1}{2}$ times safer than the comparable ordinary bolted joint.

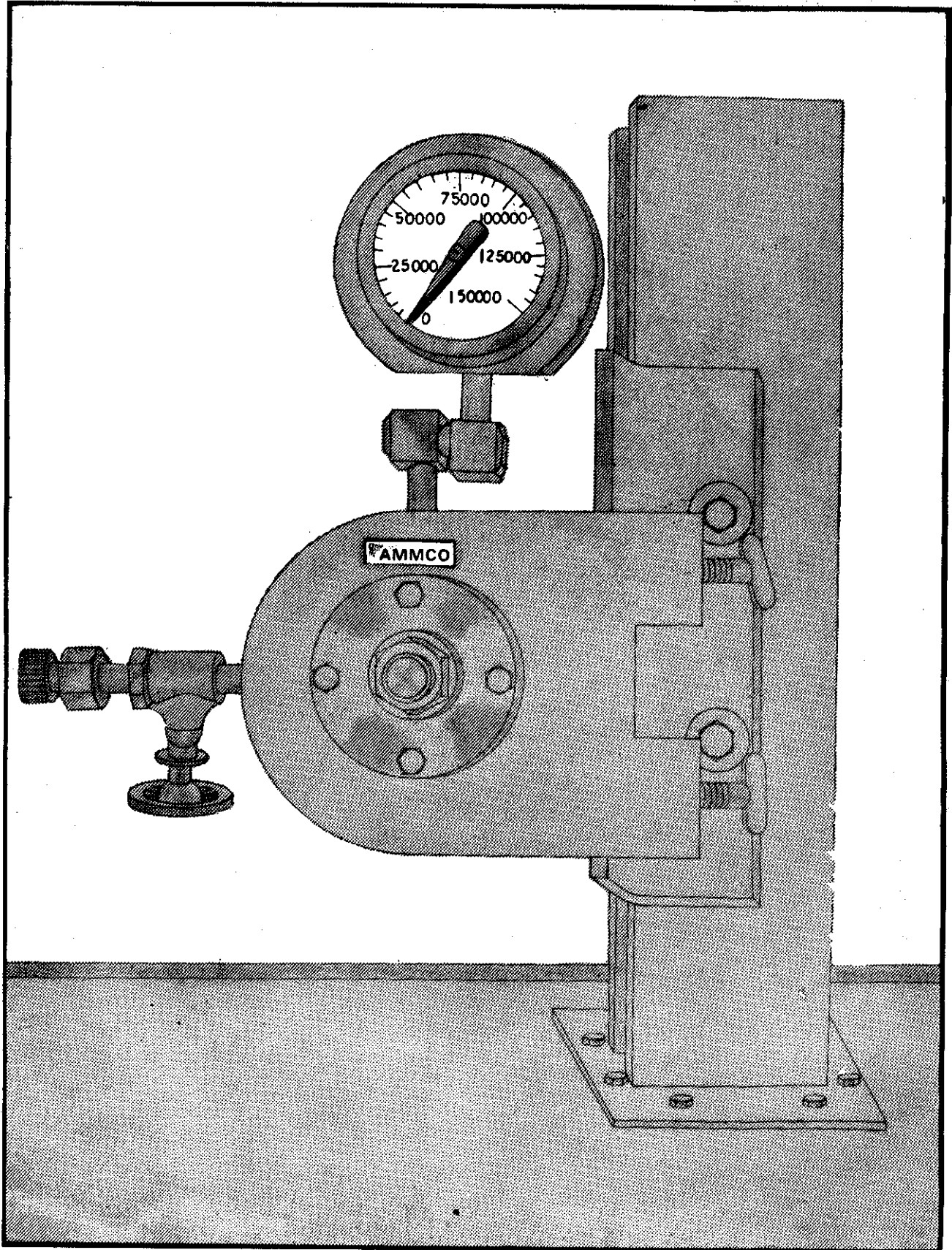


FIG. 2 BOLT TENSION CALIBRATOR

This is a hydraulic instrument which measures the actual bolt tension developed by tightening the bolt or nut. Pressure is transmitted through the hydraulic fluid to the specially calibrated gauge which indicates bolt tension directly in Kgs./Pounds.

Figure shows the calibrator clamped to the beam, column or a special fixture which should be rigid enough to withstand the torque developed.

2. THE TOOLS AND EQUIPMENTS

Although it is feasible to tighten High Strength Friction Grip Bolts by the use of manual wrenches alone, it will be most difficult to obtain sufficient torque. Erection is slow and costly, and results are generally unsatisfactory.

- 2.1 **Impact Wrenches :** Use of Standard Impact Wrench is suggested for all High Strength Friction Grip Bolting. Adequate wrenches are now available for M 24 bolts which are the ones normally used. In selecting an Impact Wrench, it is wise to choose one which has a torque output in excess of the theoretical figure required for tightening, thus making some allowance for loss of performance due to wear, air leakage, etc. and to help overcome the energy absorbed by higher than usual thread friction or "springy" joints.

Wrench sockets should be marked on the outer periphery each 90 degrees – by alternate single and double lines – to enable the operator to easily measure nut rotation.

- 2.2 **Torque control pneumatic impact wrenches :** Many erectors still use torque-control pneumatic Impact Wrenches. These wrenches can be used to tighten by the Turn-of-Nut method by simply eliminating the torque cut-off device. If the user prefers to use the torque cut-off, it is essential that continual testing be done on a Bolt-Tension Calibrator to check and recheck the proper torque requirement for each lot and diameter of bolts.

Suitable Impact Wrenches should perform the required tightening of each bolt in approximately 10 seconds. If they do not, then check for —

- Damaged or dry bolt and nut threads
- Poor fit of joint plies
- Bad alignment of holes causing bolt to trap
- Insufficient quantity and/or pressure of air supply
- Any restrictions or leaks on air line
- Excessive length of air line
- Blockage of gauge filter at tool air inlet.

If the tool is sluggish, it must be blown through with paraffin to clear it and then relubricated with light oil SAE 510.

A good source of Impact Wrenches is

M/s. Ingersoll-Rand Company, Tool & Hoist Division
28, Kennedy Boulevard, East Brunswick, N. J. 08816, USA

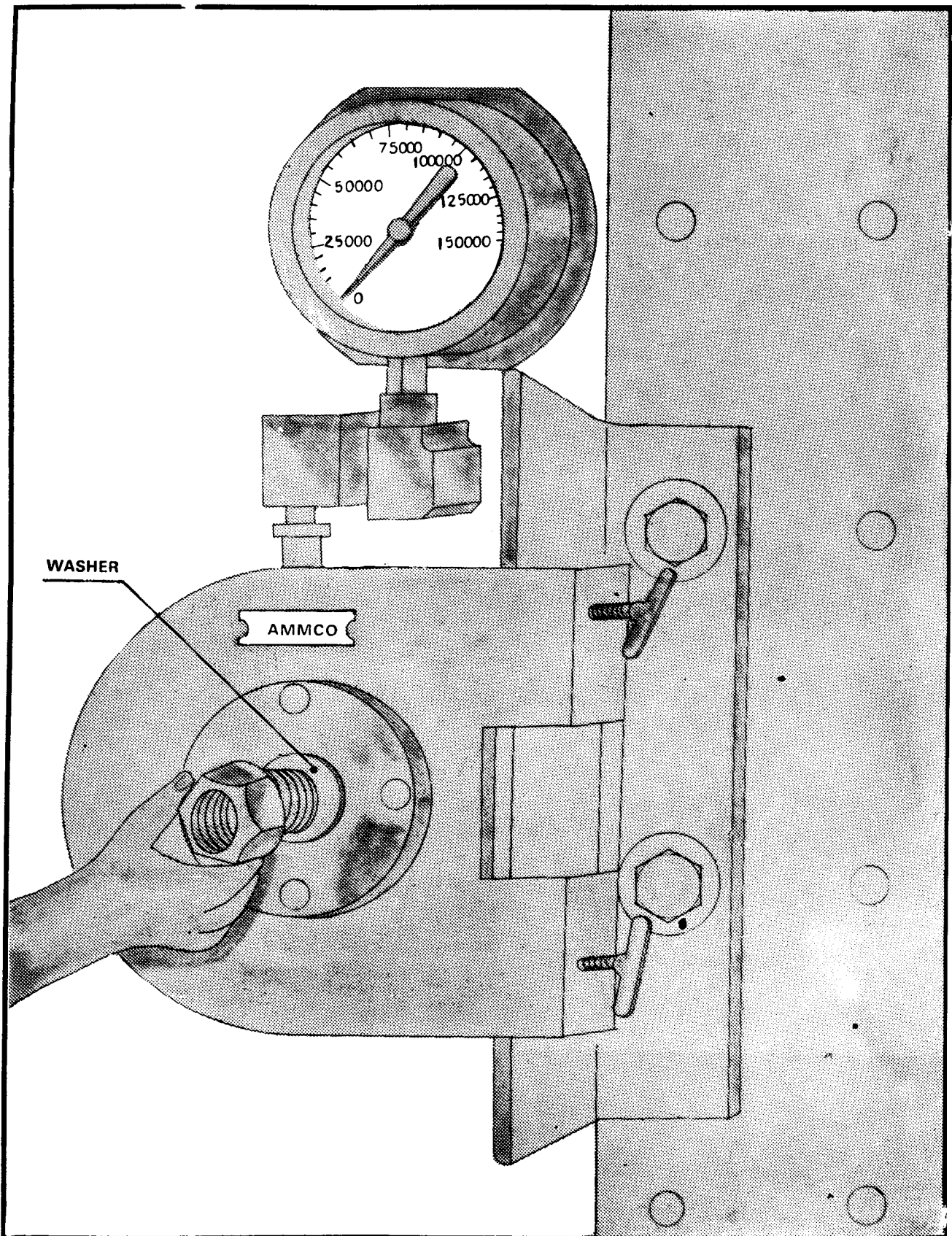


FIG. 3

If the nut is to be torqued the bolt is inserted from the rear. A hardened washer should then be placed under the nut. When the nut has been 'run' on to the bolt as far as possible by hand, calibration may proceed. The procedure is illustrated for a M 24 bolt to specification BS 4395 Part-1

It is recommended to use the following Impact Wrench for tightening High Strength Friction Grip Bolts :

Impact Wrench Model No. 2934 B2

Equipment	Weight Less Socket Kg.	Length mm	Rated Capacity Bolt Size	
			Bolt Grade B. S. 4395	Dia mm
Inside Trigger	8.4	286	Part 1	27
1" Sq. drive			Part 2	24

3 **Energy :** The ideal source of energy is compressed air. Most of the erectors have access to compressed air for use with the equipment. Most pneumatic wrenches require 1 cu. metre/min. (35 cu. ft./min.) at a pressure of 690 KN/sq. m. (100 lbs/sq. in) for optimum performance. To maintain this a $\frac{3}{4}$ " hose dia is usually required from the compressor reducing valve to the wrench keeping the line as short as possible and normally not more than 3 metres. When a large number of wrenches are used, an auxiliary air receiver should be operated to maintain adequate pressure.

2.4 **Manual Torque Wrenches :** If manual torque wrenches are proposed to be used, there are many makes of adjustable presetting and break-back types available in the market but none is available for output torques of more than 1000 lb.ft. Therefore, for tightening High Strength Friction Grip Bolts of size M24, if normal torque wrenches are to be used, these are to be used along with 5:1 Torque Multipliers. The following Torque Wrenches and Torque Multipliers are recommended :

A. Torque Wrench :

Torque Wrench Model No.5R			
Torque Range lb-ft.	Length mm	Weight Kg.	Square Drive Size
300-750	1470	7.3	$\frac{3}{4}$ "

B. Torque Multiplier :

Highwayman Torque Multiplier Model No.3 having the following specifications :

Velocity Ratio	... 5.33 : 1
Multiplication Factor	... 5 : 1
Efficiency	... 94% app.
Max. out	... 1250 lb-ft.
Input drive	... 1.5/16" A/F male hexagon female $\frac{1}{2}$ " sq drive
Output drive	... $\frac{3}{4}$ " sq.

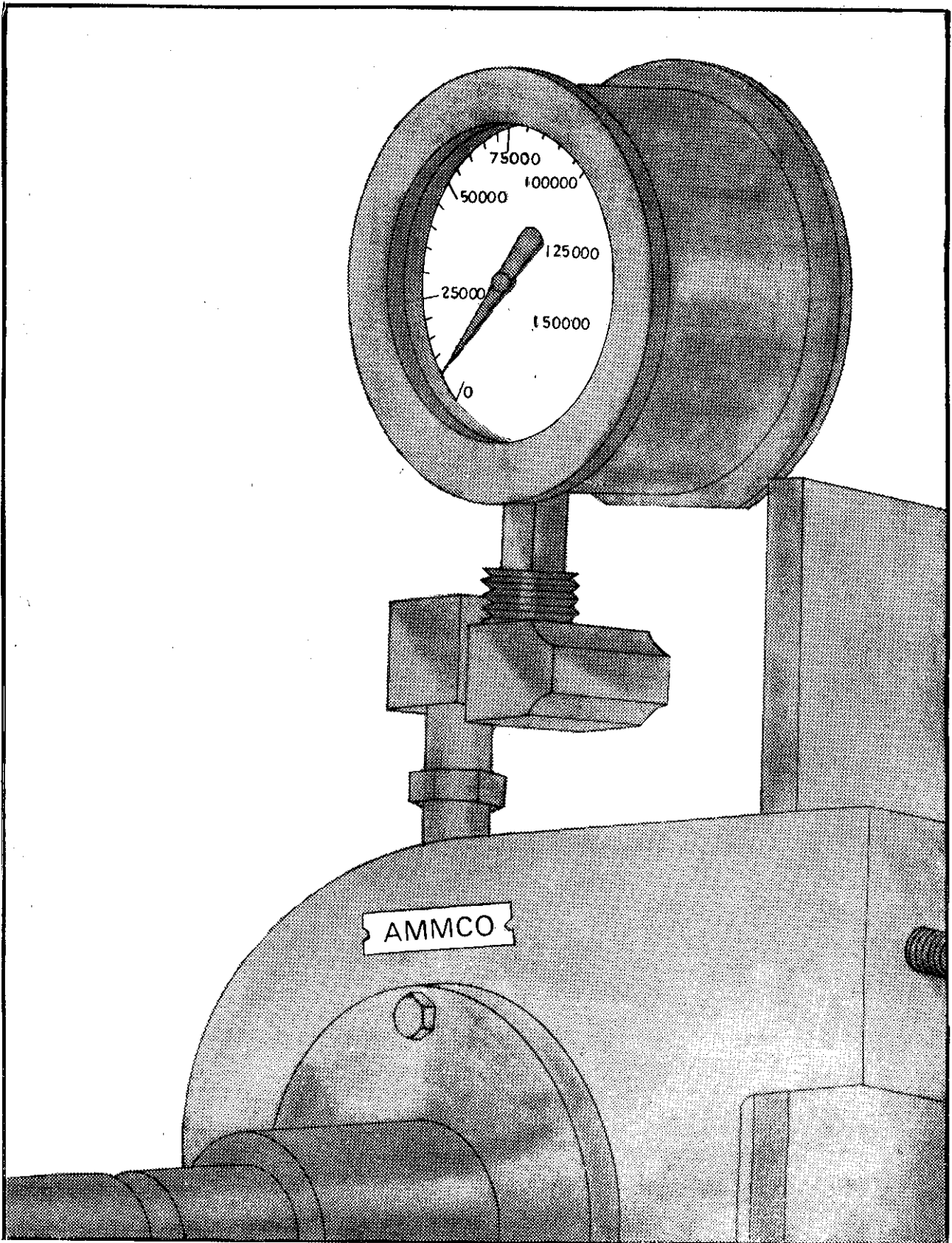


FIG. 4
SNUG TIGHTENED CONDITION

First the operation of the wrench should be checked by tightening the nut to snug condition. The dial indicates 'Snug' as being approximately 5000 lb. But normal 'Snug' may be as high as 10,000 lb.

The Torque wrench and Multiplier can be obtained from :

M/s. Norbar Torque Tools Ltd
Swan Close, Banbury, Oxon, Great Britain.

- 2.5 **Bolt-Tension Calibrators:** (See Fig. 2) Bolt-Tension Calibrator is a portable tool which is used at the erection site to calibrate all types of wrenches to ensure that correct bolt tension is achieved on tightening. This is a hydraulic instrument which measures the actual bolt tension created by tightening the nut. There are several models in the market but the most popular one is

Bolt-Tension Calibrator Model No. ML-104 marketed by

M/s. Skidmore-Wilhelm Manufacturing Co
442 South Green Road, Cleveland, Ohio 44121 USA

This model can measure bolt tensions between 6.8 tonnes and 49.90 tonnes and thus, is suitable for all sizes of High Strength Friction Grip Bolts upto and including M30.

NOTE: It is very important to be noted that no erector should proceed with the High Strength Friction Grip Bolting for steel structure unless this Bolt Tension Calibrator is available at erection site and put to proper use.

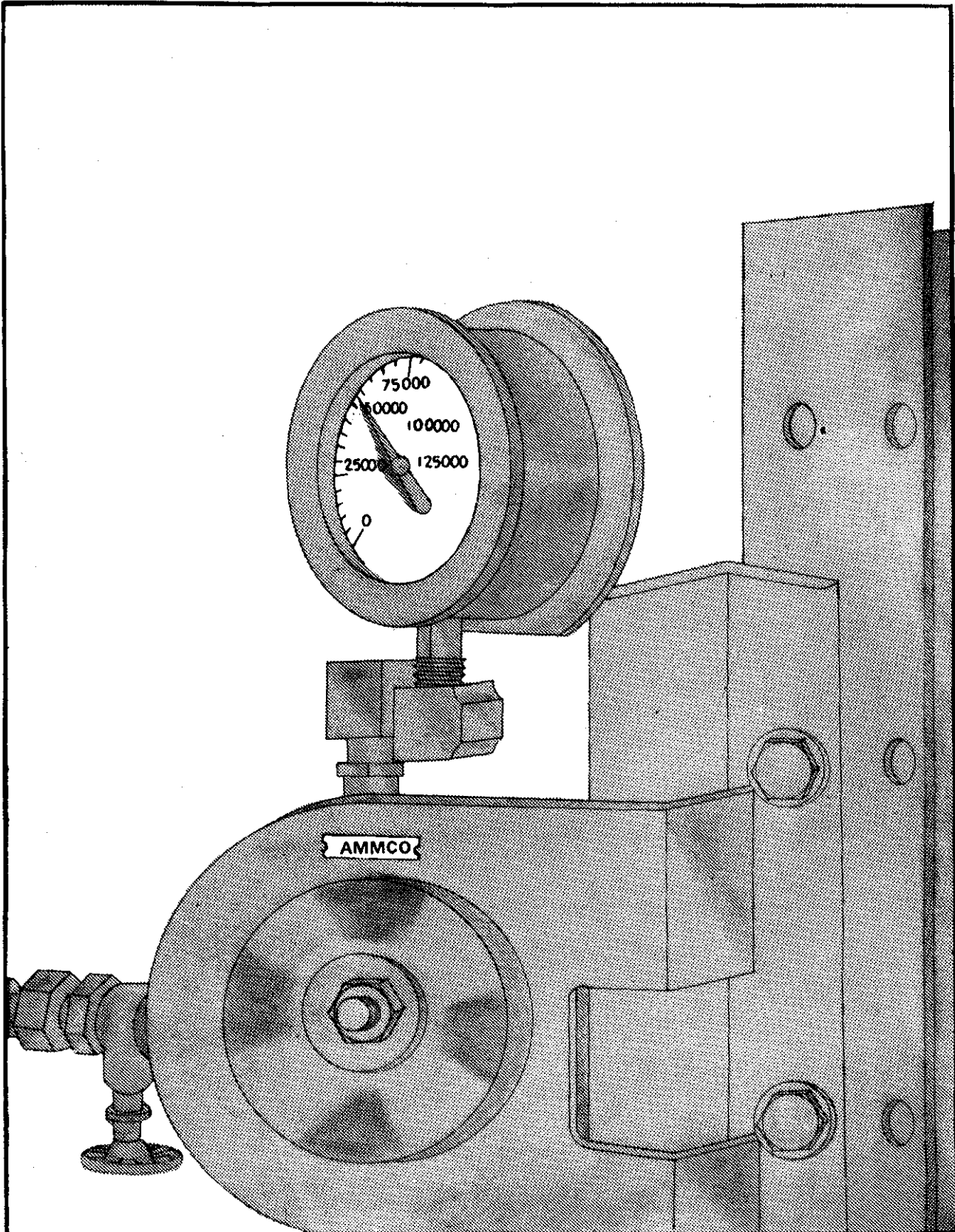


Fig. 5
TIGHTENED TO MIN. SHANK TENSION

Figure shows the dial after the operator has torqued from 'Snug' to the required minimum tension marked on the dial as 51,000 lb. (21 tonnes).

3. TIGHTENING PROCEDURE FOR HIGH STRENGTH FRICTION GRIP BOLTS

High Strength Friction Grip Bolts must be tightened to a minimum proof load specified in specifications. These are minimum loads and the bolts are deliberately tightened into the plastic range.

3.1 Recommended bolt tensions for M24 Bolts to B.S.4395 : Part 1 :

Minimum bolt tension	...	212 KN (21.6 Tonnes)
Bolt tension for setting inspection wrenches	...	218 KN (22.2 Tonnes) (105%)
Approximate equivalent Torque for the required Min. bolt tension	...	Average 680 ft.lbs.

3.2 Methods of tightening High Strength Friction Grip Bolts :

i. Part Turn Method-Procedure

Stage 1 : The members to be joined are brought together and the holes aligned with enough **drift pins** distributed over the joint, to maintain dimensions and plumbness of the structure.

Stage 2 : HSFG Bolts with washers, under the turned element are then placed in all the holes of the joint not used for drift pins and hand tightened. The bolts are then snug tightened to a tension of approximately 10000 lbs for M24 Bolts progressively away from the fixed or rigid points to the free edges to draw the members into close contact. This sequence may proceed either from top to bottom or bottom to top or it may be more convenient to go staggered pattern from the centre of the joint to the top or bottom.

It is a good practice to take a second run over the bolts with the wrench in the same sequence as above to check the snug tight position as the load-transmitting plies will be drawn in gradually tending to loosen those bolts already snug tightened.

The following are to be looked into :

- a. At the time of assembly, the surfaces in contact should be free from paint, or any other foreign material like, oil, dust, loose rust, burns and other defects which would interfere with the development of friction between them.
- b. Ensure that the alignment of members is such that the bolts fit the holes freely – forcing the bolts into the holes by means of hammering which will damage the threads should be avoided at all costs.

