

92	145-37000-A	LEVEL SWITCH-FLOAT TYPE	G060	GENERAL INSTRUMENTS CONSORTIUM	REGULAR	NA	Mr. Amarendra Kulkarni 194/195, Gopi Tank Road, Off. Pandurang Naik Marg, Mahim Mumbai-Maharashtra India Phone- 9323195251 Pincode : 400016 Email : amarendra@general- gauges.com	Workas at- GAUGES BOURDON INDIA PVT. LTD. (A MFG. UNIT OF GENERAL INSTRUMENTS CONSORTIUM , PLOT NO-4, 5 & 6, JAWAHAR Co-op. INDUSTRIAL ESTATE, KAMOTHE, PANVEL- 410 209 , ,
93	145-37000-A	LEVEL SWITCH-FLOAT TYPE	S008	SIGMA INSTRUMENTS CO.	REGULAR	C	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI-MAHARASHTRA- INDIA Phone- +919821038162 Pincode : 400078 Email : sales@sigmainstruments.co.i n	Vendor shall source import contents of Level Switch (Conductivity Type) from Mobrey Measurement, an operating unit of Morbey Ltd., Slough, Berkshire, United
94	145-37000-A	LEVEL SWITCH-FLOAT TYPE	S010	SOR INC.	REGULAR	NA	LARRY DEGARMO/Avdesh Chandra, 14685 W. 105TH STREET LENEXA-KANSAS- USA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdesh@sherman- india.com	, ,
95	145-37000-A	LEVEL SWITCH-FLOAT TYPE	S106	SBEM PVT. LTD.	REGULAR	NA	MR.N.K. BEDARKAR/MR. VISHWANATH KARANDIK 39, ELECTRONIC CO.OP. ESTATE, PUNE SATARA ROAD PUNE,- MAHARASHTRA-INDIA Phone- 912041030100 Pincode : 411009 Email : sawdalkhi@sbem.co.in	, ,
96	145-37000-A	LEVEL SWITCH-FLOAT TYPE	L005	LEVCON INSTRUMENTS PVT. LTD.	REGULAR	NA	Mr Shayak Gupta/Badal Jana Rajkamal', 7th floor, 13, Camac Street KOLKATA- WEST BENGAL-INDIA Phone- 0 33 2283 2766 Pincode : 700017 Email : b_jana@levcongroup.com	, ,
97	145-37000-A	LEVEL SWITCH-FLOAT TYPE	P068	Pune Techtrol Pvt. Ltd.	REGULAR	NA	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune-Maharashtra-INDIA Phone- 9850560042 Pincode : 411 026 Email : ho@punetechtrol.com	, ,
98	145-08000-A	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	F016	FORBES MARSHALL (HYD) LTD.	REGULAR	NA	MR SATEESH PATALAY/MR. M K SRINIVASAN PLOT NO.A- 19/2, & T-4/2, IDA, NACHARAM, HYDERABAD- TELANGANA-INDIA Phone- 9849913704 Pincode : 500 076 Email : mksrinivasan@forbesmarshall.com	, ,
99	145-08000-A	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	H040	H.GURU INSTRUMENTS (SOUTH INDIA) P. LTD	REGULAR	B	32,INDUSTRIAL SUBURB YESWANTHAPUR BANGALORE-KARNATAKA- www.hgurusouth.com Phone- 080-23370300, Pincode : 560022 Email : info@hgurusouth.com	, ,
100	145-08000-A	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	H023	H.GURU INDUSTRIES	REGULAR	NA	Mr. G. D. Hazra/Mr. P. K. Mitra 10 B, HO-CHI-MINH SARANI, KOLKATA-WEST BENGAL-INDIA Phone- 033 2282 2463 / 1637 Pincode : 700071 Email : mguru@vscpl.net	, Financial limit reviewed on 05.06.2014; ,

101	145-08000-A	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	G071	GAUGE BOURDON INDIA PVT. LTD.	REGULAR	NA	194/195, Gopi Tank Road, Off Pandurang Naik Marg, Mahim Mumbai,- Maharashtra,-India, Phone- 011-41607463, Pincode : 400016, Email : gicdelhi@general- gauge.com	Registered as per 26th MISCC- Electrical and C&I dtd. 06.03.2014. , ,
102	145-08000-A	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	B083	BOSE PANDA INSTRUMENTS PVT.LTD.	REGULAR	NA	Mr. Partha Bose 44, Saheed Hemanta Kumar Bose, Sarani, Kolkata-West Bengal India Phone- +91 33 2548 7220 Pincode : 700074 Email : parthabosebpi@gmail.com; bosepanda@vsnl.net	Trial to Hold as per SEARP amd- 3,w.e.f. 15-09- 12 , Supplier registered in trial category on 30.10.2010 and was thereafter put in susp-hold category as per SEARP Amd-03 on 15.09.2012. Further, on evaluation put in permanent category on 20.08.2014; ,
103	145-08000-A	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	A126	PRECISION MASS PRODUCTS PVT. LTD.	REGULAR	NA	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol- Gujarat,-INDIA Phone- 9999464663 Pincode : 382729 Email : sales@precisionmass.com	Registration of "M/s Ashcroft India Pvt. Ltd." substituted to "M/s Precision Mass Products Pvt. Ltd." as per MISCC dt. 15.02.2016 based on "Termination and business transfer agreement" submitted by
104	145-08000-A	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	A010	A.N. INSTRUMENTS PVT. LTD.	REGULAR	C	MARKETING DIVISION, 5th FLOOR, 59-B, CHOWRINGHEE ROAD, KOLKATA-WEST BENGAL- INDIA Phone- 24757784,22472509 Pincode : 700020 Email : anidol@aninstrument.in	, ,
105	145-08000-A	PRESSURE GAUGE/ DIFF.PRESSURE GAUGE	W017	Baumer Technologies India Pvt. Ltd.	REGULAR	NA	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI-Maharashtra-INDIA Phone- +91 99589 25151 Pincode : 400093 Email : sales.in@baumer.com	, NAME HAS BEEN CHANGED FROM M/S WAAREE INSTRUMENTS LTD. TO M/S BAUMER TECHNOLOGIES INDIA PVT. LTD. W.E.F. 15.06.2013.
106	145-06000-A	PRESSURE SWITCH/DIFF. PRESSURE SWITCH	A126	PRECISION MASS PRODUCTS PVT. LTD.	REGULAR	NA	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol- Gujarat,-INDIA Phone- 9999464663 Pincode : 382729 Email : sales@precisionmass.com	Registration of "M/s Ashcroft India Pvt. Ltd." substituted to "M/s Precision Mass Products Pvt. Ltd." as per MISCC dt. 15.02.2016 based on "Termination and business transfer agreement" submitted by
107	145-06000-A	PRESSURE SWITCH/DIFF. PRESSURE SWITCH	B085	Barksdale GmbH, Germany	REGULAR	NA	Michael Weileder Dorn Assenheimer, Strasse 27 Reichelsheim--Germany Phone- +91-9999107840 Pincode : D-61203 Email : msingh@barksdale.de	, ,

108	145-06000-A	PRESSURE SWITCH/DIFF. PRESSURE SWITCH	D021	DRESSER INDUSTRIES INC.	REGULAR	NA	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol-Gujarat-India Phone- 02764-233682 Pincode : 382729 Email : Nishit.patel@ashcroftindia.com	, ,
109	145-06000-A	PRESSURE SWITCH/DIFF. PRESSURE SWITCH	D003	INDFOS (INDIA) LIMITED	REGULAR	NA	MR.L.C.VENKATRANGAN/MR. B.KANNAN New No.17, II Floor, Adwave Towers, Dr.Sevalia Shivaji Salai, T.Nagar Chennai-TamilNadu- INDIA Phone- +91 44 24353407 Pincode : 600017 Email : delhi@indfos.com	, ,
110	145-06000-A	PRESSURE SWITCH/DIFF. PRESSURE SWITCH	G060	GENERAL INSTRUMENTS CONSORTIUM	REGULAR	C	Mr. Amarendra Kulkarni 194/195, Gopi Tank Road, Off. Pandurang Naik Marg, Mahim Mumbai-Maharashtra India Phone- 9323195251 Pincode : 400016 Email : amarendra@general-gauges.com	Workas at- GAUGES BOURDON INDIA PVT. LTD. (A MFG. UNIT OF GENERAL INSTRUMENTS CONSORTIUM , PLOT NO-4, 5 & 6, JAWAHAR Co-op. INDUSTRIAL ESTATE, KAMOTHE, PANVEL- 410 209 , ,
111	145-06000-A	PRESSURE SWITCH/DIFF. PRESSURE SWITCH	K054	Kaustubha Udyog,	REGULAR	NA	S.No. 36/1/1, Sinhgad Road, Vadgaon Khurd, Near Lokmat Press, Pune,- Maharashtra,-India, Phone- 020-24393577, Pincode : Email : pressure@vsnl.com,	, ,
112	145-06000-A	PRESSURE SWITCH/DIFF. PRESSURE SWITCH	I041	INDFOS INDUSTRIES LIMITED	REGULAR	C	B-20-21, INDUSTRIAL AREA, MEERUT ROAD, GHAZIABAD-UP-INDIA Phone- 0120-2712016 Pincode : Email : mktn@indfos.com	, ,
113	145-06000-A	PRESSURE SWITCH/DIFF. PRESSURE SWITCH	S010	SOR INC.	REGULAR	NA	LARRY DEGARMO/Avdhesh Chandra, 14685 W. 105TH STREET LENEXA-KANSAS- USA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdhesh@sherman-india.com	, ,
114	145-06000-A	PRESSURE SWITCH/DIFF. PRESSURE SWITCH	S009	SWITZER PROCESS INSTRUMENTS PVT. LTD.	REGULAR	C	B Kannan/V S Jayaprakash 9, SOUTH BOAG ROAD, II FLOOR, PB NO-1423, T.NAGAR, CHENNAI-TAMIL NADU-INDIA Phone- 044-24340999 / 24344 Pincode : 600017 Email : marketing@switzerinstrument.com	Name changed from "M/s Switzer Instrument Ltd." to "M/s Switzer Process Instruments Pvt. Ltd." w.e.f. 27.07.2016; , ,
115	145-03000-A	PROGRAMMABLE LOGIC CONTROLLER	R021	ROCKWELL AUTOMATION INDIA LTD	REGULAR	NA	(ALLENBRADLEY),C-11, SITE-4, INDUSTRIAL AREA SHHIBABAD, GHAZIABAD-UP-INDIA Phone- 2895247-52 Pincode : 201010 Email : pmehrotra@rockwell.com	, ,
116	145-03000-A	PROGRAMMABLE LOGIC CONTROLLER	S001	SIEMENS LIMITED	REGULAR	NA	Dr. Armin Bruck/Sandeep Mathur 130, Pandurang Budhkar Marg Worli Mumbai-Maharashtra-INDIA Phone- 0124 383 7377 Pincode : 400018 Email : ankit.varshney@siemens.com	, ,
117	145-03000-A	PROGRAMMABLE LOGIC CONTROLLER	S083	SCHNEIDER ELECTRIC INDIA PVT.LTD.	REGULAR	NA	A-4 , MOHAN CO-OP INDL AREA MATHURA ROAD NEW DELHI-DELHI-INDIA Phone- Pincode : 110044 Email : aditya.bawa@schneider-electric.com	, ,

118	145-03000-A	PROGRAMMABLE LOGIC CONTROLLER	M205	mitsubishi electric india pvt. ltd.	REGULAR	NA	Mr. Mehul Dholakia Emerald House, EL-3, J Block, M.I.D.C., Bhosari, Pune- Maharashtra-India Phone- 020-27102000 Pincode : 411026 Email : mehul.dholakia@asia.meap.com	, ,
119	145-03000-A	PROGRAMMABLE LOGIC CONTROLLER	H063	Honeywell Automation India Limited ,	REGULAR	NA	56 & 57, Hadapsar Industrial Estate, Pune,- Maharashtra,-India, Phone- 9689940949, Pincode : Email : amit.aglave@honeywell.com,	, ,
120	145-03000-A	PROGRAMMABLE LOGIC CONTROLLER	G035	GE Intelligent Platforms Private Limited	REGULAR	B	90/B, ELECTRONICS CITY, HOSUR ROAD, BANGLORE- KARNATAKA-INDIA Phone- 28528328 Pincode : 561229 Email : shivesh.k.iba@ge.com	, ,
121	145-34000-A	ROTAMETER	F033	Flow Star Engineering Pvt. Ltd.,	REGULAR	B	MR. KHALID AKHTAR/MR. TAPAN KUMAR JANA Plot No- 7 F/2, Northern India Industrial 20/3, Mathura Road FARIDABAD-HARYANA- INDIA Phone- 9818176380 Pincode : 121005 Email : khalid@flowstar.co.in	VENDOR IS REGISTERED IN MS&D (MICRO) W.E.F.30.11.2011 FOR FY 2011-12 , ,
122	145-34000-A	ROTAMETER	E047	EUREKA INDUSTRIAL EQUIPMENTS PVT.LTD.	REGULAR	NA	Mr V. K. Pandit/Mr Ashish Shaha 17-20, Royal chambers, Paud Road Pune-Maharashtra-India Phone- 9370469466 Pincode : 411038 Email : caloc@eurekaflow.com	, ,
123	145-34000-A	ROTAMETER	I030	INSTRUMENTATION ENGINEERS PVT LTD	REGULAR	A	SH.N.V.RAM GOPAL/MS. N.NIHARIKA PLOTS 1,2,3, PHASE-III, IDA, JEEDIMETLA HYDERABAD- TELANGANA-INDIA Phone- 9848407365 Pincode : 500055 Email : jodolbi@ioflowmotors.com	, ,
124	145-34000-A	ROTAMETER	S158	SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	REGULAR	NA	Office no. 53, Shree Manoshi Complex, Plot No. 5 & 6, Sec-3, Ghansoli (East), Navi Mumbai,-Maharashtra,- INDIA Phone- 9892230623, Pincode : 400 701, Email : sdbpl@vsnl.com	, ,
125	145-16000-A	SIGHT FLOW INDICATORS	S158	SCIENTIFIC DEVICES (BOMBAY) PVT LTD,	REGULAR	NA	Office no. 53, Shree Manoshi Complex, Plot No. 5 & 6, Sec-3, Ghansoli (East), Navi Mumbai,-Maharashtra,- INDIA Phone- 9892230623, Pincode : 400 701, Email : sdbpl@vsnl.com	, ,
126	145-16000-A	SIGHT FLOW INDICATORS	I030	INSTRUMENTATION ENGINEERS PVT LTD	REGULAR	A	SH.N.V.RAM GOPAL/MS. N.NIHARIKA PLOTS 1,2,3, PHASE-III, IDA, JEEDIMETLA HYDERABAD- TELANGANA-INDIA Phone- 9848407365 Pincode : 500055 Email : jodolbi@ioflowmotors.com	, ,
127	145-16000-A	SIGHT FLOW INDICATORS	S008	SIGMA INSTRUMENTS CO.	REGULAR	NA	Gopal Kannan/R Gopinath 201, ANANDRAJ INDUSTRIAL ESTATE, OFF.LBS MARG, SONAPUR LANE, BHANDUP (W) MUMBAI-MAHARASHTRA- INDIA Phone- +919821038162 Pincode : 400078 Email : sales@sigmainstruments.co.i	Reassessed on 27.04.2016; , ,
128	145-16000-A	SIGHT FLOW INDICATORS	B077	BLISS ANAND PVT. LTD.	REGULAR	NA	Mr. Vikas Anand/ Mr.RGRajan 92B & 93 B , IMT MANESAR Gurgaon- Haryana-India Phone- 0124- 4366000 TO 9 Pincode : 122001 Email : caloc@blissanand.com	Reassessed on 31.03.2016; , ,

129	145-16000-A	SIGHT FLOW INDICATORS	B068	B.K.EQUIPMENTS PVT.LTD.	REGULAR	A1	T. BALAKRISHNAN/S.VENKATES H 217 , ARCOT ROAD PORUR , CHENNAI-TAMIL NADU-INDIA Phone- 9444057761 Pincode : 600116 Email : bkravin@gmail.com	, ,
130	145-13000-A	TEMP. ELEMENT	G032	GOA INSTRUMENTS INDUSTRIES PVT.LTD.,	REGULAR	NA	D2/5, Mapusa Industrial Estate, Mapusa, Goa,- MAHARASHTRA-INDIA Phone- 09326054551, Pincode : 403507, Email : sumukh@goainstruments.com,	GCC Rev.5 has been accepted in toto. , ,
131	145-13000-A	TEMP. ELEMENT	G071	GAUGE BOURDON INDIA PVT. LTD.	REGULAR	NA	194/195, Gopi Tank Road, Off Pandurang Naik Marg, Mahim Mumbai,- Maharashtra,-India, Phone- 011-41607463, Pincode : 400016, Email : gicdelhi@general-assembly.com	, ,
132	145-13000-A	TEMP. ELEMENT	I022	DETRIVE INSTRUMENTATION & ELECTRONICS LTD.	REGULAR	B	320, TV INDUSTRIAL ESTATE, OFF.DR.A.BESANT ROAD, BEHIND GLAXO, WORLI, MUMBAI-MAHARASHTRA-INDIA Phone- 24934125,24938403 Pincode : 400025 Email : trivtech@vsnl.com	, ,
133	145-13000-A	TEMP. ELEMENT	P061	PYRO ELECTRIC INSTRUMENTS GOA PVT.LTD.	REGULAR	B	M. D. BICHU/R. M. BICHU G.B. HILL CROWN APARTMENTS, COLLEGE ROAD, MAPUSA-GOA-INDIA Phone- 9326114601 Pincode : 403507 Email : priyanka.marketing@pyro-electric.in	, ,
134	145-13000-A	TEMP. ELEMENT	T106	TECHNO INSTRUMENTS	REGULAR	NA	Abhijit Gohel/Mr. Amit Pandya Plot No. 1145/1, Uma Conventor Lane, Santej,Ta. Kalol, Gandhinagar-Gujarat-India Phone- 9909925223 Pincode : 382721 Email : amit@techno-instruments.com	, ,
135	145-13000-A	TEMP. ELEMENT	T107	Tempsens Instrument (I) Pvt Ltd	REGULAR	NA	MR. V.P.RATHI/MR. HEMANT RATHI B-188A ROAD NO.5 , M.I.A UDAIPUR-RAJASTHAN-INDIA Phone- 09352420069 Pincode : 313003 Email : info@homcon.com	, ,
136	145-13000-A	TEMP. ELEMENT	T108	TM TECNOMATIC SPA	REGULAR	NA	MR. ANTONIO NOVIELLO/Mrs. Enrica Bazzoc VIA DELLE INDUSTRIE, 36 CREMONA-ITALY Phone- 39037221574 Pincode : 26100 Email : info@tmtcnomatic.com	, ,
137	145-13000-A	TEMP. ELEMENT	T115	Thermal Instrument India Pvt. Ltd.	REGULAR	NA	Mr. Raghavendra M. Kulkarni 194/195, Gopi Tank Road Behind Citylight Cinema,Mahim Mumbai-Maharashtra-India Phone- 09322664709 Pincode : 400016 Email : ramk@aicoindia.com	Registered as per 11th MISCC-Electrical and C&I (FY 2014-15) dt. 20.09.2014. , ,
138	145-13000-A	TEMP. ELEMENT	T111	TOSHNIWAL INDUSTRIES PVT. LTD.,	REGULAR	NA	Industrial Estate, Makhupura, Ajmer,- Rajasthan,-India, Phone- 9352009000, Pincode : 305002, Email : info@tinl.com	GCC Rev.5 has been accepted in toto. , ,
139	145-13000-A	TEMP. ELEMENT	W017	Baumer Technologies India Pvt. Ltd.	REGULAR	NA	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI-Maharashtra-INDIA Phone- +91 99589 25151 Pincode : 400093 Email : sales.in@baumer.com	, NAME HAS BEEN CHANGED FROM M/S WAAREE INSTRUMENTS LTD. TO M/S BAUMER TECHNOLOGIES INDIA PVT. LTD. W.E.F. 12.06.2012

