4x270 MW TSGENCO BHADRADRI TPS

TECHNICAL SPECIFICATION
FOR

LT XLPE FIRE SURVIVAL CABLES

SPECIFICATION NO : *PE-TS-411-507-E005*
REVISION : *01*

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

PREAMBLE

1 The Tender documents contain 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 vendor 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 SPECIFICATIONS

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 equipment complete with Data Sheets 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 is contains Technical schedule and Data sheet-B, which are to be duly filled by bidders and the same shall be furnished with 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.

CONTENTS (VOL IIB)

CONTENTS (VOL III)

TOTAL NO. OF SHEETS = 41
(Including Separator Sheets)

BIDDER'S STAMP & SIGNATURE

SECTION-A

SCOPE OF ENQUIRY

SCOPE OF ENQUIRY

1.0 This specification covers the design, manufacture, inspection and testing at manufacturer's works, proper packing and delivery to site of LT XLPE FIRE SURVIVAL CABLES as mentioned in different sections of this specification for **4X270 MW TSGENCO BHADRADRI TPS.**

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

INTRODUCTION

4x270 MW BHADRADRI TPS is being set up by Telangana State Electricity Corporation Limited (TSGENCO) at Manuguru in the district of Khammam, Telangana, India.

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 BHEL/Owner. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.

APPROACH TO SITE

The distance from Manuguru to Major cities in state: Hyderabad-345KM, Warangal-180km, Bhadrachalam-38km, Kothagudem-70km and Khammam-130km, Vijayawada-195km.

District: KHAMMAM

State: TELANGANA

Nearest Airport: The nearest airport is Vijayawada Airport but the most used airport is the Hyderabad International Airport.

Nearest Railway Station: Manuguru railway station is 10KM from nearby town. However Warangal/Vijaywada railway Station is major railway station near to Manuguru.

1. **Owner** TSGENCO
2. **Owner Consultant** DESEIN PRIVATE LIMITED, NEW DELHI
3. **Project Title** 4X270 MW MANUGURU TPS
4. **Location** 16 Km from Manuguru Railway station
5. **Nearest Railway Stn**. Manuguru
6. **Temperature**
   a. Mean daily minimum ambient temperature during oldest month of the year=11.5 Deg.C
   b. Mean daily minimum ambient temperature during hottest month of the year=45.1 Deg.C
7. **Rainfall**

   Intensity of rainfall @ 80 mm/hr considering heaviest fall in 24 hrs
8. **Wind Data**
   a. Basic wind speed at 10m height

      44 m/sec
   b. Wind pressure As per IS: 875 Part III- 1987
9. **Seismic Zone** Zone III as defined in IS:1893 (part-1)-2002according to Indian Standard Seismic Zoning Map

10.0	**Power Supply** **The power supplies for distribution and auxiliaries shall be as under:**	
	a) In plant generation	16.5kV ±5%, 3ph, 50Hz ±5%, high resistance earthed.
	b) MV distribution	6.6kV ±6 %, 3ph, 3w , 50 Hz, + 5 % to – 5%, Non-effectively earthed
	c) LT distribution	415V ±10%, 3ph, 4W, 50Hz + 5% to –5%, Effectively earthed
	d) Motor rated above 160kW	6.6kV ±6 %, 3 ph 50Hz +5% to -5%.
	e) Motor rated 160kW and below all motorized actuators.	415V ±10%, 3 ph, 50Hz +5% to -5%.
	f) For motors equal and below 30kW winding heating	24V AC ±10%, 50 Hz, [to be generated in 415V switchgear by vendor]
	g) DC Motors	220V DC + 10% to - 15%, 2 wire unearthed
	h) Control supply for relay panel/ 6.6kV breakers/415V breakers and DC emergency lighting.	220V DC + 10% to - 15%, 2 wire ungrounded system
	i) UPS for instrumentation & Control system	240V AC ±1 %, 1 ph , 50Hz ±0.5%

		2 Wire AC system
	j) Control supply for 415V Motor contactors/AC Control circuits [to be generated in MCC /panel by vendor]	110V AC ±10%, 50Hz + 5% to –5%.
	k) Diesel Generator emergency supply	415V ±10%, 3ph, 3W, 50Hz +5%to –5%.
11.0	**Fault levels**	
	a) 400kV	40kA rms for 1 sec
	b) 6.6kV	44 kA rms for 1 sec.
	c) 415V	50 kA rms for 1 sec.
	d) DC Supply	25 kA

SECTION – 'C'

SPECIFIC TECHNICAL REQUIREMENTS

1.0 SCOPE OF ENQUIRY

1.1 This enquiry covers the supply of LT XLPE FIRE SURVIVAL cables conforming to this specification as detailed below.

1.2 General technical requirements of the cables are indicated in Section-D and Data sheet-A. Project specific technical/ quality requirements/ changes are listed 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 Data sheet-A shall prevail in case of any conflict between the stipulations of Section-C, Data sheet-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 Specific technical requirements shall be as listed below *:*

3.1.1 Latest revisions of all relevant Standards in this specification shall be referred.

3.1.2 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.

