

Sr. No.	Name of the item	Specification
1	Hi-Chrome Grinding Media size i). 50 mm ii). 40mm iii). 30 mm	<p><u>CHEMICAL & METALLUGICAL PROPERTIES OF HI-CHROME GRINDING MEDIA</u></p> <p>Chemical Composition:</p> <p>C : 1.8 to 3.5% Ni: 0 .0 to 2.0% Mn : 0.5 to 1.5% Mo: 0.0 to 2.5% Cr : 11.0 to 18.0% Cu: 0.0 to 2.0% Si : 0.0 to 1.0% S & P: 0.0 to 0.1% Chrome to Carbon ration (CR/C) :-Minimum 4.0 subjected to the chemical composition as specified above</p> <p>1. Hardness: Hardness: Minimum 57RC</p> <p>2. Retained Austenite: Retained Austenite: Maximum 15%.</p> <p>3. Micro Structure: Micro Structure: Wholly tempered martenisitc with trigonal (Fe-Cr)₇ C₃ type finally dispersed, complex carbides.</p> <p>4. Compliance with National / international Standard: This specification, in general, complies with BS: 4844 or 3F with the following additional requirements.</p> <p>I. Dimensions: Dimensions of the balls shall be as specified in the order.</p> <p>II. Tolerances: The tolerances on the normal diameter of the balls shall be as follows: Normal Size (mm): Dia 50 Acceptable Range (dia mm) : 48-54.3</p> <p>III. Ovality- Ovality is defined ((Dia Max. – Dia Min.)/Dia Nominal) X 100. Ovality should be <10% for 30 mm size and < 7% for 40 / 50 mm size.</p> <p>IV. Manufacture: The material shall be melted in induction furnace.</p> <p>V. Heat Treatment: The following recommended heat treatment shall be carried out.</p> <p>a. Hardening: Heat slowly to a temp. of 900-1000 Deg. C, hold for 1-2 hours, followed by air cooling or quenching in oil.</p> <p>b. Tempering: Heat slowly to a temp. of 200-500 Deg. C, hold for a suitable time to the section size and cool</p>

in still air or furnace.

The heat treatment cycle shall be established by means of process qualification to meet the requirement of the hardness and microstructure.

VI. **Finish:** All casting shall be properly fettled, tumbled and dressed. All surfaces shall be thoroughly cleaned.

VII. Freedom From defects:

All the balls must be free from defects like blow holes, sand inclusion, shrinkages, cavities, cold shuts, cracks.

Rejection is advised: If the mean dimension of the defective areas and/or depth of defect is more than specified below.

In case of scattered defects, the total area of all defect put together will be considered.

- a. For 30 mm grinding media, the acceptable mean dimension of defect is <3 mm and the depth is <2 mm
 - b. For 40 mm and 50 mm grinding media, the acceptable mean dimension of defect is <4 mm and the depth is <2 mm.
 - I. If mismatched face is >1 mm for 30, 40 and 50 mm grinding media.
 - II. Extra ingate is >2.5 mm for 30 and 40 mm size grinding balls and >3.5 mm for 50 mm size balls.
- Depression at ingate is found >2mm for 30 and 40 mm size grinding balls & >3mm for 50 mm size grinding balls.

VIII. Mechanical Properties: The hardness value shall be 600 HB (57 HRC as per IS: 1586) minimum as per ASTM E 10 using a tungsten carbide ball and 3000 Kg load.

IX. Micro Examination: The Micro structure of the balls after the heat treatment shall reveal carbides and tempered marten site. The retained austenite content shall not exceed 15% (to be aimed as low as possible).

Note 1: The carbon content shall be aimed at lower range so as to get better toughness & impact Resistance.

