

**NORTH KARANPURA SUPER  
THERMAL POWER PROJECT  
3X660MW**

**VOLUME-II**

**TECHNICAL SPECIFICATION**

**FOR**

***FIRE SEALING SYSTEM  
SUPPLY & INSTALLATION***

**SPECIFICATION NO: *PE-TS-405-507-E016***

***REVISION: 0***



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

1013125/2022/PS-PEM-EL



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

**NORTH KARANPURA STPS (3X660MW)**

SPECIFICATION NO. PE-TS-405-507-E016

VOLUME II

SECTION

REVISION 0

DATE: 04.08.2022

SHEET 1 OF 1

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*Total nos. of sheets including cover, content & separator sheets = 30 sheets*

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**SECTION – I**

**STANDARD TECHNICAL REQUIREMENTS**

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**COMPLIANCE CERTIFICATE**

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

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.
2. There are no deviations with respect to specification other than those furnished in the 'schedule of deviations'.
3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in 'BOQ-Cum-Price schedule' of the specification shall not be considered (i.e., technical description & quantities as per specification shall prevail).

-----  
BIDDER'S STAMP & SIGNATURE



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## **1.0 SCOPE OF ENQUIRY**

- 1.1 This enquiry covers the Design, manufacturing, inspection & testing at manufacturer's works, proper packing, delivery to site, handling and erection & commissioning of **Panel/powder/Mortar based Fire Sealing** for cable openings through walls, floors & below panels, pipe sleeves conforming to this specification.
- 1.2 It is not the intent to specify herein all the details of design & manufacture of material. However, the material shall, conform in all respects to high standard of design, engineering and workmanship and shall be capable of performing in continuous commercial operation at site conditions.
- 1.3 Technical requirements of the FIRE SEALING SYSTEM are indicated in Datasheet-A and Section-II. If the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the bidder shall conduct all such tests under this contract at no additional cost to the BHEL either at third party lab or in presence of BHEL/Customer representative and submit the reports for approval.
- 1.4 The stipulation of Data Sheet-A shall prevail in case of any conflict between the stipulations of Data Sheet-A, Section I & Section-II. However, in case of conflict between Section I & Section-II stipulation of Section I shall prevail

S.No.	Reference clause No. of Section II (if any)	Specific Requirement/ Change
1	2.1, 2.3, 4.2, 5.2, 6.2	Fire retardant cable coating not applicable.
2	4.5(a)	Charges shall not be paid to vendor for conduction of Type Test.

## **2.0 BILL OF QUANTITIES:**

- 2.1 The bidder to quote for items as per 'BOQ-cum-Price Schedule' attached with NIT. The BOQ excludes civil works done in the opening and includes cross section area of cables and cable support materials within the area to be fire sealed.

**The quantity as mentioned in the BOQ is only for evaluation purpose.** However actual ordered quantity may vary in project throughout the contract.

- 2.2 Successful bidder shall submit calculations for supply of material based on area to be provided with fire sealing, cured density (based on type test certificate accepted by BHEL/ CUSTOMER) & thickness as applicable for the project, wastage, space occupied by cables, etc. for approval during contract stage.

For the first lot cleared by BHEL, the calculations shall be made based on the average of the minimum & maximum cured density (wherever a range is specified for the cured density by the manufacturer) & minimum thickness. For subsequent lots cleared by BHEL, the calculation shall be based on the cured density & thickness as per accepted type test results, duly adjusting the quantities cleared in earlier lot.



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## **3.0 DRAWINGS & DOCUMENTS TO BE SUBMITTED**

3.1 The following information shall be furnished with the bid:

- Data Sheet-B
- Type test certificates for fire sealing system mentioned in section-I. Type test certificates should not be older than 10 YEARS from the date of Bid opening.
- Type test procedure
- Typical drawings showing arrangement of various components and thickness etc.
- Complete detail of the system

3.2 Following documents shall be submitted after placement of order for BHEL & customer's approval: -

S. No	Document No.	Document title	Document type	First Submission	Re-submission
1.	QUALITY PLAN FOR CABLE FIRE SEALING SYSTEM	PE-V0-405-507-E905	Primary	Within 2 weeks of PO	Within 10 days after comments
2.	INSTALLATION DRGS. OF CABLE FIRE SEALING SYSTEM	PE-V0-405-507-E042	Primary	Within 2 weeks of PO	Within 10 days after comments
3.	TECHNICAL DATA SHEET OF CABLE FIRE SEALING SYSTEM	PE-V0-405-507-E041	Primary	Within 2 weeks of PO	Within 10 days after comments
4.	TYPE TEST REPORT / CERTIFICATES	PE-V0-405-507-E043	Primary	Within 03 months of approval of other primary drawing/ documents	Within 10 days after comments
5.	FIELD QUALITY PLAN FOR CABLE FIRE SEALING SYSTEM	PE-V0-405-507-E906	Secondary	Within 2 weeks of PO	Within 10 days after comments
6.	Bill of material	PE-V0-405-507-E044	Secondary	Within 2 weeks of PO	Within 10 days after comments

3.4 Drawings/ documents shall be submitted through Document Management System (DMS).

3.5. Supplier to submit detailed 'bill of material' (BoM) at the time of drawing/document submission after placement of PO. Each item of the BoM is to be uniquely identified with item code no. or item serial no.


