

1500 MW CCPP, PRAGATI-III

VOLUME – IIB & III TECHNICAL SPECIFICATION FOR FIRE SEALING SYSTEM SUPPLY & INSTALLATION

**Specification No:
PE-TS-314-507-E010 (Rev. 0¹)**



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



1500 MW CCPP , PRAGATI-III

**TECHNICAL SPECIFICATION FOR
FIRE SEALING MATERIAL**

SPECIFICATION NO.
PE-TS-314-507-E010

VOLUME NO. :

SECTION :

REV NO. : 01 DATE : 06.11.13

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PREAMBLE

1.0 The Tender document contains three Volumes. The Bidder shall meet the requirements of all three Volumes.

1.1 VOLUME: I CONDITIONS OF CONTRACT

This consists of four parts as below:

Volume-IA: This Part contains instructions to Bidders for making Bids to BHEL.

Volume-IB: This Part contains General Commercial Conditions of the Tender & includes provision that Vendor shall be responsible for the Quality of item supplied by their Sub-Vendors.

Volume-IC: This Part contains Special Conditions of Contract.

Volume-ID: This Part contains Commercial Conditions for Erection & Commissioning Site Work as applicable.

1.2 VOLUME: II TECHNICAL SPECIFICATIONS

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

Volume-IIA: General Technical Conditions.

Volume-IIB: Technical Specification.

Volume –IIB is sub-divided in to following Sections.

Section-A: This Section outlines the Scope of enquiry.

Section-B: This Section provides Project information.

Section-C: This Section indicates Specific Requirements.

Section-D: This Section comprises the following:

Technical Specification/Requirements

Data Sheet A (Specified Data)

Data Sheet C (Data / Documents to be furnished after the award of Contract).

Section-E: This Section comprises the Drawings

1.3 VOLUME: III TECHNICAL SCHEDULES

This Volume contains the following:

Data Sheet – B (To be duly filled by Bidder and furnished with the Technical Bid.)

Quality Plan (To be duly signed and furnished with the Technical Bid.)

Note: The requirements mentioned in Section-C / Data Sheet A of Section-D shall prevail and govern in case of conflict between the same and the corresponding requirements mentioned in the descriptive portion in Section-D.



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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 and E&C of FIRE SEALING MATERIAL as mentioned in different sections of this specification for **1500 MW (Nominal) CCPP , PRAGATI-III .**
- 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 provenness 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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1.	OWNER	PRAGATI POWER CORPORATION LIMITED (PPCL)
2.	PROJECT	1500 MW CCPP , PRAGATI-III
3.	OWNER'S CONSULTANT	NTPC LIMITED , CONSULTANCY WING
4.	LOCATION	At out skirts of Delhi at latitude 28 deg. 35 mins. North and longitude of 77 deg. 12 mins. East.
5.	SITE	The site is adjacent to 400 kV substation at Bawana
6.	NEAREST AIRPORT	Indira Gandhi International Airport, Delhi is about 20 km away from the project site
7.	IMP. RAILWAY STATION	Delhi and New Delhi
8.	ROAD APPROACH	The site is approachable from GT road as well as by ring road via rohini and Delhi Engineering College.
9.	METROLOGICAL DATA	
A.	Ambient Temperature, Relative Humidity , Rainfall	Please refer Annexure-I
B.	WIND VELOCITY & PRESSURE	(i) Basic wind speed at 10 m above ground level : 47 m/s
		(ii) Minimum design wind pressure computed at any point shall not be taken less than 1500 N/sqm. Or all classes of structures (with reference to IS : 875, Part 3)
		(iii) Risk Coefficient : 1.07
C.	SEISMIC DATA	All structures shall be designed for seismic forces adopting the site specific information provided in the Annexure -2 and other provisions in accordance with IS : 1893 (Part I)-2002 and IS : 1893 (Part 41)-2005.
10.	Power Supply (The Power Supplies For Distribution And Auxillaries Shall Be As Under)	
	a) In Plant Generation	16.5 kV (+5 to -5), 3-ph, 50 Hz (+3% to -5 %),grounded through distribution transformer with secondary loading resistor.
	b) MV distribution	6.6 kV (+6% to -6%), 3-ph, 3-w, 50 Hz (+3% to -5%),low resistance earthed.
	c) LV distribution	415 V (+10% to -10%), 3-ph , 4-w, 50 Hz solidly earthed.