GUARANTEE / WARRANTEE CLAUSE FOR GRINDING MEDIA

- (i) The maximum wear rate of Hi-Chrome Grinding Media would be 125gms. Per MT of coal ground for all type of Indian/blended with imported coal. In case wear rate of Grinding Media is more than 125 gms per MT of coal ground, the firm shall supply 1.5 times additional quantity of the same specification as per the order free

		<p>of cost for topping up due to additional wear rate above guaranteed wear rate. The wear rate will be calculated as under:-</p> <p>Wear Rate= $\{(A+B)-C\} \times 10^6 \text{ gm per MT } / D$</p> <p>A= Initial ball charged in MT (i.e. total weight of 30mm, 40mm & 50mm balls) B= Balls charged in MT during running of mills (i.e. make up balls charged) C=Weight of balls removed/segregated in MT. D=Qty. of coal crushed in MT</p> <p>(ii) Breakage Guarantee for Grinding Media:- In case more than 0.5% of the total weight of the ball charged in the mill breaks during first 100 hours of operation, free replacement shall be made towards the broken quantity.</p> <p>(iii) Two Nos. Test mills out of 9 mills from Unit-6,7& 8 shall be identified for calculating wear rate in respect of Grinding Media supplied against a particular PO . Average of wear rates of both the test mills will be considered for arriving actual wear rate achieved on the complete quantity supplied against the Purchase order.</p> <p>(iv) The segregation of grinding media of the test mill will depend on the availability of coal mills; however the segregation shall be done within 18 months or completion of 6500 running hour whichever is earlier from the date of declaring the mill as test mill”.</p>								
2.	HI-CHROME LINERS FOR BALL TUBE MILLS BBD-4772 and BBD - 4760	<p>HI-CHROME LINERS for Ball Tube Mills BBD-4772 and BBD-4760 having following specifications:-</p> <p><u>A) Technical Specifications</u></p> <p>1. Chemical Composition:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">C: 2.4 to 2.8%</td> <td style="width: 50%;">Ni: 0.2 to 0.5 %</td> </tr> <tr> <td>Cr: 22.0 to 28.0%</td> <td>Mo: 0.2 to 0.6 %</td> </tr> <tr> <td>Si: 0.1 to 1.0%</td> <td></td> </tr> <tr> <td>Mn: 1.0 % max.</td> <td></td> </tr> </table>	C: 2.4 to 2.8%	Ni: 0.2 to 0.5 %	Cr: 22.0 to 28.0%	Mo: 0.2 to 0.6 %	Si: 0.1 to 1.0%		Mn: 1.0 % max.	
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Note: $9 < Cr/C \leq 11$

2. **Hardness:** The guarantee hardness on piece (on running wall thickness of liner) in heat treated conditions shall be in the range of 600-680 HB (or HRC equivalent).

3**Retained Austenite:** Maximum 8%

4. **Micro Structure:** Primary Carbides in Martensitic Matrix.

5. **Heat Treatment:** The Liners shall be heat treated by quenching in air/oil to meet the micro structural and hardness requirements. The castings shall be stress relief annealed to minimize the shrinkage stresses. The parameters of heat treatment shall be established based on hardness and for every heat treatment shall be established based on hardness and micro structural requirements.

For every Heat treatment batch the heat treatment charts (time & temp.) shall be recorded and shall be made available with reference to liners treatment (Batch /Lot No.) to ensure tractability.

6. **Repairs:** Surface shallow defects out of criterion within the dimensional tolerance and revealed by visual and liquid penetrate tests shall be performed to ensure that the defects are within the criteria defined for this test in Annexure-1. No repair by welding is allowed.

7 **General Manufacturing Conditions:** The white cast iron shall be preferably made in a induction furnace or other melting practice with required metallurgical quality. These pieces are to be manufactured in conformity with tenderer's drawings, specifications and schedules, as also the present specifications.

The pieces are cast by rigid mould to satisfy the dimensional accuracy (particularly the fixation holes on the heads of mill and fixation of screw feeder of coal) soundness and surface conditions of the lines.

