



TENUGHAT VIDYUT NIGAM LIMITED
2x210 MW Tenughat Thermal Power Station
Jharkhand
Dry Fly Ash Collection & Disposal System



08.00 DESCRIPTION, DESIGN & CONSTRUCTION DETAILS

08.01 Description of the Plant and Existing Ash Handling System

The TTPS has total 2 nos. of coal fired power plants each of 210 MW unit capacity. The ash in the steam generators is collected in boiler bottom hoppers, economiser hoppers, air preheater hoppers, gas duct hoppers and stack hoppers. For all steam generators of the power plant it is intended that existing system of bottom ash collection and disposal system shall continue to operate as it is. However, a new dry fly ash collection and disposal system shall be installed in parallel to the existing system. At present, fly ash is being collected and evacuated from all the units by pneumatic vacuum (hydro Vectors) conveying system.

In the present system, each fly ash hopper is provided with an ash intake valve just below the hopper flange and is connected to branch pipe line. On opening of this valve, fly ash falls under gravity in to the ash conveying pipe line (branch pipe line). Each branch pipe of the conveying system is provided with an air intake valve through which atmospheric air enters the conveying line. Branch pipelines are connected with a header pipe and are isolated from the header by cylinder operated isolation valve. The ash air mixture formed in the branch pipeline is conveyed under vacuum upto the hydraulic exhaustor (hydro vector) that creates the necessary vacuum for conveying the ash. High pressure water is supplied to the hydrovectors to create the vacuum. The ash-air mixture enters the hydrovector, mixes with water to form slurry and the clean air is released into atmosphere. Fly ash slurry thus formed is discharged into the slurry sump by gravity for onward disposal to the ash pond with the help of slurry pumping system.

08.02 Description of the proposed system

For the proposed dry fly ash collection facility, existing vacuum conveying system shall be isolated from the hydrovectors and shall be connected to pneumatic ash conveying system. A inverted Y type / adapter connection with hoppers with isolation valve shall be connected at the bottom of the existing system / hoppers. The proposed system will be installed in such a way that there shall also be provision for operating any one system (either wet or dry) by isolating the other system by pneumatic cylinder operated isolation valves. Only one system either proposed or existing shall be in operation at a time. However, overhauling of all existing valves including replacement of parts is under bidder's scope.



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Note: The bidder may consider vacuum pump based system for Zone-I from APH & ESP Hoppers to intermediate SILO. The existing vacuum conveying system shall be isolated from the hydro vectors. The proposed system will be installed in such a way that there shall also be provision for operating any one system (either wet or dry) by isolating the other system. Only one system either proposed or existing shall be in operation at a time.

The entire system has been schematically shown on the flow scheme enclosed with the TS. The entire ash handling system (Ash collection and disposal system), proposed to be installed, shall consist of the following sub-systems.

- a) Fly ash removal from various boiler hoppers (Economiser, APH, gas duct), ESP hoppers and stack hoppers and conveying the same upto the intermediate silos and then from intermediate silos to main silo through pneumatic conveying system. There will be total six streams of pipelines for each unit of the same.
- b) Two streams of dry ash pipelines with interconnection shall be provided from intermediate silos to main silos. The scheme shall be such that coarse & fine ash generated from ESPs can be separated, if required. However, design capacity of each stream of fly ash pipeline shall be such that it can cater the requirement of 100% fly ash keeping in view the requirement of Clause No. 7.03 and 7.04 of Chapter-07.00 of this TS.
- c) Dry disposal system of fly ash from main silos.
- d) Conveying air system
- e) Instrument air system.
- f) Fluidising air system for fly ash silos.
- g) Service air system.
- h) Closed cooling circulating water system for the compressors, air dryers, blowers, etc
- i) Ash conditioning system.



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08.02.01 Fly Ash Collection System

During operation of proposed dry fly ash collection system, existing ash intake valve below the fly ash hopper will be opened / closed based on requirement to allow the ash to flow under gravity into transporter vessels. However, fluidising pads if required may be provided to each hopper by the bidder based on their design requirement.