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	d) Motor rated above 200KW	6.6kV(+6% to -6%), 3-ph, 3-w, 50Hz (+3% to -5 %), Low resistance earthed.
	e) Motor rated below 200KW.	415V (+10% to -10%), 3-ph, 50Hz (+3% to -5 %), solidly earthed.
	f) Electric actuators	415V (+10% to -10%), 3-ph, 3-w, 50Hz (+5% to -5%).
	g) Lightning and small power distribution	240V DC (+10% to -10%), 1-ph, 2-w, 50Hz(+3%to-5%),solidly earthed.
	h) Control supply for	
	i) 6.6 kV breakers	240 V, AC 1 phase, 2 wire, and 50Hz earthed AC system.
	ii) AC control supply voltage.	110V DC
	i) DC Motors	220V DC, (+10% to -15%), 2 wire ungrounded system.
	j) Diesel Generator emergency supply	415V (+10% to -10%), 3-ph, 50Hz (+3% to -5 %), ungrounded system.
NOTE:	<p>1.All Equipments shall be suitable for rated frequency of 50 Hz with a variation of +3 % to -5 % and 10 % combined variation and frequency unless specifically brought out in specification.</p> <p>2.Any other power supply requirement shall be derived by the vendor from the above available supplies.</p>	
14.0	Design ambient:	
14.1	Air	50 Deg.C
	Cooling Water	34 Deg.C at CW inlet
	Relative Humidity	95 %
14.2	All electrical equipment and devices shall be designed for ambient temperature of <u>50 deg. C.</u>	
15.0	Fault levels	
	a) 400 KV	40kA rms for 1 sec.
	b) 6.6kV	40kA rms for 1 sec
	c) 415V	45kA rms for 1 sec



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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.

1.0 SCOPE OF WORK

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

I) Fire sealing material

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

2.0 GENERAL

2.1 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.

2.2 Purchaser reserves the right to increase / decrease the quantity as finally required for the project as per clause 11.0 below, and unit rates quoted by the bidder shall be applicable for adjustment purposes for the same.

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

3.0 SPECIFIC TECHNICAL REQUIREMENTS

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

3.2 Fire sealing system offered shall be out of any of the following system:

a) **Type-A** : Silicon foam based or equivalent foam system or using individual blocks for each cable along with suitable frame work rated for one hour. This is to be implemented at floor openings below C&I panels, control panels/boards etc. In CER & UCR/main control room.

~~b) **Type-B** : Type-B fire sealing system is any proven fire sealing system rated for one hour. Out of any of the following system :~~



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- i) Panel based sealing system (Comprising encasing panels, cavity fill material & sealant).
- ii) Powder/ mortar based sealing system (Comprising mixing mortar curing with water).

The above will comprises of rest of the wall and floor crossing of cable/cable trays, opening below HT/LT Switchgears/Boards other than those covered under Type 'A' in TG & SG area.

3.3 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.

3.4 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.

4.0 **APPLICATION OF FIRE SEALING SYSTEM WITH FIRE RESISTANCE COMPOUND SHALL BE AS UNDER:**

- A) Fire Sealing System with one hour fire rating is provided for sealing cable entry below switchgear panels/control panels (except equipment placed on trenches), cable penetration through walls and floors in main plant area to restrict the propagation of fire and reduce the damage due to fire. The fire sealing system material is non-hygroscopic, mechanically sturdy, non-toxic, and physically & chemically stable under fire conditions. For floor opening below C&I panels, Control panels/boards etc. In CER and main control room, silicone foam system or equivalent foam system or individual blocks for each cable with suitable framework is to be provided. For other areas, any proven system rated for one hour shall be provided. 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 no inflammable materials, as follows:



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- 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., D.C. Dist. 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 fire withstand capability.

6.0 TESTS ON FIRE PROOF SEALING SYSTEM AND FIRE STOP SYSTEM

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

- a) Accelerated ageing test
- b) Water absorption test
- c) Fire rating test
- d) Hose stream test
- e) Vibration test followed by fire rating test.

The details of specimen preparation and test procedures for each of these tests are to be indicated by the bidder and are subject to approval by Owner/Consultant.

