INDEX-BID DOCUMENTS- EPR INSULATED FIRE SURVIVAL CABLE for 1 X 660 MW PANKI TPP

1011306/2022/PS-PEM-EL

BHEL	**PRE-QUALIFICATION REQUIRMENTS FOR EPR INULATED FIRE SURVIVAL CABLE 1X660 MW PANKI TPS**	PE-PQ-426-507-E018 REVISION NO. 00 DATE 24.08.2022 SHEET NO. 1 OF 1

ITEMS : EPR Insulated Fire Survival cable **SCOPE :** Supply : YES; Erection & Commissioning : NO;	
1.0	Vendor should be a manufacturer of LT Power &/or Control cable.
2.0	Availability of test reports of tests on LT EPR fire survival cables to establish in-house capability to carry out all routine, type & acceptance test as per relevant IS/International standards (except UV radiation , hydrolytic stability & Fire Survival test) which can be conducted at Govt. Lab/ Govt. approved Independent lab.
3.0	Availability of type test certificate for LT-EPR fire survival cables for fire survival test conducted at independent lab or witnessed by third party as per relevant IS/ International standards.
4.0	Capacity of manufacturing 200 km of power/control cables (including XLPE /PVC/EPR insulated, FS /non-FS cables) per month.
5.0	Manufactured and supplied LT power cable sizes of minimum 185 sq.mm for 3/3.5 core and minimum 400 sq.mm for single core cable.
6.0	Manufactured & supplied at least 5 km of LT EPR fire survival cables.
6.0	Minimum two (2) nos. purchase orders for Power &/ or Control cable shall be submitted which should not be more than five (5) years old from the date of techno commercial bid opening for establishing *continuity in business*.

Notes (General points):

1. Consideration of offer shall be subject to customer's approval of bidder's, if applicable.
2. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self- attested English translated document should also be submitted.
3. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
4. After satisfactory fulfilment of all the above criteria / requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
SHWETA GABA DY. MGR	HEMA KUSHWAHA SR. MGR	PRAVEEN DUTTA AGM	DEBASISH RATH DH-ELECTRICAL

1 x 660 MW PANKI TPS

UTTAR PRADESH RAJYA VIDYUT UTPADAN NIGAM LIMITED

TECHNICAL SPECIFICATION FOR EPR INSULATED FIRE SURVIVAL CABLES

VOLUME-II

SPECIFICATION NO: PE-TS-426-507-E006

REVISION: 02

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, UP (INDIA) – 201301

	TECHNICAL SPECIFICATION FOR EPR INSULATED FIRE SURVIVAL CABLES **1 X 660MW PANKI TPS**	SPECIFICATION NO. PE-TS- 426-507-E006
		VOLUME II
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SECTION – I

SPECIFIC TECHNICAL REQUIREMENTS

BHEL	**TECHNICAL SPECIFICATION FOR EPR INSULATED FIRE SURVIVAL CABLES** **1 X 660MW PANKI TPS**	SPECIFICATION NO. PE-TS- 426-507-E006	
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COMPLIANCE CERTIFICATE

The bidder shall confirm compliance to the following by signing/ stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.

2. There are no deviation with respect to specification other than those furnished in the 'schedule of deviations'

3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.

4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.

5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in Annexure-A [BOQ-Cum-Price schedule] of the specification shall not be considered (i.e., technical description & quantities as per specification shall prevail).

BIDDER'S STAMP & SIGNATURE

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1.0 SCOPE OF ENQUIRY

1.1 This specification covers the Design, Manufacture, Inspection and Testing at Manufacturer's works, proper packing and delivery to site of EPR INSULATED FIRE SURVIVAL CABLES.

1.2 It is not the intent to specify herein all the details of design & manufacture. However, the equipment shall conform in all respects to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation at site conditions.

1.3 General technical requirements of the EPR INSULATED FIRE SURVIVAL CABLES are indicated in Section-II. Project specific technical/ quality requirements / changes are listed in Section-I.

1.4 The stipulations of Section-I, followed by those of Data Sheet-A shall prevail in case of any conflict between the stipulations of Section-I, Data Sheet - A & Section-II.

1.5 The documents shall be in English Language and MKS system of units

2.0 BILL OF QUANTITIES:

2.1 Quantity requirements shall be as per Annexure for Bill of Quantities (BOQ) enclosed as part of NIT.

3.0 TECHNICAL REQUIREMENTS

3.1 Specific Technical Requirement:

S.No.	***Reference Clause No. of Section- II***	***Specific Requirement/ Change***
1.	4.1	Shall be read as: "Cables shall be supplied in non-returnable drums, of heavy construction. Material of cable drums shall be as specified in Datasheet-A."
2.	4.2	Shall be read as follows: "Construction & other details of drums shall be in line with Datasheet-A."
3.	4.4	Shall be read as: "Each drum shall carry following details in printed form: a) UPRVUNL & Manufacturer's name or trade make b) Type of cable & voltage grade c) Year of manufacture d) Type of insulation / sheath e.g. IE2/SE3/FS. e) No. of core and size of cables f) Cable Code g) Single length of cable on drum h) Direction of rotation by arrow i) Approx. gross mass j) ISI mark k) IS number "
	4.5	This clause shall be added as follows- "A label shall be securely attached to each end of the reel indicating the length, type, voltage grade, conductor size and number of core of the cable. A tag

		containing the same information shall be attached to the leading end of the cable inside. An arrow and necessary instructions shall be marked on the drum indicating the direction in which it should be rolled. Drum numbers shall be indicated on cable drums."

3.2 Quality/ Inspection:

S.No.	***Reference Clause No. of Section- II***	***Specific Requirement/ Change***
1.	ANNEXURE-II: Standard Quality Plan: Note "C: CABLE ENDS SHALL BE SEALED AS PER MANUFACTRERS STANDARD."	Note C shall be read as: "CABLE ENDS SHALL BE SEALED AS PER APPROVED DATASHEET."

4.0 DRAWINGS & DOCUMENTS TO BE SUBMITTED

4.1 Documents/drawings to be submitted as part of technical offer & after placement of order for BHEL & customer's approval shall be as part of NIT.

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

Sl. No.	Drawings/Document Description	Drawings / Document Number
1.	Technical Data Sheet for EPR INSULATED FIRE SURVIVAL CABLES	PE-V1-426-507-E601
2.	Cross-sectional Drawings for EPR INSULATED FIRE SURVIVAL CABLES	PE-V1-426-507-E602
3.	Manufacturing Quality Plan for EPR INSULATED FIRE SURVIVAL CABLES	PE-V1-426-507-E603*****

Note:

***** Quality Plan as enclosed in the technical specification is to be appended with cover sheet bearing document number and description as stated above. The signed and stamped copy of the same shall be submitted to BHEL without making any changes in the contents of the document.

4.3 All drawings/ documents indicated above shall be submitted through Document Management System (DMS).

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DATASHEET A

BHEL	**TECHNICAL SPECIFICATION FOR EPR INSULATED FIRE SURVIVAL CABLES** **1 X 660MW PANKI TPS**	SPECIFICATION NO. PE-TS- 426-507-E006 VOLUME II SECTION I REVISION: 02 DATE: 16.08.2022 SHEET **1** of 3

DATASHEET-A

1.0	Type of Cable	EPR INSULATED FIRE SURVIVAL CABLES
2.0	Standard applicable in general(Latest amendment to be referred if any)	IS-16246, IS-8130, IS-6380, IS -10810,IS 10418, IS-3975, ASTMD:2843, ASTMD-2863, IEC-60754-1, IEC-60331, IEC-60332, IEEE-60383,SS-424-1475
3.0	Voltage Grade	1.1 KV
4.0	Number of cores, cross sectional area of conductors and quantities	As per BOQ-Cum-Price Schedule
5.0	**CONDUCTOR**	
(a)	Material	Copper
	Grade and Class (for Power Cables having crossectional area more than 2.5 sq.mm)	Stranded, plain, annealed high conductivity, Class 2
	~~Grade and Class (for Control Cables having crossectional area upto and including 2.5 sq.mm)~~	~~Stranded, Tinned, annealed high conductivity, Class 2~~
(b)	Standard Applicable	IS-16246, IS - 8130
(c)	Shape	~~Non- compacted Circular (upto 6 sq mm)~~ /Compacted Circular / Shaped ~~(for above 6 sq mm)~~
(d)	Min. number and diameter of strands for main and neutral conductor.	As per class -2 of IS 8130
(e)	Fire Barrier tape (separator tape)	Glass Mica tape in two layers with minimum 50% overlap
6.0	**INSULATION**	
(a)	Material	Heat resistant Elastomer compound , type IE2
(b)	Standard Applicable	IS-16246, IS -6380
(c)	Continuous withstand temperature	90°C
(d)	Short-circuit withstand temperature	250°C
(e)	Method of application	By extrusion; sleeve extrusion not permitted.
(f)	Method of curing	Dry/Steam/Gas/Sioplas
(g)	Nominal Thickness of insulation	As per Table-3 of IS-16246
(h)	Fire proof tape	Two Layers of plain Glass Fibre Binder Tape
7.0	**CORE IDENTIFICATION**	Colour coding as per IS-16246
8.0	**INNER SHEATH**	
(a)	Material	Heat resistant, oil resistant , flame retardant Elastomer compound
(b)	Grade and type	Extruded Type SE-6
(c)	Standard Applicable	IS : 16246
(d)	Colour	Black
9.0	**ARMOUR**	
(a)	Material:	
(i)	Single core cables	Single layer of Hard Drawn Aluminium Round Wire of H4 grade
	Standard Applicable	IS 8130, IS-16246
(ii)	Multi-core cables	Galvanised Steel Round Wire

