

**WEST BENGAL POWER DEVELOPMENT  
CORPORATION LTD**

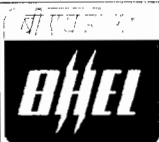
**2X500 MW SAGARDIGHI TPP PH-II  
EXTENSION UNIT- 3 & 4**

**TECHNICAL SPECIFICATION  
FOR  
FIRE SEALING SYSTEM  
SUPPLY & INSTALLATION**

**Specification No:  
PE-TS-373-507-E016 (Rev. 00)**



**BHARAT HEAVY ELECTRICALS LIMITED  
POWER SECTOR  
PROJECT ENGINEERING MANAGEMENT  
NOIDA**



**2X500 MW SAGARDIGHI TPP PH-II  
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VOLUME NO. : IIB

SECTION : A

REV NO. : 00 DATE : 4.10.12

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**PREAMBLE**

1. The Tender documents contain Two (2) volumes. The bidder shall meet the requirements of all Two 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 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 Equipments Complete with Data Sheet A. (Specific data and other requirements pertaining to the equipments.)



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**SECTION 'A'**

**SCOPE OF ENQUIRY**



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**SCOPE OF ENQUIRY**

- 1.0 This specification covers the design, manufacture, inspection and testing at manufacturer's works, proper packing, delivery to site, handling & installation of FIRE SEALING MATERIAL as mentioned in different sections of this specification for **2X500 MW SAGARDIGHI TPP PH-II EXTENSION UNIT- 3 & 4**
- 2.0 It is not the intent to specify herein all the details of design & manufacture. However, the equipment shall conform in all respect to high standards of design engineering and workmanship and shall be capable of performing in continuous commercial operation up to vendor's guarantee.
- 3.0 The general terms and conditions, instructions to tenderer and other attachment referred to Elsewhere are hereby made part of the tender specification.
- 4.0 Deviations, if any should be brought out very clearly on deviation sheet enclosed with specification only. Otherwise it will be presumed that the tenderer's offer is in line with what has been stated/asked for in this specification.
- 5.0 The offer should be complete with technical data, catalogue, brochures and drawings, as applicable.
- 6.0 Qualification data: In order to assess the proven ness of the material offered, the bidder is required to furnish elaborate details of experience, capabilities, reference list etc. in the offer.
- 7.0 The bids shall be in English language and MKS system of units.



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**SECTION 'B'**

**PROJECT INFORMATION**



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**PROJECT INFORMATION**

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**1. SOURCE OF COAL**

The Power Station has been linked to Jhanjra, Chitra and Sarpi mines of Eastern Coal fields (ECL) and Panchwara & Damagoria for extension units.

Coal will be transported on broad-gauge line of Eastern Railways from the coal fields to the Power station in BOBRN rake loads.

Fuel oil (HFO/LDO) will normally be transported by railway oil tankers from nearest oil depot.

**2. SOURCE OF WATER**

The water requirement for the Power station will be met by drawing water from river Bhagirathi at a distance of 6 KM east of project site.

The Power station will operate on closed cooling system using Natural Draft Cooling Towers. In addition, all water conservation and recycling measures will be adopted to minimize requirement of makeup water.

**3. ASH DISPOSAL AREA**

The ash disposal area for the station is located about 1 Km from the plant site.

The Site Location Plan will give an idea of the locations of the site, colony, ash disposal area and rail and road connections.

**4. SALIENT CLIMATOLOGICAL AND DESIGN DATA**

Unless otherwise specified, the following design conditions shall be considered for the equipment offered:

- a) Design ambient dry bulb : 50 °C maximum, 5 °C minimum temperature
- b) Maximum relative humidity : 84%
- c) Average relative humidity : 73%
- d) Highest wet bulb temp. : 26.9 °C
- e) Average annual rainfall : 1389 MM
- f) Seismic zone : Zone-III as per IS-1893 latest revision
- g) Wind load : In accordance with IS-875 for a basic wind speed of 47 m/sec upto a height of 10 metres above mean ground level. For further details refer Volume II-G of this specification.
- h) Altitude : 34M above MSL.



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**SECTION 'C'**

**SPECIFIC TECHNICAL REQUIREMENTS**





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**1.0 SCOPE OF ENQUIRY**

1.1 This enquiry covers the supply and installation of fire sealing material for cable opening through walls & floors (below panels & risers), pipe sleeves & fire protection coating on installed cables as listed in enclosed Bill Of Quantities (B.O.Q.) - Annexure - I in accordance with specific technical requirements section - C, section - D and data sheet - A and schedules, annexure etc.

**2.0 SCOPE OF WORK**

The scope of work shall include design, manufacturing, and testing, packing, supply to site, storage, handling & installation of:

**I) Fire sealing material.**

- a) Floor opening below panel
- b) Floor openings for risers
- c) Wall openings
- d) Pipes sleeves opening

**II) Fire protection coating on installed cables.**

**3.0 GENERAL**

3.1 Bidder shall confirm compliance to the specification in totality. Any deviation from this specification shall be brought out in Schedule of Deviations enclosed. In the absence of duly filled Schedule of Deviations, it shall be construed that the bid conforms to the specification.

3.2 Purchaser reserves the right to increase / decrease the quantity as finally required for the project as per clause 9.0 below, and unit rates quoted by the bidder shall be applicable for adjustment purposes for the same.

3.3 The bid is liable to be rejected in case complete documentation required to be the part of the bid is not furnished.

**4.0 SPECIFIC TECHNICAL REQUIREMENTS**

4.1 Fire seals for cable penetrations through walls/floors/pipe openings shall be suitable for **three hours rating**.

4.2 Fire sealing system offered shall be out of any of the following system

- a) Panel based sealing system (comprising encasing panels, cavity fill material & sealant)
- b) Powder/ mortar based sealing system (comprising mixing mortar curing with water)

4.3 In addition to the installation of the fire sealing system materials, any additional work required for the installation (e.g. preparation of the area where fire seal is intended to be applied, enlargement/ reduction of the total opening area, etc.) is included in their scope of work. However, payment towards the civil works (enlargement/ reduction) of penetration area shall be as per clause 8.1(f) & 8.3 (f) of section-D.

4.4 Bidder shall indicate price for tool and accessories required for addition or removal of cables after the seal is made. This shall include special tools; compound injection guns, spray guns, etc. (As applicable) in price schedule.

4.5 DCPL specification for the fire sealing system is as below.

## DCPL/WBPDCL SPECIFIC REQUIREMENTS

## 7.11.00 Fire proof sealing/Fire Stop/Fire Protection Coating System

The fire-proof sealing/fire stop system/fire protection coating system is required to prevent spreading of fire from one place to another (or one zone to another) through the openings in wall/floor, cables laid in trays/racks and openings below Electrical Switchgear/MCC/Distribution Boards/Cabinets/Panels etc.