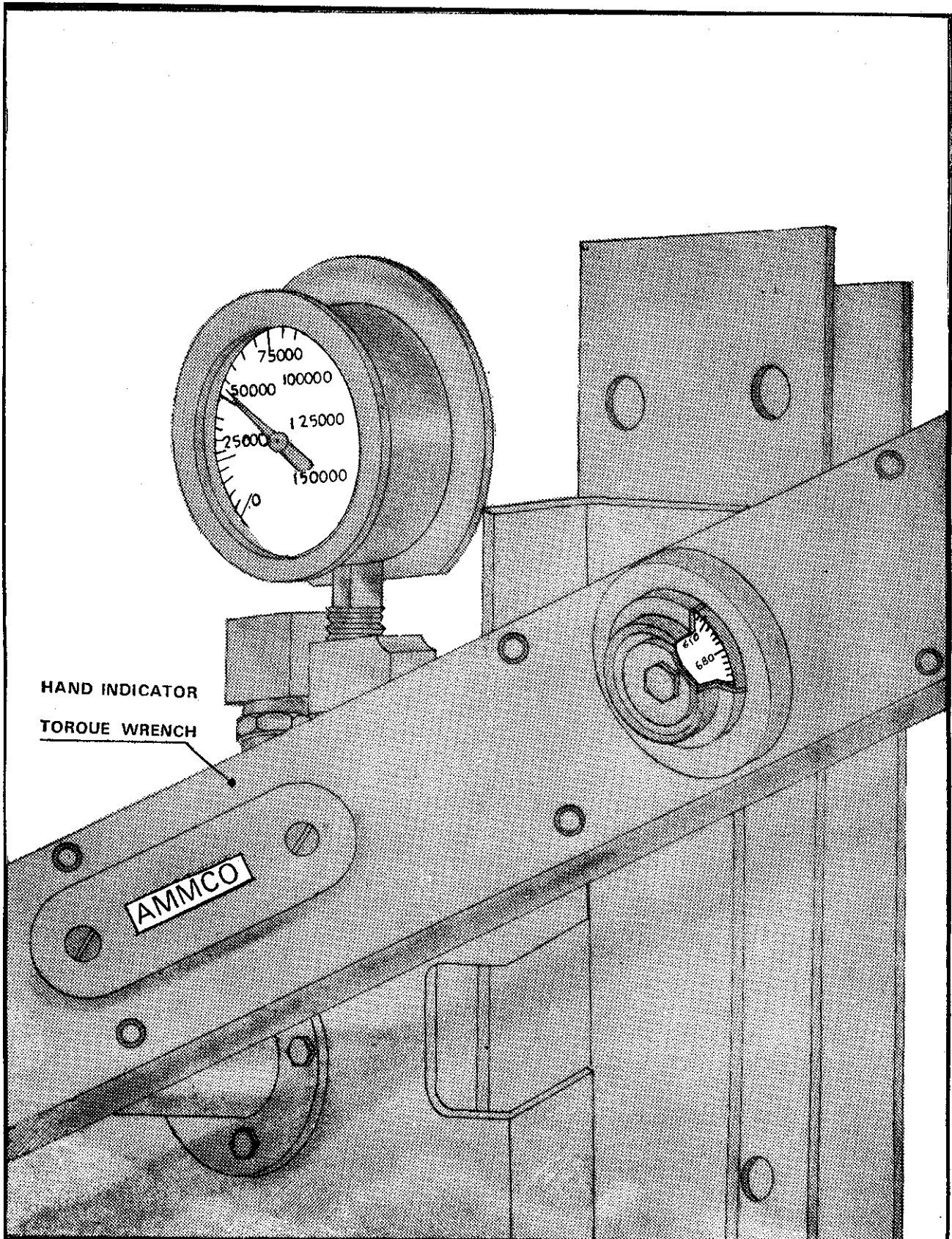


FIG. 6 DIAL READING FOR MINIMUM SHANK TENSION

The operator is using a hand indicator torque wrench to check the torque corresponding to a bolt tension of 51,000 lbs (21 Tonnes). The dial on the wrench is set at 'zero' and sufficient torque applied to slightly move the nut in the tightening direction. The dial indicates the corresponding torque value. This test should be made on at least three bolts of each lot and the torque figures averaged. This average is to be used for inspection of installed bolts of the same lot.

- c. If required, because of bolt entering and wrench operation clearances, tightening may be done by turning the bolt, while the nut is prevented from rotating.
- d. During tightening, the bolt head or nut should be held by a hand spanner or spud wrench to prevent it from turning.
- e. The nut shall be so placed in the joint that its identification mark is clearly visible after tightening.
- f. The bolted parts are to be in contact over the entire surface. However, as long as the specified tension is achieved in the bolts, the equivalent clamping force will exist between the parts even though 100 per cent contact is not realised.

Stage 3: Knock out drift pins, replace with bolts. Bring these bolts to snug tight position as in Stage 2.

Stage 4: Make permanent location marks on each nut and the protruding end of the bolt as shown in fig. 1-A to record their relative positions. This mark may be made with paint or by using a cold chisel.

Stage 5: Complete tightening of installed bolts by turning each nut by $\frac{1}{2}$ turn with tolerance $\pm 30^\circ$ ($\frac{1}{12}$ th of a turn). Tightening should proceed systematically from the most rigid part of the joint to its free edges.

Stage 6: Mark the joint to indicate that tightening has been completed. After final tightening, a nut or bolt is slackened for any reason, the bolt and nut are to be discarded and not to be used again.

Figure 2 to 6 gives an illustrative example of the calibration procedure.

Figure 7 & 8 give the check for required minimum tension by snug $\pm \frac{1}{2}$ turn.

Figure 9 to 16 illustrate how the tightening of structural steel connection should proceed (Turn of unit method.)

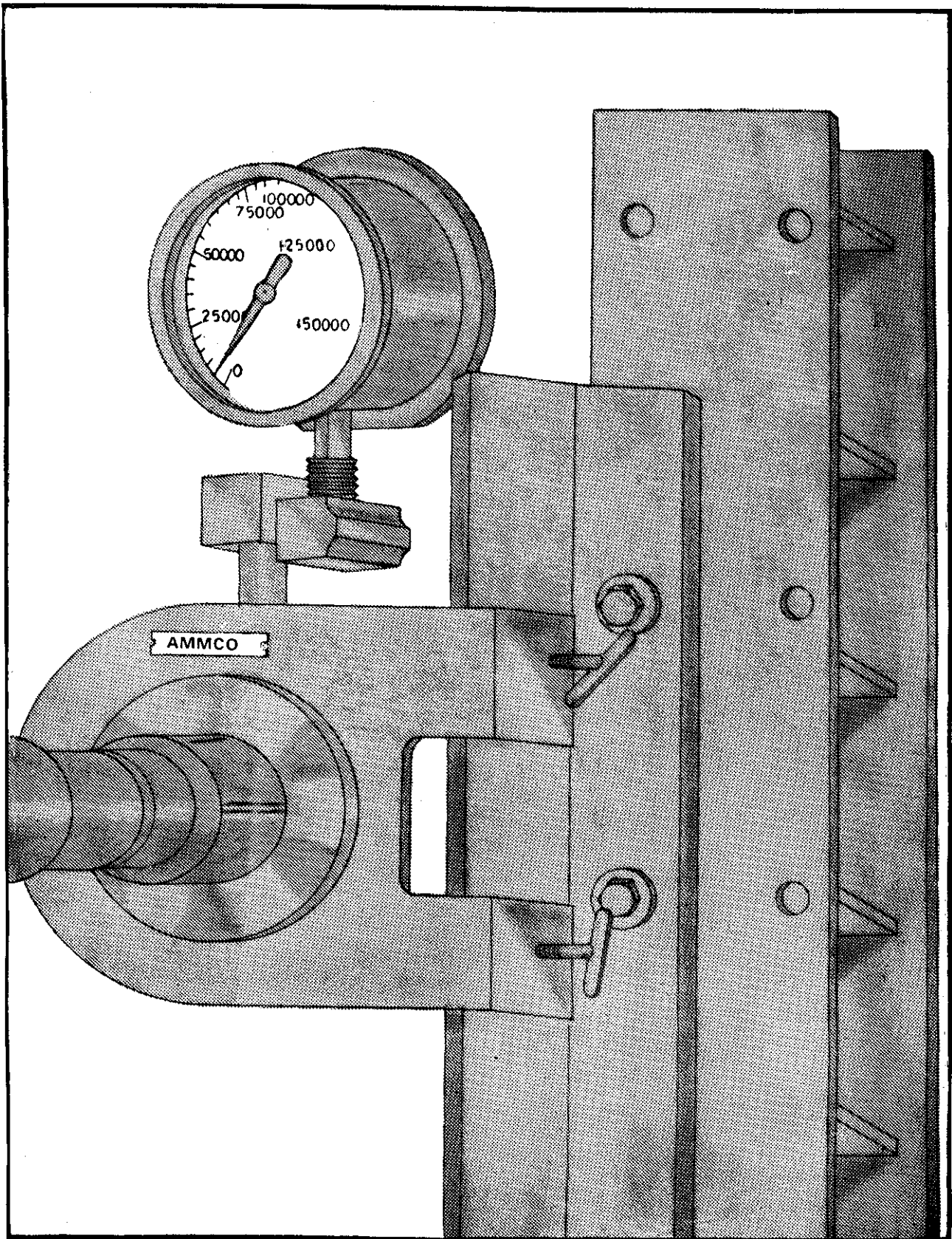


FIG. 7 SNUG TIGHTENING USING IMPACT WRENCH

Check for required minimum tension by snug + $\frac{1}{2}$ turn

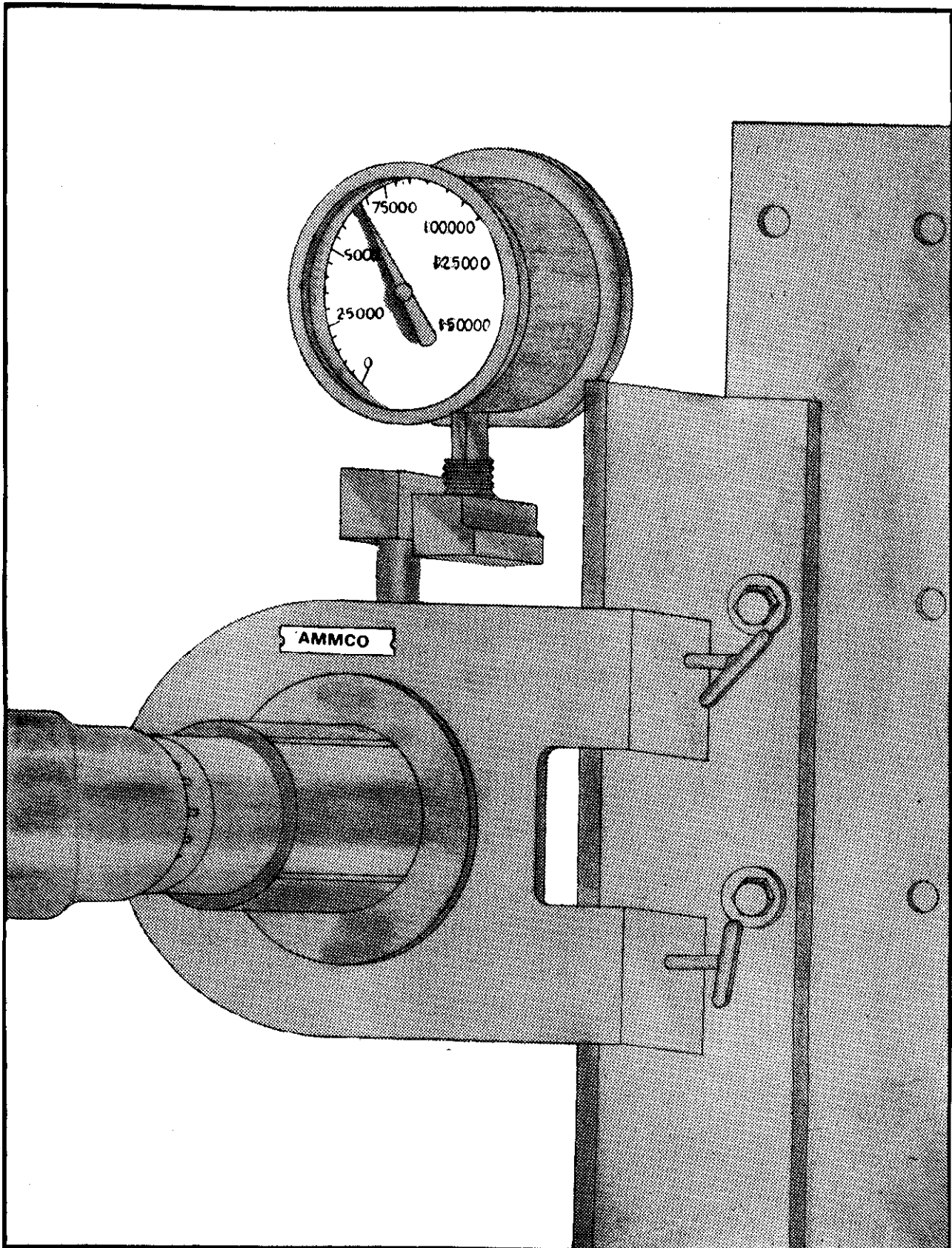
A few bolts are to be checked to determine whether 'Snug' plus the required half turn produce at least the required minimum tension. In the Figure dial reading shows the nut is Snug tightened.

4. INSPECTION OF HIGH STRENGTH FRICTION GRIP BOLTED JOINT

- i. Check markings on bolt heads and nuts.
- ii. Check that hardened washers have been used under bolt head or nut whichever is torqued.
- iii. Observe installation to determine that specified tightening procedure, **Part turn method**, is being carried out.
- iv. Check that all joints are marked to indicate that tightening has been completed.

Sides of bolt heads and nuts tightened with a pneumatic impact wrench should show slight peening, indicating that the wrench has been applied.

- v. Check tightening on proportion of bolts using an inspecting wrench. This will normally be a hand torque wrench.
- vi. Adjust or check inspecting torque wrench by tightening in a calibrating unit at least three sample bolts from lot used so that tension is developed.



**FIG. 8 SNUG + HALF TURN USING IMPACT WRENCH
(DIAL READING - 67000 PSI)**

The nut has been rotated by the required half turn from the 'Snug' tight condition by impact wrench. The calibrator dial indicates that the tension in the bolt is beyond the required minimum tension. The dial reading is 67,000 lbs which is well beyond the required minimum tension of 51,000 lbs.

5. INSPECTION PROCEDURE

The erection supervisor should work closely with inspectors in the calibration of the torque wrenches and establishment of average torque tension equivalents as indicated in Figs 2-8.

One of the inspection procedures is the examination of nut surfaces to determine whether each unit has been impacted.

1. Inspection of HSFG Bolted joint tightened by Part-Turn Method using Hardened Washer.

If bolts have been tightened without using a hardened washer under the turned element, any torque wrench inspection is not valid.

At least 2 bolts in each connection or 10% of the bolts in large connection shall be checked.

Torque wrenches used for inspection must be the same one which has been calibrated as described earlier in Figs 2-8.

To check the torque in tightened bolts, first the dial is set at zero and torque applied until **the nut moves slightly** (5°) in the tightening direction. The dial on the wrench will then show whether or not the expected torque is present.

The torque readings higher than those measured for bolts tightened to the required minimum tension are not cause for rejection.

2. Inspection of HSFG Bolted joint tightened by Part-Turn Method without Hardened Washer.

The procedure is of two stages.

Stage 1 : Inspection after snug tightening but before final tightening.

Inspector must ensure punch marks on the bolt and the nut as shown in figure 1-A.

Stage 2 : Inspection after final tightening of the joint.

The punch marks must be 180° apart so that snug + $\frac{1}{2}$ turn is assured as shown in fig. 1-B. A tolerance of $\pm 30^\circ$ is permitted.

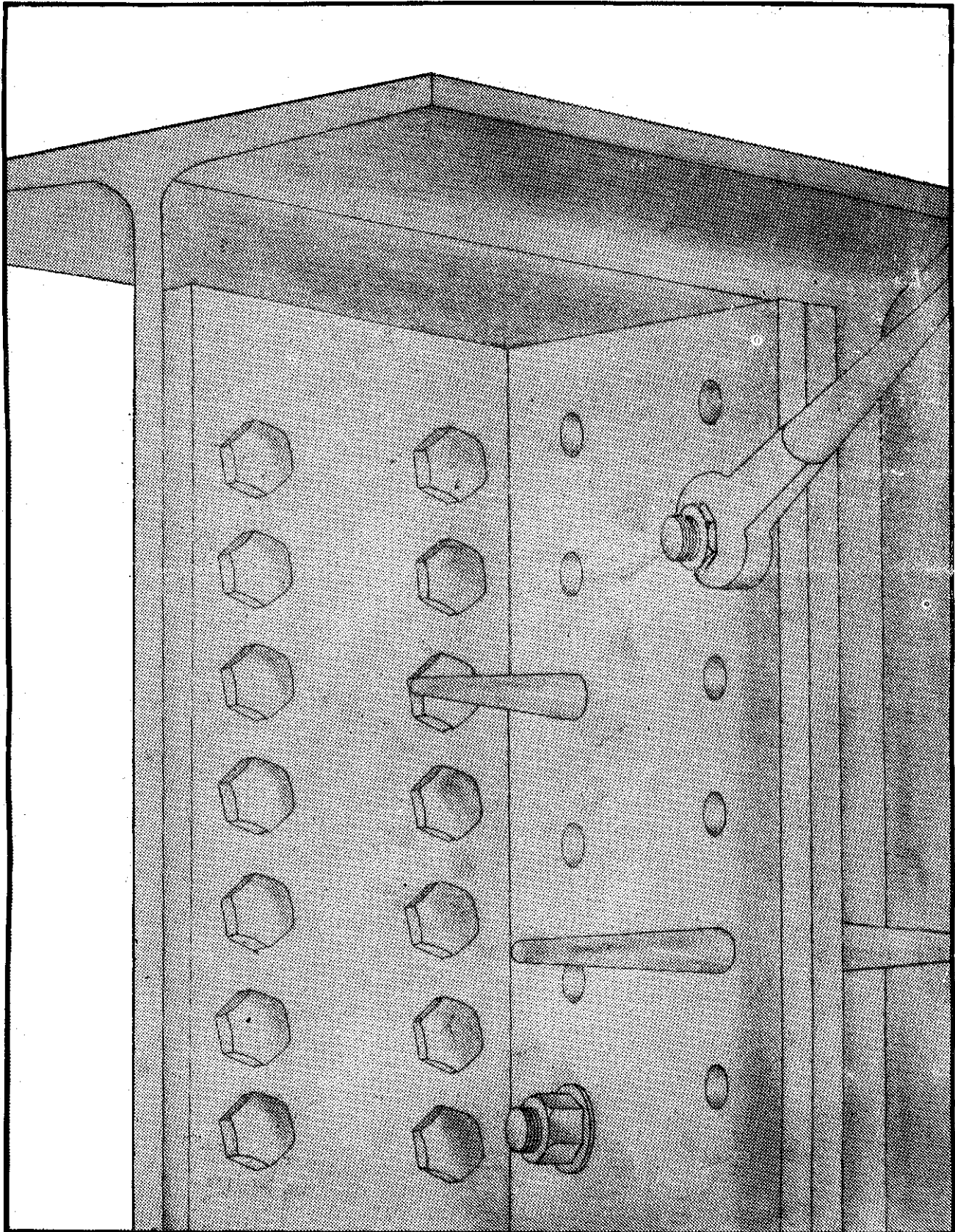


FIG. 9 FLAIRING - UP OF HOLES USING DRIFT PINS

Tightening Procedure - Turn-of-nut method (Figs. 9-16)

First the holes are 'Flaired-up' with enough drift pins to maintain dimensions and plumbness of the structure. Sufficient bolts are then installed to hold the connection in place. Washers are provided under the rotating head. Only hand tightening is sufficient at this point.

APPENDIX-A

STANDARD HIGH STRENGTH FRICTION GRIP BOLTS, NUTS & WASHERS
METRIC SERIES TO BS 4395 (PART 1 & 2)

Nom. Dia	Thread Pitch	Width A/F of Bolts & Nuts		Thickness of Head		Nut Thickness		Hardened & Tempered Flat Round Washers	
		Max	Min	Max	Min	Max	Min	Outside Max/Min	Inside Max/Min
M16	2.0	27	26.16	10.45	9.55	15.55	14.45	37/36	17.8/17.4
M20	2.5	32	31.00	13.90	12.10	18.55	17.45	44/43	21.5/21.1
M22	2.5	36	35.00	14.90	13.10	19.65	18.35	50/48.5	23.4/23.0
M24	3.0	41	40.00	15.90	14.10	22.65	21.35	56/54.5	26.4/26.0
M27	3.0	46	45.00	17.90	16.10	24.65	23.35	60/58.5	29.4/29.0
M30	3.5	50	49.00	20.05	17.95	26.65	25.35	60/64.5	32.8/32.4
M33	3.5	55	53.80	22.05	19.95	29.65	28.35	75/73.5	35.8/35.4
M36	4.0	60	58.80	24.05	21.95	31.80	30.20	85/83.5	38.8/38.4

Threads : Coarse pitch series ISO Metric Screw Threads, Medium Class of fit 6g and 6H for bolts & nuts respectively

Thread Lengths : 2D + 6 mm for lengths upto and including 125 mm for Part 1

2D + 12 mm for lengths upto and including 125 mm for Part 2

2D + 12 mm for lengths over 125 mm upto and including 200 mm for Part 1

2D + 18 mm for lengths over 125 mm upto and including 200 mm for Part 2

2D + 25 mm for lengths over 200 mm for Part 1

2D + 30 mm for lengths over 200 mm for Part 2

ALL DIMENSIONS ARE IN MILLI METRE.

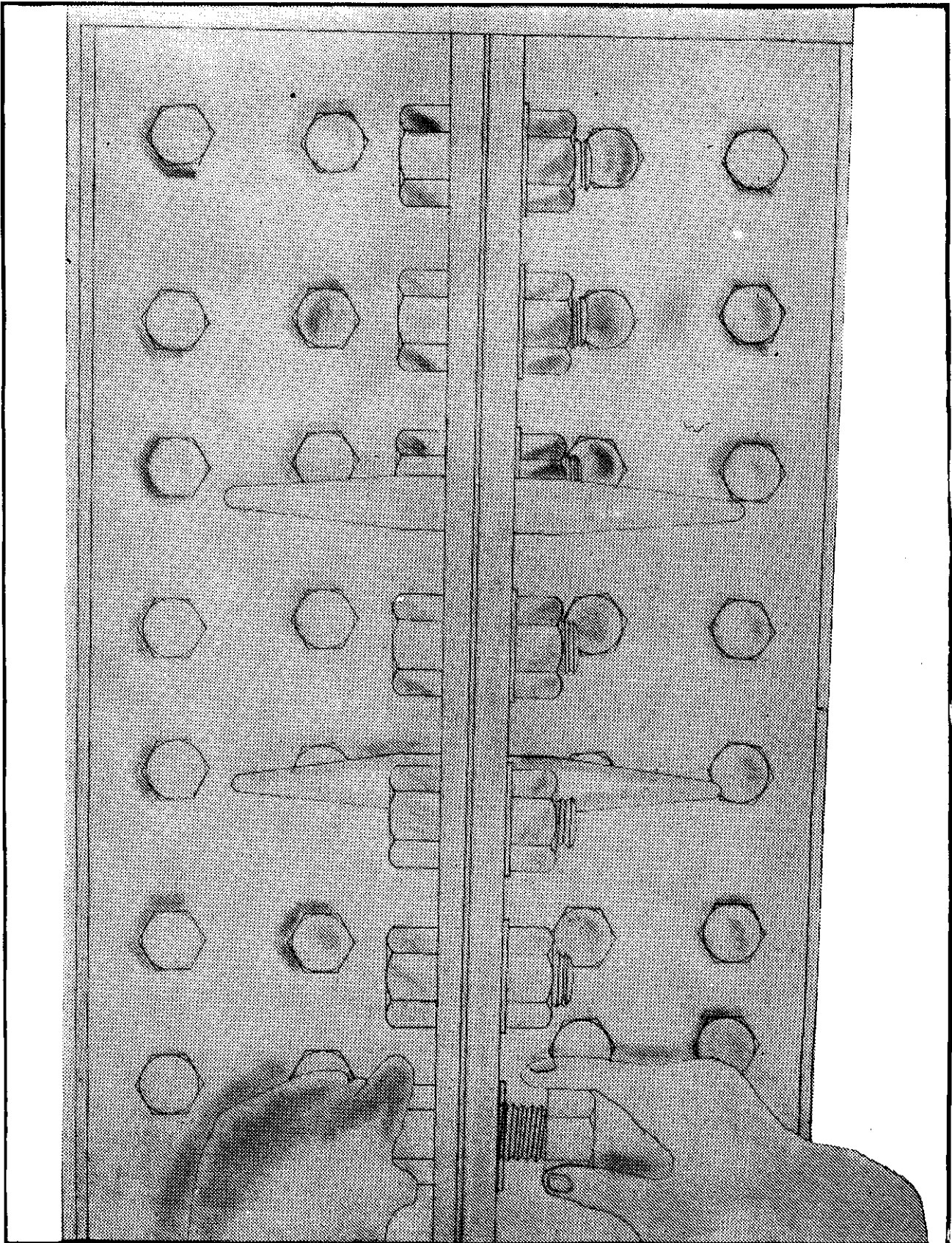


FIG. 10 BOLTS ASSEMBLED WITH NUTS & WASHERS

Fig. shows the connection after all the holes except the ones with drift pins have been filled with bolts and assembled with nuts and washers. It may be noted that the beam connection has been left out of the picture to show the gap between the angles which will be drawn together during the 'Snugging' operation.

