TELANGANA STATE POWER GENERATION CORPORATION LIMITED

1X800MW KOTHAGUDEM, TPS, STAGE-VII, UNIT#12

VOLUME – IIB

TECHNICAL SPECIFICATION FOR

EPR INSULATED FIRE SURVIVAL CABLES

SPECIFICATION NO : *PE-TS-410-507-E005*
REVISION : *0*

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

PREAMBLE

1 The Tender document contains three (3) volumes. The bidder shall meet the requirements of all three volumes.

1.1 **VOLUME - I** **CONDITIONS OF CONTRACT**

This consists of four parts as below:-

Volume – IA This part contains Instructions to bidders for making bids to BHEL.

Volume – IB This part contains General Commercial Conditions of the Tender & includes provision that vender shall be responsible for the quality of item supplied by their sub-vendors.

Volume – IC This part contains Special Conditions of Contract.

Volume – ID This part contains Commercial conditions for Erection & Commissioning site work, as applicable.

1.2 **VOLUME – II** **TECHNICAL SPECIICATIONS**

Technical requirements are stipulated in Volume – II, which comprises of:-

Volume – IIA General Technical Conditions.

Volume – IIB Technical Specification including Drawings, if any.

1.3 VOLUME – IIB

This volume is sub-divided in to following sections:-

Section – A This section outlines the Intent of Specification

Section – B This section provides "Projection Information".

Section – C This section indicates Technical Requirements specific to Contract, not covered in Section -- D

Section – D This section comprises of Technical Specifications of Equipments Complete with Datasheets A, B, C.

Data sheet - A: - Specific data and other requirements pertaining to the equipments.

Data sheet - B: - Specific Data to be filled by bidder (Data Sheet - B is contained in Volume - III).

Data sheet – C: - Indicates data / documents to be furnished after the award of Contract as per agreed schedule by the vendor (as applicable)

1.4 **VOLUME – III**

This volume contains Technical Schedule and Data Sheets–B, which are to be duly filled by bidder and the same shall be furnished with the technical bid.

2.0 This requirements mentioned in Section – C / Data Sheet – A of Section – D shall prevail and govern in case of conflict between the same and the corresponding requirements mentioned in the descriptive portion in Section – D.

SECTION – 'A'

SCOPE OF ENQUIRY

SECTION – A
(SCOPE OF ENQUIRY)

1.0 This specification covers the design, manufacture, inspection and testing at manufacturer's works, proper packing and delivery of **EPR INSULATED LT FIRE SURVIVAL CABLES** to **1 X 800 MW KOTHAGUDEM TPS.** site as mentioned in different sections of this specification for the project as indicated in Section B (Project Information).

2.0 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 up to bidder's guarantee.

3.0 The general terms and conditions, instructions to bidders and other attachment referred to elsewhere be hereby made part of technical specification.

4.0 The bidders shall be responsible for and governed by all requirements stipulated hereinafter.

5.0 Requirements of the specification shall be agreed upon for total compliance by Bidders without any deviations.
Price offers of only those bidders complying with the above requirement shall be acceptable.

6.0 The documents shall be in English language and MKS system of units

SECTION-B
PROJECT INFORMATION

SECTION - B

PROJECT SYNOPSIS AND GENERAL INFORMATION

1.00.00 INTRODUCTION

The proposed 1x800 MW Kothagudem Thermal Power Station (KTPS), Stage-VII, Unit-12 would be set up by Telangana State Power Corporation Ltd. (TSGENCO) at Kothagudem, Telangana. The proposed Power Plant will be installed adjacent to the existing D colony of Kothagudem Thermal Power Station, at Kothagudem.

The Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. The information given here in under is for general guidance and shall not be contractually binding on the Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.

2.00.00 APPROACH TO SITE

Site is located in the existing D Colony of Kothagudem Thermal Power Station, which is at a distance 30 km from temple town of Bhadrachalam and 300 km from Hyderabad by road. The Nearest railway station is Bhadrachalam Road (Known as Kothagudem) at a distance of 12 km. Kothagudem- Bhadrachalam National Highway branches off to the power station site near village Paloncha.