08.02.02 Dry ash collection and transportation upto main silos through dense phase pneumatic conveying system

Fly Ash collected in transporter vessels shall be conveyed to intermediate silos and from Intermediate silos to main silos through dense phase pneumatic conveying system. Transporter vessels shall be complete with manual gate valve, pneumatic operated gate valve, expansion joint, inlet valve, fluidising pads, etc. The compressor shall provide conveying air to these transporter vessels. The transporter vessels will receive the dry ash and feed the same into the pressure conveying line. Dry ash shall be mixed with compressed air (Dry air) and the ash air mixture shall be transported to main silos through the pipelines. The ash will be discharged into the silos and the conveying air shall be released into the atmosphere after passing through the bag / vent filter mounted over silo roof. The guaranteed dust content at vent filter outlet at fly ash silos shall not be more than 50 mg/Nm³. Bidder is to indicate the same in the guaranteed parameters.

08.02.03 Dry Fly Ash Disposal System from Main Silo(s):

Two (2) nos. intermediate silos, one for each unit, shall be provided for both the units and each shall be of RCC construction and capacity of each silo shall not be less than 120 Cu.m. Bottom of each intermediate silo shall be provided with two nos. of independent ash discharge outlets leading to two ash transporter vessels.

Two (2) nos. main silos, one for each unit, shall be provided for both the units and each shall be of RCC construction and capacity of each silo shall not be less than 1500 Cu.m. These Main silos shall be provided as common facilities for both the units. Bottom of



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each main silo shall be provided with four nos. of independent ash discharge outlets. Out of four outlets, two shall be used for efficient loading of ash to open trucks and closed tankers, one outlet shall be used for making slurry in future and one shall be blanked. The system provided shall be such so that unskilled staff can also operate the system.

One no. of ash discharge outlet of each main silo meant for moist ash disposal shall be provided with suitable arrangement for smooth control of ash flow during loading on trucks. The arrangements shall be provided with suitable heavy duty rotary feeder or air slide or other proven design to feed the ash to ash conditioner. All anti friction bearings shall have minimum 20,000 hrs. of life expectancy. The wear plate shall be made of abrasion – resistant material and shall be adjustable and replaceable. Suitable water spraying system shall be provided with control system for spraying and conditioning of ash for dust suppression during loading of ash into open trucks.

One no. of fly ash discharge outlet of main silo meant for dry ash disposal through closed tankers shall be provided with suitable proven heavy duty rotary feeder or air slide and motor operated telescopic chute.

The bidder shall note the multiplicity of number of openings (4 nos.) to be provided under each main silo. Positioning of air slides / fluidizer (with hoods) at silo bottom shall be done in such a manner that any combination of openings can be used during operation without any flow problem.

The silos (intermediate as well as main) shall be provided with all accessories & fittings such as level sensors, fluidization panel, over pressure / under pressure valve, vent filters, safety relief valves, etc. In addition, the silos shall be provided with intermediate platforms, structural roof over intermediate platforms, approach, railings, etc.

The design of silos shall take care of the following:

- a) Adequate measure to avoid formation of bridges / arches over the fluidization bed during non operation of silos.



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- b) Minimum escape of fly ash through vent filter during discharge of ash and conveying air inside silos.

The area below the main silos, at ± 0.00 m level shall be paved. A road of adequate width shall be provided all around the main silos for free movement of trucks / dumpers for transportation of ash from the silos. This road shall be connected by the bidder suitably with the existing road network of the plant.

The height and orientation of discharge outlets at main silo bottom shall be staggered in such a way that the movement of trucks / dumpers below silos is not hampered during ash transportation.

Proper washing arrangement, drain, drain pits, drain pumps, pipes, valves etc as required to be provided to keep the main silo area clean & pollution free.