140	145-10000-A	TEMPERATURE GAUGE	W017	Baumer Technologies India Pvt. Ltd.	REGULAR	C	Mr. Shyam Warilani/Mr. V Suresh Babu 36, DAMJI SHAMJI INDUSTRIAL COMPLEX, OFF.-MAHAKALI CAVES ROAD, ANDHERI(E) MUMBAI-Maharashtra-INDIA Phone- +91 99589 25151 Pincode : 400093 Email : sales.in@baumer.com	, NAME HAS BEEN CHANGED FROM M/S WAAREE INSTRUMENTS LTD. TO M/S BAUMER TECHNOLOGIES INDIA PVT. LTD. W.E.F. 10.06.2014
141	145-10000-A	TEMPERATURE GAUGE	G071	GAUGE BOURDON INDIA PVT. LTD.	REGULAR	NA	194/195, Gopi Tank Road, Off Pandurang Naik Marg, Mahim Mumbai,- Maharashtra,-India, Phone- 011-41607463, Pincode : 400016, Email : gicdelhi@general-gauges.com	, ,
142	145-10000-A	TEMPERATURE GAUGE	H023	H.GURU INDUSTRIES	REGULAR	NA	Mr. G. D. Hazra/Mr. P. K. Mitra 10 B, HO-CHI-MINH SARANI, KOLKATA-WEST BENGAL-INDIA Phone- 033 2282 2463 / 1637 Pincode : 700071 Email : gaurur@hgurur.com	, Financial limit reviewed on 05.06.2014; ,
143	145-10000-A	TEMPERATURE GAUGE	H040	H.GURU INSTRUMENTS (SOUTH INDIA) P. LTD	REGULAR	B	32,INDUSTRIAL SUBURB YESWANTHAPUR BANGALORE-KARNATAKA-www.hgurusouth.com Phone- 080-23370300, Pincode : 560022 Email : info@hgurusouth.com	, ,
144	145-10000-A	TEMPERATURE GAUGE	G032	GOA INSTRUMENTS INDUSTRIES PVT.LTD.,	REGULAR	D	D2/5, Mapusa Industrial Estate, Mapusa, Goa,- MAHARASHTRA-INDIA Phone- 09326054551, Pincode : 403507, Email : sumukh@goainstruments.com,	GCC Rev.5 has been accepted in toto. , ,
145	145-10000-A	TEMPERATURE GAUGE	G047	GOA THERMOSTATIC INSTRUMENTS PVT.LTD.	REGULAR	B	FLAT -B , GF, HILL CROWN APTS., COLLEGE ROAD, MAPUSA-GOA-INDIA Phone- Pincode : 403525 Email : nhlworks@mvno-electric.in	, ,
146	145-10000-A	TEMPERATURE GAUGE	F016	FORBES MARSHALL (HYD) LTD.	REGULAR	NA	MR SAILESH PATALAY/MR. M K SRINIVASAN PLOT NO.A-19/2, & T-4/2, IDA, NACHARAM, HYDERABAD-TELANGANA-INDIA Phone- 9849913704 Pincode : 500 076 Email : mksrinivasan@forbesmarshall.com	, ,
147	145-10000-A	TEMPERATURE GAUGE	A126	PRECISION MASS PRODUCTS PVT. LTD.	REGULAR	NA	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol-Gujarat,-INDIA Phone- 9999464663 Pincode : 382729 Email : sales@precisionmass.com	Registration of "M/s Ashcroft India Pvt. Ltd." substituted to "M/s Precision Mass Products Pvt. Ltd." as per MISCC dt. 15.02.2016 based on "Termination and business transfer agreement" submitted by
148	145-10000-A	TEMPERATURE GAUGE	B014	BUDENBERG GUAGE CO.LTD.	REGULAR	NA	PO BOX-5, ALTRINCHAM CHESHIRE-UK-UK Phone- 0161-9285441 Pincode : WA14 4ER Email : dhhdelhi@vsnl.net	, ,
149	145-10000-A	TEMPERATURE GAUGE	A010	A.N. INSTRUMENTS PVT. LTD.	REGULAR	C	MARKETING DIVISION, 5th FLOOR, 59-B, CHOWRINGHEE ROAD, KOLKATA-WEST BENGAL-INDIA Phone- 24757784,22472509 Pincode : 700020 Email : anidol@bol.net.in	, ,

150	145-15000-A	TEMPERATURE SWITCH	D003	INDFOS (INDIA) LIMITED	REGULAR	NA	MR.L.C.VENKATRANGAN/MR. B.KANNAN New No.17, II Floor, Adwave Towers, Dr.Sevalia Shivaji Salai, T.Nagar Chennai-TamilNadu-INDIA Phone- +91 44 24353407 Pincode : 600017 Email : delhi@indfos.com	, ,
151	145-15000-A	TEMPERATURE SWITCH	D021	DRESSER INDUSTRIES INC.	REGULAR	NA	Mr. Nishit Patel/Mr. Anuj Verma Plot No.2306, Phase II, GIDC Chhatral Kalol-Gujarat-India Phone- 02764-233682 Pincode : 382729 Email : Nishit.patel@ashcroftindia.com	, ,
152	145-15000-A	TEMPERATURE SWITCH	S009	SWITZER PROCESS INSTRUMENTS PVT. LTD.	REGULAR	NA	B Kannan/V S Jayaprakash 9, SOUTH BOAG ROAD, II FLOOR, PB NO-1423, T.NAGAR, CHENNAI-TAMIL NADU-INDIA Phone- 044-24340999 / 24344 Pincode : 600017 Email : marketing@switzerinstrument.com	Name changed from "M/s Switzer Instrument Ltd." to "M/s Switzer Process Instruments Pvt. Ltd." w.e.f. 27.07.2016; , ,
153	145-15000-A	TEMPERATURE SWITCH	S010	SOR INC.	REGULAR	NA	LARRY DEGARMO/Avdesh Chandra, 14685 W. 105TH STREET LENEXA-KANSAS-USA Phone- 09810905139, Pincode : 66215 Email : Ldegarmo@sorinc.com, avdesh@sherman-india.com	, ,
154	145-15000-A	TEMPERATURE SWITCH	T001	TOSHNIWAL BROTHERS PVT.LTD.	REGULAR	NA	WORKS:TOSHNIWAL IND.PVT.LTD, INDUSTRIAL ESTATE MAKHUPURA, AJMER-RAJASTHAN-INDIA Phone- 441171 Pincode : 305002 Email : toshniwalprocess@gmail.com	, ,
155	145-14000-A	TRANSMITTERS	T031	Honeywell Automation India Limited	REGULAR	NA	Mr. Ritwij Kulkarni 917, INTERNATIONAL TRADE TOWER, NEHRU PLACE, NEW DELHI-DELHI-INDIA Phone- 9890200584 Pincode : 110019 Email : rajesh.chaudhary@honeywell.com	, ,
156	145-14000-A	TRANSMITTERS	Y10	YOKOGAWA INDIA LIMITED,	REGULAR	NA	PLOT NO.96, ELECTRONICS CITY COMPLEX, HOSUR ROAD, BANGALORE,- KARNATAKA,-INDIA, Phone- 080-41586000, Pincode : Email : uday.shankar@in.yokogawa.com,	Subject to submission of renewed ISO certificate & compliance to GCC; Relevant documents (ISO 9001:2008 and GCC Rev-05) furnished on 18.06.2013. , ,
157	145-14000-A	TRANSMITTERS	T111	TOSHNIWAL INDUSTRIES PVT. LTD.,	REGULAR	NA	Industrial Estate, Makhupura, Ajmer,- Rajasthan,-India, Phone- 9352009000, Pincode : 305002, Email : info@tipl.com	GCC Rev.5 has been accepted in toto. , ,
158	145-14000-A	TRANSMITTERS	V040	V. AUTOMAT & INSTRUMENTS (P) LTD.	REGULAR	NA	Mr. R. K. BASSI/Mr. PRAVEEN KUMAR F-61, OKHLA INDL.AREA, PH-1 NEW DELHI-DELHI-INDIA Phone- 9810005826 Pincode : 110 020 Email : caloc@vautomat.com	Technical limit reviewed on 12.10.2015; , Technical limit reviewed on 30.04.2014 ,
159	145-14000-A	TRANSMITTERS	S039	SMART INSTRUMENTS LTD, BRAZIL	REGULAR	NA	Agents: Digital Electronic Ltd. 74/11 'C' Cross Road MIDC Andheri (East) MUMBAI-MAHARASHTRA-INDIA Phone- 28208477 Pincode : 400093 Email : corp@delbby.rpgms.ems.vsnl.net.in	Technical limit reviewed on 12.10.2015; , Technical limit reviewed on 30.04.2014 ,

160	145-14000-A	TRANSMITTERS	S106	SBEM PVT. LTD.	REGULAR	NA	MR.N.K. BEDARKAR/MR. VISHWANATH KARANDIK 39, ELECTRONIC CO.OP. ESTATE, PUNE SATARA ROAD PUNE,- MAHARASHTRA-INDIA Phone- 912041030100 Pincode : 411009 Email : newdelhi@sbem.co.in	Reviewed in MISCC dt. 21.07.2015 for non-response in 4 consecutive tender enquiry; , Technical limit reviewed on 30.04.2014 & 12.10.2015; ,
161	145-14000-A	TRANSMITTERS	S001	SIEMENS LIMITED	REGULAR	NA	Dr. Armin Bruck/Sandeep Mathur 130, Pandurang Budhkar Marg Worli Mumbai-Maharashtra-INDIA Phone- 0124 383 7377 Pincode : 400018 Email : ankit.varshney@siemens.com	Comm Add: Attn Mr K.K.Bedi/ Mr Sanjay Satpute, Siemens Ltd. EFIE, Plot no 6A, Sec-18, Maruti Industrial Area, Gurgaon - 122015, Ph 0124-3836250 , ,
162	145-14000-A	TRANSMITTERS	R002	EMERSON PROCESS MANAGEMENT (INDIA) PVT.LTD.	REGULAR	C	Mr. Amit Paithankar/Vikram Raj Singh 206- 210,BALARAMA BUILDING 2ND FLR. BANDRA EAST MUMBAI-MAHARASHTRA-INDIA Phone- 9619121500 Pincode : 400051 Email : vikramraj.singh@emerson.co	, ,
163	145-14000-A	TRANSMITTERS	P068	Pune Techtrol Pvt. Ltd.	REGULAR	C	N.P.Khatan/Sudhakar Badiger S-18, MIDC Bhosari, Pune-Maharashtra-INDIA Phone- 9850560042 Pincode : 411 026 Email : ho@punetechtrol.com	Technical limit reviewed on 12.10.2015; , Manufacturing works: J-52/7, MIDC, Bhosari, Pune.
164	145-14000-A	TRANSMITTERS	P082	PANAM ENGINEERS	REGULAR	NA	Mr. Santosh Shukla 203, Jaisingh Business,Parsiwada, Sahar road,Andheri(East), Mumbai,-Maharashtra,-India, Phone- 9892179529, Pincode : 400099, Email : santosh@panamengineers.com,	, ,
165	145-14000-A	TRANSMITTERS	N040	NIVO CONTROLS PVT. LTD.	REGULAR	C	Mr. Praveen Toshniwal 104-115, Electronic Complex, Indore-M.P.-India Phone- 0731-4081305 Pincode : 452010 Email : sales@nivocontrols.com	Registered in permanent category as per 11th MISCC-Electrical and C&I (FY 2014-15) dt. 20.09.2014. , Technical limit reviewed on 12.10.2015; ,
166	145-14000-A	TRANSMITTERS	M091	Moore Industries International Inc.	REGULAR	NA	Leonard.W. Moore/ Matt Moren 16650 Schoenborn St. North Hills-CALIFORNIA-USA Phone- +1 818 830 5548 Pincode : 91343 Email : mmoren@miinet.com	INDIAN REPRESENTATIVE: CHEMTROL INDUSTRIES LTD. , ,
167	145-14000-A	TRANSMITTERS	E057	Endress + Hauser (India) Pvt. Ltd.,	REGULAR	NA	Mr. Prakash Vaghela 215-216, DLF Tower 'A', Jasola District Centre, New Delhi,- New Delhi,-India, Phone- 9717593001, Pincode : 110025, Email : prakash.vaghela@in.endress.com	For temperature transmitter only. , ,

168	145-14000-A	TRANSMITTERS	B049	ABB LIMITED	REGULAR	A1	MR. RAJIV GOVIL 14, MATHURA ROAD, FARIDABAD-HARYANA-INDIA Phone- 09971085678 Pincode : 121003 Email : vipin.swami@in.abb.com	(1) A GROUP COMPANY OF ABB, NOW. (2) NAME OF VENDOR CHANGED FROM BIRLA-KENT TAYLOR LIMITED TO ABB LIMITED W.E.F. 27.06.2011 , Technical limit reviewed and changed on 05.06.2014; Technical limit further reviewed on
169	145-42000-A	ULTRASONIC FLOW METERS	N209	NIVUS GMBH	REGULAR	NA	Mr. Marcus Fischer Im Taele 2, D - 75031 Eppingen -- Germany Phone- 00491712233770 Pincode : Email : carolin.schuster@nivus.com	, ,
170	145-33000-A	VENTURI METER	M009	MICRO PRECISION PRODUCTS PVT. LTD.	REGULAR	NA	K.P. CHANDHOK/ATUL CHANDHOK 4, LINK ROAD, FARIDABAD-HARYANA-INDIA Phone- 9810265688 Pincode : 121002 Email : nal@micro1.com	, ,
171	145-33000-A	VENTURI METER	S044	STAR-MECH CONTROLS (I) PVT.LTD.	REGULAR	C	SUSHILLOTAM, SUSHILLOTAM, 29/3A/3, SASANE NAGAR, HADAPSAR, PUNE- MAHARASHTRA-INDIA Phone- 02026970450 Pincode : 411028 Email : sushil@star-mech.net	, ,
172	145-33000-A	VENTURI METER	T108	TM TECNOMATIC SPA	REGULAR	NA	MR. ANTONIO NOVIELLO/Mrs. Enrica Bazzoc VIA DELLE INDUSTRIE, 36 CREMONA- ITALY Phone- 39037221574 Pincode : 26100 Email : info@tmtecnomatic.com	AS PER DECISION OF MISCC-ELECT AND C&I HELD ON 19.10.2012 , ,
173	145-40000-A	VIBRATION MONITORING SYSTEM	S156	SKF INDIA LIMITED	REGULAR	NA	Mr. Shishir Joshipura SERVICE BUSINESS UNIT, CHINCHWAD, PUNE- MAHARASHTRA-INDIA Phone- +91 982 3161755 Pincode : 411033 Email : sandeep.gadre@skf.com	PARENT COMPANY: SKF CONDITION MONITORING INC, USA. ENTIRE RESPONSIBILITY OF ALL CONTRACTUAL OBLIGATIONS SHALL BE OF INDIAN VENDOR AS DECIDED BY 4TH MISCC (ELECT AND C&I) HELD ON
174	145-40000-A	VIBRATION MONITORING SYSTEM	R056	ROCKWELL AUTOMATION INDIA PVT LTD	REGULAR	NA	A-66, SEC- 64, NOIDA,- UP-India Phone- 0120-4671236 Pincode : 201301 Email : ra.india@ra.rockwell.com; asharma@ra.rockwell.com	PARENT COMPANY: ROCKWELL AUTOMATION INC, USA. ENTIRE RESPONSIBILITY OF ALL CONTRACTUAL OBLIGATIONS SHALL BE OF INDIAN VENDOR AS DECIDED BY 4TH MISCC (ELECT AND C&I) HELD ON

175	145-40000-A	VIBRATION MONITORING SYSTEM	M097	MEGGITT INDIA PVT. LTD.	REGULAR	NA	LJ Swaminathan/Gaurav Anand Unit-04A, Level-02, Bagmane Laurel Bagmane Tech Park, CV Raman Nagar Bangalore-Karnataka-India Phone- +91-9731577119 Pincode : 560093 Email : gaurav.anand@meggitt.com	PARENT COMPANY: MEGGITT SA, SWITZERLAND. ENTIRE RESPONSIBILITY OF ALL CONTRACTUAL OBLIGATIONS SHALL BE OF INDIAN VENDOR AS DECIDED BY 4TH MISCC (ELECT AND C&I) HELD ON
176	145-40000-A	VIBRATION MONITORING SYSTEM	F034	FORBES MARSHALL PVT. LTD.	REGULAR	NA	A - 34/35, MIDC ESTATE, H-BLOCK, PIMPRI, PUNE- MAHARASHTRA-INDIA Phone- 020-27442020, Pincode : 411 018 Email : mvyas@forbesmarshall.com	IN ASSOCIATION WITH SHINKAWA ELECTRIC CO. LTD., JAPAN (V.CODE S155) AS PER AGREED SCOPE MATRIX. ENTIRE RESPONSIBILITY OF ALL CONTRACTUAL OBLIGATIONS SHALL BE OF INDIAN VENDOR , ,
177	145-40000-A	VIBRATION MONITORING SYSTEM	G068	GE INDIA INDUSTRIAL PVT. LTD.	REGULAR	NA	Mr. Pramod Kaushik/Vijay Pal BUILDING NO-7A, 4TH FLOOR GURGAON- HARYANA-INDIA Phone- 0124-4808515 Pincode : 122002 Email : vijay.pal@ge.com	PARENT COMPANY: BENTLY NEVADA INC, USA. ENTIRE RESPONSIBILITY OF ALL CONTRACTUAL OBLIGATIONS SHALL BE OF INDIAN VENDOR AS DECIDED BY 4TH MISCC (ELECT AND C&I) HELD ON

Notes:- 1) The above sub-vendor list is tentative & reference only. However sub-vendor list is subject to BHEL/end user approval without any commercial/delivery implication. 2) New subvendor if proposed by vendor during contract stage shall be subject to BHEL/end user approval without any commercial implication.