3.00.00 LAND

Land is primarily required for the main plant & auxiliaries (BTG) and balance of plant (BOP) like ash handling, coal storage, cooling tower, switchyard etc., which is available within the existing plant boundary.

The existing colony is to be dismantled, and the land of about 137 acres will be used for the main plant building, water facilities, switchyard, coal handling etc. The raw water reservoir will be located adjacent to the existing raw water reservoirs.

230 acres of land required for Ash Dyke will be procured. Land is available for staff colony, which is to be constructed by the EPC contractor.

4.00.00 SOURCE OF COAL

100% Imported and Blended coal (50% imported + 50% indigenous) will be used. Indigenous coal shall be sourced from Suliyari coal mines, Madhya Pradesh.

5.00.00 SOURCE OF WATER

Source of water (total quantity of water is 2192 m^3/hr) is Godavari River near Burgampahad & water will be pumped through existing GRP pipe line (of length approx. 26 km).

6.00.00 ASH DISPOSAL AREA

Ash shall be dumped in the ash dump area which will be about 9 km from plant. The ash dyke area of 230 acres is adequate for 1x800 MW unit as per MOEF norms.

7.00.00 SALIENT DESIGN DATA

7.01.00 Meteorological data of site is given below:-

Elevation above MSL		:	89 m
Monthly highest temperature		:	44.9 ºC
Monthly lowest temperature.		:	12.9 ºC
Rainfall			
	Average.	:	1031 mm
	Max.	:	100 mm/ hr
Mean Wind speed		:	5.8 kmph
Relative Humidity			
	Max	:	82%
	Min	:	35%
Seismic Zone		:	Zone-III as per IS- 1893 (Part-IV)

[Climatological data of Khammam is attached for reference].

SECTION – 'C'

SPECIFIC TECHNICAL REQUIREMENTS

SECTION – C
(SPECIFIC TECHNICAL REQUIREMENTS)

1.0 SCOPE OF ENQUIRY

1.1 This enquiry covers the supply of EPR insulated Fire Survival Cables conforming to this specification as detailed below.

1.2 General technical requirements of the cables are indicated in Section-D. Project specific technical/ quality requirements/ changes are listed in Datasheet-A and below.

1.3 Cables shall conform in all respects to the requirements stipulated in all the above parts of the specification.

1.4 The stipulations of Section-C, followed by those of Datasheet-A shall prevail in case of any conflict between the stipulations of Section-C, Datasheet-A and Section-D.

2.0 BILL OF QUANTITIES:

2.1 Quantity requirements shall be as per Annexure-A (Bill of Quantities (BOQ)) enclosed.

2.2 Delivery schedule (i.e. contractual calendar dates) for the package shall be given separately to the bidders for compliance. Supplies shall be completed conforming to the lot requirements stipulated in the BOQ within the overall delivery schedule.

3.0 SPECIFIC TECHNICAL REQUIREMENTS

3.1 Technical:

(a) Latest revisions of all relevant Standards in this specification shall be referred.

(b) Data Sheet-B for power cables (enclosed with Vol. III of this specification) shall be duly filled in and furnished along with the offer. Data Sheet-B in the enclosed format only shall be accepted. Data furnished in any other format will make the offer incomplete and shall not be considered for analysis.

3.2 Quality/ Inspection:
The successful bidder shall submit their Manufacturing Quality Plan. The same shall be subject to customer/ BHEL approval.

3.3 The successful bidder shall submit the standard list of raw material suppliers/ sub-vendors of each bidder for approval without any commercial implications. Changes to the same for specific projects, if proposed by any bidder, shall be to BHEL approval.