08.02.04 Conveying Air System and Dryer

Three (3) nos. (2W+1SB) centrifugal type conveying air compressors and three (3) nos. (2W+1SB) refrigerant type air dryer of adequate capacity shall be supplied by the bidder to meet dry air requirement of dense phase pneumatic conveying of fly ash from different hoppers to silos. The compressors and air dryers shall also meet other compressed air requirements of the system such as instrumentation, pneumatic operated valves, vent filters, service air, etc. The compressors and dryers shall be installed in compressed air station building.

Note: In place of Centrifugal compressors, Non-lubricated Screw compressors of reputed make and appropriate capacities shall be installed for better performance and less maintenance requirements.

Three (3) nos. air receivers shall be provided by the bidders as follows:

- One (1) no. air receiver of adequate capacity for each unit to meet the requirement of instrument air, etc. shall be provided by the bidder.



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- One (1) no. air receiver, each of adequate capacity common for both intermediate silos and main silos to meet the requirement instrument air, bag filter cleaning air etc. shall be provided by the bidder.

The system shall be complete in all respect with all necessary equipment, instruments, piping and valves as required for satisfactory and trouble free operation.

The Bidder shall submit the selection criteria with design calculation for type, number & capacity of conveying compressors, air dryers & air receivers. This shall be subject to the Purchaser's / Consultant's approval.

08.02.05 Instrument Air System

Instrument air required for operation of various equipment and control instruments of the ash handling system shall be tapped from the air receivers / common pipe header provided for each unit and for silos. The system shall be complete in all respects with all necessary instruments, piping and valves as required for satisfactory and trouble-free operation of the system.

08.02.06 Fluidising Air System for silos

3X100% (2W+1SB) fluidising blowers and 3X100% (2W+1SB) electric heaters shall be provided for supplying fluidising air in the common header for all the fly ash hoppers & intermediate silos for both the units.

3X100% (2W+1SB) fluidising blowers and 3X100% (2W+1SB) electric heaters shall be provided for supplying fluidising air in the common header of the main silos for both the units

All necessary fluidising pads, piping, valves, instruments along with drive motor as required for satisfactory system operation shall be provided.

The system shall be complete in all respect with all necessary equipment, instrumentation, piping & valves. Bidder shall submit selection criteria with design calculation for capacity of blowers which shall be subject to the Purchaser's / Consultant's approval.



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08.02.07 Service air system

Service air for the new dry fly ash handling system shall be tapped from the common header of the proposed air network of the plant. The bidder as per the requirement shall provide all necessary distribution of service air.

08.03 Design and Construction of Plant & Equipment

08.03.01 Ash Transporter Vessels / Air Vessels

- a) The ash transporter vessels to be installed under ash hoppers shall be adequately sized and designed to effectively collect the ash at specified rate. The design of the equipment shall be such as to ensure a perfect seal against any leakage through vessels.
- b) Transporter vessels can be either top discharge type or bottom discharge type depending upon bidder's own design. In case the vessel is top discharge type, suitable fluidising panel shall be provided on the bottom portion of the vessel for fluidisation of ash before transportation. Considering the severe duty conditions, fly ash inlet valve and discharge valve shall be selected from proven, time tested design. Materials of the valves shall be suitable for the duty requirements. For ash intake valve, sealing material shall be heat and abrasion resistance viton. Metal to metal sealing is not acceptable for differential pressure of 2 kg/Sq.cm(g) and more.
- c) The vessels shall be complete with necessary support from ground, fixing bolts, etc. for their mounting. The support for vessel shall be independent so that no load whatsoever is transferred to the hopper.
- d) Each ash transporter vessel shall also have necessary additional capacity to clear excess ash collection in case of uneven ash distribution in the same row of hoppers, caused due to non-uniform flow of flue gas through the flue ducts. In such case, however, total ash collection rate shall remain unaltered.