6.2 System offered shall be **type tested** at CBRI, Roorkee or by government approved independent agency.

6.3 A) The bidder shall only submit the reports of the type tests as listed in this specification and carried out within last five years from the date of bid opening. These reports should be for the tests 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 the client. In case the bidder is not able to submit report of the type test(s) conducted within last five years from the date of bid opening, or in case the type test reports are not found to be meeting the specification requirement, the bidder shall conduct all such tests under this contract free of cost to the Owner and submit the reports for approval.

B) Acceptance and routine tests as per the specification and relevant standards



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shall be carried out. Charges for these shall be deemed to be included in the equipment price.

- C) The manufacturer shall submit detailed test procedures which clearly specifies test setups, instruments to be used, procedure, acceptance norms (wherever applicable), recording, precautions to be taken etc. for the tests to be carried out.

6.4 Bidder shall indicate price for each "type test" in the price schedule.

7.0 DRAWINGS / DATA SHEETS

7.1 "Documentation" Clause no. 12 of Vol. IIB, section –D stands deleted & is modified as under

12.1 The following information shall be furnished with the bid:

- a) Data Sheet – B.
- b) Complete details of the system.
- c) Typical drawings showing arrangement of various components and thicknesses etc.
- d) Type test certificates
- d) Material 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 10.0 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)



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- 7.2 After award of contract, vendor is required to furnish drawings/documents as per Annexure II of this specification.
- 7.3 Document distribution schedule for the project shall be as per Annexure III enclosed.
- 8.0 **CODES & STANDARDS**
- 8.1 Latest revision of relevant standards / codes shall be applicable.
- 8.2 The testing methods shall be in accordance with the international standards (such as ASTM-E-814, ASTM-E-119, UL-1479, BS: 476, IEC-332-3 and ASTMD-263)
- 9.0 **QUALITY PLAN**
- 9.1 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 BHEL/Customer without any commercial implication.
- 9.2 Successful bidder shall submit Field Quality Plan for preservation and handling of fire sealing material offered.
- 10.0 **BILL OF QUANTITY**
- 10.1 Bill of quantities (B.O.Q.) is given in Annexure – I
- 10.2 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.
- 11.0 **PRICES**
- 11.1 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 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.
- 11.2 **Lot-I** quantity shall be released along with LOI.



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

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

12.0 **DELIVERY**

Delivery shall be as per NIT (Notice Inviting Tender)

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ANNEXURE-1**BILL OF QUANTITIES (BOQ)**

SL.NO.	ITEM CODE	DESCRIPTION	UNIT	ORDER QTY.	LOT 1 QTY.	UNIT PRICE EX-WORKS	TOTAL PRICE EX-WORKS
A	MAIN ITEMS					(IN RUPEES)	(IN RUPEES)
	TYPE-A FIRE SEALING MATERIAL: SILICON BASED OR EQUIVALENT FOAM SYSTEM OR USING INDIVIDUAL FOAM BLOCKS FOR EACH CABLE ALONG WITH SUITABLE FRAMEWORK RATED FOR ONE HOUR.						
	FLOOR OPENINGS BELOW PANEL IN CONTROL ROOM (APPROX 190MM THICKNESS)	SQM		95	65		
	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)	SET		1	1		
B	E&C	DESCRIPTION	UNIT	ORDER QTY.	LOT 1 QTY.	UNIT PRICE WITHOUT SERVICE TAX	TOTAL PRICE WITHOUT SERVICE TAX
						(IN RUPEES)	(IN RUPEES)
	TYPE-A FIRE SEALING MATERIAL: SILICON BASED OR EQUIVALENT FOAM SYSTEM OR USING INDIVIDUAL FOAM BLOCKS FOR EACH CABLE ALONG WITH SUITABLE FRAMEWORK RATED FOR ONE HOUR.						
	FLOOR OPENINGS BELOW PANEL IN CONTROL ROOM (APPROX 190MM THICKNESS)	SQM		95	65		
	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)	NOs.		1	1		
C	CIVIL WORKS						
		DESCRIPTION	UNIT	UNIT RATE WITHOUT TAXES & DUTIES			
	a	ENLARGEMENT OF PENETRATION AREA IN	SQM				
	a1	BRICK WALL	SQM				
	a2	CONCRETE WALL	SQM				
	a3	FLOORS	SQM				
	b	REDUCTION OF PENETRATION AREA IN					
	b1	BRICK WALL	SQM				
	b2	CONCRETE WALL	SQM				
	b3	FLOORS	SQM				

D	TYPE TEST			
	507-26014-A	TYPE TEST	UNIT	PRICES WITHOUT TAXES & DUTIES IN Rs.
		FIRE RATING TEST	LOT	
		HOSE STREAM TEST	LOT	
		ACCELERATED AGEING TEST	LOT	
		WATER ABSORPTION TEST	LOT	
		VIBRATION TEST FOLLOWED BY FIRE RATING TEST	LOT	

DETAILED TEST PROCEDURE FOR EACH OF THESE TESTS IS TO BE INDICATED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT AND IS SUBJECT TO APPROVAL BY OWNER / CONSULTANT.