**2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM
MANDATORY SPARE LIST**

SPECIFICATION NO. PE-TS-412-555-A001

VOLUME : II B

SECTION : E / ANNEXURE-II

REV 00

DATE: 15.12.2016

SHEET: 1 OF 1

**ANNEXURE-II
MANDATORY SPARE LIST**

2X660 MW ENNORE SEZ COMPRESSED AIR SYSTEM		Spec. No.	PE-TS-412-555-A001
		Rev No:	0
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		Date of issue	15.12.2016
LIST OF MANDATORY SPARES			
S. No.	Description	QTY	UNIT
1	COMPLETE INTERNALS FOR ASSEMBLING OF 1 COMPRESSOR EXCEPT CASING	1 SET	SET
2	FILTER ELEMENTS	1 SET EACH FOR PRE & AFTER FILTERS	SET
3	TUBE NEST FOR INTER COOLER	1 NO	NOS
4	TUBE NEST FOR AFTER COOLER	1 NO	NOS
5	VALVES IN COMPRESSOR HOUSE	1 SET OF EACH TYPE	SET
6	AUTO MOISTURE TRAP	2 SET	SET
A	MECHANICAL		
1	DRY AIR INTAKE FILTER	2 NOS	NOS
2	COMPLETE SET OF LOADING – UNLOADING VALVE ASSEMBLY	2 SETS	SETS
3	LOW PRESSURE COMPRESSOR ELEMENT	1 SET	SET
4	HIGH PRESSURE COMPRESSOR ELEMENT	1 SET	SET
5	INTER COOLER TUBE BUNCH	1 SET	SET
6	AFTER COOLER TUBE BUNCH	1 SET	SET
7	AUTOMATIC PURGE DRAIN VALVE FOR INTER COOLER AND AFTER COOLER(AUTO DRAIN TRAP)	1 SET	SET
8	AIR OUTLET CHECK VALVE	2 SETS	SETS
9	RUBBER AIR OUTLET COMPENSATOR	1 SET	SET
10	LUBE OIL FILTER	2 SETS	SETS
11	LUBE OIL PRESSURE REGULATING VALVE	1 SET	SET
12	DIFFERENTIAL OIL SEALS FOR LUBE OIL SYSTEM	2 SETS	SETS
13	COOLING WATER INLET AND OUTLET CONNECTION RUBBER BELLOWS	2 SETS	SETS
14	GEAR BOX COMPONENT		
14.1	DIFFERENT OIL SEALS	2 SETS	SETS
14.2	SET OF BEARINGS	1 SET	SET
14.3	BREATHING SYSTEM	2 SETS	SETS
15	COMPONENTS OF L.P ELEMENTS		
15.1	GEAR PINION	1 SET	SET
16	COMPONENT OF HP ELEMENT		
16.1	GEAR SETS	1 SET	SET
16.2	DIFFERENT SAFETY VALVES	1 SET	SET
16.3	FLEXIBLE RUBBER STUD COUPLINGS FOR COUPLING COMPRESSOR TO THE MOTOR	1 SET	SET
B	ELECTRICAL		
1.0.00	Motors (HV/LV/DC)		
1.1.00	11 KV & 3.3 KV Motors		

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S. No.	Description	QTY	UNIT
1.1.01	Termination kits (if elastimold type)	2 Nos. of each type	NOS
1.1.02	Termination kits (end connection)	20 Nos.	NOS
1.1.03	Temp. indicators	10 Nos.	NOS
1.1.04	Vibration indicators	10 Nos.	NOS
1.1.05	Terminal box teflon glands	20 Nos.	NOS
1.1.06	Phase segregated terminal boxes	2 Nos.	NOS
1.1.07	Heaters	4 sets	SETS
1.1.08	Couplings	2 Nos. each	NOS
1.1.09	Bearings (DE and NDE) for each type and rating of motors	4 sets	SETS
1.1.10	Motor of each type and rating	10% of the installed quantity or minimum 1 number whichever be higher	NOS
1.2.00	415 V Motors		
1.2.01	Terminal plates	10 Nos. each for small motors upto 30 kW & 4 Nos. each for more than 30 kW	NOS
1.2.02	Heaters	2 sets	SETS
1.2.03	Greasing arrangements	4 sets each type of motor	SETS
1.2.04	Motor of each type and rating	10% of the installed quantity or minimum 1 number whichever be higher	NOS
1.2.05	Bearings (DE and NDE) for each type and rating of motor	4 sets	SETS
1.3.00	D C Motors		
1.3.01	Carbon brushes	10 sets each type	SETS
1.3.02	Brush assemblies	2 sets each type	SETS
1.3.03	Terminal blocks	2 sets each type	SETS
1.3.04	Heaters	2 sets each type	SETS
1.3.05	Pulleys	2 sets each type	SETS
1.3.06	Motor of each type and rating	10% of the installed quantity or minimum 1 number whichever be higher	NOS
1.3.07	Bearings (DE and NDE) for each type and rating of motor	4 sets	SETS
2.0.00	BATTERY		
2.1	Battery cell	10	NOS
2.2	MT cell container of each type	10	NOS
2.3	Level indicator	6	NOS
2.4	Vent plugs	12	NOS
2.5	Inter-cell connector	10	NOS
2.6	Set of nuts, bolts and washer	12	NOS
3.0.00	BATTERY CHARGERS		
3.1.00	For Float cum boost Charger of Unit Batteries.		
3.1.01	Electronic Cards (with all components mounted)	1 set of each type and rating.	SETS
3.1.02	Fuses	4 nos of each type and rating	NOS

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S. No.	Description	QTY	UNIT
3.1.03	SCR	6 nos of each type and rating	NOS
3.1.04	Blocking Diode	6 sets of each type and rating	SETS
3.1.05	Potentiometer	3 sets of each type and rating.	SETS
3.2.00	For Float cum boost Charger of Switchyard Batteries.		
3.2.01	Electronic Cards (with all components mounted)	1 set of each type and rating.	SETS
3.2.02	Fuses	4 nos of each type and rating	NOS
3.2.03	SCR	6 nos of each type and rating	NOS
3.2.04	Blocking Diode	6 sets of each type and rating	SETS
3.2.05	Potentiometer	3 sets of each type and rating.	SETS
4.0.00	COMMUNICATION SYSTEM		
4.1	Fuses of each rating	Eighteen (18)	NOS
4.2	Switches of each type and rating	Three (3)	NOS
4.3	Socket	One (1)	NOS
4.4	Plugs	Two (2)	NOS
4.5	Wall mounted handset stations	Five (5)	NOS
4.6	Loudspeakers of each type	Two (2) of each type	NOS
4.7	Transformers of each type and ratings	Six (6)	NOS
4.8	Microphone capsules	Ten (10)	NOS
4.9	Switch P.C.B.	Five (5)	NOS
4.10	Diaphragm Assembly	Fifteen (15)	NOS
4.11	Page mute & siren switch for Desk-top Unit	Two (2) each	NOS
4.12	Driver unit for Wall mounted station	Ten (10) Nos.	NOS
4.13	Amplifier PCB for Wall mounting	Ten (10) Nos.	NOS
4.14	Microphone assembly for wall mounted pilfer proof station	Five (5)	NOS
4.15	Ear Piece Capsule	Ten (10) Nos.	NOS
4.16	Electronic Cards	One (1)	NOS
4.17	Junction Boxes	Two (2)	NOS
5.0.00	POWER & CONTROL CABLES		
5.1	11 KV Grade power cables for each type & size	10% of installed quantity	METER
5.2	3.3 KV Grade power cables for each type & size	10% of installed quantity	METER
5.3	1.1 KV Grade power cables for each type & size	10% of installed quantity	METER
5.4	1.1 < KV Grade control cables for each type & size	10% of installed quantity	METER
C	CONTROL & INSTRUMENTATION		
1.0.00	Each type of lamps, PBs, ILPBs, fuse, MCB, MCCB used in the equipment/system.	20 % of Installed Nos. of each type.	NOS

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S. No.	Description	QTY	UNIT
2.0.00	Measuring Instruments		
2.1.00	Indicators, Recorders, Electrical Metering and Skid Mounted Instruments		
2.1.01	Indicators, recorders and meters offered from each model for the project. These instruments shall be supplied with three sets of blank scales.	10% of installed nos. of each type/model or a minimum of one number for each model and 10% of total number of instruments for each type and model or a minimum of one number for each model and type, whichever is more.	NOS
2.1.02	For skid mounted instruments		NOS
2.2.00	Temperature Elements and Thermowells		
2.2.01	Thermocouple/RTD elements	10% spare for each type and length of element furnished with thermocouple/RTD assemblies, or a minimum of one number of each type & length.	NOS
2.2.02	Thermowells	10% for each type of temperature sensors or a minimum of one for each type, whichever is more.	NOS
2.3.00	Temperature, Transmitters and Electronic Transmitters (for Pressure, Dr., Temp, Flow, Level), Temperature, Pressure, Flow & Level Switch, safety switches, Gauges, meters, Transducers or any other instrument etc.	10% of total number of instruments/transducers offered for each model and type for the project or a minimum of one number, whichever is more.	NOS
3.0.00	DDCMS/PLC system, Master slave clock system, Hart Management System, Vibration Monitoring system, CAAQMS,		
3.1.00	I/O cards		
3.1.01	Analog Input module	10% of qty Installed of each category/model or at least 2 No. of each type/model (Whichever is more)	NOS
3.1.02	Analog output module	10% of qty Installed of each category/ model or at least 2 No. of each type/model (Whichever is more)	NOS
3.1.03	RTD/TC cards/modules	10% of qty Installed of each category/model or at least 2 No. of each type/model (Whichever is more)	NOS
3.1.04	Digital input module	10% of qty Installed of each category/model or at least 2 No. of each type/model (Whichever is more)	NOS
3.1.05	Digital output module	10% of qty Installed of each category/model or at least 2 No. of each type/model (Whichever is more)	NOS
3.2.00	All types of electronic modules, controllers, function modules, cards, terminal boards, relay boards, power supply cards etc for above mentioned system and other Control System/Sub-systems and any other type of PCB not covered.	10% of qty Installed of each category/model or at least 2 No. of each type/model (Whichever is more)	NOS
3.3.00	Electronic Cards/modules	10% of number for each type or minimum of 2 number for each type whichever is high.	NOS
3.4.00	Auto/Manual stations, set-point/bias stations etc	10% of the number of stations offered for the project from each type or a minimum of 2 number from each model, whichever is more.	NOS
3.5.00	Control logic power supply fuses, MCB, MCCB, at each current rating required for the project.	20% nos spare for each type/Model	NOS
3.6.00	Electronic cards of each type used for each type of Servers supplied with any control system	Ten (10) percent or 2 no. (Whichever is more)	NOS
3.7.00	Electric to pneumatic converters of each type utilized with automatic control system using pneumatic drives	Ten (10) percent of each type or a minimum of one of each type, whichever is more.	NOS
3.8.00	Plug-in type keyboard	10 nos. of each type/model.	NOS
3.9.00	Control OWS	Two No. of each type with complete accessories & monitors.	NOS
3.10.00	Utility/Engineering OWS	Two No. of each type with complete accessories & monitors.	NOS
3.11.00	DVD/CD	10 boxes	BOXES
3.12.00	Data highway cable with adequate connectors of each type	set. 200 mts. Each	METER
3.13.00	Hard disc drive unit	Five nos of each type	NOS
3.14.00	Prefab cable connectors	10% or 5 nos (whichever is more) of each type of Installed	NOS
3.15.00	Cubicle power supply power supply modules	Ten (10) percent or 5 nos (whichever is more) of Installed of each type and rating	NOS
3.16.00	Interposing/coupling relays.	Ten (10) percent Installed of each type and rating	NOS
3.17.00	Ethernet Switches, Routers & other communication hardware	10% of qty Installed of each type or a minimum of 2 numbers from each model, whichever is more.	NOS
3.18.00	Sensors with special cables, Power supply modules, Relay, Interface Module, and electronic modules used for vibration monitoring system.	10% of qty installed or Five no. (Whichever is more) of each type)	NOS
3.19.00	Printer toners for all printers	Ten (10) percent of qty installed or 3 no. (whichever is more)	NOS
3.20.00	DMP printer head of the total quantity	Nos. 2 nos. of 132 columns of each type	NOS
3.21.00	Drum for A3 sized scanner cum copies, printer	2 nos. of each type	NOS

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S. No.	Description	QTY	UNIT
3.22.00	24" LED monitor,	3 nos.	NOS
3.23.00	29" LED monitor	1 no	NOS
3.24.00	22" LED monitors.	5 nos	NOS
3.25.00	RJ 45 connector with box of each type	Twenty (20) percent or 2 no. (Whichever is more)	NOS
3.26.00	Hooters, Buzzers, Cooling fans of each type.	Ten (10) percent or 2 no. (Whichever is more)	NOS
3.27.00	Interface cables	2 sets of each type/model	METER
3.28.00	Power supply modules (AC to DC convertors)	10% or Five no. (Whichever is more) of each type/model	NOS
3.29.00	DVD/CD drive unit of each type	5 nos.	NOS
3.30.00	Mouse	20 nos. of each type/model.	NOS
4.0.00	Relay based Control Panels		
4.1.00	LEDs for indicating lights	Nos. 10% of qty installed.	NOS
4.2.00	Control circuit fuses/MCB/MCCB/ Semiconductor Fuses	Nos. 300% of installed of each type, current rating.	NOS
4.3.00	Relays modules & contactors.	Nos. 20% spare of qty Installed of each type & rating.	NOS
5.0.00	Alarm Annunciation System		
5.01.00	logic modules, group card modules, power supply modules, Hooters and any other electronic module.	Nos. 20% spares of each type installed	NOS
5.02.00	un-engraved window boxes complete with LED etc.	Nos. 5% spares of each size installed	NOS
5.03.00	LEDs for annunciation facia windows and LEDs box assemblies offered for the project	Nos. 20% of qty installed	NOS
5.04.00	Annunciator hooter	One (1) No. of each type	NOS
6.0.00	Un-interrupted Power Supply System and DC Control Power Supply System		
6.1.00	As per manufacturer's Recommendation for three years Continuous Operation or minimum quantities indicated as below (whichever is more)		
6.1.01	Fuses/Semiconductor Fuses	Nos. 300% of installed of each type, current rating with each panel /board	NOS
6.1.02	Miscellaneous parts for the power supplies such as SCRS, transistors, resistors, diodes, light bulbs, static switches, blocking diodes etc	Nos. Minimum of 10% or atleast two (which ever is more) of each type	NOS
6.1.03	Battery cells complete with contactor, cover plates etc	Nos. 10% of qty installed	NOS
6.1.04	Electronic modules like Rectifier control card, inverter control card, Driver card, IGBT Module, DC-DC converter card or any other card as listed in approved BOM for UPS, AC supply & 24 V DC supply etc.	1 Set of each type & rating	SET
6.1.05	Miniature Circuit breakers for AC and DC supply.	Nos. 20 % of installed or 10 Nos of each type (which ever is more) for ACDB and DCDB.	NOS
6.1.06	Digital/analog panel meters/indicators	5% or 2 no. of each type (whichever is more)	NOS
6.1.07	CT's, CVT's VT's chokes, AC/DC isolators, contactors, timers, relays.	10% or 2 nos. of each type and rating, (whichever is more)	NOS
6.1.08	Cooling Fans in UPS & 24 V DC charger panels	10% or 2 nos. of each type and rating, (whichever is more)	NOS
6.1.09	Following accessory equipment for the battery shall be furnished a) Cell lifting facilities	Two sets	SETS
6.1.10	Electronic modules of each type & rating for UPS and DC control power supply system.	One set or with each set consisting of at least one number of each type of electronic module for inverter, charger, static switch, stabilizer etc. as per	SET
6.1.11	MCCB for UPS & 24 V DC charger panels, ACDB, DCDB.	20 % of installed or 5 Nos of each type (which ever is more)	NOS
7.0.00	Erection hardware		
7.1.00	Instrument valves	Nos. Ten (10) percent of each type & Size installed	NOS
7.2.00	Condensate pots of each type & Size installed	Nos. Ten (10) percent of total number of Installed or four numbers whichever is higher .	NOS
7.3.00	Manifold	Nos. Ten (10) percent of each type & Size installed	NOS

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S. No.	Description	QTY	UNIT
7.04.00	Fittings	Nos. Ten (10) percent of each type & Size installed	NOS
8.0.00	Mandatory Spares for Control valves, Power Cylinder, Control Dampers, Actuators and Accessories		
8.1.00	Following spares shall be furnished for control valves, Power Cylinder, Control Dampers as applicable.		
8.1.01	One set of spare control valve stem packing for each control valve.		SET
8.1.02	Two moulded rubber diaphragms for each control valve.		NOS
8.1.03	One sets of each of O-rings and rubber gaskets for each control valve.		SET
8.1.04	100 percent qty. of lubricants for gaskets for each control valve on one year consumption basis.		LTR / KG
8.1.05	2 sets of limit switches and 1 set of valve positioner for each control valve.		
8.1.06	20 percent of position transmitter (4-20mA) for total qty. of control valve.		
8.1.07	One (1) set of valve trims (such as plug, stem, seat ring /cage, guide bushing, stem lock pin, packing retaining ring, etc) for each control valve.		
8.1.08	One completes actuator of each type or min 10% for each type and size whichever is more.		
8.1.09	20 percent of Solenoid valves or min 2 no. of each type for total qty. of control valves.		
8.1.10	20% of I to P converters, Pressure regulators.		
9.0.00	Mandatory spares not covered above		
9.1.00	Bidder to supply 10% or 1 no. (whichever is more) of each type of sensor/instrument, instrumentation/mechanical fittings etc for any other electronic system, feeder control cabinets, hydrastep (EWLI), Vibration Monitoring System, CCTV, C&I Lab Instruments, On line Carbon in Ash analyser system, On line Coal mass flow/speed measurement system, On line secondary air flow measurement system Mass Flow meter, Solid flow meter, 3 D Acoustic type level transmitters, Nucleonic & non nucleonic density transmitter etc.		
10.0.00	OTHER RELATED CONTROL AND INSTRUMENTATION SYSTEMS/EQUIPMENTS		
Note: 1) Mandatory spares listed above is bare minimum requirement. In case any additional mandatory spares requirement is covered elsewhere in the tender specification (PE-TS-412-555-A001) same shall be deemed to have been covered in bidders scope of supply. 2) One set means, items required for one compressor or equipment. 3) Quantity mentioned in percentage (%) is the % of total installed. If percentage comes as fraction next higher integer should be considered for the purpose of quantity required.			