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- f) All the transporter vessels shall be supported from the ground with metallic expansion joint between silo outlet and vessel. The connecting pipe from silo outlet to air vessel inlet shall be adequately sized and shall be as short as possible to avoid ash choking in this region. A number of poke holes shall be provided in the pipe. The connecting pipes upto inlet of ash transporter vessel shall be kept vertical.
- g) Above each ash transporter vessel, one manual slide plate type chain operated valve shall be provided to isolate the vessel. The design of the isolation valve shall be such as to maintain the required seal in the enclosed condition against ingress of atmospheric / conveying air. Below isolation valve, pneumatic operated ash inlet valve shall be provided to allow ash to store inside the transporter vessel.
- h) Protection against thermal expansion

Due to changes in temperature all the hopper outlets shall change their position both horizontally and vertically. To protect the vessels and plate valve assemblies from damage due to such movement an expansion joint above the air vessel shall be provided.

All the dry fly ash conveying pipelines and compressed air pipelines shall also be designed taking the possible deflection into account.

i) Material of Construction

1. Plate valve body : C.I. IS-210, Gr. 200
2. Slide plate of plate valve : Mild Steel, 10 mm thick with wear resistant liner
3. Expansion joint : metallic/Neoprene
Field insert : Felt type or cloth type (suitable for 160⁰)
4. Connecting pipe : Mild steel IS:3589
9.52 mm thick
(minimum)



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5. Springs : EN 45 (B.S.)
6. Bolts & Nuts : SA 194, SA193
7. Chain : Cast steel
8. Wheel : CI, IS:210 Gr FG 200
9. Ash Transporter vessel body, Flange – MS IS:2062 gr. A.

j) The equipment shall be subjected to inspection and dimensional check against approved drawing.

08.03.02 Compressed Air Station

Compressor is the heart of pneumatic transportation and must be designed with adequate margin. Capacity of the compressors shall be selected considering simultaneous discharge of ash through maximum number of pipes at a time, though every time the system may not encounter this situation. Average power consumption shall be calculated considering duration of operation in different modes.

Quantity of compressed air, requirement of discharge pressure and air quality primarily depend upon,

- The total amount of dry fly ash to be handled
- Distance to which the ash is required to be transported from the source, and Material-air ratio.

As such selection of compressor is entirely dependent on the system requirement and to be done very carefully, to offer a reliable and efficient system.

In order to meet the requirement, a centralised compressed air station shall be installed at a suitable location considering the space availability, performance requirement and operational ease. Considering the requirement of compressed air and operational ease, centrifugal compressors shall be provided. The compressed air station shall consist of three (3) no. of centrifugal air compressors (2W+1SB) each driven by induction motor with PLC



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based control system. The bidder, based on his system design, shall select capacity and pressure of each compressor. The same compressors shall also be used to supply dry air for various uses. The compressors shall be common for all the two (2) units.

08.03.03 Centrifugal Compressor & Auxiliaries

The centrifugal compressors shall be integrally geared, multistage, multi shaft, water cooled, horizontal split casing, inlet guide vane controlled, motor driven having design flow and pressure to suit the system requirement at the worst conditions (40 deg.C & 60% RH). Compressors shall be provided with reverse rotation protection system. However, motor shall be selected as per API 672 latest edition. The compressors shall have high efficiency over the required range of operation and suitable for continuous operation under the specified conditions and shall meet the air requirement at all duty points without blow-off. Testing of compressors shall be as per ASME PTC 10. The noise level shall be restricted to 85 dB(A). Critical speeds of the compressors shall be sufficiently kept away from the normal working range.

Non-lubricated screw compressors of reputed make and appropriate capacities shall be installed in place of Centrifugal compressors for better performance and less maintenance requirements.

Each compressor unit shall be complete with air intake system, anti-surge control device, inter cooler & after cooler, lub oil system, base frame, pipes, fittings and valves.

Material of construction shall be of the manufacturer's standard for the specified operating conditions, except as required or prohibited under this specification.

Air intake duct shall be designed for the air handling capacity of each compressor. The air intake duct shall be complete with necessary supports, protecting canopy and wire mesh. Heavy duty automatic self cleaning air filter shall be provided. In case of oil filters necessary sludge removal arrangement shall be provided. Minimum dust removal capacity shall be,

- (i) 90% for particle size 1 micron & above,



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- (ii) 93% for particle size 5 microns & above and,
- (iii) 97% for particle size 10 microns & above.