3.4 Technical & Quality documentation to be submitted by all bidders is as under:

(i) Data Sheet-B [Refer 3.1 (b)]
(ii) Technical Deviations, if any in the format enclosed with Vol-III of TS.
(iii) Technical Catalogue
(iv) Type Test Reports of similar type of cables supplied by bidder in various other contracts. [Refer Annexure-C and clause 2.3.1 b) of Section-D]
(v) List of orders/ customers to whom bidder has supplied Fire Survival Cables.
(vi) Documents required as per PQR.

4.0 Document distribution schedule for the project shall be as per ANNEXURE-B attached.

5.0 List of drawings / documents required to be furnished by successful bidder after award of contract shall be as below:

SL. No.	DOCUMENT TITLE	DWG. / DOCUMENT No.
1	Data Sheet for EPR Insulated Fire Survival Power Cables	PE-V0-410-507-E001
2	Cross-sectional Drawings for EPR Insulated Fire Survival Power Cables	PE-V0-410-507-E002
3	Quality Plan for EPR Insulated Fire Survival Power Cables	PE-V0-410-507-E003
4	Type Test Reports for Tests conducted under this contract	PE-V0-410-507-E004
5	Type Test & Acceptance Procedures/ Schedule	PE-V0-410-507-E005
6	Type Test Reports for test conducted during last five years on similar type of cables	PE-V0-410-507-E006

ANNEXURE-A

BILL OF QUANTITY / PRICE SCHEDULE
FOR
LT EPR INSULATED FIRE SURVIVAL CABLES

S. No.	Cable Sizes (no. of cores Cross section area (sqmm)	Order Quantity (meters)	Lot-I qty	Drum Length (meters)	UNIT PRICE (Rs./m)
1	3C-2.5	1500	1000	500	
2	5C-2.5	3000	2500	500	
3	2C-95	5000	3500	500	
4	1C-400	2500	2000	500	

Notes:

1 The variation in quantities of all sizes for Main items put together shall be limited to (-30) 0% to (+) 30% of the total contract value derived on the basis of the Ordered quantities for this very project.

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

3 Lot-1 Quantity indicated above shall be cleared for manufacturing along with LOI. 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 and site requirements.

4 Delivery schedule of LOT-1 and subsequent lots shall be as per NIT.

5 Standard drum length shall be 500 metres.Tolerance on individual drum length shall be ±5%.

6 Overall tolerance on total dispatched quantity of each size shall be (-) 2% and (+) 0%. Cables consumed for testing and inspection shall be to bidder's account.

7 For each individual cable size, one short length of not less than 200m may be accepted only in the final drum length to complete the supply. The overall tolerance limits stipulated above shall continue to apply (in case short lengths are accepted).

8 Bidder shall indicate unit price of cables inclusive of type test charges . No separate Type Test charges are to be quoted by bidder.

9 The charges of Hydrolytic Stability test, if asked to perform shall be reimbursed extra at actual against original money receipt of Govt. lab (CPRI/ERDA)

10 In case the quantities cleared by BHEL for manufacturing (in a lot) 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.

ANNEXURE – B

DOCUMENTS/ DRAWINGS DISTRIBUTION SCHEDULE

S. NO.	DESCRIPTION	No. hard /soft copies	No. of CD-ROMs	REMARKS
1	Drawings / docs. for approval (First submission)	PDF File + 2 Hard copies	NIL	
2	Drawings /docs. for approval (Second & subsequent submission till approval)	PDF File + 2 Hard copies	NIL	
3	Final approval Drawings / docs. for Distribution after CAT-1.	PDF File + 10 Hard Copies	NIL	
4	As Built Drawings/ docs.	6 Hard Copies	4 CD-ROMS	
5	Type Test Certificates/ Reports for approval	PDF+ 2 hard Copies	NIL	
6	Type Test Certificates/ Reports for distribution	6 hard Copies	6 CD-ROMS	

ANNEXURE-C

TESTING REQUIREMENTS

A. Type Test Conduction:

1. Type tests are listed in the last column as 'T' and the same shall be conducted as type tests on one size/lot of finished cable. The Type tests may be witnessed by BHEL/ Owner, for which due notice shall be given by the vendor.