## 7.11.01 Fire-proof Sealing System

The material/components used for fire-proof sealing system shall be provided to meet the following requirements :

- a) Life expectancy should not be less than 30 years from the date of installation.
- b) Free from shrinkage or cracking or asbestos in composition and should achieve smoke and gas tightness during fire and should be modifiable.

- c) Not to generate toxic gas and harmless to the personnel handling the system.
- d) Prohibition of production of acid or alkali during gas generation.
- e) Will not produce suffocating/corrosive gas.
- f) Repellant to pest/ rodent/ termite.
- g) Expansion co-efficient - very low, which is to be comparable with masonry concrete.
- h) Not soluble/reactive to acid, water, alkali.
- i) Thermal conductivity - low.
- j) The material in contact with the cables in the fire-proof sealing system shall be compatible with the material used for outer sheath of cables.
- k) It should not have any adverse effect on the cables and should not alter the current carrying capacity of the cables.
- l) Retrofit in design to accommodate not less than 15% more addition of cables depending upon the size of cables, physically and chemically stable.
- m) Capable of withstanding vibrations, drop-loads, foot traffics, mechanical loads, etc.
- n) Non-hygroscopic, non-inflammable and shall not get affected over a period of time due to humidity, moisture and ozone etc. and should not contain volatile solvents which may cause a fire hazard during application.
- o) The fire rating shall not be less than three (3) hours and the system shall be stable after application of water jet in the exposed side in order to extinguish fire.

#### 7.11.02 Fire Protection Coating To Be Applied On Installed Cables

- a) The cables shall be coated with fire protection material of 2 mm dry thickness at the strategic locations as follows so as to limit the spread of fire :
  - i) At fire stops in walls and floors on either side upto 500 mm length.
  - ii) At fire stops below Electrical Switchgears/MCCs/Panels/ Cabinets etc. on one side coating of 500 mm length i.e. on the cable vault side/cable trench side.

- iii) Length of 500 mm on all sides of the junction/crossing of cabling work in open cable routes/cable trench.
  - iv) In fire risk areas and where specified at suitable intervals as decided upon site conditions in open cable routes.
  - v) Where necessary and specified at site at intervals along cable routes in cable trenches.
  - vi) The coating shall be applied evenly on the cables only.
- b) The fire protection coating shall have the following properties/ composition:
- i) Asbestos free, non-volatile, not eatable by vermin, harmless and non-irritant to skin of human.
  - ii) Not affecting the current carrying capacity of the cables and the properties of the installed cables.
  - iii) It shall delay fire damage to cables and prevent flame spreading meeting the requirement of IEC-332-1 & IEEE- 383.
  - iv) Coating material shall show no signs of cracking and peeling when the coated cable is bent to the radius of minimum 12 times the diameter of the maximum sized cable at 180°C.
  - v) The limiting oxygen index of the material shall not be less than 35% as per ASTM D-2863.
  - vi) Life expectancy equivalent to the cable installations.

7.11.03 The various openings in the cable vault, vertical/horizontal raceways of cables penetrating walls/floors and the bottom of Electrical Switchgears/MCCs/ Distribution Boards/Cabinets/Panels shall be provided with fire stop systems. Cables passing through the openings at various locations are laid on various tiers of the cable trays/racks in the bunch formation. In case, for the purpose of installation of seal system, steel frames are required to be fabricated and fixed in the openings, the fabrication of frame and fixing of the same shall have to be done by the Contractor. The necessary steel section for fabrication of frames shall be supplied by the Contractor without any extra cost. Any, civil works required to be done in the openings shall be carried out by the Contractor. Bidder shall also include one set of tools and accessories required for addition or removal of cables after the seal is made. This shall include special tools, compound injection guns, spray guns, etc.

All cable entry Points shall be properly sealed and made vermin and dust proof. Unusual opening, if any, shall be effectively closed. Sealing work shall be carried out with approved sealing compound having fire withstand capability for at least three hours.

Shelf life of fire sealing material & fire protection coating shall be atleast 12 months after supply of materials.

Except for inside an enclosure wherever the cable enters or leaves the conduit, the conduit end shall be sealed by suitable sealing compound, having fire withstand capability.

- 2.04.09 All openings in the floor and wall for cable access shall be sealed after installation of the cable system with non-inflammable materials, as follows:
- i) Fire stop/Penetration seal shall be installed in the cable spreaders and cable raceways.
  - ii) Similarly in the trenches fire stop/penetration seals shall be provided at suitable interval to avoid spread of fire.
  - iii) For all H.T., L.T., Relay and Control panels, Control desk, instrumentation panels, battery charger, D.C. Dist. boards and other miscellaneous panels, fire-stops should be provided below base plate.
- 2.04.10 All floor/wall openings for cable entry to the electrical equipment and accessories shall be sealed with non-inflammable materials, after completion of cable installation. Thickness of such materials shall be equal to the thickness of floor/wall unless specified otherwise.
- 2.04.11 The portion of galvanised steel, which, if required, undergoes any welding at site shall be coated with two (2) coats of cold galvanising anti-corrosive paint after welding.
- 2.04.12 The cables shall be coated with fire protection coating as specified elsewhere.

The type tests for fireproof sealing system for floor/wall opening/fire stop system for bottom of Electrical Switchgear MCCs/Panel are as under:

- a) Fire rating test
  - b) Hose stream test
  - c) Accelerated ageing test
  - d) Fire rating test on the penetration seal system built of accelerated aged components followed by Hose Stream Test.
  - e) Temperature rise test for cable in the fire stop.
  - f) Water absorption test followed by fire rating test.
  - g) Flame resistance test for fire protection coating material.
  - h) Anti-rodent Test.
  
  - i) Limiting Oxygen Index Test (ASTMD 2863) for fire protection coating , limiting oxygen index of the material shall not be less than 35%.
- The detailed test procedures for each of these tests are to be indicated by the bidder and is subject to approval by Owner/Consultant.



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4.6 System offered shall be of **type tested** design.

4.7 A) Bidder shall furnish the latest "TYPE TEST" report of type tests conducted at CBRI, Roorkee or by government approved Independent agency on the system offered (but not more than 5 yrs old from enquiry date) suitable for **3 hrs. Rating**.

B) In case bidder is not able to submit report of type test(s) conducted in last five years from date of enquiry, or in case type test report(s) are not found to be meeting the specification/ relevant standard requirements, then all such tests under the contract shall be conducted free of cost to the owner and reports shall be submitted for approval. No charges shall be paid under this contract.