Silencer of appropriate type shall be provided to maintain noise level within 85 dB(A).

Anti-surge control device shall automatically open a blow-off valve when the load fluctuation may tend to cause the compressor to enter the surge zone. Blow-off valve shall be actuated automatically.

Inter cooler shall be provided in between each stage. After cooler and moisture separator shall be provided after the final stage. The coolers shall be of shell and tube type and shall be provided with relief valve, moisture trap. Tubes shall be of brass or copper. Water flow shall be inside the tubes and air outside the tubes. The air temperature at the outlet of the after cooler shall not exceed 45 deg.C with the design cooling water temperature. Temperature rise of cooling water shall not exceed 10 deg.C. The coolers shall have suitable tube cleaning provisions. The arrangement of the tubes shall be suitable for easy maintenance.

Pipes shall be sized for minimum pressure drops and considering velocity limitations of 8-16 m/s for compressed air service. All pipelines shall have butt welded connections with minimum flange joints for connection to vessels and equipment. All pipelines shall be suitably supported and routed such that there shall be minimum hindrances for the operating personnel.

All gate, globe and needle valve shall be provided with hand wheel position indicator with clear marking of "OPEN" and "SHUT" positions and arrows to indicate direction of rotation. All valves shall be fitted with outside screwed spindles and bolted type glands and covers. Spindle glands shall be of bridge type construction. Screwed glands are not acceptable. Seating of valves shall be carefully selected suitable for use in highly abrasive environment.

Air receivers shall be vertical, self supporting, cylindrical vessels, welded construction type. Inspection opening shall be provided suitably. Relief valve shall be provided with each air receiver. Drain trap shall be provided with necessary valves and fittings. Air receivers shall be designed as per IS 2825 and IS 7938.



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08.03.04 Material Specification

Casing	:	Cast and horizontally split, cast steel ASTM A216 Gr. WCB normalized or equivalent.
Diaphragms & Guide vanes	:	Cast steel ASTM A216 Gr. WCB or cast stainless steel ASTM A743 or A351 Gr.CF8 / CF8M
Shafts	:	Forged steel ASTM A470.
Impellers	:	Cast stainless steel ASTM A 743 or A351 Gr. CA15, CA6NM
Shaft Sleeves	:	SS AISI 410
Bolts	:	ASTM A193 Gr.B7
Nuts	:	ASTM A194 Gr. 2H or ASTM A307 Gr.B case hardened

08.03.05 Refrigerant Type Air Drying Units

Performance of pneumatic transportation of ash greatly depends on the quality of air being used for transportation of the same. The refrigerant type air drying units shall be supplied for providing dry air for supply of instrument quality air requirement for the new ash collection system. The capacity of the dryers shall match the total air requirement of the system being supplied from three compressors considering all the derating factors. Selection of dryers shall be such that performance of the same shall not be affected at different loads of the system. These dryers shall be installed inside the compressor building. Under normal operating conditions, all the dryers shall operate simultaneously. The system shall be designed such that under no circumstances the dry air supply shall be stopped. Selection of refrigerant shall be environmentally acceptable.

The dryers shall be supplied along with all necessary auxiliaries. The operation and controls of the dryers shall be fully automatic.



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Each dryer shall be complete with the following as the minimum requirement :

- i) Air inlet connection
- ii) Air outlet connection
- iii) Air inlet filter
- iv) Condensate separator
- v) Digital pressure dew point indicator
- vi) Air drying unit insulating block housing air to air heat exchanger, air to refrigerant heat exchanger / evaporator, cyclone condensate separator, liquid separator, refrigerant distributor, refrigerant injection restrictor
- vii) Refrigeration compressor
- viii) Condensate trap with automatic discharge
- ix) Manual condensate drain valve
- x) Water cooled condenser
- xi) Liquid refrigerant dryer
- xii) Liquid shut-off valve
- xiii) Liquid refrigerant receiver
- xiv) Sight glass with moisture indicator
- xv) Refrigerant expansion valve
- xvi) Refrigerant circuit access connection
- xvii) Capillary bypass
- xviii) Temperature and pressure indicators / switches