B Acceptance Test Conduction:

1. Acceptance tests are listed in the last column as 'A'. And sampling plan for the same has been provided at the end of this document.

C. Routine Test Conduction:

1. Routine tests are listed in the last column as 'R' and the same shall be conducted on 100% of cables.

TYPE TEST REQUIREMENTS FOR FIRE SURVIVAL CABLES

S. No.	TEST	APPLICABLE FOR	REF. STD	CLASSIFICATION OF TEST
1.0	**Tests for Conductor**			
a)	Annealing test	For copper conductor	IS : 8130-PART1, IS : 10810, PART-1	T,A
b)	Resistance test	For copper conductor	IS : 8130-PART1, IS : 10810, PART-5	T, A,R
2.0	**Tests for Armour**			
a)	Measurement of dimensions	Applicable for Aluminium wire & GS wire	IS : 3975	T,A
b)	Tensile test	Applicable for Aluminium wire & GS wire	IS : 3975	T,A
c)	Elongation test	Applicable for GS wire only	IS : 3975	T,A
d)	Torsion test	For GS round wire only	IS : 3975	T,A
e)	Resistance test	Applicable for Aluminium wire & GS wire	IS : 3975	T,A,R
f)	Zinc coating test	For G. S. wires only	IS : 3975	T,A
g)	Wrapping Test	For Aluminium wires only	IS : 3975	T,A
3.0	**Test for Fire Barrier Tape**			
a)	Test for minimum thickness	Fire barrier tape	IS :9968 PART1, IS : 10810, PART-6	T,A
4.0	**Tests for Insulation & inner and outer sheath (EPR)**			
a)	Material	Applicable for insulation and Inner & outer sheath	IS :9968 PART1	T,A
b)	Test for thickness	Applicable for insulation and Inner & outer sheath	IS :9968 PART1, IS : 10810, PART-6	T,A
c)	Tensile strength and elongation test	Applicable for insulation and Inner & outer sheath	IS :6380-1984, IS : 10810, PART-7	T,A

S. No.	TEST	APPLICABLE FOR	REF. STD	CLASSIFICATION OF TEST
d)	Ageing in air oven	Applicable for insulation	IS :6380-1984, IS : 10810, PART-11	T
e)	Ageing in air bomb	Applicable for insulation and Inner & outer sheath	IS :6380-1984, IS : 10810, PART-56	T
f)	Hot set test	Applicable for insulation and Inner & outer sheath	IS :6380-1984, IS : 10810, PART-30	T,A
g)	Oil resistance	Applicable for Inner & outer sheath	IS :6380-1984, IS : 10810, PART-31	T
5.0	**Electrical tests**			
a)	Insulation resistance	Applicable for insulation	IS :6380-1984, IS : 10810, PART-43	T,A
b)	High voltage test	Applicable for Inner & outer sheath	IS :9968-PART1, IS : 10810, PART-45	T,A,R
c)	Water absorption test	Applicable for insulation	IS :6380-1984, IS : 10810, PART-28	T
6.0	**HOFR Tests (On complete cable)**			
a)	Oxygen Index test	For HOFR elastomer (extruded) inner & outer sheath	ASTMD-2863	T, A
b)	Temperature index test	For HOFR elastomer (extruded) inner & outer sheath	ASTMD-2863	T, A
c)	Smoke density test	For HOFR elastomer (extruded) inner & outer sheath	ASTMD 2843	T, A
d)	Acid gas generation	For HOFR elastomer (extruded) inner & outer sheath	IEC-60754-I	T, A
7.0	**Flammability Tests**	For complete cable	IEEE-383, IS-10810-Part-53, IS-10810-Part-61 & part-62. Category group shall be considered as Category 'A'	T
		For complete cable	Swedish chimney test as per Class F3 of SEN-S5-424-1475	T, A
8.0	**Fire Survival Tests**	For complete cable	IEC-60331 (750 Deg C for 3 hours)	T
9.0	**Anti -rodent and Termite Repulsion test**	For outer sheath only		T

SAMPLING PLAN :

A. TYPE TESTS : Type tests shall be conducted on one size/lot of finished cable except the Fire Survival Test 8.0 for which the sampling plan shall be 'all sizes/ lot'. The Type tests may be witnessed by BHEL/ Owner, for which due notice shall be given by the vendor.