C) Irrespective of the bidder furnishing valid test reports, owner/Consultant may get some Type tests conducted by the bidder. The charges for these Type test shall be paid to the bidder according to the price quoted by him in BOQ/Price schedule. In case any type test is not conducted then the respective type test charges shall not be paid to the bidder.

4.8 Bidder shall indicate price for each "type test" in price schedule which shall also be used for price comparison purpose.

4.9 All acceptance & routine tests as per relevant standards & specification shall be deemed to be included in the bid price.

**5.0 DRAWINGS / DATA SHEETS**

5.1 "Documentation" Clause no. 12 of Vol. IIB, section -D stands deleted & is modified as below:

12.1 The following information shall be furnished with the bid:

- a) Complete details of the system.
- b) Typical drawings showing arrangement of various components and thicknesses etc.
- c) Type test certificates
- d) Quality Plan for supply items.
- e) Field Quality Plan covering details of storage, material handling at site, checks to be observed during erection and testing details at site.
- f) BOQ as detailed in clause 12.0 below.

12.2 The following information shall be furnished within two weeks of award of contract, for purchaser's approval.

- a) Calculations for supply of material based on area to be provided with fire sealing.
- b) Manufacturing Quality Plan.
- c) Field Quality Plan.
- d) Type test procedures, installation procedures, drawings.
- e) Test reports, (Type, Batch, routine & acceptance)

5.2 No. of documents / drawings required after award of contract shall be as per "Documents / Drawings Distribution Schedule" enclosed as per Annex. II

**6.0 CODES & STANDARDS**

6.1 Latest revision of relevant standards / codes shall be applicable.

6.2 The testing methods shall be in accordance with the international standards (such as ASTM-E-814, ASTM-E-119, UL-1479, BS: 476, IEC-332-1 and ASTMD-2863)

**7.0 QUALITY PLAN**

7.1 Successful bidder shall submit Quality Plan after award of contract, which shall include various quality checks for the fire sealing material offered. The same shall be subject to the approval of



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BHEL/Customer without any commercial implication.

- 7.2 Successful bidder shall submit Field Quality Plan for storage, preservation and handling of Fire sealing material offered. The same shall be subject to the approval of BHEL/Customer without any commercial implication.

**8.0 BILL OF QUANTITY**

8.1 Bill of quantities (B.O.Q.) is given in Annexure – I

8.2 The bidder shall furnish along with his bid bill of quantities of fire sealing materials for each of the items with calculations and data justifying the same. The agreed quantities will be only for billing purposes and bidder is responsible for supplying the quantities to complete the fire sealing work meeting the specification requirements, without any price implications.

**9.0 PRICES**

9.1 Vendor shall be indicating the following unit price:

- a) Unit price for supply of material for each of the item listed in the BOQ.
- b) Unit prices for installation of fire sealing material for each item listed in BOQ.
- c) Unit rates for civil works (Optional) in line with clause no. 8.3, Section D of specification.  
Unit prices quoted shall adhere to the requirement given under **clause 8.3 section-D of this specification.**

9.2 Lot-I quantity shall be released along with LOI.

9.3 Additional quantity shall be released by BHEL progressively as per site requirement. The quantity variation shall be limited to (-)30% to (+)30% of the contract value arrived at on the basis of the total order of quantities.

9.4 Addition/deletion of quantity shall be applicable at the quoted unit price.

**10.0 DELIVERY**

Delivery shall be as per NIT (Notice Inviting Tender)





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**ANNEXURE-I**

**BILL OF QUANTITIES / PRICE SCHEDULE**

**1. SUPPLY OF FIRE SEALING SYSTEM MATERIALS**

SL. NO.	DESCRIPTION	ORDER QUANTITY	LOT 1 QUANTITY	UNIT PRICE (Ex-works)	TOTAL PRICE (Ex-works)
		(IN SQ. METRE)/(NOS.)	(IN SQ. METRE)/(NOS.)	(IN RUPEES)	(IN RUPEES)
1	<b>FLOOR OPENINGS BELOW PANELS</b> (Floor thickness 200mm approx.)	1100 Sq Mtr	770 Sq Mtr		
2	<b>FLOOR OPENINGS</b> (Floor thickness 200mm approx.)	200 Sq Mtr	140 Sq Mtr		
3	<b>WALL OPENING</b> (Wall thickness 250 mm approx.)	125 Sq Mtr	88 Sq Mtr		
4	<b>PIPE SLEEVES</b> (200NB Pipes)	250 Nos.	175 Nos.		
5	<b>COATING MATERIAL ON CABLES</b>				
	<b>A) CABLES</b> (LAID ON 600mm/ 450mm/ 300mm/ 150mm WIDE TRAYS TO BE COATED with 2mm thickness UPTO LENGTH OF 500mm.)	6500 Sq Mtr (*)	4550 Sq Mtr (*)		
6	<b>TOOLS AND ACCESSORIES REQUIRED FOR ADDITION OR REMOVAL OF CABLES AFTER THE SEAL IS MADE. THIS SHALL INCLUDE SPECIAL TOOLS, COMPOUND INJECTION GUNS, SPRAY GUNS, ETC. (As applicable)</b>	1 SET	1 SET		
<b>TOTAL SUPPLY</b>					

(\*) This is the total surface area of cables to be coated.



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**2. INSTALLATION OF FIRE SEALING SYSTEM MATERIALS**

SL. NO.	DESCRIPTION	ORDER QUANTITY	LOT 1 QUANTITY	UNIT PRICE (Without service tax)	TOTAL PRICE (Without service tax)
		(IN SQ. METRE)/(NOS.)	(IN SQ. METRE)/(NOS.)	(IN RUPEES)	(IN RUPEES)
1	<b>FLOOR OPENINGS BELOW PANELS</b> (Floor thickness 200 mm approx.)	1100 Sq Mtr	770 Sq Mtr		
2	<b>FLOOR OPENINGS</b> (Floor thickness 200 mm approx.)	200 Sq Mtr	140 Sq Mtr		
3	<b>WALL OPENING</b> (Wall thickness 250 mm approx.)	125 Sq Mtr	88 Sq Mtr		
4	<b>PIPE SLEEVES</b> (200NB Pipes)	250 Nos.	175 Nos.		
5	<b>COATING MATERIAL ON CABLES</b>				
	<b>A) CABLES</b> (LAID ON 600mm/ 450mm/ 300mm/ 150mm WIDE TRAYS TO BE COATED UPTO LENGTH OF 500mm WITH A THICKNESS OF 2mm.)	6500 Sq Mtr (*)	4550 Sq Mtr (*)		
<b>TOTAL INSTALLATION</b>					

(\*) This is the total surface area of cables to be coated.