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, which is approximately 70% of the ordered Quantity/Contract value.
- 3) Quantity variation shall be limited to (+/-)30% of the contract value arrived at on the basis of the total ordered quantities. Lot-I quantities 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 A,B and D 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. 6.3 of Section-C



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ANNEXURE-I1

LIST OF DELIVERABLES

SL. NO.	Drawings / document description	Drawings / document number	Submission date by vendor
1	Technical Data sheet	PE-V0-314-507-E951	Within two weeks from the date of LOI
2	General arrangement drawings	PE-V0-314-507-E952	Within two weeks from the date of LOI
3	Quality plan	PE-V0-314-507-E953	Within two weeks from the date of LOI
4	Type test reports for tests conducted	PE-V0-314-507-E954	Within two weeks from the date of LOI
5	Recommended Field quality plan	PE-V0-314-507-E955	Within two weeks from the date of LOI

	<p>DOCUMENT TITLE</p> <p>TECHNICAL SPECIFICATION FOR FIRE SEALING SYSTEM SUPPLY & INSTALLATION</p>	SPECIFICATION NO. PE-TS- 314-507-E010	
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ANNEXURE – III

(VENDOR DRAWING/DOCUMENT SCHEDULE)

S.No	Description	No of hard prints/copies	No. of soft copies	No. of CD-ROMs	Remarks
1.	First submission for approval	1 no. Hard print	1no. soft copy	-	
2.	Resubmission	1 no. Hard print	1 no. soft copy	-	
3.	Final distribution prints of approved documents	25	-	5	



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

PE-6666-2



U E M

FIRE STOP SYSTEM FOR CABLES

SPECIFICATION No. PES-507-26	
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GENERAL TECHNICAL REQUIREMENTS
OF
FIRE STOP SYSTEM FOR CABLES
SPECIFICATION NO.

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FIRE STOP SYSTEM FOR CABLES

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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.

- 3.1 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.



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- 3.11 The fire stop system shall be completely gas & smoke tight.
- 3.12 The materials/components used for fire stop system shall meet the following requirements :
- Shall 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 & painted steel materials 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.
 - Should have shelf life of atleast 18 months after the supply of materials.
- 3.13 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.
- 3.14 Welding
- 3.14.1 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.
- 3.14.2 All arc welding shall be carried out with low hydrogen content electrode.
- 3.14.3 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.



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3.15 Surface Treatment

3.15.1 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.

3.15.2 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.

4.0 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.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL

5.1 The quality plan enclosed forms part of this specification.



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

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

6.0 TESTING

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

- a) Fire rating test
- b) Hose stream test
- c) Accelerated aging test followed by fire test
- d) Anti rodent test
- e) Temperature rise test for cables in fire stop.
- f) 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

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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- 7.3.2 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.
- 7.4 Anti-rodent test
- 7.4.1 This test shall be carried out to ascertain the anti-rodent properties of the components of the fire stop system.
- 7.4.2 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.
- 7.4.3 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.
- 7.5 Temperature rise test for cable in the fire stop
- 7.5.1 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.
- 7.5.2 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.
- 7.5.3 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.
- 7.5.4 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.



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7.6 Explosion Test

7.6.1 Following method shall be adopted :

- a) 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.
- b) 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.
- c) Pressure shall be registered with suitable instrument like Biso Wheel pressure metre or Light Beam recorder during the test.

7.6.2 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.

7.7 Structural Stability Test (Site Test)

7.7.1 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.

- a) 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.
- b) A standard steel weight of 1 kg shall be dropped repeatedly twice at the middle of opening from a vertical height of 2 metres.

7.7.2 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.

8.0 PRICES

8.1 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 :

- a) 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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- 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.

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

8.3 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.