B. Routine tests shall be conducted on 100% drums.

Acceptance tests shall be conducted on 3 drums/ lot.

SECTION-D

STANDARD TECHNICAL SPECIFICATION

SECTION – D

STANDARD TECHNICAL SPECIFICATION

1.0 TECHNICAL REQUIREMENTS

1.1 Technical requirements for EPR insulated Fire Survival cables shall be as indicated in this section.

1.2 Project specific technical requirements shall be indicated in Datasheet-A and Section–C.

2.0 QUALITY ASSURANCE REQUIREMENTS

2.1 The successful bidder shall submit the Manufacturing Quality Plan (MQP) for approval by BHEL/ Owner during detailed engineering stage without any commercial implications.

2.2 Bidders shall submit their list of proven sub-vendors for raw materials, which will be to approval/ acceptance.

2.3 Testing requirements shall be as detailed below.

2.3.1 Type Tests

a. All cables to be supplied shall conform to type tests as per relevant standards and proven type.

b. The bidder shall furnish the reports of all the type tests as listed in ANNEXURE-C, carried out in within last five years of the date of bid opening. These reports should be for the tests conducted either in government approved third party laboratory or witnessed by client (such as major utilities/ industries) on identical/ similar cables to those ordered under this contract.

c. Irrespective of the bidder furnishing type test report as indicated above, BHEL will get type tests conducted (indicated in Datasheet-A) and Annexure-C on the lots offered for inspection.

d. Minor changes in the final Type Test Procedure (which shall be to approval during contract stage) shall be without any commercial implication.

2.4.2 Routine and Acceptance Tests

a. 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.

b. Acceptance tests shall be conducted on every lot offered for inspection as per details indicated in Datasheet A.

2.4.3 Cost of conduction of routine, type and acceptance testing shall be deemed to have been included in the quoted supply prices.

2.4.4 Cost of cables consumed for testing shall be to bidder’s account.

3.0 PACKING

3.1 Cables shall be supplied in non-returnable heavy construction drums. All wooden parts shall be manufactured from seasoned wood treated with copper napthenates/ zinc napthenates (refer IS: 401). 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.

4.0 **PROJECT SPECIFIC TECHNICAL AND QUALITY DOCUMENTATION TO BE SUBMITTED**

4.1 During tender stage (Before award of contract): Refer clause 3.1, 3.4 Section-C

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-V0-392-507-E001
2	Cross-sectional Drawings for EPR INSULATED FIRE SURVIVAL Cables	PE-V0-392-507-E002
3	Manufacturing Quality Plan for EPR INSULATED FIRE SURVIVAL Cables	PE-V0-392-507-E003(#)
4	Type Test Reports for Tests conducted under this contract	PE-V0-392-507-E004
5	Type Test & Acceptance Procedures/ Schedule	PE-V0-392-507-E005
6	Type Test Reports for test conducted during last five years on similar type of cables	PE-V0-392-507-E006

(#) : Standard Quality Plan for EPR INSULATED FIRE SURVIVAL Cables

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

DATASHEET A

1.0	Type of cable	Fire survival cable
2.0	Standard applicable in general	IEC – 60331, PART 11
3.0	Voltage Grade	1.1 kV
4.0	**CONDUCTOR**	
(a)	Material	Copper
	Grade and Class	Stranded, Tinned annealed high conductivity, Class 2
(b)	Standard applicable	IS : 8130
©	Fire proof layer	glass mica tape
5.0	FIRE BARRIER TAPE	Glass Mica tape in two layers with minimum 50% overlap, suitable to meet performance requirements as per Clause 11 (g) below
6.0	**INSULATION**	
(a)	Material	Elastomer rubber type IE2
(b)	Standard applicable	IS : 9968(Part-1)/1988
(c)	Continuous withstand temperature	90° C
(d)	Short circuit withstand temperature	250° C
7.0	**CORE IDENTIFICATION**	Color coding as per IS 9968-PART1
8.0	**INNER SHEATH**	
(a)	Material	HOFR elastomeric type SE-3 (extruded)
(b)	Standard applicable	IS : 9968(Part-1)/1988