**3. TYPE TESTING CHARGES FOR THE SYSTEM**

S.No.	The type tests for fireproof sealing system for floor/wall opening/fire stop system for bottom of Electrical Switchgear MCCs/Panel	Price (Without taxes & duties) in Rs
1.	Fire rating test	
2.	Hose stream test	
3.	Accelerated ageing test	
4.	Fire rating test on the penetration seal system built of accelerated aged components followed by Hose stream Test	
5.	Water absorption test followed by fire rating test	
6.	Temperature rise test for cable in fire stop	
7.	Anti rodent test	
8.	Flammability test as per IEC-332-1 & IEEE 383	
9.	Limiting oxygen index test as per ASTM D-2863.	

The detailed test procedure for each of these tests is to be indicated by the successful bidder after the award of contract and is subject to approval by Owner/ Consultant.



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**4. CIVIL WORKS (Optional)**

S.No.	Description	Unit	Unit Rate (Without taxes & duties in Rs)
(a)	ENLARGEMENT OF PENETRATION AREA IN		
(i)	BRICK WALL	sq. m.	
(ii)	CONCRETE WALL	sq. m.	
(iii)	FLOORS	sq. m.	
(b)	REDUCTION OF PENETRATION AREA IN		
(i)	BRICK WALL	sq. m.	
(ii)	CONCRETE WALL	sq. m.	
(iii)	FLOORS	sq. m.	

Notes:

1. The fire sealing area indicated under Column "Ordered Quantity" above shall be considered for ordering purposes. Bidder shall indicate the quantity of material required to be supplied per square metre, which shall be used for billing purposes of the supply portion after review and acceptance. However, the vendor shall supply the actual material necessary for meeting the specified area requirements as per type-tested arrangement without any commercial implication.
2. LOT 1 Quantity shall be released along with LOI.
3. Quantity variation shall be limited to (-)30% to (+)30% of the contract value arrived at on the basis of the total ordered quantities. LOT 1 quantity shall be cleared for supply along with the LOI/ PO. However, supplies of quantities shall be made only after approval of drawings, datasheets, quality documentation and successful completion of type testing (if required).
4. Successful bidder is responsible for estimation of additional quantities based on site conditions and work progress. The estimates shall be used by BHEL as inputs for clearing further quantities. These activities shall be completed within the overall contractual period.
5. Total price quoted for items 1 ,2 & 3 above shall be used for price comparison purpose.
6. Unit prices for supply and installation shall be quoted in line with clause no. 8.3, Section D of specification.
7. Unit rates for civil works (item 4 above) shall be as per clause no. 8.3 (f) of Section-D of specification.
8. For Type Tests refer clause no. 4.7 of Section-C



**2X500 MW SAGARDIGHI TPP PH-II  
EXTENSION UNIT- 3 & 4**

**TECHNICAL SPECIFICATION FOR  
FIRE SEALING MATERIAL**

SPECIFICATION NO.  
**PE-TS-373-507-E016**

VOLUME NO. : IIB

SECTION : A

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ANNEXURE-II

**LIST OF DELIVERABLE**

<u><b>S. NO.</b></u>	<u><b>Drawings description/doc.</b></u>	<u><b>Drawings / document number</b></u>	<u><b>Submission date by vendor</b></u>
1	Technical Data sheet	PE-V0-373-507-E091	Within two weeks from the date of LOI.
2	General arrangement drawings	PE-V0-373-507-E092	Within two weeks from the date of LOI.
3	Quality plan	PE-V0-373-507-E093	Within two weeks from the date of LOI.
4	Type test reports	PE-V0-373-507-E094	Within two weeks from the date of LOI.
5	Recommended field quality plan	PE-V0-373-507-E095	Within two weeks from the date of LOI.
6	Type Test Reports for Tests conducted under this contract (Ref. Cl. 4.7 of section-C)	PE-V0-373-507-E096	Within two weeks from the date of conduction of Type Test



**2X500 MW SAGARDIGHI TPP PH-II  
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ANNEXURE-III

**DRAWING/DOCUMENT SCHEDULE**

**No. OF DRAWINGS / DOCUMENTS REQUIRED FROM VENDOR**

S. NO.	DESCRIPTION	No. hard prints/copies	No. of CD-ROMs	REMARKS
1	Master List of Drgs./ Docs.	10 Copies		
2	Docs. /drgs. submission schedule for approval	10 Copies		
3	Approved Docs. /Drgs. submission schedule for distribution	25 Copies	4 CD-ROMS	
4	Docs. /drgs. for approval (First submission)	10 copies	4 CD-ROMS	
5	Drgs. / docs. for approval (Second & subsequent submission till approval)	10 copies	4 CD-ROMS	
6	Final approval drgs. / docs. for Distribution	25 Copies	4 CD-ROMS	
7	Operation & Maintenance manual for approval	10 Copies		
8	Approved Operation & Maintenance Manual for distribution	25 Copies	4 CD-ROMS	
9	Type Test Certificates/ Reports	10 Copies		



**2X500 MW SAGARDIGHI TPP PH-II  
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**SECTION 'D'**

**SPECIFICATION  
FOR FIRE SEALING MATERIAL  
& DATA SHEETS**



FIRE STOP SYSTEM FOR CABLES

SPECIFICATION No. PES-507-26	
VOLUME 13	SECTION D
REV. No. 02	DATE 3.11.93
SHEET	2 <del>25</del> OF 12 <del>40</del>

GENERAL TECHNICAL REQUIREMENTS  
OF

FIRE STOP SYSTEM FOR CABLES

SPECIFICATION NO.

PES-507-26

REV. 02

DATE 3.11.93



## FIRE STOP SYSTEM FOR CABLES

SPECIFICATION No. PES-507-26

VOLUME IIB

SECTION D

REV. No. 02

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### 1.0 GENERAL

This specification covers the requirements which are applicable in general to fire stop system of cable penetrations through floors and walls.

### 2.0 STANDARDS

The latest editions of following standards shall be applicable :

- a) ASTM-E-814 Standard test methods for fire tests of Through-Penetration fire stops

### 3.0 DESIGN REQUIREMENTS

3.1 The fire stop system, in case of fire, shall prevent spreading of fire in cables / systems beyond the fire stops.

3.2 The cables shall be generally laid in cable trays/cable racks/conduits and fire stop system shall be designed in a way such that the basic supporting structure of cables is not disturbed.

3.3 The system shall be of retrofit design, physically and chemically stable.

3.4 Through penetration cable openings on floors and walls shall be divided into modules. Each module shall have spare capacity to accommodate additional cables in future. The fire stop system shall be designed to accept additional cables without impairing fire stop capability and without disturbance / wastage of material in the nearby modules. Addition of cables should cause minimum disturbance/ wastage of material in the affected module.

