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SECTION - I

General site conditions

Bangladesh-India Friendship Power Company (Pvt.) Ltd. (BIFPCL) is a 50: 50 Joint Venture Company of Bangladesh Power Development Board, Bangladesh (BPDB) and NTPC Limited, India (NTPC), incorporated under the laws of Bangladesh.

BIFPCL has entrusted BHEL the development of the Coal fired 2x660 MW Maitree Super Thermal Power Project on Turnkey Basis at Rampal, Dist.-Bagerhat, Bangladesh, on the bank of river Possur, Bangladesh, for the purposes of supply and sale of electric power to BPDB. For the purposes of setting up the aforesaid 2x660 MW Coal fired Power project at Rampal,

I.1 Site Conditions

Parameters	Unit	**Value/Comments**
Average Site Reference Conditions (ASC)		
Atmospheric pressure	mbar	1007.6
Ambient air temperature	°C	27.3
Relative humidity	%	87
River water temperature	°C	29.8
Summer Site Reference Conditions (SSC)		
Atmospheric pressure	mbar	1007.9
Ambient air temperature	°C	36.9
Relative humidity	%	60
River water temperature	°C	33
River water conductivity	µS/cm	300
Winter Site Reference Conditions (WSC)		
Atmospheric pressure	mbar	1017.2
Ambient air temperature	°C	12.5
Relative humidity	%	100
River water temperature	°C	20
Reference Site Conditions (RSC)		
Atmospheric pressure	mbar	1007
Ambient air temperature	°C	31
Relative humidity	%	88
River water temperature	°C	32
River water conductivity	µS/cm	30000
Design ambient air temperature for all electrical equipment		
Maximum design temperature (outdoor)	°C	45

Maximum daily average ambient shade temperature	°C	38
Maximum monthly average ambient temperature (in the shade)	°C	34.6
Maximum anual average ambient temperature (in the shade)	°C	27.3
Maximum design temperature of the electrical equipments installed indoors in air conditioned rooms	°C	40
Maximum design temperature of the electrical equipments installed indoors in non-air conditioned rooms	°C	45
Minimum design temperature	°C	0
Salty atmosphere	-	The atmosphere contains considerable amounts of salt thus producing severe corrosion which is further enhanced by high ambient humidity.

SECTION – II

Applicable standards

The design, material, construction, manufacture, inspection, testing and performance of SCREENED CONTROL CABLES shall conform to the latest revision of relevant International Electro-Technical Commission (IEC) / ASTMD and other reputed standards and codes of practices mentioned in this specification and any other International standard as applicable.

SECTION – III

Scope of Supply

This specification covers the design, manufacture, inspection and testing at manufacturer's works, proper sea-worthy packing and delivery of SCREENED CONTROL CABLES as mentioned in different sections of this specification.

It is not the intent to specify herein all the details of design & manufacture. However, the cables shall conform in all respect to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation.

Item wise quantity requirement is mentioned in below table

Note :- "G" Type :- Overall Screened

"F" Type :- Individually and overall screened

Sl.No	TYPE	QTY in Meters
1	2PX0.5 Sq.mm G Type screened Control Cable	4,500
2	4PX0.5 Sq.mm G Type screened Control Cable	21,000
3	6PX0.5 Sq.mm G Type screened Control Cable	10,500
4	8PX0.5 Sq.mm G Type screened Control Cable	38,000
5	12PX0.5 Sq.mm G Type screened Control Cable	6,500
6	16PX0.5 Sq.mm G Type screened Control Cable	3,000
7	4PX0.5 Sq.mm F Type screened Control Cable	9,500
8	6PX0.5 Sq.mm F Type screened Control Cable	5,000
	TOTAL	98,000

Please note that during issue of manufacturing clearance, the quantity of individual cable sizes may be varied ensuring that the overall Purchase order price is within +/-30 % of the issued price.

SECTION – IV

Detailed Technical Specification

All technical parameters for Screened Control Cables shall be generally as per the Datasheet attached in **Annexure-1**. However relevant applicable standards shall be still applicable. Scope of supply shall be as per SECTION-III, sizes not mentioned in the scope of supply and given in datasheet may be ignored. Few major parameters are listed below. If any of the below listed parameters are contradictory to the attached reference datasheet (Annexure-1), the same shall be finalized as per BHEL/Customer requirement in detailed Engineering.

1.0 Voltage grade : 225 V (Peak)

2.0 Type of cable : FRLS SCREENED CONTROL CABLES (F & G TYPE INSTRUMENTATION CABLES)

3.0 Standards Applicable :

S. No.	STANDARD	APPLICATION
1	VDE 0815, VDE 0816, VDE 0472	General Construction & tests for cables.
2	VDE 0207, Part-4, Part-5, Part-6	For insulation thickness.
3	SEN-SS-424-1475, IEC-60332 Part-1 IEC-60332 Part-3 Cat-B	Flammability Tests
4	ASTMD-2843, ASTMD-2863, IEC-754 Part-1	FRLS Tests

4.0 CONDUCTOR

a) Material : High conductivity annealed bare copper

b) Grade : Electrolytic

c) Standard applicable : VDE 0815

d) Min number of strands, Dia of Each Strand and cross sectional area : 7, 0.3 mm (nom), 0.5 sq.mm

5.1 INSULATION

a) Material : PVC as per VDE 0207 Part 4, compound Y I3

b) Application : Extruded

c) Insulation thickness Min / Nom/ Max : 0.25/ 0.3/ 0.35 mm

d) Volume resistivity (Min) : 1x 10^{14} at 20 deg .C & 1x 10^{11} at 70 deg. C in ohm-cm

6.1 LAYING OF CORES

a) Min. number of twist per Sqmm) Metre for paired cables. : 20 (For 0.5

c) Maximum lay of individual Sqmm) twisted pair : 50 mm (For 0.5

g) Diameter of core : In accordance with clause 5 (c)

7.0 IDENTIFICATION OF CORES : As per page no. 12 of this specification

8.0 INDIVIDUALL SCREENED

a) Material :	Aluminium-Mylar tape
b) Coverage :	100%
c) Overlap :	Minimum 20%
d) Min thickness (Micron) :	28
e) Binder :	Polyester tape.

9.0 OVERALL SCREENED

a) Material :	Aluminium-Mylar tape
b) Coverage :	100%
c) Overlap :	Minimum 20%
d) Min. thickness (Micron) :	55
e) Binder :	Polyester tape.

10.1 DRAIN WIRE
To be provided separately for individual pair shield and overall shield.

a) Material : Annealed Tin coated copper conductor as per VDE: 0815

b)Min number of strands, Dia sq.mm of Each Strand and cross sectional area : 7, 0.3 mm (nom), 0.5

11.1 ACCESSORIES (BEDDING, BINDER, TAPE REQ.)

a)	Material	:	Mylar Tape

12.1 ARMOURE

a)	Applicable	:	No

13.0 OUTER SHEATH

a)	Material	:	Extruded PVC (compound YM1) as per VDE 0207 Part-5
b)	Thickness	:	As per VDE207 Part-5/ relevant VDE
	Minimum Thickness at any point	:	1.8 mm for unarmoured Cable
	Nominal Thickness at any point	:	>1.8 mm for unarmoured Cable
c)	Application	:	Extruded
d)	Colour	:	Blue/ Black
e)	Whether FRLS	:	YES
f)	Other	:	Resistant to water, Fungus, Termite & rodent attack.

14.1 FRLS/ FLAMMABILITY TESTS

a)	Oxygen Index	:	29% Minimum as per ASTMD 2863
b)	Temperature Index	:	250 °C Minimum as per ASTMD 2863
c)	Acid gas generation	:	less than 20% by weight (As per IEC-754-1)
d)	Smoke density rating	:	Not more that 60% (As per ASTMD 2843) Derived as average area under curve when the results of smoke density plotted on a curve indicating light absorption v/s time as ASTMD 2843
e)	Flammability Test	:	[√] SEN-SS-424-1475 Class F3 [√] IEC 60332 Part-1 [√] IEC 60332 Part-3 Cat-B

15.0	TOLERANCE ON OVERALL DIAMETER	:	± 2mm max. Over the declared value in Technical Data Sheet
16.0	VARIATION IN DIA & OVALITY AT ANY CROSS-SECTION	:	Maximum 1 mm

17.0 CABLE DRUM DETAILS

a)	Material Type & Construction:		Steel as per relevant International / Manufacturer standard.
b)	Standard drum length	:	1000 metres
c)	**Tolerance on drum length**	:	**±5%**
d)	Painting	:	Entire surface to be painted
e)	Outermost Layer	:	To be covered with waterproof cover
f)	Sea Worthy Packing	:	Yes
g)	**Tolerance in overall length :**		**+1% on each type and size Of cable**
h)	Particular Information on drum:		Each drum shall carry manufacturer's name, purchaser's name, address and contract no., item no. & type, size & length of cable and net gross weight stencilled on both sides of drum. A tag containing same information shall be attached to the leading end of the cable. An arrow & suitable accompanying wording shall be marked on one end of the reel indicating the direction in which it should be rolled.

18.0	RIP CORD	:	A non-hygroscopic and non-wicking non metallic cord polyethylene.

19.1 Markings on Outer Sheath

a)	Progressive sequential Length marking to be provided	:	@ 1000 mm by Printing
b)	Progressive marking @ 5M	:	Manufacturers name, type of insulation, FRLS, Cable Size (Cross-section & No. of Pairs), Voltage grade, Year of Manufacture, BHEL-PEM by embossing

20.0 TECHNICAL PARAMETERS (C & I) As per Table below

STANDARD CABLE PARAMETERS FOR INSTRUMENTATION CABLE

Parameter	0.5 mm^2 (I & OS) type-F	0.5 mm^2 (OS) type-G
Mutual Capacitance (max.)at 0.8 kHz, nF/Km	*120*	*100*
Conductor Loop Resistance (max.), Ohm/Km	*73.4*	*73.4*
Insulation Resistance (min), M Ohm/ Km	*100*	*100*
Cross Talk Figure (min) at 0.8kHz, dB	*60*	*60*
Characteristic impedance(max.) at 1 kHz	*320*	*340*
Attenuation(max.) at 1 kHz db/Km	*1.2*	*1.2*

Note:

1. Cable parameters indicated above are at 20 degC (+/- 3 degC)

21.1 TEST VOLTAGE

		Core – Core	Core- shield
a)	High voltage test	: 2kV RMS for 1 min	0.5kV RMS for 1 min
b)	Resistance to direct current test:	0.22kV DC for 240 hrs/ 10 days	

CORE IDENTIFICATION / PAIR IDENTIFICATION

The cable cores shall be colour coded as mentioned below:

PAIR	CORE	COLOUR
1 st	1 st	Blue
1 st	2 nd	Red
2 nd	1 st	Grey
2 nd	2 nd	Yellow
3 rd	1 st	Green
3 rd	2 nd	Brown
4 th	1 st	White
4 th	2 nd	Black

Each four pair is laid to form one unit and wound with Mylar tape. The cores of each unit shall then be identified by colour bands for cables of more than 4-pair. eg. All eight cores of the first unit shall have a single band of pink colour (preferably rose pink).

Unit No No.	COLOUR OF BANDS	BAND MARKS
1.	PINK	=|===|==
2.		=||====||==
3.		=|||===|||==
4.		=||||===||||==
5.	ORANGE	=|===|==
6.		=||====||==
7.		=|||===|||==
8.		=||||===||||==
9.	VIOLET	=|===|==
10.		=||====||==
11.		=|||===|||==
12.		=||||===||||==

The dimension L (distance between the marking) shall be limited to 60mm. The bands shall be neat and cover at least 2/3 of the periphery of the core.

eg: A grey wire having 3 orange bands is the first core of the second pair of the seventh unit.

SECTION – V

Inspection and Testing

The Inspection for equipment under scope shall be done in general as per Customer approved QAP/MQP, approved datasheet, specification and relevant standards which shall be submitted and approved during detailed engineering

5.1 Inspection call shall be given at least 3 weeks in advance with all test reports. Supplier shall carryout/demonstrates various routine tests and any other test specified by Customer at supplier's works at no extra cost.

5.2 All reports / certificates shall bear company seal and signature of supplier / manufacturer.

5.3 Supplier shall produce during inspection:

a) Raw material inspection certificate.
b) In House test reports (Type test certificate shall be produced for exactly the same range/specifications)
c) Statutory certificates as required.
d) Internal inspection & Factory calibration certificate

e) Complete BOM including accessories.

5.4 All Inspection & Testing shall be carried out based on the following documents: -

a. Relevant Standards
b. Specifications
c. Approved Data sheets
d. Approved QAP

5.5 The vendor shall maintain and ensure necessary safety measures as required for inspection and tests if any test equipment is found not complying with proper safety requirements, then the inspection agency may withhold inspection till such time the desired safety requirements are met. The vendor shall submit type test certificates for similar equipment supplied by him elsewhere.