B) GUARANTEE

The supplier shall submit / furnish the following Guarantee on NJSP of Rs.15/-

Guarantee: The manufacturer shall give guarantee for design, material suitability, interchangeability

and fitment of Hi-Chrome mill internals for BBD-4772 ball tube mill installed at 2X250MW , unit-7 & 8 at PTPS, Panipat with following guarantee life:-

The liners shall be guaranteed for minimum 30,000 running hours wear life for all type of Indian/imported/mixed Coal Conditions at designed capacity of the mill. In case of failure/excessive wear/ breakages below 15000 running hours, free replacement for complete set of liner is required. From 15001 to 30000 hours pro rata recovery in respect of cost of complete set shall be deposited by the firm within 15 days of receipt of intimation from PTPS in this regard. In case the same is not deposited by the firm, the amount shall be recovered from the pending payment of the firm or by encashment of performance bank guarantee.

Note:-I) The supplier at his works will also stock at least 20 Nos. Cylindrical liners 2 nos. of each oblique wave liners, 5 nos. each conical liners and 2 nos. each inlet side liners for immediate replacement in eventuality of breakage. The supplier will supply/replace the broken liners within seven days from the date of intimation of such miss happening, otherwise penalty @1/2 % of contract value per day subject to max. 5% of contract value shall be deducted from the suppliers bills/pending dues/encashment of Bank Guarantee etc. The supplier will also bear the cost of transport, assembly and installation costs (at site) of such replacement. Such replacement shall also be guarantee for full period of specificities guarantee life.

II.) Each liner casting shall be legibly marked with following:

i). Grade of casting.

ii). the identification mark by which it is possible to trace out the melt & heat treatment batch.

iii). Manufacturer Name/Trade Name.

iv). Project Name i.e. PTPS

v). PO No & date

III.) Free replacement: - Free replacement of lost or damaged materials during transit shall be made

immediately on receipt of information from the consignee without waiting for settlement of claim with transporter / under writers.

C) TESTS & INSPECTIONS:

Tests & inspection to be carried out are defined in the inspection program given below. These tests and inspections are compulsorily specific to the delivery:-

INSPECTION PROGRAMME

Sr. No.	Type of Test	Test Methods	Test Frequency	Acceptance Norms
1	Chemical Analysis	Heat Analysis	Each Heat	As per technical specifications
2	Hardness Test	One Piece	100%	600-680 BHN
3	Dimensions and Geometry	Metrology and Tracing of Centre Lines Templates	Each Piece	Tolerance and Dimensions as per drawing
4	Surface Examination	Visual Examination	-do-	Examination of 100% of surface & holes Absence of defects greater than the D.P.T. requirement Absence of defects in holes detrimental to Erection
5	Liquid penetrate Test	Dye penetrate by colored Spray	In case of doubt during Visual examination	100% of surfaces, zones with doubt for regular pieces criteria
6	Macro Examination (Internal defects)	Media cutting or breaking	-do-	Ratio between defect thickness and wall thickness < 4% Length of defects lower than 12 times its permissible

				thickness		
		7	Micrographic Examination	Magnification X100 Examination on a specimen area	10% of each type	The structure shall be white with carbides and martensite. The retained austenite. The retained austenite shall not be more than 8%.
		<p>Note: a) Templates designed & manufactured by the supplier.</p> <p>b) Checking of curvature radial, centre to centre and diameters of fixation holes.</p> <p><u>D) Technical Services to be provided by the Manufacturers/Supplier</u></p> <p>The manufacturer will provide the following services free of cost along with supply of Hi-Chrome Liners , Backing material and Hardware's</p> <p>1. The supplier will provide 30 man days supervision during installation of lining system for each set, ball loading and commissioning services including fine tuning of the mills to ensure optimized mill performance from operation and maintenance point of view.</p> <p>2. Half yearly Mill Audit:</p> <p>a) Ensure correct filling degree for minimum wearing of grinding media.</p> <p>b) To check wear profile of the mill internals for residual life estimation for easy and timely Procurement.</p> <p>c) Submission of detailed report.</p>				
3.	Grinding Rolls and Bull Ring Segments for coal mill HP-1103/HP1003 (Straight Bore)	<p>Sinter cast Grinding Rolls and bull ring segments for coal mill HP-1103/HP1003 (Straight Bore).</p> <p>The manufacturer will submit the Guaranteed Wear life as per following details</p> <p><u>Guaranteed Wear life</u></p> <ul style="list-style-type: none"> - The guaranteed wear life for grinding rolls and bull ring segments (and any associated component proposed) shall be minimum 8000 running hrs with allowable average wear depth of 60 mm for Grinding rolls and 45mm for Bull ring segments for all types of coal being used at RGTPP/DCRTPP. 				