**STANDARD HIGH STRENGTH FRICTION GRIP BOLTS, NUTS AND WASHERS
METRIC SERIES TO IS 3757 (1985) / IS 6623 (1985) AND IS 6649**

Nominal Dia D	Thread Pitch	Width A F of Bolts & Nuts		Thickness of Head		Nut Thickness		Washer	
		Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Outer Dia	Inner Dia
M 16	2.0	27.00	26.16	10.70	9.25	17.10	16.40	30	17
M 20	2.5	34.00	33.00	13.40	11.60	20.70	19.40	37	21
M 22	2.5	36.00	35.00	14.90	13.10	23.60	22.30	39	23
M 24	3.0	41.00	40.00	15.90	14.10	24.20	22.90	44	25
M 27	3.0	46.00	45.00	17.90	16.10	27.60	26.30	50	28
M 30	3.5	50.00	49.00	19.75	17.65	30.70	29.10	56	31
M 36	4.0	60.00	58.80	23.55	21.45	36.60	35.00	66	37

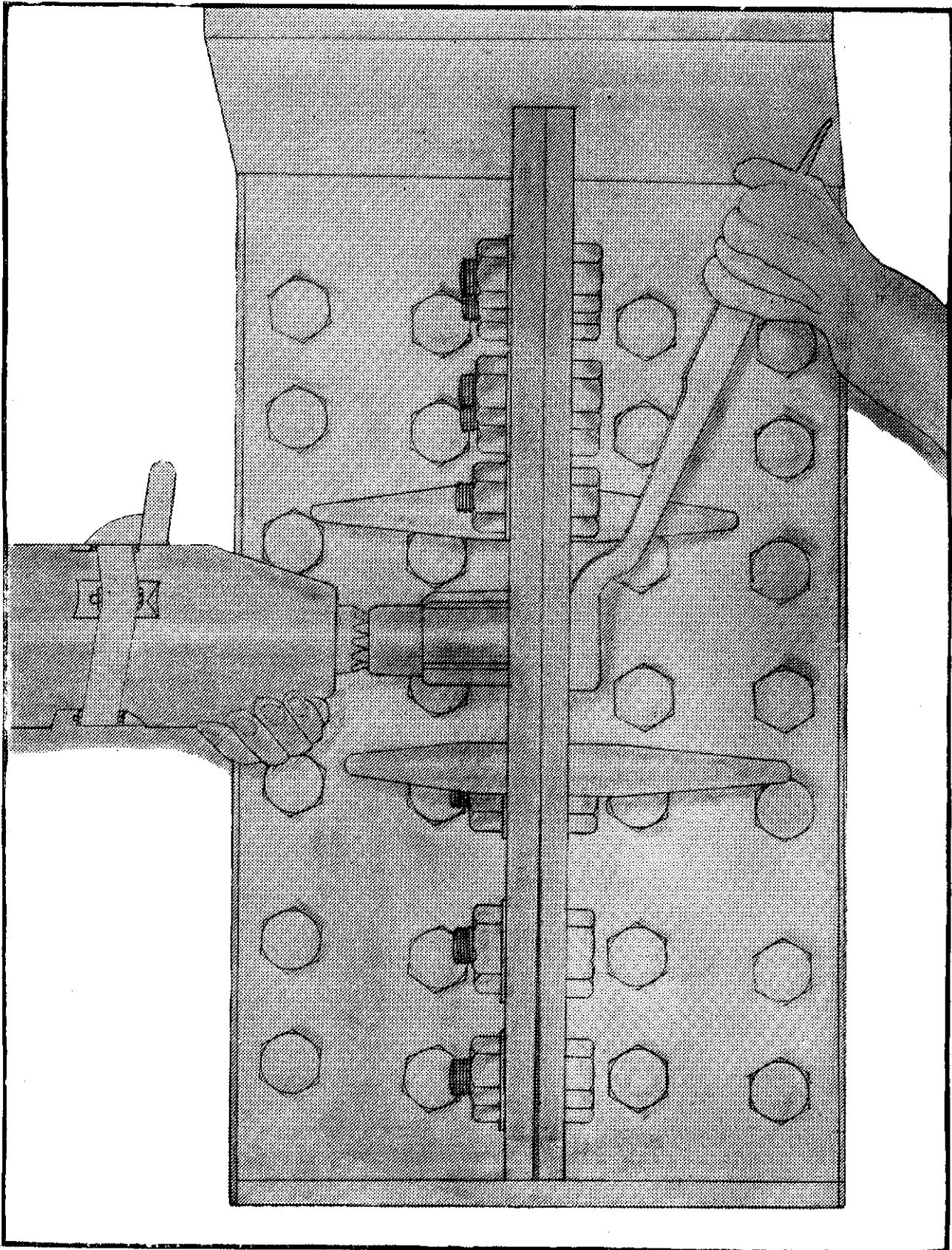


FIG. 11
CONNECTION BEING SNUG TIGHTENED

The bolts and nuts are being Snug tightened. The 'Snug' condition creates sufficient tension to draw the top half of the angles tightly together while the bottom half still remains open.

APPENDIX—B

MECHANICAL PROPERTIES (BOLTS)

METRIC SERIES TO B. S. 4395 (PART 1 & 2)

Nominal Dia	Tensile Strength Min.	Proof Load/Min Shank Tension	Hardness No.	
			Brinell HB Max./Min	Rockwell HCR Max./Min.
(mm)	(1000 kgf)	(1000 kgf)		
BS 4395 PART 1				
M16	13.25	9.39	321/255	34/25
M20	20.71	14.64	321/255	34/25
M22	25.57	18.10	321/255	34/25
M24	29.79	21.10	321/255	34/25
M27	33.89	23.88	295/223	30/19
M30	41.42	29.19	295/223	30/19
M33	—	—	—	—
M36	60.32	42.51	295/223	30/19
BS 4395 PART 2				
M16	15.7	12.45	365/280	38/27
M20	24.5	19.41	365/280	38/27
M22	30.3	24.0	365/280	38/27
M24	35.3	28.0	365/280	38/27
M27	45.9	36.3	265/280	38/27
M30	56.1	44.4	365/280	38/27
M33	69.4	55.0	365/280	38/27
M36	—	—	—	—

NOTES: 1. Tensile Strength and proof loads are based on the following gross values:-

<u>Tensile Strength</u>	<u>B. S. 4395 : Part 1</u>	<u>B. S. 4395 : Part 2</u>
a) For sizes M16 to M24 including	84.38 kgf/mm ²	100 kgf/mm ²
b) For sizes M27 to M36 including	73.83 kgf/mm ²	100 kgf/mm ²
<u>Proof Loads</u>		
a) For sizes M16 to M24 including	59.77 kgf/mm ²	79.2 kgf/mm ²
b) For sizes M27 to M36 including	52.04 kgf/mm ²	79.2 kgf/mm ²

2. Hardness values are given for guidance only.

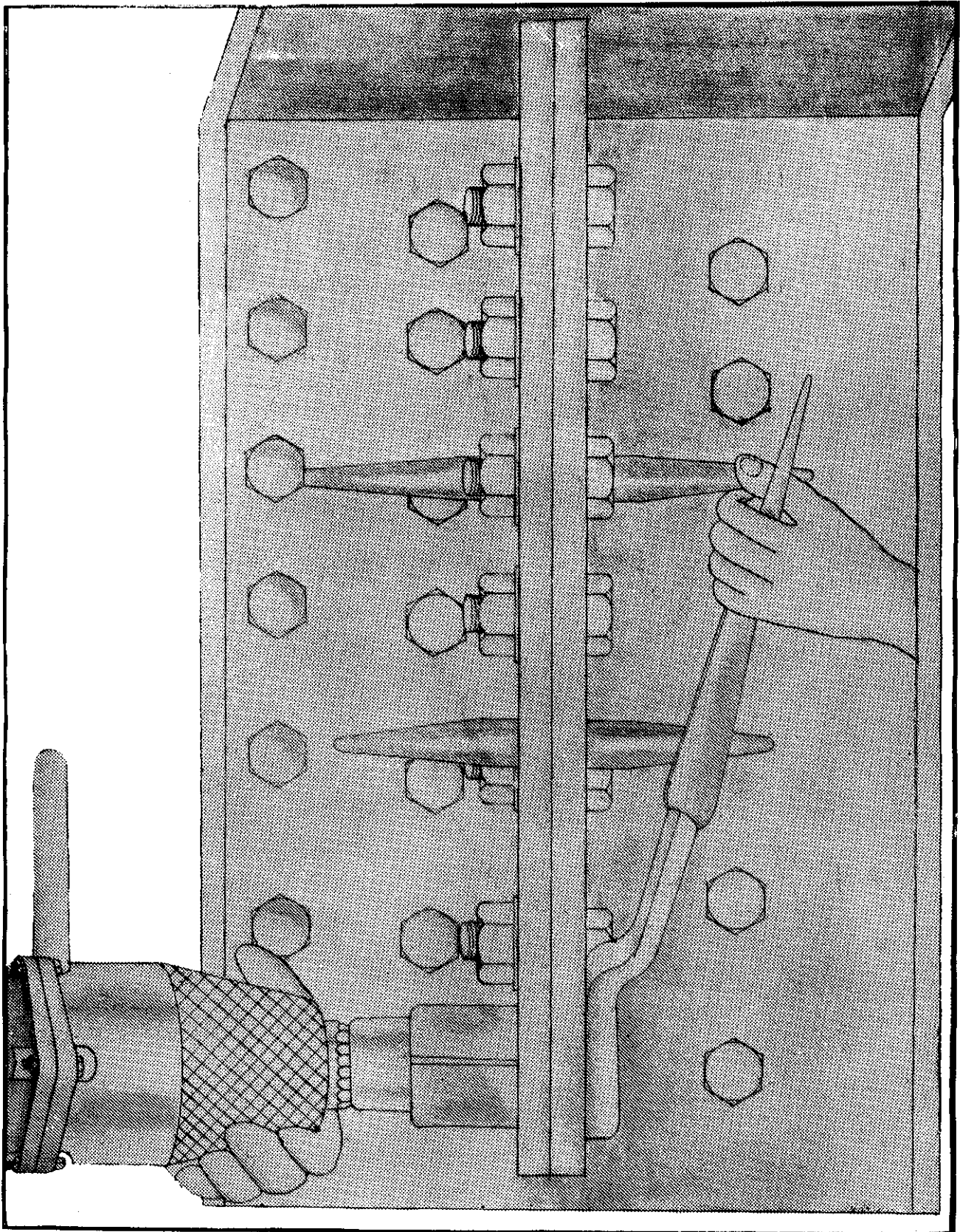


FIG. 12

COMPLETION OF SNUG TIGHTENING

The entire connection is snugged up. As a result, the gap between the angles has entirely disappeared.

APPENDIX—C
MECHANICAL PROPERTIES (NUTS & WASHERS)

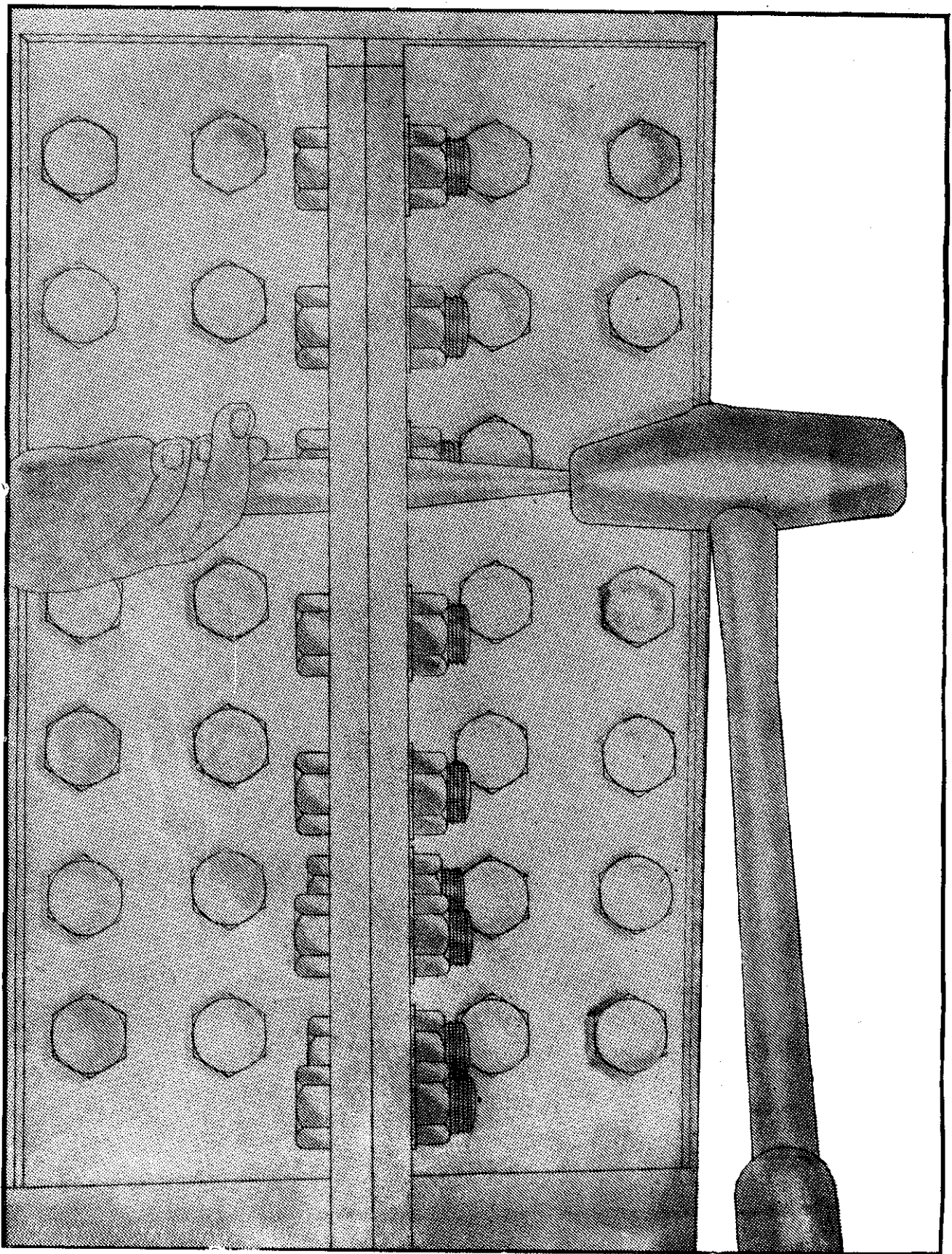
Nuts for BS 4395 : Part 1 Bolts				Nuts for BS 4395 : Part 2 Bolts		
Nominal Bolt Dia. (mm)	Proof Load (1000 kgf) (See Note 1)	Hardness Brinell HB		Proof Load (1000 kgf) (See Note 2)	Hardness Brinell HB	
		Max.	Min.		Max.	Min.
M16	16.0	302	166	18.8	353	—
M20	25.0	302	166	29.4	353	—
M22	30.9	302	166	36.4	353	—
M24	36.0	302	166	42.3	353	—
M27	46.8	302	166	55.0	353	—
M30	57.2	302	166	67.3	353	—
M33	—	—	—	53.3	353	—
M36	83.3	302	166	—	—	—

Washers for BS 4395 : Part 1 & 2 Bolts

	M16	M20	M22	M24	M27	M30	M33	M36
Max. Hardness Rockwell HRC	38	38	38	38	38	38	38	38
Min. Hardness Rockwell HRC	45	45	45	45	45	45	45	45

NOTES :

- 1) Based on 102 kgf/mm² on the equivalent stress area of the corresponding bolt.
- 2) Based on 120 kgf/mm² on the equivalent stress area of the corresponding bolt.



**FIG. 13 REMOVAL OF DRIFT PINS & FILLING UP
WITH BOLTS & SNUG TIGHTENED**

The drift pins are being knocked out and these holes are filled with bolts and torqued up to 'Snug'. The connection is now ready for final tightening.

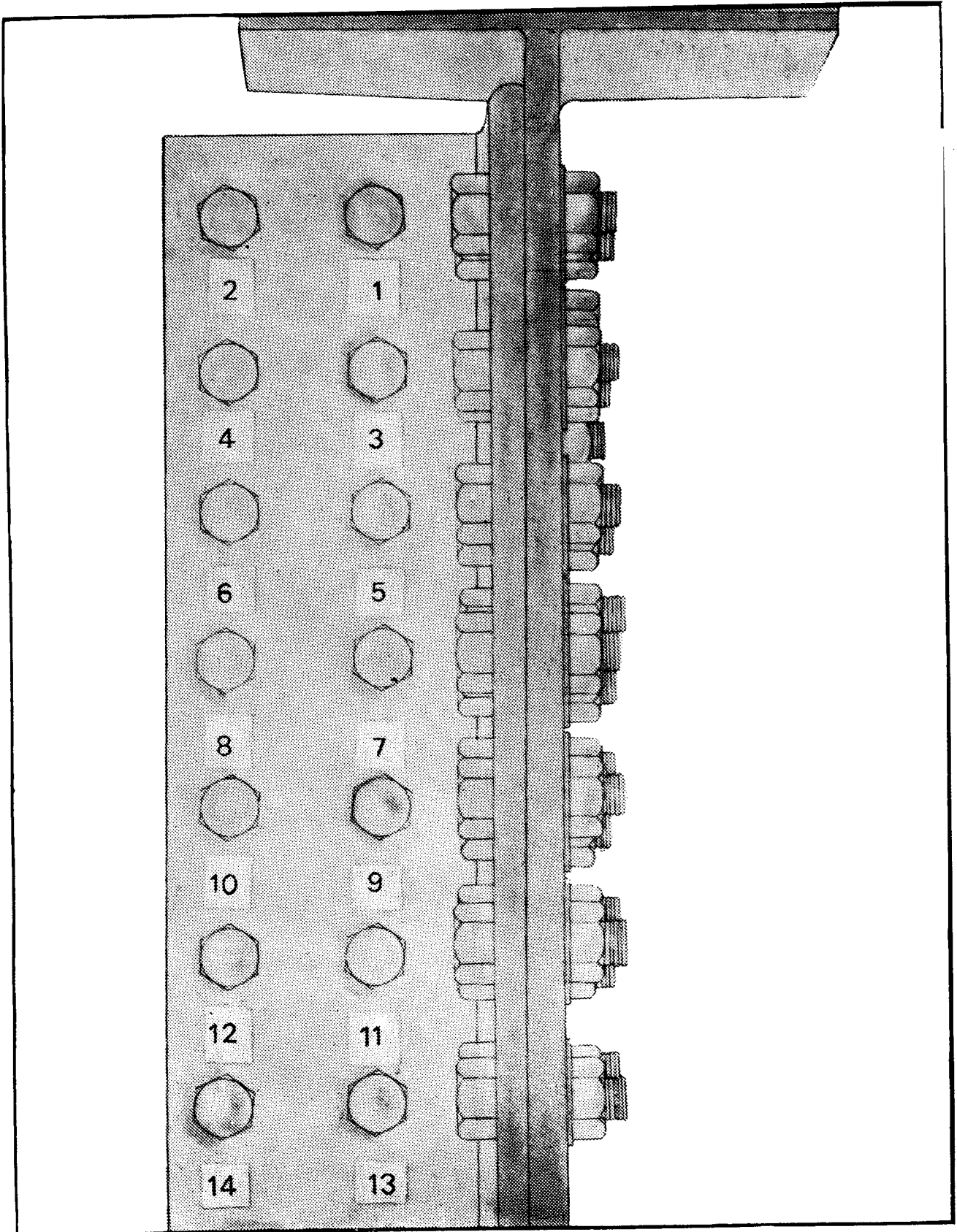


Fig. 14 SUGGESTED TIGHTENING SEQUENCE

In this figure each bolt has been numbered to show a suggested tightening sequence. Bolts and nuts should always be tightened progressively away from the FIXED or RIGID points to the free edges as shown. This sequence may proceed either from top to bottom or from bottom to top, or it may be more convenient to go from the centre to the top or bottom.

NUT ROTATION* FROM SNUG TIGHT CONDITION

Bolt Length (as measured from underside of head to extreme end of point)	Disposition of Outer Faces of Bolted Parts		
	Both the faces normal to bolt axis	One face normal to bolt axis and other face sloped not more than 1 : 20 (bevel washer not used)	Both faces sloped not more than 1 : 20 from normal to bolt axis (bevel washer not used)
Upto and including 4 diameters	1/3 turn	1/2 turn	2/3 turn
Over 4 diameters but not exceeding 8 diameters	1/2 turn	2/3 turn	5/6 turn
Over 8 diameters but not exceeding 12 diameters**	2/3 turn	5/6 turn	1 turn

* Nut rotation is relative to bolt, regardless of the element (nut or bolt) being turned. For bolts installed by 1/2 turn and less, the tolerance should be plus or minus 30°; for bolts installed by 2/3 turn and more, the tolerance should be plus or minus 45°.

** No research work has been performed by the Council to establish when bolt lengths exceed 12 diameters. Therefore, the required rotation must be determined by actual tests in a suitable tension device simulating the actual conditions.

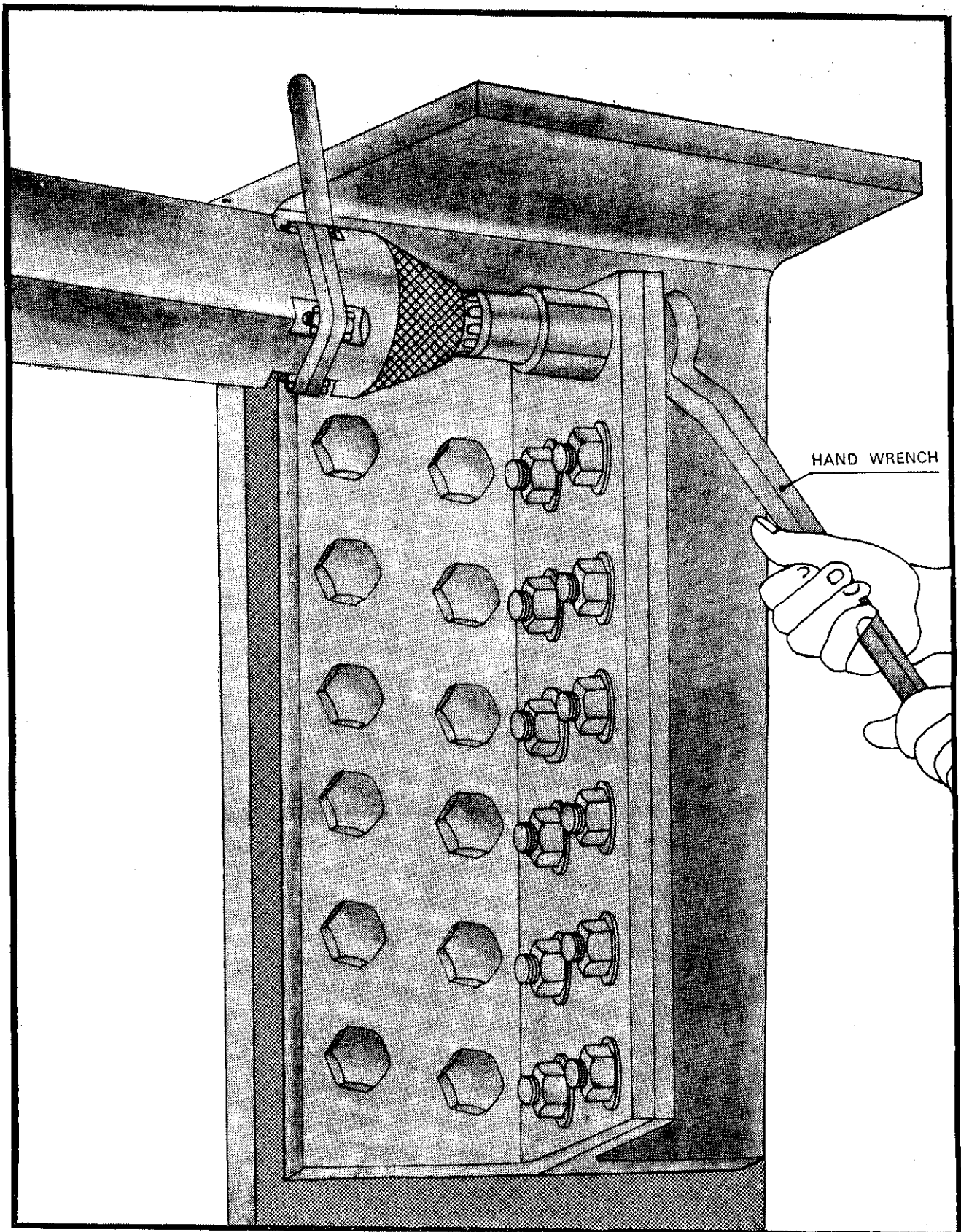


FIG. 15 FINAL TIGHTENING BEYOND SNUG OF BOLT No. 2

Fig. Shows final tightening by means of the required 'Turn' beyond the 'Snug' condition. Here the bolt No. 2 is being tightened. In the final tightening care must be exercised to ensure against rotation of the element not being turned. A hand wrench should be used to hold the end not being torqued. Otherwise the actual required turn measurement may be lost.