5.6 **Charges for all tests shall be deemed to be included in the bid price**. There shall be no commercial implication to BHEL on account of minor changes in QP during contract stage. Cost of cables consumed for testing shall be to bidder's account.

5.7 T**est certificates shall be provided, proving that each cable type to be used has successfully passed type tests as required by the applicable Standards during the last 12 months before date of issue of this tender. Otherwise, these tests have to be repeated on sample Sections. Cable of identical construction to be taken up for testing immediately on receipt of LOA. No delay in providing the type test certificates is acceptable.**

5.8 All tests shall be as per Annexure-2. However final MQP /tests shall be as per BHEL/Customer approval.

NOTE :- Any tests which is not explicitly mentioned in Annexure-2 but which are required as per the relevant IEC standard mentioned below shall also be conducted by the bidder at their own cost**.**

Section VI

Packing & Marking

7.1 Cables shall be supplied in non-returnable heavy construction steel drums. New or practically new cable drums made of steel and painted with epoxy resin paint are to be used. Cable ends are carefully protected before packing. Polyethylene sheet shall be wrapped over the cables and then sealed properly. For Typical details of Steel drums, **Annexure-3**, may be referred by the bidder. Bidder may modify, to choose appropriate dimensions of steel drums to suite various sizes/weight/ lengths of Screened Control cables.

7.2 Bidder shall provide sea worthy packing as per the details given in **Annexure-4**

7.3 Cable drum identification/marking will be as follows:

a) Makers name

b) Consignee's full address

c) Type size and length of cables

d) Net and gross weights

e) Any other marking for shipping

f) Drum Markings

The steel drums shall be clearly marked with lettering "SUPPLIED THROUGH BHEL-ISG FOR CHP & AHP AREAS".

Section VII

DOCUMENTATION

Following documents/drawings shall be submitted after placement of order for BHEL & customer's approval

Sl. No.	Drawings/Document Description	Drawings / Document Number	Schedule of Submission
1.	Technical Data Sheet for Screened Control Cables	Will be provided later	Within 7 days of LOI
2.	Cross-sectional Drawings for Screened Control Cables	Will be provided later	Within 7 days of LOI
3.	Manufacturing Quality Plan for Screened Control Cables	Will be provided later	Within 7 days of LOI
4.	Type Test Reports	Will be provided later	Within 14 days of LOI

1) All drawing submissions shall be through WRENCH (BHEL Web based document management portal) Only, User name and password of WRENCH portal will be provided to the successful bidder after placing PO. Drawings sent through email will not be considered for review.
2) Resubmission of any document incorporating comments shall be made within 3 days.
3) All documents to be submitted with approved Title Block and Drawing Numbering System, a soft copy of which shall be provided to successful bidder.
4) Test certificate shall invariably consist of customer details
5) If any additional document is required during detailed engineering it shall be included.
6) All drawings provided by the contractor shall be on standard size A4/A3 sheets, in the form of black or blue lines on a white background.
7) Approval of drawings shall not relieve the supplier of his responsibility in terms of the contract

Section VIII

Information to be furnished along with the offer

Bidder to clearly confirm that no deviation has been taken in this technical specification & referred annexures

Bidder to confirm that relevant Type test certificates for the applicable sizes are available with them. Please note that type tests certificates to be valid during the last 12 months before date of issue of this tender.

Bidder to confirm that if relevant Type tests are not available with them, cable of identical construction will be taken up for testing immediately on receipt of LOA.

TECHNICAL DATA SHEET FOR "G" TYPE (OVERALL SHIELD DIGITAL SIGNALS) CABLES

CUSTOMER : BHARAT HEAVY ELECTRICALS LIMITED.-ISG-BANGALORE PROJECT :1X660 MW MAITREE STPP ON TURNKEY BASIS
P.O. REF. : 77/19/0116/RAJ, Dt: 12.11.2019
DOC.No.: MAITREE-00-EBY-DA-180353-ISG, Rev.01 DATASHEET AND CROSS SECTIONAL DRAWING FOR SCREENED CONTROL CABLES FOR CHP AND AHP

S.No.	PARTICULARS	UNIT	DESCRIPTION							
	NO. OF PAIRS & SIZE	**No. x Sqmm**	**2 P x 0.50**	**4 P x 0.50**	**6 P x 0.50**	**8 P x 0.50**	**12 P x 0.50**	**16 P x 0.50**	**20 P x 0.50**	**24 P x 0.50**
1	Manufacturer's Name	-------								
2	Referance design standards	-------								
3	Conductor Size	**Sq.mm**	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
4	Rated Voltage	Volts	225 (Peak)							
5	Number of pairs	No.	2 Pair	4 Pair	6 Pair	8 Pair	12 Pair	16 Pair	20 Pair	24 Pair
6	Cable suitable for both earthed & unearthed system	-------	Suitable for Both							
7	**CONDUCTOR**	-------								
a)	Material	-------	High Conductivity Multi Stranded Annealed Bare Copper							
b)	Reference Standard	-------	VDE: 0815							
c)	Grade	-------	Electrolytic							
d)	No. of strands	No.	7	7	7	7	7	7	7	7
e)	Diameter of strands (before strading) (Nom.)	mm	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
f)	Approx. dia of conductor	mm	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
	Cross Section area. (Approx.)	Sq.mm	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
g)	Maximum Conductor Resistance per Km at 20°C	Ohm/Km	36.7							
8	**INSULATION**	-------								
a)	Reference Standard	-------	VDE 0207(Part 4)							
b)	Material Composition	-------	PVC Compound Type-YI3							
c)	Application		Extruded							
d)	Min. Thickness	mm	0.25							
e)	Nom. Thickness	mm	0.30							
f)	Max. Thickness	mm	0.35							
g)	Minimum Volume Resistivity as per IS 5831 (1984)	Ohm-cm	1×10^{14} ohm-cm at 20°C & 1×10^{11} ohm-cm at 70°C							
h)	Dielectric Constant	------	5 to 8							
i)	The Insulation will withstand conductor operating temperature	°C	70							
j)	Core diameter including Insulation (Approx.)	mm	1.5							

S.No.	PARTICULARS	UNIT	DESCRIPTION							
	NO. OF PAIRS & SIZE	No. x Sqmm	2 P x 0.50	4 P x 0.50	6 P x 0.50	8 P x 0.50	12 P x 0.50	16 P x 0.50	20 P x 0.50	24 P x 0.50
9	**CORE LAYING**	-------								
a)	Whether cores are twisted	------	Yes, 2 cores shall be twisted to form a pair							
b)	No. of twist	Nos.	20							
c)	Max. lay of twist.	mm	50							
d)	Pairs Colour & Identification	-------	Refer Enclosed Annexure-I							
10	**INDIVIDUAL PAIR SHIELDING**	-------	**Not Applicable**							
a)	Material	-------								
b)	Thickness of Al. mylar tape (Min.)	mm								
c)	Coverage/ Overlap	%								
d)	Noise Intereference better than	dB								
11	**DRAIN WIRE FOR INDIVIDUAL SHIELD**	-------								
a)	Reference Standard	-------								
b)	Size/ No. of strands	Sq.mm/ No.								
c)	Material	-------								
d)	Maximum Resistance of drain wire per Km at 20°C (including shield)	Ohm/Km								
12	**OVERALL SHIELDING**	-------								
a)	Material	-------	Aluminium Mylar tape							
b)	Thickness of Al. mylar tape (Min.)	mm	0.055							
c)	Coverage/ Overlap	%	100 / 20 (Min.)							
d)	Noise Intereference better than	dB	60							
13	**DRAIN WIRE FOR OVERALL SHIELD**	-------								
a)	Reference Standard	-------	VDE: 0815							
b)	Size/ No. of strands	Sq.mm/ No.	0.5 Sq.mm with 7 strands/0.3mm(approx.)							
c)	Material	-------	Annealed Tinned Copper							
d)	Maximum Resistance of drain wire per Km at 20°C (including shield)	Ohm/Km	30							
14	**FILLERS IF APPLICABLE**	-------	Non hygroscopic with FR property (As & where applicable as per Manufacturer's discretion)							
15	**INNER SHEATH**	-------	**Not Applicable**							
a)	Material Type & Standard	-------								
b)	Whether FRLS	-------								
c)	Colour	-------								
d)	Method of Application	-------								
e)	Thickness (Min.)	mm								

S.No.	PARTICULARS	UNIT	DESCRIPTION							
	NO. OF PAIRS & SIZE	No. x Sqmm	2 P x 0.50	4 P x 0.50	6 P x 0.50	8 P x 0.50	12 P x 0.50	16 P x 0.50	20 P x 0.50	24 P x 0.50
16	**ARMOUR**	-------	**Not Applicable**							
a)	Material	-------								
b)	Minimum Coverage	%								
c)	Method of jointing	-------								
d)	Breaking load of joint	%								
e)	Size of Strip (Approx.)	mm								
f)	Dia. Of Armour (Approx.)	mm								
g)	No. of wires/ strip (Approx.)	No.								
17	**OUTER SHEATH**	-------								
a)	Reference Standard	-------	VDE 0207(Part 5)							
b)	Material	-------	PVC Compound Type-YM3 having FRLS Properties **(resistant to solar radiation, the effect of oil, sea water, bacteria action, insects and rodents)**							
c)	Minimum thickness of sheath	mm	1.80							
d)	Calculated dia. Under outer sheath (Approx.)	mm	6.2	7.0	8.8	12.5	13.4	15.0	16.7	18.5
e)	Oxygen index (as per ASTMD 2863)	%	29% (Minimum)							
f)	Temperature Index (in deg.C as per ASTMD 2863)	°C	250 (Minimum)							
g)	Max. Acid gas generation as per IEC 60754 (P-1)	%	20% (Maximum) By weight							
h)	Max. Smoke density rating as per ASTMD 2843	%	60% (Maximum)							
i)	Colour of Outer sheath	-------	**Blue**							
18	Dia. Over laid-up Pairs (Approx.)	mm	5.8	6.6	8.4	12.1	13.0	14.6	16.3	18.1
19	Dia. Under armour (Approx.)	mm	**Not Applicable**							
20	Dia. Above armour (Approx.)	mm								
21	Overall Dia of Cable (Approx.) for Referance	mm	10.0	11.0	12.5	16.5	17.5	18.0	20.0	22.0
22	Tolerance on overall diameter	mm	± 2 mm							
23	Weight of Cable per Km (Approx.)	Kg/Km	130	155	190	315	335	400	470	550
24	Cable parameters at 20°C(+/-3 deg.C)	-------								
a)	Conductor loop Resistance (Max.)	Ohm/Km	73.4 (of loop)							
b)	Insulation Resistance (Min.)	Mohm/Km	100							
c)	Mutual Capacitance at 0.8 Khz (Max.)	nF/Km	100							
d)	Cross talk at 0.8 Khz (Min.)	dB	60							
e)	Attenuation at 1 Khz (Max.)	dB/Km	1.20							
f)	Characteristic Impedance at 1 Khz (Max.)	Ohm	340							
25	Continuous operating temperature	°C	70							

