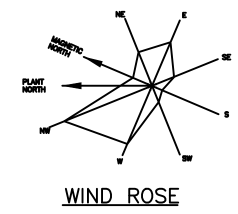
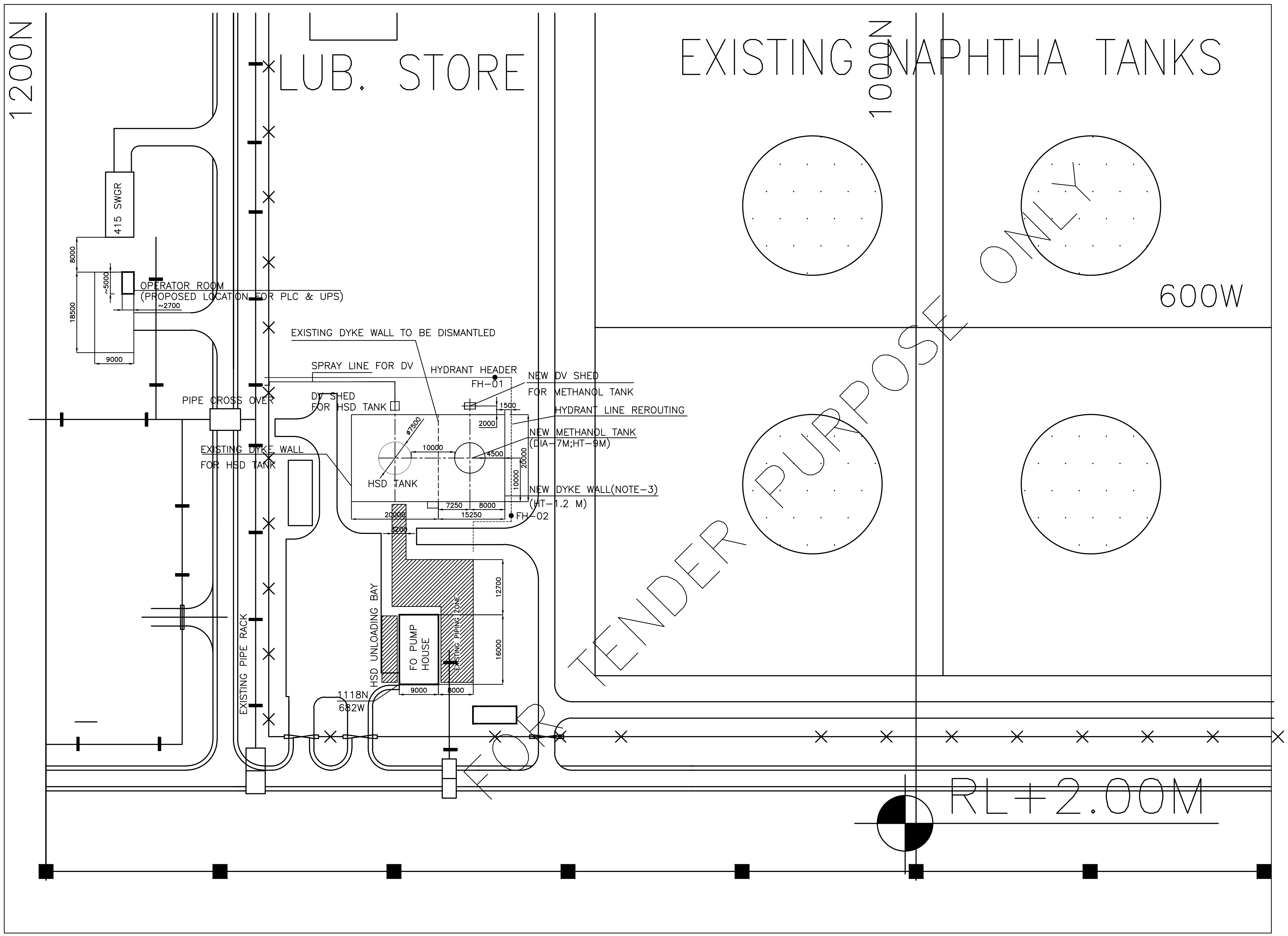
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. PY-LE-1-M231-2012-01 SHT. 00 OF 00





NOTES:-

1. EL (+) 0.00 M CORRESPONDS TO RL (+) 2.50M.
2. FORMATION LEVEL FOR SITE LEVELLING SHALL BE SHALL BE RL (+) 2.50M.HOWEVER AFTER GROUND IMPROVEMENT WORKS THE FINISHED GROUND LEVEL SHALL BE RL(+)2.00M.
3. NEW DYKE WALL SHALL BE MADE AROUND METHANOL TANK FROM 3 SIDES WITH HEIGHT-1.2M AS IN EXISTING WALL.THE SOUTH SIDE OF THE EXISTING DYKE WALL SHALL BE DISMANTLED.
4. FIRE WATER LINE IN THE NEW TANK AREA SHALL BE REROUTED OUTSIDE THE NEW DYKE WALL.