9.0	**ARMOUR**	
(a)	Material	Single layer Round Galvanised Steel wire for multi core cable. For single core cable aluminium round wire armour.
(b)	Gap between armour wires/ formed wires	Shall not exceed one armour wire space (No cross-over/ over-riding).
(c)	Breaking load of joint	95 % of normal armour
10.0	**OUTER SHEATH**	
(a)	Material	HOFR elastomeric type SE-3 (extruded)
(b)	Standard applicable	IS : 9968(Part-1)/1988
(c)	**Colour**	Black

11.0	**HOFR CHARACTERISTICS**	
(a)	Oxygen index	≥30 (as per ASTMD 2863)
(b)	Temperature Index	≥350. C (as per ASTMD-2863)
(c)	Acid gas generation	≤ 0.5% by weight (as per IEC-60754-1)
(d)	Smoke density rating	≤ 20% (As per ASTMD 2843)
(e)	Water absorption test	As per IS : 6380-1984
(f)	Flammability test	
	1.	Cable shall pass test under fire condition as per IS-10810-Part-53
	2.	Cable shall also pass test under fire condition as per IS-10810-Part-61 & part-62. Category group shall be considered as Category 'A', IEEE-383
	3.	Cable shall pass the flammability test as per IEC-331-1 (750deg C for 3 hours) (1993)
	4.	In addition, it shall also pass flammability test as per Class F3 of Swedish Standard SS-424-1475 (1977)
12.0	Rodent & Termite Test	To be conducted
13.0	**CABLE DRUMS**	
(a)	Type & construction	As per IS 10418
(b)	Standard drum length	500m (+/-) 5%
14.0	**MARKING**	
		Ref IS: 9968 (Part I), Cable size (cross section area of conductor and no. of cores) voltage grade, Manufacturer's name and /or trade mark, year of manufacture, Type of insulation, Type of inner & outer sheath e.g. "IS: 9968, ELASTOMER RUBBER TYPE IE2, HOFR ELASTOMERIC TYPE SE-3" etc, @ 5m (by embossing) 'BHEL-PEM' and 'TSGENCO' @5m (by embossing) Progressive sequential marking @ 1m (by printing) Cable code,

DATASHEET B

(TO BE SUBMITTED ALONG WITH THE BID)

1.0 **General**

1.1 Name of manufacturer :

1.2 Place of Manufacture :

2.0 **Standards applicable**

2.1 For general specification of EPR Insulated Fire Survival Cables:

2.2 For conductor material

2.3 For material of innersheath & outersheath.

2.4 For method of tests in general

2.5 For cable drums

2.6 For oxygen index test

2.7 For flammability test

For Fire Survival Test

2.8 For acid gas generation test on outer sheath

2.9 For smoke generation test on outer sheath

2.10 Current rating of cables conforms to :

2.11 Short circuit rating conforms to :

3.0 **CABLE CONSTRUCTION**

BIDDER TO SPECIFY SIZE WISE (WHEREVER APPLICABLE)

3.1 VOLTAGE GRADE

3.2 No. of Cores X Size

3.3 BASE CURRENT RATING AS PER STANADARD
(a) INSTALLATION CONDITIONS
(i) In air
(ii) In ground
(iii) In ducts

3.4 SHORT CIRCUIT RATING & STANDARD REF.

3.5 CONDUCTOR

a) Conductor material, grade & standard :
b) Shape of conductor
c) No & dia of wires in each core before stranding : no x mm
d) Applicable standard
e) D.C. resistance of conductor at 20 deg. C : ohm/km
f) A.C. resistance of conductor at deg. C : ohm/km
a) Maximum conductor temperature :
b) Maximum Short Circuit Temperature :

3.6 HEAT BARRIER TAPE

c) Material
d) Thickness of tape
e) No. of layers, overlap
f) Standard ref.