3.5 The system shall be mechanically secured to the masonry work/concrete work to resist dislocation.

3.6 The system shall remain unaffected due to any vibrations or expansion in cables. The system must also remain unaffected due to adverse temperature and humidity variations in the atmosphere. Temperature and humidity conditions shall be specified in the project information for the respective projects.

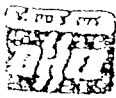
3.7 The system should be equally effective in horizontal and vertical formations.

3.8 The system should not affect the current carrying capacity of cables passing through the fire stop.

3.9 The system should provide firm grip on the outer surface of the cable in the event of fire.

3.10 The system shall be capable of withstanding mechanical loads, foot traffic, drop loads and wind pressure etc.





## FIRE STOP SYSTEM FOR CABLES

SPECIFICATION No. PES-507-26	
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- 1.11 The fire stop system shall be completely gas & smoke tight.
- 1.12 The materials/components used for fire stop system shall meet the following requirements :
- a) Shall not get affected over a period of time due to humidity, moisture, Ozone and variation in ambient temperature.
  - b) Should not contain volatile solvents after the setting period of system.
  - c) Should be able to withstand stresses due to expansion/vibrations.
  - d) Should be free from shrinkage and cracking and should maintain smoke and gas tightness during fire.
  - e) Should not react with cable sheaths, galvanized & painted steel materials etc.
  - f) Should be easy to apply/install using conventional methods.
  - g) Should be non-toxic and harmless to the working personnel.
  - h) Should have anti-rodent properties.
  - i) Should have shelf life of atleast 18 months after the supply of materials.
- 1.13 The system shall have a fire resistance rating of duration as per Data Sheet A. Fire resistance rating shall be in accordance with ASTM E-119 and integrity and stability shall be maintained by the system after application of water jet on the exposed side in order to extinguish fire.
- 1.14 Welding
- 1.14.1 All welded connections if applicable shall be made by electric arc welding. All welding work shall be carried out by qualified and experienced welders and adequately protecting the already laid cables.
- 1.14.2 All arc welding shall be carried out with low hydrogen content electrode.
- 1.14.3 All welded joints shall be allowed to cool down gradually to atmospheric temperature before putting any load on them. No artificial cooling should be adopted to cool welded joints.



## FIRE STOP SYSTEM FOR CABLES

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### 1.15 Surface Treatment

#### 1.15.1 Supply Items

Surface treatment of all materials supplied shall be done as applicable in an approved manner and as per the specific requirements given in the Data Sheet A. Surface treatment shall include following steps :

- a) Pretreatment : Pretreatment shall conform to the requirements of IS:6005. The clean and dry pretreated surface shall be given a coat of red oxide primer paint and shall be left for natural drying.
- b) Galvanizing : Articles shall be hot dip galvanized after pretreatment. The galvanizing shall be done in accordance with IS:2629. The galvanizing shall be uniform, clean, smooth, continuous and free from acid spots. The amount of zinc deposit shall not be less than the value specified in Data Sheet A.

#### 1.15.2 After erection :

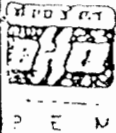
- a) GALVANIZED ITEMS shall be given a surface treatment only at the welded joints and at the places where the galvanization has been damaged. Welded joints shall be applied with two coats of cold zinc paint whereas damaged portions of galvanizing shall be applied with single coat of zinc paint.
- b) In addition to the above, the vendor shall ensure after completion of fire stop system that the final finish of all surfaces of materials is in good condition and wherever needed a touch up of cold zinc paint shall be given.
- c) The final finish of all erected materials shall be uniform, clean, smooth and free from spots.

### 1.0 PACKING & STORAGE

All materials/components of fire stops shall be supplied in proper packing to avoid contamination of materials due to dust/moisture. All packing shall be of durable quality. Packing containers shall be suitable for storing on wet surface. However, the materials shall be generally stored on wooden racks inside enclosed area and the responsibility of proper storage of materials shall be of the vendor.

### 1.0 QUALITY ASSURANCE AND QUALITY CONTROL

- a) The quality plan enclosed forms part of this specification.



## FIRE STOP SYSTEM FOR CABLES

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5.2 Stages of quality control shall include but not be limited to the following :

- Verification of test certificates for materials before despatch.
- Visual inspection of materials before despatch.
- Testing of materials before despatch as applicable.
- Inspection of packing before despatch.
- Quality checks during erection
- Inspection & testing of fire stops after erection.

### TESTING

6.1 The system offered shall comply with the following type tests and the test reports shall be submitted along with offer.

- Fire rating test
- Hose stream test
- Accelerated aging test followed by fire test
- Anti rodent test
- Temperature rise test for cables in fire stop.
- Explosion Test (optional, refer Data Sheet A)

6.2 System shall be subjected to structural stability test, which shall be conducted at site.

6.3 The test details have been covered in clause 7.0

### TEST DETAILS

#### 7.1 Fire rating test

Fire rating test shall be done as per ASTM E 119

#### 7.2 Hose Stream Test

Hose stream test shall be done as per ASTM E 119

#### 7.3 Accelerated Aging test

7.3.1 The fire stop system shall be subjected to accelerated aging. The system/components shall be stored for 400 hours in air furnace where the temperature of the inside air shall be maintained at 100 °C. The aged specimen then shall be immersed in water for a period of minimum 24 hours. The specimen shall thereafter be subjected to the live fire test as per cl. 7.1 above.



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## FIRE STOP SYSTEM FOR CABLES

SPECIFICATION No. PES-507-26

VOLUME 13

SECTION D

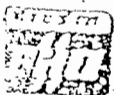
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- 1.3.2 In case the mechanical properties before and after the accelerated aging do not indicate substantial change, the system shall be deemed to have passed the accelerated aging test. Similarly, the variation in the form of the system/component at the end of the test shall not indicate permanent deformation which is likely to affect the sealing properties of the system.
- 1.4 Anti-rodent test
- 1.4.1 This test shall be carried out to ascertain the anti-rodent properties of the components of the fire stop system.
- 1.4.2 This test shall be carried out at approved test station dealing with the tests on pharmaceutical products. The complete fire stop assembly shall be subjected to attack of insects and vermin such as rats for about 20 days.
- 1.4.3 At the end of the test the condition of the surface of fire stop shall be compared with the surface condition before commencement of the test. The fire stop shall be deemed to have passed this test in case no marks of gnawing are seen on the surface.
- 1.5 Temperature rise test for cable in the fire stop
- 1.5.1 This test shall be carried out to ascertain whether due to inadequate dissipation of heat at the location of fire stop the temp. of cable conductor or outer sheath in contact with the fire stop rises beyond the acceptable limits due to which whether any derating is required for cables.
- 1.5.2 Fire stop system shall be erected with at least 10 armoured power cables. While laying the cable through fire stop assembly, thermocouples shall be placed on the outer surface of cable in contact with the fire stop system. The location shall be selected where there is possibility of inadequate dissipation of heat from cables to the atmosphere due to fire stop system components. Two thermocouples shall also be located on the two surfaces of the firestop system. Similarly thermo-couples shall also be placed on the outer surface of cables where there is contact of free air without any obstruction so as to enable adequate natural cooling. Ambient temperature at test location should not be less than 40 °C.
- 1.5.3 Rated current of the cable (after adjusting for ambient conditions), guaranteed by the cable manufacturer as free air rating shall be injected through the cable one by one. Measurement of temperatures at the location where thermocouples are provided shall be recorded. Test shall continue till stable temperatures on all surfaces are achieved.
- 1.5.4 In case the temp. of outer surface of the cable in contact or inside the fire stop system does not exceed 60°C, it is inferred that no derating of cable is required for cable when used in conjunction with the particular fire stop system.