		<p>- Free replacement shall be made by the firm in case wear is more than 50mm for grinding rolls and 40mm for bull ring segments before completing 6000 running hrs. Prorata refund shall be made by the firm between 6001 hrs to 8000 hrs(means supply of that item on discounted rates arrived after consideration of penalty).</p>
4.	Vacuum pump for ash handling plant	<p>Vacuum pump with double discharge, Type- Water liquid ring, Rated Vacuum-16"Hg Rated Capacity- From 2980 M³/Hr. to 3200 M³/Hr. (with no negative tolerance) Material of construction:- A) Casing : Cast iron GR. FG.260,IS 210 with 2% NI BHN 200MIN B) Rotor/Impeller: SS-410 ASTM A 217 GR. CA 15 C) Shaft: EN-8 Steel D) Shaft Sleeve: SS-410 ASTM A 217 GR. CA 15 E) Port Plates/Control Cones: SS-410 F) Side cover: Cast iron GR. FG.260 G) Bearing Bracket: Cast iron GR. FG.260 H) Suitable to Motor rating: 75KW,1475 RPM,415V I) Vacuum pump should be suitable to base frame already installed at thermal power plant of HPGCL. H)Testing standard: IS-10431/1994 & PNEUROP 6612/1984</p>
5.	Abrasive resistance submersible slurry pump for ash handling plant	<p>Electrically driven abrasive resistant submersible slurry pump designed specifically for abrasive duties to handle slurries containing solids up to 65 percent by weight, temperature up to 90 deg centigrade and specific gravity up to 2.8 with Built in agitator and Twin volute suction.</p> <p>Material of construction-</p> <ol style="list-style-type: none"> 1. Motor housing cover-SG Iron 2. Shafts,locknuts,seal housing and fasteners – stainless steel 3. Casing ,wear plate, impeller – NI Hard type IV 4. Inducer-Hardenable stainless steel. <p>Performance Parameters-</p> <ol style="list-style-type: none"> 1. Solid content- Up to 65% by weight