	Standard Applicable	IS-3975, IS-16246
(b)	Gap between armour wires	Shall not exceed one armour wire space (No cross-over/ over-riding)
(c)	Minimum Coverage	90%
(d)	Breaking load of joint	95 % of normal armour
		Zinc rich paint shall be applied on armour joint surface of GS wire
10.0	**OUTERSHEATH**	
(a)	Material	Heat resistant, oil resistant , flame retardant Elastomer compound
(b)	Grade and type	Extruded Type SE-6
(c)	Colour	Black
(d)	Standard Applicable	IS : 16246
(e)	Marking	Cable size (cross section area and no. of cores) and voltage grade, ISI mark @ 1m (by embossing) Type of insulation & sheath(IE2/SE3), Word "EPR" "FS" etc, @ 1m (by embossing) Manufacturer's name and/ or trade name, and year of manufacture @ 1m (by embossing) 'BHEL-PEM' and 'UPRVUNL' Name @1m (by embossing) Progressive sequential marking @ 1m (by embossing)
.		
11.0	**ELASTOMERIC INNER & OUTER SHEATH CHARACTERISTICS**	
(a)	Oxygen index	≥30 (as per ASTMD 2863/ IS-16246)
(b)	Temperature Index	≥350ºC (as per ASTMD-2863)
(c)	Acid gas generation	< 2% by weight (as per IEC-60754-1/is-16246)
(d)	Smoke density rating	≤ 20% (As per ASTMD 2843 / IS 16246)
(e)	Water absorption test	IS 10810-28
(e)	**Flammability Test**	
(i)	Flammability test for single cable	As per IEC-60332 Part-1/ IS 16246
(ii)	Flammability test for bunched cables	As per IEC-60332 Part-3 CAT-B / IS 16246
(iii)	Flammability test for complete cable	As per IEEE-60383
(iv)	Swedish Chimney test	As per SEN-SS-424-1475-F3
(f)	***Fire survival test***	As per IEC-60331 / IS 16246 for min 3 Hrs at 750ºC
12.0	**Allowable Tolerance on OD**	±2 mm (max.)
13.0	**CABLE DRUMS**	
(a)	Type of Drum	Wooden Drum as per IS 10418
(b)	Standard drum length	500m , ~~1000m~~ (±) 5% (as specified in BOQ-Cum-Price Schedule)
(c)	Painting	Entire surface to be painted. All ferrous parts used shall be treated with suitable rust preventive finish or coating to avoid rusting during transit or storage. Wooden drum shall be treated by immersing in copper nitrate solution.. Drum number shall be indicated on each drum.
(d)	Outermost Layer	To be covered with water-proof polyethylene followed by complete drum covering with wooden plank of suitable thickness across flanges. (Pls refer typical drawing of cable drum packing, attached in section -II)
(e)	Particular information on Drum	Both the end of cables shall be properly sealed with heat

		shrinkable PVC / rubber caps secured by 'U' nails so as to eliminate ingress of water during transportation, storage & erection.
(f)	Construction Details	All wooden parts from seasoned wood and ferrous parts shall be treated with suitable rust preventive finish or coating. Wooden drum shall be treated by immersing in copper nitrate solution.

NOTE: 1. Suitable fire retardant material fillers shall be used for filling in the interstices. Two layers of plain glass binder tape should be applied over the laid up cores.
2. Minimum value of 'Tensile Strength' and 'Percentage elongation rate rupture' for inner sheath and outer sheath shall be 8 Newton/Sq. mm and 250% respectively.

3. If the ISI marking is not available with the bidder, discretion for acceptance or rejection of bid lies on BHEL based on BHEL customer requirement

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DATASHEET C

GUARANTEED TECHNICAL PARTICULARS
(TO BE SUBMITTED BY SUCCESSFUL BIDDER)

S.No.	Particulars	Unit	Description
1.0	**GENERAL**		
1.1	Name of Manufacturer	-	
1.2	Place of Manufacture	-	
2.0	**STANDARDS APPLICABLE**		
2.1	For general specification of EPR Cables	-	
2.2	For conductor material	-	
2.3	For material of inner-sheath & outer-sheath	-	
2.4	For method of tests	-	
2.5	For cable drums	-	
2.6	For oxygen index test	-	
2.7	For flammability test	-	
2.8	For acid gas generation test	-	
2.9	For smoke generation test	-	
2.10	For fire survival test	-	
2.11	Current rating of cables conforms to	-	
2.12	Short circuit rating conforms to	-	
3.0	**INFORMATION TO BE FILLED IN FOR EACH SIZE CABLE IN THE FORM OF TABLE**		
3.1	No. of cores x size	-	
3.2	Voltage grade (Uo/U)	kV	
3.3	Base current ratings as per standard		
a)	In air	Amp	
b)	In ground	Amp	
c)	ducts	Amp	
3.4	Short circuit rating	kA, sec	
3.5	CONDUCTOR		
a)	Applicable Standard	-	

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b)	Material type & grade	-	
c)	No & dia of wires in each core before stranding	no x mm	
d)	Shape	-	
e)	D.C. resistance of conductor at 20 deg. C	ohm/km	
f)	A.C. resistance of conductor at 85 deg. C	ohm/km	
g)	A.C. resistance of conductor at 90 deg. C	ohm/km	
h)	Reactance of cable at normal frequency	ohm/km	
i)	Electrostatic capacitance of cable at normal frequency	mF/km	
j)	Maximum conductor temperature	deg. C	
k)	Maximum short circuit temperature	deg. C	
3.6	HEAT BARRIER TAPE		
a)	Applicable Standard	-	
b)	Material	-	
c)	Thickness of tape	mm	
d)	No. of layers, overlap	-	
3.7	INSULATION		
a)	Applicable Standard	-	
b)	Material	-	
c)	Method of cross linking	-	
e)	Method of curing	-	
f)	Process of extrusion	-	
g)	Nominal thickness	mm	
h)	Minimum thickness	mm	
i)	Minimum insulation resistance constant at 27 deg. C	mega ohm/km	
j)	Minimum volume resistivity at 27 deg. C	ohm.cm	
k)	Minimum volume resistivity at 85/90 deg. C	ohm.cm	
l)	Dielectric strength of insulation		
m)	Resistivity of insulation		
n)	Acid gas generation of insulation & tape	%	
3.8	CORE IDENTIFICATION		
a)	Applicable Standard	-	

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3.9	INNERSHEATH		
a)	Material & type	-	
b)	Nominal Thickness	mm.	
c)	Minimum Thickness	mm.	
d)	Process of Extrusion	-	
e)	Type & Shape of fillers (if used)	-	
f)	Colour	-	
3.10	ARMOUR		
a)	Applicable Standard	-	
b)	Material	-	
c)	Size/ dimensions	-	
d)	Minimum no. of wires/ formed wires	-	
e)	Maximum DC resistance of armour	-	
f)	Maximum AC resistance of armour	-	
g)	Minimum coverage	-	
3.11	OUTERSHEATH		
a)	Material & type	-	
b)	Nominal Thickness	mm.	
c)	Minimum Thickness	mm.	
d)	Process of Extrusion	-	
e)	Colour	-	
4.0	**PERMISSIBLE VARIATION**		
a)	Voltage variation	%	
b)	Frequency Variation	%	
c)	Combined voltage & frequency	lAbsl	
5.0	**CHARACTERISTICS OF SHEATH (Inner & Outer)**		
a)	Oxygen index at 50 deg. C.	-	
b)	Temperature index	-	
c)	Acid gas generation	-	
d)	Smoke density rating	-	
6.0	**APPLICABLE TESTS UNDER FIRE CONDITIONS FOR SINGLE**		

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	CABLE & MULTIPLE CABLES		
7.0	**High Voltage Test Voltage**	kV	
8.0	**Water Absorption Test Voltage**	kV	
9.0	**CIRCUIT INTEGRITY TEST**		
a)	Applicable Standard	-	
b)	Temperature	Deg. C.	
c)	Duration	hrs	
10.0	**CABLE DRUMS**		
a)	Type & construction	-	
b)	Standard drum length (as per BOQ)	-	
c)	Tolerance on drum length	(+/-) 5%	
11.0	**DIAMETERS**		
a)	Overall diameter of conductor	mm	
b)	Overall diameter over taped conductor	mm	
c)	Approximate cable diameter of insulated conductor	mm	
d)	Approximate Cable diameter over inner sheath		
e)	Approximate overall diameter of cable		
12.0	**Tolerance on overall diameter**	**(±) mm**	
13.0	**Minimum bending radius**	**x O.D.**	
14.0	**Safe pulling force**	**kg.**	
15.0	**Maximum Charging current at nominal voltage (approx.)**	**amps/km**	
16.0	**Minimum Tensile strength**	**N/mm^2**	
17.0	**Minimum elongation percentage at rupture**		
18.0	**Weight of cable / components**	**kg./m**	

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a)	Weight of conductor	-	
b)	Weight of fire barrier tape	-	
c)	Weight of insulation	-	
d)	Weight of polymeric material	-	
e)	Weight of Armour (GS/Aluminium)	-	
f)	Total weight of cable	-	
19.0	**Shipping Weight**	**kg**	
20.0	**Cable marking on outer sheath**	**-**	

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SECTION-II

STANDARD TECHNICAL SPECIFICATION

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1.0 TECHNICAL REQUIREMENTS

1.1 Technical requirements for EPR INSULATED FIRE SURVIVAL CABLES shall be as indicated in this section, in addition to those specified in Section I & Datasheet-A.

2.0 CODES & STANDARDS

2.1 The design, material, construction, manufacture, inspection, testing and performance of EPR INSULATED FIRE SURVIVAL CABLES shall conform to the latest revision of relevant standards and codes of practices mentioned in Data Sheet – A.

2.2 In case of conflict between the applicable reference standard and this specification, this specification shall govern.

3.0 QUALITY ASSURANCE REQUIREMENTS

3.1 Bidder shall confirm compliance with the BHEL Standard Quality Plan (PE-QP-999-507-E006 as attached with the specification without any deviations. At contract stage, the successful bidder shall submit the same QP for BHEL/ ultimate customer's approval. In case bidder has reference QP agreed with ultimate customer, same can be submitted for specific project after award of contract for BHEL/ultimate customer's approval. There shall be no commercial implication to BHEL on account of minor changes in QP during contract stage.