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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.
- f) 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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- 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. *Written*
- 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 implements, 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 as 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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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.



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FIRE STOP SYSTEM FOR
CABLES

SPECIFIC TECHNICAL REQUIREMENTS

SPECIFICATION No. PES-507-26

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DATA SHEET-A

- 1.0 Rating of fire stop : **ONE (1) hours**
- 2.0 Type of application : ☒ Horizontal
☒ Vertical
☒ Below panels
☒ Across Trenches
- 3.0 Cable laying conditions ☐ Cables on cable trays
☒ Unsupported cables
- 4.0 Suitability of fixing arrangement : ☒ In masonry work
☒ In concrete work
- 5.0 Whether explosion test is required to be conducted : ~~YES~~ / NO
- 6.0 Packing : Suitable for storing on wet 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 gms/m²

8.0

Type of Fire Sealing System :-

- a) Type A - Silicon foam based or equivalent foam based system or using individual blocks for each cable along with suitable frame work rated for One hour.

DATA SHEET - C		SPECIFICATION No. PES-507-26	
FIRE STOP SYSTEM FOR CABLES		VOLUME IIB	SECTION D
		SHEET <u>14</u>	OF <u>26</u>
INSTRUCTIONS TO VENDOR	1. This data sheet shall be filled up on the basis of finally agreed points of Data Sheet B, Bid Clarifications and MOM with the bidder. 2. This data sheet shall be submitted by successful bidder after award of contract.		

DATA SHEET-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 required as part of system to meet rating : YES / NO

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 :

Name of vendor		Project			
Revision number	0	1	2	3	
Vendor's signature					

DATA SHEET - C

SPECIFICATION No. PES-507-26

FIRE STOP SYSTEM FOR CABLES

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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 and MOM with the bidder.
2. This data sheet shall be submitted by successful bidder after award of contract.

- 3.6 Pressure withstand capacity : kg/mm²
of Fire Stop
- 3.7 Weight of fire stop assembly : kg/mm²
(without cables)
- 3.8 Shelf life of most perishable : years
material
- 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 : YES/NO
(Type, routine & acceptance)
- d) Bar Chart : YES/NO
- e) Billing Schedule : YES/NO

Name of vendor

Project

Revision number

0

1

2

3

Vendor's signature



1500 MW CCPP, PRAGATI-III

**TECHNICAL SPECIFICATION FOR
FIRE SEALING MATERIAL**

SPECIFICATION NO.
PE-TS-314-507-E010

VOLUME NO. :

SECTION : D

REV NO. : 01 DATE : 06.11.13

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1500 MW CCPP, PRAGATI-III

VOLUME III

DATA SHEET - B & SCHEDULE

FOR

FIRE SEALING SYSTEM

SUPPLY & INSTALLATION

SPECIFICATION NO. : PE-TS-314-507-E010 (Rev. ⁰¹)



BHARAT HEAVY ELECTRICALS LIMITED

**POWER SECTOR PROJECT ENGINEERING MANAGEMENT
NOIDA, 201301**

FIRE STOP SYSTEM FOR
CABLES

VOLUME III

PART A

SHEET

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INSTRUCTIONS
TO BIDDER

1. This data sheet shall be read in conjunction with specification no. PES-507-26 Section - D, Volume-III.
2. Items which deviate from specification shall be marked with an asterisk(*).
3. This data sheet shall be submitted alongwith bid.

DATA SHEET-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 : YES / NO
coating required as 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 :

Name of bidder

Project

Revision number

0

1

2

3

Bidder's signature

Date

FIRE STOP SYSTEM FOR
CABLES

VOLUME III

PART A

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- 3.6 Pressure withstand capacity : kg/mm²
of Fire Stop
- 3.7 Weight of fire stop assembly : kg/mm²
(without cables)
- 3.8 Shelf life of most perishable : years
material
- 3.9 Life of total assembly : years
- 1.0 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

Name of bidder

Project

Revision number

0

1

2

3

Bidder's signature



TITLE

SCHEDULE OF PERFORMANCE GUARANTEES

SPECIFICATION
NUMBER

PE-TS-202-507-006

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S. No.	* Item	* Unit of Measurement	* * Guaranteed Value
	IT IS GUARANTEED THAT THAT THE SYSTEM SUPPLIED SHALL PERFORM ACCORDING TO SPECIFICATION REQUIREMENTS UNDER SITE INSTALLED CONDITIONS.		