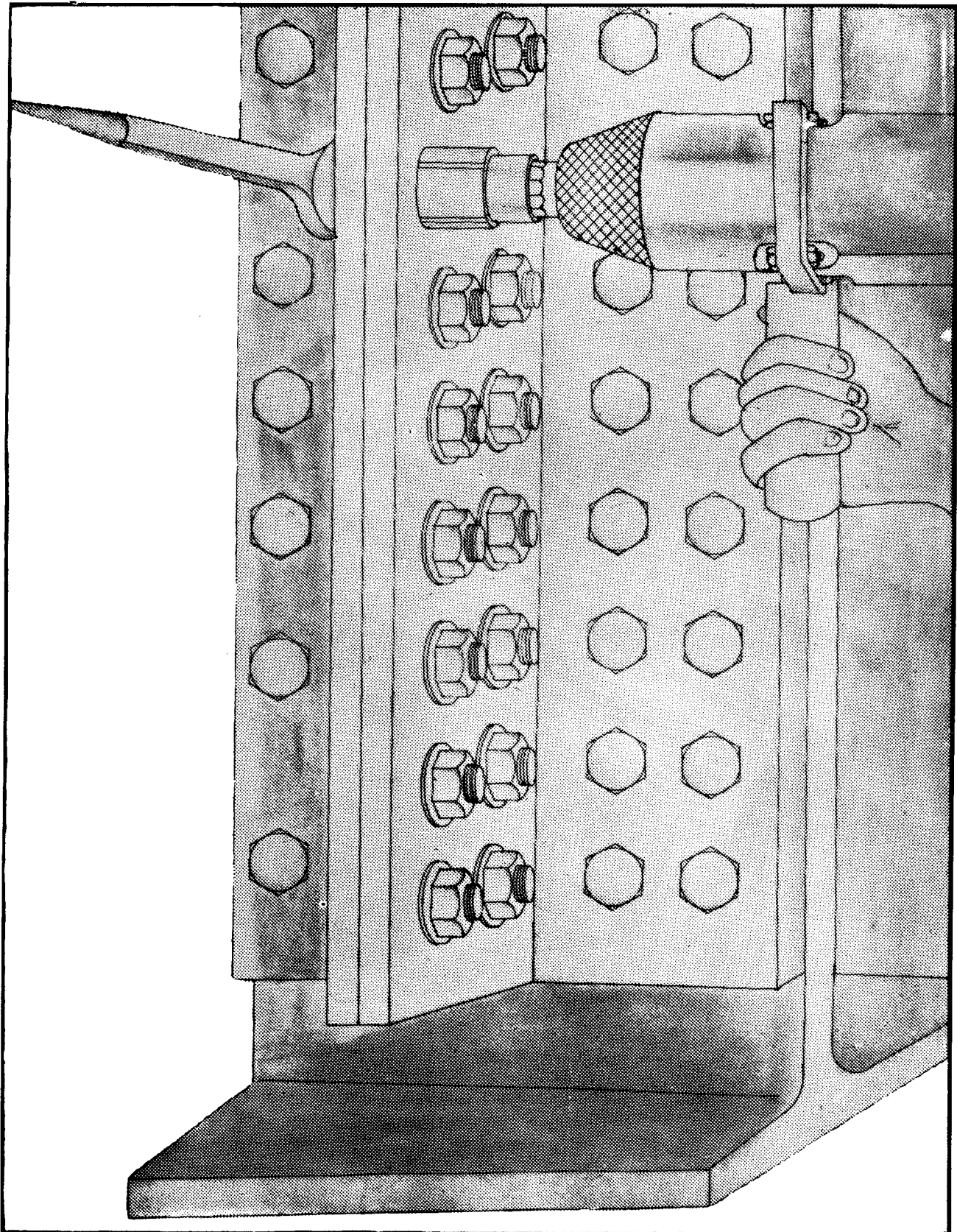


FIG. 16

FINAL TIGHTENING OF BOLT No. 12

The operator has completed
the HALF TURN on bolt No. 12.

REFERENCES

1. *I.S Code of Practice for assembly of structural joints using HSFG fasteners IS-4000—1967.*
2. *“Tightening procedure for High Strength structural bolting” by H C. Trumbore, Bethlehem Steel Corporation USA PA.*
3. *“High Strength Bolting” – GKN bolts & nuts limited, Darlaston, England.*
4. *Article from GKW on HSFG bolts & Tightening procedure.*
5. *AISC manual for structural steel design.*
6. *BS-4395.*
7. *“Turn of Nut” – A 16 mm motion picture film by Bethlehem Steel Corpatation USA PA.*



THE SINGARENI COLLIERIES COMPANY LIMITED
(A Government Company)
IR Wing, Corporate Personnel Department

O/o. GM(E&M) STPP
I.W.No. 5580
Date 27/10/25

Ref.No. CRP/PER/IR/M/361/1287

Dt. 27.10.2025

CIRCULAR

**GMs of all Areas
All Heads of Corp. Depts**

Sub:- Implementation of minimum wages as notified by the Central Government to the contractors' workers working on various outsourced activities in SCCL – Rates of Minimum wages and subsequent revision of VDA - Reg.

- Ref:- 1) Circular No.CRP/PER/IR/M/361/1304, dated 31.08.2017
2) Circular No.CRP/PER/IR/M/361/1539, dated 19.10.2024
3) Circular No.CRP/PER/IR/M/361/487, dated 16.04.2025

-oOo-

1. Reference above, it is to inform that the Chief Labour Commissioner (Central), Ministry of Labour & Employment, Govt. of India vide Order Nos. F.No.1/6(3)/2025-LS-II, Dated 25.09.2025 and F.No.1/(6)/2025-LS-II, Dated 25.09.2025 (downloaded from CLC(C) website) has communicated revision of rates of VDA on the basis of average consumer price index number for industrial workers. Subsequently, Corrigendum Order No. F.No.1/(6)/2025-LS.II, Dt.14.10.2025 was received from CLC(C) communicating as follows:

"In exercise of the powers conferred by Central Government vide Notification No.S.O. 186(E) dated 19th January, 2017 of the Ministry of Labour and Employment the undersigned hereby revises the rates of Variable Dearness Allowance for the employees employed in Agriculture w.e.f. 01.10.2025 on the basis of the average Consumer Price Index for Industrial workers reaching 413.52 from 413.424 as on 30.06.2025 (Base 2016=100) and thereby resulting in an increase of 0.096 points which is less than one.

Therefore, the resultant increase in Variable Dearness Allowance is considered as 'NIL/Zero'.

The same is applicable for rest of the schedule Employments namely (Mines, Sweeping and Cleaning, Watch and Ward, Construction or Maintenance of Roads or Runways or in Building operations, Stone Mines, Loading & Unloading)".

Sr/O

DA

AGM(C&A)
DG in Charge
→ DG in Charge
Manager (Personnel)

27/10/25

PERSONNEL
I.W.No. 4/81
28/10/2025
STPP, JAIPUR

2. As per the above orders, there is no increase in VDA w.e.f. 01.10.2025. As such, the VDA remains unchanged and continues as paid during the period from 01.04.2025 to 30.09.2025.

3. Accordingly, the minimum rates of wages including Variable Dearness Allowances payable w.e.f. 01.10.2025 is as under.

- i. The minimum rates of wages including basic rates and Variable Dearness Allowance for employees employed **in construction or maintenance of roads or runways or in building operations and other jobs etc.** (Notification No.: S.O. 188(E), dated 19.01.2017).

Category of worker	Rates of wages including V.D.A per day (in Rupees)		
	'A' Area	'B' Area	'C' Area
Unskilled	523+282=805	437+237=674	350+191=541
Semi-Skilled/Unskilled Supervisory	579+314=893	494+266=760	410+222=632
Skilled/Clerical	637+344=981	579+314=893	494+266=760
Highly Skilled	693+372=1065	637+344=981	579+314=893

- ii. The minimum rates of wages including basic rates and Variable Dearness Allowance for employees employed in "Employment of Watch and Ward" (without arms) (Notification No.: S.O. 191(E), dated 19.01.2017).

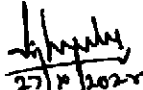
Area	RATES OF WAGES PLUS VDA PER DAY		
	Basic Wages (Rs.)	VDA (Rs.)	Total (Rs.)
A	637	+ 344	= 981
B	579	+ 314	= 893
C	494	+ 266	= 760

4. In the said notification the classification of cities into Areas A, B & C (Notification of Areas) are as detailed below.

Area – 'A'	Hyderabad and Secunderabad
Area – 'B'	Guntur, Vijayawada (UA), Visakhapatnam (UA), Warangal and Nellore
Area – 'C'	All Areas not mentioned above

5. It is, therefore, requested to implement the above rates of minimum wages applicable/payable to the concerned contractors' employees engaged on various outsourced activities w.e.f. 01.10.2025 and also incorporate the above minimum wage rates/VDA in the NITs/Contracts.

6. The procedure/practice being followed hitherto with regard to payment of minimum wages by Contractors to the Contractors' employees will continue and the revised rates of minimum wages notified from time to time shall be displayed on the Notice Board.
7. Action may please be taken accordingly.
8. This issues with the approval of Competent Authority.


27/12/2024
G.M.(Per) IR & PM

cc.

All Directors.

ED(CM), GM(CDN)

GM(MP)/ GM(CMC)/GM(E&M), STPP / GM(Per) Welfare

GM(F&A)/GM(Expln.)/GM(Transport)/GM(Civil)/CMO/GM(Env)&(Forestry)

Admn. Officer, Hyd.

All Area Personnel Dept. Heads.

All Area Civil Dept. Heads.

All Area F&A Dept. Heads.

All Area Purchase Dept. Heads.

All Area Medical & Health Dept. Heads.

Regional Exploration Dept. Heads

GENERAL GUIDELINES FOR INSULATION WORKS

This booklet is given as a general guideline to this tenderers about insulation works, However instructions given in the drawings & other schedule issued during execution of the work shall be final and binding of the contractor.



**Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector Southern Region
690, Anna Salai , Nandanam,
Chennai – 600 035**

GENERAL NOTES ON ERECTION OF INSULATION

1. It is important that the sheet metal covering is done, by a experienced and competent tinsmith.
2. Person, who is doing the actual job, can alter the following said methods of fixing the sheet metal, as and when necessary, only after consulting the BHEL Erection Engineer.
3. Fixing pin of corresponding thickness of insulation shall be welded by **STUD WELDING** process.
4. Circumferential and axial overlapping of outer casing should be 50 mm unless specified otherwise.
5. **FOR HORIZONTAL AND INCLINED DUCT AND PIPE:**
 - 1) All overlapping in axial direction should be at the bottom of the duct and pipe. Provision of beading and Sealing compound is not required.
 - 2) For circumferential overlapping of inclined duct and pipe, provision of beading and Sealing compound is not required.
 - 3) For circumferential overlapping of horizontal pipe and duct, provide beading. Apply Sealing compound if necessary.
- 5A. **FOR VERTICAL DUCT AND PIPE:**
 - 1) For overlapping in the axial direction provide beading. Apply Sealing compound if necessary.
 - 2) For circumferential overlapping provision of beading and Sealing compound is not required.
6. The joints of wool mattresses should be staggered in both circumferential and axial direction. The Wire netting at the joints of Wool mattresses are to be sewn together by G.I. sewing wire dia 0.71 mm.
7. In case more than one layer of Wool mattress is to be applied for pipe insulation the inner layer should be tied by two turns of G.I binding wire dia 1.22 mm at a pitch of 240 mm, and the outer layer should be tied by two turns of G.I. binding wire dia 1.22 mm at a pitch of 160 mm. The ends of the wire should be twisted and pressed in to the insulation.

8. All the overlapping of outer casing should be made such that no rain water enters into the insulation through the joints.
9. In case of insulation fixing pin welding to tubes, equal circumferential pitch is to be maintained. Use a minimum number of 4 pins, at 90 degree radial spacing.
10. The inner side of the Aluminum / G.I sheet of outer casing should be painted with two coats of anticorrosive Paint (IS:158). Retainer – Type A must be coated with Aluminum paint to avoid bi-metal corrosion or Neoprene strip must be provided between Retainer – Type A and Casing support.

The above mentioned paints are not in BHEL scope of supply

11. Self tapping screws should be fixed over the circumferential overlapping. The axial joints should be on the Casing supports and outer casing should be fixed to Casing supports with Self tapping screws at a pitch of 150 mm approximately.
12. The outer casing should be wound tightly around the insulation and then fixed with Self tapping screws when there is not any Fixing pin for insulation.
13. Loose wool can be taken from the Wool mattresses wherever required.
14. Clean the surface to be insulated of rust, dust, grease, loose scale, oil, moisture, etc.
15. Care shall be taken that flexible insulation is not unduly compressed.
16. After insulating the equipment with Calcium silicate / Mineral wool mattress, all voids in the joints shall be filled with Moldable insulation / loose mineral wool respectively.
17. Each day application of insulation should be weather proofed overnight by either with the final protective casing or with some temporary weatherproof covering so that it does not get drenched in rain.
18. The indicated thickness of insulation is the minimum requirement which should be provided. Any alteration in the thickness of insulation should be done only after getting the prior approval from the Design Engineer.
19. The layers of Wool mattresses are to be taken as indicated below:

THICKNESS IN mm	LAYER IN mm				
	1 st	2 nd	3 rd	4 th	5 th
250	50	50	50	50	50
230	50	60	60	60	
210	50	50	50	60	
200	50	50	50	50	
190	40	50	50	50	
180	60	60	60		

160	50	50	60
150	50	50	50
140	40	50	50
120	60	60	
100	50	50	
80	40	40	

20. Where junctions between two or three bodies or different dia, occur and different insulation thickness is specified the greater thickness shall be continued for a length equal to one dia of the smaller body then smoothly tapered to the required smaller thickness over a length equal to two dia of the smaller body. When there is a differential thermal expansion between these bodies, they should be insulated individually.

21. The required fixing components and outer casing sheets have been released under PG_32. The insulation materials have been released under PG-33.

22. **STORAGE INSTRUCTIONS:**

22a) Mineral wool mattress:

These materials should be stored under fully covered sheds. Stocking must be done over planks and must be out of contact with ground. Height of stacking should not exceed 3 Meters.

Once drenched in water these materials loose all the desired properties and become unsuitable for use. Drying the material does not restore the desired properties.

22b) Outer casing sheets:

Outer surfaces are meant for improving the appearances also scratch marks, dents, etc, spoil the appearance.

23. Typical insulation arrangement drawings are indicated below.

- | | | |
|----|--------------------------|------------------------------------|
| 1) | Tees | 4-00-235-08546 |
| 2) | Elbows | 4-00-235-08547 |
| 3) | Flanges | 4-00-235-08548 |
| 4) | Expansion joint for pipe | 4-00-235-08549 |
| 5) | Expansion piece for duct | 3-00-235-06258 &
3-00-235-06259 |
| 6) | Manhole door for duct | 3-00-235-06260 |

INSULATION OF DRUM END

MATERIAL:

- 1) FLAT 50 X 6
- 2) FIXING PIN INSLN DIA – 6
- 3) RETAINER TYPE – A
- 4) G.L. BINDING WIRE DIA – 1.22 / 0.914
- 5) WOOL MATTRESS
- 6) OUTER CASING
- 7) SELF TAPPING SCREW – M4 X 13
- 8) G.L. SEWING WIRE DIA – 0.71 / 0.914

APPLICATION:

Install Flat 50 x 6 circumferential bands to fit snugly around the drum.

Flat 50 x 6 lattice bar 8 numbers should be radially placed over the dished end and contouring the same and it is to be welded over circumferential bands.

Weld the Fixing pins to the lattice bars circumferential bands.

Fix the Wool mattress.

Position the Retainer and tack weld to the Pin.

Tie with Binding wire across the Pins.

Fix the outer casing strips by Self tapping screws.

INSULATION OF PIPES AND BUNCH OF TUBES

MATERIAL:

- 1) WOOL MATTRESS
- 2) G.L. SEWING WIRE DIA-0.71 / 0.914
- 3) G.L. BINDING WIRE DIA – 1.22 / 0.914
- 4) OUTER CASING
- 5) SELF TAPPING SCREW – M4 x 13

APPLICATION:

Fix the insulation over the bunch of tubes / pipes.

Tie the insulation with G.I. binding wire circumferentially.

Fix the outer casing sheet with self-tapping screws.

**INSULATION OF VERTICAL PIPES
(WELDING OF FIXING PINS NOT PERMITTED ON PIPES)**

MATERIALS:

- | | |
|-------------------------------|---------------------------------------|
| 1) FIXING PIN INSLN DIA – 6 | 9) FLAT 50 x 6 |
| 2) RETAINER TYPE – A | 10) PACKING CLOTH – 3 MM TK |
| 3) CASING SUPPORT – 850MM | 11) HEX HD BOLT M8X40 |
| 4) OUTER CASING | 12) HEX NUT M8 |
| 5) WOOL MATTRESS | 13) PNCHD WASHER A9 |
| 6) SELF TAPPING SCREW – M4X13 | 14) GI BINDING WIRE DIA – 1.22 /0.914 |
| 7) CLAMP | 15) GI SEWING WIRE DIA – 0.71 / 0.914 |
| 8) SUPPORTING SHEET | 16) SHEET 3.15x30x3000 |

APPLICATION:

At every three meters provide the Clamps over the pipe with bolt but and washer by using packing cloth in between the pipe and clamp. Fix the sheet 3.15x30x3000 over the pipe and weld to the clamps. Weld the fixing pin over the sheet. Consult the Welding engineer before welding.

Weld the Flat to the Clamps.

Weld the Supporting sheets to the Flats.

Fix the insulation.

Position the Retainer Type – A and tack weld to the Pins.

Tie the insulation to the pipe with GI biding wire circumferentially.

Fix the casing support to the Retainer by using two numbers of Self tapping screws, fixed diagonally for each Retainer.

Fix the outer casing sheet with self tapping screws.

INSULATION OF VALVE

MATERIAL:

- 1) SM CLAMP FOR DETACHABLE INSULATION TYPE – A (To be used up to 200 mm overall dia)
- 1)a SM CLAMP FOR DETACHABLE INSULATION TYPE – B (To be used above 200 mm overall dia)
- 2) WOOL MATTRESS
- 3) OUTER CASING
- 4) SELF TAPPING SCRES – M4 x 13
- 5) G.I SEWING WIRE DIA – 0.71
- 6) SNAP HD RIVET 3 x 8
- 7) CHS SCREW M4 x 20
- 8) HEX NUT M4

APPLICATION:

The sheeting shall be made in two halves and the Sheet metal clamp mounted.

Wool mattress thickness according to adjacent pipe lines shall be pressed in to two halves.

The two halves shall be fitted over the valve to be insulated and locked by Sheet metal clamp.

Self tapping screws shall be used for clamping the two edges of the outer sheet casing when the length of the valve is more.

After assembling the Clamp put a bit of GI Binding wire as a pin through 1.6 mm hole provided.

INSULATION OF DUCT / FLAT SURFACE

MATERIALS:

- | | |
|-----------------------------|--------------------------------------|
| 1) FIXING PIN INSLN DIA – 6 | 5) GI BINDING WIRE DA – 1.22 / 0.914 |
| 2) WOOL MATTRESS | 6) CASING SUPPORT – 650 MM |
| 3) OUTER CASING | 7) SELF TAPPING SCREW M4 x 13 |
| 4) RETAINER TYPE – A | 8) GI SEWING WIRE DIA – 0.71 / 0.914 |

APPLICATION:

Weld the Fixing pin over the Duct / Flat surface.

Fix the insulation.

Position the Retainer Type – A and tack weld to the Fixing pins.

The GI Binding wire dia 1.22 shall be wound across the Fixing pins diagonally underneath the Retainer Type – A.

Fix the Casing support – 650 long to the Retainer Type – A by using two numbers of Self tapping screws, fixed diagonally for.

Retainer Type – A.

Fix the outer casing by using Self tapping screws.

DUCT STIFFENERS

When the stiffeners protrudes through the insulation and are exposed to atmosphere, provide an additional 40 mm insulation over the stiffener.

DUCT DAMPER & GATE

Insulation thickness shall be as per the adjacent duct insulation. The stuffing boxes should not be insulated. A clear gap of 50 mm (minimum) should be maintained all around the stuffing boxes.

AIR HEATERS

DO NOT insulate over the axial seal, adjuster seal access covers and basket removal doors insulation should be applied in a manner to permit a free circulation of ambient air around the bearing.

INSULATION OF DUCT (CLEARING STIFFENERS)

MATERIALS:

- | | |
|--------------------------------------|-----------------------------|
| 1) FIXING PIN INSLN DIA – 6 | 7) OUTER CASING |
| 2) RETAINER TYPE – A | 8) SELF TAPPING SCREW M4X13 |
| 3) RETAINER TYPE – C | 9) WOOL MATTRESS |
| 4) CASING SUPPORT – 650 MM | 10) WELD MESH |
| 5) GI BINDING WIRE DIA – 1.22/0.914 | 11) CORNER SUPPORT |
| 6) GI SEWING WIRE DIA – 0.71 / 0.914 | 12) ANGLE 40X40X5 – 100 |

APPLICATION:

Weld the Fixing pin over the Duct.

Position the Retainer Type – C so that it will be in the same plane as that of the top surface of the stiffener.

Tack weld the Retainer – Type – C to the Fixing pin.

For the top plate of the horizontal duct, spread the Weld mesh over the Retainer Type – C.

This serves as the additional support where people walk over the insulation.

Weld the Corner support to the bottom corners of the duct.

Weld the Angle to the corner support.

This arrangement will help to achieve a sharp corner for the insulation and outer casing.

Fix the insulation.

Position the Retainer Type – A and tack weld to the Fixing pin.

The Binding wire shall be wound across the pins diagonally underneath the Retainer Type – A.

Fix the Casing support - 650 mm long to the Retainer by using 2 numbers of Self tapping screws, fixed diagonally for each Retainer.

Fix the outer casing by using Self tapping screws.

PROCEDURE FOR CURING OF CASTABLE REFRECTORY

CURING OF REFRACTORY WORK

Curing of refractory means retaining the moisture for a minimum period in order to ensure the proper hydration of the binder. Curing of exposed castable surfaces should start after the surface has become firm. This can be tested when a finger rubbed across the surface comes away clean or when the surface feels warm to the touch. Moisture loss for the first 24 hours, after the material has been installed shall be retarded. Initial set occurs within one or two hours.

Castables should be cured for 24 hours. Moist conditions can be maintained by protection with damp sacking or plastic sheet which should not come into immediate contact with the refractory or alternatively by dry coating the castable with an impervious organic based sealing compound. In some instances, satisfactory results can be obtained by sparkling water over the surface. It should be watered for a period of 20 to 24 hours after 4 to 5 hours of construction. The rate of water applicable should be carefully controlled to prevent washing of the fines and to prevent collection of pools in low spots. Shield the surface from direct sunlight at least for about 48 hours. 8 hours after casting and pouring, remove the wooden frames which have no load bearing function in order to permit watering of the lateral parts of the structures. In case of steel frames apply water without stripping them. On completion of the curing period the application of moisture should be stopped. The exposed castable should be allowed to air dry for 24 hours. Naturally air drying of castable after curing will actually cause slight increase in strength. The castable can be all dried indefinitely without adverse effect. Optimum results can be obtained with a drying period of 48 hours.