3.2 All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved Quality Plan.

3.3 Type testing requirements, routine / acceptance testing and special testing requirements shall be as per Annexure to QAP. Charges for all these tests for all the equipment & components shall be deemed to be included in the bid price (except UV Radiation test).

3.4 The charges of UV Radiation test (if applicable) shall be reimbursed extra at actual against original money receipt of Govt. Lab. (CPRI/ ERDA etc).

3.5 Cost of cables consumed for testing shall be to bidder's account.

4.0 Packing

4.1 Cables shall be supplied in non-returnable drums. Material of cable drums shall be as specified in Datasheet-A.

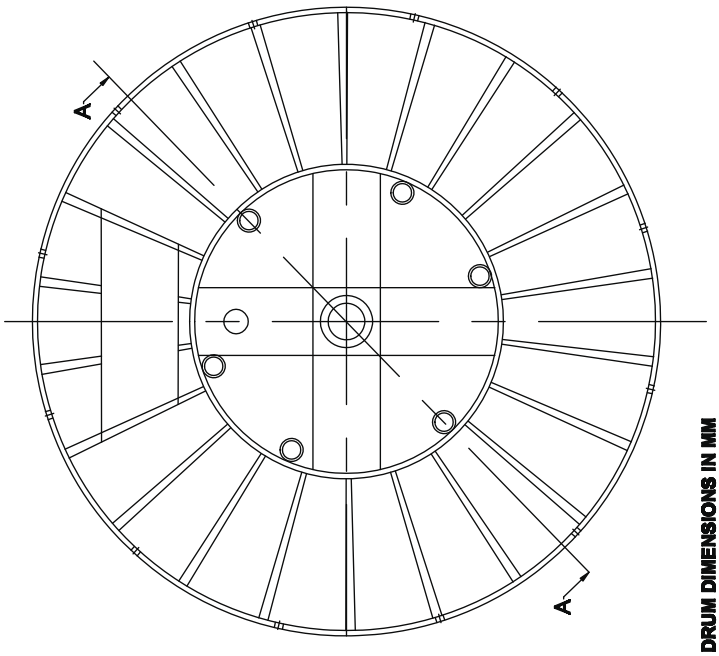
4.2 In case of wooden drums, all wooden parts shall be manufactured from seasoned wood treated with copper napthenates / zinc napthenates (refer IS: 401). Dimensions of wooden drums shall be as per IS 10418. All ferrous parts shall be treated with suitable rust protective finish or coating to avoid rusting during transit and storage. BIS certification mark shall be stamped on each cable drum.

4.3 In case of 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. Over the cables polyethylene sheet shall be wrapped and then sealed properly. For Typical details of Steel drums, Annexure-I to Section-II, may be referred by the bidder. Bidder may modify, to choose appropriate dimensions of steel drums to suite various sizes/weight/ lengths of EPR INSULATED FIRE SURVIVAL CABLES.

4.4 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.

ANNEXURE-I TO SECTION-II

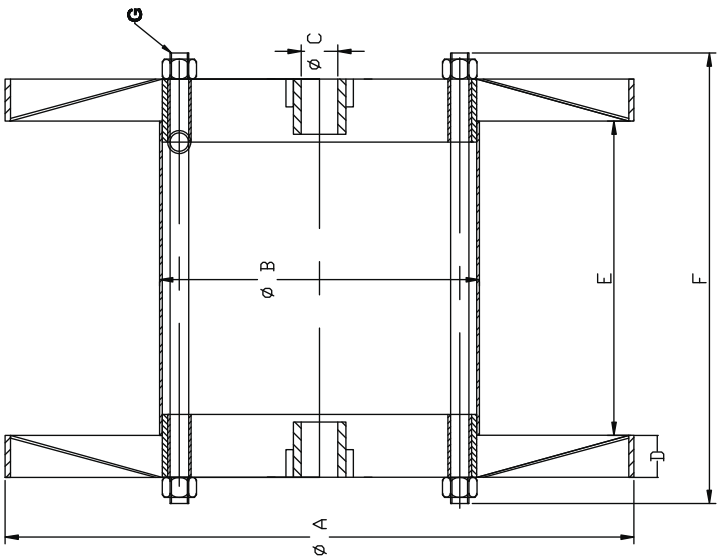
- Drg. not to scale.
- ALL DIMENSIONS ARE IN MM.



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	1600
G	STUD SIZE	16 MM.



TYPICAL DRAWING OF CABLE DRUM PACKING

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ANNEXURE-II

QUALITY PLAN

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	MANUFACTURING QUALITY PLAN	QP NO.: PE-V0-426-507-E914, REV 03.	DATE: 29.12.21
	CUSTOMER : UPVUNL		
	PROJECT: 1X660MW PANKI TPS		
	ITEM: EPR INSULATED FIRE SURVIVAL CABLE	SHEET 1 OF 10	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	C/N				D	M	C	N	
1.0	**RAW MATERIALS & BOUGHT OUT ITEMS**													
1.1	**Aluminium/copper Rods**	**GENERAL :**												
	(Conductor/Armour Wire)	1. Physical properties	MA	Physical Tests	Batch	Batch	IS 613 (For Copper) IS 5082 (For Al)	IS 613 (For Copper) IS 5082 (For Al)	Test Cert.	✓	P/V	V	-	
		2. Elec.Properties	MA	Electrical Tests	Batch	Batch	-do-	-do-	-do-	✓	P/V	V	-	
		SPECIFIC CHECKS :												
		a) Make	MA	Verify	100%	100%	Mfr. approved source	Mfr. approved source	Test Cert.	✓	P	V	-	
		b) Grade	MA	-do-	-do-	-do-	IS 613	IS 613	-do-	✓	P	V	-	
		c) Resistivity	MA	Electrical Tests	Mfr.std.	Mfr. std.	IS 613	IS 613	-do-	✓	P	V	-	
1.2	**Insulation (EPR) Compound**	**GENERAL :**												
		1. Physical properties	MA	Physical Tests	Batch	Batch	IS 6380	IS 6380	Test Cert.	✓	P/V	V	-	
		2. Elec.Properties	MA	Electrical Tests	Batch	Batch	-do-	-do-	-do-	✓	P/V	V	-	

SUPPLIER QUALITY ASSURANCE			BHEL- PEM QUALITY			FOR CUSTOMER REVIEW & APPROVAL		
	Sign & Date	Name		Sign & Date	Name		Sign & Date	Name
Prepared by:			Reviewed by:			Approved by:		
Reviewed by:								

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	MANUFACTURING QUALITY PLAN CUSTOMER : UPVUNL PROJECT: 1X660MW PANKI TPS	QP NO.: PE-V0-426-507-E914, REV 03.	DATE: 29.12.21
		ITEM: EPR INSULATED FIRE SURVIVAL CABLE	SHEET 2 OF 10	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9		**			
		SPECIFIC CHECKS :												
		a) Make	MA	Verify	100%	100%	Mfr. approved source	Mfr. approved source	Test Cert.	✓	P	V	-	
		b) Type/ Grade	MA	-do-	-do-	-do-	Approved datasheet	Approved datasheet	-do-	✓	P	V	-	
		c) Shelf life/ Storage condition	MA	-do-	-do-	-do-	Compound Mfr. std.	Compound Mfr. std.	-do-	✓	P	V	-	
1.3	**Sheathing Compound (Inner & Outer Sheath)**	**GENERAL :**												
		1. Physical properties	MA	Physical Tests	Batch	Batch	IS 16246 & Approved datasheet	IS 16246 & Approved datasheet	Test Cert.	✓	P/V	V	-	
		2. Mech. properties	MA	Envir/Chemical	Batch	Batch	-do-	-do-	-do-	✓	P/V	V	-	
		SPECIFIC CHECKS :												
		1. Make	MA	Verify	100%	-	Mfr. approved source	Mfr. approved source	T.C	✓	P/V	-	-	
		2. Type/ Grade	MA	-do-	-do-	-	Approved datasheet	Approved datasheet	-do-	✓	P/V	-	-	

SUPPLIER QUALITY ASSURANCE			BHEL- PEM QUALITY			FOR CUSTOMER REVIEW & APPROVAL		
	Sign & Date	Name		Sign & Date	Name		Sign & Date	Name
Prepared by:			Reviewed by:			Approved by:		
Reviewed by:								

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	MANUFACTURING QUALITY PLAN	QP NO.: PE-V0-426-507-E914, REV 03.	DATE: 29.12.21
	CUSTOMER : UPVUNL		
	PROJECT: 1X660MW PANKI TPS		
	ITEM: EPR INSULATED FIRE SURVIVAL CABLE	SHEET 3 OF 10	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	*	**			
					M	C/N				D	M	C	N	
		3. Shelf life/ Storage condition	MA	-do-	-do-	-	Compound Mfr. std	Compound Mfr. std.	-do-	✓	P/V	-	-	
1.4	**Glass Mica Tape (Separator Tape)**	**GENERAL :**												
		1. Physical properties	MA	Physical Tests	Batch	-	IS 16246	IS 16246	T.C	✓	P/V	-	-	
		2. Elec.Properties	MA	Electrical Tests	Batch	-	Mfr. std.	Mfr. std.	-do-	✓	P/V	-	-	
1.5	Galvanised steel round wire/ formed wire strip/ Aluminium round wire for Armour (as applicable)	**GENERAL :**												
		1. Make	MA	Verify	Mfr std.	-	Mfr. approved source	Mfr. approved source	Test Cert.	✓	P/V	-	-	
		2. Dimension	MA	Measurement	-do-	-	Approved datasheet	Approved datasheet	-do-	✓	P/V	-	-	

SUPPLIER QUALITY ASSURANCE			BHEL- PEM QUALITY			FOR CUSTOMER REVIEW & APPROVAL		
	Sign & Date	Name		Sign & Date	Name		Sign & Date	Name
Prepared by:			Reviewed by:			Approved by:		
Reviewed by:								