**2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM
PAINTING & COLOUR SCHEME**

SPECIFICATION NO. PE-TS-412-555-A001

VOLUME : II B

SECTION : E / ANNEXURE-III

REV 00

DATE: 15.12.2016

SHEET: 1 OF 1

**ANNEXURE-III
PAINTING & COLOUR SCHEME**

CHAPTER - 6

PAINTING

1.0 SCOPE

This section defines the technical requirements for surface preparation, selection and application of paints on equipment, vessels, machinery, piping, ducts etc. However, manufacturers shall follow their standard procedures for painting their equipment. The bidder shall submit a detailed painting procedure for approval of owner/ owner's representative after the award of contract.

The following surface and material shall require painting:

- a. All un-insulated carbon steel and alloy steel equipment like columns, vessels, storage tanks, pumps, heat exchangers etc.
- b. All un-insulated carbon steel and low alloy piping, fitting and valves (including painting of identification marks).
- c. All pipe structural steel supports, walkways, platforms, handrails, ladders etc.

The following surfaces and materials shall not require painting :

- a. Non-ferrous materials
- b. Austenitic stainless steel
- c. Plastic and / or plastic coated materials
- d. Insulated surface of equipment and pipes except color coating wherever required.
- e. Painted equipment like blowers, pumps, valves etc. with finishing coats in good condition and with matching color code.

2.0 CODES AND STANDARDS

Painting of equipment shall be carried out as per the specifications indicated below and shall conform to the relevant IS specification for the material and workmanship.

The following Indian Standards may be referred to for carrying out the painting job :

IS:5	:	Colours for ready mixed paints and enamels
IS:1303	:	Glossary of terms relating to paints
IS:2379	:	Colour code for identification of pipelines
IS:1477	:	Code of practice for painting of ferrous metals in buildings (Parts I & II)
IS:2524	:	Code of practice for painting of non-ferrous metals in buildings (Parts I & II)
IS:2395	:	Code of practice for painting of concrete, masonry and plaster surfaces (Parts I & II)

IS:2338	:	Code of practice for finishing of wood and wood based materials (Parts I & II)
IS:158	:	Ready mixed paint, brushing, bituminous, black, lead free, acid, alkali, water and heat resisting.
IS:2074	:	Ready mixed paint, air drying, red Oxide Zinc Chrome, priming
IS:104	:	Ready mixed paint, brushing, Zinc Chrome, priming
IS:2932	:	Enamel Synthetic exterior (a) Undercoating (b) finishing
IS:4682	:	Code of practice for lining of vessels & equipment
SIS 559000	:	Swedish standard for blasting
ISO 8504-2	:	Preparation of steel substrates before application of paints and related products. Surface preparation methods Part 2 Abrasive blast cleaning
ISO 8501-1	:	Preparation of steel substrates before application of paints and related products. Visual assessment of surface cleanliness. Part 1 : Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings.
SIS 05 5800	:	Surface preparation by acid pickling
SSPC SP08	:	Surface preparation by acid pickling
IS 2629	:	Recommended practice for hot dip galvanizing of iron and steel
ASTM A780	:	Standard practice for repair of damaged galvanized coatings
SSPC	:	Steel structures painting council
NACE	:	National association of Corrosion Engineers
DIN	:	Deutsehes Institute for Normung
BS	:	British Standard
ASTM	:	American Society for Testing material
AWWA	:	American Water works association

3.0 SURFACE PREPARATION

The surface shall be prepared in a manner suitable for coatings. Chemical derusters or rust converters shall not be applied. Acid cleaning is subject to approval of Purchaser/ Purchaser's representative.

3.1 BLASTING

The surface of the part/ component shall be blasted before the coating material is applied.

Compressed air supply for blast cleaning shall be free of water and oil. Air compressors shall not be allowed to deliver air above 1100C. Blasting activity shall be performed at temperatures 30C above dew point and substrata temperature between 50C & 500C and relative humidity not exceeding 85% shall be maintained during painting. Necessary safety precautions for equipment and operator shall be adhered to and shall comply with applicable laws, regulations, ordinances etc., of the local authority, state or the nation pertains to the work.

Abrasive used for blast cleaning carbon steel and alloy steel shall be as per ISO 8504-2 and SSPC painting manual. Suggested abrasives are chilled iron grit, shot steel, malleable iron grit and shots of non metallic abrasive (aluminum oxide, copper slag, garnet etc.).

The grade of blasting shall be performed in line with the approved painting scheme.

The nature, quality and grain size of abrasives and the parameter of their use are to be chosen to obtain the required surface profile depth and cleanliness.

Surfaces prepared for coating shall be coated the same day and before any visible rusting occurs (the time elapsed between blast cleaning and commencement of painting shall under no circumstances exceed 4 hours, but in any case must commence before signs of degradation occur).

The grades of surface finish

	ISO 8501-1	SIS 055900	SSPC	NACE
White metal	Sa3	Sa3	SP5	1
Near White metal	Sa 2½	Sa 2½	SP10	2
Commercial Blast	Sa2	Sa2	SP6	3
Brush off blast	Sa1	Sa1	SP7	4

Unless otherwise specified in the documents, the surface shall satisfy the following requirements after blasting

(a) Blasting according to SIS 055900, Grade Sa 2½

Primer paint shall be Zinc Silicate of approved brand. Dry film thickness of each primer coat shall be 15-25 µm.

3.2 Manual Rust Removal

Manual rust removal shall be allowed for welded zones and for touching up installed components.

3.3 Cleaning

Removal of impurity

	Impurity	Removal
a)	Dust, Loose deposits	Vacuum cleaning, brushing
b)	Adhesive deposits	Power brushing
c)	Oils, greasy impurities	Wet Blasting, Use of Detergent Additives by agreement
d)	Salt deposits	Rinsing
e)	Markings (eg felt up pen)	Organic solvents to manufacturer's specifications eg Trichloro trifluoro ethane and solvents containing acetone (renew solvent and rag frequently)

3.4 Acid Pickling

Prior to galvanizing the surface preparation shall be done by acid pickling as per SSPC-SP-08.

4.0 PROCESSING

4.1 General Application Conditions

The primer shall be applied to properly prepared surfaces only. The specifications of the coating material manufacturers shall be observed. The minimum temperature shall be + 5°C and the relative humidity shall not exceed 80%. The temperature of the work piece shall be at least 3°C above dew point.

4.2 Application Procedure

The primer shall be applied by means of brush or by spary. The top coats shall be applied by means of brush, roller or spray.

At points where coating application is interrupted, the individual layers shall be adequately stepped to ensure proper layer sequence when coating operations are resumed.

4.3 Touching Up

Before each layer is applied, previous coating shall be touched up where necessary by way of rust removal and cleaning according coating manufacturers specification. The final top shall be reapplies completely.

4.4 Uncoated Surfaces

Moving parts of machines (e.g stems, shafts, sliding and locating bearings), nameplates, instruments and sealing surface shall not be coated. Welds shall be left free of coating upto a distance of 30 mm on each side of the weld edge until erection and weld examinations, if any, have been completed.

4.5 Bond Strength

The pill off stress determined using the pull off test method for adhesion shall not be less than 1.5 N/mm², according to ISO 4624.

5.0 SURFACE CONDITIONS OF COATING SURFACES

The coating surface shall have a uniform film thickness, shade and gloss and shall be free from inclusions, sags and wrinkles.

6.0 COATING SYSTEMS

6.1 General Requirements for Coating Systems

Coating materials according to SSPC, BS 5493 or DIN 55 928 shall be used. Intermediate coats are to be pigmented with micaceous iron oxide. The materials shall be matched with each other so that they are compatible. Coatings deviating this

specification shall be subject to approval. Standards of surface preparation and painting shall give a time to first maintenance of 10 years.

The colour and gloss of top coats shall be in accordance with sub clause suggested colour codes for painting (Sub Clause 6.8)

6.2 Standard Coating System (External Coatings)

(a) Steel Surfaces

- (i) All steel structures shall receive two primer coats and two sandwich coat of MIO Epoxy paint and one finish coat of painting. First coat of primer shall be given in shop after fabrication before dispatch to erection site after surface preparation as described below. The second coat of primer shall be applied after erection and final alignment of the erected structures. Two intermediate coats and one finished coat shall also be applied after erection.
- (ii) Steel surface which is to be painted shall be cleaned of dust and grease and the heavier layers of rust shall be removed by chipping prior to actual surface preparation. The surface shall be abrasive blasted as explained in clause 3.1 to Sa 2½ finish as per SIS05-5900. Primer paint shall be Zinc Silicate of approved brand. Dry film thickness of each primer shall be 60 microns.
- (iii) Two intermediate MIO Epoxy paint, and one top polyurethane coating of approved brand shall be applied. Dry film thickness of each intermediate coat shall be 90 microns and top polyurethane coating shall be 30 microns. The under coat and finish coat shall be of different tint to distinguish the same from finish paint. The total dry film thickness shall be 330 microns. All paints shall be of approved brand and shade as per owner's requirement.
- (iv) Joints to be site welded shall have weldable primer applied within 100 mm of welding zone. Similarly where friction grip fasteners are to be used removable anti corrosive coating shall be provided. On completion of the joint the surfaces shall receive the paint as specified.
- (v) Surfaces inaccessible after assembly shall receive two coats of primer prior to assembly. Surfaces inaccessible after erection including top surfaces of floor beams, supporting gratings or chequered plate shall receive one additional coat of finish paint over the above number of coats specified before erection. Portion of steel member embedded/ to be encased in concrete shall not be painted.

(b) Gratings and Step Threads

(i) Surface Preparation

Gratings and step threads shall be cleared by acid pickling as per SSPC-SP-08

(ii) Hot Dip galvanizing

The hot dip galvanizing shall be done as per IS 2629. The average mass of coating shall be 610 gm/m².

(iii) Post Treatment

Immediately after galvanizing post treatment such as chromating shall be applied to retard white rust attack.

(iv) Touch up mechanical damages

The repair of damages coatings shall be done as per the recommended practice ASTM A780.

6.3 Painting of Indoor components such as valves, pumps, motors, electrical parts, tanks etc.

At Works

Surface Preparation

Blasting according to SIS 055900 grade Sa 2½. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer of minimum dry film thickness 25 µm may be used.

Prime Coat

Two (2) layers of Zinc phosphate epoxy, total dry film thickness 75µm.

At Site

Thorough cleaning to remove oil, grease, dirt and any other contaminants. Derusting of all mechanical damages according to SIS 055900 Grade ST3. Touch up with dry film thickness 50 µm.

Finish Coat

Application of two (2) finishing coats of chlorinated rubber paint in approved shades at 30-40 microns DFT each coat in approved shades.

Remarks

Equipment coated with a standard application system can be accepted if the quality of this application system is corresponding with the quality of the above mentioned system.

6.4 Painting of Outdoor equipment (external surfaces) such as piping, valves, pumps, motors, electrical parts, tanks etc.

Weather exposure, weather resistance, temperature upto 120°C as per clause 6.1 & 6.3. However

Surface Preparation

Blasting according to SIS 055900 grade Sa 2½. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer of minimum dry film thickness 15-25 µm may be used.

Prime Coat

Two (2) layers of Zinc phosphate epoxy, total dry film thickness 75µm.

Intermediate Coat

One (1) layer 2 pack high build epoxy polyamide MIO, DFT 100µm.

Finish Coat

Application of two (2) finishing coats of chlorinated rubber paint in approved shades at 50 microns DFT each coat in approved shades.

6.5

Special Coating

(a) Parts exposed to temperatures above 120°C, upto 200°C, not insulated

(i) At Works

Surface Preparation

Blasting according to SIS 055900 grade Sa 2½ and ISO 8501-1:1958. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer of minimum dry film thickness 15-25 µm may be used.

Prime Coat

Inorganic ethyl Zinc silicate, total dry film thickness 75µm.

(ii) At Site

Pretreatment

Removal of all mechanical damages, according to ISO 8501-1:1989, grade St 3 touch up with 1 pack inorganic ethyl zinc silicate, dry film thickness 50µm.

Intermediate Coat

1 pack silicon acrylic dry film thickness 35 µm.

Final Coat

1 pack silicon acrylic, dry film thickness as 35µm.
Total system dry film thickness 145µm.
Final coat according to colour code.

(b) Parts exposed to temperatures above 200°C, upto 400°C, not insulated

(i) At Works

Surface Preparation

Blasting according to ISO 8501-1:1958 grade Sa-2½. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer of minimum dry film thickness 15-25 µm may be used.

Prime Coat

Inorganic ethyl Zinc silicate, total dry film thickness 75µm.

(ii) At Site

Pretreatment

Derusting of all mechanical damages, according to standard Sa 2½ to ISO 8501-1:1988. Touch up with coating system according to manufacturer's recommendations.

(c) Insulated parts continuously exposed to condensing water or parts exposed to temperatures

For parts that are provided with insulation on site.

(i) Insulated parts exposed to condensing water

At Works

Surface Preparation

Blasting according to Sa 2½ to ISO 8501-1:1988. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer of minimum dry film thickness 15-25 µm shall be used.

Prime Coat

Inorganic ethyl Zinc silicate, total dry film thickness 75µm

(ii) Insulated parts exposed to temperatures

Parts exposed to temperatures upto < 400°C

Surface Preparation

Blasting according to Sa 2½ to ISO 8501-1:1988. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer of minimum dry film thickness 15-25 µm shall be used.

Parts exposed to temperature above 400°C at works (Steam pipes, pressure tubes and parts for the HRSG, such as heating surfaces, heaters and superheaters, reheaters etc)

Temporary Primer

Varnish

(d) Intermittent exposure due to condensing water/ chemicals (Indoors)

(i) At Works

Surface Preparation

Blasting according to Sa 2½ and ISO 8501-1:1988. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer of minimum dry film thickness 15-25 µm may be used.

Prime Coat

Two layers of Zinc phosphate primer, total dry film thickness 75µm.

(ii) At Site

Pretreatment

Removal of all mechanical damages, according to standard Sa3 to ISO 8501-1:1988, touch up with 2 pack high build epoxy with volume solid content of more than 85%, 75µm.

Intermediate Coat

2 pack high build epoxy, dry film thickness 80 µm.

Finish Coat

2 pack silicon acrylic, dry film thickness of 50µm.

Total system dry film thickness 205µm.

When exposed to weathering, weather resistance finish coat shall be applied.

(e) Water Exposure

(i) At Site/ Works

Pretreatment

Removal of all welding pearls.

Blasting according to Sa 3 to ISO 8501-1:1988

Coat

4 coats 2 pack coal tar epoxy, dry film thickness 125 µm each.

Total system dry film thickness 500µm

Touch up after erection as required.

6.6 Painting of Pipes

6.6.1 Buried Piping

Internal surfaces

- (i) Surface cleaning by sand blasting.
- (ii) Two (2) coats of epoxy primer coats. The minimum DFT of each coat shall be 35 microns.
- (iii) Finish coat-Two (2) coats of high build epoxy paint. The minimum DFT of each coat shall be 35 microns.

The total dry film thickness of 150 microns.

Note : All steel pipes carrying sea water shall be internally coated with corrocoat/ polyurea coating having thickness 1500 DFT.

Tests to be carried out after application : Bond/ Adhesion test, Holiday test

External surfaces

- (i) Surface cleaning by Sand Blasting.
- (ii) Coal tar primer compatible with coal tar enamel grade. The number of coats shall be two with a DFT of 35 microns each.
- (iii) Coal tar enamel shall be applied. A single spiral inner wrap of glass fibre tissues shall be applied overlapping at least 25 mm ensuring impregnation of glass fibre tissues in the first coat. The second coat of enamel and second outer wrap of glass fibre felt, Type – I to IS: 7193-1974 will be applied in the same way confirming to Table – 10 of IS – 10221 – 1982.

The total thickness of the coating will not be less than 4.0 mm

- (iv) Alternatively Wrapping with coal tar based anticorrosion tape conforming to IS 15337: 2003 is also acceptable in lieu of s.no. (iii) above. Wrapping thickness shall be 4.0 mm.

Tests to be carried out after application : Bond/ Adhesion test, Holiday test

6.6.2 Overground Piping

Internal surfaces

- (i) Surface cleaning by sand blasting.
- (ii) Two (2) coats of epoxy primer coats. The minimum DFT of each coat shall be 35 microns.
- (iii) Finish coat-Two (2) coats of high build epoxy paint. The minimum DFT of each coat shall be 35 microns.

The total dry film thickness of 150 microns.

Note : All steel pipes carrying sea water shall be internally coated with corrocoat/ polyurea coating having thickness 1500 DFT.