		<p>2. Specific gravity Max- 2.8</p> <p>3. Outlet size- 100 mm</p> <p>4. Maximum submergence- 28M in H₂O</p> <p>5. Horizontal Pumping Distance- 750 M Max</p> <p>6. Temperature- Up to 90 deg C</p> <p>7. Max flow- 200 m³/hr</p> <p>8. Head- 38 M Max</p> <p>9. Maximum particle size- 32 mm</p> <p>Motor- Fitted with 30 KW, high efficiency, three phase direct online motor, high starting /break out torque in excess of 375 NM. Rotor and Stator made of copper and brass, H Class winding fully immersed in oil.</p> <p>Automatic Control Panel (DOL Starter)- Automatic control panel with IP65 rating. Manual & auto mode function with automatically operated auto timer mode which avoids float switch.</p> <p>Hose Size 4" size (100 mm)- Heavy duty, flexible, abrasive resistant delivery hose double braided in steel, synthetic textile fabrics layered rubber hose. Suitable for application of water based slurries containing abrasive solids.</p>
6.	Fire Crete special castable refractory used for bottom ash hopper and pressure parts of Boiler	<p>Castable refractory, equivalent to fire Crete special, service temp. 1350Deg C, PCE-1580 Deg C, Dry density Min-2100 kg/Cum, Linear Change % Max- +/- 1.54 at 1400 Deg C per 2 Hrs., CCS min-250 kg/Sq Cm at 110 Deg C, 225 Kg/Sq Cm at 1300 Deg C, Al₂O₃ (min)-45%, Fe₂O₃ (max)- 4%, max grain size-5mm</p> <p>Testing Standard-</p> <p>For Chemical analysis- IS:12107</p> <p>For Physical properties- IS:10570</p> <p>Marking: Following details are to be legibly written on the bags. Suppliers Name, Customer Name/Project, Purchase order No./date, Batch no., material name, Net weight in kgs, shelf life in months.</p> <p>Packing: The material shall be packed and sealed in polythene bags and the thickness of polythene bags shall be atleast 0.2mm. Then the sealed bags shall be put inside the polythene lined HDPE or HDPP woven netting bags and sealed by machine stitching.</p>
7.	High Alumina Binder for castable refractory used	<p>10% by weight of high alumina binder is required to be added in Castable refractory for better repair of BAH of AHP.</p> <p>Chemical composition:-</p>

	in bottom ash hopper and pressure parts of Boiler	LOI- 0.50% SiO ₂ - 5.60% Fe ₂ O ₃ - 4.20% TiO ₂ - 6.60% CaO- 32.80% Al ₂ O ₃ - 49.00% MgO- 1.00% Note:- ACC or equivalent make
8.	Mild Steel ERW pipes used for Ash Handling Plant and balance of plant	<p>A) MS ERW pipe for ash slurry application:-</p> <ol style="list-style-type: none"> 1. MS ERW pipe, 400NB with bevel ends as per IS-3589, thickness- 9.5mm (Pipe length 6 meter), Steel Grade- FE-410. 2. MS ERW pipe, 300NB with bevel ends as per IS-3589, thickness- 9.5mm (Pipe length 6 meter), Steel Grade- FE-410. 3. MS ERW pipe, 250NB with bevel ends as per IS-3589, thickness- 9.5mm (Pipe length 6 meter), Steel Grade- FE-410. 4. MS ERW pipe, 200NB with bevel ends as per IS-3589, thickness- 9.5mm (Pipe length 6 meter), Steel Grade- FE-410 <p>B) MS ERW pipe for water/air application:-</p> <ol style="list-style-type: none"> 1. MS ERW pipe, 200NB with bevel ends as per IS-3589, thickness- 6.35mm (Pipe length 6 meter), Steel Grade- FE-330. 2. MS ERW pipe, 150NB with bevel ends as per IS-1239 (Part-1), Heavy 3. MS ERW pipe, 100NB with bevel ends as per IS-1239 (Part-1), Heavy 4. MS ERW pipe, 80NB with bevel ends as per IS-1239 (Part-1), Heavy 5. MS ERW pipe, 65NB with bevel ends as per IS-1239 (Part-1), Heavy 6. MS ERW pipe, 50NB with bevel ends as per IS-1239 (Part-1), Heavy 7. MS ERW pipe, 32NB with bevel ends as per IS-1239 (Part-1), Heavy 8. MS ERW pipe, 25NB with bevel ends as per IS-1239 (Part-1), Heavy 9. MS ERW pipe, 20NB with bevel ends as per IS-1239 (Part-1), Heavy
9.	Cast iron Gate valve used for	Size (40mm-600mm), Gate Valve, Manual, Flanged Type, OS&Y, Rising Stem, Class#125, BS 5150