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	MANUFACTURING QUALITY PLAN CUSTOMER : UPVUNL PROJECT: 1X660MW PANKI TPS	QP NO.: PE-V0-426-507-E914, REV 03.	DATE: 29.12.21
	ITEM: EPR INSULATED FIRE SURVIVAL CABLE	SHEET 4 OF 10	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9		**			
		3. Phy.and Elec. Properties	MA	Physical & Electrical Tests	Sample*	-	-do-	-do-	-do-	✓	P/V	-	-	* Sample from each armour size/ Batch / Lot
		4.Galvanization Quality	MA	Galv.Tests	-do-	-	IS3975	IS3975	-do-	✓	P/V	-	-	
1.6	**Wooden Drum (as applicable)**	1. Phy. And constructional checks	MA	Meas.	Mfr's Plant Std.	Mfr's Plant Std.	IS10418	IS10418	Test Cert.	✓	P	V	-	
		2. Anti-termite treatment	MA	chemical	-do-	-do-	Mfr's Plant Std.	Mfr's Plant Std.	-do-	✓	P	V	-	
1.7	**Steel Drum (as applicable)**	1. Dimension	MA	Meas.	Mfr's Plant Std.	Mfr's Plant Std.	Approved drawing of steel drum	Approved drawing of steel drum	Test Cert.	✓	P	V	-	
		2. Surface finish	MA	Meas.	-do-	-do-	Surface shall be smooth	Surface shall be smooth	-do-	✓	P	V	-	
2.0 IN PROCESS														
2.1	Wire Drawing	1. Size	MA	Dimensional	Plant Mfg. Std.	Plant Mfg. Std.	Appd. Datasheet	Appd. Datasheet	Test report/Inspection report	✓	P	V	-	

SUPPLIER QUALITY ASSURANCE			BHEL- PEM QUALITY			FOR CUSTOMER REVIEW & APPROVAL		
	Sign & Date	Name		Sign & Date	Name		Sign & Date	Name
Prepared by:			Reviewed by:			Approved by:		
Reviewed by:								

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	MANUFACTURING QUALITY PLAN CUSTOMER : UPVUNL PROJECT: 1X660MW PANKI TPS	QP NO.: PE-V0-426-507-E914, REV 03.	DATE: 29.12.21
		ITEM: EPR INSULATED FIRE SURVIVAL CABLE	SHEET 5 OF 10	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9		**			
		2. Surface finish	MA	Visual	-do-	-do-	Surface shall be smooth	Surface shall be smooth	-do-	✓	P	V	-	
2.2	Stranding of wires	1. No. of wires	MA	Counting	Plant Mfg. Std.	Plant Mfg. Std.	Appd. Datasheet	Appd. Datasheet	Test report/Inspection report	✓	P	V	-	
		2. Resistance	CR	Electrical	-do-	-do-	-do-	-do-	-do-	✓	P	V	-	
		3. Sequence, lay length & Direction	MA	Visual, Meas.	One Sample of each size/ lot	One Sample of each size/ lot	Mfrs Std.	Mfrs Std.	-do-	✓	P	V	-	
		4. Surface Finish	MA	Visual	100%	100%	Surface shall be smooth	Surface shall be smooth	-do-	✓	P	V	-	
		5. Dimension	MA	Measurement	One Sample of each size/ lot	One Sample of each size/ lot	Appd. Datasheet	Appd. Datasheet	-do-	✓	P	-	-	

SUPPLIER QUALITY ASSURANCE			BHEL- PEM QUALITY			FOR CUSTOMER REVIEW & APPROVAL		
	Sign & Date	Name		Sign & Date	Name		Sign & Date	Name
Prepared by:			Reviewed by:			Approved by:		
Reviewed by:								

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	MANUFACTURING QUALITY PLAN CUSTOMER : UPVUNL PROJECT: 1X660MW PANKI TPS	QP NO.: PE-V0-426-507-E914, REV 03.	DATE: 29.12.21
		ITEM: EPR INSULATED FIRE SURVIVAL CABLE	SHEET 6 OF 10	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9		**			
2.3	Glass Mica tape	1. Dimensions	MA	Measurement	100%	100%	Appd. datasheet	Appd. datasheet	Test report/Inspection report	✓	P	V	-	
		2. Dia over tape	MA	Measurement	Sample	Sample	Mfrs Std.	Mfrs Std.	-do-	✓	P	V	-	
		3.Mica tape overlap	MA	Measurement	Sample	Sample	Appd. datasheet	Appd. datasheet	-do-	✓	P	V	-	
2.4	Core Insulation (EPR)													
	(No repair permitted)	1. Surface finish	MA	Visual	100%	100%	Free from bulging, burnt particles, lumps, cuts & scratches	Free from bulging, burnt particles, lumps, cuts & scratches	Test report/Inspection report	✓	P	V	-	
		2. Concentricity#	CR	Measurement	One Sample of each size/ lot	One Sample of each size/ lot	Mfrs Std.	Mfrs Std.	-do-	✓	P	V	-	# To be checked at starting & finished end of extruded length.
		3. Insulation Thickness	CR	Measurement	-do-	-do-	Appd. datasheet	Appd. datasheet	-do-	✓	P	-	-	
		4. Dia over insulation	MA	Measurement	-do-	-do-	-do-	-do-	-do-	✓	P	-	-	

SUPPLIER QUALITY ASSURANCE			BHEL- PEM QUALITY			FOR CUSTOMER REVIEW & APPROVAL		
	Sign & Date	Name		Sign & Date	Name		Sign & Date	Name
Prepared by:			Reviewed by:			Approved by:		
Reviewed by:								

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	MANUFACTURING QUALITY PLAN CUSTOMER : UPVUNL PROJECT: 1X660MW PANKI TPS	QP NO.: PE-V0-426-507-E914, REV 03.	DATE: 29.12.21
	ITEM: EPR INSULATED FIRE SURVIVAL CABLE	SHEET 7 OF 10	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9		**			
		5. Tensile Strength & % Elongation	MA	Mechanical	100%	100%	IS 6380	IS 6380	-do-	✓	P	-	-	
		6. Water absorption test	CR	Electrical	100%	100%	-do-	-do-	-do-	✓	P	-	-	
2.5	Core Laying	1. Dia over laid up core	MA	Measurement	One Sample of each size/ lot	-	Appd. datasheet	Appd. datasheet	Test report/Inspection report	✓	P	-	-	
		2. Sequence of lay & direction	MA	Visual & Meas.	-do-	-	IS 16246	IS 16246	-do-	✓	P	-	-	
		3. Lay Length	MA	Measurement	-do-	-	-do-	-do-	-do-	✓	P	-	-	
2.6	Inner Sheath Extrusion	1. Surface finish	MA	Visual	100%	-	Surface shall be smooth	Surface shall be smooth	Test report/Inspection report	✓	P	-	-	(Pimple, fish eye, porosity & burnt particles not permitted.)
		2. Thickness	CR	Measurement	One Sample of each size/ lot	-	Appd. Datasheet	Appd. Datasheet	-do-	✓	P	-	-	
		3. Dia over inner sheath	MA	-do-	-do-	-	-do-	-do-	-do-	✓	P	-	-	
						-								
2.7	Armour	1. No.of wires/Strips	MA	Counting	At the start of	-	Mfrs Std.	Mfrs Std.	Test report/I	✓	P	-	-	

SUPPLIER QUALITY ASSURANCE			BHEL- PEM QUALITY			FOR CUSTOMER REVIEW & APPROVAL		
	Sign & Date	Name		Sign & Date	Name		Sign & Date	Name
Prepared by:			Reviewed by:			Approved by:		
Reviewed by:								

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	MANUFACTURING QUALITY PLAN CUSTOMER : UPVUNL PROJECT: 1X660MW PANKI TPS	QP NO.: PE-V0-426-507-E914, REV 03.	DATE: 29.12.21
		ITEM: EPR INSULATED FIRE SURVIVAL CABLE	SHEET 8 OF 10	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9		**			
					the process				nspection report					
		2. Lay length	MA	Visual & Meas.	-do-	-	-do-	-do-	-do-	✓	P	-	-	
		3. Lay Direction	MA	Visual & Meas.	-do-	-	IS 16246	IS 16246	-do-	✓	P	-	-	
		4. Dia over armouring	MA	Measurement	-do-	-	Appd. Datasheet	Appd. Datasheet	-do-	✓	P	-	-	
		5. Coverage	MA	Measurement	-do-	-	-do-	-do-	-do-	✓	P	-	-	
2.8	Outer Sheath Extrusion (No repair permitted)	1. Surface finish	MA	Visual	100%	-	Surface shall be smooth	Surface shall be smooth	Test report/Inspection report	✓	P	-	-	(Pimple, fish eye, porosity & burnt particles not permitted.)
		2. Sheath Thickness	CR	Measurement	One Sample of each size/ lot	-	Appd. Datasheet	Appd. Datasheet	-do-	✓	P	-	-	
		3. Dia over outer sheath	MA	-do-	-do-	-	-do-	-do-	-do-	✓	P	-	-	
		4. Embossing/ Sequential Marking	MA	Visual	100%	-	-do-	-do-	-do-	✓	P	-	-	
3.0	Final Inspection (INTERNAL)	1. Routine Test (Refer Note-H)	CR	Electrical Tests & Measurement	100%	100%	#	#	Test report/Inspecti	✓	P	V	V	# Refer Annexure to QAP enclosed

SUPPLIER QUALITY ASSURANCE			BHEL- PEM QUALITY			FOR CUSTOMER REVIEW & APPROVAL		
	Sign & Date	Name		Sign & Date	Name		Sign & Date	Name
Prepared by:			Reviewed by:			Approved by:		
Reviewed by:								