## FIRE STOP SYSTEM FOR CABLES

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### 1.6 Explosion Test

Following method shall be adopted :

- The explosion test shall be carried out in an explosion apparatus having approximately 1 metre cube volume and capable of withstanding maximum pressure of about 100-bars. Acetylene-Air mixture is exploded in the apparatus chamber in order to obtain different dynamic pressures.
- The fire-stop system is subjected to the dynamic pressure produced inside the explosion chamber. The pressure is increased to the guaranteed explosion pressure, which shall not be less than 16 bars.
- Pressure shall be registered with suitable instrument like Bisco Wheel pressure metre or Light Beam recorder during the test.

The explosion test shall be deemed to have been passed if the system maintains stability and is not found leaking when subjected to explosion pressure as mentioned above.

### 1.7 Structural Stability Test (Site Test)

For structural stability test i.e. to check the mechanical strength and workmanship of fire stop system, following test shall be conducted by the vendor at site before the start of erection work.

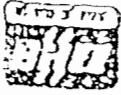
- The vendor shall construct a fire stop specimen on a floor slab having a horizontal opening of 500x500x225mm (LxBxH). The test opening shall not be provided with any cables or penetration items. The specimen shall be constructed using same materials and techniques as are intended to be used in actual service.
- A standard steel weight of 1 kg shall be dropped repeatedly twice at the middle of opening from a vertical height of 2 metres.

The fire stop system shall be deemed to have failed if the drop test results in dislocation or collapse or cracking of the fire-stop system.

### 3.0 PRICES

Unit prices listed out in this clause shall be applicable for payment to the vendor for activities covered under this specification. The unit price shall be inclusive of :

- Design, manufacture, testing at works, packing, supply, transportation to site, handling and storage at site of the fire stop system materials.



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## FIRE STOP SYSTEM FOR CABLES

SPECIFICATION No. PES-507-26

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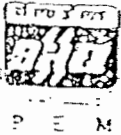
- b) Visual inspection & Transportation of materials from Vendor's/ Owner's storage yard to work site, handling, testing including supply and installation of all associated materials and consumables, carrying out of all associated minor civil works and furnishing of all skilled /unskilled labour and supervisory staff.
- c) Provision of fasteners like nuts, bolts, washers, spring washers, rawl plugs, anchoring bolts and lugs etc.
- d) Provision of all sealing compounds for wall and floor openings.
- e) Consumables like enamels, cold zinc paint, electrodes for welding etc.
- f) Minor civil works like chipping/ breaking of floors/walls and masonry work for reducing/ closing of openings on floors/ walls including supply of materials like cement, sand, brick etc. as required. Any work as described above to the extent of 200 mm on all sides of openings on walls and floors for the purpose of fitting the actual fire stop assembly shall be deemed to have been included in the unit prices of fire stop assembly.
- g) Provision of all facilities/equipment for site fabrication such as cutting, bending and drilling equipment.
- h) Provision of welding sets.
- i) Provision of all special tools and tackles for erection.
- j) Provision of all testing equipment, & Conducting the specified test after erection at site.

2. Requirement of Quality Plan and Field Quality Plan shall be considered in the quoted prices.

3. Unit Prices

Following unit prices shall be applicable for the purpose of payment :

- a) Unit rate of SUPPLY AND INSTALLATION OF HORIZONTAL FIRE STOP BELOW EQUIPMENT shall be applicable for the cutout area to be measured in square metres. Coating of cable, if considered, shall be provided on one side of the fire stop i.e. below the equipment.
- b) Unit rate of SUPPLY AND INSTALLATION OF HORIZONTAL FIRE STOP AT FLOOR CROSSINGS IN CABLE SHAFTS shall be applicable for the cutout area to be measured in square metres. Coating of cable, if considered, shall be provided on both sides of the fire stop.



## FIRE STOP SYSTEM FOR CABLES

SPECIFICATION No. PES-507-26

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- c) Unit rate of ~~SUPPLY AND INSTALLATION~~ OF VERTICAL FIRE STOP AT WALLS FOR HORIZONTAL RACEWAYS shall be applicable for the cutout area to be measured in square metres. Coating of cable, if considered, shall be provided on both sides of the fire stop. Unit rate shall also be applicable for the part of the Fire Stop Walls other than doors, provided for the segregation of various units.
- d) Unit rate of ~~SUPPLY AND INSTALLATION~~ OF VERTICAL FIRE STOP IN TRENCHES shall be applicable for the cross section area of the trench measured in square metres. Coating of cable, if considered, shall be provided on both sides of the fire stop.
- e) Unit rate of ~~SUPPLY AND INSTALLATION~~ OF FIRE DOORS shall be applicable for the area of the door and its assembly to be measured in square metres.
- f) Unit rate of ~~SUPPLY AND INSTALLATION~~ OF FIRE BARRIER PARTITION WALLS shall be applicable for the area of the fire barrier wall constructed and measured in square metres.
- g) Unit rate for CIVIL WORKS such as chipping/ breaking of floors/ walls and masonry work for closing/ reducing of openings on floors/ walls including supply of cement, sand, brick etc. over and above the limits described in cl. 8.1(f) above shall be applicable for the area measured in square metres of such construction.

### 9.0 MEASUREMENT & WASTAGES

#### 9.1 Quantity Measurement

9.1.1 for all payment purposes, measurement shall be made on the basis of the execution drawings/physical measurements. Physical measurements shall be made by the vendor in the presence of the Engineer.

#### 9.2 Wastage Allowance

9.2.1 No wastage allowance is permissible. All wastages shall be to the account of vendor.

### 10.0 ADDITIONAL POINTS OF CONSIDERATION

10.1 The work to be carried out under this specification shall be done under the supervision of purchaser's/owner's representative.