The dryers shall have in built control panel with auto / manual operation. Indication of outlet air temperature and pressure shall be provided at prominent place. Lifting eye bolt shall be provided for installation & maintenance purpose. First fill of all consumables shall be supplied along with the dryer units. Design considerations of the air drying units are indicated below :

- | | | | |
|------|------------------------|---|---|
| i) | Outlet pressure | : | Suitable to match the requirement at all operating conditions |
| ii) | Inlet CW temperature | : | 32 - 34deg.C |
| iii) | Ambient temperature | : | 45 deg.C |
| iv) | Pressure Dew Point | : | (+) 3 deg.C (max.) |
| v) | Pressure drop of dryer | : | 0.2 kg/cm ² |
| vi) | Noise level | : | 65 dB(A) |

All controls and safety provisions shall be provided for smooth and



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trouble free operation of the unit.

08.03.06 Air receivers

The air receivers shall be designed in accordance with IS:7938 (latest) or ASME Section-VIII or IS 2825. Corrosion allowance of 3 mm shall be considered for the design. The air receivers shall preferably be of vertical cylindrical design with welded dished ends. The air receivers shall have safety relief valves, auto drain with by pass arrangement, vent connections, inlet/outlet connections as per the requirement. Pressure gauges shall be provided at each air inlet line and on air receivers. The air receivers shall have structural platforms & access for maintenance of safety relief valves and instruments.

08.04.05 Fludising Air Blowers

Fludising blowers shall be of positive displacement type.

The rated capacity and head of each blower shall be selected by the Bidder and the same shall be indicated in the offer along with the back up calculation.

The blowers shall be suitable for continuous outdoor operation in the highly dusty power plant atmosphere.

Material of Construction

- | | | | |
|------|-------|---|--|
| i. | Body | : | Fine, Grained – Grey C.I. |
| ii. | Lobes | : | Fine Grained C.I. |
| iii. | Shaft | : | Alloy steel, forged and heat treated |
| iv. | Gears | : | Alloy steel, forged and heat treated with induction hardening. |

The lobes shall be dynamically balanced. The blower shall be complete with suction filter, silencer, air pressure relief valves, mounting plates, foundation bolts, and all other accessories as required.



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Performance test shall be conducted on the blowers as per BS : 1571 Part – I. Preferably direct drive shall be employed between motor and blower. Rating of the drive motor shall be selected to ensure at least 15% margin over the power consumption at rated duty points. Electric air heater shall be provided with necessary bypass and valve arrangement to increase the temperature of the fluidized air for effective fluidizing, the rating of the heater shall be so selected that dry (moisture-free) fluidized air at temperature of approx. of 150⁰C becomes available at silo hopper. The fluidized air piping shall be thoroughly insulated.

The electric air-heater shall be provided with necessary indicating lamps, temperature controllers, temperature switches, etc. for remote interlocked operation.

Fluidising air blowers for intermediate silos shall be installed at + 0.00 m level near the intermediate silos. However, the fluidizing air blowers for main silos shall be installed on the intermediate platforms. The design of intermediate platform shall take account of the extra loading.

08.03.07 Pneumatic Conveying pipes, fittings, expansion joints & couplings

- a. The design, manufacture, testing and performance of the ash conveying pipes, fittings, expansion joints shall comply with the requirements of this specification and applicable codes.
- b. For longer life of pipes, valves and consequently the system, number of operating cycles of a single transport line shall be restricted to 8 – 10 cycles per hour.
- c. Fly ash being highly abrasive, fly ash pick up velocity near the feed pipe shall be restricted to 5 m/s and fly ash velocity at any point including the discharge point shall not exceed 10 –12 m/s for longer plant life. To restrict the velocity within limits diameter of the pipeline shall be increased, if required.
- d. Material to air ratio during conveying shall be minimum 45 : 1