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	MANUFACTURING QUALITY PLAN CUSTOMER : UPVUNL PROJECT: 1X660MW PANKI TPS	QP NO.: PE-V0-426-507-E914, REV 03.	DATE: 29.12.21
		ITEM: EPR INSULATED FIRE SURVIVAL CABLE	SHEET 9 OF 10	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	*	AGENCY			REMARKS
					M	C/N				D	M	C	N	
1	2	3	4	5	6		7	8	9		**			
									on report					
4.0	Final Inspection (EXTERNAL)	1. Finish & Length (cable & Cable Drum)	MA	Visual	One drum in each Lot	One drum in each Lot	Approved datasheet	Free from Porosity, Bulging, Burnt particles, lumps, cuts & scratches	Test report/Inspection report	✓	P	W	W	
		2. Dimension	MA	Measurement	-do-	-do-	-do-	Approved Data Sheet	-do-	✓	P	W	W	
		3. Armouring - Coverage & No.of Wires	MA	Visual & Meas.	-do-	-do-	-do-	-do-	-do-	✓	P	W	W	
		4. Marking & Colour coding	MA	Visual	IS 16246	IS 16246	Approved datasheet	Approved datasheet	-do-	✓	P	W	W	
		5. Acceptance Tests (Refer Note-H)	CR	Phy, Elect. Tests FRLS Tests	Sample #	Sample #	#	#	-do-	✓	P	W	W	# Refer Annexure to QAP enclosed
		6. Type Tests (Refer Note-H)	CR	Physical & Electrical Tests	Sample #	Sample #	#	#	-do-	✓	P	W	W	*# Refer Annexure to QAP enclosed*
5.0	Packing	Sealing Identification	MA	Visual	100%	100%	As per Mfr. Std.	As per Mfr. Std.	-do-	✓	P	W	-	

SUPPLIER QUALITY ASSURANCE			BHEL- PEM QUALITY			FOR CUSTOMER REVIEW & APPROVAL		
	Sign & Date	Name		Sign & Date	Name		Sign & Date	Name
Prepared by:			Reviewed by:			Approved by:		
Reviewed by:								

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	MANUFACTURING QUALITY PLAN CUSTOMER : UPVUNL PROJECT: 1X660MW PANKI TPS	QP NO.: PE-V0-426-507-E914, REV 03.	DATE: 29.12.21
	ITEM: EPR INSULATED FIRE SURVIVAL CABLE	SHEET 10 OF 10	

Sl. No.	COMPONENTS & OPERATIONS	CHARACTERSTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					6				9	*	**			
					M	C/N	7	8		D	M	C	N	
1	2	3	4	5										

NOTES:

A). JOINTS IN CONDUCTORS & ARMOUR SHALL BE AS PERMITTED BY IS:8130 & IS:7098-I RESPECTIVELY.
B). NO REPAIR OF CORE INSULATION PERMITTED.
C). CABLE ENDS SHALL BE SEALED.
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 RELEVANT STANDARD.
F). WHEREVER EXTENT OF CHECK FOR STAGE IS MENTIONED AS 'SAMPLE' & NOT DEFINED IN QP, THE SAME SHALL BE AS PER SAMPLING PLAN AGREED BY PURCHASER.
G). VENDOR SHALL FURNISH COMPLIANCE CERTIFICATE TO THE INSPECTION AGENCY CONFIRMING THE PACKING AS PER IS/ BHEL SPECIFICATION.
H). FOR LISTS OF ROUTINE TESTS, ACCEPTANCE TESTS & TYPE TESTS, REFER ANNEXURE-1 TO QAP.
I). 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.
J). CABLE MANUFACTURER TO MAINTAIN ALL QUALITY RECORDS IDENTIFIED AS PER ALL QP STAGES ENUMERATED BELOW WHETHER IT IS IDENTIFIED FOR BHEL VERIFICATION / WITNESS OR NOT.
K). BHEL / OWNER RESERVES THE RIGHT TO CONDUCT REPEAT TESTS, IF REQUIRED.
L). THE LATEST REVISION/ YEAR OF ISSUE OF ALL THE STANDARDS INDICATED IN THE QP SHALL BE REFERRED.
M). PHOTOGRAPHS OF CABLE TO BE DESPATCHED SHALL BE SENT TO BHEL PURCHASE GROUP FOR REVIEW PRIOR TO ISSUE OF MDCC.
N). MATERIAL SHALL BE PACKED SUITABLY IN ORDER TO AVOID DAMAGE DURING TRANSIT AND ALSO DURING STORAGE AT SITE IN TROPICAL CLIMATE CONDITIONS.
O). FOR CABLE SIZE AND RATINGS, KINDLY REFER ANNEXURE-2.
P). FOR LIST OF MAKES OF BOIs / RAW MATERIALS, KINDLY REFER ANNEXURE-3.

LEGENDS:

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

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

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

MA: MAJOR, **MI**: MINOR, **CR:** CRITICAL

SUPPLIER QUALITY ASSURANCE			BHEL- PEM QUALITY			FOR CUSTOMER REVIEW & APPROVAL		
	Sign & Date	Name		Sign & Date	Name		Sign & Date	Name
Prepared by:			Reviewed by:			Approved by:		
Reviewed by:								

BHEL	ANNEXURE TO QAP	CUSTOMER: UPRVUNL	PROJECT TITLE: 1 X 660MW PANKI TPS	SPECIFICATION NUMBER: PE-TS-426-507-E006, R01
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E006, R01	SPECIFICATION TITLE: TECHNICAL SPECIFICATION FOR EPR INSULATED FIRE SURVIVAL CABLES
	SHEET 8 of 11	SYSTEM	ITEM: EPR INSULATED FIRE SURVIVAL CABLE	DOC. NO.

TYPE/ ACCEPTANCE/ ROUTINE TEST 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 test to be conducted on each size & type of cable on 1 drum out of every 10 drums. The type tests may be witnessed by BHEL/ Owner, for which due notice shall be given by the vendor

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:
Acceptance tests shall be carried out on 1 drum out of every 10 drums chosen at random for acceptance of lot of every size.

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 tests shall be conducted on 100% drums.

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
1.0	**Tests for Conductor**				
I.	Persulphate test	For copper conductor only	**T**	IS 10810 Pt 4	
II.	Annealing test	For copper conductor only	**T, A**	IS 10810 Pt 1	***Internal in process Test Report to be furnished for acceptance test***
III.	Conductor Resistance test	For Cu	**T, A, R**	IS 10810 Pt 5	
2.0	**Tests for Armour Wires/Strips**				
I.	Measurement of dimensions	Applicable for Aluminium wire & GS wire/Strip	**T,A**	IS 10810 Pt 36	
II.	Test for measurement of DC resistance of armour		**T**	Relevant IS	

BHEL	PARTICULARS	BIDDER/ VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S / VENDORS COMPANY SEAL

	ANNEXURE TO QAP	CUSTOMER: UPRVUNL	PROJECT TITLE: 1 X 660MW PANKI TPS	SPECIFICATION NUMBER: PE-TS-426-507-E006, R01
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E006, R01	SPECIFICATION TITLE: TECHNICAL SPECIFICATION FOR EPR INSULATED FIRE SURVIVAL CABLES
	SHEET **9** of **11**	SYSTEM	ITEM: EPR INSULATED FIRE SURVIVAL CABLE	DOC. NO.

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
III.	Tensile test	Applicable for Aluminium wire & GS wire/Strip	**T, A**	IS 10810 Pt 37	
IV.	Elongation at break test	Applicable for GS wire/Strip only	**T, A**	IS 10810 Pt 37	
V.	Torsion test	For GS round wire only	**T, A**	IS 10810 Pt 38	
VI.	Winding test	For GS strip only	**T, A**	IS 10810 Pt 39	
VII.	Resistivity test	Applicable for Aluminium wire & GS wire	**T, A,R**	IS 10810 Pt 42	
VIII.	Uniformity of Zinc coating test	For G. S. wires/Strip only	**T, A**	IS 10810 Pt 40	
IX.	Mass of Zinc coating test	For G. S. wires/Strip only	**T, A**	IS 10810 Pt 41	
X.	Wrapping Test	For Aluminium wires only	**T, A**	IS 10810 Pt 3	
3.0	**Test for Fire Barrier Tape**				
I.	Test for minimum thickness	Fire barrier tape	**T,A**	IS 10810 Pt 6	
4.0	**Physical Tests for EPR insulation & sheath**				
I.	Material	Applicable for insulation, elastomeric inner & outer sheath	**T,A**	IS 16246	
II.	Test for thickness	Applicable for insulation, elastomeric inner & outer sheath	**T,A**	IS 10810 Pt 6	
III.	Tensile strength and elongation test at break	Applicable for insulation, elastomeric inner & outer sheath	**T,A**	IS 10810 Pt 7	
IV.	Ageing in air oven	Applicable for insulation	**T**	IS 10810 Pt 11	
V.	Ageing in air bomb	Applicable for insulation, elastomeric inner & outer sheath	**T**	IS 10810 Pt 56	
VI.	Aging in O_2 bomb	Insulation, elastomeric inner & outer sheath **(if applicable as per IS)**	**T**	IS 10810 Pt 16	
VII.	Hot set test	Applicable for insulation, elastomeric inner & outer sheath	**T,A**	IS 10810 Pt 30	
VIII.	Oil resistance	Applicable for insulation, elastomeric inner & outer sheath	**T**	IS 16246	
5.0	**Electrical Tests**				
I.	Insulation resistance	Applicable for EPR insulation	**T,A**	IS 10810 Pt 43	
II.	High voltage (Water immersion) test	Applicable for elastomeric Inner & outer sheath	**T,A,R**	IS 10810 Pt 45	

	ANNEXURE TO QAP	CUSTOMER: UPRVUNL	PROJECT TITLE: 1 X 660MW PANKI TPS	SPECIFICATION NUMBER: PE-TS-426-507-E006, R01
		BIDDER/VENDOR:	QUALITY PLAN NUMBER : PE-QP-999-507-E006, R01	SPECIFICATION TITLE: TECHNICAL SPECIFICATION FOR EPR INSULATED FIRE SURVIVAL CABLES
	SHEET **10** of **11**	SYSTEM	ITEM: EPR INSULATED FIRE SURVIVAL CABLE	DOC. NO.