3.7 INSULATION

a) Material & standard
b) Method of cross –linking
c) Method of curing
d) Extrusion process
e) Thickness of insulation & Minimum thickness of insulation
f) Dielectric strength of insulation.
g) Resistivity of insulation
h) Acid gas generation of insulation & tape in %

3.8 CORE IDENTIFICATION
Specify standard

3.9 INNER SHEATH

a) Material & type
b) Extrusion process
c) Nominal & minimum Thickness
d) Type & Shape of fillers (if used)
e) Colour

3.10 ARMOUR
a) Material, type & standard
b) Dimensions
c) No. of wires
d) Maximum DC resistance of armour
e) Maximum AC resistance of armour
f) Minimum coverage

3.11 OUTER SHEATH

a) Material & type
b) Extrusion process
c) Nominal & minimum Thickness
d) Colour

4.0 **Permissible voltage & frequency variation**

a)	Voltage	:	(+/-)10%
b)	Frequency	:	(+/-) 5 %
c)	Voltage-frequency combined	:	|ABS| 10%

5.0 **CHARACTERISTICS OF LSLH INNER & OUTER SHEATH (SPECIFY ALONG WITH STANDARD)**

a)	Oxygen index at room temp. of 50 deg. C	:
b)	Temperature index	:
c)	Acid gas generation	:
d)	Smoke density rating	:

6.0 **Applicable Tests under Fire conditions**
For single cable & multiple cables

7.0 **Applicable Standard for Circuit Integrity Test**
a) Temperature
b) Duration

8.0 **CABLE DRUMS**

a)	Type & construction	:	
b)	Standard drum length	:	as per BoQ
c)	Tolerance on drum length	:	(+/-) 5%

9.0 **DIAMETERS in mm.**

a) Overall Dia of Conductor
b) Overall dia over taped conductor
c) Approximate cable diameter of insulated conductor
d) Approximate Cable diameter over inner sheath
e) Approximate overall diameter of cable

10.0 **Tolerance on overall diameter** : (±)mm

11.0 **Minimum bending radius** : x O.D.

12.0 **Safe pulling force** : kg.

13.0 **Weight of cable components/ cable in Kg/ m**
(i) Weight of conductor
(ii) Weight of Fire Barrier Tape
(iii) Weight of XLPE
(iv) Weight of PVC/ Polymeric material
(v) Weight of armour (Galvanised steel/ Aluminium)
(vi) Total weight of cable

DATASHEET C

GUARANTEED TECHNICAL PARTICULARS
(TO BE SUBMITTED BY SUCCESSFUL BIDDER)

The above shall be submitted by the successful bidder during contract stage in the format provided by BHEL.

1.0 **General**

1.1 Name of manufacturer :

1.2 Place of Manufacture :

2.0 **Standards applicable**

2.1 For general specification of EPR Insulated Fire Survival Cables:

2.2 For conductor material

2.3 For material of innersheath & outersheath.

2.4 For method of tests in general

2.5 For cable drums

2.6 For oxygen index test

2.7 For flammability test

For Fire Survival Test

2.8 For acid gas generation test on outer sheath

2.9 For smoke generation test on outer sheath

2.10 Current rating of cables conforms to :

2.11 Short circuit rating conforms to :

3.0 **CABLE CONSTRUCTION**

BIDDER TO SPECIFY SIZE WISE (WHEREVER APPLICABLE)