S. No.	*Reference Clause No. of Section D (if any)*	*Specific Requirement/ Change*
1	2.4.1.(b): The bidder shall furnish the reports of all the type tests listed in Annexure-D of S. No. II of Datasheet-A carried out in within last five years of the date of bid opening.	May be read as 2.4.1 (b) The bidder shall furnish the reports of all the type tests listed in "Annexure to QP" carried out in within last five years of the date of bid opening.
2	2.4.1.(c): Irrespective of the bidder furnishing type test report as indicated above, BHEL will get type tests conducted (indicated in Datasheet-A) on the lots offered for inspection.	May be read as 2.4.1.(c): Irrespective of the bidder furnishing type test report as indicated above, BHEL will get type tests conducted (indicated in "Annexure to QP") on the lots offered for inspection.
3	2.4.2 (b): Acceptance tests shall be conducted on every lot offered for inspection as per details indicated in Data sheet-A.	May be read as 2.4.2.(b): Acceptance tests shall be conducted on every lot offered for inspection as per details indicated in "Annexure to QP".

3.2 Quality Plan applicable for project:

BHEL Standard Quality Plan no. PE-QP-999-507-E005. (This clause shall prevail over clause 2.1 & 4.2.(c) of Section-D).

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:

3.4.1 Data Sheet-B [Refer 3.1.2]
3.4.2 Technical Deviations, if any in the format enclosed with Vol-III of TS.
3.4.3 Technical Catalogue
3.4.4 Type Test Reports of similar type of cables supplied by bidder in various other contracts. [Refer 2.4.1 (b), Section-D].
3.4.5 List of orders/ customers to whom bidder has supplied Fire Survival Cables.

4.0 The list and schedule of deliverables to be submitted by successful bidder shall be as Annexure- B.

5.0 Document distribution schedule for the project shall be as per Annexure-C.

ANNEXURE-A

BILL OF QUANTITIES (1.1kV LT XLPE FIRE SURVIVAL CABLES)

COPPER CONDUCTOR, XLPE INSULATED, ARMOURED (Al round wire for single core & GS round wire for multicore) FIRE SURVIVAL CABLE.
APPLICABLE TO TECHNICAL SPECIFICATION No. PE-TS-411-507-E005.

S.No.	Item code	Item name	UOM	Order Quantity	Order Quantity LOT-I	Drum Length
1	507-38009-A	1C-300- CU ARMOURED	MTR	3500	2500	500
2	507-38071-A	1C-95- CU-ARMOURED	MTR	1000	1000	500
3	507-38069-A	1C-70- CU-ARMOURED	MTR	3000	2500	500
4	507-38074-A	1C-35- CU-ARMOURED	MTR	14500	10500	500
5	507-38002-A	12C-2.5- CU-ARMOURED	MTR	12000	9000	1000
6	507-38021-A	3C-2.5- CU-ARMOURED	MTR	4000	3000	1000
7	507-38023-A	3C-95- CU-ARMOURED	MTR	2000	1500	500

NOTES :

1 Quantities indicated above shall be known as Order Quantities. The variation in quantities of all sizes put together shall be limited to (-) 30% to (+) 30% of the total contract value derived on the basis of the Ordered quantities .

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 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.

5 Standard drum length shall be 500metres.Tolerance on individual drum length shall be ±5%. For 1C-35- CU-ARMOURED & 12C-2.5- CU-ARMOURED cables, 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).

6 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 without any price implication.

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

8 Bidder shall qoute for all sizes of cables as per specification, failing which their offer shall be rejected.

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

ANNEXURE-B: LIST OF STANDARD DELIVERABLES

LIST OF STANDARD DELIVERABLES FOR LT XLPE FIRE SURVIVAL CABLES TO BE SUBMITTED BY SUCCESSFUL BIDDER

SL. No.	DOCUMENT TITLE	DWG. / DOCUMENT No.	**SUBMISSION SCHEDULE**
1	Data Sheet for LT XLPE Fire Survival Cables	PE-V0-411-507-E181	Within Two weeks from the date of LOI
2	Cross-sectional Drawings for LT LT XLPE Fire Survival Cables	PE-V0-411-507-E183	Within Two weeks from the date of LOI
3	Type Test Reports for Tests conducted under this contract	PE-V0-411-507-E184	Within a week from the date of conduction of Type Test
4	Quality Plan LT LT XLPE Fire Survival Cables	PE-V0-411-507-E920	Within Two weeks from the date of LOI

ANNEXURE-C: DOCUMENT DISTRIBUTION SCHEDULE

S. No.	DESCRIPTION	THROUGH DMS	HARD PRINTS	CD-ROMs
1	Docs. /drgs. for approval (First submission)	YES	-	-
2	Docs. / drgs. for approval (Second & subsequent submission till approval)	YES	-	-
3	Final approved docs. / drgs. for Distribution	YES	As per NIT	As per NIT
4	As-built prints	YES	As per NIT	As per NIT

SECTION – 'D'

STANDARD TECHNICAL SPECIFICATION

1.0 TECHNICAL REQUIREMENTS

1.1 Technical requirements for LT XLPE 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 Bidder shall confirm compliance with BHEL Quality Plan as attached with the specification without any deviations.