S.No.	PARTICULARS	UNIT	DESCRIPTION							
	NO. OF PAIRS & SIZE	No. x Sqmm	2 P x 0.50	4 P x 0.50	6 P x 0.50	8 P x 0.50	12 P x 0.50	16 P x 0.50	20 P x 0.50	24 P x 0.50
26	a) Relevant IS standard including Part & Category for Flame retardance of complete cable	-------	IEC: 60332 Part-1, IEC: 60332 Part-3, Cat-B							
	b) Relevant IEC standard including Part & Category for Flammability of complete cable									
27	Whether complete cable passes Swedish Chimney test as per SEN 4241475 (F3)	-------	Yes							
28	Identification	-------								
a)	Length of cable marked at every meter	-------	Yes							
b)	FRLS marked at every 5 meters	-------	Yes							
c)	Each Core of the pair numbered	-------	Refer Enclosed Annexure-I							
d)	Conductor identification details for pairs	-------								
e)	Details of cable marking on outer sheath	-------	, Voltage Grade, Year Of Mfg., PVC YI3, F Type, FRLS, Nomina Cross sectional area of conductor and no. of pairs, "BHEL-ISG", "FRLS", "BIFPCL" shall also be marked at 5 Meter by embossing.							
29	Test Voltage	-------								
a)	High voltage test/ Dielectric Strength	-------								
i)	Voltage, core to core	KV	2							
ii)	Duration	min	1							
b)	High Voltage test	-------								
i)	Voltage, core to screen	KV	0.5							
ii)	Duration	min	1							
30	Min. bending radius	mm	12 x Overall Diameter of cable							
31	Ovality at any cross-section (Max.)	mm	Not more than 1.0 mm							
32	Variation of dia throughout cable length	mm								
33	Cable cross-sectional drawings for each type of cable furnished	-------	Enclosed							
34 i)	Length of single coil in a drum	meters	1000 ± 5%	1000 ± 5%	1000 ± 5%	1000 ± 5%	1000 ± 5%	500 ± 5%	500 ± 5%	500 ± 5%
ii)	Marking on drum	-------	Manufactures Name, Purchaser Name, Address and Contract number, Item number and Type, Size, Length of Cable, Net Gross Weight & Year of Mfg, Drum No.							
iii)	Drum provided	-------	Yes (Non-returnable **Steel** drums)							
iv)	Both ends of cable to be sealed with PVC/ Rubber caps to prevent water/ moisture ingress	-------	PVC end caps shall be provided							
v)	Gross weight (Approx.)	Kg/Km	200	225	260	395	415	490	565	680
vi)	Net weight of cable (Approx.)	Kg/Km	130	155	190	315	335	400	470	550
35	Type test procedure as per BHEL Technical Spec. and other relevant standards enclosed	-------	As per Approved QAP							
36	Anti termite & rodent test	-------	Yes							
37	**Other Details**									
a)	Overall Quantity Tolerance		**(-) 0% and (+) 1%**							
b)	**UNIT FORMATION**	---	NA			4 Pairs shall be laid up to form a unit and shall be maylar taped				
c)	**CABLE LAYING**	---	2 Pairs shall be laid-up to from circular cable	4 Pairs shall be laid-up to from circular cable	6 Pairs shall be laid-up to from circular cable	2 Units shall be laid-up to form circular cable	3 Units shall be laid-up to form circular cable	4 Units shall be laid-up to form circular cable	5 Units shall be laid-up to form circular cable	6 Units shall be laid-up to form circular cable
37.1	Rip Cord	%	Non hygroscopic , Non wicking & Non Metallic cord Polyster under outer sheath							

TECHNICAL DATA SHEET FOR "F" TYPE (INDIVIDUAL PAIR & OVERALL SHIELD ANALOGUE SIGNALS) CABLES

CUSTOMER : BHARAT HEAVY ELECTRICALS LIMITED.-ISG-BANGALORE PROJECT :1X660 MW MAITREE STPP ON TURNKEY BASIS
P.O. REF. : 77/19/0116/RAJ, Dt: 12.11.2019
DOC.No.: MAITREE-00-EBY-DA-180353-ISG, Rev.01 DATASHEET AND CROSS SECTIONAL DRAWING FOR SCREENED CONTROL CABLES FOR CHP AND AHP

S.No.	PARTICULARS	UNIT	DESCRIPTION					
	NO. OF PAIRS & SIZE	**No. x Sqmm**	**4 P x 0.50**	**6 P x 0.50**	**8 P x 0.50**	**12 P x 0.50**	**20 P x 0.50**	**24 P x 0.50**
1	Manufacturer's Name	-------						
2	Referance design standards	-------	VDE: 0815, VDE: 0816, VDE 0207 Part-4 & Part-5, ASTMD:2863, ASTMD:2843, IEC 60754(P-1), IEC: 60332 Part-1, IEC: 60332 Part-3 Cat-B ,SEN 4241475 (F3)					
3	Conductor Size	**Sq.mm**	0.5	0.5	0.5	0.5	0.5	0.5
4	Rated Voltage	Volts	225 (Peak)					
5	Number of pairs	No.	4 Pair	6 Pair	8 Pair	12 Pair	20 Pair	24 Pair
6	Cable suitable for both earthed & unearthed system	-------	Suitable for Both					
7	**CONDUCTOR**	-------						
a)	Material	-------	High Conductivity Multi Stranded Annealed Bare Copper					
b)	Reference Standard	-------	VDE: 0815					
c)	Grade	-------	Electrolytic					
d)	No. of strands	No.	7	7	7	7	7	7
e)	Diameter of strands (before strading) (Nom.)	mm	0.30	0.30	0.30	0.30	0.30	0.30
f)	Approx. dia of conductor	mm	0.90	0.90	0.90	0.90	0.90	0.90
	Cross Section area. (Approx.)	Sq.mm	0.50	0.50	0.50	0.50	0.50	0.50
g)	Maximum Conductor Resistance per Km at 20°C	Ohm/Km	36.7					
8	**INSULATION**	-------						
a)	Reference Standard	-------	VDE 0207(Part 4)					
b)	Material Composition	-------	PVC Compound Type-YI3					
c)	Application		Extruded					
d)	Min. Thickness	mm	0.25					
e)	Nom. Thickness	mm	0.30					
f)	Max. Thickness	mm	0.35					
g)	Minimum Volume Resistivity as per IS 5831 (1984)	Ohm-cm	1×10^{14} ohm-cm at 20°C & 1×10^{11} ohm-cm at 70°C					
h)	Dielectric Constant	------	5 to 8					
i)	The Insulation will withstand conductor operating temperature	°C	70					
j)	Core diameter including Insulation (Approx.)	mm	1.5					

S.No.	PARTICULARS	UNIT	DESCRIPTION					
	NO. OF PAIRS & SIZE	No. x Sqmm	4 P x 0.50	6 P x 0.50	8 P x 0.50	12 P x 0.50	20 P x 0.50	24 P x 0.50
9	**CORE LAYING**	-------						
a)	Whether cores are twisted	------	Yes, 2 cores shall be twisted to form a pair					
b)	No. of twist	Nos.	20					
c)	Max. lay of twist.	mm	50					
d)	Pairs Colour & Identification	-------	Refer Enclosed Annexure-I					
10	**INDIVIDUAL PAIR SHIELDING**	-------						
a)	Material	-------	Aluminium Mylar tape					
b)	Thickness of Al. mylar tape (Min.)	mm	0.028					
c)	Coverage/ Overlap	%	100 / 20 (Min.)					
d)	Noise Intereferance better than	dB	60					
11	**DRAIN WIRE FOR INDIVIDUAL SHIELD**	-------						
a)	Reference Standard	-------	VDE: 0815					
b)	Size/ No. of strands	Sq.mm/ No.	0.5 Sq.mm with 7 strands/0.3mm(approx.)					
c)	Material	-------	Annealed Tinned Copper					
d)	Maximum Resistance of drain wire per Km at 20°C (including shield)	Ohm/Km	30					
12	**OVERALL SHIELDING**	-------						
a)	Material	-------	Aluminium Mylar tape					
b)	Thickness of Al. mylar tape (Min.)	mm	0.055					
c)	Coverage/ Overlap	%	100 / 20 (Min.)					
d)	Noise Intereferance better than	dB	60					
13	**DRAIN WIRE FOR OVERALL SHIELD**	-------						
a)	Reference Standard	-------	VDE: 0815					
b)	Size/ No. of strands	Sq.mm/ No.	0.5 Sq.mm with 7 strands/0.3mm(approx.)					
c)	Material	-------	Annealed Tinned Copper					
d)	Maximum Resistance of drain wire per Km at 20°C (including shield)	Ohm/Km	30					
14	**FILLERS IF APPLICABLE**	-------	Non hygroscopic with FR property (As & where applicable as per Manufacturer's discretion)					
15	**INNER SHEATH**	-------	**Not Applicable**					
a)	Material Type & Standard	-------						
b)	Whether FRLS	-------						
c)	Colour	-------						
d)	Method of Application	-------						
e)	Thickness (Min.)	mm						

S.No.	PARTICULARS	UNIT	DESCRIPTION					
	NO. OF PAIRS & SIZE	No. x Sqmm	4 P x 0.50	6 P x 0.50	8 P x 0.50	12 P x 0.50	20 P x 0.50	24 P x 0.50
16	**ARMOUR**	-------	**Not Applicable**					
a)	Material	-------						
b)	Minimum Coverage	%						
c)	Method of jointing	-------						
d)	Breaking load of joint	%						
e)	Size of Strip (Approx.)	mm						
f)	Dia. Of Armour (Approx.)	mm						
g)	No. of wires/ strip (Approx.)	No.						
17	**OUTER SHEATH**	-------						
a)	Reference Standard	-------	VDE 0207(Part 5)					
b)	Material	-------	PVC Compound Type-YM3 having FRLS Properties **(resistant to solar radiation, the effect of oil, sea water, bacteria action, insects and rodents)**					
c)	Minimum thickness of sheath	mm	1.80					
d)	Calculated dia. Under outer sheath (Approx.)	mm	7.6	9.6	13.5	14.6	18.1	20.1
e)	Oxygen index (as per ASTMD 2863)	%	29% (Minimum)					
f)	Temperature Index (in deg.C as per ASTMD 2863)	°C	250 (Minimum)					
g)	Max. Acid gas generation as per IEC 60754 (P-1)	%	20% (Maximum) By weight					
h)	Max. Smoke density rating as per ASTMD 2843	%	60% (Maximum)					
i)	Colour of Outer sheath	-------	**Blue**					
18	Dia. Over laid-up Pairs (Approx.)	mm	7.2	9.2	13.1	14.2	17.7	19.7
19	Dia. Under armour (Approx.)	mm	**Not Applicable**					
20	Dia. Above armour (Approx.)	mm						
21	Overall Dia of Cable (Approx.) for Referance	mm	11.5	13.0	17.5	18.5	22.0	24.0
22	Tolerance on overall diameter	mm	± 2 mm					
23	Weight of Cable per Km (Approx.)	Kg/Km	185	240	385	420	650	750
24	Cable parameters at 20°C(+/-3 deg.C)	-------						
a)	Conductor loop Resistance (Max.)	Ohm/Km	73.4 (of loop)					
b)	Insulation Resistance (Min.)	Mohm/Km	100					
c)	Mutual Capacitance at 0.8 Khz (Max.)	nF/Km	120					
d)	Cross talk at 0.8 Khz (Min.)	dB	60					
e)	Attenuation at 1 Khz (Max.)	dB/Km	1.20					
f)	Characteristic Impedance at 1 Khz (Max.)	Ohm	320					
25	Continuous operating temperature	°C	70					

S.No.	PARTICULARS	UNIT	DESCRIPTION					
	NO. OF PAIRS & SIZE	No. x Sqmm	4 P x 0.50	6 P x 0.50	8 P x 0.50	12 P x 0.50	20 P x 0.50	24 P x 0.50
26	a) Relevant IS standard including Part & Category for Flame retardance of complete cable	-------	IEC: 60332 Part-1, IEC: 60332 Part-3, Cat-B					
	b) Relevant IEC standard including Part & Category for Flammability of complete cable							
27	Whether complete cable passes Swedish Chimney test as per SEN 4241475 (F3)	-------	Yes					
28	Identification	-------						
a)	Length of cable marked at every meter	-------	Yes					
b)	FRLS marked at every 5 meters	-------	Yes					
c)	Each Core of the pair numbered	-------	Refer Enclosed Annexure-I					
d)	Conductor identification details for pairs	-------						
e)	Details of cable marking on outer sheath	-------	Voltage Grade, Year Of Mfg., PVC YI3, F Type, FRLS, Nomina Cross sectional area of conductor and no. of pairs, "BHEL-ISG", "FRLS", "BIFPCL" shall also be marked at 5 Meter by embossing.					
29	Test Voltage	-------						
a)	High voltage test/ Dielectric Strength	-------						
i)	Voltage, core to core	KV	2					
ii)	Duration	min	1					
b)	High Voltage test	-------						
i)	Voltage, core to screen	KV	0.5					
ii)	Duration	min	1					
30	Min. bending radius	mm	12 x Overall Diameter of cable					
31	Ovality at any cross-section (Max.)	mm	Not more than 1.0 mm					
32	Variation of dia throughout cable length	mm						
33	Cable cross-sectional drawings for each type of cable furnished	-------	Enclosed					
34 i)	Length of single coil in a drum	meters	1000 ± 5%	1000 ± 5%	1000 ± 5%	1000 ± 5%	500 ± 5%	500 ± 5%
ii)	Marking on drum	-------	Manufactures Name, Purchaser Name, Address and Contract number, Item number and Type, Size, Length of Cable, Net Gross Weight & Year of Mfg, Drum No.					
iii)	Drum provided	-------	Yes (Non-returnable **Steel** drums)					
iv)	Both ends of cable to be sealed with PVC/ Rubber caps to prevent water/ moisture ingress	-------	PVC end caps shall be provided					
v)	Gross weight (Approx.)	Kg/Km	255	310	465	510	780	885
vi)	Net weight of cable (Approx.)	Kg/Km	185	240	385	420	650	750
35	Type test procedure as per BHEL Technical Spec. and other relevant standards enclosed	-------	As per Approved QAP					
36	Anti termite & rodent test	-------	Yes					
37	**Other Details**							
a)	Overall Quantity Tolerance		**(-) 0% and (+) 1%**					
b)	**UNIT FORMATION**	---	NA		4 Pairs shall be laid up to form a unit and shall be maylar taped			
c)	**CABLE LAYING**	---	4 Pairs shall be laid-up to from circular cable	6 Pairs shall be laid-up to from circular cable	2 Units shall be laid-up to form circular cable	3 Units shall be laid-up to form circular cable	5 Units shall be laid-up to form circular cable	6 Units shall be laid-up to form circular cable
37.1	Rip Cord	%	Non hygroscopic , Non wicking & Non Metallic cord Polyster under outer sheath					

ANNEXURE - I

Conductor/Pair Identification

For 4-pair cables, the colour scheme shall be as follows:-

PAIR	CORE	COLOUR
1st pair	1st core	Blue
1st pair	2nd core	Red
2nd pair	1st core	Grey
2nd pair	2nd core	Yellow
3rd pair	1st core	Green
3rd pair	2nd core	Brown
4th pair	1st core	White
4th pair	2nd core	Black

In case of higher number of pairs, the above colour scheme shall be repeated, and to distinguish between two pairs giving same colour code in a cable, suitable colour bands shall be used. For example all,eight core of first unit shall have one band of PINK colour. The complete scheme is given below and the order of colour bands shall be PINK, ORANGE, VIOLET,etc.....