Before lighting the boiler for drying the setting the following shall be attended.

1. All dirt and foreign objects sticking to tube surface are to be removed to ensure a thoroughly clean surface.
2. Expansion joints are to be cleaned and inspected for the proper functioning of expansion during operation.
3. Test sample of castable refractory is to be taken from entry door regions to determine the moisture content in the laboratory.

Sample of castable are to be taken for the determination of moisture content before and after drying. When the moisture content drops below 0.58 the castable is considered to be dry and the boiler is ready for commissioning. All result of measurement should be duly recorded.

CARE OF THE REFRACTORY WORK

The refractory work is subjected to considerable thermal stresses during boiler operation. Sudden application of heat or cooling introduces severe stresses and endangers the refractory work. Even when the boiler is operated in the recommended regime possibilities of damage occurring to the refractories (due to severed reasons such as bad workmanship, poor quality, slag deposition, corrosive atmosphere etc) must be kept in mind. The following simple rules to be observed.

- (i) Avoid sudden cooling of the furnace after a shut down. A cooling rate of 20° to 30° per hour for the refractory lining in the initial period is recommended. This means that FD fans must be stopped after a shut down of the boiler. Ventilation of the furnace by natural draft is permissible only after six hours of shut down. Forced cooling can be started only after 16 hours.
- (ii) Avoid quick heating of the furnace. Boiler starting diagram is usually a reliable guide.
- (iii) Thoroughly examine the refractory work during shot downs for cracks, chipping off spelling etc. During operation also this can be checked periodically by visual examination through observation holes.

Whenever defects are notice arrange for their quick alimentation, by shutting down the boiler at the earliest depending on the scarceness of the defect.

- (iv) Abnormal heating of outside metal sheet covering of the boiler and hot spots are usually a good indication of damaged refractory and insulation in this area. The leakage of flue gas will spoil the property of good mattresses within a short time.
- (v) Deep the access door, observation doors, etc. properly shut. They are entry points for cold air and this cold air can damage the refractory work by localized cooling.
- (vi) Sufficient quantity of water is to be added to the castable refractory for mixing before application as per supplier's recommendations.

METHOD OF APPLICATION AND CURING
OF POURABLE INSULATION

- (i) Typical application are for insulating behind buckstays and areas such as roofs having multiplicity of hangers, rods and other penetrations.
- (ii) The application of pourable insulation cab be pumping and gunning.
- (iii) Density of the pourable insulation installed and cured is around 600 to 650 Kgs/ M
- (iv) Pourable insulation is a hydraulic setting insulation additive or air entrainment agents shall not be used.
- (v) (a) Empty the entire bag at a time and mi the while material so that segregated particles get mixed.
(b) The pourable insulation should be thoroughly mixed with coal clean water to develop casing and pump consistencies.
© The correct quantity of water shall be placed in the mixer before adding the dry pourable insulation normally about 70 to 100 by weight. However this has to be confirmed from the supplier while purchasing this material.
(d) Mixing time shall not to be less than the minutes or more than five minutes.
(e) Dried out material shall not be remixed.
(f) Pourable insulation once mixed must be in place within half an hour.
- (vi) (a) All areas where pourable insulation will be placed must be free of scale, rust, dust or other loose materials.
(b) All porous forms used such as wood etc shall be oiled before pouring.
© All absorbent surface such as insulation brick, concrete, shall be wet down thoroughly to prevent water absorption.
(d) Waiting of wall insulation used as forms at buckstay levels is not required.
- (vii) (a) The surface of pourable insulation once in place will become firm in approximately two hours. The surfaces should be kept damp with an occasional light spray or covering with a cloth that is kept damp for the entire 24 hours curing period.
(b) For mixing and spraying the water should be clean and cold.
© Application of moisture after 24 hours should be stopped forms etc should be removed and the materials allowed to air dry for 24 hours.
- (viii) The shuttering scaffolding moulds should be removed after about 36 hours of casing.

**APPLICATION OF INSULATION FOR BOILER PIPING,
PIPING AND EQUIPMENTS / VESSELS AND ACCESSORIES.**

Bonded mattress having standard thickness to 25, 40, 50, 60, 75 mm conforming IS 8103 having a density of 150 kg/cubic meter and light bonded mattress having a density of 150 kg/cubic meter and light bounded mattress having standard thickness of 25, 40, 50, 60, 75 mm conforming to IS 9842 having a density of 144 kg/cubic meter and pipe section in the standard thickness of 25, 40, 50, 60, 75 mm conforming IS 9842 having density of 144 kg/cubic meter will be 100 kg/cubic Mtr.

The application of insulation will be done as per general notes/ drawings enclosed. The application commissioning shall be as per latest editions of IS 7413 code of practice for application and finishing of thermal insulation materials between 40° C to 700° C of Bs 5970 code for practice for thermal insulation of pipe work and equipment (in the temperature range – 100° C to + 870° C).

Inspection before application, during the application and after the application of insulation will be carried out by BHEL Field Quality Engineer as per BHEL Field Quality Plan. Every layer of insulation shall be got approved by BHEL Engineer / FQA Engineer.

Prior to applying insulation the surfaces to be insulated shall be made clean and dry and free from dirt and grease. Where cladding is attached to carbons steel or low alloy steels the steel shall be first prime painted with zinc chromate and then painted with Aluminum paintings. Wherever required to provide aluminum foil as protective covering for bolts and other fittings shall be arranged by contactor. The prints wherever required for preservation coating shall be supplied by contractor.

For insulation of piping with performed pipe sections the came shall be applied over pipe and finally be held in position with 15 mm wide aluminum band at greater than 300 mm spacing for mineral wool insulation.

For insulation of piping with mattresses having backing GI wire netting, the required lengths and shapes are to be cut from the blankets and wrapped on the piping and held in position with proper support by fastening the binding to be done circumferential at not greater than 300 mm spacing.

Performed insulation on vertical or near vertical piping must be supported in position by means of metal ring at interval not greater than 960 mm.

The support attachment may be welded or clamped to the pipe, subject to the approval of BHEL Site Engineer Necessary fabrication of support rings to be done as per site requirement.

Piping bends shall be insulated to the same specification as adjacent straight piping and should form a smooth external surface. Where performed material is used it should be cut lobster-back fashion and wired or strapped into position.

Pipe insulation shall be cut to fit nearly around hangers and supports. On horizontal lines which are supported directly on pipe racks the insulation and weather proofing shall be sufficiently cut away at the support to accommodate pipe movement.

Protrusions through insulations which themselves do not required insulations such as pipe clamps supports of small pipings instrument take offs etc shall be covered to the same thickness as the adjacent insulation expect for hanger rods.

At outdoor location the hanger rod protraction shall be shielded with metal flashing to deflect rain and protect the insulation from moisture while permitting the movement of the hanger rod.

Arrangement of securing the metal finish even the insulation shall ensure that direct metal contact between the insulated surface and outer meter cladding is avoided. 4mm thick asbestos board packing shall be used at interface to thermally isolate the metal covering from supporting arrangement. All cladding joints shall be vapours tight and shall be able to accommodate thermal movements. Paste type self setting vapours sealing compound shall be used.

Metal cladding on piping shall be screwed with self tapping screws. These joints should be arranged approximately 30° below horizontal centre line so as to shed water on any horizontal pipe line. The screws shall be flat or round head types of 12mm size and overlapping of 50 mm on both longitudinal and circumferential joints. The screws shall be provided at not greater than 150 mm spacing.

Insulation expansion joints shall be provided in all pipelines to allow movements and expansion of the pipe. The recommended intervals of expansion joints are.

Pipe Temperature	Spacing of Insulation Expansion joints
Below 200°C	5.5 M
201° - 300°C	3.5 M
301°C - 400°C	3.0 M
Above 400°C	2.0 M

All joints in the insulation shall be staggered. For multiple layer of insulation the different layers shall be applied so that the butt joints of one layer do not coincide with those of the other layers. At the joint of each layer of insulation loose insulation shall be packed firmly.

Equipments Insulation Application Procedure

For equipment and shells a matrix of insulation support shall be developed by:-

- (a) Welding the insulation support lugs on a frame work prepared with 20 mm x 3 mm size MS Straps where direct welding of lugs to the sheet is not permitted.
- (b) Welding the directly on shell after written permission by Site Engineer. The material of the support shall be similar to the material of the shell in this case.

The support shell be pitched at 300 mm for vertical and underside surfaces and 500 mm for oppressed surfaces. A support shall be located above each vessel flange at a sufficient distance above the flange bolts to allow for easy removal. The top and bottoms supports shall be slotted suitably for attachments of straps and wires.

The support lugs shall be 6 mm

Insulation with back up GI wire noting, shall be cut to fit the equipments and shall be wrapped on the equipment and held in position with proper support and tie wires. All joints between course shall be staggered and tightly butter and adjacent edges laced together with lacing wire.

Insulation shall be fastened in place with MS Straps of 20 x 3 mm, on approx., 300 mm centers where contour of equipment permits. Straps shall be tightened with a banding machine and champed with seals.

Insulation on top of horizontal heads shall be cut to fit the curvature of the head and shall be secured in place with the help of radial straps fixed in between circumferential rings. Insulation on bottom heads shall be wired to nuts welded to head. Insulation shall also be strapped to bottoms insulation support. For outdoor equipments insulation shall be arranged to be weather proof.

Metal jacketing shall be applied directly over the met insulation and neatly fitted to place. All gaps shall be arranged so as to shed water. Suitable flashing and weather proofing shall be provided at all nozzles, manholes and other projections to prevent the entrance of water.

VALVES & FLANGES INSULATION APPLICATION

The insulation on all valves and flanged joints shall be enclosed in a removable jacketing so that it may be removed without disturbing the concerned equipment or piping. The thickness of insulation shall be same as that of the pipe line in which these valves and fittings are located.

The layout of wool mattresses to be adopted to obtain the specified insulation thickness are as per be on unless otherwise specified:

Thickness of Insulation (mm)	Layer			
	I	II	III	IV
25	25			
40	40	-	-	-
50	50	-	-	-
60	60	-	-	-
65	40	25	-	-
75	75	-	-	-
80	40	40	-	-
100	50	50	-	-
110	60	50	-	-
125	75	50	-	-
135	75	60	-	-
150	75	75	-	-
155	75	40	40	-
160	75	60	25	-
165	75	50	40	-

The material density of boned mineral wool used for pipe having outside diameter more than 355.6 mm is 150 kg/cubic meter IS 8183.

The material density of bonded mineral wool used for pipe having outside diameter less than or equal to 355.6 mm is 144 kg/cubic meter IS 9842.

Cladding material used is galvanised steel sheet as per IS 277 GRADE 375.

Cladding material gauge for pipe outside diameter less than or equal to 300 mm is 24 SWG.

Cladding material gauge for pipe outside diameter greater than 300 is 22 SWG.

For piping up to including 355.6 mm OD, first layer shall be pipe sections and subsequent layer shall be bonded. Wherever pipe sections are not supplied the first layer has to be wrapped using bonded wool material for piping 355.6 mm OD, bonded mattress shall be used on all the layers.

Description of type of insulation and the method of Application for Boiler Feed Pumps

1. Type of insulation

The pumps should be insulated with 125 mm thick flexible wire backed mineral wool mattress of 150 kg/ density.

2. Method of Application

The above insulation is to be applied to 2.0 mm thick flats aluminum sheeting (18 SWG) and secured by 19 mm wide aluminum retaining dips and 1/8 inch diameter aluminum pop rivets, all to be secured by 2 inch long X No.8 spacing to a 40 mm wide x 3 mm thick angle iron frame work of all welded construction bound by 40 mm PVC tape.

<u>SECTION</u>	<u>TITLE</u>	<u>NO. OF SHEETS</u>
A	METHOD OF APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS AND MATERIAL SPECIFICATIONS (ANNEXURE-1)	4
B	THERMAL INSULATION APPLICATION DRAWINGS	13

SECTION - A

THERMAL INSULATION FOR PIPING AND EQUIPMENTS

1.0 INTRODUCTION

In a thermal power station or process plant, thermal insulation or heat lagging of piping and equipment's carrying hot fluids is essential for best economy and protection of operating personnel. Any pipe which is at a temperature higher than its surroundings will lose heat and the amount of heat lost will depend upon the temperature of the fluid and the thermal conductivity of the piping material/covering.

The heat lost through bare pipe increases with

- a) Increase in the temperature of fluid conveyed
- b) Decrease in ambient temperature and
- c) Increase in wind velocity of the surroundings.

The heat so lost has potential for work and rapidly increasing cost of fuel in the recent past has promoted to find all possible means to conserve energy. Providing proper and adequate insulation on to the piping and equipments controls heat transfer and maintains the required service temperature.

2.0 METHOD OF APPLICATION

The method of application is highly skilled job. Badly fitted/laid insulation can lead to greater heat loss, higher cold surface temperature than that estimated and frequent maintenance. Following are the important points to be considered in the application of the insulation.

- 2.1 Before applying insulation, it should be ensured that all instrument tappings, clamps, lugs and other connections on the surface to be insulated have been properly installed as per relevant drawings.
- 2.2 All surfaces to be insulated shall be cleaned of all foreign materials such as dirt, grease, loose scale, moisture etc.
- 2.3 Welding of lugs, attachments, clips etc. on the surface to be insulated for supporting insulation shall not be carried out without the permission of the authorized person.
- 2.4 All flanged joints shall be insulated only after final tightening and testing.
- 2.5 The insulation shall be applied to all surfaces when they are at ambient temperature.
- 2.6 Where more than one layer of insulation is involved, mattresses should have staggered joints (at 60 deg) and they must be held in close contact with face of

pipes/fittings by means of binding wires / Aluminum bands / seals. Circumferential joints of multilayer insulation should also be staggered by at least 150 mm.

(Refer Drg. No. PE-4-999-169-01).

- 2.7 For the first layer of insulation and in case of multi layer of insulation, mattresses with hexagonal wire netting will be facing on outer side.
- 2.8 Insulation mattresses shall be held in place by fastening over with binding wire. Care should be taken to see that the flexible insulation mattresses are not unduly compressed. The ends of binding wire shall be lightly twisted together, bent over and pressed into the insulation. For mattresses, binding wire shall be used at intervals of 300mm.

In the addition Aluminium bands shall also be provided at 300 mm intervals for diameters greater than 500mm. (Refer Drg No. PE-4-99-169-01.)

- 2.9 Where junctions between bodies of different diameters occur and difference in insulation thickness is specified, the greater thickness is to be continued for a length equal to one diameter of the smaller body and then smoothly tapered to the required smaller thickness over a length equal to two diameters of the small body.
- 2.10 The indicated thickness of insulation are minimum requirement which should be maintained. Any change in the thickness of the insulation should be done only after prior approval of the design engineer.
- 2.11 The day-to-day insulation work should be covered with suitable protective materials to prevent the rain water entry, if same is expected.
- 2.12 The insulation shall be cut to fit the piping O.D / equipment and shall be wrapped on the piping / equipments and held in position with proper support and wires. All the joints should be properly staggered and tightly butted and adjacent edges laced (Refer Drg No. PE-4-999/169/01)
- 2.13 The insulation of valves and flange joints shall be enclosed in a removable jacketing so that it may be removed without disturbing the concerned equipment or piping. The thickness of insulating shall be same as that of the pip line in which these valves and fittings are located. (Refer Drg No. PE-4-999-169-07.)
- 2.14 Steam / Air / Gas leakages in and around the pipes to be insulated with be attended before applying insulation.
- 2.15 In order to provide support to Aluminium cladding, support rings made out of 20 x 3 mm M.S. flats shall be fixed at equal intervals of approximately 850 mm spacing and at every circumferential joints. These rings shall be fixed with 'L'

type lugs and shall be fabricated from 20 x 3 mm M.S flats. To reduce that conductivity through these lugs 20 mm x 3 mm size Ceramic mill board shall be used between rings and lugs (Refer Drg No. PE-4-999-169-04 and PE-4-999-169-13).

- 2.16 Spacing between supporting rings for vertical piping shall be 3 mtrs. Support rings are to be provided only when the vertical height exceeds 3 mtrs. (Refer Drg No. PE-4-999-169-03-and PE-4-999-169-05).
- 2.17 For vertical pipes since support rings is provided at every 3 mtrs interval, only two spacer rings shall be provided in between support rings.
- 2.18 Spacer rings shall be provided at both ends of elbows/bends, valves and flanges pipe having dia more than 89mm.
- 2.19 Wherever the end of hanger clamp assembly protrudes out of the insulation at the bottom suitable box structure are to be provided. Pipe hangers and supports should be covered in such a way that the moisture cannot penetrate into the insulation.
- 2.20 It is very important that sheet metal cladding should be done by a well experienced and competent fabricator. Person doing the job can alter the method of fixing of cladding sheet after consulting the concerned design engineer.
- 2.21 The longitudinal joint in the outer cladding sheet should always be at the lower half of the circumference for horizontal piping so that no rain water enters the insulation through the joints. (Refer Drg No. PE-4-999-169-01).
- 2.22 The joints of outer cladding should be staggered axially.
- 2.23 Inside surface of all Aluminium sheet will have two coats of Bituminous paint applied uniformly.
- 2.24 Aluminium sheets covering on outdoor horizontal pipes will be provided with 3 mm drain hole at the bottom center line at 6 mtr intervals.
- 2.25 The cladding sheet shall provide directly over the insulation/finishing cement (1F APPLICABLE). Suitable flashing and weather proofing shall be provided at all nozzles, manholes and other projections to prevent the entrance of water.
- 2.26 Loose wool can be taken from wool mattresses. Wherever gaps and voids have to be filled.
- 2.27 Sealing compound to be applied on Aluminum cladding sheet joints.

- 2.28 Support rings/spacer rings shall be provided if the insulation thickness > 40mm and pipe diameter > 89mm.
- 2.29 Equipment's name plates shall not be insulated.
- 2.30 Clips made out of sheet be riveted inside the box for insulation of valves and flanges to hold the insulation in box. (Refer Drg No. PE-4-999-169-06).
- 2.31 The insulation local to the inspection points of the critical piping shall be removable.
- 3.00 For Thermal Insulation Material Specification related to the project refer Annexure – 1.

IMPORTANT POINTS TO BE TAKEN CARE DURING APPLICATION

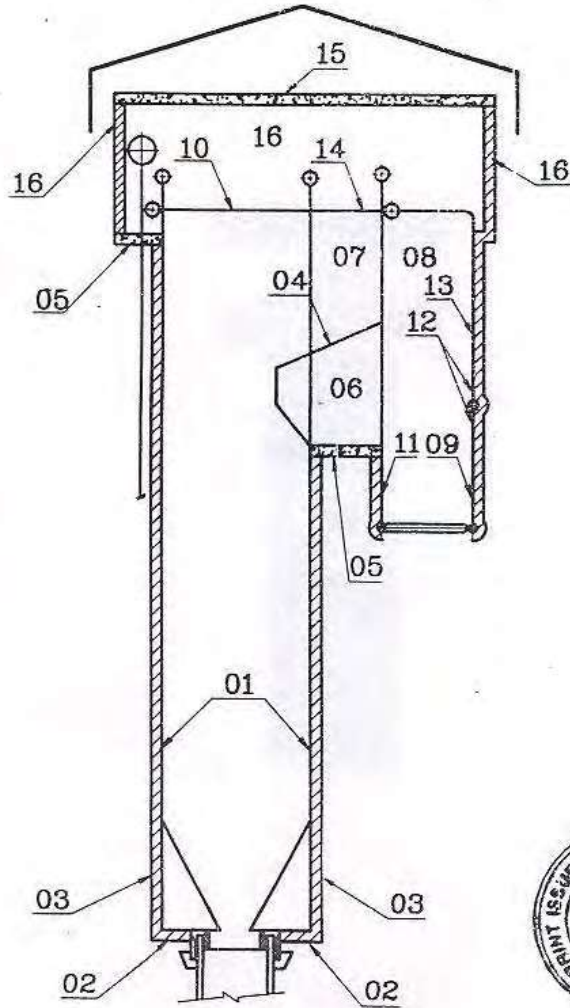
- I) Binding wires for all layers of insulation will be at distance of 300mm.
- ii) In addition Aluminum bands/seals also to be provided at distance of 300 mm for sizes above 500mm.
- iii) Aluminum bands/seals to be provided over aluminum sheets at distance of 500mm.
- iv) Ceramic mill boards to be used between all 'L' type lugs and the support rings.
- v) Inside surface of Aluminum sheets to have 2 coats of bituminous paint applied uniformly.
- vi) Gaps to be properly filled with loose wool taken from mattresses.
- vii) End of hanger clamp assembly protruding out of insulation at the bottom should be suitably boxed with Aluminum sheets.
- viii) Valves to be insulated properly in box structure as given in enclosed drawings.
- ix) Multilayer longitudinal and circumferential joints should be staggered.

ANNEXURE – 1

- 1.0 **Thermal insulating materials shall be per the details given below:-**
- 1.1 **Lightly Bonded Mineral (Rock) wool Mattresses** of density 150 Kg / Cub. Mt with S.S. wire netting will be applied for the first layer of insulation where hot face temperature greater than 400 degree centigrade. For subsequent layers matters of density 150 Kg / Cub. Mtr with G.S. wire netting will be applied.
- 1.2 **Lightly Bonded Mineral (Rock) wool Mattresses** of density 100 Kg/Cub. Mt with G.S. wire netting will be applied for all layers of insulation for host face temperature less than and equal to 400 degree centigrade.
- 2.0 **Binding and lacing wires:** For insulation matters shall be of stainless steel for all insulation interface temperatures.
- 3.0 **Aluminum cladding sheet** shall be provided over the Mattresses ad per details given below.

18 SWG (1.22 mm thk.)	For pipes with dia over insulation above 450 MM.
20 SWG (0.91 mm thk.)	For pipes with dia over insulation above 150 MM and less than equal to 450MM.
22 SEG (0.71 mm thk.)	For pipes with dia over insulation less than equal to 150mm.