10.2 The materials and components offered for fire stop system shall be complete in all respects. Any materials and components not specifically stated but which are necessary for the erection of the systems are to be included. All such equipment/accessories shall be supplied free of cost.

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# FIRE STOP SYSTEM FOR CABLES

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- 10.3 All work shall be carried out in accordance with the agreed quality plan and approved drawings. The work shall be done to the satisfaction of purchaser and acceptance of the work shall be subject to the purchaser's approval.
- 10.4 Bidder shall be deemed to have confirmed to the specification in toto.
- 10.5 The installation work shall be carried out in a neat workman like manner by skilled, experienced and competent workmen.
- 10.6 Installation work at site shall be properly coordinated with other services.
- 10.7 All materials, equipment, instrument, hardware, tools, consumables, fasteners, accessories whether specifically mentioned or not in the offer but required for complete installation and testing in all respects and to the satisfaction of Engineers will be in the scope of vendor and no extra payment will be made for the same.
- 10.8 All materials being supplied or consumed during erection by the vendor in the process of erection work shall be of the best quality and according to the relevant standards. All materials shall be got inspected and got approved by the Engineer before the same is used for erection. Also, purchaser reserves the right to carry out inspection of installation work at any stage during erection, testing and commissioning.
- 10.9 Any drilling and welding on building structural steel for fixing supports etc. will not be done without the prior approval of Engineer.
- 10.10 Any work like chipping, or breaking of existing structure like walls, floors, fabrications etc. shall be done after taking prior approval of Engineer.
  - a) After installation of fire stops through a structure, the vendor shall repair / refabricate the affected portion of structure.
  - b) Any wrong erection shall be removed and reerected promptly to comply with the requirements at no extra cost.
- 10.12 After completion of work the contractor shall remove all debris and take back all erection impliments, left-overs, surplus materials over and above the ordered quantity without any financial implications to either party.
- 11.0 PERFORMANCE GUARANTEE
- 11.1 Bidder shall guarantee that the system offered shall meet the requirement as indicated in this specification and is confirmed through various clauses of Data Sheets. If it is proved that the system doesn't conform to performance guarantee, the bidder should be ready to replace the faulty components / equipment without any loss or extra cost to the purchaser.

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## FIRE STOP SYSTEM FOR CABLES

SPECIFICATION No. PES-507-26

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### 12.0 DOCUMENTATION

12.1 The following information shall be furnished in requisite copies for distribution as per respective contract requirements :

- a) Complete details of the system.
- b) Typical drawings showing arrangement of various components and thicknesses etc.
- c) All test certificates (Type, routine & acceptance)
- d) Contract drawings for all fire stops.

12.2 The following information shall be furnished within two weeks of award of contract, for purchaser's approval.

- a) Bar Chart covering all activities including activities at site.
- b) Billing Schedule.



**2X500 MW SAGARDIGHI TPP PH-II  
EXTENSION UNIT- 3 & 4**

**TECHNICAL SPECIFICATION FOR  
FIRE SEALING MATERIAL**

SPECIFICATION NO.  
**PE-TS-373-507-E016**

VOLUME NO. : IIB


SECTION : A

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**DATASHEET-A**

- 1.0 fire stop : Three (3) hours
- 2.0 Thickness of Fire protection coating : 2 mm
- 3.0 Type of application : (√) Horizontal  
(√) Vertical  
(√) Below panels  
(√) Across Trenches
- 4.0 Cable laying conditions : (√) Cables on cable trays  
(×) Unsupported cables
- 5.0 Suitability of fixing arrangement : (√) In masonry work  
(√) In concrete work
- 6.0 Packing : suitable for storing on dry surface
- 7.0 Surface Treatment of Steel Material (for frame work as applicable)
- a) Surface protection : Galvanization conforming to IS: 2629
- b) Mass of Zinc : 460 g/m<sup>2</sup>

	<b>2X500 MW SAGARDIGHI TPP PH-II EXTENSION UNIT- 3 &amp; 4</b>  <b>TECHNICAL SPECIFICATION FOR FIRE SEALING MATERIAL</b>	SPECIFICATION NO. <b>PE-TS-373-507-E016</b>
		VOLUME NO. : IIB
		SECTION : A
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**INSTRUCTIONS  
TO BIDDER**

1. This data sheet shall be read in conjunction with specification number PES-507-26 section – D volume- IIB.
2. Items which deviate from specification shall be marked with an asterisk(\*)
3. This data sheet shall be submitted alongwith bid.

**DATASHEET-B**

**1.0 GENERAL**

1.1 Name of bidder :

1.2 Address :

**2.0 APPLICABLE STANDARDS**

2.1 ASTM-E-814 & ASTM-E-119 : YES / NO  
For fire rating test and hose  
Stream test

**3.0 TECHNICAL DETAILS**

3.1 Type of system :

3.2 Make :

3.3 Fire rating :

3.4 Whether fire retardant coating req. as : YES / NO  
part of system to meet rating

3.5 If answer to 3.4 is 'YES'

a) Material of coating :

b) Length of coating :

c) Thickness of coating

i) On cable :

ii) On panel :

d) Physical Properties

i) Density :

ii) Viscosity :



**2X500 MW SAGARDIGHI TPP PH-II  
EXTENSION UNIT- 3 & 4**

**TECHNICAL SPECIFICATION FOR  
FIRE SEALING MATERIAL**

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- 3.6 Pressure withstand capacity of Fire stop : kg/mm<sup>2</sup>
- 3.7 Weight of fire stop assembly (without cables) : kg/mm<sup>2</sup>
- 3.8 Shelf life of most perishable material : years
- 3.9 Life of total assembly : years

**4.0 DOCUMENTATION**

The following shall be furnished for each contract

- a) Complete details of the system : YES / NO
- b) All relevant drawings : YES / NO
- c) All test certificates (Type, routine & acceptance) : YES / NO



**2X500 MW SAGARDIGHI TPP PH-II  
EXTENSION UNIT- 3 & 4**

**TECHNICAL SPECIFICATION FOR  
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**INSTRUCTIONS  
TO VENDOR**

1. This data sheet shall be filled up on the basis of finally agreed points of Data Sheet B, Bid clarifications & MOM with the bidder.
2. This data sheet shall be submitted by successful bidder after award of contract.