3.6. Supplier to ensure that all items which will find separate mention in the packing list are covered in this detailed BoM.

3.7. Supplier to also give the following undertaking in the BOM:

***"The BoM provided herewith completes the scope (in content and intent) of material supply under PO No. -----, dated -----,***


***Any additional material which may become necessary for the intended application of the supplied item(s)/package will be supplied free of cost in most reasonable time."***


NTPC		NTPC	
CLAUSE NO.	TECHNICAL REQUIREMENTS		
1.00.00	CODES AND STANDARDS		
1.01.00	The fire proof cable penetration (FPCP) sealing system shall conform to the requirement of latest edition including amendments of BS:476 Part-20 Fire tests on Building materials and structures.		
1.02.00	Fire penetration seal complying with any other international standards will also be considered if it ensures performance equivalent or superior to standard listed above.		
1.03.00	The Bidder shall clearly indicate the standards adopted and furnish a copy of the English version of the latest editions of standards along with the bid, and shall clearly bring out the salient features for comparison.		
2.00.00	SYSTEM DESCRIPTION		
2.01.00	<p>The fire proof cable penetration sealing system shall be of the following types;</p> <p>i) <del>Type A</del></p> <p><del>Type A fire sealing system is either Silicone foam or equivalent foam system or using individual blocks for each cable along with suitable frame work rated for one hour. Type A is to be implemented at floor openings below C&amp;I panels, control panels/Boards etc. in CER &amp; CCR.</del></p> <p>ii) Type-B</p> <p>Type B fire sealing system is any proven fire sealing system rated for one hour. This will comprise of rest of wall and floor crossings of cables/cable trays, opening below HT/LT Switchgears/board other than those covered under Type A.</p>		
2.02.00	The penetration system, shall be installed immediately after the completion of cable termination in a particular switchboard/ <del>control panel</del> /area after clearance from the Project Manager.		
3.00.00	GENERAL INFORMATION		
3.01.00	The cables shall generally be laid in cable trays/racks, conduits, ducts. The fire proof cable penetration system shall be designed in such a way that the existing supporting structure/cable is not disturbed.		
3.02.00	The penetration system shall be suitable for site condition at 50 <sup>0</sup> C ambient temperature and relative humidity of 100%.		
3.03.00	The penetration system of each wall/floor crossing shall be adequately designed/sized such that 20% addition of cables is possible at any later date without disturbance/wastage of material in the penetration system.		
3.04.00	Contractor shall plan the schedule of supply of the materials in consultation with Project Manager and use the material within stipulated shelf life of material. After award of work, drawings for each penetration seal shall be prepared by the contractor after verifying the		
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CLAUSE NO.		TECHNICAL REQUIREMENTS			
		<p>actual installation of cables at site and approval shall be taken from the Project Manager's representative before proceeding with the actual work. The requirement of fire sealing material shall be quantified accordingly.</p> <p>Fire sealing material to be supplied shall be based on the net area to be sealed, wastage, thickness, density and other parameters as per the type test report approved under this contract.</p>			
4.00.00		TECHNICAL REQUIREMENTS			
4.01.00		The fire proof cable penetration system shall fully comply with the requirements of BS:476 Part-20 and also to the requirements specified in this specification.			
4.02.00		The penetration system shall prevent spreading of fire in cable beyond the seal system in case of fire and shall have minimum 1 hour fire resistance rating.			
4.03.00		The penetration system shall be physically, chemically, thermally stable and shall be mechanically secure to the masonry/concrete/structural members. The system shall be mechanically robust and capable of giving satisfactory performance under vibrations encountered in power stations.			
4.04.00		The penetration system shall be capable of withstanding mechanical loads, foot traffic drop loads, vibrations, wind pressure, etc.			
4.05.00		The penetration system shall be completely gas and smoke tight.			
4.06.00		The penetration system shall retain integrity and perform satisfactorily even after remaining in water for long period.			
4.07.00		The materials used in FPCP sealing system shall be non-toxic and harmless to the working personnel.			
4.08.00		The penetration materials shall have no reaction with cable sheath/galvanising/painting of structural steel.			
4.09.00		The penetration materials shall have anti-rodent and anti-termite properties.			
4.10.00		The penetration materials shall have no shrinkage or cracking after the setting for the complete life of the power Plant.			
4.11.00		Under normal load, short circuit and fire conditions, cables may be subjected to movement and vibration. The FPCP sealing system shall be designed to withstand and perform satisfactorily under these conditions.			
4.12.00		The penetration system shall not affect the current carrying capacity of cables passing through it.			
4.13.00		Asbestos shall not be used in the construction of fire penetration seal system.			
4.14.00		The penetration system shall have life expectancy of 40 years.			
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22701 ITEM 11		CLAUSE NO.		TECHNICAL REQUIREMENTS		<div>एनटीपीसी NTPC</div>		
4.15.00		The penetration system shall not emit any corrosive or toxic fumes or smoke on the unexposed face of the barrier.						
4.16.00		Any wastage of the compound during the process of mixing for preparing the FPCP sealing compound shall be to Contractor's account.						
4.17.00		<del>For foam type of systems, only the foam shall form the penetration seal of specified rating, having the damming board removed after curing of the foam.</del>						
5.00.00		PACKING AND STORAGE						