Unit No.	Colour of Bands	Band Marks
1	PINK	= | = = = | = =
2		=| | = = = | |= =
3		=| | | = = = | | | = =
4		= | | | | = = = | | | |= =
5	ORANGE	= | = = = | = =
6		=| | = = = | |= =
7		= | | | = = = | | | = =
8		= | | | | = = = | | | |= =
9	VIOLET	= | = = = | = =
10		= | | = = = | |= =
11		= | | | = = = | | | = =
12		= | | | | = = = | | | |= =

L

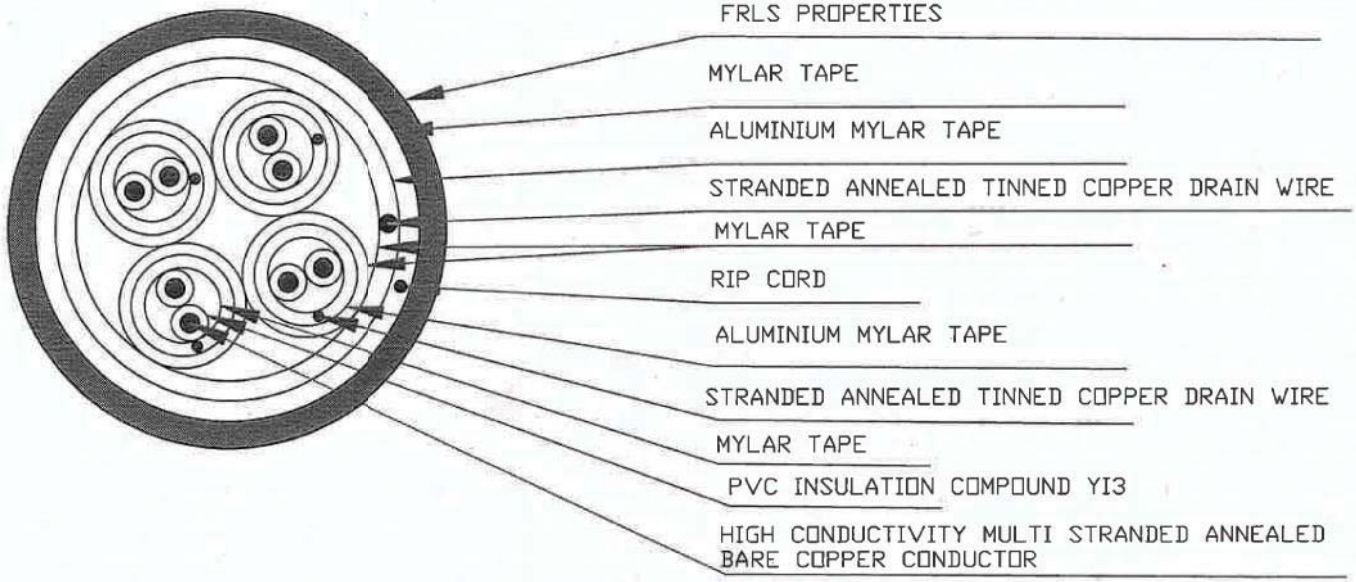
ANNEXURE - I

The dimesnsion 'L' shall be limited to 60mm . The bends shall be neat and cover at least ninety percent (90%) of the periphery of the core.

Band markings shall not be easily erasable and shall also meeting Bleeding and Blooming test and colour fastness to water test requirement as per releveant standard .

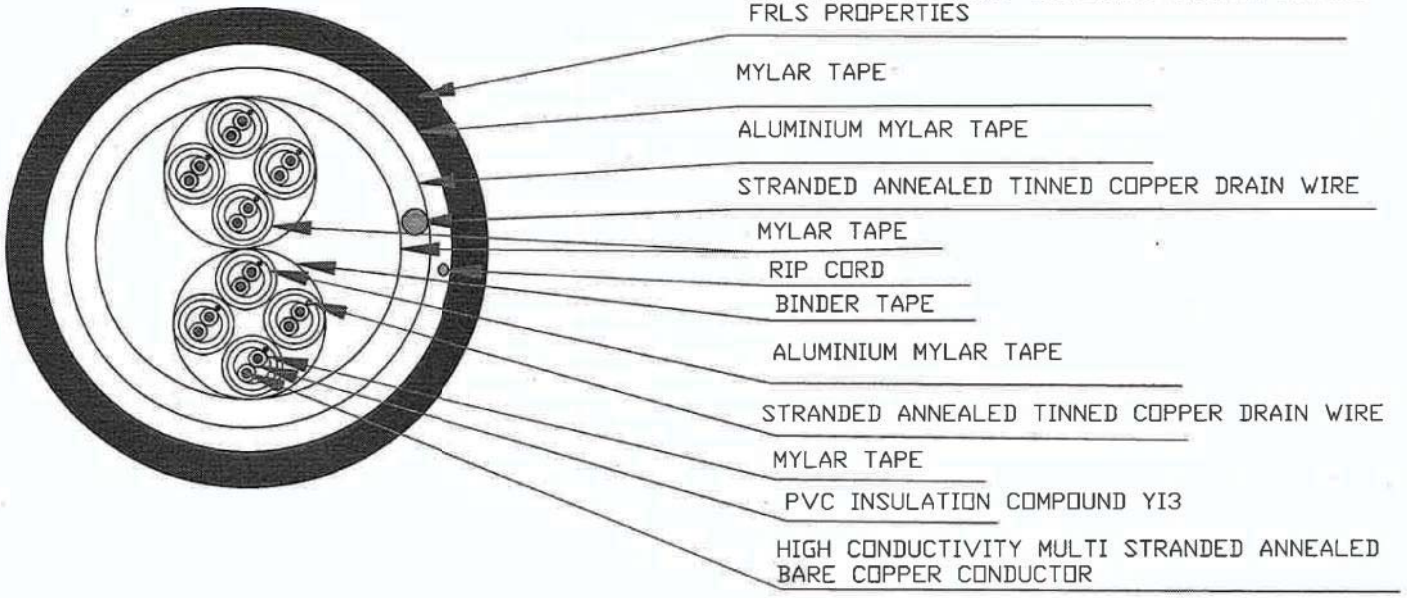
For cables more then 4 pair, Polyester tape over first unit shall be marked 1,polyester tape over unit 2 shall be marked 2,polyester tape over 3 shall be marked 3, polyester tape over unit 4 shall be marked 4, polyester tape over unit 5 shall be marked 5, polyester tape over unit 6 shall be marked 6, polyester tape over unit 7 shall be marked 7, polyester tape over unit 8 shall be marked 8,polyester tape over unit 9 shall be marked 9, polyester tape over unit 10 shall be marked 10, polyester tape over unit 11 shall be marked 11 and polyester tape over unit 12 shall be marked 12 for unit identification.....

CUSTOMER : BIFPCL, PROJECT :2X660 MW MAITREE STPP, Main Contractor- BHEL-ISG
P.O. REF. : 77/19/0116/RAJ, Dt: 12.11.2019
DOC.No.: MAITREE-00-EBY-DA-180353-ISG, Rev.01, DATASHEET AND CROSS SECTIONAL DRAWING FOR SCREENED CONTROL CABLES FOR CHP AND AHP



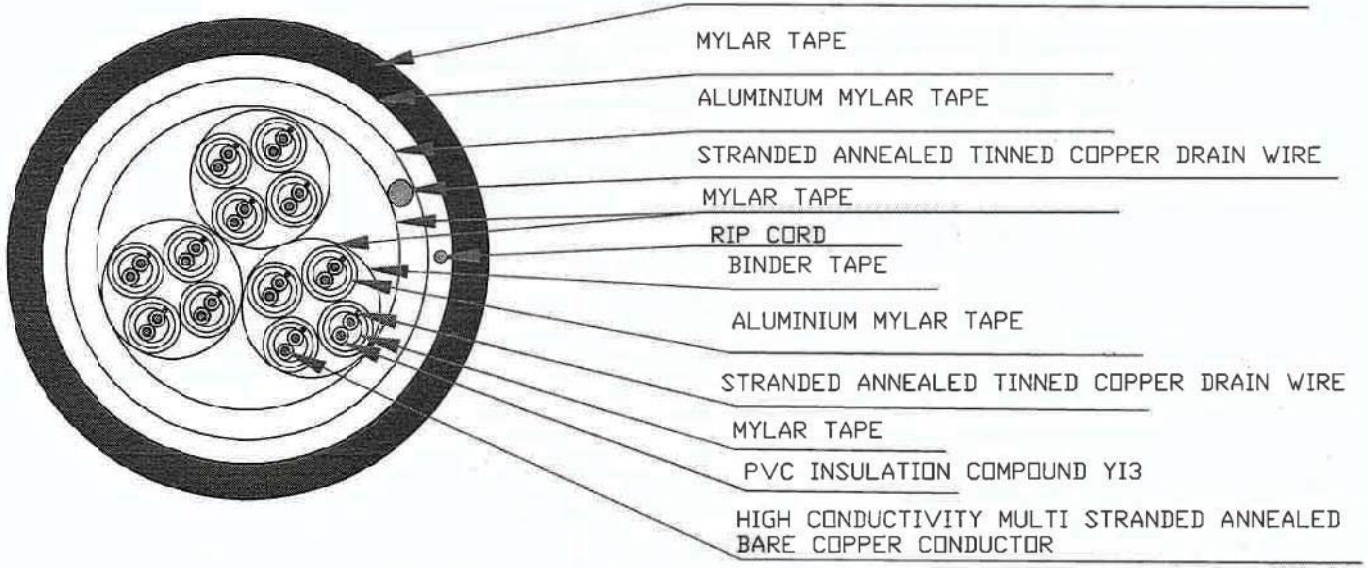
CABLE DESCRIPTION -4 P X 0.5 SQMM
TYPE-F INSTRUMENTATION CABLE.