External surfaces

- (i) Surface cleaning by Sand Blasting.
- (ii) Two (2) coats of epoxy primer coats. The minimum DFT of each coat shall be 35 microns.
- (iii) Finish coat-Two (2) coats of high build epoxy paint. The minimum DFT of each coat shall be 35 microns.

6.7 Internal Coatings

6.7.1 Tanks (Internal surfaces) as specified in relevant sections of specification

Industrial deionised, demineralised and potable water upto 60°C pH range 4.5-9.5

Blasting according to Sa 2½ and ISO 8501-1:1988.

Prime Coat

Two layers of Zinc phosphate epoxy primer, total dry film thickness >75µm.

Pretreatment

Dersuting of all mechanical damages, according to standard Sa3 to ISO 8501-1:1988, touch up with 2 pack high build epoxy with volume solid content of more than 85%, 75µm.

Intermediate Coat

2 pack high build epoxy, dry film thickness 80 µm.

Finish Coat

2 pack silicon acrylic, dry film thickness of 150µm per coat.

In case of service or potable water tanks, the coating material selected shall not taint the water. The paint system shall confirm to regulations issued by Food & drug administration/ National Public Health service/ AWWA/ OSHA and comply with applicable laws, regulations, ordinances etc. of the local authority, state or the nation pertains to work.

QA/ QC Procedure including pinhole inspection, shall be submitted for approval by Owner/ Owner's representative.

6.6.2 Rubber Lining of Pipes, Valves and Tanks for DM Water

Pretreatment

Blasting according to Sa 2½ and ISO 8501-1:1988

Rubber Lining

Hard rubber 5 mm for DM water applications as IS – 4682

6.7 Painting for Electrical items

- 6.7.1 All the steel work shall be thoroughly cleaned of rust, scale, oil, grease, dirt and swarf by pickling, emulsion cleaning etc. The sheet steel shall be phosphate/ oven dried and then painted with two coats of zinc rich primer paint. After application of the primer, two coats of finishing epoxy paint shall be applied. The colour of the finishing coats inside shall be glossy white and exterior of the treated sheet steel shall be shade 631 of IS-5/ RAL 7032 for all switchboard/ MCC/ Distribution boards, control panels etc.
- 6.7.2 All electrical equipment shall be given tropical and fungicidal treatment and outdoor equipment shall be provided with rain hood to prevent entry of rain water into the equipment.
- 6.7.3 Painting of I & C equipment : Epoxy coating required for all I & C equipment.

6.8 SUGGESTED COLOUR CODES FOR PAINTING

SL. NO.	ITEM/SERVICE	COLOUR	IS-5	COLOUR (BAND)	IS-5
1.	Structures, platforms, galleries, ladders and handrails	Dark Admiralty Grey	632	-	-
2.	Boiler casing, ducting	Nut Brown	413	-	-

SL. NO.	ITEM/SERVICE	COLOUR	IS-5	COLOUR (BAND)	IS-5
3.	Crane				
3.1	Crane structure	Golden Yellow	356	Black	-
3.2	Trolley & hook	Crimson	540	-	-
4.	Fans, pumps, motors, compressors	Light Grey	631	-	-
5.	Tanks (without insulation and cladding)				
5.1	Outdoor	Aluminium	-	-	-
5.2	Indoor	Light grey	631	-	-
6.	Vessels & all other proprietary equipment (without insulation & cladding)	Light grey	631	-	-
7.	Switchgear	Light grey (Powder coated)		-	-
8.	Control & relay panels	Light grey (Powder coated)	631/70 78 of IS 1650	-	-
9.	Turbines	Light Grey	631	-	-
10.	Generators & Exciter	Light Grey	631	-	-
11.	Transformers	Aluminum	-	-	-
12.	Machinery guards	Signal red	537	-	-
13.	Piping (without insulation and cladding)				
13.1	Water System				
a	Boiler feed	Sea Green	217	-	-

SL. NO.	ITEM/SERVICE	COLOUR	IS-5	COLOUR (BAND)	IS-5
b	Condensate	Sea Green	217	Light Brown	410
c	DM Water	Sea Green	217	Light Orange	557
d	Soft Water	Sea Green	217	French Blue	166
e	Bearing Cooling Water	Sea Green	217	French Blue	166
f	Potable & filtered Water	Sea Green	217	French Blue	166
g	Service and clarified water	Sea Green	217	French Blue	166
h	Cooling water	Sea Green	217	French Blue	166
l	Sea Water	Sea Green	217	White	-
14.	Ash Transmitting Vessels and pipe lines	Aluminium	-	-	
15.	Air System				
15.1	Station air	Sky blue	101	-	-
15.2	Control air	Sky blue	101	White	-
16.	Oil system				
16.1	Fuel oil	Light brown	410	French	166
16.2	Light oil (HSD)	Light Brown	410	Brilliant green	221
16.3	Lubricating oil	Light brown	410	Light grey	631
16.4	Transformer oil	Light brown	410	Light orange	557
17.	Gas System				
17.1	Carbon dioxide	Canary yellow	309	Light grey	631
17.2	Hydrogen	Canary yellow	309	Signal red	537
18.	Fire services	Fire red	536	-	-
19.	Effluent pipes	Black	-	-	-
20.	Vacuum pipes	Sky blue	101	Black	-

Notes :

1. This colour code basically refers to IS:2379 for piping with necessary modifications

2. Where band colour is specified, same shall be provided at 30 meter intervals on long uninterrupted lines and also adjacent to valves and junctions.

Bidder shall furnish his painting specification to suit corrosive atmosphere of coastal area along with the bid. The specification shall in general be in line with the above requirements.



**2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM
LIST OF TOOLS & TACKLES**

SPECIFICATION NO. PE-TS-412-555-A001

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**ANNEXURE-IV
LIST OF TOOLS & TACKLES**

engraved on the back. The name plates shall be suitably fixed on both front and rear sides.

8.13.04 Items of plant such as valves, which are subject to handling, shall be provided with an engraved chromium plated nameplate or label with engraving filled with epoxy. The name plates for valves shall be marked in accordance with MSS standard SP-25 and ANSI B 16.34 as a minimum.

8.13.05 Hanger/ support numbers shall be marked on all pipe supports, anchors, hangers, snubbers and restraint assemblies. Each constant and variable spring support shall also have stamped upon it the designed hot and cold load which it is intended to support. Suitable scale shall also be provided to indicate load on support/hanger.

8.13.06 Valves, steam traps and strainers shall be identified by Owner's tag number of a metal tap permanently attached to non pressure parts such as the yoke by a stainless steel wire. The direction of flow shall also be marked on the body.

8.13.07 Safety and relief valves shall be provided with the following :

- (a.) Manufacturer's identification.
- (b.) Nominal inlet and outlet sizes in mm.
- (c.) Set pressure in Kg/cm² (abs).
- (d.) Blowdown and accumulation as percentage of set pressure.
- (e.) Certified capacity in Kg of saturated steam per hour or in case of liquid certified capacity in litres of water per minute.

8.13.08 All such plates, instruction plates, etc. shall be bilingual with Hindi inscription first, followed by English. Alternatively, two separate plates one with Hindi and the other with English inscriptions may be provided.

8.13.09 All segregated phases of conductors or bus ducts, indoor or outdoor, shall be provided with coloured phase plates to clearly identify the phase of the system

8.14.00 **Tools and Tackles**

The Bidder shall supply with the equipment one complete set of all special tools and tackles and other instruments required for the erection, assembly, disassembly and proper maintenance of the plant and equipment and systems (including software). These special tools will also include special material handling equipment, jigs and fixtures for maintenance and calibration / readjustment, checking and measurement aids etc. A list of such tools and tackles shall be submitted by the Bidder alongwith the offer.

The price of each tool / tackle shall be deemed to have been included in the total bid price. These tools and tackles shall be separately packed and sent to site. The Bidder shall also ensure that these tools and tackles are not used by him during erection, commissioning and initial operation. For this period the Bidder should bring his own tools and tackles. All the tools and tackles shall be of reputed make acceptable to the Owner.

8.15.00 Welding

8.15.01 If the manufacturer has special requirements relating to the welding procedures for welds at the terminals of the equipment to be performed by others the requirements shall be submitted to the Owner in advance of commencement of erection work.

8.16.00 Colour Code for all Equipment/ Pipings/ Pipe Services

8.16.01 All equipment/ piping/ pipe services are to be painted by the Bidder in accordance with Owner's standard colour coding scheme, which will be furnished to the Bidder during detailed engineering stage.

8.17.00 Protection and Preservative Shop Coating

8.17.01 Protection

All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either metallic or a nonmetallic protection device. All ends of all valves and piping and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage. The parts which are likely to get rusted, due to exposure to weather, should also be properly treated and protected in a suitable manner. All primers/paints/coatings shall take into account the hot humid, corrosive & alkaline, subsoil or overground environment as the case may be.

8.17.02 Preservative Shop Coating

All exposed metallic surfaces subject to corrosion shall be protected by shop application of suitable coatings. All surfaces which will not be easily accessible after the shop assembly, shall be treated beforehand and protected for the life of the equipment. All surfaces shall be thoroughly cleaned of all mill scales, oxides and other coatings and prepared in the shop. The surfaces that are to be finish-painted after installation or require corrosion protection until installation, shall be shop painted with atleast two coats of primer.

Transformers and other electrical equipment if included shall be shop finished with one or more coats of primer and two coats of high grade epoxy. The finished colors shall be as per manufacturer's standards, to be selected and specified by the Owner at a later date.



TITLE

TECHNICAL SPECIFICATION FOR COMPRESSED AIR SYSTEM

SPECIFICATION NO. PE-TS-412-55-A001

REV 00

DATE

SHEET OF

LIST OF SPECIAL MAINTENANCE TOOLS & TACKLES*

S.No.	ITEM DESCRIPTION	QUANTITY
01		
02		
03		
04		
05		
06		
07		
08		
09		
10		

*Bidders need to fill this list ONLY IF the Tools are SPECIAL in nature.

SIGNATURE: _____

NAME : _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

COMPANY SEAL

	2X660 MW ENNORE SEZ COMPRESSED AIR SYSTEM CLARIFIED WATER ANALYSIS, DM WATER ANALYSIS, FUEL OIL ANALYSIS	SPECIFICATION NO. PE-TS-412-555-A001	
		VOLUME : II B	
		SECTION : E / ANNEXURE-V	
		REV 00	DATE: 15.12.2016
		SHEET: 1 OF 1	

ANNEXURE-V

CLARIFIED WATER ANALYSIS, DM WATER ANALYSIS, FUEL OIL ANALYSIS (AS APPLICABLE)

1. DM Water Analysis

a. pH : maintained at 8.5 to 9.5



**2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM
DRAWINGS / DOCUMENTS SUBMISSION
PROCEDURE**

SPECIFICATION NO. PE-TS-412-555-A001

VOLUME : II B

SECTION : E / ANNEXURE-VI

REV 00

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ANNEXURE-VI

**DRAWINGS / DOCUMENTS SUBMISSION
PROCEDURE
(PL. REFER SECTION: C1A)**



**2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM
DRAWINGS / DOCUMENTS SUBMISSION
PROCEDURE**

SPECIFICATION NO. PE-TS-412-555-A001

VOLUME : II B

SECTION : E / ANNEXURE-VII

REV 00

DATE: 15.12.2016

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**ANNEXURE-VII
INSPECTION AND TESTING**

	TITLE	PE-TS-412-555-A001
		REV 00
	INSPECTION AND TESTING	SHEET 1 OF 2
1.00.00	INSPECTION AND TESTING	
1.01.00	Inspection and Tests during Manufacture.	
1.01.01	The method and techniques to be used by the Bidder for the control of quality during manufacture of all plant and equipment shall be agreed with the Owner.	
1.01.02	The Owner's general requirements with respect to quality control and the required shop tests are set out elsewhere in this specification.	
1.01.03	Before any item of plant or equipment leaves its place of manufacture the Owner shall be given the option of witnessing inspections and tests for compliance with the specification and related standards.	
1.01.04	Advance notice shall be given to the Owner as agreed in the Contract, prior to the stage of manufacture being reached, and the piece of plant must be held at this stage until the Owner has inspected the piece, or has advised in writing that inspection is waived. If having consulted the Owner and given reasonable notice in writing of the date on which the piece of plant will be available for inspection, the Owner does not attend the Bidder may proceed with manufacture having forwarded to the Owner duly certified copies of his own inspection and test results. The owner's representative shall have at all reasonable times access to bidder's or his sub-vendor's premises and shall have power to inspect/ examine materials and workmanship or equipment under manufacture. The Bidder shall forthwith forward to the engineer duly certified copies of the Test Certificates in six copies (one to the Purchaser and five to the Consulting Engineer) for approval. Further nine (9) copies of Shop Test Certificates shall be bound with Instruction Manuals referred to elsewhere. For electrical equipment, routine tests as per relevant IS spec are to be carried out on all equipment. Type tests are also to be carried out on selected equipment as detailed in the specs of concerned electrical equipment.	
1.01.05	Under no circumstances any repair or welding of castings be carried out without the consent of the Engineer. Proof of the effectiveness of each repair by radiographic and/or other non-destructive testing technique, shall be provided to the Engineer.	
1.01.06	All the individual and assembled rotating parts shall be statically and dynamically balanced in the works. Where accurate alignment is necessary for component parts of machinery normally assembled on site, the Bidder shall allow for trial assembly prior to despatch from place of manufacture.	
1.01.07	All materials used for the manufacture of equipment covered under this specification shall be of tested quality. Relevant test certificates shall be made available to the Purchaser. The certificates shall include tests for mechanical properties and chemical analysis of representative material. Equipment or parts coming under any statutory Regulations shall be certified by a Competent Authority under the regulations in the specified format.	

	TITLE	PE-TS-412-555-A001	
		REV	00
INSPECTION AND TESTING			
		SHEET	2 OF 2
1.01.08	All pressure parts connected to pumping main shall be subjected to hydraulic testing at a pressure of 150% of shut-off head for a period not less than one hour. Other parts shall be tested for one and half times the maximum operating pressure, for a period not less than one hour.		
1.01.09	All necessary non-destructive examinations shall be performed to meet the applicable code requirements.		
1.01.10	All welding procedures adopted for performing welding work shall be qualified in accordance with the requirements of Section-IX of ASME code or IBR as applicable. All welded joints for pressure parts shall be tested by liquid penetrant examination according to the method outlined in ASME Boiler and Pressure Vessel code. Radiography, magnetic particle examination magnuflux and ultrasonic testing shall be employed wherever necessary/ recommended by the applicable code. At least 10% of all major but welding joints shall be radiographed unless otherwise stipulated. Statutory payments in respect of IBR approvals including inspection shall be made by the bidder. Bidder's scope shall include to preparation of all necessary documents, co-ordination and follow-up for above approval. Owner shall only forward assistance/endorsement of documents /design /drawings /reports/records to be submitted for approval as stipulated/ required by Statutory Authorities till registration of the unit and clearance for commercial operation.		
1.02.00	Performance Tests at Site		
1.02.01	The full requirements for testing the system shall be agreed between the Owner and the Bidder prior to Award of Contract. The completely erected System shall be tested by the Bidder on site under normal operating conditions. The Bidder shall also ensure the correct performance of the System under abnormal conditions, i.e. the correct working of the various emergency and safety devices, interlocks, etc.		
1.02.02	The Bidder shall provide complete details of his normal procedures for testing, for the quality of erection and for the performance of the erected plant. These tests shall include site pressure test on all erected pipe work to demonstrate the quality of the piping and the adequacy of joints made at site.		
1.02.03	The Bidder shall furnish the quality procedures to be adopted for assuring quality from the receipt of material at site, during storage, erection, pre-commissioning to tests on completion and commissioning of the complete system/equipment.		
1.03.00	For details of specific tests required on individual equipment refer to respective section of this specification. All Statutory testing / clearance is in Bidder's scope including payment of all fees, etc. as required		

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	2X660 MW ENNORE SEZ COMPRESSED AIR SYSTEM MASTER DRAWING LIST WITH SCHEDULE OF SUBMISSION		SPECIFICATION NO. PE-TS-412-555-A001	
			VOLUME : II B	
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			REV 00	DATE: 15.12.2016

ANNEXURE-VIII

MASTER DRAWING LIST WITH SCHEDULE OF SUBMISSION

MDL FOR CAS PACKAGE FOR PROJECT TITLE

PROJECT	SURATGARH STPS	PACKAGE-COMPRESSED AIR SYSTEM	NOA DATE	"G" NAME OF BOI	"H" SCHEDULED SUBMISSION (NO. OF WEEKS FROM LOA DATE/SCH PO DATE)(*)	"I" SCH_SUB_DATE (DD-MON-YYYY)	"J" SCH_APPL_DATE (DD-MON-YYYY)
"A" S NO	"B" VENDOR_DRG_NO.	"D" DRAWING TITLE	"E" PURPOSE				
1	PE-V0-412-555-A001	QUALITY PLAN OF AIR COMPRESSOR FOR COMPRESSED AIR SYSTEM	A-CUST	CAS	8		
2	PE-V0-412-555-A002	QUALITY PLAN OF AIR DRYING PLANT FOR COMPRESSED AIR SYSTEM	A-CUST	CAS	8		
3	PE-V0-412-555-A003	QUALITY PLAN OF AIR RECEIVER FOR COMPRESSED AIR SYSTEM	A-CUST	CAS	8		
4	PE-V0-412-555-A004	QUALITY PLAN OF MOTOR FOR COMPRESSED AIR SYSTEM	A-CUST	CAS	8		
5	PE-V0-412-555-A005	TDS OF INSTRUMENT AIR & SERVICE AIR COMPRESSORS	A-CUST	CAS	8		
6	PE-V0-412-555-A006	TDS OF AIR DRYING PLANT FOR COMPRESSED AIR SYSTEM	A-CUST	CAS	8		
7	PE-V0-412-555-A007	TDS & CHARACTERISTIC CURVES OF MOTOR FOR COMPRESSED AIR SYSTEM	A-CUST	CAS	12		
8	PE-V0-412-555-A008	TDS & GA OF VALVES FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	12		
9	PE-V0-412-555-A009	TDS OF PIPES & FITTINGS FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	10		
10	PE-V0-412-555-A010	TDS OF INSTRUMENTS FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	12		
11	PE-V0-412-555-A011	GA DRAWING OF INSTRUMENT & SERVICE AIR COMPRESSOR	I-CUST	CAS	12		
12	PE-V0-412-555-A012	GA DRAWING OF AIR DRYER FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	8		
13	PE-V0-412-555-A013	GA DRAWING OF MOTOR FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	12		
14	PE-V0-412-555-A014	GA DRAWING OF AIR RECEIVER FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	8		
15	PE-V0-412-555-A015	COMPRESSOR HOUSE LAYOUT	A-CUST	CAS	14		
16	PE-V0-412-555-A016	P & I DIAGRAM OF AIR COMPRESSOR FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	10		
17	PE-V0-412-555-A017	P&I DIAGRAM OF AIR DRYER FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	8		
18	PE-V0-412-555-A018	P&I DIAGRAM OF COMPRESSED AIR SYSTEM WITHIN COMPRESSOR HOUSE	A-CUST	CAS	8		
19	PE-V0-412-555-A019	OPERATION & CONTROL PHILOSOPHY OF COMPRESSED AIR SYSTEM	A-CUST	CAS	12		