SECTION – B

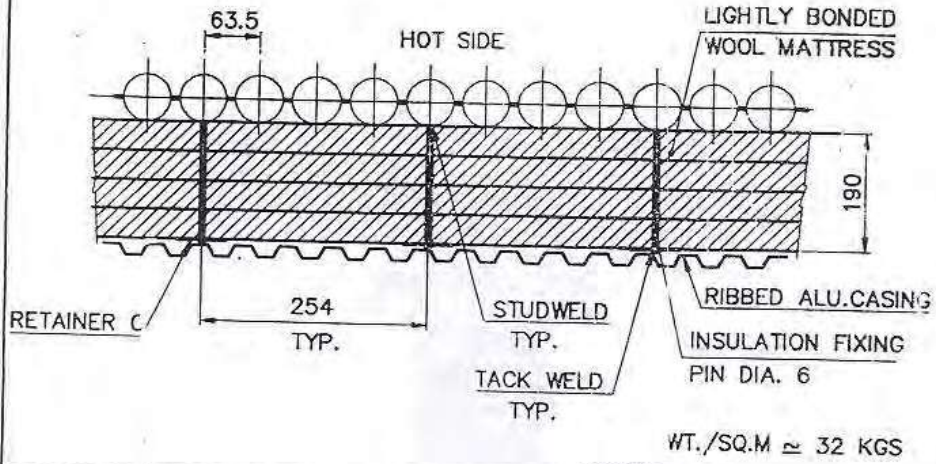


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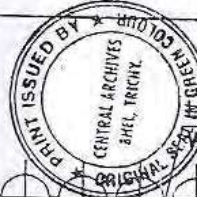
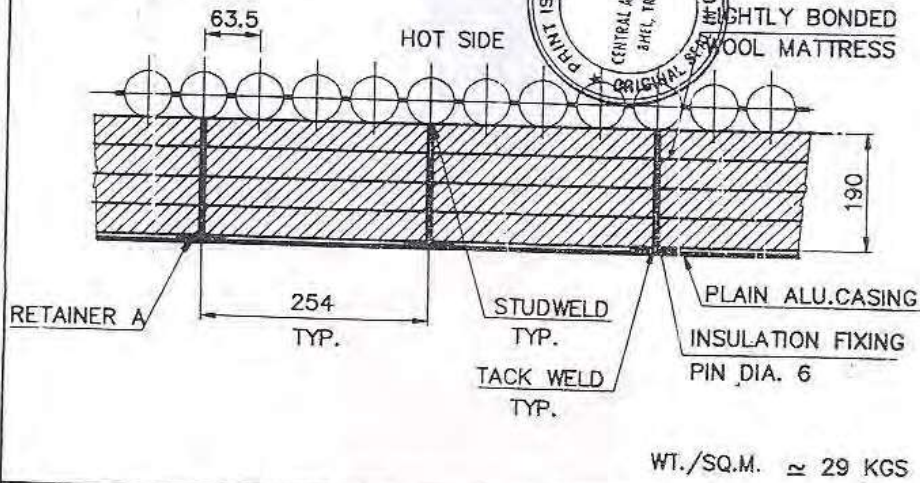
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DETAIL 01

SHEET 02 OF 09



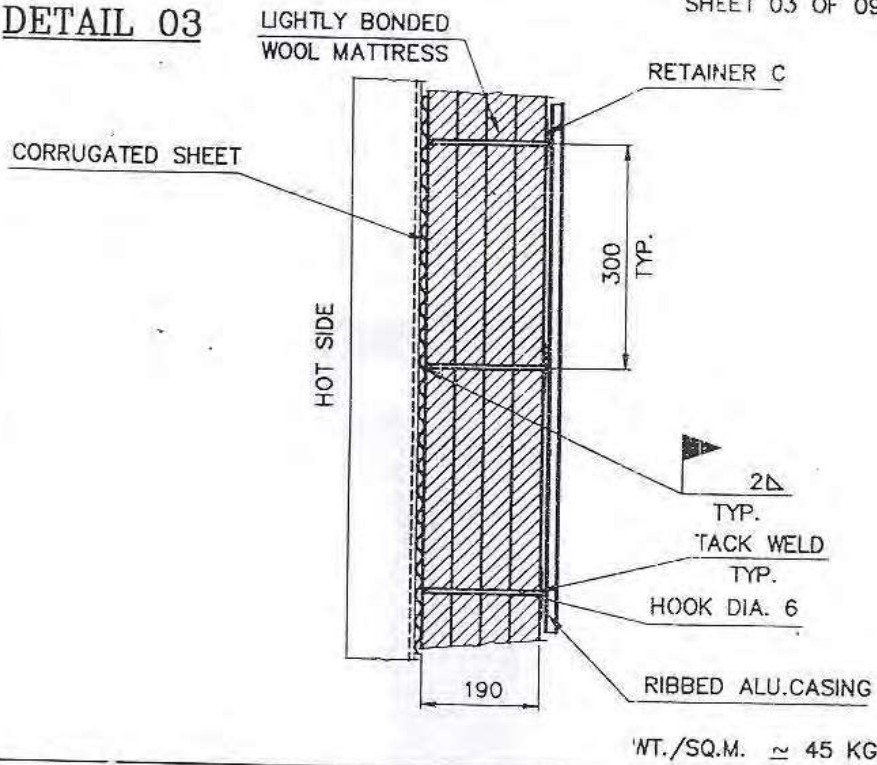
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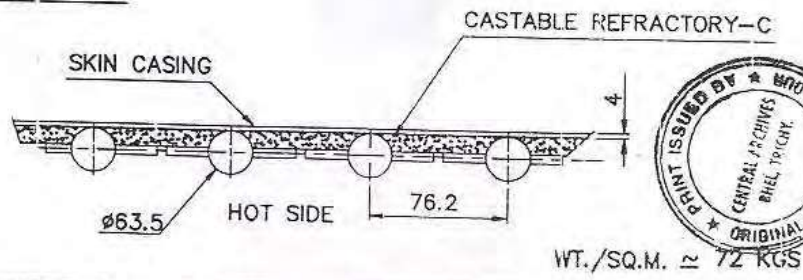
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DETAIL 03



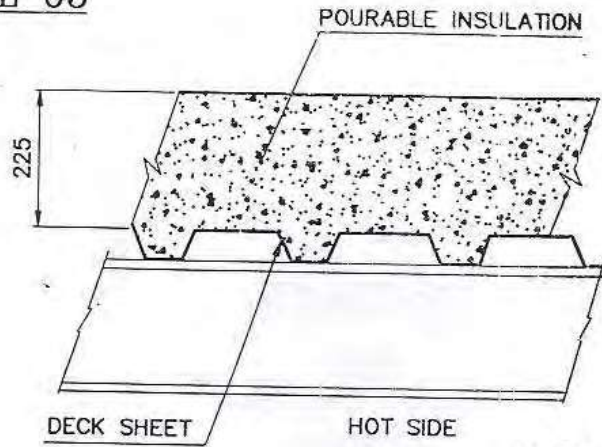
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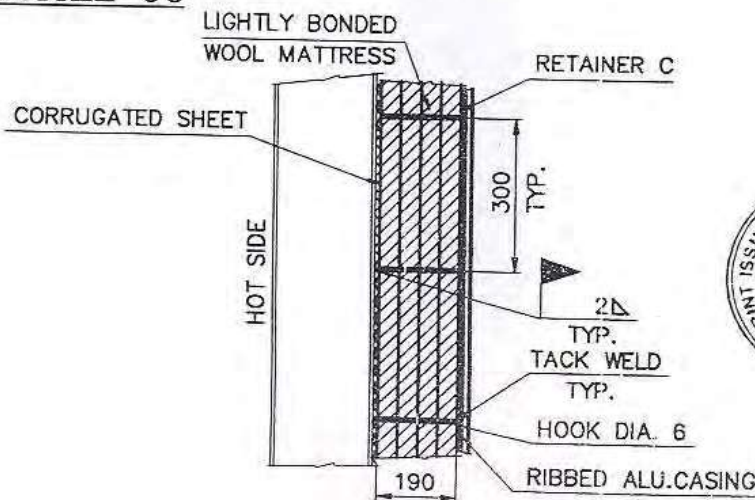
DETAIL 05

SHEET 04 OF 09



WT./SQ.M \approx 193 KGS

DETAIL 06



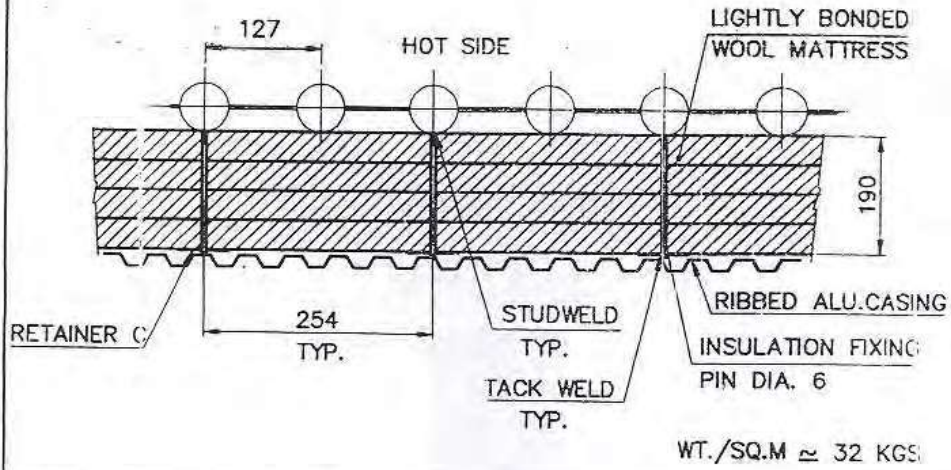
WT./SQ.M \approx 45 KGS

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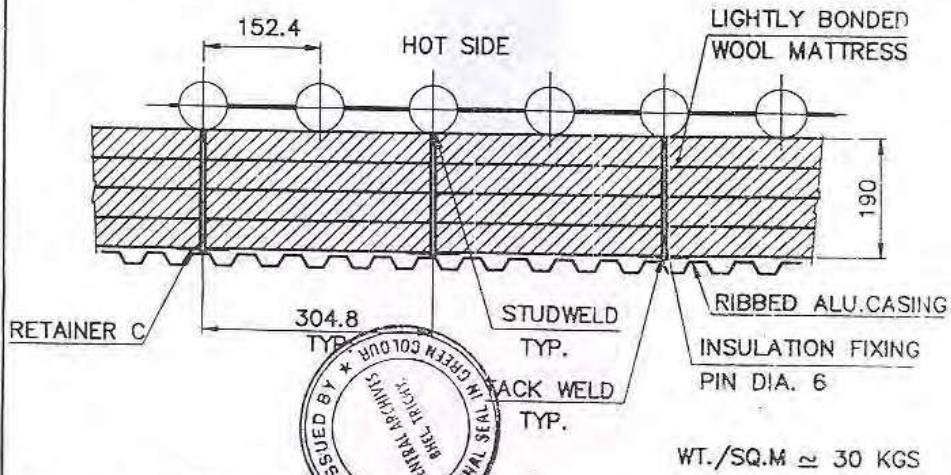
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DETAIL 07

SHEET 05 OF 09



DETAIL 08

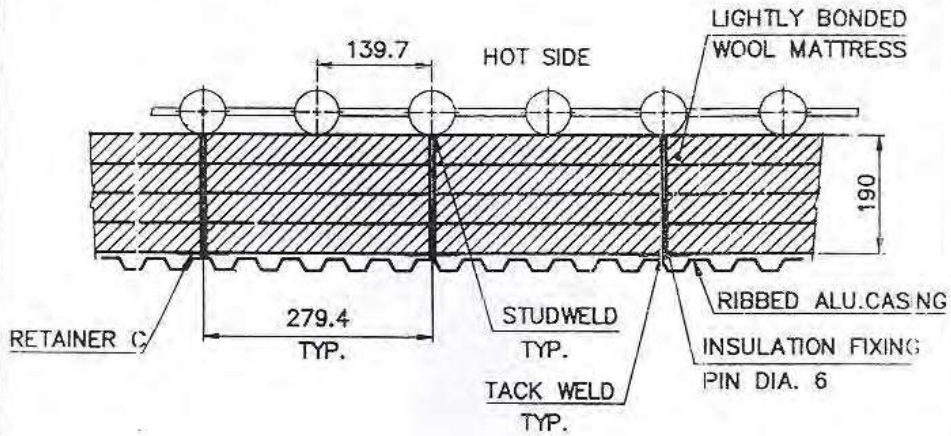


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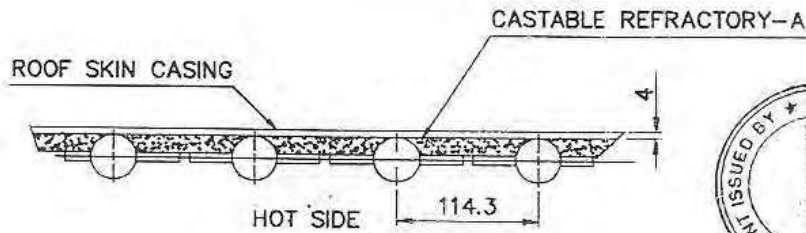
DETAIL 09

SHEET 06 OF 09



WT./SQ.M \approx 30 KGS

DETAIL 10



WT./SQ.M \approx 75 KGS

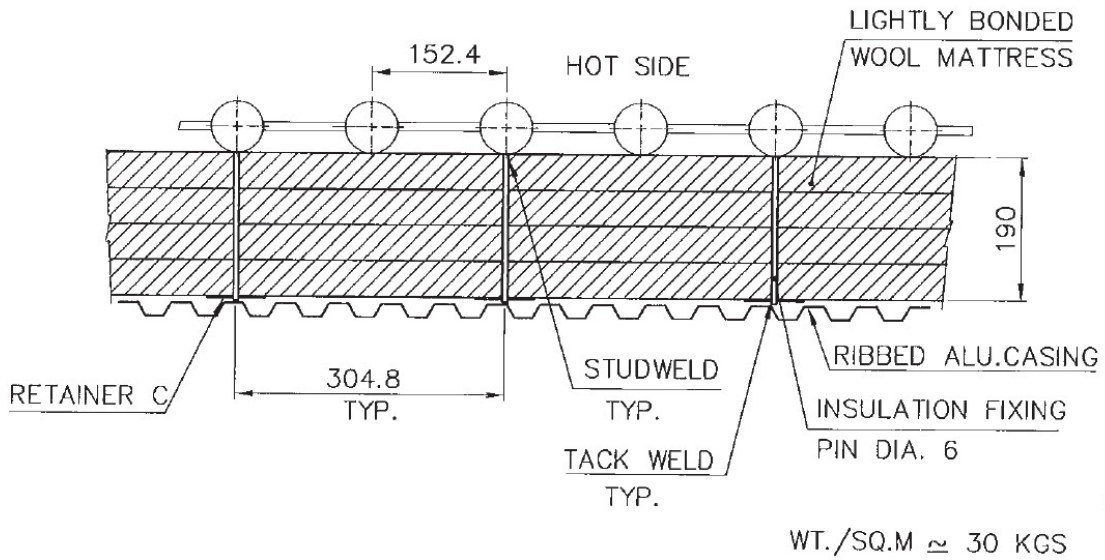


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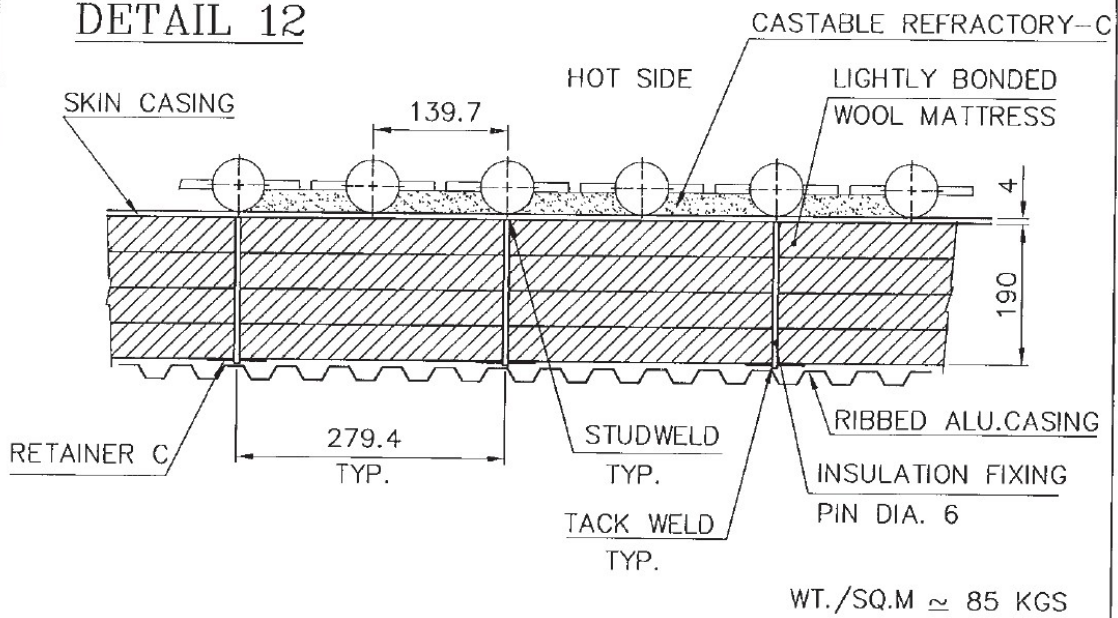
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DETAIL 11

SHEET 07 OF 09



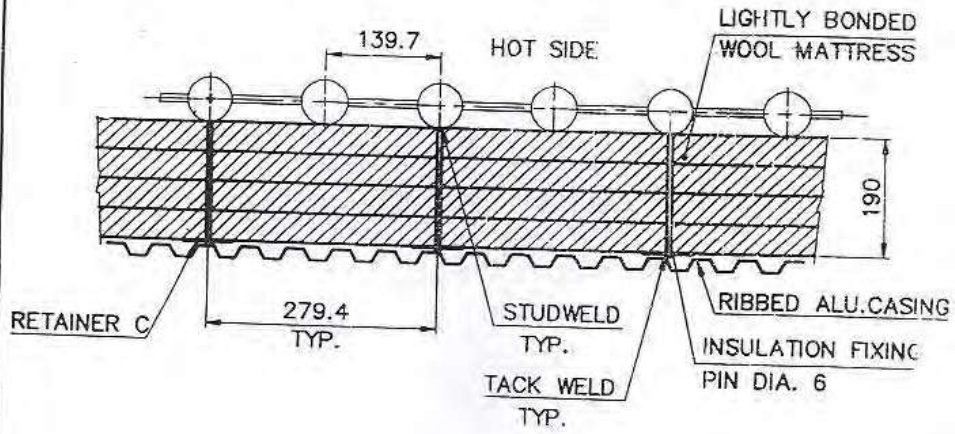
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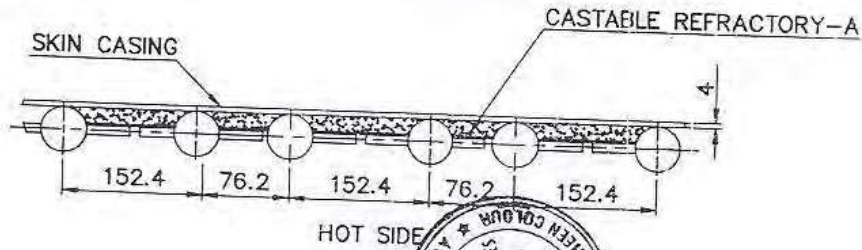
DETAIL 13

SHEET 08 OF 09



WT./SQ.M \approx 30 KGS

DETAIL 14



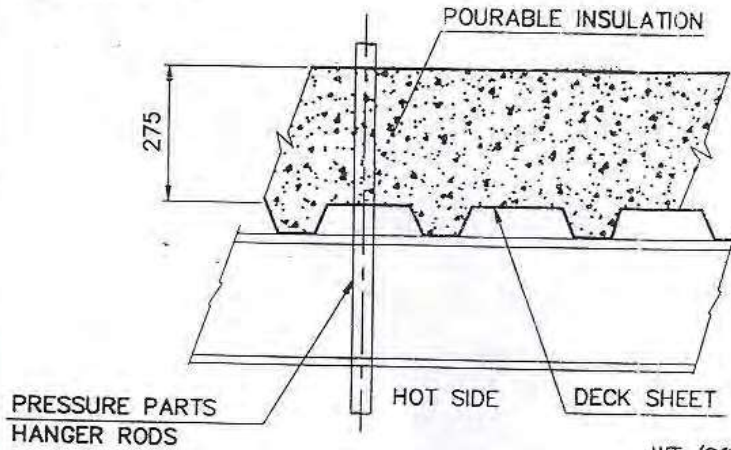
WT./SQ.M. \approx 75 KGS

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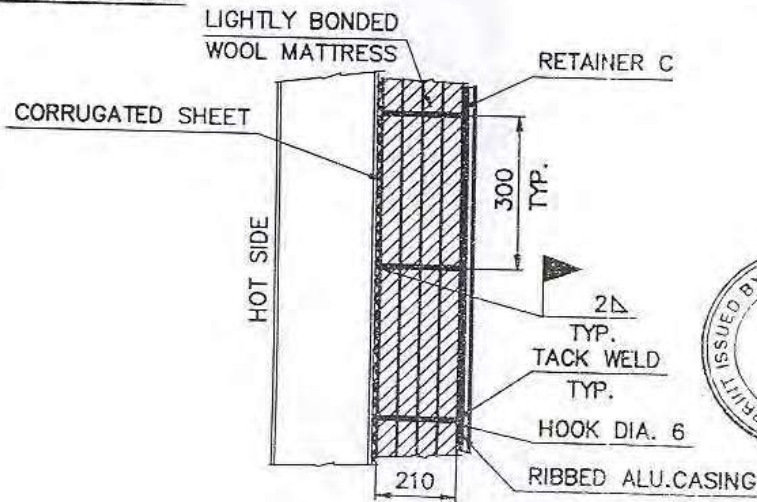
DETAIL 15

SHEET 09 OF 09



WT./SQ.M \approx 233 KGS

DETAIL 16



WT./SQ.M \approx 46 KGS

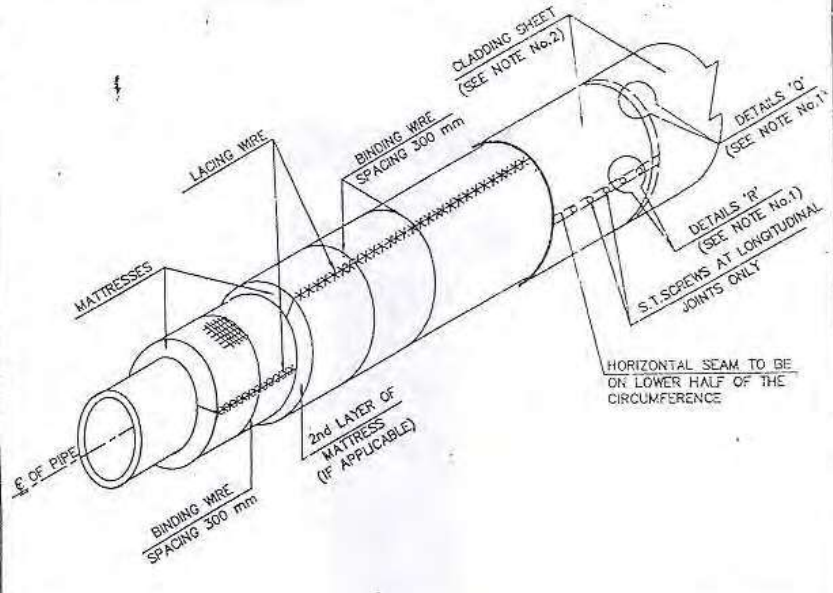
INSULATION	DRN	C.S		DRG.NO.	REV.NCL
	CHD	C.G.S		4-00-215-08559	00
	APPD	C.G.S			

CTS001284.0

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED
JOB NO. STANDARD					

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NOTES:—

1. FOR DETAILS 'Q' AND 'R' REFER DRG No. PE-4-999-169-12
2. FOR SHEET SUPPORT REFER DRG No. PE-4-999-169-04
3. FOR GENERAL INFORMATION ON APPLICATION OF INSULATION REFER DOCUMENT "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS".
4. IN ADDITION TO BINDING WIRE ALUMINIUM BANDS TO BE PROVIDED FOR DIAMETERS > 500 MM

MATERIALS REQUIRED:—

1. MATTRESSES
2. BANDS AND SEALS
3. CLADDING SHEET
4. S.T. SCREWS
5. SEALING COMPOUND
6. LACING WIRE
7. BINDING WIRE



BHARAT HEAVY ELECTRICALS LIMITED
 POWER SECTOR
 PROJECTS ENGINEERING MANAGEMENT
 NEW DELHI

DEPT. MF.	CODE M	SCALE N.T.S.	WEIGHT (KG.)	REF. TO ASSY. DRG	ITEM
TITLE: INSULATION APPLICATION (HORIZONTAL PIPES WITH MATTRESSES)				DRN	NAME
				DESIGN	S.C.S.
				CHKD	D.B.S.
				APPRD	S.K.J.
				SIGN	DATE
					9.6.97
					11.6.97
CARD CODE		DRAWING NO.		PE-4-999-169-01	
—		SHEET 1 OF 1		REV. 00	

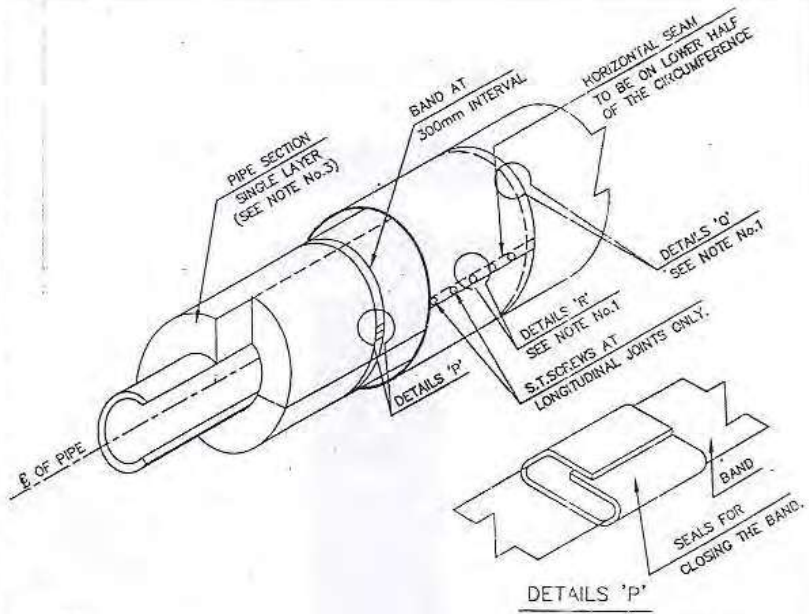
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A4