REFERENCE DRAWINGS

1. PLOT PLAN-3230-999-POC-F-001
2. FUEL SUPPLY SYSTEM-LAYOUT PLAN-TC-P06-0-003,REV-12

GENERAL DIMENSIONAL LIMITS,FITS & TOLERANCES AS PER HY0230261

COMPUTER FILE NAME 03810100777-S01-R01

CUSTOMER: RAJIV GANDHI COMBINED CYCLE POWER PROJECT
NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)
ENGINEERING DIVISION

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT	METHANOL FIRING IN GT NTPC KAYAMKULAM				
BHARAT HEAVY ELECTRICALS LTD. HYDERABAD		NAME	SIGN.	DATE	NO.OF VAR.
	DRN.	SATISH	-sd-	16.08.24	-N.A-
	CHD.	IMRAN AHMAD	-sd-	16.08.24	
	APPD.	UDAY G	-sd-	16.08.24	

DEPT. PED CODE 450	UNTOL. DIMS. GR.		SCALE 1:500	WEIGHT (KG) -N.A-	REF. TO ASSY. DRG. -N.A-	ITEM NO. -N.A-	NO.OF ITEMS -N.A-

TITLE PLOT PLAN & EQUIPMENT LAYOUT METHANOL FIRING SYSTEM

CARD CODE
NTPC DRG NO. 1101-131-PVM-F-002
BHEL DRG NO. PY-LE-1-M231-2012-01
REV. 00
SHT. No 01 NO. OF SHT. 01

QW – 482 WELDING PROCEDURE SPECIFICATION (WPS)

Welding Procedure Specification No.: ***WE 001*** **Date:** ***02-04-84*** **Supporting PQR No.:** ***185+21***

Revision No.: ***02*** **Date:** ***15-09-93***

Welding Process (es) : ***SMAW*** **Type (s) :** ***MANUAL***

JOINTS (QW 402)

Joint Design : **As per manufacturing drawing (groove / fillet)**

Backing (Yes) : ***for double side and backing strip groove welds***
(No) : ***for single side groove welds***
Backing Material (Type) : ***Base metal / Weld metal***
Metal : ***Yes*** **Non-Fusing Metal :** ***No***
Retainer : ***No***

BASE METALS (QW – 403)

P. No. : 1 **Group No. :** 1&2 **TO** **P. No.: 1** **Group No.:** 1&2

OR
Specification type & grade : --- **to** Specification type & grade : ---
OR
Chemical Analysis & Mechanical Properties : --- **to** Chemical Analysis & Mechanical Properties : ----

Thickness Range :
Base Metal : **Groove:** ***4.8 mm to 200 mm*** **Fillet :** ***all sizes***

Pipe Dia. Range : Groove: ***all dia*** **Fillet : :** ***all sizes***

Other : Root spacing for backing strip joints : 8 - 10 mm
For others : 2 ± 1 mm

Filler Metals (QW – 404)	
Spec. No. (SFA)	***5.1***
AWS NO (CLASS)	***E-7018***
F. No.	***4***
A. No.	***1***
Size of Filler Metals	***Dia 2.5; 3.15; 4.0; 5.0; 6.3 mm***
Deposited Weld Metal	
Thickness Range: Groove: **Fillet :**	***200 mm Max.*** **ALL**
Electrode Flux (Class)	***Basic***
Consumable Insert	***No***
Max. Bead Thickness	***5*** **mm**

Rev 02 : Changes in non essential variables

WPS:WE 001

POSITIONS (QW-405)	POSTWELD HEAT TREATMENT (QW-407)
Position(s) : ALL POSITIONS **Welding Progression : UP for Vertical Down ---** **Position (s) Fillet : ALL**	**Temperature Range : 600 – 650°C** **Time Range :** ***As per UCS 56***
PREHEAT (QW-406)	**GAS (QW-408)**
Preheat Temp Min : 18 ° C UPTO 31 mm **100° C FROM 31 – 100 mm** **150° C ABOVE 100 mm** **Interpass Temp Max : 350 ° C** **Preheat Maintenance : Nil**	**NOT APPLICABLE**

ELECTRICAL CHARACTERISTICS (QW-409)

Current AC or DC : ***DIRECT CURRENT*** **Polarity :** ***ELECTRODE POSITIVE***

Amps [Range] : 60 to 300 A **Volts Range : 22-26 V**

TECHNIQUE (QW-410)

String or Weave Bead : string and weave (max 3D)
Initial and Interpass Cleaning : chipping ; brushing ; grinding
Method of Back Gouging: by air arc gouging / grinding
Multiple or Single Pass : multiple pass / single pass
Multiple or Single Electrodes : single electrode
Peening : not allowed

Clean weld area to remove oil, rust, grease, etc. prior to welding.

Weld Layer (s)	Process	Filler Metal		Current		Other
		Class	Dia mm	Type Polar	Amp Range	
Root and subseq-uent layers	*SMAW*	*E - 7018*	*2.5*	*DC +*	*60-90*	*STRING & WEAVE (MAX 3 x Electrode Dia)*
	SMAW	*E - 7018*	*3.15*	*DC +*	*90-140*	
	SMAW	*E - 7018*	*4.0*	*DC +*	*140-180*	
	SMAW	*E - 7018*	*5.0*	*DC +*	*180-240*	
	SMAW	*E - 7018*	*6.3*	*DC +*	*240-300*	

HEAD / WELDING ENGG

BHARAT HEAVY ELECTRICALS LIMITED

Ramachandrapuram, Hyderabad – 502 032, INDIA

QW – 482 WELDING PROCEDURE SPECIFICATION (WPS)

Welding Procedure Specification No.: WE003, **Date:** 02.04.1984 **Supporting PQR No.:** 544, Dt : 09.02.2017

Revision No.: 04 **Date:** 09.02.2017

Welding Process (es) : *GTAW + SMAW* **Type (s) :** *MANUAL*

JOINTS (QW 402)

Joint Design: *As per manufacturing drawing (groove/fillet)*

Root Spacing : *As per manufacturing drawing*

Backing (Yes) : *for double side welds and backing strip joints*

(No) : *for single side welds*

Backing Material (Type) : *Base metal / Weld metal*

Metal: *Yes* **Non-Fusing Metal:** *No*

Retainer: *No*

BASE METALS (QW – 403)

P. No. *1* **Group No. :** *1 & 2* **TO** **P. No.:** *1* **Group No.:** *1 & 2*

OR

Specification type & grade: -------- **to** Specification type & grade : -------

OR

Chemical Analysis & Mechanical Properties: --- to Chemical Analysis & Mechanical Properties: ----