	Ash Handling Plant and balance of plant.	
10.	Cast iron Globe valve for Ash Handling Plant and balance of plant.	Size (15mm-300mm), Gate Valve, Manual, Flanged Type, OS&Y, Rising Stem, Class#125, BS 5152
11.	Ceralin pipe lines, Mill Discharge Valve (MDV), Multiport outlet (MPO), Outlet Ventury, Ventury Collar, Inner Cone, Orifice, Various Elbows / Bends, Transition Pieces for coal mills.	<p><u>Technical Specifications:</u></p> <p>To combat the various prone areas in coal milling system, the High Alumina Ceramic Wear Resistance Tiles are to be used having following specifications and operating parameters:</p> <p>A) Specifications</p> <ol style="list-style-type: none"> 1. Alumina (Al₂O₃) content more than 90% 2. Hardness more than 8 on MOH's scale 3. Bulk density more than 3.2 gm/cc 4. Water absorption less than 0.5% 5. Cold Crushing Strength more than 3000 Kg/ Cm² 6. Flexure strength at (room temperature) more than 2200 Kg/ Cm² 7. Co-efficient of thermal expansion (1x10⁻⁶/°C) is 7.0-9.0. 8. Abrasion by Jet Erosion max. 0.05 gm/30 seconds 9. Abrasion by rubbing max. 0.01 gm/30 seconds 10. Color : White <p>B) Operating conditions:</p> <ol style="list-style-type: none"> 1. Flow medium : Pulverised coal mixture 2. Particle size : 70% less than 75 microns 15% 75 to 90 microns 15% 90 to 150 microns 3. Coal concentration : 0.935 to 10545 Kg/Nm³ 4. Ash content : 50% Maximum

		<p>5. Flow velocity : 30 mtr/Sec. Maximum</p> <p>6. Pressure : 0.5 Kg/Cm²</p> <p>7. Temperature : 30⁰ C max.</p>
12.	Valves for Fire-Fighting /Water system	<p>80NB Cast Iron Rising Stem OS&Y Type hand wheel operated Gate Valve with Position Indicator. Valve generally conforms to IS-14846:2000 (PD), PN-1.6. Body- Cast Iron, IS: 210 FG 200, Wedges & Body Seat Ring-Stainless Steel AISI-410, Spindle-SS-410. P.C.D.-155 mm, Hole-4 Nos., Hole Dia-19 mm</p> <p>100NB Cast Iron Rising Stem OS&Y Type hand wheel operated Gate Valve with Position Indicator. Valve generally conforms to IS-14846:2000 (PD), PN-1.6. Body- Cast Iron, IS: 210 FG 200, Wedges & Body Seat Ring-Stainless Steel AISI-410, Spindle-SS-410.P.C.D.-190 mm, Hole-8 Nos., Hole Dia-19 mm</p> <p>150NB Cast Iron Rising Stem OS&Y Type hand wheel operated Gate Valve with Position Indicator. Valve generally conforms to IS-14846:2000 (PD), PN-1.6. Body- Cast Iron, IS: 210 FG 200, Wedges & Body Seat Ring-Stainless Steel AISI-410, Spindle-SS-410.P.C.D.-240 mm, Hole-8 Nos., Hole Dia-23 mm</p> <p>200NB Cast Iron Rising Stem OS&Y Type hand wheel operated Gate Valve with Position Indicator. Valve generally conforms to IS-14846:2000 (PD), PN-1.6. Body- Cast Iron, IS: 210 FG 200, Wedges & Body Seat Ring-Stainless Steel AISI-410, Spindle-SS-410.P.C.D.-272 mm, Hole-8 Nos., Hole Dia-23 mm</p> <p>250NB Cast Iron Rising Stem OS&Y Type hand wheel operated Gate Valve with Position Indicator. Valve generally conforms to IS-14846:2000 (PD), PN-1.6. Body- Cast Iron, IS: 210 FG 200, Wedges & Body Seat Ring-Stainless Steel AISI-410, Spindle-SS-410.P.C.D.-360 mm, Hole-12 Nos., Hole Dia-25 mm</p> <p>300NB Cast Iron Rising Stem OS&Y Type hand wheel operated Gate Valve with Position Indicator. Valve generally conforms to IS-14846:2000 (PD), PN-1.6. Body- Cast Iron, IS: 210 FG 200, Wedges & Body Seat Ring-Stainless Steel AISI-410, Spindle-SS-410.P.C.D.-420 mm, Hole-12 Nos., Hole Dia-25 mm</p> <p>200NB Cast Iron Non-Rising Stem hand wheel operated Gate Valve with Position Indicator. Valve generally conforms to IS-14846:2000 (PD), PN-1.6. Body- Cast Iron, IS: 210 FG 200, Wedges & Body Seat Ring-Stainless Steel AISI-410, Spindle-SS-410.P.C.D.-272 mm, Hole-8 Nos., Hole Dia-23 mm</p> <p>250NB Cast Iron Non-Rising Stem hand wheel operated Gate Valve with Position Indicator. Valve generally conforms to IS-14846:2000 (PD), PN-1.6. Body- Cast Iron, IS: 210 FG 200, Wedges & Body Seat Ring-Stainless Steel AISI-410, Spindle-SS-410.P.C.D.-360 mm, Hole-12 Nos., Hole Dia-25 mm</p> <p>300NB Cast Iron Non-Rising Stem hand wheel operated Gate Valve with Position Indicator. Valve</p>