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

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

2.4 Testing requirements shall be as detailed below.

2.4.1 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 listed in Annexure-D of S. No. II of Datasheet-A 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) on the lots offered for inspection.

e. Minor changes in the final Type Test Procedures (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 Data sheet-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 The following documents shall be submitted by Successful Bidder (for approval during contract stage)

a. Cross-section drawings of the cables.
b. Datasheet C in the format provided to the successful bidder along with LOI.
c. Manufacturing Quality Plan in case BHEL SQP is not applicable.
d. List of sub-vendors/ suppliers of raw materials.
e. Type Test Reports for tests conducted under this contract.
f. Field Quality Plan.
g. Type Test Procedure.

4.3 Two copies of the above documentation shall be submitted for first review. Number of copies to be submitted for second and subsequent submissions (till Cat-I approval is accorded), and those for final distribution prints of approved documentation and test certificates shall be as indicated separately in section C.

4.4 Wherever required, soft copy of all approved technical/ quality documentation shall be submitted as specified without any additional commercial implication. Soft copies may be required both in native file format (e.g. MS Word/ MS Excel) as well as PDF files.

	STANDARD QUALITY PLAN	CUSTOMER : IB THERMAL POWER STATION, BANHARPALLI			PROJECT TITLE : 4 X 270MW TSGENCO BHADRADRI TPS			SPECIFICATION NUMBER :			PE-TS-411-507-E005
		VENDOR			**QUALITY PLAN NUMBER PE-QP-999-507-E005, R0**			SPECIFICATION TITLE :			TS FOR LT XLPE FIRE SURVIVAL CABLE
	SHEET 1 OF 09	SYSTEM			**ITEM : LT XLPE FIRE SURVIVAL CABLES**			SECTION			VOLUME III

SL. NO.	COMPONENT/ OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			**11**
Instructions :												
1. Cable manufacturer to maintain records to show co-relation of raw materials to finish cables i.e raw material batch / lot no. to be tracable to the final cable drum no. or batch no.												
2. Cable manufacturer to maintain all quality records identified as per all QP stages inumerated below whether it is identified for BHEL verification or witness or not.												
1.0	RAW MATERIALS											
1.1	Copper Rods/ Wires	1. Physical Properties	MA	Physical Tests	-do-	Rel. BS	Rel. BS	-do-	3/2	-	1,2	
		2. Chemical Composition & purity	MA	Chemical analysis	-do-	-do-	-do-	-do-	3/2	-	1,2	
		3.Electrical properties	MA	Electrical Tests	-do-	-do-	-do-	-do-	3/2	-	1,2	
		4. Dimensions	MA	Measurement	-do-	-do-	-do-	-do-	3/2	-	1,2	
		SPECIFIC CHECKS										
		a) MAKE	MA	Verify	100%	Manufacturer approved source	Manufacturer approved source	Log book / Test certificate	3/2	-	1	
		b) GRADE	MA	Do	Do	Rel. BS / Approved datasheet	Rel. BS / Approved datasheet	Do	3/2	-	1	
		c) RESISTIVITY	MA	Electrical tests	Sample from each batch / lot	Rel. BS	Rel. BS	Do	3/2	-	1	
1.2	XLPE Compound	1. Physical properties	MA	Physical Tests	Sample/ Lot	Rel. BS & Mfrs Std./ Appd Data Sheet	Rel. BS & Mfrs Std. Appd Data Sheet	Test Report Log Book	3/2	-	1,2	
		2. Elec.Properties	MA	Electrical Tests	-do-	-do-	-do-	-do-	3/2	-	1,2	
		SPECIFIC CHECKS										
		a) MAKE	MA	Verify	100%	Manufacturer approved source	Manufacturer approved source	Log book / Test certificate/ Inspection	3/2	-	1	