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for short distance (say upto 250 m) transportation and minimum 22 : 1 to 25 : 1 for long distance (about 900 – 1000 m) transportation

- e. For longer plant life, fly ash conveying pipelines shall be provided with bends preferably having a minimum radius of 5D. All transition pieces and bends shall be lined with basalt or of Ni – hard material of BHN not less than 350 conforming to IS:4771.
- f. Conveying pipelines in the straight run shall be of welded type and flanges shall be provided at an interval of 30 m in the straight run. For long straight run suitable number of expansion joints with basalt lining or with Ni-hard pipe of minimum 350 BHN shall be incorporated in the system. Proper care shall be taken for fixed supports. Sleeve type couplings, which are prone to leakage, shall not be used.
- g. All the pipelines up to 150 mm dia. shall be of ERW Carbon steel heavy grade schedule as per IS 1239 Part 1 & Part 2. For 150mm dia. and above pipes, minimum thickness shall be 9.52 mm. Conforming to IS : 3589.
- h. Bellow type stainless steel expansion joints of proven design shall be provided with replaceable type liners of adequate hardness. The expansion joints shall be designed and constructed as per EJMA standard and shall have a minimum cyclic life of 5000 cycles. Hardness of the replaceable liner shall not be less than 350 BHN. During detailed engineering stage, contractor shall submit complete pipe stress / flexibility analysis justifying the selection of number and location of the expansion joints.

08.03.08 Air-line Piping (other than pneumatic conveying), Fitting and Accessories.

As far as possible all piping shall be laid above ground on pedestals and / or pipe bridges to be provided by the Contractor. At rail and road crossings a minimum clear height of 6.5 m and 6.0 m respectively from top of the rail / road, shall be provided. Pipe shall not be buried or laid below ground without the specific approval from the Purchaser. Buried pipes, if any, shall be provided with



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suitable wrapping and coating for protection against corrosion as per applicable code of IS.

08.03.08.01 Air piping & Accessories

- a. The air piping shall be galvanised and shall be as per IS : 1239 Heavy Grade. The pipes shall have screwed ends as per BSPT (British Standard Pipe Threads).
- b. 10-12 m/sec velocities shall be considered for design of pipes.

08.03.08.02 Gate, Globe and Check Valves

- a. For valves of sizes 50 mm NB and below the ends shall be suitable for socket welding. For valves of sizes more than 50 mm NB, the ends shall be flanged as per ANSI B 16.1 with flat face for cast iron valves and ANSI B 16.5 for cast steel valves or any other approved equivalent standards.
- b. Constructional Feature
 - i. The valves of sizes of 50 mm NB shall be inside screw-rising stem screwed bonnet type having renewable type seats.
 - ii. The valves of sizes above 50 mm NB shall be outside screw and yoke-rising stem-bolted bonnet type having renewable body and disc seats.
 - iii. The discs of gate valve shall be solid wedge type./ The disc for globe valve shall be renewable plug type suitable for controlling. The check valves shall be swing check type.
 - iv. The gate and globe valves shall be manual hand wheel operated unless otherwise specified. The direction of rotation for "OPEN" & "CLOSE" position and direction of flow shall be marked on the hand wheel and body respectively working under full operating pressure.



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c. Type of Valves

i. Water Line:

Forged steel / cast steel Gate, Globe, Swing check non return valve.

ii. Air line:

Forged steel / Cast steel ball valve, non return valve.