CUSTOMER : BIFPCL, PROJECT :2X660 MW MAITREE STPP, Main Contractor- BHEL-ISG
P.O. REF. : 77/19/0116/RAJ, Dt: 12.11.2019
DOC.No.: MAITREE-00-EBY-DA-180353-ISG, Rev.01, DATASHEET AND CROSS SECTIONAL DRAWING FOR SCREENED CONTROL CABLES FOR CHP AND AHP



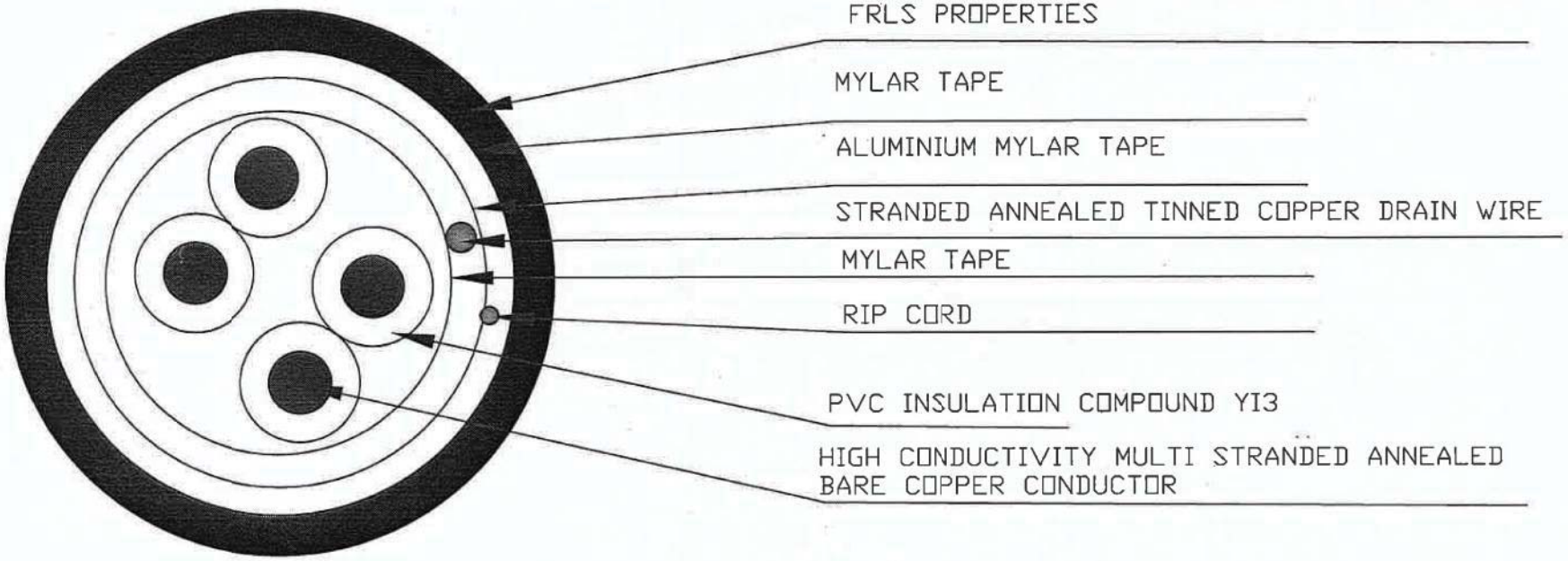
CABLE DESCRIPTION -8P X 0.5 SQMM
TYPE-F INSTRUMENTATION CABLE.

CUSTOMER : BIFPCL, PROJECT :2X660 MW MAITREE STPP, Main Contractor- BHEL-ISG
P.O. REF. : 77/19/0116/RAJ, Dt: 12.11.2019
DOC.No.: MAITREE-00-EBY-DA-180353-ISG, Rev.01, DATASHEET AND CROSS SECTIONAL DRAWING FOR SCREENED CONTROL CABLES FOR CHP AND AHP



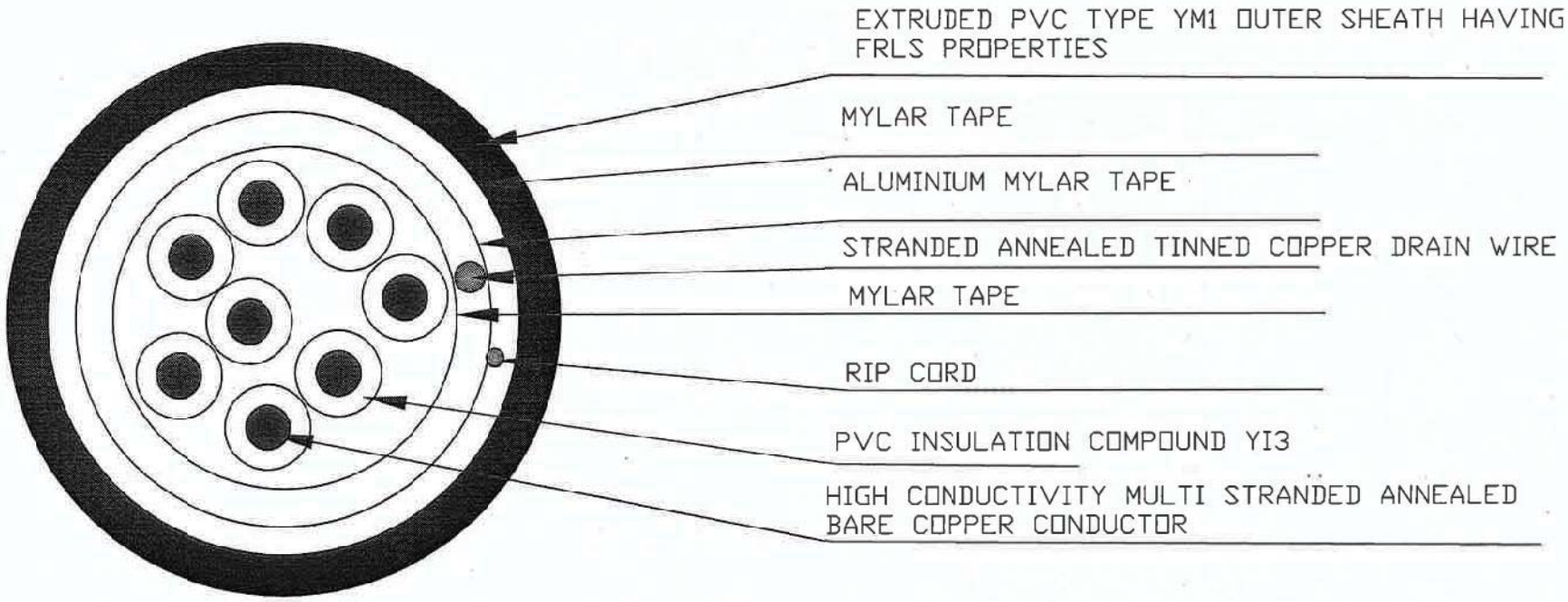
CABLE DESCRIPTION -12P X 0.5 SQMM
TYPE-F INSTRUMENTATION CABLE.

CUSTOMER : BIFPCL, PROJECT :2X660 MW MAITREE STPP, Main Contractor- BHEL-ISG
P.O. REF. : 77/19/0116/RAJ, Dt: 12.11.2019
DOC.No.: MAITREE-00-EBY-DA-180353-ISG, Rev.01, DATASHEET AND CROSS SECTIONAL DRAWING FOR SCREENED CONTROL CABLES FOR CHP AND AHP



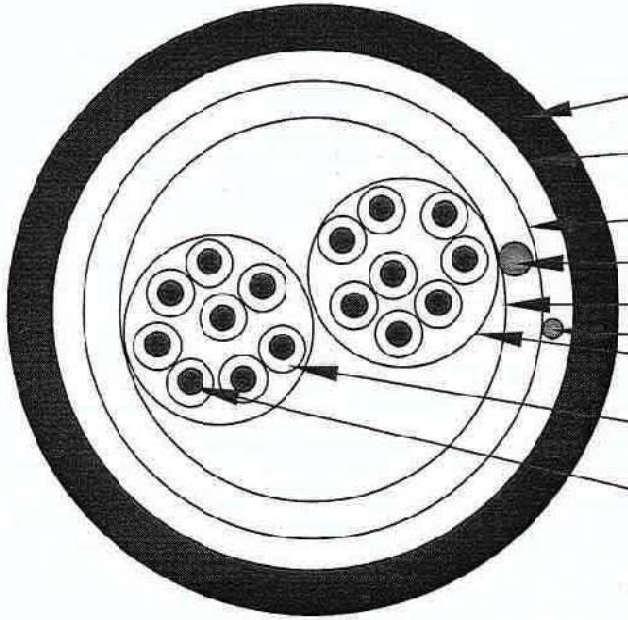
CABLE DESCRIPTION -2 P X 0.5 SQMM
TYPE-G INSTRUMENTATION

CUSTOMER : BIFPCL, PROJECT :2X660 MW MAITREE STPP, Main Contractor- BHEL-ISG
P.O. REF. : 77/19/0116/RAJ, Dt: 12.11.2019
DOC.No.: MAITREE-00-EBY-DA-180353-ISG, Rev.01, DATASHEET AND CROSS SECTIONAL DRAWING FOR SCREENED CONTROL CABLES FOR CHP AND AHP



CABLE DESCRIPTION -4 P X 0.5 SQMM
TYPE-G INSTRUMENTATION CABLE

CUSTOMER : BIFPCL, PROJECT :2X660 MW MAITREE STPP, Main Contractor- BHEL-ISG
P.O. REF. : 77/19/0116/RAJ, Dt: 12.11.2019
DOC.No.: MAITREE-00-EBY-DA-180353-ISG, Rev.01, DATASHEET AND CROSS SECTIONAL DRAWING FOR SCREENED CONTROL CABLES FOR CHP AND AHP



EXTRUDED PVC TYPE YM1 OUTER SHEATH HAVING FRLS PROPERTIES

MYLAR TAPE

ALUMINIUM MYLAR TAPE

STRANDED ANNEALED TINNED COPPER DRAIN WIRE

MYLAR TAPE

RIP CORD

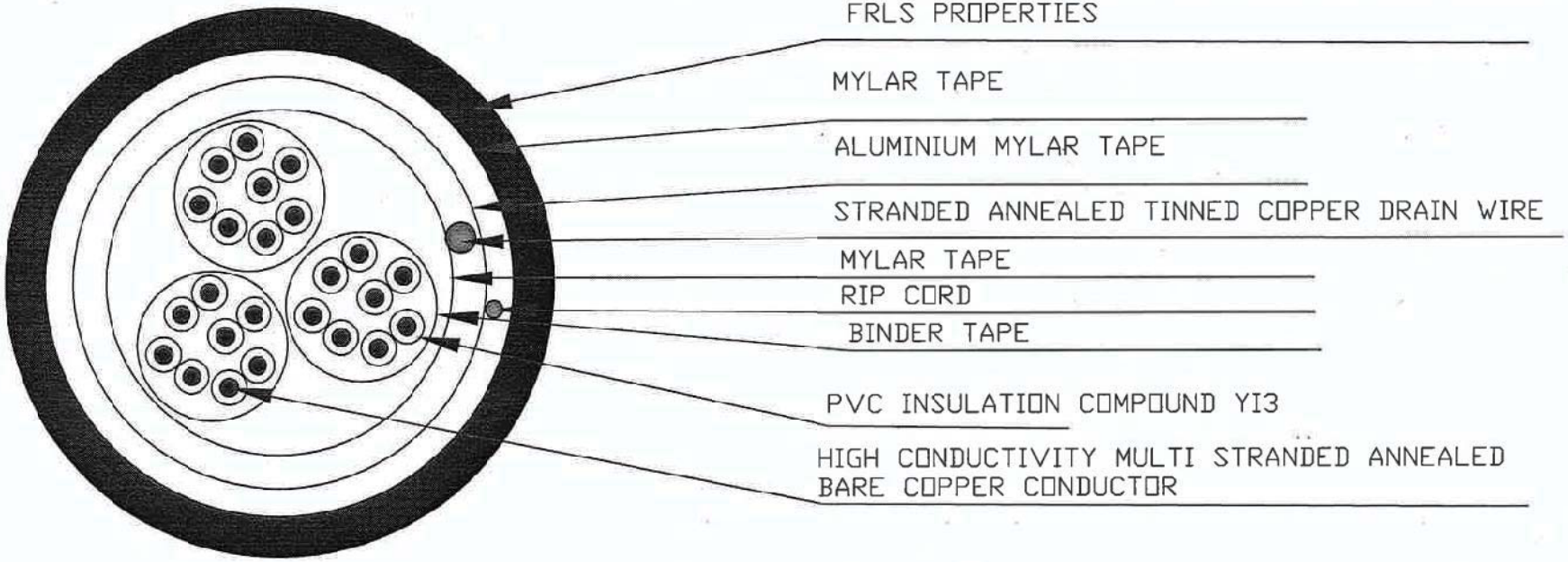
BINDER TAPE

PVC INSULATION COMPOUND TYPE YI3

HIGH CONDUCTIVITY MULTI STRANDED ANNEALED BARE COPPER CONDUCTOR

CABLE DESCRIPTION -8 P X 0.5 SQMM
TYPE-G INSTRUMENTATION CABLE

CUSTOMER : BIFPCL, PROJECT :2X660 MW MAITREE STPP, Main Contractor- BHEL-ISG
P.O. REF. : 77/19/0116/RAJ, Dt: 12.11.2019
DOC.No.: MAITREE-00-EBY-DA-180353-ISG, Rev.01, DATASHEET AND CROSS SECTIONAL DRAWING FOR SCREENED CONTROL CABLES FOR CHP AND AHP



CABLE DESCRIPTION -12 P X 0.5 SQMM
TYPE-G INSTRUMENTATION CABLE

MANUFACTURING QUALITY PLAN

ITEM: INSTRUMENTATION CABLES

QP NO: PCL/QAP/ P-10299/18
REV NO: 03
DATE: 01.10.2018
PAGE: 01 of 05

PROJECT :-2 X 660 MW MAITREE SUPER THERMAL POWER PROJECT,RAMPAL BANGLADESH
PACKAGE:- Instrumentation Cable
CONTRACT NO: 419
PO NO. PW/PE/PG/BIF/P-86/18 DTD. 20.06.2018
Main Supplier: BHEL PEM, NOIDA

SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK M, C/B	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	D	AGENCY M	AGENCY C	AGENCY B	REMARKS
1	2	3	4	5	6	7	8	9		10			11
1.0	RAW MATERIAL												
1.1	Copper Rods/ Wires (For Conductor & drain wire)	GENERAL :											
		1. Physical properties	MA	Physical Tests	Sample	Relevant Standard/ Approved datasheet	Relevant Standard/ Approved datasheet	Inpection Report/ Test Cert.		P	V	-	
		2. Elec.Properties	MA	Electrical Tests	Sample	-do-	-do-	-do-		P	V	-	
		SPECIFIC CHECKS :											
		a) Make	MA	Verify	100%	Manufacturer approved source	Manufacturer approved source	Log book/ Test Cert.		P	V	-	
		b) Grade	MA	-do-	-do-	Approved datasheet	Approved datasheet	-do-		P	V	-	
		c) Resistivity	MA	Electrical Tests	Manufacturer std.	IEC 60502-1, IEC 60228 & Approved datasheet	IEC 60502-1, IEC 60228 & Approved datasheet	-do-		P	V	-	
1.2	PVC Compound (for insulation)	GENERAL :											
		1. Physical properties	MA	Physical Tests	Sample	Relevant Standard/ Approved datasheet	Relevant Standard/ Approved datasheet	Inpection Report/ Test Cert.		P	V	-	
		2. Elec.Properties	MA	Electrical Tests	Sample	-do-	-do-	-do-		P	V	-	
		SPECIFIC CHECKS :											
		a) Make	MA	Verify	100%	Manufacturer approved source	Manufacturer approved source	COC/ Test Cert.		P	V	-	
		b) Type/ Grade	MA	-do-	-do-	Approved datasheet	Approved datasheet	-do-		P	V	-	
		c) Shelf life/ Storage condition	MA	-do-	-do-	Compound Manufacturer std.	Compound Manufacturer std.	-do-		P	V	-	
1.3	Screen / Tapes/ Binders	1. Make	MA	Verify	100%	Manufacturer approved source	Manufacturer approved source	TC & IR		P	V	-	
		2. Dimension	MA	Measurement	Manufacturer std.	Manufacturer datasheet/ Approved datasheet	Manufacturer datasheet/ Approved datasheet	TC & IR		P	V	-	
		3. T.S. & Elongation	MA	Physical Tests	-do-	Manufacturer datasheet	Manufacturer datasheet	-do-		P	V	-	
		4. Chem. & Phys. Properties	MA	Chemical & Physical Tests	-do-	Manufacturer std.	Manufacturer std.	-do-		P	V	-	

LEGEND : RECORDS IDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION

M : MANUFACTURER / SUB-SUPPLIER C : MAIN SUPPLIER B :BIFPCL/OE
P : PERFORM W : WITNESS V : VERIFICATION. AS APPROPRIATE.
CHP:BIFPCL/OE SHALL IDENTIFY IN COLUMN B AS W

DOC. NO-MAITREE-00-BTW-EDB-105097-PEM REV- 03 CAT.....

FOR BIFPC

WED BY | APPROVED BY | APPROVAL SEAL

MANUFACTURING QUALITY PLAN

ITEM: INSTRUMENTATION CABLES

QP NO: PCL/QAP/ P-10299/18
REV NO: 03
DATE: 01.10.2018
PAGE: 02 of 05

PROJECT :-2 X 660 MW MAITREE SUPER THERMAL POWER PROJECT,RAMPAL BANGLADESH
PACKAGE:- Instrumentation Cable
CONTRACT NO: 419
PO NO. PW/PE/PC/BIF/P-86/18 DTD. 20.06.2018
Main Supplier: BHEL PEM NOIDA

SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK M, C/B	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	D	AGENCY M	AGENCY C	AGENCY B	REMARKS
1	2	3	4	5	6	7	8	9		10			11
1.4	Fillers (as applicable)	1. Type	MA	Verify	-do-	Approved datasheet	Approved datasheet	-do-		P	V	-	
		2. Flame retardant & moisture resistant (as applicable)	CR	Chemical/ Environ.	-do-	-do-	-do-	-do-		P	V	-	
1.5	PVC compound for Sheath	**GENERAL :**											
		1. Physical properties	MA	Physical Tests	Sample	Relevant Standard/ Approved datasheet	Relevant Standard/ Approved datasheet	Log book/ Test Cert.		P	V	-	
		2. Elec Properties	MA	Electrical Tests	Sample	-do-	-do-	-do-		P	V	-	
		3. FRLS Properties (as applicable)	CR	Chemical/ Environ.	Sample	-do-	-do-	-do-		P	V	-	
		SPECIFIC CHECKS :											
		a) Make	MA	Verify	100%	Manufacturer approved source	Manufacturer approved source	Log book/ Test Cert.		P	V	-	
		b) Type/ Grade	MA	-do-	-do-	Approved datasheet	Approved datasheet	-do-		P	V	-	
		c) Shelf life/ Storage condition	MA	-do-	-do-	Compound Manufacturer std.	Compound Manufacturer std.	-do-		P	V	-	
1.6	Steel drums	1. Dimension	MA	Meas.	Mfr's Plant Std.	Mfr's Plant Std.	Mfr's Plant Std.	Log book/ Test Cert.		P	V	-	
		2. Surface finish	MA	Meas.	-do-	-do-	-do-	-do-		P	V	-	
2.0	IN PROCESS												
2.1	Wire Drawing & Annealing	1. Size	MA	Dimensional	Mfr's Plant Std.	Approved datasheet	Approved datasheet	Inspection Report		P	V	-	
		2. Surface finish	MA	Visual	-do-	Surface shall be smooth	Surface shall be smooth						
		3. % of Elongation	MA	Mechanical	-do-	IEC 60502-1, IEC 60228	IEC 60502-1, IEC 60228						
2.2	Tinning (Conductor or drain wire)	1. Size	MA	Dimensional	Plant Mfg. Std	Approved datasheet	Approved datasheet	Log Book		P	V	-	(Applicable only for tin-coated copper conductor and drain wire)
		2. % of Elongation	MA	Mechanical	-do-	IEC 60502-1, IEC 60228	IEC 60502-1, IEC 60228						
2.3	Stranding of wires	1. No.of wires	MA	Counting	Mfr's Plant Std.	IEC 60502-1, IEC 60228 / Appd. Data Sheet	IEC 60502-1, IEC 60228 / Appd. Data Sheet	-do-		P	-	-	

LEGEND : RECORDS IDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION

M : MANUFACTURER / SUB-SUPPLIER C : MAIN SUPPLIER B :BIFPCL/OE
P : PERFORM W : WITNESS V : VERIFICATION. AS APPROPRIATE.
CHP:BIFPCL/OE SHALL IDENTIFY IN COLUMN B AS W

FC

DOC. NO-MAITREE-00-BTW-EDB-105097-PEM REV- 03 CAT.....

REVIEWED BY	APPROVED BY	APPROVAL SEAL

MANUFACTURING QUALITY PLAN

ITEM: INSTRUMENTATION CABLES

QP NO: PCL/QAP/ P-10299/18
REV NO: 03
DATE: 01.10.2018
PAGE: 03 of 05

PROJECT :-2 X 660 MW MAITREE SUPER THERMAL POWER PROJECT,RAMPAL BANGLADESH
PACKAGE:- Instrumentation Cable
CONTRACT NO: 419
PO NO. PW/PE/PG/BIF/P-86/18 DTD. 20.06.2018
Main Supplier: BHEL PEM NOIDA

SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK M, C/B	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	D	AGENCY M	AGENCY C	AGENCY B	REMARKS
1	2	3	4	5	6	7	8	9		10			11
		2. Resistance	CR	Electrical	-do-	-do-	-do-	-do-		P	-	-	
		3. Sequence, lay length & Direction	MA	Visual, Meas	Sample	BHEL'S/ Vendor's Spec./ Approved datasheet	BHEL'S/ Vendor's Spec./ Approved datasheet	-do-		P	-	-	
		4. Surface Finish	MA	Visual	Sample	-do-	-do-	-do-		P	-	-	
		5.Dimension	MA	Measurement	Sample	Appd. Data Sheet	Appd. Data Sheet	-do-		P	-	-	
2.4	Core Insulation (No repair permitted)	1. Surface finish	MA	Visual	100%	-	Free from bulging burnt particles lumps, cuts & Scratches	Inpection Report		P	-	-	
		2 Insulation thickness (Min./ Max.)	CR	Measurement	Sample	Appd.data sheet/ Relevant Std.	Appd.data sheet/ Relevant Std.	-do-		P	-	-	
		3. Concentricity #	CR	Measurement	Sample	Mfr's Std./Appd. data sheet	Mfr's Std./Appd. data sheet	Inpection Report		P	-	-	# To be checked at starting & finish end of Extruded Length
		4 Dia over insulation	MA	Measurement	Sample	Relevant Standard/ Appd. Data Sheet	Relevant Standard/ Appd. Data Sheet	-do-		P	-	-	
		5. Core identification	MA	Visual	100%	Relevant Standard/ Appd. Data Sheet	Relevant Standard/ Appd. Data Sheet	-do-		P	-	-	
		6. TS & % Elongation	MA	Mechanical	100%	Relevant Standard/ Appd. Data Sheet	Relevant Standard/ Appd. Data Sheet	-do-		P	-		
2.5	Core pairing, screening (provision of drain wire & laying)	1. Pair identification	MA	Visual	100%	Relevant Standard/ Appd. Data Sheet	Relevant Standard/ Appd. Data Sheet	Log Book		P	-	-	
		2.Wire size & tape size	MA	Measurement	100%	-do-	-do-	-do-		P	-	-	
		3.Test for capacitance	CR	Elect. Test	100%	-do-	-do-	-do-		P	-	-	
		4. Sequence of lay and lay length	MA	Visual meas	Sample	Appd. Data Sheet & MFRs. Std.	Appd. Data Sheet & MFRs. Std.	-do-		P	-	-	
		5. Screen overlap & coverage	MA	Measurement	Sample	-do-	-do-	-do-		P	-	-	
		6. Dia over laid up core	MA	Measurement	-do-	-do-	-do-	-do-		P	-	-	
		7. Continuity of drain & drain wire with Screen	MA	Elect. Test	100%	<——No Discontinuity ——>		-do-		P	-	-	

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P : PERFORM W : WITNESS V : VERIFICATION AS APPROPRIATE,
CHP:BIFPCL/OE SHALL IDENTIFY IN COLUMN B AS W

FOR E

DOC. NO-MAITREE-00-BTW-EDB-105097-PEM REV- 03 CAT.....

REVIEWED BY | APPROVED BY | APPROVAL SEAL

MANUFACTURING QUALITY PLAN

ITEM: INSTRUMENTATION CABLES

QP NO: PCL/QAP/ P-10299/18
REV NO: 03
DATE: 01.10.2018
PAGE: 04 of 05

PROJECT :-2 X 660 MW MAITREE SUPER THERMAL POWER PROJECT,RAMPAL BANGLADESH
PACKAGE:- Instrumentation Cable
CONTRACT NO: 419
PO NO. PW/PE/PG/BIF/P-86/18 DTD. 20.06.2018
Main Supplier: BHEL PEM NOIDA

SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK M, C/B	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	D	AGENCY M	AGENCY C	AGENCY B	REMARKS
1	2	3	4	5	6	7	8	9		10			11
2.6	Outer Sheath Extrusion	1. Surface Finish	MA	Visual	100%	-	Free from Bulging Burnt particles, lumps, cuts & scratches	Log Book		P	-	-	
		2.Sheath thickness	MA	Measurement	Sample	Relevant Standard/ Appd. Data Sheet	Relevant Standard/ Appd. Data Sheet	Log Book		P	-	-	
		3. Dia over outer sheath	MA	Measurement	Sample	-do-	-do-	-do-		P	-	-	

LEGEND : RECORDS IDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION

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CHP:BIFPCL/OE SHALL IDENTIFY IN COLUMN B AS W

DOC. NO-MAITREE-00-BTW-EDB-105097-PEM REV- 03 CAT.....