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

	STANDARD QUALITY PLAN	CUSTOMER : IB THERMAL POWER STATION, BANHARPALLI			PROJECT TITLE : 4 X 270MW TSGENCO BHADRADRI TPS			SPECIFICATION NUMBER :			PE-TS-411-507-E005	
		VENDOR			**QUALITY PLAN NUMBER PE-QP-999-507-E005, R0**			SPECIFICATION TITLE :			TS FOR LT XLPE FIRE SURVIVAL CABLE	
	SHEET 2 OF09	SYSTEM			**ITEM : LT XLPE FIRE SURVIVAL CABLES**			SECTION			VOLUME III	
SL. NO.	COMPONENT/OPERA	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	W	V	REMARKS
1	2	3	4	5	6	7	8	9	10			11
		b) TYPE/ GRADE	MA	Verify	100%	Approved datasheet	Approved datasheet	-do-	3/2	-	1	
		c) SHELF LIFE / STORAGE CONDITION	MA	-do-	-do-	Compound manufacturer standard.	Compound manufacturer standard.	-do-	3/2	-	1	
1.3	Sheathing compound	1. Physical properties	MA	Physical Tests	Sample/ lot	Rel.BS /BHEL Specification	Rel.BS /BHEL Specification	Log Book/ Test Report	3/2	-	1,2	
		2. FRLS Properties	MA	Envir/ Chemical	Sample/ lot	ASTMD-2863, ASTMD-2843, IEC-754-1	Appd. Data sheet	Log Book/ Test Report	3/2	-	1,2	
		SPECIFIC CHECKS										
		a) Make	MA	Verify	100%	Manufacturer approved source	Manufacturer approved source	Log book / Test certificate / Inspection	3/2	-	1	
		b) Type/ Grade	MA	-do-	-do-	Approved datasheet	Approved datasheet	-do-	3/2	-	1	
		c) Shelf life / Storage condition	MA	-do-	-do-	Compound manufacturer standard.	Compound manufacturer standard.	-do-	3/2	-	1	
1.4	Glass Mica tape	a) Dimensions-thickness, weight (glass cloth,mica paper)	MA	Measurement	-do-	Manufacturer's standard	Manufacturer's standard	-do-	3/2	-	1,2	
		b) Tensile strength,	MA	Mechanical/ Elect tests	-do-	Manufacturer's standard	Manufacturer's standard	-do-	3/2	-	1,2	
		c) Dielectric Strength	MA	Mechanical/ Elect tests	-do-	Manufacturer's standard	Manufacturer's standard	-do-	3/2	-	1,2	
1.5	Galvanised steel wire/strip	1. Phy. and Elec. Properties	MA	Physical & Electrical Tests	Sample from each batch/ lot	Rel. BS / Appd Datasheet	Rel. BS / Appd. Datasheet	Log Book/ Test Cert.	3/2	-	1,2	
		2. Dimension	MA	Measurement	-do-	-do-	-do-	-do-	3/2	-	1,2	
BHEL		**PARTICULARS**			**BIDDER/VENDOR**							
		NAME										
		SIGNATURE										
		DATE							BIDDER'S/VENDORS COMPANY SEAL			

	STANDARD QUALITY PLAN	CUSTOMER : IB THERMAL POWER STATION, BANHARPALLI			PROJECT TITLE : 4 X 270MW TSGENCO BHADRADRI TPS			SPECIFICATION NUMBER :			PE-TS-411-507-E005	
		VENDOR			**QUALITY PLAN NUMBER PE-QP-999-507-E005, R0**			SPECIFICATION TITLE :			TS FOR LT XLPE FIRE SURVIVAL CABLE	
	SHEET 3 OF 09	SYSTEM			ITEM : LT XLPE FIRE SURVIVAL CABLES			SECTION			VOLUME III	
SL. NO.	COMPONENT/OPERA	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY			REMARKS
									P	W	V	
1	2	3	4	5	6	7	8	9	10			11
		3. Galvanization Quantity	MA	Galv. Tests	Sample from each batch/ lot	Rel. BS / Appd Datasheet	Rel. BS / Appd. Datasheet	Log Book/ Test Cert.	3/2	-	1,2	
		4. Make	MA	Verify	-do-	-do-	-do-	-do-	3/2	-	1,2	
1.6	WOODEN DRUMS	i) Phy . And constructional checks	MA	Visual	Mfr's Plant Standard	IS 10418	IS 10418	Log Book / Test cert.	3/2	-	1	
		ii) Anti termite treatment	MA	Chemical	Mfr's Plant Standard	Mfr's Plant Standard	Mfr's Plant Standard	COC	3/2	-	1	
1.7	STEEL DRUMS	i) Dimension	MA	Measurement	Mfr's Plant Standard	Mfr's Plant Standard	Mfr's Plant Standard	Log Book / Test cert.	3/2	-	1	
		ii) Surface Finish	MA	Measurement	Mfr's Plant Standard	Mfr's Plant Standard	Mfr's Plant Standard	Log Book / Test cert.	3/2	-	1	
2.0	IN PROCESS											
2.1	Wire Drawing	1. Size	MA	Dimensional	Plant Mfg. Std.	Approved datasheet	Approved datasheet	Log Book	2	-	1	
		2. Surface finish	MA	Visual	-do-	Surface shall be smooth	Surface shall be smooth	-do-	2	-	1	
		3. % of Elongation	MA	Mechanical	-do-	IS 8130	IS 8130	-do-	2	-	1	
		4. Physical, electrical	CR	Phy & electrical tests	Sample	Rel. BS & datasheet	Rel . BS & datasheet	Log Book / Test cert. / Inspection	2	-	1	
		5. Finish & dimension	MA	Visual / meas	-do-	Rel. BS & datasheet	Rel. BS & datasheet	Log Book / Test cert. / Inspection	2	-	1	
2.2	Stranding of wires	1. No.of wires	MA	Counting	Plant Mfg. Std.	Rel. BS / Appd. Datasheet	Rel. BS / Appd. Datasheet	-do-	2	-	-	
		2. Resistance	CR	Electrical	-do-	-do-	-do-	-do-	2	-	-	
		3. Sequence, lay length & Direction	MA	Visual, Meas.	-do-	-do-	-do-	-do-	2	-	-	
		4 Surface Finish	MA	Visual	-do-	-do-	-do-	-do-	2	-	-	
		5. Dimension	MA	Measurement	-do-	-do-	-do-	-do-	2	-	-	