S. No.	TEST	APPLICABLE FOR	TEST CONDUCTION REQUIRED AS	REFERENCE STANDARD	REMARKS
III.	Water absorption test	Applicable for EPR insulation	**T**	IS 10810 Pt 28	
IV.	Measurement of Insulation Resistance constant (K-value)		**T**	IS:6380/1984	
V.	Spark test high voltage test		**T**	As per relevant IS	***Internal in process Test Report to be furnished for type test***
6.0	**HOFR Tests (On complete cable)**				
I.	Oxygen Index test	Applicable for elastomeric Inner & outer sheath	**T, A**	ASTMD-2863	
II.	Temperature index test	Applicable for elastomeric Inner & outer sheath	**T, A**	ASTMD-2863	
III.	Smoke density test	Applicable for elastomeric Inner & outer sheath	**T, A**	ASTMD 2843	
IV.	Swedish chimney test	For complete cable	**T, A**	SEN SS 424 1475 (Class F3)	
V.	Acid Gas Generation test	Applicable for elastomeric Inner & outer sheath	**T, A**	IEC 60754-1	
7.0	**Flammability Tests**				
I.	Flammability test for bunched cables	For complete cable	**T**	IEC-60332 (Part-3) CAT-B	Refer Notes 1,2 & 3
II.	Flammability test for single cable	For complete cable	**T**	IEC:60332 Part-1	
III.	Flammability test	For complete cable	**T**	IEEE: 60383	
8.0	**Fire Survival Test (3 hr)**	For complete cable	**T, A**	IEC-60331/IS 16246	Withstanding 750deg C temperature for 3 hours

Notes:

1. This test shall generally be carried out as per IEEE 383. The cable installation to be tested shall consist of as many cables as are necessary to give at least 10 kg of organic material per metre run.
2. The following cable installation shall be tested: Installation with single / multi core cables in touching formation.
3. Size of cables, number of cables, number of layers and laying arrangements for each installation shall be subject to BHEL / Customer's approval.

BHEL	PARTICULARS	BIDDER/ VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S / VENDORS COMPANY SEAL

ANNEXURE-2; QAP	
PROJECT: 1X660 MW PANKI TPS	
ITEM: EPR INSULATED FIRE SURVIVAL CABLE	
S.No.	Size & Rating of Cables
1	1 Core-630 Sq.mm, 1.1 kV grade - ARMOURED
2	2 Core-16 Sq.mm, 1.1 kV grade - ARMOURED
3	2 Core-35 Sq.mm, 1.1 kV grade - ARMOURED
4	2 Core-70 Sq.mm, 1.1 kV grade - ARMOURED
5	2 Core-120 Sq.mm, 1.1 kV grade - ARMOURED
	NOTE: 1.1 kV EPR Insulated Fire Survival cable as per approved datasheet & Cross sectional drawings.

ANNEXURE-3

Sub-vendor/Make List

Make list for various components shall be attached by vendor as Annexure -3 which shall be subject to BHEL customer approval during contract stage without any price implication.

Delivery Schedule of EPR INSULATED FIRE SURVIVAL CABLE-PANKI Project (Annexure-II)

Sl. No.	Package name	BHEL Drawing No	Drawing Title	Primary/Secondary	Drg Sch for Vendors	Delivery Terms for Supply Portion
1	**EPR INSULATED FIRE SURVIVAL CABLE**	PE-V0-426-507-E183	TECHNICAL DATA SHEET - EPR INSULATED FIRE SURVIVAL CABLE	**Primary**	R-0 within 14 days from PO & subsequent revisions within 10 days of comments received from BHEL. BHEL shall furnish comments / approval on each submission within 18 days from receipt.	**For Main Supply Qty:** Within Four (04) months from date of CAT-1 approval of Primary drawing/documents, subjected to drawing/document submission/re-submission schedule as stipulated, in case of any delay in submission/re-submission of Primary drawing/documents, then same shall be reduced from the given delivery period. **Mandatory spares qty:-** Delivery of Mandatory spares shall be 04 months from the date of BHEL Clearance. Separate manufacturing clearance shall be given for mandatory spares qty. Qty of mandatory spares shall be supplied separately. **For Subsequent Lots (If any)**: Within 3 months from Lot clearance by BHEL.
		PE-V0-426-507-E181	CROSSSECTIONAL Drawings for EPR INSULATED FIRE SURVIVAL CABLE	**Primary**		
		PE-V0-426-507-E920	QUALITY PLAN for EPR INSULATED FIRE SURVIVAL CABLE	**Primary**		
		PE-V0-426-507-E184	TYPE TEST CERTIFICATES - EPR INSULATED FIRE SURVIVAL CABLE	**Secondary**	Within 1 week after conduction of Type Test	

ANNEXURE-A (MAIN SUPPLY)

BILL OF QUANTITIES (1.1kV EPR INSULATED FIRE SURVIVAL CABLES)-PANKI Project

(A) MAIN SUPPLY

1.1 kV Fire Survival cable with stranded, non-compacted/compacted, plain/tinned annealed copper conductor (as per technical specification), EPR insulation, HOFR elastomeric Inner Sheath, Al Round Wire (applicable for single core cable) / GS Round Wire Armour (applicable for multi core cable) and HOFR elastomeric Outer Sheath Generally conforming to IS :16246 and BHEL specification.

S.No.	Item code	Item name	UOM	Ordered Quantity	Drum Length	HSN CODE	Quoted/Not Quoted
A1	507-42025-A	2C-16 ARMOURED	MTR	7000	500	85444930	
A2	507-42026-A	2C-35 ARMOURED	MTR	6000	500	85444930	
A3	507-42027-A	2C-70 ARMOURED	MTR	500	500	85444930	
A4	507-42028-A	2C-120 ARMOURED	MTR	500	500	85444930	
A5	507-42006-A	1C-630 ARMOURED	MTR	1000	500	85444930	

NOTES : (Applicable for Main Supply only)

1. Quantities indicated above for S. No. (A) shall be known as Order Quantities. The variation in quantities of all sizes shall be as per GeM.
2. The bidder shall indicate the unit price of each type and size of cables listed as per the BOQ-Cum-Price Schedule. The unit prices shall apply for adjustment of variation in quantity as stipulated above.
3. Quantities indicated above shall be cleared for manufacturing along with PO. However, manufacturing of the cables shall be taken up by the successful bidder only after approval of technical and quality documentation. Subsequent lots shall be cleared for manufacture based on progress of engineering & site requirements.
4. The standard drum length shall be 500 meters. Tolerance on individual drum length shall be ±5%.
5. Overall tolerance on total dispatched quantity of each size shall be (-) 2% and (+) 0% except where the total ordered quantity is one single drum length of 500m , in which case it shall be -5%/0%. Cables consumed for testing and inspection shall be to bidder's account.
6. For each individual cable size, one short length of not less than 250m (for drum length of 500m) may be accepted only in the final drum length to complete the supply (except where the total ordered quantity is one single drum length of 500m). The overall tolerance limits stipulated above shall continue to apply (in case short lengths are accepted).
7. In case of the quantities of any one lot cleared by BHEL for manufacturing are manufactured and offered for inspection by successful bidder in more than one batch, BHEL reserves the right to witness type testing on all batches without any price implications.
8. Bidder shall indicate unit price of cables inclusive of type test charges. No separate charges shall be payable for type tests.

ANNEXURE-B (Mandatory Spares)

BILL OF QUANTITIES (1.1kV EPR INSULATED FIRE SURVIVAL CABLES)-PANKI Project

(B) MANDATORY SPARES

1.1 kV Fire Survival cable with stranded, non-compacted/compacted, plain/tinned annealed copper conductor (as per technical specification), EPR insulation, HOFR elastomeric Inner Sheath, Al Round Wire (applicable for single core cable) / GS Round Wire Armour (applicable for multi core cable) and HOFR elastomeric Outer Sheath Generally conforming to IS :16246 and BHEL specification

S.No.	Item code	Item name	UOM	Ordered Quantity	HSN CODE	QUOTED/NOT QUOTED
B1	507-42000-B	2C-16 ARMOURED	MTR	700	85444930	
B2		2C-35 ARMOURED	MTR	600	85444930	
B3		2C-70 ARMOURED	MTR	50	85444930	
B4		2C-120 ARMOURED	MTR	50	85444930	
B5		1C-630 ARMOURED	MTR	100	85444930	

Notes: (Applicable for Mandatory Spares only)

1. Quantities indicated above for SI. NO. (B) shall be known as Order Quantities. The variation in quantities of all sizes shall be as per GeM portal.

2. The bidder shall indicate the unit price of each type and size of cables listed as per the BOQ-Cum-Price Schedule. The unit prices shall apply for adjustment of variation in quantity as stipulated above.

3 . Tolerance on individual drum length shall be ±5%. Overall tolerance on total dispatched quantity of each size shall be (-) 2% and (+) 0%.

4. Quantity of mandatory spares indicated above shall be manufactured by the successful bidder only after approval from BHEL. The drums supplied against item B shall be clearly identified as "MANDATORY SPARE".

5. Bidder shall indicate unit price of cables inclusive of type test charges. No separate charges shall be payable for type tests.