FOR BIFPCL/O

:WED BY APPROVED BY APPROVAL SEAL

MANUFACTURING QUALITY PLAN

ITEM: INSTRUMENTATION CABLES

QP NO: PCL/QAP/ P-10299/18
REV NO: 03
DATE: 01.10.2018
PAGE: 05 of 05

PROJECT :-2 X 660 MW MAITREE SUPER THERMAL POWER PROJECT,RAMPAL BANGLADESH
PACKAGE:- Instrumentation Cable
CONTRACT NO: 419
PO NO. PW/PE/PG/BIF/P-86/18 DTD. 20.06.2018
Main Supplier: BHEL PEM NOIDA

SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK M, C/B	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	D	AGENCY M	AGENCY C	AGENCY B	REMARKS
1	2	3	4	5	6	7	8	9		10			11
		4. Marking/ Colour/ Embossing	MA	Visual	100%	Appd. Data Sheet	Appd. Data Sheet	Test Report		P	-	-	Sequential marking shall be done by printing
		5. TS & % Elongation	MA	Mechanical	100%	Relevant Standard/ Appd. Data Sheet	Relevant Standard/ Appd. Data Sheet	-do-		P	-		
3.0	**Final Inspection**	1. Finish & Length	MA	Visual	(See remark)	Relevant Standard/ Appd. Data Sheet	Free from Bulging Burnt particles, lumps, cuts & scratches	Inpection Report		P	W	V	One drum in a Lot
		2. Dimensions	MA	Measurement	Sample Lengths	Appd. Data sheet	Appd. Data sheet	Inpection Report		P	W	V	
		3. Marking/Colour/ pair identification	MA	Visual	-do-	-do-	-do-	-do-		P	W	V	
		4. Test for screening	CR	Elect. Test	-do-	-do-	-do-	-do-		P	W	V	
		5. Acceptance Tests (Refer Note - H)	CR	Phy & Elect. Tests	sample	-do-	-do-	-do-		P	W	V	Refer Annexure to QP for sampling plan.
		6. Type & FRLS Tests (Refer Note - H)	CR	Measurement	Sample	Appd. Data sheet	Appd. Data sheet	-do-		P	W	V	

NOTES:-
(A) JOINTS IN WIRE SHALL BE AS PERMITTED BY REL STD / BHEL SPECIFICATION. VENDOR TO CERTIFY THE SAME.
(B) NO REPAIR OF CORE INSULATION PERMITTED
(C) CABLE ENDS SHALL BE SEALED AS PER REL. STD./ BHEL SPECIFICATION
(D) RECORD OF RAW MATERIAL, PROCESS & ALL STAGES SHALL BE CERTIFIED BY VENDORS QC. AND ARE LIABLE TO AUDIT CHECK BY PURCHASER.
(E) FILLERS/DUMMY CORES ETC. SHALL BE AS PER BHEL SPECIFICATION
(F) WHEREVER EXTENT OF CHECK FOR STAGE IS MENTIONED AS SAMPLES AND NOT DEFINED IN QP, THE SAME SHALL BE AS PER VENDORS SAMPLING PLAN AGREED BY PURCHASER.
(G) VENDOR SHALL FURNISH COMPLIANCE CERTIFICATE TO THE INSPECTION AGENCY CONFIRMING THE PACKING AS PER REL. STD./ BHEL SPECIFICATION.
(H) FOR LIST OF TYPE TESTS, ROUTINE TESTS & ACCEPTANCE TESTS; REFER ANNEXURE TO QP.

INSTRUCTION- 1 Cable manufacturer to maintain records to show co-relation of raw materials to finished cables i.e. raw material batch/ lot no. should be traceable to the final cable drum number or batch no.
2. Cable manufacturer to maintain all quality records identified as per all QP stages enumerated below whether it is identified for BHEL verification or witness or not.

MANUFACTURER/ | SUB- | MAIN-SUPPLIER

LEGEND : RECORDS IDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION

M : MANUFACTURER / SUB-SUPPLIER C : MAIN SUPPLIER B :BIFPCL/OE
P : PERFORM W : WITNESS V : VERIFICATION, AS APPROPRIATE,
CHP:BIFPCL/OE SHALL IDENTIFY IN COLUMN B AS W

FOR BIFP

DOC. NO-MAITREE-00-BTW-EDB-105097-PEM REV- 03 CAT.....

REVIEWED BY	APPROVED BY	APPROVAL SEAL

ANNEXURE – C TO QP

I. TESTING REQUIREMENTS

A. Type Test Conduction:

1. Tests for which "T" is indicated in the 'Test Conduction Required As' column below shall be conducted as Type Test.

2. Sampling:
   a) Type tests (except for Sl. no. b & c below) to be conducted on one size (2P,4P etc.) of each type/ lot.
   b) Electrical tests to be conducted on each size (2P,4P etc.) of each type/ lot.
   c) FRLS & Flammability Test to be conducted only on one sample/ lot, irrespective of size/type.

B. Acceptance Test Conduction:

1. Tests for which "A" is indicated in the 'Test Conduction Required As' column below shall be conducted as Acceptance tests.

2. Sampling:
   Sampling for acceptance tests for every lot shall be as per IEC 60502-1/ Relevant International standard.

C. Routine Test Conduction:

1. Tests for which "R" is indicated in the 'Test Conduction Required As' column below shall be conducted as Routine tests.

2. Sampling:
   Routine testing shall be conducted in line with the applicable standards and as per the Manufacturing Quality Plan approved for the project for every lot offered for inspection.

D. C&I Tests listed in S.No-8.0 shall be conducted only one size/ type / lot.

E. ADS: Approved datasheet.

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
1.0	**Tests for Conductor**				
I.	Annealing test	For copper conductor only	T, A	Plant Standard/ Relevant International Standard	***Internal in process Test Report to be furnished for acceptance test***
II.	Tin coating test (for tinned copper)	For copper conductor only	T, A	Plant Standard/ Relevant International Standard	
III.	Resistance test	For Cu	T, A, R	VDE 0815	
IV.	Diameter test	For conductor	T, A	ADS	
2.0	**Physical Tests for PVC Insulation & PVC sheath**				

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
I.	Test for thickness & Eccentricity	Applicable for PVC insulation, PVC inner sheath & PVC outer sheath	T, A	VDE 0472/	
II.	Tensile strength and elongation test at break	Applicable for PVC insulation & PVC outer sheath	T, A	VDE 0472	
(a)	Before ageing		T, A		
(b)	After ageing		T, A		
III.	Ageing in air oven	Applicable for PVC insulation & PVC outer sheath	T	VDE 0472	
IV.	Loss of mass in air oven test	For PVC outer sheath.	T	VDE 0472	
V.	Hot deformation test	For PVC outer sheath.	T	VDE 0472	
VI.	Heat shock test	For PVC outer sheath.	T	VDE 0472	
VII.	Shrinkage test	For PVC insulation, PVC outer sheath.	T	VDE 0472	
VIII.	Thermal stability test	For PVC outer sheath only	T	VDE 207	
3.0	**Tests for Al-Mylar Shield**				
I.	Continuity test	For Al-Mylar shield	T, A	Plant Standard	
II.	Shield thickness	For Al-Mylar shield	A	ADS	
III	Overlap test	For Al-Mylar shield	A	ADS	
IV	Constructional details, dimensions	For Al-Mylar shield	A	ADS	
V	Visual, surface finish+	For Al-Mylar shield	A	Plant Standard	
VI	Overall coverage	For Al-Mylar shield	A	Plant Standard	
VII	Noise interference test.	For Al-Mylar shield	A	ADS	
4.0	**Tests for Drain Wire**				
I.	Annealing test	For copper conductor only	T, A	Plant Standard/ Relevant International Standard	*Internal in process Test Report to be furnished for acceptance test*
II.	Tin coating test (for tinned copper)	For copper conductor only	T, A	Plant Standard/ Relevant International Standard	
III.	Resistance test	For Cu	T, A, R	VDE 0815	
IV.	Diameter test	For conductor	T, A	ADS	
V.	Continuity test	For Al-Mylar shield	T, A	Plant Standard	
5.0	**FRLS Tests**				
I.	Oxygen index test	For PVC outer sheath only	T, A	ASTMD 2863	
II.	Smoke density test	For PVC outer sheath only	T, A	ASTMD 2843	
III.	Acid gas generation test	For PVC outer sheath only	T, A	IEC-754-1	
IV.	Temperature Index Test	For PVC outer sheath only	T	ASTMD 2863	

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
6.0	**Flammability Tests**				
I.	Flammability test for single cable	For complete cable	T,A	IEC:60332 Part-1	
II.	Swedish chimney test	For complete cable	A	SEN SS 424 1475 (Class F3)	
III	Flammability test	For complete cable	A	IEC:60332 Part-3, Cat-B	
7.0	**Electrical Tests**				
I.	High Voltage Test	For complete cable	T, A, R	VDE 0815	
II.	Insulation Resistance Test (Volume resistivity method)	For complete cable	T, A, R	Relevant International standard/ ADS	
III.	Thermal ageing test	For complete cable	T	Relevant International standard/ ADS	
8.0	**C&I Tests**				
I.	Cross talk	For complete cable	T, A	ADS	
II.	Attenuation	For complete cable	T, A	ADS	
III.	Characteristic Impedance	For complete cable	T, A	ADS	
IV.	Mutual capacitance	For complete cable	T, A, R	ADS	
V.	Noise interference	For complete cable	T, A	ADS	

ANNEXURE -A

ACCEPTABLE MAKES

COPPER WIRE ROD

M/S. AUM UDYOG,

M/S. VEN TRADE PVT. LTD.

M/S. TAYAJI & SONS PVT. LTD.

M/S. SUNIL ALCOP INDUSTRY,

M/S. STERLITE INDUSTRIES (I) LTD.

M/S. VALLABH METAL INDUSTRIES,

M/S. TAMRA DHATU UDYOG PVT. LTD.,

M/S. HINDALCO INDUSTRIES LTD. (BIRLA COPPER UNIT)

PVC COMPOUND FOR INSULATION AND FRLS SHEATH

M/S. BHIANI MANUF ACTURING COMPANY, CHOPANKI

M/S. SHRI RAM AXIALL PVT. LTD.

M/S. AUM UDYOG,

M/S. SWASTIK POLYVINYALS PVT. LTD.,

M/S. RP PLASTIC INDUSTRIES,

M/S. BANSAL POLYPLAST PVT. LTD.

M/S. KLJ POLYMERS AND CHEMICAL LTD,

This list is indicative only. Successful Bidder shall provide respective raw material supplier list along with QAP

MASTER BATCHES

M/S. BHIANI MANUF ACTURING CO. PVT. LTD.

M/S. SWASTIK POLYVINYALS PVT. LTD.

M/S. KLJ POLYMERS & CHEMICALS LTD.

M/S. SHRI RAM AXIALL PVT. LTD.

M/S. SCJ PLASTICS, NEW DELHI

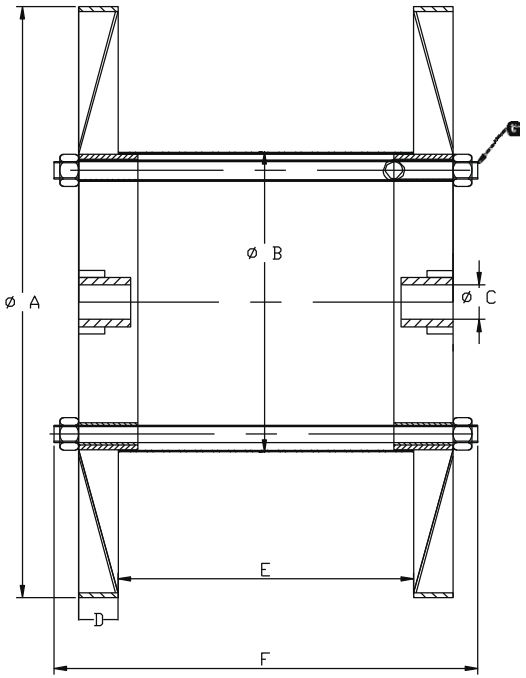
M/S. INNOVIEW SOLUTIONS PVT. LTD.

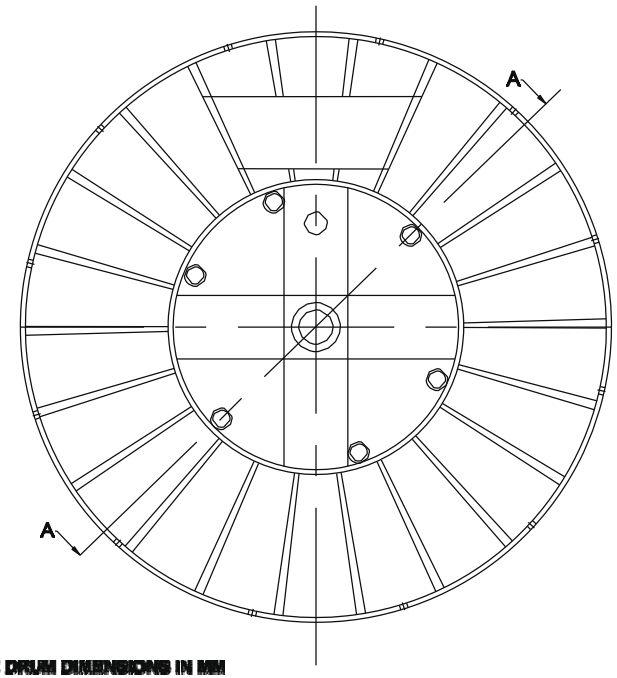
POLYESTER / ALUMINIUM MYLAR TAPES

M/S. AAVEES LAMINATIONS

M/S. BELLS INSULATIONS PVT. LIMITED

M/S. SRV INTERNATIONAL





APPROXIMATE DRUM DIMENSIONS IN MM

ALL DIMENSIONS AND VALUES ARE TYPICAL AND ARE DEPENDENT ON CABLE WEIGHT.