Thickness Range :

Base Metal : **Groove:** *5.0 mm to 34 mm* **Fillet :** *all sizes*

Deposited pass thickness *> 13mm – Not permitted*

Other : None

Filler Metals (QW – 404)

	GTAW	SMAW
Spec. No. (SFA)	*5.18*	*5.1*
AWS NO (CLASS)	*A 5.18 (ER 70S-2)*	A 5.1 (*E 7018*)
F. No.	6	4
A. No.	*1*	*1*
Size of Filler Metals	*Dia 2.4 mm*	*Dia 3.15, 4.0, 5.0mm*
Filler Metal Product Form	*Bare (Solid)*	N.A
Supplemental Filler Metal	*N.A*	N.A
Deposited Weld Metal Thickness Range : Groove:	*38mm Max for combined processes*	
Fillet:	*6 mm Max. 38mm Max Throat*	*28 mm Max. 38 mm Max Throat*
Electrode Flux (Class)	*NA*	*Basic*
Consumable Insert	*No*	*No*
Max. Bead Thickness	*3 mm*	*5 mm*

Rev : 04 – Re Established to meet NACE requirements (Hardness test)

N.A – Not Applicable

POSITIONS (QW-405)

Position(s) Groove : *ALL POSITIONS*
Welding Progression: *UP for Vertical*
Down - Not permitted
Position (s) Fillet: *ALL*
Other : None

POSTWELD HEAT TREATMENT (QW-407)

Not Permitted

Temperature Range: *N.A*

Time Range: *N.A*
Other : *None*

PREHEAT (QW-406)

Preheat Temp Min: *10 ° C min for < 25mm*
100 ° C for 25mm and above
Interpass Temp Max: *300 ° C*
Preheat Maintenance: *Nil*
Other : None

GAS (QW - 408)

	Percentage Composition Gas(es)	Mixture	Flow Rate
Shielding :	Argon	Single gas	6-10LPM
Trailing :	No	-	-
Backing :	No	-	-

Other : None

ELECTRICAL CHARACTERISTICS (QW-409)

Weld Pass (es)	Process	Filler Metal Classification	Filler Metal Diameter	Current type & Polarity	Amps (Range)	Wire feed speed	Energy or Power (Range)	Volts (Range)	Travel speed	Other
Root& Subse-equent as reqd	*GTAW -do- SMAW -do- -do-*	*ER70S-2 -do- E 7018 -do- -do-*	*2.4mm -do- 3.15mm 4.0mm 5.0mm*	*DCEN -do- DCEP -do- -do-*	*150-200A -do- 100-150A 150-200A 200-260A*	N.A -do- -do- -do- -do-	N.A -do- -do- -do- -do-	*10-20V -do- 22-34V -do- -do-*	N.A -do- -do- -do- -do-	*String String for horizontal; Others Weave (Max 3 times Electrode Core Dia)*

Pulsing Current : *N.A*

Heat Input : *N.A*

Tungsten Electrode Size and Type : *Dia 2.4/3.2 mm 2% Ceriated (EW Ce-2)*

Mode of Metal Transfer for GMAW (FCAW): *N.A*

Others **:** *None*

TECHNIQUE (QW-410)

String or Weave Bead: *String and/or weave*

Orifice or Gas Cup Size : *6-11 mm ID*

Initial / Interpass Cleaning : *Chipping / brushing / grinding*

Method of Back Gouging: *Grinding/Gouging - if required*

Oscillation : *N.A*

Contact tube to work distance : N.A

Multiple or Single Pass : *Multiple pass*

Multiple or Single Electrodes : *Single electrode*

Closed to out chamber : *N.A*

Peening : *Not allowed*

Use of thermal processes : *N.A*

Other : *Clean weld area to remove oil, rust, grease, etc. prior to welding.*

Prepared by

09/02/17

Sr Welding Engineer

Approved by

09/02/17

HEAD / Welding Engg

N.A – Not Applicable

DETAILS OF WELDING, INSPECTION & TESTING FOR BALANCE OF PLANT PIPING

1.0.0 WELDING DETAILS :

1.1.0 To reduce number of welding procedure qualifications required, base metals have been assigned, P-NUMBERS, and GROUP NUMBERS. The assignments are based on comparable base metal characteristics such as composition, weld quality and mechanical properties (as per ASME SEC-IX)

All fusion faces shall be as per plant standard HY06205599 for butt welds; Fillet welds shall be as per Drg. No.3-38101-00033.

Selection of P-Number and Group Number for the materials shall be as per Table-1.

For electrodes, heat treatment and other details, refer relevant Welding Procedure Specification (WPS) as given in Table-2.

Table-2 lists out WPS number for welding between the various combinations of group numbers / P- Numbers.

1.2.0 STEP BY STEP PROCEDURE :

STEP-1: Select material of two components to be welded.

STEP-2: Identify the P-NUMBER for the each component from Table-1.

STEP-3: Follow appropriate WPS from Table-2.

1.3.0 EXAMPLE :

Welding shall be done between material A106 GrB. (CS) and A132 TP321 (SS). Service natural gas. Pipe thickness is 8.0 mm.

STEP-1 : Welding is between CS & SS materials.

STEP-2 : P-NUMBER for A106 Gr. B is P1 and for A312 TP321 is P8.
i.e., welding between P1 & P8

STEP-3 : From Table-2 for t > or =5.0 use WPS NO WE 315 for root weld,
WE 046 for the remaining passes.