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

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		VENDOR	**QUALITY PLAN NUMBER PE-QP-999-507-E005, R0**	SPECIFICATION TITLE : TS FOR LT XLPE FIRE SURVIVAL CABLE
	SHEET 4 OF 09	SYSTEM	ITEM : LT XLPE FIRE SURVIVAL CABLES	SECTION VOLUME III

SL. NO.	COMPONENT/OPERA	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	2	3	4	5	6	7	8	9	10			11
2.3	Glass Mica tape	1. Dimenions	MA	Measurement	100%	Approved Data Sheet	Approved Data Sheet	Log Book	2	-	-	
		2. Dia over tape	MA	Measurement	Sample	Approved Data Sheet	Approved Data Sheet	Log Book	2	-	-	
		3. Mica tape overlap	MA	Measurement	Sample	Approved Data Sheet	Approved Data Sheet	Log Book	2	-	-	
2.4	Core Insulation (XLPE) (No repair permitted)	1. Surface finish	MA	Visual	100%	Surface shall be smooth	-do-	Log Book/Test cert./Inspection report	2	-	1	
		2. Concentricity #	CR	Measurement	Sample	Mfr's Std./Appd. Datasheet	Mfr's Std./Appd. Datasheet	Log Book/Test cert./Inspection report	2	-	1	# To be checked at starting & finish end of extruded length
		3. Thickness of Insulation (Min./ Max.)	CR	Measurement	-do-	Appd. Datasheet	Appd. Datasheet	Inspection Report	2		-	
		4 Dia over insulation	MA	Measurement	-do-	-do-	-do-	-do-	2		-	
		5. Test on XLPE (Tensile & Elongation, Hot Set & Ageing Test)	MA	Tests	-do-	Appd. Datasheet / Rel. BS	Appd. Datasheet / Rel. BS	-do-	2		1	
		6. Spark test or water immersion test	CR	Electrical	100%	Mnfr's Std	Mnfr's Std	Log Book/Test cert./Inspection report	2	-	1	
2.5	Core Laying	1. Dia over laid up core	MA	Measurement	Sample	Apprd. Data Sheet	Apprd. Data Sheet	Log Book	2	-	-	
		2.Sequence of lay, & direction	MA	Visual & Meas.	Sample	Mfrs.Std.	Mfrs.Std.	-do-	2	-	-	
		3. Lay Length	MA	Meas.	-do-	Mnfrs. Std.	Mnfrs. Std.	-do-	2	-	-	
2.6	InnerSheath Extrusion	1. Surface finish	MA	Visual	100%	--	Free from bulging, burnt particles, lumps cuts & scratches.	-do-	2	-	-	
		2. Sheath thickness	MA	Measurement	Sample	Appd. Data Sheet, Rel. Standard	Appd. Data Sheet, Rel. Standard	-do-	2	-	-	
		3. Dia over inner sheath	MA	-do-	-do-	-do-	-do-	-do-	2	-	-	
		4. Colour	MA	Visual	100%	Appd. Data Sheet	Appd. Data Sheet	-do-	2	-	-	

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

	STANDARD QUALITY PLAN	CUSTOMER : IB THERMAL POWER STATION, BANHARPALLI			PROJECT TITLE : 4 X 270MW TSGENCO BHADRADRI TPS			SPECIFICATION NUMBER :			PE-TS-411-507-E005
		VENDOR			**QUALITY PLAN NUMBER PE-QP-999-507-E005, R0**			SPECIFICATION TITLE :			TS FOR LT XLPE FIRE SURVIVAL CABLE
	SHEET 5 OF 09	SYSTEM			ITEM : LT XLPE FIRE SURVIVAL CABLES			SECTION			VOLUME III

SL. NO.	COMPONENT/OPERA	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	W	V	REMARKS
1	2	3	4	5	6	7	8	9	10			11
2.7	Armour	1. No.of wires/Strips	MA	Counting	At the start of the process	Apprd.Data sheet	Apprd.Data sheet	-do-	2	-	-	
		2. Size of wire/ Strip	MA	Measurement	-do-	-do-	-do-	-do-	2	-	-	
		3. Lay Direction	MA	Visual	-do-	Rel. BS	Rel. BS	-do-	2	-	-	
		4. Lay Length	MA	Meas.	-do-	Plant Standard	Plant Standard	Log Book	2	-	-	
		5. Coverage	MA	Measurement	-do-	Appd. Data Sheet	Appd. Data Sheet	-do-	2	-	-	
		6. Dia over armouring	MA	Measurement	-do-	-do-	-do-	-do-	2	-	-	
2.8	Outer Sheath Extrusion	1. Surface Finish	MA	Visual	100%	-	Free from Porosity, Bulging, burnt particles, lumps, cuts & scratches	Log Book	2	-	-	
		2.Sheath thickness	MA	Measurement	Sample	Appd. Data Sheet	Appd. Data Sheet	Log Book	2	-	-	
		3. Dia over outer sheath	MA	-do-	-do-	-do-	-do-	-do-	2	-	-	
		4. Marking/ Colour/ Embossing	MA	Visual	100%	Appd. Data Sheet	Appd. Data Sheet	Test Report	2	-	-	Sequential marking shall be done by printing
		5. TS & % Elongation	MA	Mechanical	100%	Rel. Standard/ Appd. Data Sheet	Rel. Standard/ Appd. Data Sheet	-do-	2	-		
2.9	Finished Cable	1. Routine Test (Refer note-H)	CR	Elec. & Meas.	100%	Rel. BS:	Rel. BS:	Test Report	2	-	1	