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED
					JOB NO. STANDARD

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NOTES: -

- FOR DETAILS 'Q' AND 'R' REFER DRG. No. PE-4-999-169-12
- FOR CLADDING SHEET SUPPORT REFER DRG. No. PE-4-999-169-04
- 2nd & 3rd LAYER IF ANY SHALL BE OF MATTRESSES.
- FOR GENERAL INFORMATION ON APPLICATION OF INSULATION REFER DOCUMENT "INSTRUCTIONS" FOR APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS"

MATERIALS REQUIRED: -

- PIPE SECTIONS
- BANDS AND SEAL
- CLADDING SHEET
- S.T. SCREWS
- SEALING COMPOUND



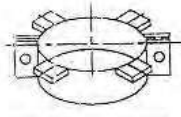
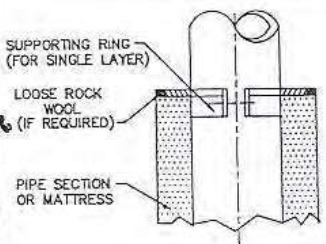
BHARAT HEAVY ELECTRICALS LIMITED
 POWER SECTOR
 PROJECTS ENGINEERING MANAGEMENT
 NEW DELHI

DEPT. MPL	CODE M		SCALE N.T.S.	WEIGHT (KG.)	REF. TO ASSY. DRG	ITEM		
TITLE: -					DRN	NAME	SIGN	DATE
INSULATION APPLICATION (HORIZONTAL PIPES WITH PIPE SECTION)					DESN	S.C.S.	<i>[Signature]</i>	6.6.97
					CHD	D.B.S.	<i>[Signature]</i>	9.6.97
					APPL	S.K.J.	<i>[Signature]</i>	11.6.97
CARD CODE		DRAWING NO.						
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		SHEET 1 OF 1			REV. 00			

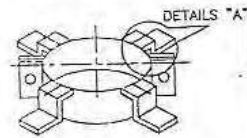
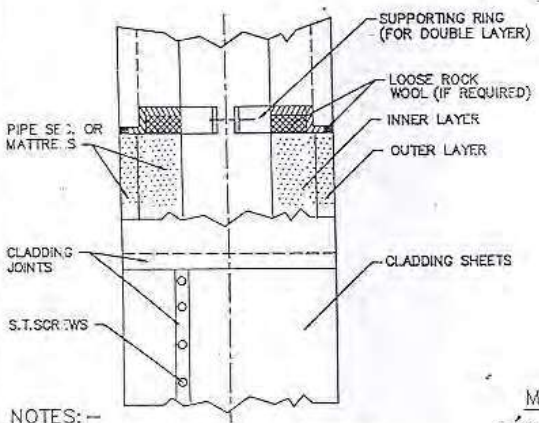
FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED
JOB NO. STANDARD					

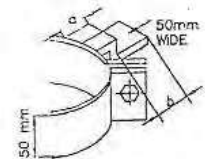
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SUPPORT RING
(FOR SINGLE LAYER)



SUPPORT RING
(FOR DOUBLE LAYER)



DETAIL 'A'

NOTES: -

1. LENGTH 'a' & 'b' TO BE 12 TO 50mm LESS THAN SPECIFIED INSULATION THICKNESS.
2. SUPPORT RING TO BE FABRICATED OUT OF MS FLATS/STRAPS.
3. SUPPORT RING REQUIRED FOR PIPE 80 Nb & LARGER IF INSULATION THICKNESS LARGER THAN 30mm.
4. SUPPORT RINGS REQUIRED FOR MATTRESS ONLY.
5. FOR GENERAL INFORMATION ON APPLICATION OF INSULATION REFER DOCUMENT "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS"

MATERIALS REQUIRED: -

1. FLATS/STRAPS
2. MATTRESSES/PIPE SECTIONS
3. CLADDING SHEET
4. NUTS AND BOLTS
5. SELF TAPPING SCREWS
6. SEALING COMPOUND
7. SUPPORT RINGS (FOR MATTRESSES ONLY)



BHARAT HEAVY ELECTRICALS LIMITED
 POWER SECTOR
 PROJECTS ENGINEERING MANAGEMENT
 NEW DELHI

DEPT. MPL	CODE M	SCALE N.T.S.	WEIGHT (KG.)	REF. TO ASSY. DRG	ITEM																
TITLE: -			<table border="1"> <tr> <td>DRN</td> <td>NAME</td> <td>SIGN</td> <td>DATE</td> </tr> <tr> <td>DESN</td> <td>S.C.S.</td> <td></td> <td>9.6.77</td> </tr> <tr> <td>CHD</td> <td>S.C.S.</td> <td></td> <td>9.6.77</td> </tr> <tr> <td>APPD</td> <td>S.K.J.</td> <td></td> <td>11.6.77</td> </tr> </table>			DRN	NAME	SIGN	DATE	DESN	S.C.S.		9.6.77	CHD	S.C.S.		9.6.77	APPD	S.K.J.		11.6.77
DRN	NAME	SIGN	DATE																		
DESN	S.C.S.		9.6.77																		
CHD	S.C.S.		9.6.77																		
APPD	S.K.J.		11.6.77																		
INSULATION APPLICATION (VERTICAL PIPING)			DRAWING NO. PE-4-999-169-03																		
CARD CODE		SHEET 1 OF 1		REV. 00																	

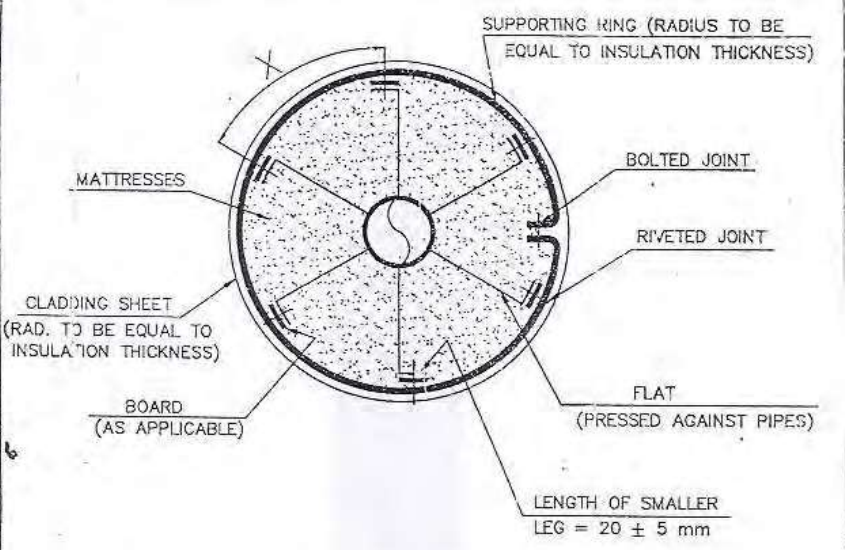
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FIRST ANGLE PROJECTION ALL DIMENSIONS ARE IN MM

REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED
			JOB NO. STANDARD		

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X = 150 mm TO 200 mm SO THAT NUMBER OF WEBS IS EVEN NUMBER

MATERIAL REQUIRED:-

1. FLATS
2. RIVETS
3. BOLTS AND NUTS
4. BOARD

NOTE:-

1. FOR GENERAL INFORMATION ON APPLICATION OF INSULATION REFER DOCUMENT "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS".



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POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NEW DELHI

DEPT. MPL	CODE M	SCALE N.T.S.	WEIGHT (KG)	REF. TO ASSY. DRG	ITEM
TITLE:- INSULATION APPLICATION (CLADDING SHEET SUPPORT RING FOR HOR. PIPE O.D > 114.3mm & HOR. EQUIPMENTS)					
		DRN	NAME	SIGN	DATE
		DESIGN	S.S.S.	[Signature]	9.6.97
		CHKD	T.B.S.	[Signature]	9.6.97
		APP'D	S.K.J.	[Signature]	11.6.97
CARD CODE	DRAWING NO.		PE-4-999-189-01		
	SHEET 1 OF 1	REV.	00		

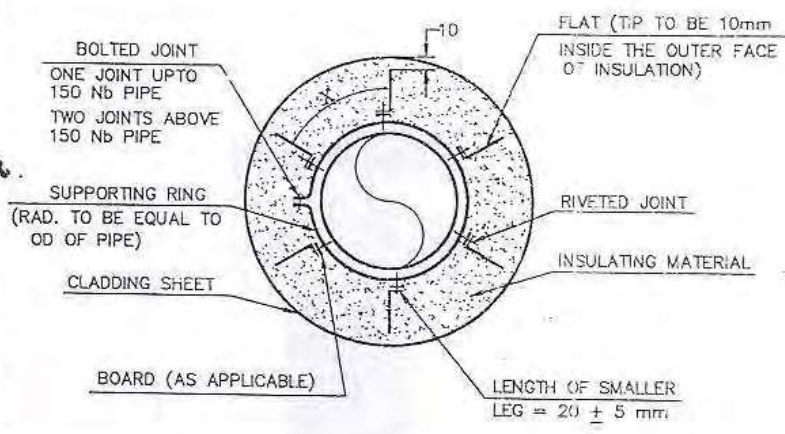
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FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED
			J.E.B. NO. STANDARD		

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X = 150 mm TO 200 mm SO THAT NUMBER OF WEBS IS EVEN NUMBER
 MATERIAL REQUIRED:-

1. FLATS
2. RIVETS
3. BOLTS AND NUTS
4. BOARD

NOTES:-

1. INSULATION DETAILS ON VERTICAL PIPING SHALL BE SAME AS PER FOR HORIZONTAL PIPES.
2. SPACING BETWEEN SUPPORTING RINGS SHALL BE 3 Mtrs.
3. FOR INSULATION OF END OF VERTICAL EQUIPMENTS REFER DRG. No. PE-4-999-169-09.
4. FOR GENERAL INFORMATION ON APPLICATION OF INSULATION REFER DOCUMENT "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS."
5. FLATS/RINGS OF REQUIRED LENGTH/DIA SHALL BE MADE BY ERECTING AGENCY AT SITE FROM MS FLATS/STRAPS.



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 POWER SECTOR
 PROJECTS ENGINEERING MANAGEMENT
 NEW DELHI

DEPT. M.L.	CODE M	SCALE N.T.S.	WEIGHT (KGD)	REF. TO ASSY. DRG	ITEM
TITLE - INSULATION APPLICATION (INSULATION SUPPORT RING FOR VERTICAL PIPING & VERTICAL EQUIPMENTS)				DRN NAME DESN S.C.S. CHD D.B.S. APPD S.K.J.	SIGN DATE 9.2.77 9.6.77 11.6.77
CARD CODE			DRAWING NO. PE-4-999-169-05		
SHEET 1 OF 1			REV. 00		

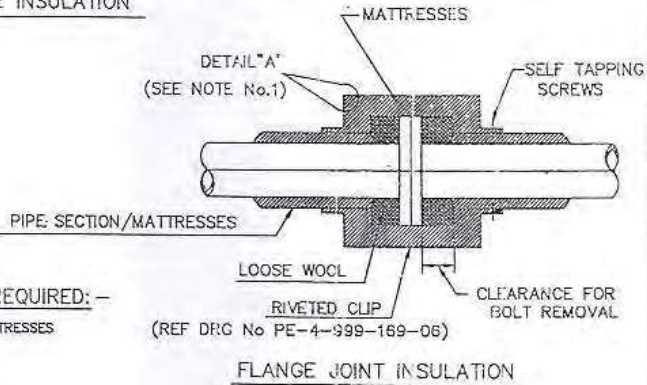
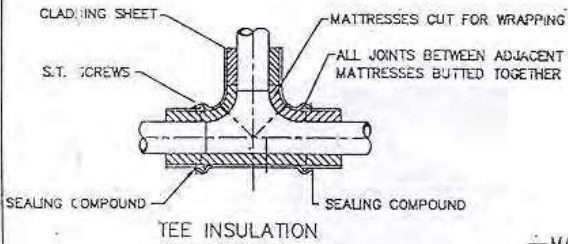
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AV

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV.	DATE	ALTERED	REV.	DATE	ALTERED
6		CHECKED			CHECKED
JOB NO. STANDARD					



MATERIALS REQUIRED:-

1. PIPE SECTION/MATTRESSES
2. STITCHING WIRE
3. CLADDING SHEET
4. BINDING WIRE
5. SELF TAPPING SCREWS
6. SEALING COMPOUND

(REF DRG No PE-4-999-169-06)

NOTE:-

1. FOR DETAIL "A" REFER DRG No. PE-4-999-169-10
2. FOR GENERAL INFORMATION ON APPLICATION OF INSULATION REFER DOCUMENT "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS."

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POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NEW DELHI

DEPT. MPL	CODE M		SCALE N.T.S.	WEIGHT (KG)	REF. TO ASSY. DRG	ITEM
TITLE:- INSULATION APPLICATION (TEES AND FLANGE JOINTS)						
			CARD CODE	DRAWING NO. PE-4-999-169-07		
			SHEET	1	OF	1
			REV.	00		

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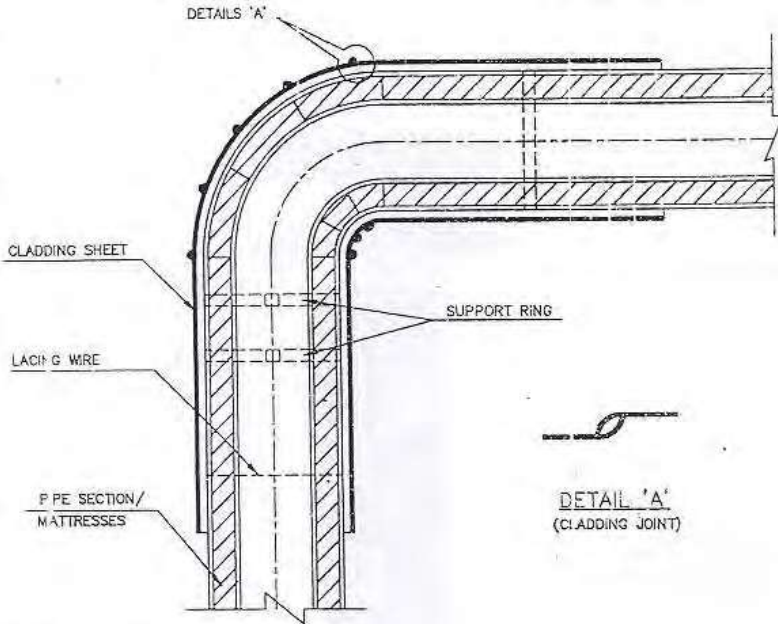
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FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED

JOB NO. STANDARD

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MATERIALS REQUIRED:-

1. MATTRESSES
2. PIPE SECTION (IF APPLICABLE)
3. LACING WIRE
4. CLADDING SHEET
5. BINDING WIRE
6. SELF TAPPING SCREWS
7. SEALING COMPOUND

NOTES:-

1. TWO SELF TAPPING SCREWS TO BE USED FOR EACH SHEET SEGMENT AT INNER SIDE OF BEND.
2. FOR GENERAL INFORMATION ON APPLICATION OF INSULATION REFER DOCUMENT "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS."



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POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NEW DELHI

DEPT. MPL	CODE M		SCALE N.T.S.	WEIGHT (KG.)	REF. TO ASSY. DRG.	ITEM		
TITLE:- INSULATION APPLICATION (ELBOWS & BENDS SIZE EXCEEDING 150mm)					DRN	NAME	SIGN	DATE
					DESN	S.C.S.	<i>[Signature]</i>	9.6.97
					CHD	D.B.S.	<i>[Signature]</i>	9.6.97
					APPD	S.K.J.	<i>[Signature]</i>	11.6.97
CARD CODE				DRAWING NO.				
-				PE-4-999-169-08				
				SHEET 1 OF 1		REV. 00		

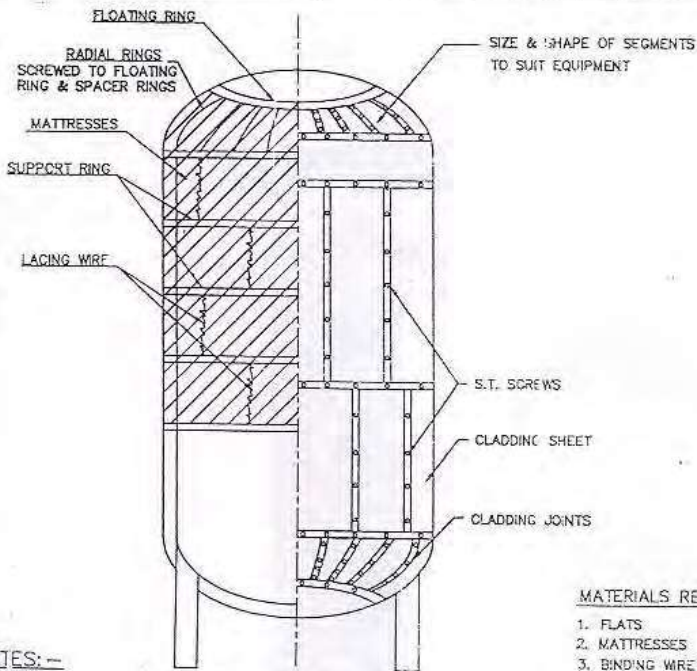
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FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED

JOB NO. STANDARD



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NOTES:-

1. STRAPS/BANDS CUT FROM SHEET, WITH SEAL SHALL BE USED OVER FINAL LAYER AT 300mm INTERVALS.
2. INSULATION OF HOR. EQPTS. SHALL BE AS FOR HOR. PIPES. REFER DRG No. PE-4-999-169-01 & PE-4-999-169-02
3. FOR CLADDING SHEET SUPPORT REF. DRG. No. PE-4-599-169-04.
4. FOR INSULATION SUPPORT REF. DRG. No. PE-4-999-169-05.
5. INSULATION OF ENDS OF HOR. EQPTS. SHALL BE SIMILAR TO THIS DRG.
6. WELDING TO EQUIPMENT NOT PERMITTED.
7. FOR GEN. INF. ON APPLICATION OF INSULATION REF. DOC. "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING & EQPTS".

MATERIALS REQUIRED:-

1. FLATS
2. MATTRESSES
3. BINDING WIRE
4. LACING WIRE
5. CLADDING SHEET
6. GLASS FABRIC/BOARDS (AS APPLICABLE)
7. RIVETS
8. SELF TAPPING SCREWS
9. SEALING COMPOUND
10. STRAPS/BANDS



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PROJECTS ENGINEERING MANAGEMENT
NEW DELHI

DEPT. MPL	CODE M	SCALE N.T.S.	WEIGHT (KG.)	REF. TO ASSY. DRG	ITEM
TITLE:- INSULATION APPLICATION (EQUIPMENT)				DRN	NAME
				DESIGN	S.C.S.
				CHKD	D.B.S.
				APPD	S.K.J.
				SIGN	DATE
				<i>[Signature]</i>	9.6.1972
				<i>[Signature]</i>	11.6.72
CARD CODE	DRAWING NO.				
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	SHEET 1 OF 1	REV.	00		

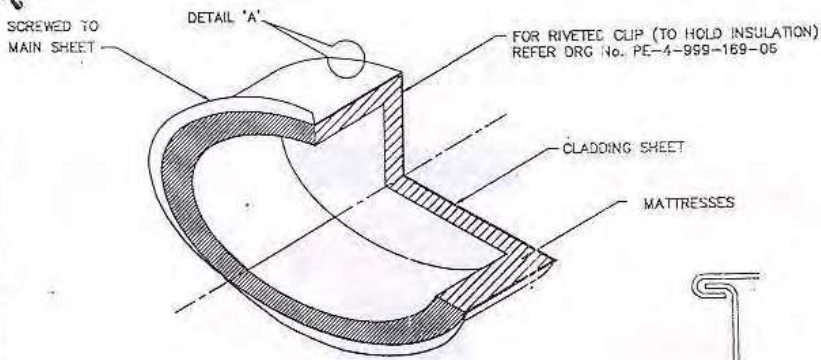
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FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV.	DATE	ALTERED	REV.	DATE	ALTERED
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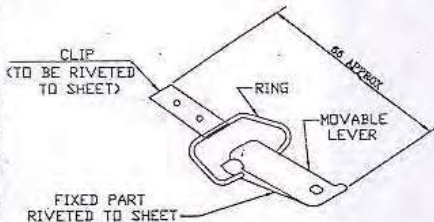
JOB NO. STANDARD

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INSULATING COVER FOR MAN HOLE

DETAILS 'A'
(LOCKING OF SHEETS)



G.I. SHACKLE LOCK CONNECTING BUCKLE

DETAILS 'X'

MATERIAL REQUIRED:-
(MAN HOLE)

1. MATTRESSES
2. CLADDING SHEET
3. SELF TAPPING SCREWS
4. RIVETS
5. CLIPS (TO BE MADE AT SITE)
6. SEALING COMPOUND

NOTES:-

1. FOR GENERAL INFORMATION ON APPLICATION INSULATION REFER DOCUMENT "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS".

MATERIAL REQUIRED:-

(FOR SHACKLE LOCK)

1. CLIP (MADE FROM CLADDING SHT.)
2. RIVETS



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POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NEW DELHI

DEPT. MPL	CODE M	SCALE N.T.S.	WEIGHT (KG.)	REF. TO ASSY. DRG	ITEM
TITLE:- INSULATION APPLICATION (FABRICATED HEAT INSULATING COVER FOR MAN-HOLE)				DRN	NAME
				DESIGN	S.C.S.
				CHKD	D.B.S.
				APPD	S.K.J.
				SIGN	DATE
					9.8.97
					14.6.97
CARD CODE	DRAWING NO.			PI-4-999-169-10	
	SHEET	1	OF	1	REV. 00

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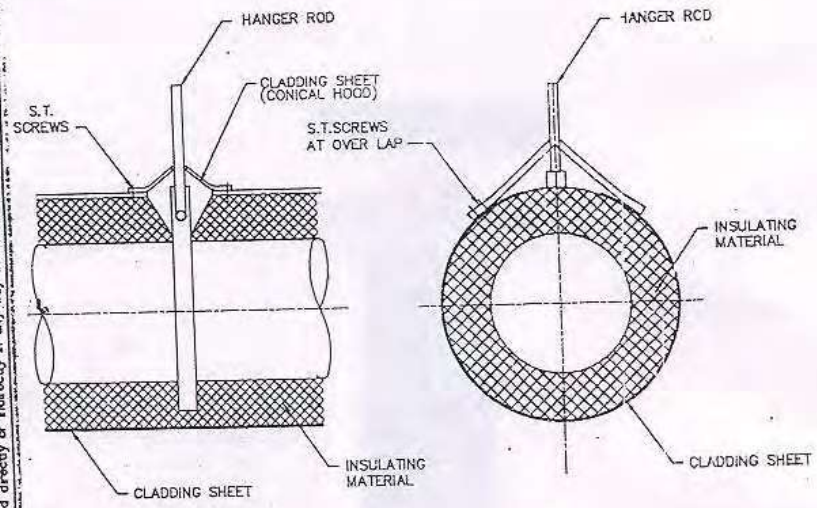
FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV.	DATE	ALTERED	REV.	DATE	ALTERED
01	10.5.82	Slab Checked			

NOTE 2 ADDED.

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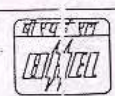


MATERIALS REQUIRED:--

1. MATTRESSES/PIPE SECTIONS
2. CLADDING SHEET
3. SELF TAPPING SCREWS
4. SEALING COMPCUND

NOTES:-

1. FOR GENERAL INFORMATION ON APPLICATION OF INSULATION REFER DOCUMENT "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS".
2. WHEREVER THE END OF CLAMP PROTRIDES OUT OF INSULATION AT THE BOTTOM, SUITABLE BOX STRUCTURE TO BE PROVIDED MADE OF ALUMINIUM.