PROJECT	SURATGARH STPS	PACKAGE-COMPRESSED AIR SYSTEM	NOA DATE			
20	PE-V0-412-555-A020	ELECTRICAL & INTERNAL WIRING DIAGRAM FOR COMPRESSOR PANEL FOR COMPRESSED AIR SYSTEM.	I-CUST	CAS	8	
21	PE-V0-412-555-A021	ELECTRICAL FEEDER LIST FOR COMPRESSED AIR SYSTEM	I-G-P	CAS	12	
22	PE-V0-412-555-A022	CONTROL CABLE SCHEDULE FOR COMPRESSED AIR SYSTEM	I-G-P	CAS	16	
23	PE-V0-412-555-A023	PG TEST PROCEDURE FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	24	
24	PE-V0-412-555-A024	O&M MANUAL-COMP AIR SYSTEM	I-CUST	CAS	26	
25	PE-V0-412-555-A025	QUALITY PLAN OF INSTRUMENTS FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	10	
26	PE-V0-412-555-A026	QUALITY PLAN OF PLC FOR COMPRESSED AIR SYSTEM	A-CUST	CAS	16	
27	PE-V0-412-555-A027	QUALITY PLAN OF BROUGHT OUT ITEMS (BOI) FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	14	
28	PE-V0-412-555-A028	TDS OF COMMON SEQUENTIAL PANEL FOR COMPRESSED AIR SYSTEM	I-CUST	CAS	16	
29	PE-V0-412-555-A029	SUB-VENDOR LIST WITH INSPECTION CATEGORISATION PLAN FOR COMPRESSED AIR SYSTEM	A-CUST	CAS	4	
30	PE-V0-412-555-A029	SEA WORTHY PACKING OF EQUIPMENTS FOR COMPRESSED AIR SYSTEM	I-G-P	CAS	20	
31	PE-V0-412-555-A030	Data sheet Control Cable & screened control cables	I-G-P	CAS	16	
32	PE-V0-412-555-A031	QAP for Control Cable & screened control cables	I-G-P	CAS	16	
33	PE-V0-412-555-I001	TDS OF PLC FOR COMPRESSED AIR SYSTEM	A-CUST	CAS	16	
34	PE-V0-412-555-I002	TDS OF UPS FOR COMPRESSED AIR SYSTEM	A-CUST	CAS	16	
35	PE-V0-412-555-I003	I/O LIST OF PLC FOR COMPRESSED AIR SYSTEM	A-CUST	CAS	16	



**2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM
FORMAT FOR OPERATION AND
MAINTENANCE MANUAL**

SPECIFICATION NO. PE-TS-412-555-A001

VOLUME : II B

SECTION : E / ANNEXURE-IX

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DATE: 15.12.2016

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ANNEXURE-IX

**FORMAT FOR OPERATION AND MAINTENANCE
MANUAL**

Format for Operation & Maintenance Manual

Project name :

Project number :

Package Name :

PO reference :

Document number :

Revision number :

Sl.no. & Sections	Description	Tick (√)if included in Manual			Remarks
		Yes	No	Not Applicable	
1.	Cover page				
1.1	Project Name				
1.2	Customer/consultant Name				
1.3	Name of Package				
1.4	Supplier details with phone, FAX ,email address , Emergency Contact number				
1.5	Name and sign of prepared by , checked by & approved by				
1.6	Revision history with approval Details				
2.0	Index				
2.1	showing the sections & related page nos All the pages should be numbered section wise				
3.0	Description of Plant/System				
3.1	Description /write up of operating principle of system equipment/ associated sub-systems & accessories/controls system , operating conditions, performance parameters under normal , start up and special cases				
3.2	Equipment list and basic parameter with Tag numbers				
3.3	Data sheets approved by Customer/for information and catalogues provided by original manufacturer				
3.4	Associated other packages and Interface /terminal points				
3.5	P&ID & Process Diagrams				
3.6	GA Layout drawings, As-built drawings , Actual photograph of items/system (Drawings of A2 & bigger sizes are to be attached in the last)				
3.7	Single line/wiring diagrams				
3.8	Control philosophy /control write-ups				

4.0	Commissioning Activities (if not covered in separate document i.e. erection manual, commissioning manual)				
4.1	Pre-Commissioning Checks				
4.2	handling of items at site				
4.3	Storage at site				
4.4	Unpacking & Installation procedure				
5.0	Operation Guidelines for plant personal/user/operator				
5.1	Interlock & Protection logic along with the limiting values of protection settings for the equipment along with brief philosophy behind the logic, drawings etc. to be provided.				
5.2	Start up, normal operation and shut down procedure for equipments along with the associated systems in step by step mode. Valve sequence chart, step list, interlocks etc. with Equipment isolating procedures to be mentioned.				
5.3	Do's & Don't of the equipments.				
5.4	Safety precautions to be taken during normal operation. Safety symbols, Emergency instructions on total power failure condition/lubrication failure/any other condition				
5.5	Parameters to be monitored with normal values and limiting values				
5.6	Trouble shooting with causes and remedial measures				
5.7	Routine operational checks, recommended logs & records				
5.8	Changeover schedule if more than one auxiliary for the same purpose is given				
5.9	Painting requirement and schedule				
5.10	Inspection, repair , Testing and calibration procedures				
6.0	Maintenance guidelines for plant personal				
6.1	List of Special Tools and Tackles required for Overhaul/Trouble shooting including special testing equipment required for calibration etc.				
6.2	Stepwise dismantling and re-assembly procedure clearly specifying the tools to be used, checks to be made, records to be maintained, clearances etc. to be mentioned. Tolerances for fitment of various components to be given.				

6.3	Preventive Maintenance & Overhauling schedules linked with running hours/calendar period along with checks to be given				
6.4	Long term maintenance schedules especially for structural, foundations etc.				
6.5	Consumable list along with the estimated quantity required during commissioning, normal running and during maintenance like Preventive Maintenances and Overhaul. Storage/handling requirement of consumables/self-life.				
6.6	List of lubricants with their Indian equivalent, Lubrication Schedule, Quantity required for each equipment for complete replacement is to be given				
6.7	List of vendors & Sub-vendors with their latest addresses, service centres ,Telephone Nos., Fax Nos., Mobile Nos., e-mail IDs etc.				
6.8	List of mandatory and recommended spare parts list				
6.9	Tentative Lead time required for ordering of spares from the equipment supplier				
6.10	Guarantee and warranty clauses				
7.0	Statutory and other specific requirements considerations.				
8.0	List of reference documents				
9.0	Binding as per requirement				



**2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM
SITE STORAGE AND PRESERVATION**

SPECIFICATION NO. PE-TS-412-555-A001

VOLUME : II B

SECTION : E / ANNEXURE-X

REV 00

DATE: 15.12.2016

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ANNEXURE-X

SITE STORAGE AND PRESERVATION

CONTENT

- 1 SCOPE OF THE DOCUMENT
- 2 PURPOSE OF STORAGE & PRESERVATION
- 3 MEASURES TO BE TAKEN FOR STORAGE AND PRESERVATION
 - a) GENERAL STORAGE REQUIREMENTS
 - b) GENERAL PRESERVATION REQUIREMENTS
 - c) GENERAL INSPECTION REQUIREMENTS
- 4 TYPE OF STORAGE FOR VARIOUS EQUIPMENT
5. CONCLUSION
6. STACKING ARRANGEMENT FOR PLATES AND STRUCTURAL STEEL

1. SCOPE OF THE DOCUMENT

This guideline is prepared in intent to provide proper site storage and preservation of the Mechanical, Electrical and C & I items / equipment supplied under various bought out packages/items. This storage procedure shall be followed at different power plant sites by concerned agency for storage and preservation from the date of equipment received at site until the same are erected and handed over to the customer.

2. PURPOSE OF STORAGE & PRESERVATION

Many of the items may be required to be kept in stores for long period. It shall therefore be essential that proper methods of storage and preservation be applied so that items do not deteriorate, loose some of their properties and become unusable due to atmospheric conditions and biological elements.

3. MEASURES TO BE TAKEN FOR STORAGE, HANDLING & PRESERVATION

a) GENERAL STORAGE REQUIREMENTS

1. To the extent feasible, materials should be stored near the point of erection. The storage areas should have adequate unloading and handling facilities with adequate passage space for movement of material handling equipment such as cranes, fork lift trucks, etc. The storage of materials shall be properly planned to minimise time loss during retrieval of items required for erection.
2. The outdoor storage areas as well as semi-closed stores shall be provided with adequate drainage facilities to prevent water logging. Adequacy of these facilities shall be checked prior to monsoon.
3. The storage sheds shall be built in conformity with fire safety requirements. The stores shall be provided with adequate lights and fire extinguishers. 'No smoking' signs shall be placed at strategic locations. Safety precautions shall be strictly enforced.
4. Adequate lighting facility shall be provided in storage areas and storage sheds and security personnel positioned to ensure enforcement of security measures to prevent theft and loss of materials.
5. Adequate number of competent stores personnel and security staff shall be deployed to efficiently store and maintain the equipment / material.
7. The equipment shall be stored in an orderly manner, preserving their identification slips, tags and instruction booklets, etc., required during erection. The storage of materials shall be equipment-wise. Loose parts shall be stored in sheds on racks,

preserving the identification marks and tags in good condition. The group codes shall be displayed on the racks

6. At no time shall any materials be stored directly on ground. All materials shall be stored minimum 200 mm above the ground preferably on wooden sleepers

b) GENERAL PRESERVATION REQUIREMENTS

1. All special measures to prevent corrosion shall be taken like keeping material in dry condition, avoiding the equipment coming in contact with corrosive fluid like water, acid etc.
2. Materials which carry protective coating shall not be wrapped in paper, cloth, etc., as these are liable to absorb and retain moisture. The material shall be inspected and in case of signs of wear or damages to protective coating, that portion shall be cleaned with approved solution and coated with an approved protective paint. Complete record of all such observations and protective measures taken shall be maintained.
3. Generally equipment supplied at site are properly greased or rust protective oil is applied on machined/ fabricated components. However periodic inspection shall be carried out to ensure that protection offered is intact.
4. While handling the equipment, no dragging on the ground is permitted. Avoid using wire rope for lifting coated components. Use polyester slings (if possible) otherwise protective material (e.g. clothes, wood block etc.) should be used while handling the components with rope / slings
5. For Equipment supplied with finished paint, touch paint shall be done in case any surface paint gets peeled off during handling. Otherwise such surfaces shall necessarily be wrapped with polythene to avoid any corrosion. Further for equipment wherein finish coat is to be applied at site, site to ensure that equipment is received with primer coat applied.
6. It shall be ensured by periodic inspection that plastic inserts are intact in tapped holes, wherever applicable.
7. Pipes shall be blown with air periodically and it shall be ensured that there is no obstruction.
8. Silica gel or approved equivalent moisture absorbing material in small cotton bags shall be placed and tied at various points on the equipment, wherever necessary.
9. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion/jamming due to prolonged storage.

10. All the electrical equipment such as motors, generators, etc. shall be tested for insulation resistance at least once in three months and a record of such measured insulation values shall be maintained.
11. Following preservatives/preservation methods can be used depending upon type of equipment
 - a. Rust preventive fluid (RPF)
 - b. Rust protective paints
 - c. Tarpaulin covers, in case of outdoor storage
 - d. De-oxy aluminate for weld-ments

c) GENERAL INSPECTION REQUIREMENTS

1. Period inspection of materials with specific reference to –
 - Ingress of moisture and corrosion damages.
 - Damage to protective coating.
 - Open ends in pipes, vessels and equipment -
 - In case any open ends are noticed, same shall be capped.
2. Any damages to equipment / materials.
 - In case of any damages, these shall be promptly notified and in all cases, the repairs / rectification shall be carried out.
 - Any items found damaged or not suitable as per project requirements shall be removed from site. If required to store temporarily, they shall be clearly marked and stored separately to prevent any inadvertent use.

4. TYPE OF STORAGE FOR VARIOUS EQUIPMENT

The types of storage are broadly classified under the following heads:

i **Closed storage with dry and dust free atmosphere. (C)**

The closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated asbestos sheets / galvanised iron sheets for roofing. Brick walls / asbestos sheets can be used to cover all the sides. The floor of the shed can be finished with plain cement concrete suitably glazed. The shed shall be provided with proper ventilation and illumination.



ii **Semi-closed storage. (S)**

The semi closed shed can be constructed by using cold-rolled / tubular components for structure and corrugated / asbestos sheets for roofing. The floor shall be brick paved. If required a small portion of sides can be covered to protect components from rainwater splashing onto the components.





iii Open storage (O)

The open yard shall be levelled, well consolidated to achieve raised ground with the provision of feeder roads for crane approach along with access roads running all sides. One part of the open yard shall be stone pitched, levelled and consolidated with raised ground suitable for storing / stacking heavier and critical components with due space to handle them by cranes etc . Adequate number of sleepers, concrete block etc. to be provided to make raised platforms to stack critical materials.

A separate yard to be identified as “scrap yard” slightly away from main open yard to store wooden/steel scraps, which are to be disposed off. This is required to avoid mix up with regular components as well as to avoid fire hazard.

Some of the components, which are having both machined & un-machined surfaces and are bulky, shall be stored in open storage area on a raised ground and suitably covered with water proof / fire retardant tarpaulin.



The equipment listed below shall be stored and inspected as per requirement mentioned in the table below.

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
Raw material /mechanical items like pipes, plates, structure sections etc.)				
1.	Steel pipes (lined/unlined)	S	Damage , paint, corrosion, rubber lining peeling	Provide end cap
2.	MS Plates	S	Damage, paint, corrosion	
3.	SS Plates	S	Damage	
4.	Non-metallic pipes	S	Damage, cracks	Provide end cap
5.	Stainless steel pipes	S	Damage ,	Provide end cap
6.	MS sections, beams	S	Damage, paint, corrosion	
7.	Cable trays	S	Damage, condition of preservations	
8.	Insulation sheets	S	Damage	
9.	Insulation	C	Damage, packing	
10.	Hangers Rods	S	Damage, paint, packing	
11.	Tubes	S	Damage, paint , packing	Provide end cap
12.	Hume pipes	O	Damage	
13.	Castings	O	Damage, paint, corrosion	
Fabricated mechanical items (pressure vessels, tanks etc.)				
14.	Pressure vessels (unlined)	O	Damage, paint, corrosion,	Covered nozzles
15.	Atmospheric storage tanks (unlined)	O	Damage, paint, corrosion	Covered nozzles

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
16.	Pressure vessels (lined)	S	Damage, paint, corrosion, rubber lining	
17.	Atmospheric storage tanks(lined)	S	Damage, paint, corrosion, rubber lining	
18.	Support structures	O	Damage , paint, corrosion	
19.	Flanges	C	Damage , paint, corrosion	
20.	Fabricated pipes	S	Damage , paint, corrosion	Provide end cap
21.	Vessels internals	C	Damage , paint, corrosion ,packing	
22.	Grills	S	Damage , paint, corrosion	
23.	Angles	S	Damage , paint, corrosion	
24.	Bridge mechanism/clarifier mechanism	O	Damage , paint, corrosion	
25.	Cranes, rails	S	Damage , paint, corrosion	
26.	Stair cases	O	Damage , paint, corrosion	
27.	Ladders/handrails	O	Damage , paint, corrosion	
28.	Fabricated ducts	S	Damage , paint, corrosion	
29.	Isolation Gates	O	Damage , paint, corrosion	
30.	Fabricated boxes/panels	S	Damage , paint, corrosion	
Mechanical components like valves, fittings, cables glands, spares etc.)				
31.	Valves	S	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
32.	Fittings	S	Damage , packing	Provide end cap
33.	Cable glands	C	Damage , packing	
34.	Tools & tackles	C	Damage , packing	
35.	Nut , bolts, washers,	C	Damage , packing	
36.	Gasket & Packings	C	Damage , packing	
37.	Copper tubes	C	Damage , packing, corrosion	Provide end cap
38.	SS tubing	C	Damage , packing	Provide end cap
Rotating assemblies (pumps, blowers, stirrers, fans, compressors etc.)				
39.	Pumps	S	Damage , packing, corrosion	Shaft rotation
40.	Blowers/Compressors	S	Damage , packing, corrosion	Shaft rotation
41.	Agitators/stirrers/radial launders	C	Damage , packing, corrosion	Shaft rotation
42.	Rollers for chlorine tonner mounting	C	Damage , packing, corrosion	
43.	Centrifuge	S	Damage , packing,	
44.	Gear box	C	Damage , packing, corrosion	
45.	Bearings	C	Damage , packing, corrosion	
46.	Fans	S	Damage , packing, corrosion	
47.	Dosing skids	S	Damage , packing, corrosion	
48.	Pump assemblies	S	Damage , packing, corrosion	
49.	Air washers(INTERNALS)	S	Damage , packing	
50.	Air conditioners (split)	C	Damage , packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
51.	Elevators(CONTAINERIZED)	O	Damage , packing, corrosion	
52.	Chillers/VA machines	S	Damage , packing	
53.	Air handling Unit/Package unit	S	Damage , packing	
54.	Chlorinators & Evaporators	C	Damage , packing	
55.	Ejectors	C	Damage , packing	
56.	Electrolyser	C	Damage , packing	
Miscellaneous items like chain pulley blocks, hoists etc.				
57.	Chain pulley blocks	S	Damage, Packing	
58.	Electric hoists	S	Damage, Packing	
59.	Fire extinguishers	C	Damage, expiry date	
60.	Fork Lift Truck	S	Damage, Packing	
61.	Hydraulic Mobile Crane	O	Damage, Packing	
62.	Mobile Pick Up & Carry Crane	O	Damage, Packing	
63.	Motor boats	O	Damage, Packing	
64.	Safety showers	S	Damage, Packing	
65.	Diffusers/dampers	S	Damage, Packing	
Chemicals and consumables (acid, alkali, paints, oils, reagents and special chemicals)				
66.	Hydro Chloric Acid (HCl)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical
67.	Sulphuric acid (H ₂ SO ₄)	Store in canes/ storage tank in dyke area	Date of production/ leakage/fumes	hazardous chemical