5.01.00		All materials and components of penetration system shall be supplied in packing to avoid contamination of materials due to dust/moisture and temperature during transit and storage. All packing shall be of durable quality and the date of expiry and the date of manufacture shall be printed on it.						
6.00.00		INSTALLATION						
6.01.00		The contractor shall take adequate care to ensure that cables are not damaged in any manner during penetration system installation.						
6.02.00		Wherever the floor/wall opening provided in the vicinity of penetration seals larger or smaller than that required for the cable fire penetration, these opening size can be reduced or increased in an approved manner by the contractor using the same materials as provided around the opening and of the same thickness. Generally the walls in the power station comprises of brickwork and the floors are made of RCC/steel work.						
6.03.00		The work to be carried out under this specification shall be done under the supervision of Project Manager's representative.						
6.04.00		All work shall be carried out in accordance with the agreed "field quality plan" and approved drawings. The "field quality plan" shall additionally specify the fire sealing material thickness, minimum cured density and other related parameters achieved in the approved type tests for the contract. The work shall be done to the satisfaction of the Project Manager and the same shall be subject to Project Manager's approval for acceptance.						
6.05.00		The installation shall be carried out in a neat workmen like manner by the skilled, experienced and competent workmen.						
6.06.00		Installation work at site shall be properly coordinated with other services.						
6.07.00		All materials being supplied or consumed during installation by the Contractor in the process of installation shall be of the best quality and according to relevant standards. All materials shall be inspected and approved by the Project Manager before the same is used for installation work. Also regarding inspection of work, the engineer shall have the right to inspect at any stage during installation, testing and commissioning.						
6.08.00		The drilling and welding of building-steel or fixing supports etc. shall be carried out by contractor after taking prior approval of Project Manager.						
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CLAUSE NO.	TECHNICAL REQUIREMENTS			
7.00.00	TYPE TESTS, ROUTINE & ACCEPTANCE TESTS			
7.01.00	All equipment to be supplied shall be of type tested design. During detail engineering, the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last ten years from the date of bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.			
7.02.00	However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of bid opening, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost to the owner either at third party lab or in presence of client/owners representative and submit the reports for approval.			
7.03.00	All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.			
7.04.00	The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, an endorsement sheet will be furnished by the manufacturer confirming similarity and "No design change". Minor changes if any shall be highlighted on the endorsement sheet.			
7.05.00	Following Type test reports as per the setup and procedures given in subsequent clauses for the Fire proof cable penetration sealing system shall be submitted:  a) The accelerated ageing test b) Water absorption test c) Fire rating test d) Hose stream test e) Vibration test followed by fire rating test			
7.05.01	Tests a, b, c and d should have been carried out on same test sample subsequently one after the other without any touching up/repair/modifications in the same sequence and in accordance with the clause 9.00.00. The test sample shall be assembled as per clause 8.00.00.			
7.05.02	Test indicated in clause 7.05.00 (e) above should have been carried out on a separate sample and as per the procedure indicated under clause 9.05.00.			
7.05.03	Physical, chemical and mechanical properties of various components/ingredients used should have been also be tested as a part of type tests.			
7.05.04	Test reports shall contain the following information:  1. Type of penetration material tested			
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CLAUSE NO.		TECHNICAL REQUIREMENTS			
		<div><div>2.</div><div>Details of various components/ingredients used alongwith their catalogue.</div></div> <div><div>3.</div><div>Physical, chemical and mechanical properties of various components/ ingredients used.</div></div> <div><div>4.</div><div>Description of the various test assemblies tested.</div></div> <div><div>5.</div><div>Details of method of conditioning.</div></div> <div><div>6.</div><div>The observations as called for in BS:476 Part-20 and technical specification.</div></div>			
7.06.00		<div><div>ROUTINE &amp; ACCEPTANCE TESTS</div><div>Routine and acceptance tests to be carried out on <del>Type-A and</del> Type-B cable fire sealing system shall be mutually agreed based on the type of fire sealing material offered before placement of award.</div></div>			
8.00.00		<div><div>TEST SPECIMEN ASSEMBLY</div></div>			
8.01.00		<div><div>The test specimen shall be assembled as per enclosed drawing and shall resemble typical floor crossing cable penetration system.</div></div>			
8.02.00		<div><div>The test specimen shall be designed to seal an opening of adequate size in a concrete slab of 200 mm thickness. Two lengths of 300/600 mm wide ladder type cable tray shall be assembled with required layer of XLPE/PVC insulated, PVC sheathed unarmoured cables in touching formation. Type and number of cables in the cable tray shall be as per enclosed drawing. Cables shall be adequately clamped with tray at both the sides of the penetration as shown in the drawings. <del>However, for penetration system with blocks which require staggered arrangement, cables can be clamped at an adequate distance from the penetration and the tray need not pass through the penetration seal.</del></div></div>			
8.03.00		<div><div>The opening in the test specimen then shall be sealed with fire proof cable penetration sealing materials.</div></div>			