		generally conforms to IS-14846:2000 (PD), PN-1.6. Body- Cast Iron, IS: 210 FG 200, Wedges & Body Seat Ring-Stainless Steel AISI-410, Spindle-SS-410.P.C.D.-420 mm, Hole-12 Nos., Hole Dia-25 mm 400NB Cast Iron Rising Stem OS&Y Type hand wheel operated Gate Valve. Valve generally conforms to IS-14846:2000 (PD), PN-1.6. Body- Cast Iron, IS: 210 FG 200, Wedges & Body Seat Ring-Stainless Steel AISI-410, Spindle-SS-410.Flange to flange distance = 410 mm
13	Shields for Boiler Tubes	Shields type/Spec Stainless steel SS-304 Size and other details Angle of bend 90°, In-side/Outside, Suitable for tube OD 57mm,thickness3.00mm, length 368 mm, radius 171mm,Clamps of Shields type/Spec Stainless steel SS-304 Size and other details Dia of tube ϕ 42X5 mm, thickness 3.0 mm,width30mm
14	Straight Shields and Clamps	Specification of straight shield suitable for 70mm OD Thickness-3mm, Length-1250mm, MOC-SS304 Specification of clamps suitable for 70mm OD pipe with,Thickness-3mm, MOC-SS304, width 30 mm
15	Multi layered fabric expansion bellow	Hot PA duct- Size: Width-400mm, Length – 22000 mm, Working Temp.–350-400°C, Working Pr.– 1000-1500 mm WCL,without frame, flanges &hardware, with Insulation Bolster (50mm Thick) Hot SA duct:- Size: Width-400mm, Length – 28000 mm, Working Temp.–350-400°C,Working Pr.– 100-150mmWCL, Without frame, flanges &hardware, with Insulation Bolster (50mm thick) ESP inlet duct:- Size: Width-350mm, Length – 16000 mm, Working Temp.–200-250°C,working Pr.– (-)250mmWCL, Without frame, flanges & hardware
16	HT Fixing Fasteners	HT Fixing Fasteners as per size requirement are to be procured for the following brands only:- i) LAKSHAMI ii) BOLT MASTER iii) UNBRAKO iv) PRECESION v) GKW vi) TVS
17.	Jointing Sheets (Metallic & Non-Metallic)	Jointing sheets as per size requirement are to be procured for the following brands only:- i) CHAMPION ii) PACKMAN iii) SPITMAN

		iv) KLINGER
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