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
68.	Sodium hydroxide (NaOH)	Store in canes/ storage tank in dyke area	Date of production/ leakage/ fumes/ breather	hazardous chemical ,breather to be checked for air ingress
69.	Sodium hypo chlorite	To be stored under shed	Date of production/ leakage/ fumes	hazardous chemical ,self-life normally 15-30 days after which strength of chemical decays
70.	Ammonia	S	Date of production/ leakage/ fumes	Store in closed storage tanks, hazardous chemical
71.	CW treatment chemicals	S	Date of production , Self-life	Store in closed canes
72.	RO/UF cleaning chemicals	S	Date of production , Self-life	Store in closed canes
73.	Lime	C	Damage to packing , seepage	Prevent moisture, rain
74.	Alum bricks	C	Damage to packing	Prevent moisture, rain
75.	Poly electrolyte	S		Store in closed storage tanks
76.	Laboratory chemicals(powder)	C	Damage, Packing self- life	
77.	Laboratory chemicals(liquid)	C	Damage, Packing self- life	
78.	Lubrication oils	C	Leakage	
79.	Paints	S	Leakage ,air tightness	
80.	Sand	O	Damage of packing	No hooks
81.	Salt (NaCl)	C	Damage of packing, water ingress	Prevent moisture, rain
82.	Anthracite	S	Damage of packing	
83.	Activated carbon	S	Damage of packing	

Sl. No.	Description of the equipment	Type of Storage	Check for	Remarks
84.	Thermal insulation	S	Damage of packing	
85.	Cement	C	Damage of packing	Prevent moisture, rain
86.	Gravels	O	Damage of packing	
87.	ION exchange resins	C	Damage , packing	Refer manufacturer guidelines
88.	RO membranes	C	Damage , packing	Refer manufacturer guidelines
89.	UF membranes	C	Damage , packing	Refer manufacturer guidelines
90.	Cleaning chemicals	C	Damage , packing	Refer manufacturer guidelines
91.	Chemicals for analysers/calibration	C	Damage , packing	Refer manufacturer guidelines
Electrical and C & I items (motors, cables etc.)				
92.	Motors	C	Damage , packing	
93.	Cable drums	O	Damage	
94.	Control Panel /control desk, UPS ,JB	S	Damage, Packing	
95.	Instruments(gauges/analysers)	C	Damage	
Special items		As per Manufacturer's item, like Hydrogen cylinders, Ozonator, Analyser, Chlorine dioxide generators etc.		

5. CONCLUSION

Concerned storage agency at site should make sure that loss in equipment performance and wear & tear are minimised through proper storage and preservation. The above are broad guidelines and cover major equipment / materials. However specific storage practices shall be followed as per manufacturer recommendation. All the necessary measures even in addition to the ones mentioned above, if found necessary, should be taken to achieve the objective.

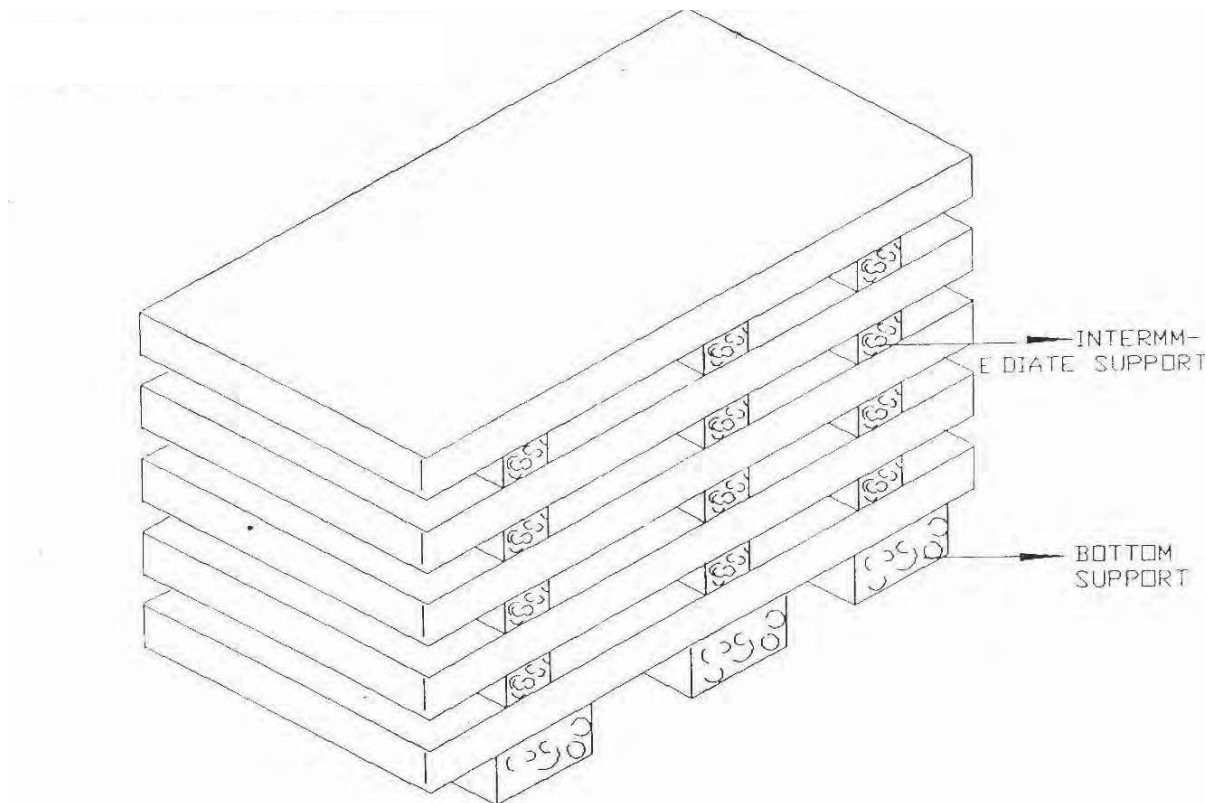


Figure – 1 – PLATE STACKING ARRANGEMENT

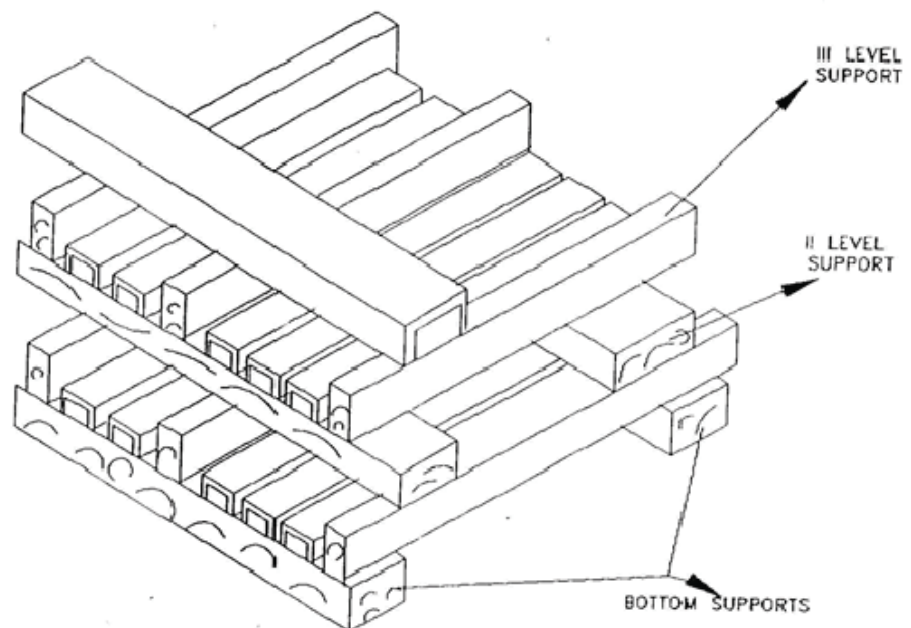


Figure – 2 – STRUCTURAL STEEL STACKING ARRANGEMENT



**2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM
PACKING PROCEDURE**

SPECIFICATION No: PE-TS-412-555-A001

VOLUME : II B

SECTION : E / ANNEXURE-XI

REV 00

DATE: 15.12.2016

SHEET: 1 OF 1

**ANNEXURE-XI
PACKING PROCEDURE**

14.00.00 NOISE LEVEL

The equivalent 'A' weighted sound pressure level measured at a height of 1.0 m above floor level in elevation and at a distance of one (1) meter horizontally from the nearest surface of any equipment / machine, furnished and installed under these specifications, expressed in decibels to a reference of 0.0002 microbar, shall not exceed 85 dBA except for

- (a.) Safety valves and associated vent pipes for which it shall not exceed 105 dBA.
- (b.) Regulating drain valves in which case it shall be limited to 90 dBA.
- (c.) TG unit in which case it shall not exceed 90 dBA.
- (d.) For HP-LP bypass valves and other intermittently operating control valves, the noise level shall be within the limit of 85 dBA.

15.00.00 PACKAGING AND TRANSPORTATION

All the equipment & spares shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. Each spare shall be clearly marked or labeled on the outside of the packing with its description. When more than one spare part is packaged in a single case, a general description of the contents shall be shown on the outside of such a case and other packages must be suitably marked and numbered for the purpose of identification. All cases, containers or packages, are liable to be opened for such examination as may be considered reasonable by the Engineer. In case of equipment supplied with grease/lubricants from imported origin, the supplied shall clearly indicate the indigenous equivalent of the grease/lubricant and source of supply so as to enable the Owner to procure these items from indigenous sources. While packing all the materials, the limitation from the point of view of the sizes of railway wagons available in India should be taken account of. The Bidder shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. The Bidder shall ascertain the availability of Railway wagon sizes from the Indian Railways or any other agency concerned in India well before effecting dispatch of equipment. Before dispatch it shall be ensured that complete processing and manufacturing of the components is carried out at shop, only restricted by transport limitation, in order to ensure that site works like grinding, welding, cutting & pre-assembly to bare minimum. The Owner's Inspector shall have right to insist for completion of works in shops before dispatch of materials for transportation.

16.00.00 ELECTRICAL ENCLOSURE

All electrical equipment and devices, including insulation, heating and ventilation devices shall be designed for ambient temperature and a maximum relative humidity as specified elsewhere in the specification.

	2X660 MW ENNORE SEZ COMPRESSED AIR SYSTEM COMMISSIONING SPARES	SPECIFICATION No: PE-TS-412-555-A001	
		VOLUME : II B	
		SECTION : E / ANNEXURE-XII	
		REV 00	DATE: 15.12.2016
		SHEET: 1 OF 1	

ANNEXURE-XII

LIST OF COMMISSIONING SPARES

ANNEXURE- XII

LIST OF COMMISSIONING SPARES (Required for Commissioning of Compressed Air System)
Break up price for COMMISSIONING SPARES

Sl. no	Description	Qty.	Unit	Unit price	Total Ex-Works Prices duly packed	ED	CST	FREIGHT Inclusive Service Tax	Total price FOR SITE
	TC (K type)	2 Nos							
	RTD (Pt 100)	2 Nos							
	Pressure Transmitters	3 Nos							
	Diff Pressure Transmitters	3 Nos							
	DIN type Temp transmitters	4 Nos							
	Control Valve								
	a. One pair of gaskets for each valve								
	a. One set of packing for each valve								
	Oil (To be supplied for all 6 compressor)	1 Lot							
	Lube Oil Filter (1 set for each compressors)	5 Sets							
	Air Filters (1 set for each compressors)	5 Sets							
	Total (Rs)								

NOTE -

1. The items indicated in the above list are minimum. Any other spares if required shall be included by bidder in the above list.
2. Bidder shall furnish unit price of commissioning spares in above format alongwith the Bid. Any part even though not mentioned in list furnished but required at later date shall be supplied free of cost.
3. Bidder to note that the items indicated in the above list shall be provided prior to commissioning of the Compressed air System. Further, items indicated in the list shall be supplied over and above the consummables that is supplied along with the compressors/compressed air system prior to start up.

2X660 MW ENNORE SEZ

TECHNICAL SPECIFICATION

FOR

COMPRESSED AIR SYSTEM

PE-TS-412-555-A001

VOLUME-III

(TECHNICAL SCHEDULES)



**BHARAT HEAVY ELECTRICALS LTD
POWER SECTOR PROJECT ENGINEERING MANAGEMENT
PPEI, NOIDA-INDIA**

	2X660 MW ENNORE SEZ COMPRESSED AIR SYSTEM		SPECIFICATION NO. PE-TS-412-555-A001	
			VOLUME : III	
			SECTION : 1	
	LIST OF DOCUMENTS TO BE SUBMITTED WITH BID		REV: 00	DATE: 15.16.2016
			SHEET 1 OF 1	

**VOLUME: III
SECTION: 1**

**LIST OF DOCUMENTS TO BE SUBMITTED
WITH BID**



TITLE:

**TECHNICAL SPECIFICATION
2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM**

SPEC. NO.: PE-TS-412-555-A001

VOLUME: III

SECTION: 1

REV. NO. 0 DATE: 15.12.2016

SHEET 1 OF 1

CHECK LIST TO BE SUBMITTED BY BIDDER ALONG WITH THE BID

Sl No.	Item Description	Yes/No
1	Schedules to be submitted dully filled up with bidder's signature and stamp. 1) Technical Deviation Schedule (Volume III-Section-4) 2) List of Mandatory Spares 3) List of Maintenance Tool & Tackles (Volume II-Annexure-IV) 4) List of commissioning spares (Volume II-Annexure- XII) 5) Guaranteed Power Consumption For Air Compressor System ((Price schedule)) 6) Compliance and Confirmation certificate (Volume III-Section-2) 7) List of recommended spares (Volume III-Section-9)	
2	Resolution to pre-bid clarifications, if any, duly stamped and signed by the bidder enclosed with the bid	
3	Un-priced bid- clearly indicating 'QUOTED' and 'NOT-QUOTED' against each item.	
4	'Compressor House Layout - (Volume III-Section- 6 of technical specification' duly stamped and signed by bidder to be enclosed with the bid.	
5	Electrical load List (Volume III-section-5) of technical specification duly filled, stamped and signed by bidder to be enclosed with the bid.	
6	Supporting Documents meeting PQR requirements (if Applicable)	
7	Offered model of compressor matching FAD calculation along with the catalogue of the offered model to justify selection.	

Please note that all the schedules shall be submitted even though they may not be applicable. Under such circumstances it shall be clearly mentioned across such schedules that these are not applicable.(e.g. in case of there are no technical deviation, it shall be mentioned in the deviation schedule that ' THERE ARE NO DEVIATIONES TO THE TECHNICAL SPECIFICATION').

Name: _____

Signature: _____

Designation: _____

Company: _____

Date: _____

Bidder Stamp

	2X660 MW ENNORE SEZ COMPRESSED AIR SYSTEM		SPECIFICATION NO. PE-TS-412-555-A001	
			VOLUME : III	
			SECTION : 2	
			REV: 00	DATE: 15.12.2016
			SHEET 1 OF 1	

VOLUME-III
SECTION 2
COMPLIANCE CUM CONFIRMATION CERTIFICATE

	TITLE: TECHNICAL SPECIFICATION 2X660 MW ENNORE SEZ COMPLIANCE CUM CONFIRMATION CERTIFICATE	SPEC. NO.: PE-TS-412-555-A001
		VOLUME: III
		SECTION:
		REV. NO. 0 DATE: 15.12.2016
		SHEET 1 OF 2

COMPLIANCE CUM CONFIRMATION CERTIFICATE

The bidder shall confirm compliance with following by signing/ stamping this compliance certificate (every sheet) and furnish same with the offer.

- a) The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusions other than those mentioned under "exclusion" and those resolved as per 'Schedule of Deviations', if applicable, with regard to same.
- b) There are no other deviations w.r.t. specifications other than those furnished in the 'Schedule of Deviations'. Any other deviation, stated or implied, taken elsewhere in the offer stands withdrawn unless specifically brought out in the 'Schedule of Deviations'.
- c) Bidder shall submit QP in the event of order based on the guidelines given in the specification & QP enclosed therein. QP will be subject to BHEL/ CUSTOMER approval & customer hold points for inspection/ testing shall be marked in the QP at the contract stage. Inspection/ testing shall be witnessed as per same apart from review of various test certificates/ Inspection records etc. This shall be within the contracted price with no extra implications to BHEL after award of the contract.
- d) All drawings/ data-sheets/ calculations etc. submitted along with the offer shall be considered for reference only, same shall be subject to BHEL/ CUSTOMER approval in the event of order.

- e) The offered materials shall be either equivalent or superior to those specified in the specification & shall meet the specified/ intended duty requirements. In case the material specified in the specifications is not compatible for intended duty requirements then same shall be resolved by the bidder with BHEL during the pre - bid discussions, otherwise BHEL/ Customer's decision shall be binding on the bidder whenever the deficiency is pointed out.

For components where materials are not specified, same shall be suitable for intended duty, all materials shall be subject to approval in the event of order.

- f) The commissioning spares shall be supplied on 'As Required Basis' & prices for same included in the base price itself.
- g) All sub vendors shall be subject to BHEL/ CUSTOMER approval in the event of order.
- h) Guarantee for plant/equipment as applicable, shall be as per relevant clause of GCC /SCC /Other Commercial Terms & Conditions.
- i) In the event of order, all the material required for completing the job at site shall be supplied by the bidder within the ordered price even if the same are additional to approved billing break up, approved drawing or approved Bill of quantities. This clause will apply in case during site commissioning additional requirements emerges due to customer and/ or consultant's comments. No extra claims shall be put on this account.
- j) Schedule of drawings submissions, comment incorporations & approval shall be as stipulated in the specifications. The successful bidder shall depute his design personnel to BHEL's/ Customer's/ Consultant's office for across the table resolution of issues and to get documents approved in the stipulated time.