9.00.00		<div><div>TEST PROCEDURES</div></div>			
9.01.00		<div><div>ACCELERATED AGEING TEST</div><div>The test specimen assembled as per clause 8.01.00 with damming board removed shall be subjected to accelerated ageing test by storing in air furnace where the temperature of the inside air shall be maintained at 85 degree centigrade for 168 hours. The temperature controlled furnace should have 7 air changes per hour approx.</div></div>			
9.02.00		<div><div>WATER ABSORPTION TEST</div></div>			
9.02.01		<div><div>The test specimen shall be immersed in fresh clean water at a temperature of 20 deg. C <math>\pm</math> 2 deg C. The test specimen must be separated from the bottom and sides of the soak tank by at least 10 mm and it shall be covered by approximately 25 mm of water. At the end of the 24 hour soak period the specimen shall be removed from water and mopped up with a damp cloth.</div></div>			
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CLAUSE NO.		TECHNICAL REQUIREMENTS		<div>एनटीपीसी NTPC</div>	
9.03.00	FIRE RATING TEST				
9.03.01	The test specimen after withstanding water absorption test shall be subjected to fire rating test as per BS: 476 part-20.				
9.03.02	Oil/Gas fired furnace shall be used for heating. The furnace shall have achieved standard time/temperature characteristics for fire tests as per BS:476 part-20.				
9.03.03	The pressure inside the furnace at the time of test shall be within 1.5 ± 0.5 mm water gauge.				
9.03.04	Cables in the test specimen shall be anchored on the hot side to a structure independent of the barrier and its penetrations. This is to ensure that any differential movement between the penetration and the cable that could occur during a fire, is produced in the type tests and the reliability of the integrity of the penetration is checked.				
9.03.05	Cables shall be protruding between 1 to 2 metre, from the penetration face on the unexposed side and protruding into the furnace as far as it is practicable with a minimum length 750 mm. The ends of the cables shall be capped on the unexposed face to prevent gases and fumes to escape from the furnace during the fire.				
9.03.06	The test specimen shall be subjected to fire test with surface exposed to controlled fire in the furnace confirming to time/temperature characteristics specified in BS:476(20).				
9.03.07	During the test the temperature of both the faces of the fire stop i.e. one which is exposed to fire and other unexposed shall be measured by calibrated thermo couples after regular interval of 5 minutes.				
9.03.08	<p>Atleast 3 thermo couples shall be provided for temperature measurement of each face. The results at the end of the test shall be interpreted for failure criteria as under.</p> <div><div>1.</div><div>The system is deemed to have failed to maintain stability if there is a total collapse of the fire proof seal.</div></div> <div><div>2.</div><div>In case cracks are seen on the face of the fire stop or cracks through which the flame/ hot gas can pass the systems deemed to have failed to maintain integrity.</div><div>The development of crack is characterised by appearance of black soot on cotton wool held near the penetration on the unexposed surface at a distance of about 100mm.</div></div> <div><div>3.</div><div>Failure shall be deemed to have occurred when the mean temperature of the unexposed surface of the specimen assembly increases by more than 140<sup>0</sup>C above the initial temperature or if the temperature of the unexposed surface is increased at any point by more than 180<sup>0</sup>C above the initial temperature.</div><div>During the test the specimen shall meet all the three criteria simultaneously.</div></div>				
9.03.09	Temperature measurement on the unexposed side of penetration seal shall be measured by thermocouples at a distance of 25 mm from unexposed side of fire stop.				
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9.04.00		HOSE STREAM TEST			
9.04.01		A hose stream test shall be conducted on the test specimen immediately following a fire resistance test on that assembly. The specimen must first be removed from the furnace since the hose stream is to be applied to the exposed face. This must be done quickly since it is the intention of the test that the stream be applied to the specimen whilst it is hot.			
9.04.02		The hose stream shall be long range narrow angle, (20 <sup>0</sup> - 90 <sup>0</sup> set at 30 <sup>0</sup> included angle). High velocity water spray provided from a 28 mm hose discharging through an appropriate nozzle. The water pressure shall be 5 bar calculated at the base of the nozzle and the minimum flow rate shall be 4.7 litres/second. The stream shall be supplied perpendicularly to the exposed face of the test specimen with nozzle 3 m away from the exposed face.			
9.04.03		Application shall be for minimum of two and a half minutes per 9 sq.m. of the test specimen including the barrier.			
9.05.00		VIBRATION TEST			
9.05.01		The test assembly is to comprise a single ladder rack penetration in 1 m x 1m high normal section of fire barrier which is securely supported. The penetration seal shall be formed in the middle of the barrier around 1 m length of 600 mm ladder rack. The tray shall be fully loaded with cables in touching formation. The penetration assembly shall be formed symmetrically through the fire barrier as in service. The penetration sealant material shall then be allowed to cure for atleast as long as the time required for conditioning to constant mass. A vibration test shall then be conducted on the sample as set out below.			
9.05.02		The vibration shall be of 100 Hz frequency and of 0.5 mm amplitude (1.0 mm peak to peak) and this shall be applied to one rail of the ladder rack or the centre of a cross member secured to the two rails at 250 mm from the centre line of the penetration. This vibration shall be applied to the sample for the minimum period of 3 hrs. Immediately following this vibration test the barrier/ penetration assembly shall be successfully subjected to a fire test in accordance with clause no. 9.03.00.			
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## **DATASHEET-A**