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

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL



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

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

PARTICULARS OF BIDDER / AUTHORISED REPRESENTATIVE

NAME	DESIGNATION	SIGNATURE	DATE	COMPANY SEAL

INSTRUCTIONS FOR FILLING QUALITY PLAN (Form No. PEM-6041-0)

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


- Column 1 - Component
- Column 2 - Characteristic/Operation- The component and/or operation to be 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 per heat 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'
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 OC
- Entry '2' in column 'W' means test/inspection to be witnessed by Vendor's OC
- Entry '1' in column 'V' means verification shall be done by BHEL and next stage to be started only after the lot/point is cleared by BHEL
- Column 11 - 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 by 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 OS 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 OS Engineer unless otherwise 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 OS 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 OS 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 BHEL's Purchaser/Third Party/Statutory authorities are mandatory, this shall be complied with.
7. Inspection reports, log sheets, test reports, certificate etc. shall be furnished to BHEL at the appropriate stage 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 septuplicate (7 Copies).

	1500MW PRAGATI III CCPP TECHNICAL SPECIFICATION FOR FIRE SEALING SYSTEM	SPECIFICATION NO. PE-TS-314-507-E010	
		VOLUME IIB	
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SCHEDULE OF PRICES-SUPPLY

SL.NO.	ITEM CODE	DESCRIPTION	UNIT	ORDER QTY.	LOT 1 QTY.	UNIT PRICE EX-WORKS (IN RUPEES)	TOTAL PRICE EX-WORKS (IN RUPEES)
A	MAIN ITEMS						
		TYPE-A FIRE SEALING MATERIAL: SILICON BASED OR EQUIVALENT FOAM SYSTEM OR USING INDIVIDUAL FOAM					
		FLOOR OPENINGS BELOW PANEL IN CONTROL	SQM	95	65		
		TOOLS AND ACCESSORIES REQUIRED FOR	SET	1	1		

	1500MW PRAGATI III CCPP TECHNICAL SPECIFICATION FOR FIRE SEALING SYSTEM	SPECIFICATION NO. PE-TS-314-507-E010	
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SCHEDULE OF PRICES-E &C

B	E&C	DESCRIPTION	UNIT	ORDER QTY.	LOT 1 QTY.	UNIT PRICE WITHOUT SERVICE TAX	TOTAL PRICE WITHOUT SERVICE TAX
						(IN RUPEES)	(IN RUPEES)
		TYPE-A FIRE SEALING MATERIAL: SILICON BASED OR EQUIVALENT FOAM SYSTEM OR USING INDIVIDUAL FOAM BLOCKS FOR EACH CABLE ALONG WITH SUITABLE FRAMEWORK RATED FOR ONE HOUR.					
		FLOOR OPENINGS BELOW PANEL IN CONTROL ROOM (APPROX 190MM THICKNESS)	SQM	95	65		
		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)	NOs.	1	1		

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SCHEDULE OF PRICES-CIVIL WORKS

C	CIVIL WORKS	DESCRIPTION	UNIT	UNIT RATE WITHOUT TAXES & DUTIES
	a	ENLARGEMENT OF PENETRATION AREA IN	SQM	
	a1	BRICK WALL	SQM	
	a2	CONCRETE WALL	SQM	
	a3	FLOORS	SQM	
	b	REDUCTION OF PENETRATION AREA IN		
	b1	BRICK WALL	SQM	
	b2	CONCRETE WALL	SQM	
	b3	FLOORS	SQM	

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SCHEDULE OF PRICES-TYPE TEST

D	TYPE TEST			
	507-26014-A	TYPE TEST	UNIT	PRICES WITHOUT
		FIRE RATING TEST	LOT	
		HOSE STREAM TEST	LOT	
		ACCELERATED AGEING TEST	LOT	
		WATER ABSORPTION TEST	LOT	
		VIBRATION TEST FOLLOWED BY FIRE RATING TEST	LOT	

DETAILED TEST PROCEDURE FOR EACH OF THESE TESTS IS TO BE INDICATED BY SUCCESSFUL BIDDER

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, which is approximately 70% of the ordered Quantity/Contract value.
- 3) Quantity variation shall be limited to (+/-)30% of the contract value arrived at on the basis of the total ordered quantities. Lot-I quantities 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 A,B and D 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. 6.3 of Section-C