TABLE-1

MATERIAL	P- NUMBER	GROUP NO.
SA 106 Gr.B	1	1
SA 234 WPB		
SA 672 Gr.B60		
SA 105 Gr.II	1	2
SA 216 WCB		
SA 182 F304	8	1
SA 182 F321		
SA 312 TP304		
SA 240 TP304		
SA 403 WP321		
SA 403 WP304		
SA 312 TP321		
SA 312 TP316		
SA 351 CF8		
SA 335 P11	4	1
SA 182 F11		
SA 234 WP11		
SA 387 Gr12		
SA 217 WC6		
SA 335 P22	5	1
SA 182 F22		
SA 217 WC9		
SA 234 WP22		

TABLE-2

Sr no.	WELDING BETWEEN	GROUP	THICKNESS (mm)	WPS NO.	REMARK
1	CS to CS (P1 to P1)	1 & 2	Up to 5.0	WE 301	Only GTAW
			> 5.0 to (=)18.0	WE 003	GTAW + SMAW
			> 18.0 to (=) 38.0	WE 004	GTAW + SMAW
			> 38.0 to (=) 200.0	WE 001	SMAW
2	SS to SS (P8 to P8)	1	Up to 5.0	WE 313-ER 347 WE 314-ER 308L	Only GTAW (WPS SELECTION BASED ON FILLER METAL USE.)
			> 5.0 to (=) 50.0	WE313+WE042/ 045	GTAW + SMAW (WE 045 instead of 042 for E347 Electrode)
3	CS to SS (P1 to P8)	1 &2 to 1	Up to 5.0	WE 315	Only GTAW
			> 5.0 to (=) 38.0	WE 315 + WE 046	GTAW + SMAW
4	P11 to P11 (P4 to P4)	1	Up to 5.0	WE 312	Only GTAW
			> 5.0 to (=) 50.0	WE 343	GTAW + SMAW
5	CS to P11 (P1 to P4)	1&2 to 1	Up to 5.0	WE 311	Only GTAW
			> 5.0 to (=) 50.0	WE 345	GTAW + SMAW
6	CS to P22 (P1 to P5)	1&2 to 1	> 4.8 to(=) 28.0	WE 024	SMAW
7	P22 to P22 (P5 to P5)	1	> 5.0 to (=) 200.0	WE 159	GTAW + SMAW
8	P11 to P22 (P4 to P5)	1	> 4.8 to (=) 28.0	WE 023	SMAW

2.00 INSPECTION & TESTING :

2.1.0 PIPING CLASSIFICATION:

For rationalizing the testing and inspection procedure, piping may be classified into following groups based on the critical nature of the service conditions.

GROUP-A: **IBR purview piping** like

a. Main Steam Lines
b. Auxiliary Steam Lines
c. Boiler Feed Water Lines

GROUP-B: **Non-IBR piping** like

a. Natural Gas Lines
b. Refinery Gas Lines
c. Naphtha Lines
d. Natural Gasoline Lines
e. HSD Lines
f. LSHS Lines
g. Furnace Oil Lines
h. Polished Water Lines
i. Condensate Lines
j. DM Water Lines.
k. Instrument Air Lines
l. Lube oil Lines.

GROUP-C : **Utility piping** like

a. Cooling Water Lines
b. Service Water Lines
c. Plant / Service Air Lines
d. Nitrogen lines

2.2.0 HYDRAULIC TESTING:

Hydraulic testing shall be conducted for all the lines except the atmospheric lines vents, flares & drains at a pressure of **1.5 times of the design pressure**.

2.3.0 INSPECTION (FOR WELD JOINTS) :

2.3.1 For Alloy steel piping. 100% radiography shall be conducted.

2.3.2 (a) Group-A piping:

Inspection of IBR piping shall be done as per IBR class 360-D with latest amendments.
For IBR class-1 pipes (steam pressure>17.6 ATA or Temp 218^{o}C)

1. Radiography for pipe bore 102 mm and above:

   10% welds/welder with min 2 welds/welder selected at random

2. Radiography for pipe bore 38 mm upto 102 mm:

   2% of welds/welder with min. of 1 weld /welder selected at random

3. 100% DP test shall be conducted for all fillet welds

For IBR Class-II pipes (Design parameters less than class-I)

1. On completion of first 10 welds / welder, one of the weld shall be cut or a separate specimen be prepared for visual examination and bend test
2. 2% of the remainder welds / welder cut for test purpose or a separate test specimen be prepared for visual examination and bend test
3. 10% DP test shall be conducted for fillet welds

2.3.2. (b) Group-B piping:

1) 100% visual inspection
2) 20% DP check for fillet welds.
3) Radiography for 10% of butt welds with min. of two welds / welder

2.3.2. (c) Group-C piping:

1) 100% visual inspection.
2) 10% DP check for fillet welds.
3) Radiography for 2% of butt welds with min of one welds / welder

RECORD OF REVISIONS

Rev. No.	Date	Revision Details	Revised By	Approved By
00	08.04.93	First issue.	---	---
01	10.10.95	WPS Changed from WE 14 to WE 13.	---	---
02	23.07.97	100% RT for alloy steel pipe incorporated.	---	---
03	15.12.11	Table-2 Updated.	Kishor	K.Srinivas.

Ref. Doc.

Technical Specification
For
Fire Proof Sealing Materials (FPSS)

	Prepared by :	Checked by :	Approved by :	Date :
Revisions: Refer to record of revisions	Shadab Ahmed	Abu Malick	Saroj Kumar	16.02.2021

Technical Specification for Fire Proof Sealing Material (FPSS)

1.0 Scope:

This specification includes the design, manufacture, supply, testing at manufacturer's works, packing and delivery to various project sites listed elsewhere.

2.0 General Technical Requirements:

The Fire proof sealing system shall comprise of following items:

~~i) Mineral Wool type fire stop materials for sealing of Wall/Floor cutouts and Panel.~~

ii) Mortar Seal for sealing of conduits/trenches and Wall/Floor cutouts.

iii) Fire Break Coatings for Power cables.