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

	STANDARD QUALITY PLAN	CUSTOMER : IB THERMAL POWER STATION, BANHARPALLI			PROJECT TITLE : 4 X 270MW TSGENCO BHADRADRI TPS			SPECIFICATION NUMBER :			PE-TS-411-507-E005
		VENDOR			**QUALITY PLAN NUMBER PE-QP-999-507-E005, R0**			SPECIFICATION TITLE :			TS FOR LT XLPE FIRE SURVIVAL CABLE
	SHEET 6 OF 09	SYSTEM			**ITEM : LT XLPE FIRE SURVIVAL CABLES**			SECTION			VOLUME III

SL. NO.	COMPONENT/OPERA	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**			**11**
3.0	Final Inspection	1. Finish & Length	MA	Visual, Measurement	(See remark)	BHEL specn. & Rel. BS	BHEL Specn./ Free from Porosity, Bulging Burnt particles, lumps, cuts scratches	-do-	2	1	-	One drum in each lot.
		2. Dimension	MA	Measurement	As per Rel. BS	Appd.Data Sheet/ Rel. BS	Specn./ Appd. Data Sheet/ Rel. BS	-do-	2	1	-	
		3. Armouring - Coverage No.of Wires/Strips	MA	Visual & Meas.	-do-	-do-	-do-	-do-	2	1	-	
		4. Marking & Colour Coding	MA	Visual	-do-	-do-	-do-	-do-	2	1	-	
		5. Acceptance Tests (Refer note - H)	CR	Phy, Elect. Tests, FRLS Tests	2 sample/ Lot	Annexure-A	Annexure-A	-do-	2	1	-	
		6. Type Test (Refer note- H)	CR	Measurement	Sample* (refer remarks)	Annexure-A	Annexure-A & Appd. Datasheet	Test report	2	1	-	
4	Packing	Sealing Identification	MA	Visual	100%	As per manufacturer's standard	As per manufacturer's standard	-do-	2	1	-	

NOTES:-

(A) JOINTS IN WIRE SHALL BE AS PERMITTED BY Rel. BS , VENDOR TO CERTIFY THE SAME.
(B) NO REPAIR OF CORE INSULATION PERMITTED
(C) CABLE ENDS SHALL BE SEALED AS PER MANUFACTURER'S STANDARD.
(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 APPROVED DATA SHEET
(F) WHEREVER EXTENT OF CHECK FOR STAGE RELEVANT BS MENTIONED AS SAMPLES AND 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 BHEL SPECIFICATION.
(H) TYPE TEST, ROUTINE TEST & ACCEPTANCE TEST SHALL BE AS PER ANNEXURE TO QP.

LEGEND : P : PERFORMER W: WITNESSER V: VERIFIER 1- BHEL 2-VENDOR 3- SUB VENDOR CHP:CUSTOMER HOLD POINT WHICH WILL BE DECIDED AT CONTRACT STAGE

BHEL	**PARTICULARS**	**BIDDER/ VENDOR**
	NAME	
	SIGNATURE	
	DATE	

BIDDER'S/VENDORS COMPANY SEAL

Annexure to QP

TESTING REQUIREMENTS

A. Type Test Conduction:

Test for which "T" is indicated in 'Test Conduction Required As' column below shall be conducted as type test on one size/lot of finished cable except the Fire Survival Test, Flammability tests & Electrical tests listed at clause no. 7,8 & 10 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 Acceptance Test Conduction:

Test for which 'A' is indicated in the 'Test Conduction Required As' column below shall be conducted as acceptance test.

Sampling for acceptance tests shall be as under:
Sample: 2 nos. drums
Permissible no. of defectives: 0

C. Routine Test Conduction:

Test for which 'R' is indicated in the in 'Test Conduction Required As' column below shall be conducted as routine test and the same shall be conducted on 100% of cables.