3.1 VOLTAGE GRADE

3.2 No. of Cores X Size

3.3 BASE CURRENT RATING AS PER STANADARD
- (a) INSTALLATION CONDITIONS
- (i) In air
- (ii) In ground
- (iii) In ducts

3.4 SHORT CIRCUIT RATING & STANDARD REF.

3.5 **CONDUCTOR**

a)	Conductor material, grade & standard	:	
b)	Shape of conductor		
c)	No & dia of wires in each core before stranding	:	no x mm
d)	Applicable standard		
e)	D.C. resistance of conductor at 20 deg. C	:	ohm/km
f)	A.C. resistance of conductor at 90 deg. C	:	ohm/km
g)	Reactance of cable at normal frequency	:	ohm/km
h)	Electrostatic capacitance of cable at normal frequency	:	mF/km
i)	Maximum conductor temperature	:	
j)	Maximum Short Circuit Temperature	:	

3.6 **HEAT BARRIER TAPE**

a) Material
b) Thickness of tape
c) No. of layers, overlap
d) Standard ref.

3.7 **INSULATION**

a) Material & standard
b) Method of cross –linking
c) Method of curing
d) Extrusion process
e) Thickness of insulation &
Minimum thickness of insulation

f) Dielectric strength of insulation.
g) Resistivity of insulation
h) Acid gas generation of insulation & tape in %

3.8 **CORE IDENTIFICATION**
Specify standard

3.9 **INNER SHEATH**

a) Material & type
b) Extrusion process
c) Nominal & minimum Thickness
d) Type & Shape of fillers (if used)
e) Colour

3.10 **ARMOUR**

a) Material, type & standard
b) Dimensions
c) No. of wires
d) Maximum DC resistance of armour
e) Maximum AC resistance of armour
f) Minimum coverage

3.11 **OUTER SHEATH**

a) Material & type
b) Extrusion process
c) Nominal & minimum Thickness
d) Colour

4.0 **Permissible voltage & frequency variation**

a)	Voltage	:	(+/-)10%
b)	Frequency	:	(+/-) 5 %
c)	Voltage-frequency combined	:	|ABS| 10%

5.0 **CHARACTERISTICS OF LSLH INNER & OUTER SHEATH (SPECIFY ALONG WITH STANDARD)**

a) Oxygen index at room temp. of 50 deg. C :

b) Temperature index :

c) Acid gas generation :

d) Smoke density rating :

6.0 **Applicable Tests under Fire conditions**
For single cable & multiple cables

6.0 **Applicable Standard for Circuit Integrity Test**
a) Temperature
b) Duration

8.0 **CABLE DRUMS**

a)	Type & construction	:	
b)	Standard drum length	:	as per BoQ
c)	Tolerance on drum length	:	(+/-) 5%

9.0 **DOCUMENTATION**

Whether following enclosed

a) X-sectional drawing with constructional details :

b) Manufacturer Quality Plan :
c) Type test, Acceptance test & routine test reports
d) Technical Catalog
e) List of orders/ customers to whom bidder has supplied Fire Survival cables

10.0 **Diameters in mm.**

a) Overall Dia of Conductor
b) Overall dia over taped conductor
c) Approximate cable diameter of

insulated conductor

d) Approximate Cable diameter over inner sheath

e) Approximate overall diameter of cable

11.0 **Tolerance on overall diameter** : (±)mm

12.0 **Minimum bending radius** : x O.D.

13.0 **Safe pulling force** : kg.

14.0 **Weight of cable components/ cable in Kg/ m**

(i) Weight of conductor
(ii) Weight of Fire Barrier Tape
(iii) Weight of EPR
(iv) Weight of PVC/ Polymeric material
(v) Total weight of cable

15.0 **Shipping weight** : kg.

16.0 **Identification mark on outer sheath** :

A) By embossing @5m interval

1) Cable size (Nominal cross Sectional area and no. of cores) and voltage grade

2) Letters “FS”

3) Manufacturer’s Name/Trade mark
4) Year of manufacture
5) PROJECT NAME
6) BHEL-PEM

B) By embossing /printing @ 1m interval progressive sequential marking