They shall have following properties:

2.1 Completely free from dust and fibers.
2.2 Halogen and solvent free.
2.3 Operating temperature between -5˚ C to 40˚ C.
2.4 Temperature resistance between - 60˚ C to + 60˚ C.
2.5 Expansion temperature + 300˚ C.
2.6 Easy installation.
2.7 They shall be smoke and gas tight, non-toxic and non-combustible in nature.
2.8 Readiness for use immediately after installation.
2.9 Density 0.6 gm/cm3 (approx.).
2.10 Compressive Strength: Approx. 6-7 N/mm2.
2.11 Expansion ratio at +300˚ C-1.5.
2.12 Self-Life: Min. Eighteen months from date of dispatch (in original un-opened packing)
2.13 Details of structures through which cables/cable trays/pipe sleeves penetrate:
a. Wall Thickness : 230 mm (Average).
b. Floor Thickness : 150 mm (Average).
2.14 Materials of Conduits/Pipes/Pipe sleeves: GI/PVC

3.0 Specific Technical Requirements of Mineral Wool Type Panel Sealing System:

3.1. All entry and exit openings for cables crossing in substation, control room etc. shall be provided with fire barrier and it shall have Three (3) hours rating (double panel seal). The product must be tested, approved and listed in UL / FM Global / LPCB / CBRI / ERDA or equivalent Lab with NABL accreditation.

3.2. The sealing compound in conjunction with mineral wool shall form effective fire seals. Density of the mineral wool panel shall be minimum 144 kg/cubic meter and melting point shall be above 1000 deg C.

3.3. All material shall be new, freshly manufactured and of good quality.

3.4. It shall be completely gas and smoke tight besides being an efficient fire seal.

3.5. It shall not contain flammable materials or solvents which are toxic or release toxic gases during exposure to fire. The system should be non-hazardous and should not emit any excess of smoke under fire exposure

3.6. The design shall be such as to allow pre and post inspection of the materials used during and after execution UL / FM Global / LPCB / CBRI / ERDA or equivalent Lab with NABL accreditation approval Certificates shall be made available.

3.7. The fire stop/barrier system shall have no effect on the ampcity of the cables and the same shall be demonstrated by actual tests on a sample length.

3.8. In case the thickness of opening is lesser than that required for 3 hour rated barrier, additional thermal insulation rigidly secured in panel shall be proved and if thickness of opening is more than that required for 3 hours rating then the fire barrier shall be laid flush with top of floor or one side of wall and thickness of fire barrier required for 3 hour rating.

3.9. Fire stop/barrier design shall be such that the insulation material and panels remains secured in place throughout the service life and does not get dislodged during repair for / retrofit operations.

3.10. The insulation panel should be so designed as to have uniformity with respect to its construction, density and insulation properties.

3.11. The material used in the fire barrier / stop system shall have no shrinkage or cracking after prolonged use. The encasing panel shall not contain any material which is prone to aging and get affected by moisture, adverse weather conditions and prone to damage by white ants / termite and rodents.

3.12. The system including reinforcing elements shall be capable of withstanding mechanical loads such as foot traffic, drop loads and vibrations thought out service life.

3.13. Asbestos shall not be used in the construction of fire stop/barrier materials.

3.14. The materials used in the system shall be non-hygroscopic. The system shall be resistant to chemicals.

3.15. The fire barrier shall have a life expectancy of at least 30 years.

3.16. The system shall retain its integrity and perform satisfactory even after remaining in water for long period.

3.17. The materials shall not be corrosive and it shall be anti-rodent.

3.18. The system shall have compatibility with FRLS PVC, PVC neoprene, silicone rubber sheathing materials of cables.

3.19. The material used for fire barrier shall have high oxygen index (greater than 60%).

3.20. The shelf of all materials, which form a part of supply of the fire barrier, shall be indicated.

3.21. If cutout is circular in nature, round and spongy type of plug shall be used which requires minimum skill for installation.

4.0 Specific Technical Requirements of Mortar Seal type Sealing System:

4.1 All entry and exit openings for cables passing through GI/PVC conduits /Cable trenches in substation, control room etc. shall be provided with fire barrier and it shall have minimum Two (2) hours rating.

4.2 The sealing compound shall form effective fire seals, which is non-shrinking, non-hygroscopic, homogeneous, gas and smoke for cable penetrations.

4.3 Material shall be new, freshly manufactured and of good quality.

4.4 It shall be completely gas and smoke tight besides being an efficient fire seal.

4.5 It shall not contain flammable materials or solvents witch are toxic or release toxic gases during exposure to fire.

4.6 The design shall be such as to allow retrofitting activities without dismantling of original sealing system.

4.7 The fire stop/barrier system shall have no effect on the ampacity of the cables and same shall be demonstrated by actual tests on a sample length.

4.8 Fire stop/barrier design shall be such that the insulation material remains secured in place throughout the service life and does not get dislodged during repair for / retrofit operations.

4.9 The insulation system should be so designed as to have uniformity with respect to its construction, density and insulation properties.

4.10 The material used in the fire barrier / stop system shall have no shrinkage or cracking after prolonged use. The encasing panel shall not contain any material which is prone to aging and get affected by moisture, adverse weather conditions and prone to damage by white ants / termite and rodents.

4.11 The system including reinforcing elements shall be capable of withstanding mechanical loads such as foot traffic, drop loads and vibrations thought out service life.

4.12 Asbestos shall not be used in the construction of fire stop/barrier materials.

4.13 UL/ FM / LPCB / CBRI / ERDA or equivalent Lab with NABL accreditation Approval Certificates shall be made available.

4.14 The system shall retain its integrity and perform satisfactory even after remaining in water for long period, the materials shall not be corrosive and it shall be anti-rodent, the system should be non-hazardous and should not emit any excess of smoke under fire exposure.