TEST REQUIREMENTS FOR FRLSH POWER CABLES

No.	TEST	APPLICABLE FOR	REF. STD	CLASSIFICATION OF TEST	REMARKS
1.0	Tests for Conductor				
a)	Persulphate test	For copper conductor only	BS-7846/BS-6360	T,A	
b)	Annealing test	For copper conductor only	"	T, A	Internal in process test report to be furnished for acceptance test.
c)	Resistance test	For Cu	"	T, A,R	
d)	Tensile, Wrapping & Elongation test	For Cu	"	T,A	
2.0	Tests for Armour				
a)	Measurement of dimensions/Armour Diameter	for armour wire	BS-7846	T,A	
b)	Mass of zinc coating test	For G. S. armour wires	"	T	
c)	Wrapping test	Galvanized armour wires	"	T	
d)	Armour resistance test	for armour wire	BS-7846	T,R	
3.0	Test for Fire Barrier Tape				

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

No.	TEST	APPLICABLE FOR	REF. STD	CLASSIFICATION OF TEST	REMARKS
a)	Test for minimum thickness	Fire barrier tape	-	T,A	
4.0	Tests for Insulation (XLPE/GP-8)				
a)	Material	Applicable for insulation	BS-7846	T	
b)	Test for thickness	"	"	T,A	
c)	Spark Test	"	"	R	Internal in process test report to be furnished for verification during inspection.
d)	Tensile strength and elongation test	Applicable for insulation	BS-7655,1.3	T,A	
e)	Ageing in air oven	Applicable for insulation	BS-7655-1.3:2000	T	
f)	Insulation resistance	Applicable for insulation	BS-7655-1.3:2000	T,A	
g)	Hot set test	Applicable for insulation	BS-7655-1.3:2000	T,A	
h)	Water absorption test	Applicable for insulation	BS-7655-1.3:2000	T	
i)	Shrinkage of insulation	Applicable for insulation	BS-7846	T	
j)	Abrasion	On complete cable	"	T	
k)	Power factor & permittivity test	Applicable for insulation	BS-7655-0:2006/ BS-6469-99.2:1992	A	
5.0	Test for Inner Sheath (Bedding)				
	Physical Properties	Applicable for inner sheath	"	T	
	Test for thickness	Applicable for inner sheath	"	T,A	
	Corrosive and acid gas emission	Applicable for Inner sheath	IEC-60754-I	T	
6.0	Test for Over Sheath				
	Physical Properties	Applicable for Over sheath	"	T	
	Test for thickness	Applicable for Over sheath	"	T,A	
	Spark test	Applicable for Over sheath	"	R	
	Corrosive and acid gas emission	Applicable for Over sheath	IEC-60754-I	T	
	Shrinkage of over sheath	For complete cable	"	T	
	IR constant of oversheath	For complete cable	"	T	
7.0	Improved Fire Performance (FR-LSH) Tests				
a)	Oxygen Index test	For PVC outer sheath only	ASTMD-2863	T,A	
b)	Temperature index test	For PVC outer sheath only	ASTMD-2863	T,A	

No.	TEST	APPLICABLE FOR	REF. STD	CLASSIFICATION OF TEST	REMARKS
c)	Smoke density test	For PVC outer sheath only	ASTMD 2843	T,A	
d)	Smoke emission	For complete cable	BS-7846	T,A	
e)	Acid gas generation test	For complete cable	IEC-60754- part-1	T,A	
8.0	Electrical Tests				
a)	High Voltage Test	On complete cable	BS-7846	T,R	
b)	Insulation Resistance Test (Volume resistivity method)	Over sheath	BS-7846	T	
9.0	Compatibility	Over Complete cable	BS-7846	T	
10.0	Fire Survival Tests	For complete cable	IEC-60331, BS-6387		
11.0	Flammability test				
a)	Flame propagation on single cable	For complete cable	IEC 60332, Part-1	T,A	
b)	Flame propagation on multiple cables	For complete cable	BS-50266, CAT-B	T	
c)	Swedish chimney test	For complete cable	SEN-SS-424-1475	T	
12.0	Anti -rodent and Termite Repulsion test	For PVC outer sheath only		A	

T : SHALL BE CONDUCTED AS TYPE TEST
R: ROUTINE TEST
A: ACCEPTANCE TEST

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

DATA SHEET - A

DATA SHEET-A

I. TECHNICAL DATA;

1.0	Type of Cable	Fire Survival cables (FS type)
2.0	Standard applicable in general	BS 7846/ BS 6724/ BS 7655 & Technical specification
3.0	Voltage Grade	1100V
4.0	Number of cores, cross sectional area of conductors and quantities	As per BOQ, Annexure-A to Section-C
5.0	**CONDUCTOR**	
(a)	Material	Annealed Copper
	Grade and Class	Stranded plain Class 2
(b)	Standard Applicable	BS 6360
(c)	Shape	Circular/Circular Compacted/ shaped
(d)	Min. number of strands	As per Table-2 of BS-6360
6.0	**FIRE BARRIER TAPE**	Glass Mica tape in two layers with minimum 50% overlap, suitable to meet performance requirements as per Clause 12.0 below
7.0	**INSULATION**	
(a)	Material	GP8 (XLPE)
(b)	Standard Applicable	BS 7655, Section-1.2 OR BS 7655, Section-1.3
(c)	Continuous withstand temperature	90°C
(d)	Short-circuit withstand temperature	250°C
(e)	Method of application	Pressure extruded (sleeve extrusion is not acceptable).
7.0	**CORE IDENTIFICATION**	Colour coding as per BS 6724
8.0	**INNER SHEATH**	
(a)	Material	Polymeric material
(b)	Standard Applicable	BS 7655
(c)	Colour	Black
(d)	Type	**LSZH, suitable to meet performance reqmt. mentioned at clause 11.0 below**
(e)	Fillers	Not Acceptable
(f)	Method of application	Pressure Extruded
9.0	**ARMOUR**	
(a)	Material:	For multi core cables: Single Layer of GS round wire (as per BS 6724). For single core cables: Aluminium round wire as per BS 6724)
(b)	Gap between armour wires/ formed wires	Shall not exceed one armour round wire space (No cross-over/ over-riding).
(c)	Breaking load of joint	95 % of normal armour
10.0	**OUTERSHEATH**	
(a)	Material	Polymeric material