TITLE:

TECHNICAL SPECIFICATION

2X660 MW ENNORE SEZ

**COMPLIANCE CUM CONFIRMATION
CERTIFICATE**

SPEC. NO.: PE-TS-412-555-A001

VOLUME: **III**

SECTION:

REV. NO. **0** DATE: 15.12.2016

SHEET **2** OF **2**

k) As built drawings shall be submitted as and when required during the project execution.

l) The bidder has not tempered with this compliance cum confirmation certificate and if at any stage any tempering in the signed copy of this document is noticed then same shall be treated as breach of contract and suitable actions shall be taken against the bidder.

SIGNATURE: _____

NAME : _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

COMPANY SEAL

	2X660 MW ENNORE SEZ COMPRESSED AIR SYSTEM	SPECIFICATION No: PE-TS-412-555-A001	
		VOLUME: III	
		SECTION : 3	
		REV. 00	DATE: 15.12.2016

VOLUME: III
SECTION: 3
PRE-BID CLARIFICATION FORMAT



TITLE

**2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM**

SPECIFICATION NO. PE-TS-412-555-A001

VOLUME: III

SECTION: 3

REV 00

DATE: 15.12.2016

SHEET: 1 OF 1

PRE-BID CLARIFICATION FORMAT

S.No.	Section/Clause/ Page No.	Statement of the referred clause	Clarification required

The bidder hereby certifies that above mentioned are the only clarifications required on the technical specification for the subject package.

SIGNATURE: _____

NAME : _____

DESIGNATION: _____

COMPANY: _____

DATE: _____

COMPANY SEAL

VOLUME-III
SECTION 4
SCHEDULE OF TECHNICAL DEVIATION

DEVIATION SHEET (COST OF WITHDRAWAL)									
 PROJECT:- 2X660 MW ENnore SEZ									
PACKAGE:- COMPRESSED AIR SYSTEM									
TENDER ENQUIRY REFERENCE:-									
NAME OF VENDOR:-									
SL NO	VOULME/ SECTION	PAGE NO.	CLAUSE NO.	TECHNICAL SPECIFICATION/ TENDER DOCUMENT	COMPLETE DESCRIPTION OF DEVIATION	COST OF WITHDRAWAL OF DEVIATION	REFERENCE OF PRICE SCHEDULE ON WHICH COST OF WITHDRAWAL OF DEVIATION IS APPLICABLE	NATURE OF COST OF WITHDRAWAL OF DEVIATION (POSITIVE/ NEGATIVE)	REASON FOR QUOTING DEVIATION
TECHNICAL DEVIATIONS									
COMMERCIAL DEVIATIONS									
PARTICULARS OF BIDDERS/ AUTHORISED REPRESENTATIVE									
NAME				DESIGNATIONS			SIGN & DATE		
NOTES:									
1. For self manufactured items of bidder, cost of withdrawal of deviation will be applicable on the basic price (i.e. excluding taxes, duties & freight) only.									
2. For directly dispatchable items, cost of withdrawal of deviation will be applicable on the basic price including taxes, duties & freight.									
3. All the bidders have to list out all their Technical & Commercial Deviations (if any) in detail in the above format.									
4. Any deviation not mentioned above and shown separately or found hidden in offer, will not be taken cognizance of.									
5. Bidder shall submit duly filled unpriced copy of above format indicating "quoted" in "cost of withdrawal of deviation" column of the schedule above along with their Techno-commercial offer, wherever applicable.									
6. Bidder shall furnish price copy of above format along with price bid.									
7. The final decision of acceptance/ rejection of the deviations quoted by the bidder shall be at discretion of the Purchaser.									
8. Bidders to note that any deviation (technical/commercial) not listed in above and asked after Part-I opening shall not be considered.									
9. For deviations w.r.t. Payment terms, Liquidated damages, Firm prices and submission of E1/ E2 forms before claiming 10% payment, if a bidder chooses not to give any cost of withdrawal of deviation loading as per Annexure-VIII of GCC, Rev-06 will apply. For any other deviation mentioned in un-priced copy of this format submitted with Part-I bid but not mentioned in priced copy of this format submitted with Priced bid, the cost of withdrawal of deviation shall be taken as NIL.									
10. Any deviation mentioned in priced copy of this format, but not mentioned in the un-priced copy, shall not be accepted.									
11. All techno-commercial terms and conditions of NIT shall be deemed to have been accepted by the bidder, other than those listed in unpriced copy of this format.									
12. Cost of withdrawal is to be given seperately for each deviation. In no event bidder should club cost of withdrawal of more than one deviation else cost of withdrawal of such deviations which have been clubbed together shall be considered as NIL.									
13. In case nature of cost of withdrawal (positive/negative) is not specified it shall be assumed as positive.									
14. In case of discrepancy in the nature of impact (positive/ negative), positive will be considered for evaluation and negative for ordering.									



**2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM**

SPECIFICATION NO. PE-TS-412-555-A001

VOLUME : III

SECTION : 1

REV: 00

DATE: 15.12.2016

SHEET 1 OF 1

**VOLUME-III
SECTION 5
ELECTRICAL LOAD DATA**

LOAD TITLE	RATING (KW / A)		UNIT (U)/STN (S)	Nos.		VOLTAGE CODE*	FEEDER CODE**	EMER. LOAD (Y)	CONT.(C)/ INTT.(I)	STARTING TIME >5 SEC (Y)	LOCATION	BOARD NO.	CABLE		BLOCK CABLE DRG. No.	CONTROL CODE	REMARKS	LOAD No.
	NAME PLATE	MAX. CONT. DEMAND (MCR)		RUNNING	STANDBY								SIZE CODE	Nos				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
INSTRUMENT AIR COMPRESSORS	350 KW		S	2	1	C	U	N	C		Compressor House							
SERVICE AIR COMPRESSORS	350 KW		S	2	1	C	U	N	C		Compressor House							
INSTRUMENT AIR COMPRESSOR FAN MOTOR (IF REQUIRED SEPARATE POWER SUPPLY)	2.2 KW		S	2	1	D	U	N	C		Compressor House							
SERVICE AIR COMPRESSOR FAN MOTOR (IF REQUIRED SEPARATE POWER SUPPLY)	2.2 KW		S	2	1	D	U	N	C		Compressor House							
INSTRUMENT AIR COMPRESSOR PANEL	3 KW		S	2	1	E	S	N	C		Compressor House							
SERVICE AIR COMPRESSOR PANEL	3 KW		S	2	1	E	S	N	C		Compressor House							
INSTRUMENT AIR COMPRESSORS MOTOR SPACE HEATER	0.15 KW		S	2	1	E	D	N	I		Compressor House							
INSTRUMENT AIR COMPRESSORS MOTOR SPACE HEATER	0.15 KW		S	2	1	E	D	N	I		Compressor House							
AIR DRYER PLANT PANEL	2 KW		S	2	1	D	S	N	C		Compressor House							
AIR DRYER PLANT MOTOR	10 KW		S	2	1	D	U	N	C		Compressor House							
UPS, PLC & ACCESSORIES	10KVA		S	1	-	E	-	-	C		Compressor House							
NOTES: 1. COLUMN 1 TO 12 & 18 SHALL BE FILLED BY THE REQUISITIONER (ORIGINATING AGENCY); REMAINING COLUMNS ARE TO BE FILLED UP BY PEM (ELECTRICAL)/ CUSTOMER 2. ABBREVIATIONS : * VOLTAGE CODE (7):- (ac) A=11 KV, B=6.6 KV, C=3.3 KV, D=415 V, E=240 V (1 PH), F=110 V (cc): G=220 V, H=110 V, J=48 V, K=+24V, L=24 V **: FEEDER CODE (8):- U=UNIDIRECTIONAL STARTER, B=BI-DIRECTIONAL STARTER, S=SUPPLY FEEDER, D=SUPPLY FEEDER (CONTACTER CONTROLLED)																		
LOAD DATA (ELECTRICAL)	JOB NO.	412		ORIGINATING AGENCY		PEM (ELECTRICAL)												
	PROJECT TITLE	2x660 MW ENNORE SEZ		NAME		DATA FILLED UP ON												
	SYSTEM	COMPRESSED AIR SYSTEM		SIGN.		DATA ENTERED ON												
	DEPTT. / SECTION	MAX		SHEET 1 OF 2		REV. 00		DE'S SIGN. & DATE										

LOAD TITLE	RATING (KW / A)		UNIT (U)/STN (S)	Nos.		VOLTAGE CODE*	FEEDER CODE**	EMER. LOAD (Y)	CONT.(C)/ INTT.(I)	STARTING TIME >5 SEC (Y)	LOCATION	BOARD NO.	CABLE		BLOCK CABLE DRG. No.	CONTROL CODE	REMARKS	LOAD No.
	NAME PLATE	MAX. CONT. DEMAND (MCR)		RUNNING	STANDBY								SIZE CODE	NOS				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
AUTO DRAIN TRAP	0.02 KW		S	6	-	E	S	N	I		6 nos. at Compressor House							
Any other power supply as required by bidder	To be filled by bidder																	
Note: - Bidder to confirm that the system provided by them would be catered by the above loads considered by BHEL. In case there is any variation, the same should be clearly stated in the technical offer. No changes would be admissible during detailed engineering stage. - Bidder to note that for the system being supplied by them, only the above loads will be provided. In case any other load is required the same would be derived / multiplied by bidder on their own from these feeders only. - Any change in the electrical load list shall be entertained only subject to its feasibility, and BHEL reserves the right to debit the vendor cost of any changes necessitated in the switch gear /MCC on account of changed loads.																		
NOTES: - COLUMN 1 TO 12 & 18 SHALL BE FILLED BY THE REQUISITIONER (ORIGINATING AGENCY); REMAINING COLUMNS ARE TO BE FILLED UP BY PEM (ELECTRICAL)/ CUSTOMER - ABBREVIATIONS : * VOLTAGE CODE (7):- (ac) A=11 KV, B=6.6 KV, C=3.3 KV, D=415 V, E=240 V (1 PH), F=110 V (cc): G=220 V, H=110 V, J=48 V, K=+24V, L=-24 V : ** FEEDER CODE (8):- U=UNIDIRECTIONAL STARTER, B=BI-DIRECTIONAL STARTER, S=SUPPLY FEEDER, D=SUPPLY FEEDER (CONTACTOR CONTROLLED)																		
LOAD DATA (ELECTRICAL)			JOB NO.		412		ORIGINATING AGENCY		PEM (ELECTRICAL)									
			PROJECT TITLE		2x660 MW ENNORE SEZ		NAME		DATA FILLED UP ON									
			SYSTEM		COMPRESSED AIR SYSTEM		SIGN.		DATA ENTERED ON									
			DEPTT. / SECTION		MAX		SHEET 2 OF 2		REV. 00		DE'S SIGN. & DATE							



**2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM**

SPECIFICATION NO. PE-TS-412-555-A001

VOLUME : III

SECTION : 6

REV: 00

DATE: 15.12.2016

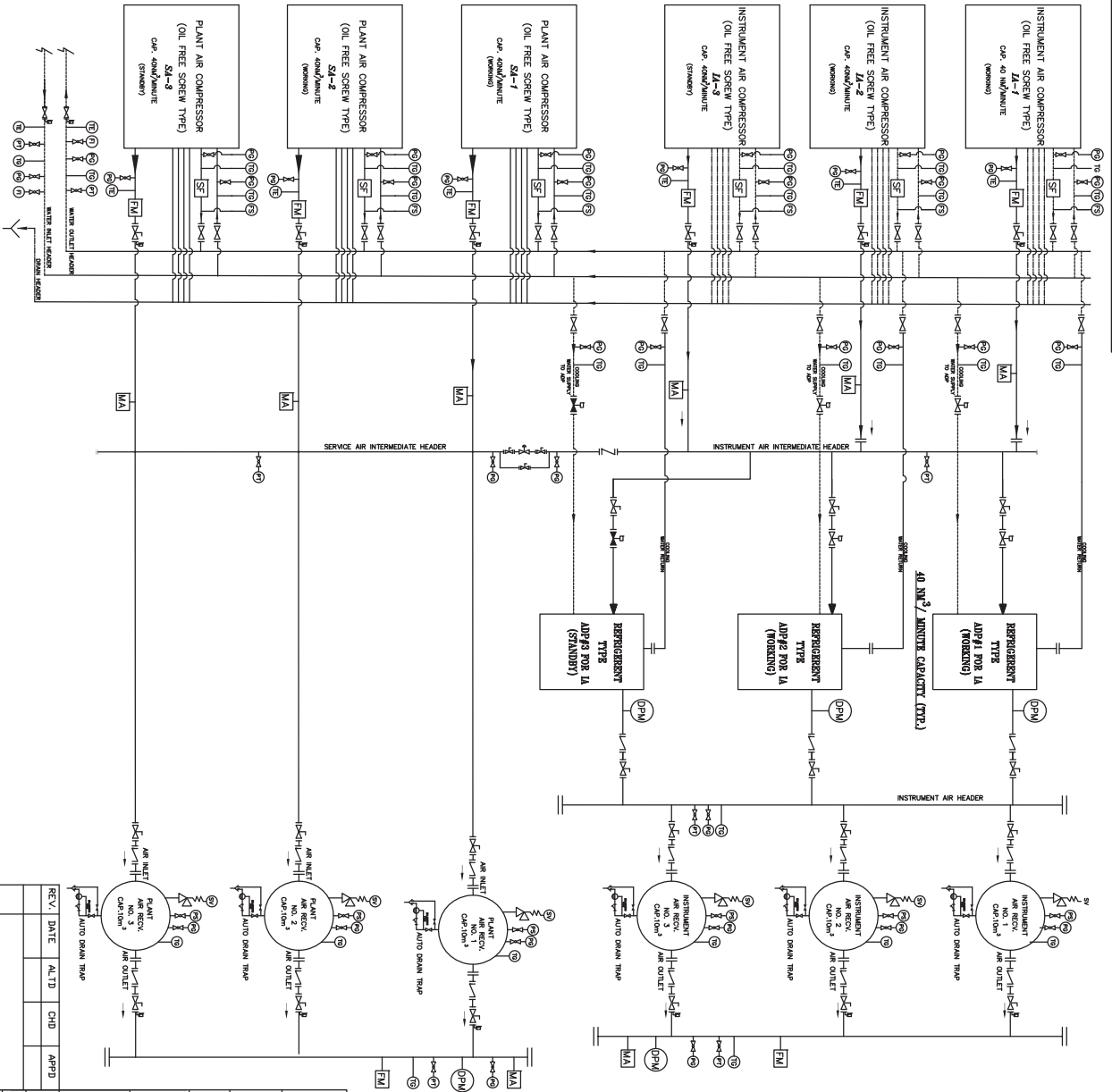
SHEET 1 OF 1

**VOLUME-III
SECTION: 6
DRAWINGS**

100V-555-112-DG-01 PE-DG-412-555-A001

FIRST ANGLE PROJECTION

ALL DIMENSIONS ARE IN MM



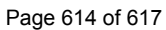
LEGEND

	BALL VALVE (OPEN)		TEMP. GAUGE
	BALL VALVE (CLOSED)		NON RETURN VALVE
	ISOLATION VALVE (COOLING WATER LINE)		WATER
	GLOBE VALVE (OPEN)		AIR
	GLOBE VALVE (CLOSED)		DRAIN
	RELIEF/SAFETY VALVE		Y TYPE FUNNEL
	PRESSURE GAUGE		FLOW SWITCH
	FLOW INDICATOR		PRESSURE TRANSMITTER
	ADT ASSY. / AUTO DRAIN TRAP ASSEMBLY		TWO WAY SOLENOID VALVE
	PNEUMATIC VALVE		SIGHT FLOW INDICATOR
	VALVE WITH LIMIT SWITCH		MOISTURE ANALYSER
	FLOW METER		

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH TECHNICAL SPECIFICATION.
2. DRAINS SHALL BE PROVIDED AT THE LOWEST POINTS.
3. THE PIPE SIZING SHALL BE DONE DURING DETAIL ENGINEERING BASED ON PIPE SIZING CRITERIA.
4. FIRST UNIT TAG NO SHALL HAVE PREFIX 10 AND SECOND UNIT TAG NO SHALL HAVE 20 PREFIX 20 AND COMMON SYSTEM TAG NO SHALL HAVE PREFIX 90. THIS SHALL BE REFLECTED IN VENDOR GENERATED PIDS DURING DETAIL ENGINEERING.

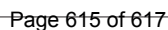
CUSTOMER			
CONSULTANT			
PACKAGE: COMPRESSED AIR SYSTEM		TAMILNADU GENERATION AND DISTRIBUTION CORPORATION (TENGENCO)	
		M/s DESIN PVT LTD.	
		DESEIN HOUSE, GK - II, NEW DELHI	
		2 X 660 MW ENNORE SEZ STPP AT ASH DYKE OF NCPTPS, CHENNAI.	
		BHARAT HEAVY ELECTRICALS LTD, POWER SECTOR PROJECT ENGINEERING MANAGEMENT, NOIDA.	
PROCESS & INSTRUMENTATION DIAGRAM FOR CAS			
TMS		DRAWING No.	
DATE		SHEET 01 OF 01	
SCALE		REV.01	
DESIGN		15.12.2016	
CHECK		15.12.2016	
APPROVE		15.12.2016	



NOTES :-

- 1) ALL DIMENSIONS ARE IN MM.
- 2) TOP OF CRANE GIRDER: 7.6M
- 3) CAPACITY OF EOT CRANE : 8.0T

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT





**TECHNICAL SPECIFICATION
2X660 MW ENNORE SEZ
COMPRESSED AIR SYSTEM**

SPECIFICATION No: PE-TS-412-555-A001

VOLUME: III

SECTION: 7

REV. 00

DATE: 15.12.2016

SHEET 1 OF 1

SECTION: 7

**INDICATIVE BILLING BREAK-UP ALONGWITH PERCENTAGE
BREAKUP**