4.15 The system shall have compatibility with XLPE, FRLS PVC, PVC neoprene, silicone rubber sheathing materials of cables shall be resistant to chemicals.

4.16 The mortar seal shall have a life expectancy of at least 30 years.

5.0 Specific Technical Requirements for Fire Break Coatings:

5.1 Fire Break Coatings for all power cables shall consist of non-intumescent water based thermoplastic resins, in-organic incombustible fibres, fillers, pigments and various flame retardant chemicals and it shall have minimum 30 minutes fire rating.

5.2 Fire Break Coatings on cables shall retard fire and shall arrest its propagation in horizontal and vertical directions. Test and approvals certificates shall be made available.

5.3 Fire Break Coatings shall not be affected even after prolonged exposure to high humidity, moisture, tap or rain water, UV radiation at outdoor environment.

5.4 Coatings shall be water and weather resistant by itself after cure.

5.5 Fire Break Coatings shall prevent propagation of fire arising from internal short circuit of cables and fire arising due to external sources. Test and approvals certificates shall be made available.

5.6 Fire Break Coatings shall be resistant to gasoline, diesel fuel, fuel oils transformer and motor oils.

5.7 Fire Break Coatings shall have no flame propagation due to ablation and is of high flexibility.

5.8 Fire Break Coatings shall be tough, permanent, non-intumescent, water based, suitable for moisture & damp areas and lasting to the lifetime of the cables.

5.9 Fire Break Coatings shall have no deterioration at all with age even when used externally.

5.10 Fire Break Coatings shall not de-rate electrical power cables. Fire Break Coatings shall not reduce the current carrying capacity of the cables.

5.11 Fire Break Coatings shall have good mechanical resistance and human health compatibility.

5.12 Fire Break Coatings Thermal Conductivity shall be higher than of insulation under normal working conditions.

5.13 Fire Break Coatings shall have a LOI (Limiting Oxygen Index) value of greater than 50. Test Certificate shall be submitted.

5.14 Fire Break Coatings shall prevent the formation of poisonous and corrosive gases and smoke.

5.15 Fire Break Coatings shall be non-toxic, solvent-free, phosphate-free and shall not contain asbestos or any other substance identified as being carcinogenic.

5.16 Fire break coatings on cables shall retard fire and shall arrest its propagation in horizontal and vertical directions and tested to IEEE – 383,634, IEC 331,332-3 standards, tests and approved certificate shall be available.

5.17 UL/ FM / LPCB / CBRI / ERDA or equivalent Lab with NABL accreditation Approval Certificates shall be made available.

5.18 The system shall have compatibility with XLPE, FRLS PVC, PVC neoprene, silicone rubber sheathing materials of cables shall be resistant to chemicals.

5.19 The fire break coating shall have a life expectancy of at least 30 years.

6.0 Tests and Inspection:

A) Fire Stops/Barriers System (Panel seal & Mortar seal)

6.1 Test reports (not more than 5 Years old from date of LOI/PO) for below mentioned tests shall be submitted for owner's review/acceptance.

UL, FM or NFPA / LPCB / CBRI / ERDA or equivalent Lab with NABL accreditation Approval certificates shall be furnished along with technical bids for evaluation purpose.

a) Fire Rating Test
b) Fire endurance, hose stream test and temp measurement on non-flaming side.
c) Impact Test
d) Accelerated aging Test

6.2 The product shall be tested as per the following standards / norms.

a. UL 1479
b. BS 476 p-20
c. IS 12458
d. ASTM E – 814
e. Din 4102 standards

B) Fire Retardant coatings

6.3 Test reports (not more than 5 Years old from date of LOI/PO) for below mentioned tests shall be submitted for owner's review/acceptance

UL, FM or NFPA / LPCB / CBRI / ERDA or equivalent Lab with NABL accreditation Approval certificates shall be furnished along with technical bids for evaluation purpose.

a. Test certificate on flame spread as per BS 476p.7 (Flame spread) & as per BS 476 p.6(Fire spread)
b. Flame propagation on coated cables test certificate as per IEC 332-3 or flame propagation on coated cables test certificates as per DIN 4102 p.1B1.
c. Circuit integrity test on coated cables as per IEC 332 (with coatings applied on cables)
d. 100% LOI (Limited Oxygen Index) test certificate Acc. to ASTM D2863.
e. All relevant test as per UL 3971.

6.4 Bidder shall furnish the QAP for owner's review/approval.

6.5 Testing and Inspection shall be carried out in presence of TPI representative as per approved factory testing procedure.

7.0 Documentation:

7.1 Bidding stage documentation

Bidder shall submit one set of following documents along with the Technical Bid, otherwise technical bid shall not evaluate further.

1. Duly signed and stamped copy of check list. (As per Format- 9.1)
2. Duly signed and stamped copy of Deviation schedule (As per format- 9.2)
3. Filled in Technical Data sheets in enclosed format (As per format- 9.4)
4. Technical Catalogues
5. Valid test report as per cl. 6.0 which are listed above, not older than 5years, from FM/UL/LPCB/CBRI/ERDA/NABL accredited testing laboratories shall be submitted for review. In case any valid test reports are not available, same shall be conducted without any time and cost implication. Same shall be clearly mentioned in the technical offer & deviation schedule .
6. Duly signed and stamped unpriced price format. (As per format- 9.3)
7. BOQ of material & it's accessories

7.2 Order execution stage documentation

Successful bidder shall submit soft copy of following documents with in 7day after receipt of LOI/Purchase order from purchaser.

1. Filled in Technical Data sheets in enclosed format for approval.
2. Sizing details of fire stops/barriers and fire break coatings.
3. Installation Procedures of the fire stops/barriers and firebreak coating materials.
4. Quality Plan along with Inspection, Test Plan and Type Test Certificates.
5. All the Test / Approval Certificates as mentioned in clause no. 5.0(Tests & Inspection).
6. Offered materials BOQ.