(b)	Standard Applicable	BS 7655
(c)	Colour	Black
(d)	Type	**LSZH, suitable to meet performance reqmt. as defined at clause 11.0 below**
(e)	Method of application	Pressure Extruded
(f)	Marking	A. By Embossing @ 5m interval 1. Cable size (Nominal cross sectional area and no. of cores) and voltage grade. 2. Type of insulation/ sheath 3. Letters “FS”, “BHEL-PEM” & “TSGENCO” 4. Manufacturer’s Name/Trade Name 5. Year of manufacture B. By Embossing @ 1m interval:- Progressive sequential marking
11.0	**FRLS CHARACTERISTICS FOR OUTER SHEATH**	
(a)	Oxygen index at room temperature of 50 deg C	Min 30 (As per ASTMD 2863)
(b)	Temperature index	Min. 350^{o}C (As per ASTMD 2863)
(c)	Acid gas generation	Max. 2.0% (as per IEC-60754-1)
(d)	Smoke density rating	Max. 20% as per ASTMD 2843
(e)	Flammability Test	As per IEC: 60332-I, Swedish chimney test & flammability test on multiple cables as per BS EN 50266, CAT-B
12.0	**FIRE RESISTANCE CHARACTERISTICS**	Meet the requirement of Circuit Integrity test for Min. 3HR. AT 750 DEG. C AS PER IEC 60331
13.0	**TEST FOR RODENT & TERMITE TEST**	Applicable as per manufacturer standard
14.0	**TOLERANCE ON OUTER DIAMETER**	±2mm
15.0	**STANDARD DRUM LENGTH**	As specified in BOQ.

DATA SHEET - 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

DATASHEET C

GUARANTEED TECHNICAL PARTICULARS

(TO BE SUBMITTED BY SUCCESSFUL BIDDER)

1.0 **General**

1.1 Name of manufacturer :

1.2 Place of Manufacture :

2.0 **Standards applicable**

2.1 For general specification of XLPE Fire Survival Cables

2.2 For conductor material

2.3 For material of innersheath & outersheath.

2.4 For armour of 3 core/ single core cables

2.5 For method of tests in general

2.6 For cable drums

2.7 For oxygen index test

2.8 For flammability test

For Fire Survival Test

2.9 For acid gas generation test on outer sheath

2.10 For smoke generation test on outer sheath

2.11 Current rating of cables conforms to :

2.12 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 :

2.0 Applicable Tests under Fire conditions
For single cable & multiple cables

3.0 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
e) Approximate Cable diameter under armour/over inner sheath
f) Approximate cable diameter over armour
g) 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 XLPE
(iv) Weight of PVC/ Polymeric material
(v) Weight of armour (Galvanised steel/ Aluminium)
(vi) Total weight of cable

15.0 Shipping weight : kg.

16.0 Identification mark on outer sheath : A) By embrossing @5m interval
1. Cable size (Nominal cross sectional area and no. of cores) and voltage grade.
2. Type of insulation/ sheath
3. Letters “FS”
4. Manufacturer’s Name/Trade Name
5. Year of manufacture

B) By embossing @ 1m interval progressive sequential marking

VOLUME-III
DATA SHEET - B
(TO BE SUBMITTED ALONG-WIH THE BID)

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 XLPE Fire Survival Cables

2.2 For conductor material

2.3 For material of innersheath & outersheath.

2.4 For armour of 3 core/ single core cables

2.5 For method of tests in general

2.6 For cable drums

2.7 For oxygen index test

2.8 For flammability test

2.9 For Fire Survival Test

2.10 For acid gas generation test on outer sheath

2.11 For smoke generation test on outer sheath

2.12 Current rating of cables conforms to :

2.13 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) Maximum conductor temperature :
h) 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 LSZH 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%

8.0 **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 under armour/over inner sheath
e) Approximate cable diameter over armour
f) Approximate overall diameter of cable

9.0 Tolerance on overall diameter : (±)mm

10.0 Minimum bending radius : x O.D.

11. Safe pulling force : kg.

12.0 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

TECHNICAL DEVIATION/CLARIFICATION SHEET

Sl. No	Specification Clause Ref.	Technical Deviation	Reason for Deviation

We the undersigned hereby certify that the above mentioned are the only Technical deviations w.r.t the Technical Specification.

Particulars of bidder/Authorised representative				
NAME	**Designation**	**Signature**	**Date**	**COMPANY SEAL**