### **1.0 REFERENCE CODES & STANDARDS**

The latest edition of following standards shall be applicable:

- a) ASTM-E-814: Standard test methods for fire test of Through-penetration fire stops.
- b) ASTM E-119: Standard test methods for Fire resistance rating and hose stream test.
- c) IS-12458: Method of fire resistance test of fire stop.
- d) UL-1479: Standard test methods for Fire resistance rating.
- e) BS-476: Standard test methods for Fire resistance rating.
- f) IEC-60332-3-23: Flammability test for fire retardant coating.
- g) ASTM D-2863: Limiting oxygen index test for fire retardant coating.
- h) IS: 6005- Pretreatment shall conform to the requirement of IS: 6005.
- i) IS: 2629- Galvanizing shall be done in accordance with IS: 2629.

2.0 Rating of fire stop : One (1) hour

3.0 Type of application : Horizontal/ Vertical/ Below panels

4.0 Cable laying conditions : Cables on cable trays

5.0 Suitability of fixing arrangement : In masonry work/ In concrete work

6.0 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>

7.0 Type of fire stop system : 1) Fire stop system [Panel or Powder/Mortar based]

8.0 Minimum shelf life : 12 months  
of most perishable material

9.0 Life expectancy of material : Greater than 40 years

1.0 Packing suitable for : Storage on dry Surface

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## DATASHEET-B

(Guaranteed technical Particulars to be submitted along with the bid)

### 1.0 GENERAL

1.1 Name of vendor : .....

1.2 Address : .....

### 2.0 APPLICABLE STANDARDS

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

2.2 IS-12458: Method of fire resistance test of fire stop : YES / NO

2.3 UL-1479: Standard test methods for Fire resistance rating : YES / NO

2.4 BS-476: Standard test methods for Fire resistance rating : YES / NO

2.5 IEC-60332-3-23: Flammability test for fire retardant coating : YES / NO

2.6 ASTM D-2863: Limiting oxygen index test for fire retardant coating : YES / NO

2.7 IS: 6005- Pretreatment shall conform to the requirement of IS: 6005 : YES / NO

2.8 IS: 2629- Galvanizing shall be done in accordance with IS: 2629 : YES / NO

### 3.0 TECHNICAL DETAILS

3.1 Type of system : 1) Fire stop system [Panel based ]

3.2 Fire rating : 1) Fire stop system .....

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

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

3.5 Shelf life of most perishable Material : ..... years

3.6 Life of total assembly : ..... Years

1013125/2022/PS-PEM-EL



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

**NORTH KARANPURA STPS (3X660MW)**

SPECIFICATION NO. PE-TS-405-507-E016

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#### 4.0 TYPE TEST

- a) Type tests shall be conducted as per Section-I of this specification and as per relevant standards. Type test reports should not be older than 10 Years.



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**TECHNICAL SPECIFICATION FOR  
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SPECIFICATION NO. PE-TS-405-507-E016

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**SECTION – II**

**STANDARD TECHNICAL REQUIREMENTS**

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## 1.0 CODES AND STANDARDS

- 1.1 The material shall comply with all currently applicable safety codes and statutory regulations of India as well as of the locality where the material is to be installed.
- 1.2 The design, material, construction, manufacture, inspection, testing and performance of Fire Sealing System shall conform to the latest revision of relevant standards as per Data Sheet-A. Any other international standards will also be considered if it ensures performance equivalent or superior to standards listed.
- 1.3 In case of conflict between the applicable reference standard and this specification, this specification shall govern.

## 2.0 TECHNICAL REQUIREMENTS

- 2.1 Fire sealing system and fire-retardant coating shall be supplied as per technical particulars specified in Data Sheet – A and Section-II.

### 2.2 **DESIGN REQUIREMENTS FOR FIRE STOP SYSTEM**

#### 2.2.1 **Type-B fire sealing system shall be of following system:**

**Panel based sealing system (Comprising encasing panels, cavity fill material & sealant).**

- 2.2.2 The fire stop system, in case of fire, shall prevent spreading of fire in cables/systems beyond the fire stops.
- 2.2.3 Cables shall be generally laid in cable trays/cable racks/ conduits and fire stop system shall be designed in such a way that the basic supporting structure of cables is not disturbed.
- 2.2.4 The system shall be retrofit design, physically and chemically stable.
- 2.2.5 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.
- 2.2.6 The system shall be mechanically secured to the masonry work/concrete work to resist dislocation.

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2.2.7 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. The system shall be suitable for ambient temperature of 50°C and relative humidity of 100%.

2.2.8 The system should be equally effective in horizontal & vertical formations.

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

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

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

2.2.12 The fire stop system shall be completely gas & smoke tight.

2.2.13 Materials used for fire stop system shall meet the following requirements:

- Should not get affected over a period of time due to humidity, moisture, ozone and variation in ambient temperature.
- Should not contain volatile solvents after the setting period of system.
- Should be able to withstand stresses due to expansion/ vibrations.
- Should be free from shrinkage and cracking and should maintain smoke and gas tightness during fire.
- Should not react with cable sheaths, galvanized and painted steel material etc.
- Should be easy to apply/ install using conventional methods.
- Should be non-toxic and harmless to the working personnel
- Should have anti –rodent properties and should be repellent to pest & termites.
- Should not produce any acid or alkali during gas generation.
- Should not produce suffocating/ corrosive gas.

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- k) Should have a very low Expansion co-efficient, which is to be comparable with masonry concrete.
- l) Should not be soluble and reactive to acid and alkali water.
- m) Should have a low thermal conductivity.
- n) 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.

2.2.14 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, ASTM E-814, BS-476, UL-1479 and integrity & stability shall be maintained by the system after application of water jet on the exposed side in order to extinguish fire.