   BHEL will furnish Approval/Comments within 7 Days after receipt of satisfactory documents from manufacturer. However, vendor is responsible for completion of approval cycle and minimizing number of revisions.

7.3 As-shipped documentation (Final)

Final documentation in six sets in bound volumes along with a softcopy (2 Nos CD) shall be submitted and shall consist of following:

1. O&M manuals comprising of:
   - Technical Data Sheets
   - Installation procedure
2. All test Certificates
3. Contact details

8.0 BHEL Material Codification:

Var No	Material Description	BHEL Materials Code
01.	Fire Proof Sealing Materials for sealing of Wall/Floor openings and Panel bottoms (Panel Seal)	PY9755426019
02.	Fire Proof Sealing Materials for sealing of conduits/cable trenches etc. (Mortar Seal)	PY9855426029
03.	Fire Break Coatings for HT/LT Power Cables	PY9855426037

Notes:

1 No Deviation on above mentioned requirements would be accepted.

2 UL / FM / NFPA / LPCB / CBRI / ERDA or equivalent **Lab with NABL accreditation** Approval certificates shall be furnished along with technical bids. Test certificates furnished from agencies (other than the above) without having NABL accreditation will not be considered for tech. evaluation.

3 **Detail application procedure of each material shall be submitted.**

4 **Technical Bid without the above will not be evaluated and bid is likely to be rejected technically.**

9.0 Standard Formats

9.1 Check list for bidder

Enquiry No. Date :
Name of the Bidder :
Project :
Specification No : PY55426, Rev-00
Item : Fire Proof Sealing Materials

SL.No	Check point description	Bidder Compliance
1.0	Deviation schedule enclosed (Format- 9.2)	Yes/No
2.0	Filled in Technical data sheets (Format- 9.4) enclosed.	Yes/No
3.0	Signed & Stamped unpriced price format enclosed (Format- 9.3)	Yes/No
4.0	Valid Type test reports as per cl. 5.0 and not older than 5-years enclosed	Yes/No

Bidder shall strictly fill up the checklist as applicable and submit along with technical offer. Otherwise offer shall not consider for evaluation.

(Signature of the Bidder with Seal)

9.2 Deviation Schedule (Technical)

Enquiry No. Date :
Name of the Bidder :
Project :
Specification No : PY55426, REV-00
Item : Fire Proof Sealing Material.

1. Deviation to tender documents, if any, shall be consolidated list of deviations shall be submit in this schedule.
2. Deviation listed elsewhere will be summarily rejected and shall be ignored.
3. Attach more sheets in this format, if required.
4. If there are no deviations the same shall be mentioned in the format and submitted.
5. Bidder shall state reason for the deviations in the remark column.
6. Only the deviations listed herein, in conjunction with the original tender, shall constitute the contract document for the award of the job to the Bidder.

Sl.No.	CL.No./Page No./Sec No.	Description as specified	Deviation taken	Reason	Remarks

(Signature of the Bidder with Seal)

9.3 Price Format

Sl No.	Item Description	Units	Qty.	% Weightage	Quoted (Yes/No)	Remarks
A	**Main Items**					
A1	Fire Proof Sealing Materials Panel Seal (Mineral Wool type)	Sq. M	150	53.61		
A2	Fire Proof Sealing Materials – Mortar Seal	Sq. M	25	8.23		
A3	Fire Break Coatings	Sq. M	425	38.16		
	TOTAL BID VALUE (E) EXPRESSED IN FIGURE:				To be quoted in Part-2 of GeM Portal (Inclusive of P&F, Freight and GST)	

Notes:

1. Bidders should quote the Total Bid Value in part-2 of GeM Portal.
2. The quoted prices in GeM Portal must be inclusive of Packing & Forwarding charges, Freight charges & GST.
3. Transit insurance charges and inspection charges are in BHEL scope and shall not be included in the total bid value.
4. Unit rates of line items mentioned in the Price Format shall be derived by BHEL by multiplying the Total Bid Value quoted by the Bidder with the Weightage Factor assigned against respective line items above. Unit prices for above materials for addition/deletion in scope quantity
5. The bidders will provide un-priced price format strictly in the BHEL price format given above, in the techno commercial part of their offers. Bid will be rejected if any other price format is used. The un-priced price format to be provided by the bidders shall be signed and stamped.

(Signature of the Bidder with Seal)

9.3.1 Optional Prices

B	Supervision of Installation (Optional)					
B1	Supervision for Installation of Fire Proof Sealing materials- Panel Seal.	Man day	--	--		Note-1
B2	Supervision for Installation of Fire Proof Sealing materials- Mortar Seal	Man day	--	--		Note-1
B3	Supervision for Installation of Fire Break Coatings	Man day	--	--		Note-1

Notes:

1. Vendor to quote per man-day charges for supervision and installation separately as an optional price at Sl. Nos. B1 and B3 above. The Prices quoted shall not be considered for Price Evaluation. BHEL reserves the right to order separately or not at all. The bidder will keep their prices valid till execution of order or 18 months from the date of dispatch of material (main items), whichever is later.
2. The bidders will provide priced format of these prices strictly in the BHEL price format given above, in the techno commercial part of their offers. Bid will be rejected if any other price format is used. Priced format to be provided by the bidders shall be signed and stamped copies.