CORPORATE QUALITY ASSURANCE/ कॉरपोरेट गुणवत्ता आश्वासन

SUB-VENDOR QUESTIONNAIRE/ सब-वेंडर प्रश्नावली

i.	***Item/Scope of Sub-contracting*** **उप-संविदा(अनुबंध) का मद/ दायरा**	
ii.	***Address of the registered office*** पंजीकृत कार्यालय का पता	***Details of Contact Person*** संपर्क व्यक्ति का विवरण ***(Name, Designation, Mobile, Email)*** (नाम, पदनाम, मोबाइल, ईमेल)
iii.	***Name and Address of the proposed Sub-vendor's works where item is being manufactured*** प्रस्तावित उप-विक्रेता के कार्यों का नाम और पता, जहां मद का निर्माण किया जा रहा है	***Details of Contact Person:*** संपर्क व्यक्ति का विवरण ***(Name, Designation, Mobile, Email)*** (नाम, पदनाम, मोबाइल, ईमेल)
iv.	***Annual Production Capacity for proposed item/scope of sub-contracting*** **उप-संविदा(अनुबंध)** के प्रस्तावित मद / दायरे के लिए वार्षिक उत्पादन क्षमता	
v.	***Annual production for last 3 years for proposed item/scope of sub-contracting*** **उप-संविदा(अनुबंध)** के प्रस्तावित मद / दायरे के लिए पिछले 3 वर्षों का वार्षिक उत्पादन	
vi.	***Details of proposed works*** **प्रस्तावित कार्यों का विवरण**	
1.	***Year of establishment of present works*** वर्तमान फैक्टरी की स्थापना का वर्ष	
2.	***Year of commencement of manufacturing at above works*** उपरोक्त फैक्टरी में निर्माण कार्य शुरू होने का वर्ष	
3.	***Details of change in Works address in past (if any*** पूर्व में फैक्टरी स्थल में परिवर्तन का विवरण (यदि कोई हो)***)***	
4.	***Total Area*** कुल क्षेत्र	
	Covered Area शामिल क्षेत्र	
5.	***Factory Registration Certificate*** फैक्टरी पंजीकरण प्रमाण पत्र	***Details attached at Annexure – F2.1*** विवरण अनुलग्नक- एफ 2.1 पर संलग्न है
6.	***Design/ Research & development set-up*** डिजाइन / अनुसंधान और विकास सेटअप ***(No. of manpower, their qualification, machines & tools employed etc.)*** (श्रमिकों की संख्या, उनकी योग्यता, मशीन और उपलब्ध उपकरण आदि)	***Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design)*** ***Details attached at Annexure – F2.2*** ***(if applicable)*** लागू / लागू नहीं, अगर विनिर्माण मुख्य संविदाकार / खरीददार के डिजाइन के अनुसार है) विवरण अनुलग्नक –एफ 2.2 पर संलग्न है । (यदि लागू हो)
7.	***Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)*** मैनपावर विवरण के साथ समग्र संगठन का चार्ट(डिजाइन / विनिर्माण / गुणवत्ता आदि)	***Details attached at Annexure – F2.3*** विवरण अनुलग्नक – F2.3 में संलग्न है ।
8.	***After sales service set up in India, in case of foreign sub-vendor(Location, Contact Person, Contact details etc.)*** भारत	***Applicable / Not applicable*** लागू / लागू नहीं

	में बिक्री सेवा की स्थापना के बाद, विदेशी उप-विक्रेता के मामले में(स्थल , संपर्क व्यक्ति, संपर्क विवरण आदि)	***Details attached at Annexure – F2.4*** विवरण अनुलग्नक -2.4 पर संलग्न है ।
9.	***Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any*** फ्लोचार्ट सहित विनिर्माण प्रक्रिया निष्पादन योजना , जिसमें आउटसोर्स प्रक्रिया, यदि कोई हो, सहित कच्चे माल से तैयार उत्पाद तक विनिर्माण के विभिन्न चरणों को दर्शाया गया हो,	***Details attached at Annexure – F2.5*** विवरण अनुलग्नक - F2.5में संलग्न है ।
10.	***Sources of Raw Material/Major Bought Out Item*** कच्चे माल के स्रोत / खरीदे हुए मुख्य मद	***Details attached at Annexure – F2.6*** विवरण अनुलग्नक - F2.6में संलग्न है।
11.	***Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing*** कच्चे माल / खरीदे हुए मद, प्रक्रियाबद्ध, अंतिम परीक्षण, पैकिंग करते समय गुणवत्ता नियंत्रण	***Details attached at Annexure – F2.7*** विवरण अनुलग्नक - F2.7 पर संलग्न है
12.	***Manufacturing facilities (List of machines, special process facilities, material handling etc.)*** विनिर्माण सुविधा(मशीनों की सूची , विशेष प्रक्रिया सुविधाएं, सामग्री रख-रखाव आदि)	***Details attached at Annexure – F2.8*** विवरण अनुलग्नक - F2.8में संलग्न है ।
13.	***Testing facilities (List of testing equipment)*** परीक्षण सुविधाएं(परीक्षण उपकरण की सूची)	***Details attached at Annexure – F2.9*** विवरण अनुलग्नक – F2. 9 में संलग्न है ।
14.	***If manufacturing process involves fabrication then-*** यदि निर्माण प्रक्रिया में फेब्रिकेशन की गई है तो-	***Applicable / Not applicable*** लागू / लागू नहीं ***Details attached at Annexure – F2.10*** विवरण अनुलग्नक - F2.10में संलग्न है। ***(if applicable)*** लागू / लागू नहीं
	List of qualified Welders पात्र वेल्डर की सूची	
	List of qualified NDT personnel with area of specialization विशेषज्ञता के क्षेत्र सहित पात्र एनडीटी कार्मिकों की सूची	
15.	***List of out-sourced manufacturing processes with Sub-Vendors' names & addresses*** सब-वेंडर द्वारा बाह्य स्रोतों (उनके नाम और पते सहित)से करवाएं गए निर्माण प्रक्रियाओं की सूची	***Applicable / Not applicable*** लागू / लागू नहीं ***Details attached at Annexure. –F2.11*** विवरण अनुलग्नक - F2.10में संलग्न है। ***(if applicable)*** (यदि लागू हो)
16.	***Supply reference list including recent supplies*** नवीनतम आपूर्ति सहित आपूर्ति संदर्भ सूची	***Details attached at Annexure – F2.12*** विवरण अनुलग्नक - F2.12 में संलग्न है । ***(as per format given below)*** (नीचे दिए गए प्रारूप के अनुसार)

Project/ package परियोजना /पैकेज	***Customer Name*** ग्राहक का नाम	***Supplied Item (Type/Rating/Model /Capacity/Size etc)*** आपूर्ति की गई वस्तु (प्रकार / रेटिंग / मॉडल / क्षमता / आकार आदि)	***PO ref no/date*** पीओ संदर्भ सं. / तिथि	***Supplied Quantity*** आपूर्ति की मात्रा	***Date of Supply*** आपूर्ति की तारीख

17.	***Product satisfactory performance feedback letter/certificates/End User Feedback*** उत्पाद के संतोषजनक प्रदर्शन संबंधी फीडबैक पत्र / प्रमाण पत्र / अंतिम उपयोगकर्ता फ़ीडबैक	***Attached at annexure - F2.13*** अनुलग्नक F2. 3पर संलग्न है
18.	***Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product***	***Applicable / Not applicable*** लागू / लागू नहीं

	(similar or higher rating) प्रस्तावित उत्पाद (एक समान या उच्च रेटिंग वाले) के लिए टाइप टेस्ट रिपोर्ट (टाइप टेस्ट विवरण, रिपोर्ट संख्या, एजेंसी, जांच की तारीख) का सारांश नोट: - रिपोर्ट प्रस्तुत करने की आवश्यकता नहीं है ***Note:- Reports need not to be submitted***	***Details attached at Annexure – F2.14*** विवरण अनुलग्नक - F2.1 4में संलग्न है ***(if applicable)*** (यदि लागू हो)
19.	***Statutory / mandatory certification for the proposed product*** प्रस्तावित उत्पाद के लिए वैधानिक / अनिवार्य प्रमाणीकरण	***Applicable / Not applicable*** लागू / लागू नहीं ***Details attached at Annexure – F2.15*** ***(if applicable)*** (यदि लागू हो)
20.	***Copy of ISO 9001 certificate*** आईएसओ 9001 प्रमाण पत्र की प्रति ***(if available***(यदि उपलब्ध हो)	***Attached at Annexure – F2.16*** अनुलग्नक में संलग्न - F2.1 6 है
21.	***Product technical catalogues for proposed item (if available)*** प्रस्तावित मद के लिए उत्पाद तकनीकी कैटलॉग (यदि उपलब्ध हो)	***Details attached at Annexure – F2.17*** विवरण अनुलग्नक - F2.1 7 में संलग्न है

Name: ***नाम:***		***Desig:*** ***पदः***		***Sign:*** ***हस्ताक्षरः***		***Date:*** ***तिथि:***	

Company's Seal/Stamp:- कंपनी की मुहर/ मोहरः -

Annexure-A

DEFAULT/ BREACH OF CONTRACT, INSOLVENCY AND RISK PURCHASE

In case of delays (beyond the maximum late delivery period as per LD clause) in supplies, or if there be defective supplies or non-fulfilment of any other terms and conditions of the Contract as enumerated subsequently in this clause, then, without prejudice to its right to recover any expenses, losses or damages to which the Buyer may be put to incur or sustain by reason of the Seller/Contractor's default or breach of Order/Contract or to suspend business dealings with the Seller/Contractor in terms of the Buyers' Guidelines for Suspension of Business Dealings as applicable from time to time, the Buyer shall also be entitled to cancel the Order/ Contract either in whole or portion thereof without compensation to Seller. On the occurrence of any of the acts/omissions mentioned below, the Buyer may if it so desires, procure upon such terms and in such manner as deemed appropriate, plant/ equipment/ stores not so delivered or others of similar description where plant/ equipment/ stores exactly complying with particulars are not, in the opinion of the Buyer (which shall be final), readily procurable, at the risk and cost of the Seller.

The Seller shall be liable to the Buyer for any excess costs incurred thereof and the Seller shall continue the performance of the Order/Contract to the extent not cancelled under the provisions of this clause. The Seller shall on no account be entitled to any gain on such repurchases. If the Bidder does not agree to this Risk Purchase clause, BHEL reserves the right to reject the bid/offer of the Bidder.