### 2.3 DESIGN REQUIREMENTS FOR FIRE RETARDANT COATING

2.3.1 Materials used for fire retardant coating shall meet the following requirements:

- a) Asbestos free, non-volatile, not eatable by vermin, harmless and non-irritant to skin of human.
- b) Not affecting the current carrying capacity of the cables and the properties of the installed cables.
- c) Coating material shall show no signs of cracking and peeling when the coated cable is bent to the radius of minimum sized cable at 180 degree C.

### 2.4 WELDING

- a) 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.
- b) All arc welding shall be carried out with low hydrogen content electrode.
- c) All welded connection 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.

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## 2.5 SURFACE TREATMENT

### 2.5.1 Supply items:

Surface treatment of all material 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:

- 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.
- 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 free acid spots. The amount of zinc deposit shall not be less than the value specified in Data Sheet-A.

### 2.5.2 After erection:

- 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.
- 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.
- The final finish of all erected materials shall be uniform, clean, smooth and free from spots.

## 3.0 QUALITY ASSURANCE REQUIREMENTS

3.1 At contract stage, the successful bidder shall submit the Quality Plan in attached BHEL format for BHEL/ ultimate customer's approval. In case bidder has reference, Quality Plan agreed with ultimate customer, same can be submitted for specific project after award of contract for BHEL/ ultimate customer's approval. There shall be no commercial implication to BHEL on account of minor changes in Quality Plan during contract stage.

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

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- a) Verification of test certificates for materials before dispatch.
- b) Visual inspection of materials before dispatch (as applicable).
- c) Testing of materials before dispatch.
- d) Inspection of packing before dispatch.
- e) Quality checks during erection.
- f) Inspection & testing of fire stops after erection.

- 3.3 All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved Quality Plan.
- 3.4 The supplier shall perform all tests necessary to ensure that the material and workmanship conform to the relevant standards and comply with the requirements of the specification.
- 3.5 In addition to meeting the type test requirements, material/ batch test certificates conducted at the premises of the bidder's principals for the supplies to be made for the project shall be submitted for BHEL/ CUSTOMER review and clearance.
- 3.6 All acceptance & routine tests as per relevant standards & specification shall be carried out. Charges for these shall be deemed to be included in the bid price.
- 3.7 Installation at site shall be as per parameters (i.e. minimum cured density & minimum thickness) achieved during type testing. In case type test waiver is given based on past type test certificates, installation shall be carried out as per the type test certificates accepted.
- 3.8 The successful bidder shall submit Field Quality Plan for storage, preservation, handling and erection work at site for fire-sealing system. The same shall subject to CUSTOMER/ BHEL approval without any commercial implications. Fire sealing shall be as per approved installation drawings.

#### **4.0 TESTING**

##### **4.1 FIRE STOP SYSTEM**

- 4.1.1 The system offered shall comply with the following type tests and test reports shall be submitted along with offer:
  - a) Accelerated aging test
  - b) Water absorption test
  - c) Fire rating test
  - d) Hose stream test
  - e) Vibration test followed by fire rating test

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

#### 4.2 FIRE RETARDANT COATING

It shall comply with the following tests and test reports shall be submitted along with offer:

- Flammability test
- Liming oxygen test

4.3 The test details have been covered in clause no. 5.0

4.4 System offered shall be **type tested** at **CBRI, Roorkee or by NABL accredited government approved Independent agency**.

- The bidder shall furnish the reports of all the type tests for fire sealing system materials. These reports should be for the tests conducted on identical materials to those offered/ proposed to be supplied under the contract.
- In case bidder is not able to submit report of type test(s) conducted 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.

4.5 Type Test charges:

- In case type test certificates are available with vendor & acceptable to BHEL/ CUSTOMER and still vendor being asked to conduct type testing and type tests successfully conducted, the type test charges shall be payable to vendor at actual against Original money receipt of **CBRI Roorkee/ NABL accredited Govt approved lab**.
- In case type test certificates are not available with the vendor or available with the vendor but not acceptable to BHEL/ CUSTOMER and vendor being asked to carry out type testing, and type testing successfully conducted, the type test charges by the vendor shall not be payable.

4.6 BHEL/ CUSTOMER reserve the right to witness type testing on any one lot for the project without any commercial implications.

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## 5.0 TEST DETAILS

### 5.1 FIRE STOP SYSTEM

#### 5.1.1 Accelerated aging test:

The fire stop system specimen shall be subjected to accelerated ageing test for 168 hours. During the test, the system/ components shall be placed in air furnace where the temperature of inside air shall be maintained at 85 deg. C. The specimen shall be taken out of the furnace after 168 hours for water absorption test.

In case the mechanical properties before and after the accelerate 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.

#### 5.1.2 Water absorption test:

The test specimen shall be immersed in fresh clean water at a temperature of  $20 \pm 2$  deg. C for a period of minimum 24 hrs. At the end of 24 hour soak period, the specimen shall be removed from water and mopped with a damp cloth. The specimen shall thereafter be subjected to the live fire test as per clause 5.1.3 below.

#### 5.1.3 Fire rating test: shall be done as per ASTM E 814/BS:476/UL:1479/IS:12458.

#### 5.1.4 Hose stream test: Test shall be conducted on the test specimen immediately after fire resistance test as per ASTM E 119

#### 5.1.5 Vibration test: The test specimen shall be subjected to vibration of 100Hz frequency and 0.5 mm amplitude for a minimum period of 3 hours.