(Signature of the Bidder with Seal)

9.4 Technical Data Sheets (TO BE FILLED UP BY BIDDERS) :

1.0	**Mineral Wool design (Panel Seal) Fire Stops/Barriers**		
1.1	**General Particulars**	**Type/Unit**	**Qty**
1.1.1	Type of Fire Barrier system provided		
1.1.2	Manufacturer's Name		
1.1.3	Country of Manufacture		
1.1.4	Applicable Standards		
1.1.5	Fire Rating of Fire Stops	Mins	
1.1.6	Duration for which the fire stop will retain its guaranteed properties (Life Expectancy)	Yrs	
1.1.7	Minimum Shell Life of the materials used in fire stops	Months	
1.1.8	Laboratories where tests have been conducted (names and addresses)		
1.1.9	Whether copies of all test certificates attached	Yes/No	
1.2	**Material**		
1.2.1	Density of fire stop materials used Panel Seal	gm/cc	
1.2.2	Thermal Conductivity of fire stop (Cal/cm/sec/deg.c at 25 deg.c)		
1.2.3	Dielectric Strength of fire stop		
1.2.4	Whether fire resistant coating is required on the fire stop	Yes/No	
a	If Yes, thickness of coat for the specified rating	In case of vertical stop	
b	Quantity of fire resistance coating	Liters/Sq. Meter	
c	Application mode of the coating	On Panel	
1.3	**Performance Particulars**		
1.3.1	Whether the fire stops are suitable for water logged area	Yes/No	
1.3.2	Performance Variation, due to ageing		
	Indicate clearly, if any		
1.3.3	Maximum Temperature recorded on the unexposed side of the fire stop during the fire rating test	Deg.C	
1.4	**Design/Installation Particulars**		
1.4.1	Curing/Setting time of the fire stop	Days	
1.4.2	Whether Derating of Cables required		
	If Yes, Percentage of derating required	%	
1.5	**Performance Tests**		
1.5.1	Whether Type Test Certificates for the following tests enclosed		
	a) Fire Rating	Yes/No	
	b) Hose stream test	Yes/No	
	c) Accelerated Ageing test	Yes/No	
	e) Impact test	Yes/No	

2.0	**Mortar Seal Type Fire Proof Sealing System.**		
2.1	**General Particulars**	**Type/Unit**	**Qty**
2.1.1	Type of Fire Barrier system provided		
2.1.2	Manufacturer's Name		
2.1.3	Country of Manufacture		
2.1.4	Applicable Standards		
2.1.5	Fire Rating of Fire Stops	Mins	
2.1.6	Duration for which the fire stop will retain its guaranteed properties (Life Expectancy)	Yrs	
2.1.7	Minimum Shell Life of the materials used in fire stops	Months	
2.1.8	Laboratories where tests have been conducted (names and addresses)		
2.1.9	Whether copies of all test certificates attached	Yes/No	
2.2	**Material**		
2.2.1	Density of fire stop materials used Mortar Seal	gm/cc	
2.2.2	Thermal Conductivity of fire stop (Cal/cm/sec/deg.c at 25 deg.c)		
2.2.3	Dielectric Strength of fire stop		
2.2.4	Whether fire resistant coating is required on the fire stop	Yes/No	
a	If Yes, thickness of coat for the specified rating	In case of vertical stop	
b	Quantity of fire resistance coating	Liters/Sq. Meter	
c	Application mode of the coating	On Panel	
2.2.5	Offered quantity of mortar seal material	KG/Sq. M	
2.3	**Performance Particulars**		
2.3.1	Whether the fire stops are suitable for water logged area	Yes/No	
2.3.2	Performance Variation, due to ageing		
	Indicate clearly, if any		
2.3.3	Maximum Temperature recorded on the unexposed side of the fire stop during the fire rating test	Deg.C	
2.4	**Design/Installation Particulars**		
2.4.1	Curing/Setting time of the fire stop	Days	
2.4.2	Whether Derating of Cables required		
	If Yes, Percentage of derating required	%	
2.5	**Performance Tests**		
2.5.1	Whether Type Test Certificates for the following tests enclosed		
	a) Fire Rating	Yes/No	
	b) Hose stream test	Yes/No	
	c) Accelerated Ageing test	Yes/No	
	f) Impact test	Yes/No	

3.0	**Fire Break Coatings**		
3.1	Manufacturer's Name		
3.2	Country of Manufacture		
3.3	Applicable Standards		
3.4	Fire Rating of the fire break	Mins	
3.5	Duration for which the fire breaks will retain its guaranteed properties (Life Expectancy)	Yrs	
3.6	**Non-intumescent, water based**	Yes/No	
3.7	Shelf Life of the fire resistant coating	Months	
3.8	List of places where the fire resistant coating has been successfully installed	Certificates	
3.9	At each fire break to achieve the specified fire rating		
	a) Length of the coating required (Minimum)	mm	
	b) Thickness of the coating required (Minimum)	mm	
3.10	Density of material	gm/cc	
3.11	Offered quantity of fire break coating	Liters/Sq. Meter	
3.12	Whether Cables gets derated due to the coating	Yes/No	
3.13	Whether test certification test attached	Yes/No	
3.14	Application Mode		
3.15	Whether primer coat is required	Yes/No	
3.16	Limiting oxygen index of the coating		
3.17	Setting/Drying Time of the coating	Hrs	
3.18	Whether the coating is resistant to water. Attached suitable test	Yes/No	
3.19	Bending Radius of the coated cables to still withstand cracking or peeling of the coating		
3.20	Type Test Certificates of the following tests enclosed		
	a) Ampacity Test	Yes/No	
	b) Flame Test	Yes/No	
	c) Flame Propagation on coated Cables	Yes/No	
	d) Ageing and weathering	Yes/No	
	e) LOI Determination	Yes/No	
	f) Di-electric Strength	Yes/No	
	g) Salt Water Exposure	Yes/No	

RECORD OF REVISIONS				
Rev. No.	**Date**	**Revision Details**	**Revised By**	**Approved By**
00	16.02.2021	First Issue	----------	Saroj Kumar