iii. Material of construction and other details of valve and pipes

Valve	Size DN mm	Rating	Des. Std.	Testing Std.	Material
Gate	15 - 40	800/1500	API-600 / BS-1414	API-598 / BS6755 Pt1, Leakage Rate A	Forged Steel, A105, Trim SS (13%Cr)
Globe/Check	15 - 40	800/1500	API-602 / BS-5352	API-598 / BS6755 Pt1, Leakage Rate A	Forged Steel, A105, Trim SS (13%Cr)
Gate	50 - 600	150/300/600	API-600 / BS-1414	API-598 / BS6755 Pt1, Leakage Rate A	Cast Steel, A216 Gr WCB
Gate	650 - 1050	150/300	API-600 / BS-1414	API-598 / BS6755 Pt1, Leakage Rate A	Cast Steel, A216 Gr WCB
Globe	50 - 200	150/300/600	BS-1873 / API-602	API-598 / BS6755 Pt1, Leakage Rate A	Cast Steel, A216 Gr WCB
Check	50 - 600	150/300/600	BS-1868	API-598 / BS6755 Pt1, Leakage Rate A	Cast Steel, A216 Gr WCB
Ball	15 - 400	150/900/1500	API-608 / BS-5351	API-598 / BS6755 Pt1, Leakage Rate A	Forged Steel, A105, Trim SS (13%Cr) / Cast Steel, A216 Gr WCB

PIPING MATERIAL SPECIFICATION

SERVICE: Ash+Air, Air, Water

Item	Size Range	Description	Dimension Standard	Material
Pipe	DN 15 to 40	ERW, PE; Heavy	IS : 1239 part-1	IS:1239 - Black
	DN 50 to 150	ERW, BE; Heavy	IS : 1239 part-1	IS:1239 - Black
	DN 200 to 250	ERW, BE; 6.3 mm Thk	IS : 3589	IS: 3589 Gr.410
	DN 300 to 350	ERW, BE; 8.0 mm Thk	IS : 3589	IS: 3589 Gr.410
	DN 400	ERW/SWP, BE; 8.8 mm Thk	IS : 3589	IS: 3589 Gr.410
	DN 450	ERW/SWP, BE; 10 mm Thk	IS : 3589	IS: 3589 Gr.410
	DN 500	ERW/SWP, BE; 11 mm Thk	IS : 3589	IS: 3589 Gr.410
	DN 600	ERW/SWP, BE; 12 mm Thk	IS : 3589	IS: 3589 Gr.410
Fittings	DN 15 to 40	SW /Screwed Fittings (Elbow R=1.5D), Heavy	IS : 1239 (P-2)	IS : 1239 (P-2), Black
	DN 50 to 150	SW /Screwed Fittings (Elbow R=1.5D), Heavy	IS : 1239 (P-2)	IS : 1239 (P-2), Black
	DN 200 & above	Fabricated Miters bends (3 cut) & fittings from pipe		IS: 2062 Gr Fe410



TENUGHAT VIDYUT NIGAM LIMITED
2x210 MW Tenughat Thermal Power Station
Jharkhand
Dry Fly Ash Collection & Disposal System



Flanges			IS:6392	IS: 2062 Gr Fe410
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08.03.08.03 All the pipes and valves shall be hydro-statically tested at site after completion of erection at a pressure 1.5 times the maximum working pressure or two (2) times of normal working pressure, whichever is higher. Seat test for the valves is to be as per the relevant code.

08.03.08.04 Manually operated ash isolation valves:

1. Manually operated isolation valves shall be provided at the outlet of each transporter vessel. Necessary arrangements shall be provided to ensure ease of operation of these valves. The manual operation arrangement shall be suitable for highly infrequent operation in dusty atmosphere.
2. The valve design shall be such that the open condition of the valve should be visible to the operator from outside, i.e. the valve enclosing cover the valve plate in the closed condition and in open condition the valve plate be out of the enclosed valve body and shall be visible from outside. The valves shall also be provided with maintenance/inspection covers.
3. It may be noted that accumulation of solid material in seat area could affect the tight closure of the valve. Bidders shall therefore bring out in their proposal special features incorporated in the valve design to prevent such accumulation in the seat area.
4. Material of construction:
 - a. Body : C.I. FG – 260 hardened to 180 – 200 BHN
 - b. Gate : 10 mm thick MS with 10 – 15 micron of hard chrome plating on both sides of the plate.
The chrome plating hardness shall be equivalent to 300 – 350 BHN
 - c. Seat : Replaceable stainless steel hardened and smooth finished.