### 5.2 FLAME RETARDANT COATING

#### 5.2.1 Flammability test shall be conducted in accordance with IEC-60332-3-23 CAT-B.

#### 5.2.2 Limiting oxygen index test shall be conducted in accordance with ASTM D-2863. Limiting oxygen index of the material shall not be less than 35 %.

## 6.0 APPLICATION OF FIRE SEALING SYSTEM & FIRE PROTECTIVE COATING ON CABLES WITH FIRE RESISTANCE COMPOUND SHALL BE AS UNDER:



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### 6.1. FIRE SEALING SYSTEM

- a) The various openings in the cable vault, vertical/horizontal raceways of cables penetrating walls/floors and the bottom of Electrical Switchgears and panels in Control Equipment room/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.
- b) 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) For all H.T., L.T., relay and control panels, Control desk, instrumentation panels, battery charger, D.C. distribution boards and other miscellaneous panels, fire stops should be provided below base plate. The non-inflammable type sealing material shall be supplied by the contractor.
- c) Except for inside an enclosure wherever the cable enters or leave the conduit, the conduit end shall be sealed by suitable sealing compound, having specified fire withstand capability.

### 6.2. FIRE PROTECTION COATING TO BE APPLIED ON INSTALLED CABLES: -

The cables shall be coated with fire protection material at the strategic locations as follows so as to limit the spread of fire:

- a) At fire stops below electrical switchgear/ MCCs/ Panels/ cabinets etc. On one side coating for the specified rating. i.e. on the cable vault side/ cable trench side.
- b) For the specified rating on adjacent/ one side(s) of the junction/ crossings of cabling work in open cable routes/ cable trench.
- c) In fire risk areas and where specified at suitable intervals at decided upon site conditions in open cable routes.


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- d) Where necessary and specified at site at intervals along cable routes in cable trenches.
- e) The coating shall be applied evenly on the cables only.

## 7.0 PRICES

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

- a) Design, manufacture, testing at works, packing, supply, transportation to site, handling at site of the fire stop system materials.
- 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 floor/walls including supply of materials like cement, sand, bricks 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 all site fabrication such as cutting, bending and drilling equipment.
- h) Provision of welding sets.
- i) Provision of special tools and tackles for erection.
- j) Provision of all testing equipment and conducting the specified test after erection at site.

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

## 8.0 MEASUREMENT & WASTAGES

8.1 Quantity measurement: For all payment purpose, measurement shall be made on the basis of the execution drawings/physical measurements. Physical measurements shall be made by vendors in the presence of Engineer.

8.2 Wastage Allowance: No wastage allowance is permissible. All wastages shall be to the account of vendor.

## 9.0 ADDITIONAL POINTS OF CONSIDERATION

9.1 Bidder shall be deemed to have confirmed to the specification in toto.

9.2 All work shall be carried out in accordance with the agreed field quality plan and approved drawings. The field quality plan shall additionally specify the fire sealing material thickness, minimum cured density and other related parameters achieved in the approved type tests for the contract. The work shall be done to the satisfaction of purchaser and acceptance of the work shall be subject to the purchaser's approval.

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

9.4 The installation work at site shall be properly coordinated with other services.

9.5 All materials, equipment, instrument, hardware, tools, consumables, fasteners, accessories whether specifically mentioned or not in offer required for complete installation and testing in all respect and to the satisfaction of Engineers will be in the scope of vendor and no extra payment will be made for the same.

9.6 All materials being supplied or consumed during erection by the vendor in the process of erection work shall be of best quality and according to the relevant standard. 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.

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- 9.7 Any drilling and welding on building structural steel for fixing supports etc. will not be done without the prior written approval of Engineer.
- 9.8 Any work like chipping, or breaking of existing structure like walls, floors, fabrication etc. shall be done after taking prior approval of Engineer.
- After installation of fire stops through a structure, the vendor shall repair/ refabricate the affected portion of structure.
  - Any wrong erection shall be removed and re-erected promptly to comply with requirement at no extra cost.
- 9.9 After completion of work the contractor shall remove all debris and Take back all erection implements, left - overs, surplus materials over and above the ordered quantity without any financial implications to either party.

#### **10.0 PERFORMANCE GUARANTEE**

Bidder shall guarantee that the system offered shall meet the requirements as indicated in this specification and as confirmed through various clauses of datasheets. 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.

#### **11.0 PACKING & STORAGE**

All material/ components of fire stop shall be supplied in proper packing to avoid contamination of material due to dust/ moisture. All packing shall be of durable quality. Space shall be provided by BHEL. Packing containers shall be suitable for storing on dry surface.

<div></div>		QUALITY PLAN		CUSTOMER	PROJECT TITLE	SPECIFICATION : NUMBER :					
				BIDDER/	QUALITY PLAN NUMBER	SPECIFICATION					
		SHEET 1 OF 1		VENDOR	ITEM-FIRE STOP MATERIAL	TITLE					
				SYSTEM	REFERENCE DOCUMENT	ACCEPTANCE NORM	SECTION	VOLUME III			
SL. NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECK	CAT.	TYPE/METHOD OF CHECK	EXTENT OF CHECK	FORMAT OF RECORD	P	W	V	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		BIDDER/VENDOR						
			NAME								
			SIGNATURE								
			DATE								
BIDDER'S/VENDORS COMPANY SEAL											

ANNEXURE-1INSTRUCTIONS 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 'MA' stands for major Characteristic - affecting safety of equipment and personnel '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 shets, 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' 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
Column11-	Remarks - Any special remarks shall be given here.