The order/contract may be cancelled in whole or part thereof and Risk & Cost Clause in line with terms and conditions of PO/Contract may be invoked by the Buyer in any of the following cases:

i. If the Seller/Contractor fails to deliver the goods or materials or any installment thereof within the period(s) fixed for such delivery or the Seller's poor progress of the supply/services vis-à-vis delivery/execution timeline as stipulated in the contract, backlog attributable to the Seller including unexecuted portion of supply does not appear to be executable within balance period available;
ii. delivers goods or materials not of the contracted quality and failing to adhere to the contract specifications/execution methodology;
iii. withdrawal from or repudiation/abandonment of the supply/services by the Seller before completion as per contract or if the Seller refuses or is unable to supply goods or materials covered by the order/Contract either in whole or in part or otherwise fails to perform the Order/Contract.
iv. Non supply by the Seller within scheduled completion/delivery period as per contract or as extended from time to time for reasons attributable to the Seller;
v. Termination of Contract on account of any other reason(s) attributable to the Seller.
vi. Assignment, transfer, sub-letting of Contract without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.
vii. If the Seller be an individual or a Sole Proprietorship, in the event of death or insanity of the Seller.
viii. If the Seller/Contractor being an individual or if a partnership firm thereof, shall at any time be adjudged insolvent or shall have a receiving order for administration of his estate made against him or shall take any proceeding for composition under any Insolvency Act for the time being in force or make any assignment of the order/Contract or enter into any arrangement or composition with his creditors or suspend payment or if the firm dissolved under the Partnership Act;
ix. If the Seller/Contractor being a Company is wound up voluntarily or by order of a Court or a Receiver, Liquidator or Manager on behalf of the debenture holders and creditors is appointed or circumstances have arisen which entitles the Court of debenture holder and creditors to appoint a receiver, liquidator or manager
x. Non- Compliance to any contractual condition or any other default attributable to the Seller.

Such defaulting vendor/Seller shall not be eligible to participate in re-tendering conducted on account of risk purchase made due to fault of such vendor/Seller.

BHEL's right to go for Risk and Cost, Calculation of Risk and Cost amount & LD, recovery options to BHEL are given in detail in Annexure-V hereto.

ANNEXURE-V

(RISK AND COST CLAUSE)

1. BHEL reserves the right to terminate the contract or withdraw portion of work and get it done through other agency, at the risk and cost of the contractor *after due notice of a period of 14 days' by BHEL* in any of the following cases:

   i) If the Seller/Contractor fails to deliver the goods or materials or any instalment thereof within the period(s) fixed for such delivery or the Seller's poor progress of the supply/ services vis-a-vis delivery/execution timeline as stipulated in the Contract, backlog attributable to seller including unexecuted portion of supply does not appear to be executable within balance available period;
   ii) Delivers goods or materials not of the contracted quality and failing to adhere to the contract specifications;
   iii) Withdrawal from or repudiation/ abandonment of the supply/ services by Seller before completion as per contract or if the Seller refuses or is unable to supply goods or materials covered by the Order/Contract either in whole or in part or otherwise fails to perform the Order/Contract;
   iv) Non-supply by the Seller within scheduled completion/delivery period as per Contract or as extended from time to time, for the reasons attributable to the Seller;
   v) Termination of Contract on account of any other reason (s) attributable to Seller.
   vi) Assignment, transfer, subletting of Contract without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.
   vii) If the Seller be an individual or a sole proprietorship Firm, in the event of the death or insanity of the Seller;
   viii) If the Seller/Contractor being an individual or if a firm on a partnership thereof, shall at any time, be adjudged insolvent or shall have a receiving order for administration of his estate made against him or shall take any proceeding for composition under any Insolvency Act for the time being in force or make any assignment of the Order/Contract or enter into any arrangement or composition with his creditors or suspend payment or if the firm dissolved under the Partnership Act;
   ix) If the Seller/Contractor being a company is wound up voluntarily or by order of a Court or a Receiver, Liquidator or Manager on behalf of the debenture holders and creditors is appointed or circumstances shall have arisen which entitles the Court of debenture holder and creditors to appoint a receiver, liquidator or manager;
   x) Non-compliance to any contractual condition or any other default attributable to Seller.

1.1 **Risk & Cost Amount against Balance Work:**

Risk & Cost amount against balance work shall be calculated as follows:

Risk & Cost Amount= [(A-B) + (A x H/100)]

Where,
A= Value of Balance scope of Work (*) as per rates of new contract
B= Value of Balance scope of Work (*) as per rates of old contract being paid to the contractor at the time of termination of contract i.e. inclusive of PVC & ORC, if any.
H = Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

1.2 *** Balance scope of work (in case of termination of contract):**

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work for calculating risk & cost amount.

Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities.

Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose.

Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.

However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: In case portion of work is being withdrawn at risk & cost of contractor instead of termination of contract, contract quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work' for calculating Risk & Cost amount.

1.3 **LD against delay in executed work in case of Termination of Contract:**

LD against delay in executed work shall be calculated in line with LD clause no. 16 of GCC, for the delay attributable to contractor. For limiting the maximum value of LD, contract value shall be taken as Executed Value of work till termination of contract.

Method for calculation of LD against delay in executed work in case of termination of contract" is given below.

i. Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor = T1
ii. Let the value of executed work till the time of termination of contract = X
iii. Let the Total Executable Value of work for which inputs/fronts were made available to contractor and were planned for execution till termination of contract = Y
iv. Delay in executed work attributable to contractor i.e. T2 = [1-(X/Y)] x T1
v. LD shall be calculated in line with LD clause (clause 16) of the Contract for the delay attributable to contractor taking "X" as Contract Value and "T2" as period of delay attributable to contractor.

2. <u>Recoveries arising out of Risk & Cost and LD or any other recoveries due from Contractor</u>

Without prejudice to the other means of recovery of such dues from the Seller recoveries from the Seller on whom risk & cost has been invoked shall be made from the following:

a) Dues available in the form of Bills payable to seller, SD, BGs against the same contract.
b) Dues payable to seller against other contracts in the same Region/Unit/ Division of BHEL.
c) Dues payable to seller against other contracts in the different Region/Unit/ division of BHEL.

In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor.

(ON COMPANY LETTER HEAD)

To,
M/s Bharat Heavy Electricals Ltd.,
Project Engineering Management,
Power Project Engineering Institute,
HRD & ESI Complex,
Plot No 25, Sector-16 A, Noida-201301

Dear Sir,

This has reference to:

1. Our offer for EPR INSULATED FIRE SURVIVAL CABLE for 1 X 660 MW PANKI TPP, Tender No. _____
2. Order no. F.No. 6/18/2019-PPD dt. 23.07.2020 issued by Ministry of Finance, Department of Expenditure Public Procurement Division.

I have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India; I certify that M/s (Company Name_____) is not from such a country,
or,
if from such a country, has been registered with the competent authority. *(Strike through if not applicable)*

I hereby certify that M/s (Company Name_____) fulfil all requirements in this regard and is eligible to be considered for procurement on GeM.

[where applicable, evidence of valid registration by the competent authority shall be attached]

Thanking You,
Yours faithfully,

Director/Proprietor/Partner
M/s _____

LOCAL CONTENT CERTIFICATE
(ON COMPANY LETTER HEAD)

To,
Bharat Heavy Electricals Limited
PEM, PPEI Building, Plot No 25,
Sector 17 A, Noida (U.P)-201301

Subject: - Certification regarding local content

Reference: Tender Enquiry No.:
Name of Package: EPR INSULATED FIRE SURVIVAL CABLE
Project Name: 1 X 660 MW PANKI TPP

Dear Sir,
We hereby certify that items offered by us for EPR INSULATED FIRE SURVIVAL CABLE for 1 X 660 MW PANKI TPP has local content of _____**%**

Further, it is also certified that the local content % certified above is in line with definition of local content given in Public Procurement (Preference to Make in India), Order 2017-revision, having ref no. P45021/2017/-PP (BE-II) dtd. 04.06.20 & 16.09.20 and we qualify as Class_____ supplier.
We further confirm that address of the location at which the local value addition is made will be as follows:
_____
_____
_____
_____
_____

Thanking You,
Yours faithfully,

M/s _____

(ON COMPANY LETTER HEAD)

To,
Bharat Heavy Electricals Limited
PEM, PPEI Building, Plot No 25,
Sector -I6A, Noida (U.P)-201301

Subject: - No Deviation Certificate

Reference: Tender Enquiry No.: _____
Name of Package: EPR INSULATED FIRE SURVIVAL CABLE
Project Name: 1 X 660 MW PANKI TPP.
Dear Sir,
We hereby confirm that we have not taken any deviation in the above referred tender enquiry.
If any deviation in any part of our offer is found same shall be null & void.

Thanking You,
Yours faithfully,

M/s _____

ANNEXURE-IV

Price Variation Formulae
1 X 660 MW UPRVUNL PANKI TPS
EPR INSULATED FIRE SURVIVAL CABLE

Prices shall be variable as per following PVC formulae as per IEEMA. The price shall be limited to +20% of total Ex-works price actually supplied (cable size wise) & -ve price variation shall be unlimited.PVC shall be limited for the metals for which rates published by IEEMA.

CABLE TYPE	CONDUCTOR	FORMULA	TABLE REF
LT EPR INSULATED SIRE SURVIVAL Cables	**(Cu conductor,)**	**P= P0+ CuF(Cu-Cu0)+ CCFCu(PVCC-PVCC0)+FeW (Fe-Fe0)+ AlF (Al-Al0)**	**as applicable as per IEEMA**

Note:

1. **Quantity Variation**: As per GeM Bid ATC.

2. **PVC** shall be applicable for Order Qty. and subsequent lots**.**

3. Base date for prices (as per **IEEMA):**

   Initial Price:
   Base date shall be **Jul-2022**

   Final Price:
   The first working day of month, one month prior to the **date of delivery**.

   Note: The date of delivery is the date on which the cable is notified as being ready for inspection/dispatch (in the absence of such notification, the date of manufacturer's dispatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

4. PVC shall be payable within agreed contractual delivery period. In case of delay is attributable to vendor, for the payment purpose, the PVC shall be calculated based on rates applicable as on the date of expiry of contractual delivery date or actual delivery date, whichever is beneficial to BHEL.

Applicable Factors-

Factors/Cable Size	2C-16	2C-35	2C-70	2C-120	1C-630
CuF	0.299	0.664	1.299	2.273	6.012
CCFCu	0.341	0.319	0.335	0.421	0.469
FeW	0.439	0.591	0.745	1.147	
ALF	------	----	-----	----	0.537