A	FLANGE	2200
B	BARREL	1200
C	CENTRAL HOLE	100
D	FLANGE	50
E	TRAVERSE	1400
F	GROSS WIDTH	1500
G	STUD SIZE	16 MM.

- Dig. not to scale.
- ALL DIMENSIONS ARE IN MM.

10.4 PACKING OF LOOSE ITEMS

Loose mechanical, electrical and C&I items e.g. valves, fittings, pressure/temperature gauges/switches, circuit breakers, relays etc shall be individually wrapped using polyethylene sheets/U foam/ thermocol sheets/air bubble sheets depending upon the items and then packed in wooden boxes. The left out spaces and top of the boxes shall be filled with rubberized coir to get proper cushioning effect, Special attention shall be paid to relays, instruments etc for arresting the movements of their operating mechanism during transportation.

The construction of wooden packing cases shall be as per clause 9.3.1 retaining its all features concerning strength of the box. The construction of wooden packing case for electrical and C&I items shall be as per fig-16.

Inner surface of 6 sides of the box shall be lined with bitumen coated hessian polyethylene kraft paper. Rubberized coir of min. 25mm thickness and 100 mm width shall be nailed to inner surfaces of bottom and 4 sides of the boxes.

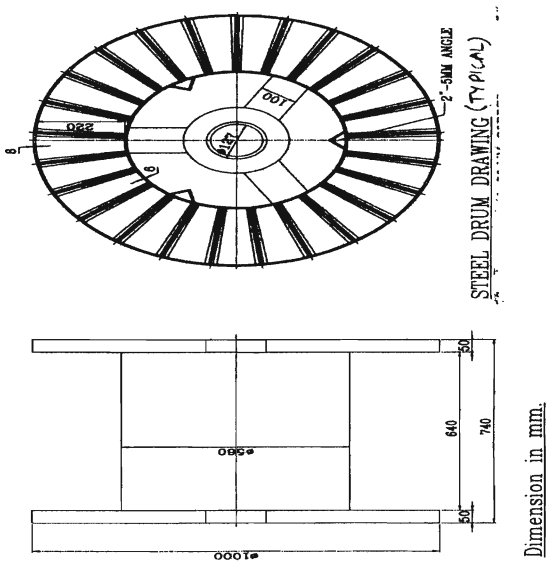
11.0 PACKING OF ELECTRICAL ITEMS

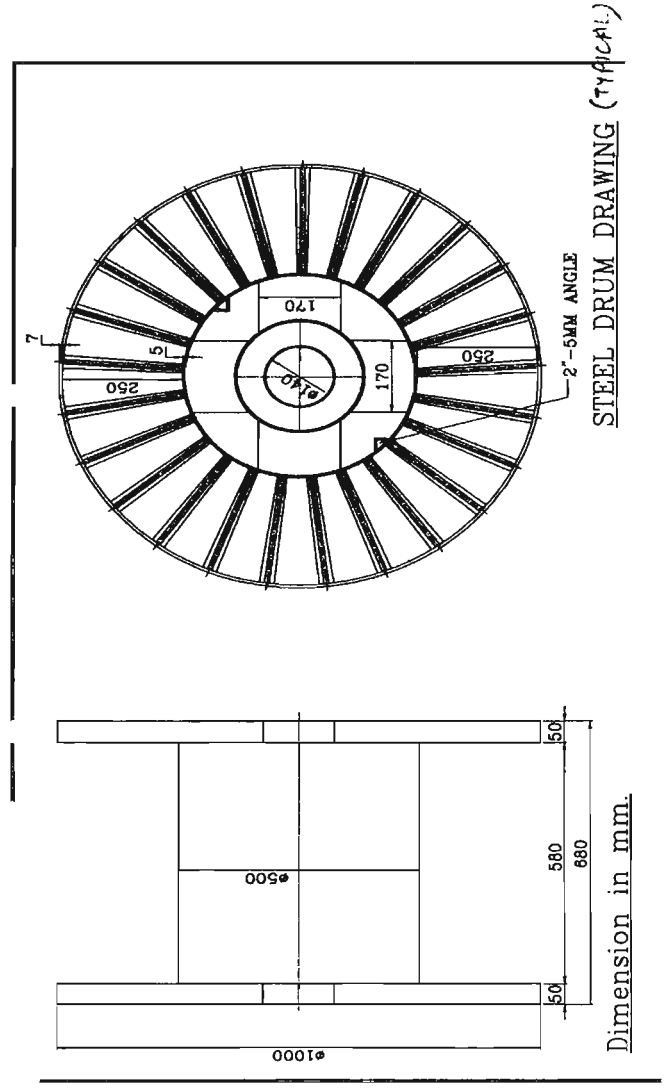
11.1 CABLES

11.1.1 Type of Equipment
All type of cables..

11.1.2 Type of Construction

New or practically new cable drums made of steel and painted with epoxy resin paint are to be used. Cable ends are carefully protected before packing. Over the cables polyethylene sheet shall be wrapped and then sealed properly. Cable drum can be put in wooden crates for ease in transportation and handling. (Wooden cable drum is also acceptable, however vendor to furnish constructional details for approval).


STEEL DRUM DRAWING (TYPICAL)
640
740
Dimension in mm.



11.2 PACKING OF CABLE TRAYS & ACCESSORIES AND CABLE TRAY SUPPORT MATERIAL

11.2.1 Cable trays can be packed in wooden boxes as per fig 1 to 11 or in steel boxes. Details of steel box construction is as indicated below.

1) All Dimensions are in "mm" unless otherwise stated.
2) Packing Box shall be fabricated using 50x50x6mm MS Angle, 50x3mm Flat, 2.5 mm thick C Channel, 1mm & 1.6mm Thick sheet.
3) Finish of Packing Box Shall be Galvanized.
4) Angle & Channel Section forming part of the Main frame shall be welded thoroughly with each other to give a rigid structure.
5) Sheet Section and Flat section shall be bolted/ Riveted/ Welded suitably to the Main frame stated in '4' above.

SUB-SUPPLIER QUESTIONNAIRE

(Information marked with asterisk (*) is mandatory)

FICHTNER

Name of the proposed Equipment / Item / Process with Model / Type / Rating / Capacity / Size / Tonnage etc. (As applicable):

_____

_____

1. **Name of Proposed Sub-Supplier *:** _____

Website *: _____

2. **Address of Regd. Office *:**

_____

_____

Details of contact person *:
Name_____

Mobile no._____

Desig._____
E-mail:

- **Country of Head Office ***

  _____

- **Field of activities ***

3. **Address of Works where Item is being manufactured***

_____

_____

Details of contact person:
Name_____

Mobile no._____

Desig._____
E-mail:

4. **Branch / Liaison office in Dhaka***

_____

_____

Details of contact person:
Name_____

Mobile no._____

Desig._____
E-mail:

5. Details of Proposed Works (If Applicable):

a. Year of Establishment of present works: _____

b. Year of Commencement of: _____
Manufacturing at the above works

c. Details of change in works address in past, if any : _____

d. Total Covered Area : _____

e. Details of covered area like no. of sheds, : _____
Area of each shed etc.

f. Electric power- Connected load: _____
Electric power- Stand by load & system: _____

6. **Annual Turnover * &** : _____
Profit in past three years * _____
: _____

7. Do you have in-house Department for

a) Design Yes / No

b) Research & Development Yes / No

c) Quality control/Inspection Yes / No

d) After Sales Service Yes / No

If any of these items answered with "No", an explanation shall be provided.

8. **Shift works per day** One / Two / Three
Weekly day off

9. Present Manpower Status:

Division Status	Graduate		Diploma	Skilled	Un-Skilled	Remarks
	Technical	Non-Technical				
Design						
Production						
Quality Control / Inspection						
After Sales Service						

a. Enclose organization chart of the proposed works (Y / N) _____

b. Enclose Organization chart of QA / QC Deptt. (Y / N) _____

c. Enclose List of Qualified Welders with process etc. (Y / N) _____

d. Enclose List of Qualified NDT personnel with area of specialization (Y / N) _____

10. Trade Name of Product (if any) _____

11. Brief details of items manufactured*:

Sl. No.	Item & Material (Type / Size / Rating / Model / Tonnage, as applicable)	Installed Capacity	Annual Production Capacity	Annual Production for last Three years		
				I	II	III

12. Details of foreign Collaboration, if any:

Sl. No.	Product	Name & Address of Collaborator	Collaboration		
			Scope	Year	Valid upto

13. Furnish Type Test report for the proposed product (if applicable).

14. **Approval/Certification by National/International standards/accredited agency applicable for the proposed product (if applicable)**.

15. Furnish statutory/mandatory certification for proposed product (if applicable).

16. Furnish supply Experience list of the proposed product *.

List shall include Item description (Type / Size / Rating / Model / Tonnage, as applicable), Customer name, Quantity, Year of Supply, and Year of commissioning.

17. Enclose End User's operational feedback certificate for the proposed product*.

18. Enclose list of equipment & machinery specific to the proposed product.

This should include name of equipment, capacity & nos. etc.:

19. Enclose Process Flow Diagram indicating in-house & outsourced process.

20. General manufacturing facilities available:

Sl. No.	Description of machine	Inhouse		Outsourced	
		Capacity	No.	Capacity	No.
a)	Material Handling Mobile Crane Fork Lift Over Head Cranes				
b)	Metal Cutting & Bending				
c)	Casting				
d)	Forging				
e)	Fabrication				
f)	Welding				
g)	Machining				
h)	Heat Treatment				
i)	Surface & Cleaning Sand Blasting Shot Blasting Pickling				
j)	Painting				
k)	Metal Coating				
l)	Packing				
m)	Other, if any				

21. Enclose Testing & Inspection facilities specific to the proposed product:

a. In-house
b. Outsourced _____

22. Storage of finished goods (covered / open). _____

23 **Enclose list of the source / make with location of major raw material, bought out items and out sourced process** _____

24. Furnish details regarding local service support and spare parts availability in Bangladesh. ~~process~~* _____

25. Quality management*

25.1 General*

25.1.1 Work Instruction for different processes available. (Y / N) _____

if yes, furnish list.

25.1.2 Evaluation system for raw material / bought out item's supplier is available. (Y / N) _____

25.1.3 Records generated during inspection maintained & available for review? (Y / N) _____

25.1.4 Statistical quality control techniques used? (Y/N) If yes please furnish details. (Y / N) _____

25.1.5 ISO certificate for the works available?* (Y / N) _____

If yes, enclose copy of the certificate.

25.1.6 Quality & HSE Manual for the works available* (Y / N) _____

If yes, enclose copy of the manual.

25.2 Corrective action

25.2.1 Specifically confirm whether System for identifying & disposition of Non Conformity in the process / product is available (Y / N) _____

25.2.2 Specifically confirm whether System for Customer complains & their satisfactory disposal is available. (Y / N) _____

25.3. Documentation Control

25.3.1 Procedure available for documentation control (Y / N) _____

25.4. Control of Inspection, measuring & testing equipments.

25.4.1 Procedure for calibration of testing & measuring instrument available. (Y / N) _____

27. Certification of sub-supplier *

I CERTIFY THAT THE INFORMATION SUPPLIED HEREIN (INCLUDING ALL PAGES ATTACHED) IS CORRECT.

SEAL

SIGNATURE_____
NAME _____
DESIGNATION_____
MOBILE NO _____
EMAIL _____

M/S._____
PLACE _____

DATE _____

LIST OF ENCLOSURE:

28. Certification by Main Supplier *:

ABOVE INFORMATION HAVE BEEN VERIFIED AND FOUND IN ORDER TO COMPLY WITH TECHNICAL SPECIFICATION AS PER EPC-CONTRACT.

Name:_____ **Designation:**_____**Signature:**_____**Date:** _____

NOTE:

1. ***COLUMN SHALL NOT BE LEFT UNFILLED. IN CASE OF NOT APPLICABLE / NOT AVAILABLE, THE SAME SHALL BE INDICTED IN THE PROVIDED SPACE.***
2. ***IN CASE PROVIDED SPACE IS NOT ADEQUATE, INFORMATION SHALL BE PROVIDED AS AN ATTACHMENT.***
3. ***PRODUCT CATALOGUE FOR*** *THE PROPOSED EQUIPMENT / ITEM / PROCESS, IF AVAILABLE, SHALL BE ENCLOSED*