## NOTES :

1. In absence of correlation with the test certificate(s) (e.g. material identification) samples shall be drawn bgy BHEL and all tests as per relevant specifications shall be carried out in their presence or in recognized Government Laboratory.
2. When materials and components are initially identified and stamped by BHEL QS engineer, the identification marks shall be presserved till despatch. Wherever this is not possible, the identification mark shall be transferred to the components in the presence of BHEL QS Engineer unless other wise agreed.
3. 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.
4. 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.
5. 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.
6. Wherever inspection by BHELs Purchaser/Third Party/Statutory authorities are mandatory, this shall be compiled with.
7. 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.
8. This Quality Plan is also applicable to spares, if any, under scope of supply of Vendor.
9. The quality plan shall be submitted in minimum 4 copies with a soft copy of the same or in line with contract requirements.



	PRE-QUALIFICATION REQUIREMENTS FOR		PE-PQ-405-607-E006
	FIRE SEALING SYSTEM – TYPE B		REVISION NO: 00 DATE 24/08/2022
	NORTH KARANPURA TPS		SHEET NO. 1 OF 2

**ITEMS :** Fire sealing system  
Vendor may be considered for evaluation for one or more of the following types of Fire sealing system:

Type 1 : Panel based  
Type 2 : Mortar/ Powder based

**SCOPE:** Supply : YES; Erection & Commissioning : YES;

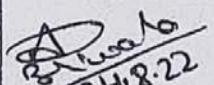
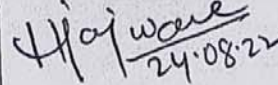
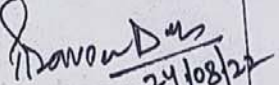
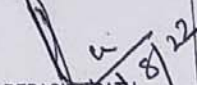
1	Availability of type test certificates conducted at Independent Lab or witnessed by third party for the applicable type of fire sealing system and fire-retardant cable coating as per IS/ International standards.
2	Bidder should be OEM for the applicable type of fire sealing system. In case bidder is not OEM, offer shall be evaluated as per point no. 1 of Notes.
3	Repeat order received from at least one end user/ purchaser for supply and E&C of applicable type of fire sealing system during last Ten (10) years provided the gap between award of two POs is minimum two (2) years. OR Completion certificate from at least one end user/ BHEL PEM for successful execution of supply and E&C for applicable type of fire sealing system. Completion certificates should not be more than ten (10) years old from the date of techno-commercial bid opening.
4	Minimum two (2) nos. purchase orders for fire sealing system of applicable type shall be submitted which should not be more than five (5) years old from the date of techno-commercial bid opening for establishing continuity in business.


**NOTES:**

1. Offers of the JV companies/ Joint Bidders/ bidders having collaboration/ licensing agreement/ MOU/Indian subsidiaries shall be evaluated as follows: -
  - a. If bidder happens to be an Indian subsidiary of foreign OEM, then the credentials of the foreign OEM can also, be considered for meeting PQR.
  - b. If bidder happens to be the Joint Venture Company, then the credentials of any of JV partners can be also considered for meeting PQR.
  - c. If bidder happens to bid jointly with their partner, then credentials of both the partners will be considered for meeting PQR as per distribution of the work. In all such cases, lead bidder as specified in bid documents shall be responsible for overall execution of the contract and all guarantee/ warranty.
  - d. If bidder happens to be the having valid collaboration agreement/ MOU/ licensing agreement with some other company, then the credentials of collaborator/ MOU partner/ licensing company can also be considered for meeting PQR.

Note: If bidder(s) qualifies on the basis of credentials of his principal/ JV partner/ Collaborator/ joint bidder etc., then the principal/ JV partner/ Collaborator/ MOU partner/ joint bidder shall be responsible for overall design vetting and warranty/ guarantee of the package. The scope matrix clearly defining their respective roles including design vetting, manufacturing of critical component, E&C etc. etc. and warranty/ guarantee shall be submitted along with the offer.

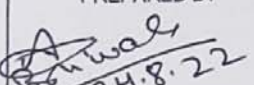
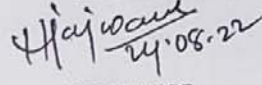
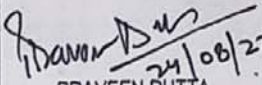
2. Bidder to note that the arrangement of bidding (joint bid partners/ collaborator/ MOU partner/ licensing

PREPARED BY  24/8/22 ABHINAV BANSHIWALA MANAGER	CHECKED BY  24/08/22 N.N. JAJWARE SR. MANAGER	REVIEWED BY  24/08/22 PRAVEEN DUTTA A.G.M.	APPROVED BY  24/8/22 DEBASISARATHI A.G.M. (H-EEEC)
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	PRE-QUALIFICATION REQUIREMENTS FOR	PE-PQ-405-507-E006
	FIRE SEALING SYSTEM – TYPE B	REVISION NO. 00 DATE 24/08/2022
	NORTH KARANPURA TPS	SHEET NO. 2 OF 2

company etc.) once offered to BHEL as a part of bidding documents cannot be changed till the execution of the project.

3. Consideration of offer shall be subject to customer's approval of bidders, if applicable.
4. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
5. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.

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