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POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NEW DELHI

DEPT. MPL	CODE M	SCALE N.T.S.	WEIGHT (KG.)	REF. TO ASSY. DRG	ITEM
TITLE:- INSULATION APPLICATION (METAL FLASHING ON HANGER ROD PROTRUSION)				DRN	NAME
				DESN	S.C.S.
				CHD	D.B.S.
				APPD	S.K.J.
				SIGN	DATE
					11.6.82
					11.6.82
CARD CODE		DRAWING NO.			
-		PF-4-999-169-11			
		SHEET 1 OF 1		REV. 00	

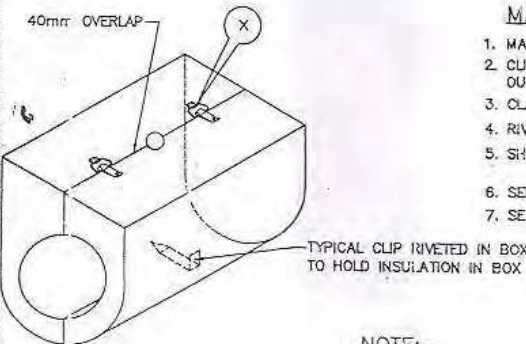
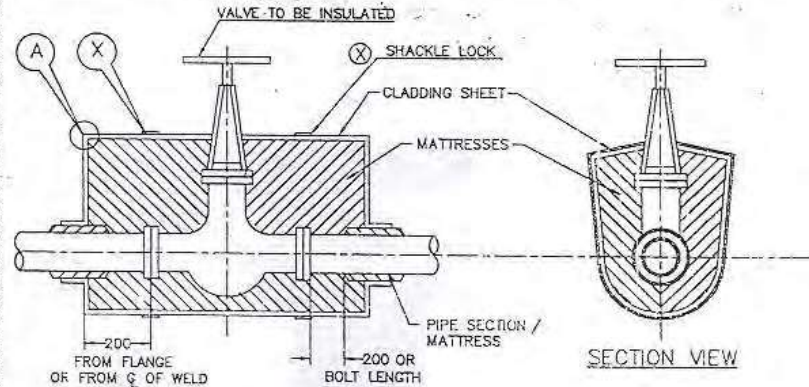
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FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED

JOB NO. STANDARD



MATERIALS REQUIRED:-

1. MATTRESSES
2. CLIPS OF SHACKLE LOCKS FABRICATED OUT OF CLADDING SHEET
3. CLADDING SHEET
4. RIVETS
5. SHACKLE LOCKS CONNECTING BUCKLES. (REF. DRG. PE-4-999-169-10)
6. SELF TAPPING SCREWS
7. SEALING COMPOUND.

NOTE:-

1. FOR DETAIL A & X REFER DRG No. PE-4-999-169-10
2. FOR GENERAL INFORMATION ON APPLICATION OF INSULATION REFER DOCUMENT "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS".

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 NEW DELHI

DEPT. MPL	CODE M	SCALE N.T.S.	WEIGHT (KG.)	REF. TO ASSY. DRG	ITEM
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TITLE:- INSULATION APPLICATION (VALVES)	DRN	NAME	SIGN	DATE
	DESN	S.C.S.		5.6.77
	CHD	D.B.S.		6.6.82
	APPD	S.K.J.		11.6.92

CARD CODE	DRAWING NO.
	PE-4-999-169-06
SHEET 1 OF 1	REV. 00

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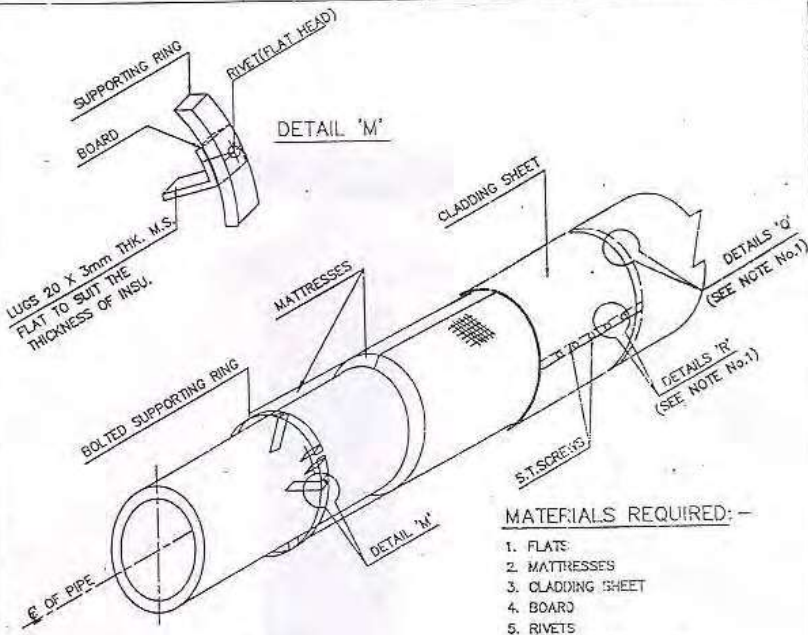
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FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED

JOB NO. STANDARD

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MATERIALS REQUIRED:-

1. FLATS
2. MATTRESSES
3. CLADDING SHEET
4. BOARD
5. RIVETS
6. SELF TAPPING SCREWS
7. SEALING COMPOUND
8. BOLTS & NUTS.

DETAILS OF LUGS:

PIPE No(mm)	No. OF LUGS
1. 33 - 150	4
2. 200 - 300	6
3. 350 - 450	8
4. 500 - 600	10

NOTES:-

1. FOR DETAILS 'O' AND 'R' REFER DRG No. PE-4-999-169-12
2. FOR GENERAL INFORMATION ON APPLICATION OF INSULATION REFER DOCUMENT "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING & EQUIPMENTS".



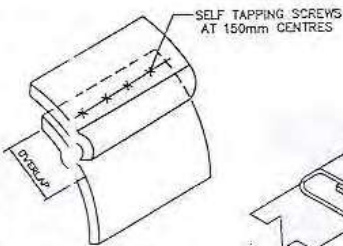
BHARAT HEAVY ELECTRICALS LIMITED
 POWER SECTOR
 PROJECTS ENGINEERING MANAGEMENT
 NEW DELHI

DEPT. MPL	CODE M	SCALE N.T.S.	WEIGHT (KG.)	REF. TO ASSY. DRG	ITEM
TITLE:- INSULATION APPLICATION (SUPPORT RING FOR PIPE O.D.>168.3mm)				NAME S.C.S.	SIGN DATE
				DRN S.C.S.	7.6.54
				CHD O.B.S.	6/6/54 7.6.54
				APPD S.K.J.	
CARD CODE	DRAWING NO.		PE-4-999-169-13		
	SHEET 1 OF 1	REV.	00		

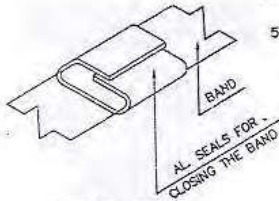
213

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM)

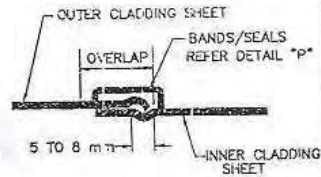
REV.	DATE	ALTERED	REV.	DATE	ALTERED
		CHECKED			CHECKED
JOB NO. STANDARD					



**DETAIL 'R'
(LONGITUDINAL JOINT)



DETAIL 'P'



*DETAIL 'Q'
(CIRCUMFERENTIAL JOINT)

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**

- JOINTS TO BE MADE AT 45° FROM BOTTOM
- JOINTS TO BE ON LOWER HALF OF THE CIRCUMFERENCE FOR HORIZONTAL PIPES AND EQUIPMENTS.
- SEALING COMPOUND WILL BE USED ON ALL LONGITUDINAL JOINTS.

*

- TELESCOPIC SLIDING JOINTS SHALL HAVE 5 TO 8mm SPACING.
- THE OVERLAPING OF TELESCOPIC JOINTS SHALL BE AS BELOW: -

CIRCUMFERENCE OF SHEET (mm ²)	LONGITUDINAL OVERLAP (mm ²)
< 400	30
401 - 500	40
> 500	50
- TELESCOPIC JOINT SHALL BE PLAIN.

NOTE: -

- ALL JOINTS NEAR OIL PIPING TO HAVE SEALING COMPOUND.
- FOR GENERAL INFORMATION ON APPLICATION OF INSULATION REFER DOCUMENT "INSTRUCTIONS FOR APPLICATION OF THERMAL INSULATION FOR PIPING AND EQUIPMENTS".



BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECTS ENGINEERING MANAGEMENT
NEW DELHI

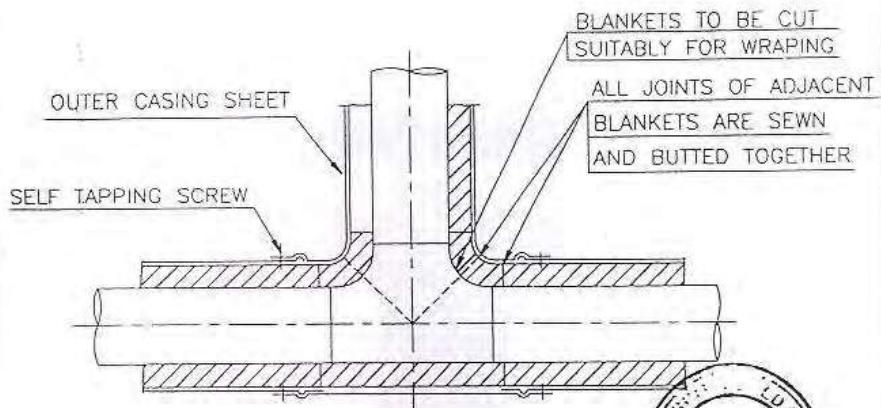
DEPT. MPL	CODE M		SCALE N.T.S.	WEIGHT (KG.)	REF. TO ASSY. DRG	ITEM		
TITLE: - INSULATION APPLICATION (DETAILS OF "P", "Q" AND "R")					DRN	NAME	SIGN	DATE
					DESN	S.C.S.		11.2.97
					CHD	D.B.S.		11.2.97
					APPO	S.K.J.		11.2.97
CARD CODE		DRAWING NO.		PE-4-999-169-12				
-		SHEET 1 OF 1		REV. 00				

D/22

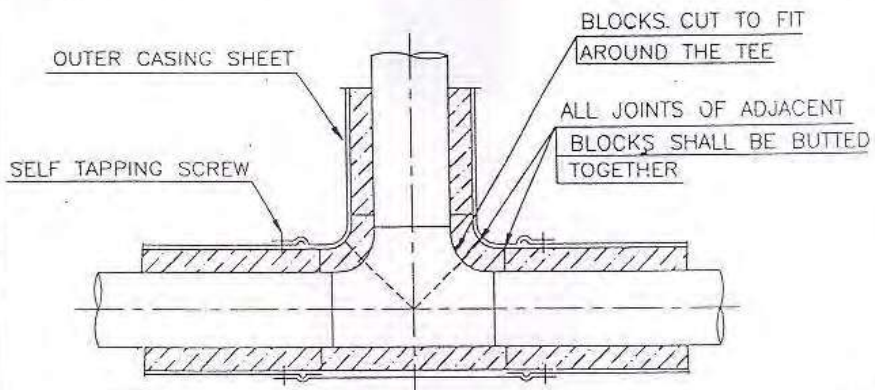
A4



TEE INSULATION



TEE INSULATION
(WITH WOOL MATTRESS)

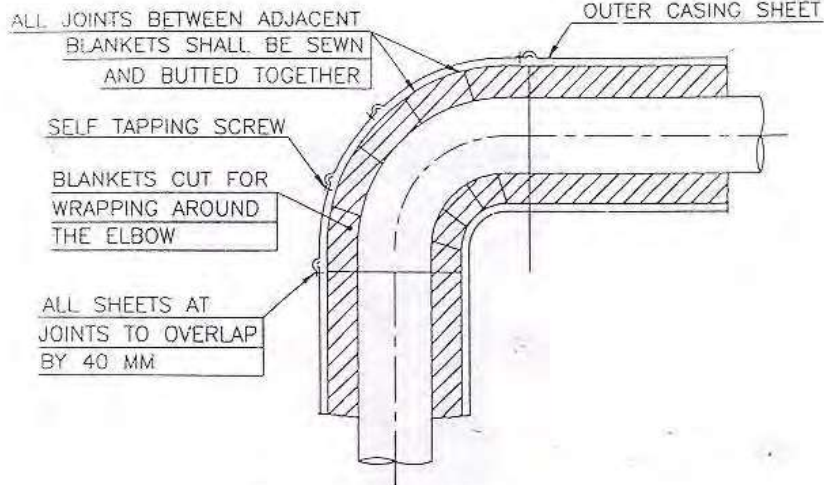


TEE INSULATION
(WITH CALCIUM SILICATE)

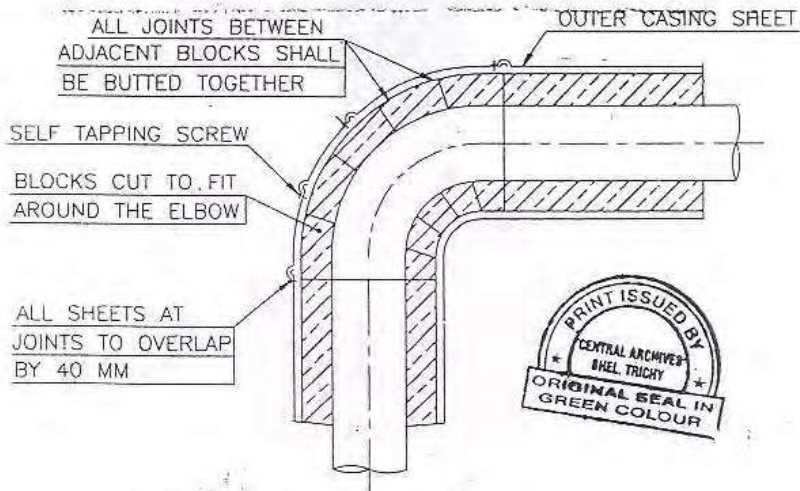
INSULATION	PREPARED	A.R. JOTHIRUNATHAN	SIGNATURE	DATE	04/12/03	DRAWING NO.	4-00-235-08546	REV.
	CHECKED	K. KALIRAJAN						
	APPROVED	C. GUNASEKARAN						



ELBOW INSULATION



WITH WOOL MATTRESS



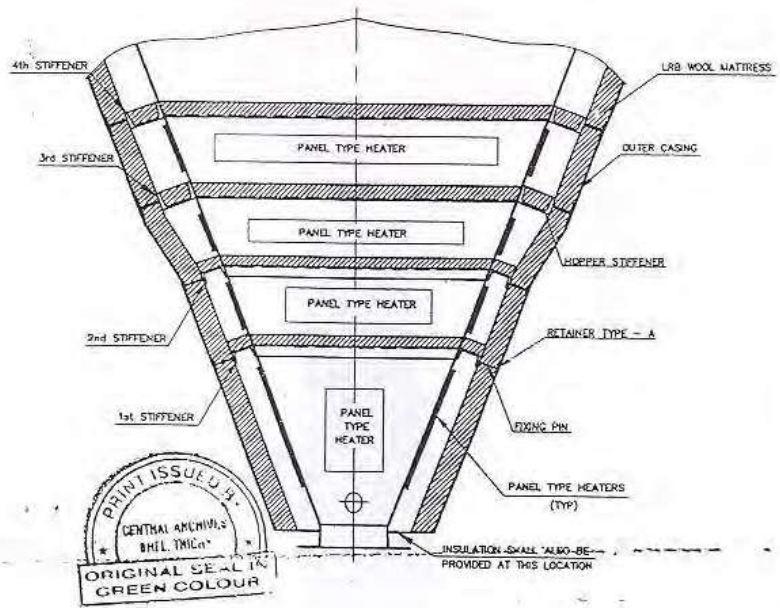
WITH CALCIUM SILICATE

INSULATION	PREPARED	A.R. JOTHIBHARUNATHAN	SCALE	DATE	DRAWING NO :	REV
	CHECKED	K. KALIRAJAN		04.12.03	4-00-235-08547	
	APPROVED	C. GUNASEKARAN				

THE INFO. ON THIS DOCUMENT IS THE PROPERTY OF BHEL.
 CAUTION: IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF BHEL.

REV	DATE	ALTERED - A.R.J
01	01.10.05	CHD & APPD : C.G.S
DRAWING ALTERED		

FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER PLANT STD. NO TP 023 0299



PRINT ISSUED BY
 CENTRAL ARCHIVES
 BHEL, THIRU
 ORIGINAL SEAL IN
 GREEN COLOUR

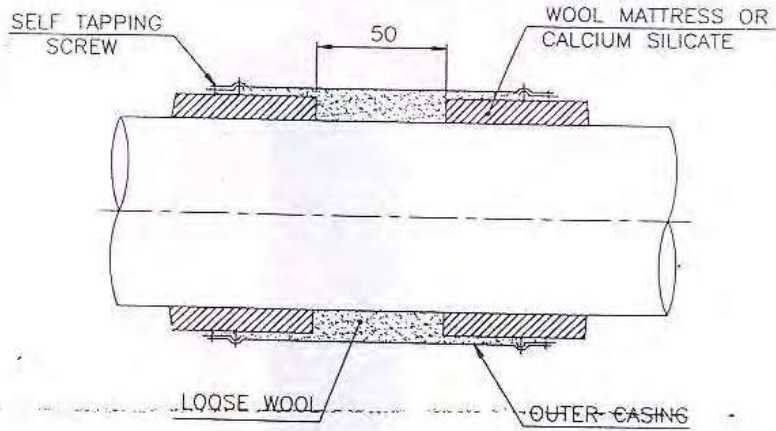
NOTE:

01. THE INSULATION SHOWN IS FOR TYPICAL PANEL HEATER HOPPERS. THIS IS TO BE FOLLOWED WHERE EVER PANEL TYPE HEATERS ARE ENVISAGED.
02. INSULATION FIXING PINS AND RETAINERS SHOULD NOT FOUL WITH THE PANEL HEATERS.
03. FOR OTHER INSULATION DETAILS, REFER DRG. 1-00-235-06654.

Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		NAME A.R.J	SIGNATURE	DATE 20.09.05
DEPT L&I		CHD C.G.S	DATE 22.09.05	
CODE 123		APPD C.G.S	DATE 22.09.05	
ALL DIMENSIONS ARE IN MM	PROJECTION 	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG
TITLE HOPPER INSULATION DETAIL FOR PANEL TYPE HEATERS			DRAWING NO : 4-00-235-08702	REV 01



EXPANSION JOINT FOR PIPES



NOTE:—

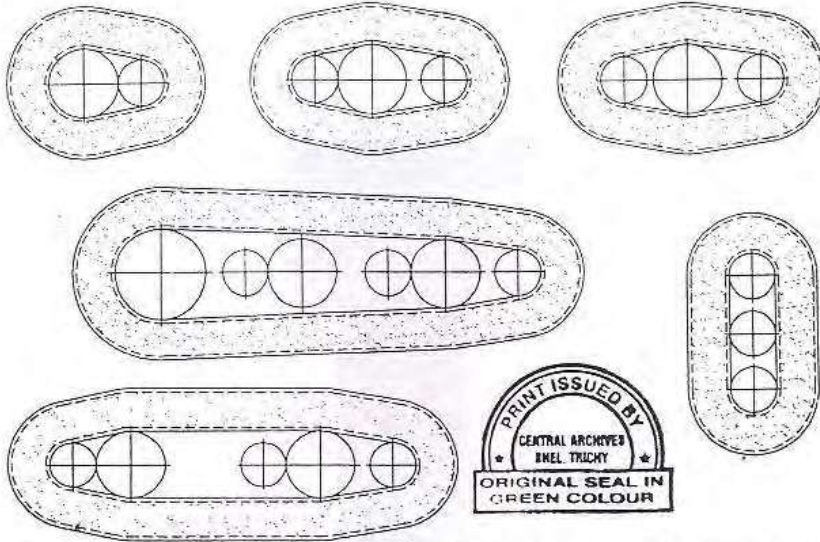
1. THIS ARRANGEMENT IS APPLICABLE FOR BOTH HORIZONTAL AND VERTICAL PIPE LINES, AT EVERY 5 METRES.
2. WHEN THE OPERATING TEMPERATURE IS BELOW 230°C, EXPANSION JOINTS ARE NOT REQUIRED.
3. FOR PIPES, WHERE THE FLOW IS ONLY INTERMITTANT, EXPANSION JOINTS ARE NOT REQUIRED.



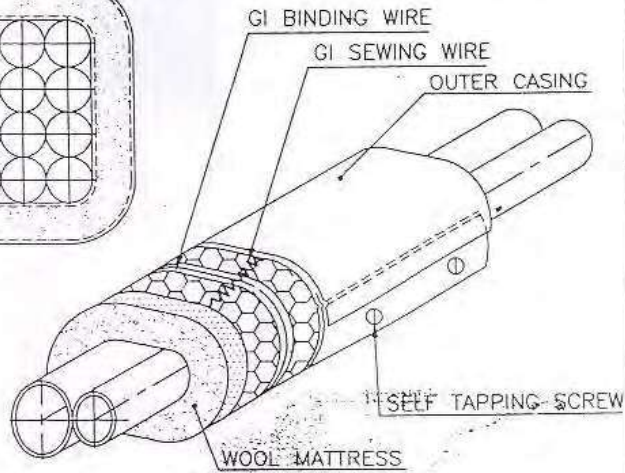
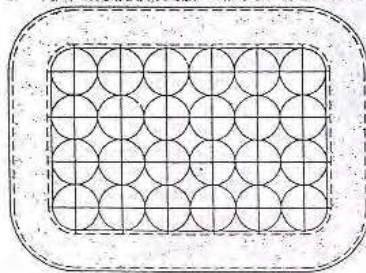
INSULATION	PREPARED BY	A. JOTHI GURUNATHAN	DATE	04.12.03	DRAWING NO : 4-00-235-08549	REV
	CHECKED BY	K. KALIRAJAN				
	APPROVED BY	C. GUNASEKARAN				



BUNCH INSULATION



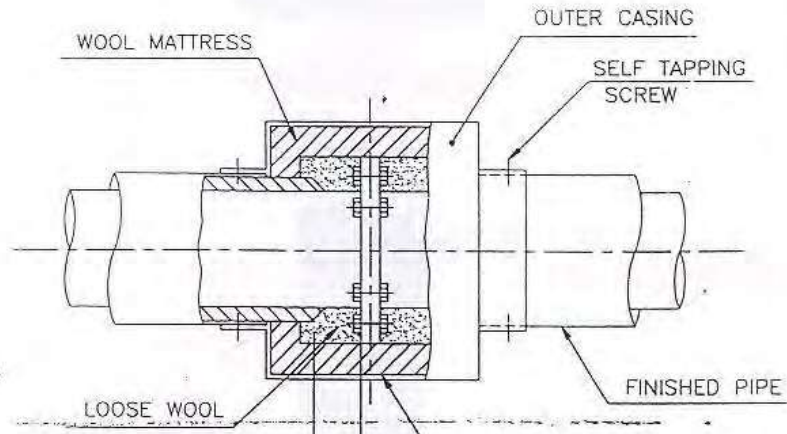
FOR NOTES REFER DRG.4-00-235-08541.



INSULATION	PREPARED	A.R. JOTHARUNATHAN	SIGNATURE	DATE	DRAWING NO.	REV
	CHECKED	K. KALIRAJAN				
	APPROVED	C. GUNASEKARAN				
					4-00-235-08550	



FLANGE INSULATION



CLEARANCE FOR BOLT REMOVAL
NOT LESS THAN 1.5 TIMES OF
THE BOLT LENGTH

PROVIDE 25 MM DIA HOLE
IN THE SHEET



NOTE:-

1. WHEREVER THE FLANGES ARE ENVISAGED FOR DISMANTLING, THIS TYPICAL ARRANGEMENT IS TO BE FOLLOWED.

INSULATION	PREPARED	A.R. JOTHI CURUNATHAN	DATE	04.12.03	DRAWING NO.	4-00-235-08548	REV
	CHECKED	K. KALIRAJAN					
	APPROVED	C. GUNASEKARAN					