**DATASHEET-C**

**1.0 GENERAL**

1.1 Name of vendor :

1.2 Address :

**2.0 APPLICABLE STANDARDS**

2.1 ASTM-E-814 & ASTM-E-119 : YES / NO  
For fire rating test and hose  
Stream test

**3.0 TECHNICAL DETAILS**

3.1 Type of system :

3.2 Make :

3.3 Fire rating :

3.4 Whether fire retardant coating req. as : YES / NO  
part of system to meet rating

3.5 If answer to 3.4 is 'YES'

a) Material of coating :

b) Length of coating :

c) Thickness of coating

j) On cable :

ii) On panel :

d) Physical Properties

ii) Density :

ii) Viscosity :



**2X500 MW SAGARDIGHI TPP PH-II  
EXTENSION UNIT- 3 & 4**

**TECHNICAL SPECIFICATION FOR  
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REV NO. : 00 DATE : 4.10.12

SHEET: OF

3.6 Pressure withstand capacity of Fire stop : kg/mm<sup>2</sup>

3.7 Weight of fire stop assembly (without cables) : kg/mm<sup>2</sup>

3.8 Shelf life of most perishable material : years

3.9 Life of total assembly : years


**4.0 DOCUMENTATION**

The following are furnished for purchaser's approval

a) Complete details of the system : YES / NO

b) All relevant drawings : YES / NO

c) All Test certificates (Type, routine & acceptance) : YES / NO

	TITLE	SPECIFICATION NUMBER: PE-TS-229-55
	<b>SCHEDULE OF PERFORMANCE GUARANTEES</b>	VOLUME II
		SHEET 1 OF 1

S. No.	Item	Unit of Measurement	Guaranteed Value
	It is guaranteed that the system supplied shall perform according to specification requirement under site installed conditions.		

We the undersigned hereby undertake to meet the performance guarantees as listed in the table above on the conditions as elsew specified. Any variation of the specified conditions during cscu tests will be taken in a account by the customer.

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE				COMPANY SEAL
NAME	DESIGNATION	SIGNATURE	DATE	



## TITLE

## • SCHEDULE OF DEVIATIONS

- ( ) From Conditions of Contract (Volume - I)  
 ( ) From General Technical Conditions (Volume - II A)  
 ( ) From Technical Specifications (Volume - II B)

SPECIFICATION  
NUMBER

PE-TS-229-557-E001

VOLUME III

SHEET

OF

Each type of deviation shall be listed on a separate sheet. ☒ Tick the applicable


We the undersigned hereby certify that the above mentioned are the only deviations.

## PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

4006  
 (18) (20) 42



		QUALITY PLAN		CUSTOMER		PROJECT TITLE		SPECIFICATION NUMBER				
				BIDDER/		QUALITY PLAN		SPECIFICATION				
				VENDOR		NUMBER		TITLE				
				SYSTEM		ITEM: FIRE STOP MATERIAL		SECTION				
SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CAT	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	P	W	V	VOLUME III REMARKS
1	2	3	4	5	6	7	8	9	10	11		
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												
NAME												
SIGNATURE												
DATE												
BIDDER'S/VENDORS COMPANY SEAL												

## INSTRUCTIONS FOR QUALITY PLAN

The Quality Plan shall include all the Quality Control Measures and Checks adopted by the Vendor to ensure that the material/component/assembly/services supplied by him meet/will meet the requirements as per specifications and good practices. They shall include all stages of operation such as materials, processes, manufacture, assembly, packing and despatch. The following guide lines may be noted:

- |            |   |
|------------|---|
| Column 1-  | Serial Number   |
| Column 2-  | Component/Operation- The component and/or operation being checked shall be given here.  |
| Column 3-  | Characteristics check- The characteristics being checked shall be given here, e.g., chemical composition, mechanical properties, leak tightness, surface defects etc..  |
| Column 4-  | Category - 'CR' stands for critical characteristic      - affecting safety of equipment and personnel<br>'MA' stands for major Characteristic                - affecting safety of equipment and personnel<br>'MI' stands for minor characteristic                - affecting appearance etc. |
| Column 5-  | Type/Method of check e.g. chemical analysis tensile testing, hydraulic test, visual examination radiography etc.  |
| Column 6-  | Extent of check, such as, 100, 10, 1 percent etc.   |
| Column 7-  | Reference Documents - Documents, such as technical specification, drawings, standard specifications (IS, BS ETC.) procedure, etc. according to which check is done.   |
| Column 8-  | Acceptance Norms - Standards etc. according to which acceptability or otherwise of the characteristics being checked is decided.  |
| Column 9-  | Format of Record - Formats, log sheets, reports, etc. in which the observations are recorded. Standard log sheets, reports, formats etc. of the Vendors shall be numbered and such reference numbers shall be included here.  |
| Column 10- | Agency - The agency which performs the test/instruction shall be written in sub-column 'W'.<br>The agency which verifies test certificates/inspection records and carries out audit check of the components/operation shall be written in sub-column 'V'.                                     |
- The agencies are codified as 1,2 & 3
- |       |  |
|-------|--|
| '1'   | stands for (BHEL)  |
| '1' * | means the operation shall be cleared by BHEL before the start of the next operation. |
| '2'   | Stands for Vendor  |
| '3'   | stands for sub-Vendor of the Vendor and so on.                                       |
- Example
- |       |  |
|-------|--|
| Entry | '3' in column 'P' means test/inspection to be performed by sub-Vendor's QC   |
| Entry | '2' in column 'W' means test/inspection to be witnessed by Vendor's QC   |
| Entry | '1' in column 'V' means verification shall be done by BHEL and next stage to be started only after the hold point is cleared by BHEL |
- Column 11- Remarks - Any special remarks shall be given here.

### NOTES.

- In absence of correlation with the test certificate(s) (e.g. material identification) samples shall be drawn by BHEL and all tests as per relevant specifications shall be carried out in their presence or in recognized Government Laboratory.
- When materials and components are initially identified and stamped by BHEL QS engineer, the identification marks shall be preserved till despatch. Wherever this is not possible, the identification mark shall be transferred to the components in the presence of BHEL QS Engineer unless otherwise agreed.
- For castings and forgings integral test specimens shall be provided, When this is not possible for casting, they shall be poured in the presence of BHEL QS Engineer unless otherwise, if witnessing of test by BHEL is called for.
- When welders qualified by reputed inspection agencies or statutory bodies are not available, qualification tests shall be conducted in the presence of BHEL QS Engineer.
- This Quality Plan is liable to be modified as per the requirements of approved drawings and changes in technical specifications/drawings. If there are contradictions in respect of column 7 & 8 between this Quality Plan and the approved drawings specifications, the latter shall prevail.
- Wherever inspection by BHELs Purchaser/Third Party/Statutory authorities are mandatory, this shall be complied with.
- Inspection reports, log sheets, test reports/certificate etc. shall be furnished to BHEL at the appropriate stages or at the time of final inspection, as required.
- This Quality Plan is also applicable to spares, if any, under scope of supply of Vendor.
- The quality plan shall be submitted in minimum 4 copies with a soft copy of the same or in line with contract requirements.