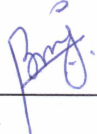
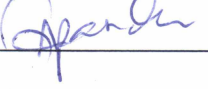


Bharat Heavy Electricals Limited
High pressure boiler plant, Tiruchirappalli - 620 014.



Technical Specification of
Smoke Density Analyser

CI:1430:SPM

Rev.no.	Date	Description of events	Prepared	Reviewed	Approved
00	04-04-2019	Initial release	A Anand 	Balaji K 	Aswini Kumar Panda 

1) Technical requirements for SPM analyser:

- Type of instrument : In-situ dry type visible light (Through LED)
- Principle of measurement : Transmission and absorption. Optical transmission method using single beam- dual path or dual beam- single path
- Application : To monitor continuously the dust concentration in boiler chimney flue gas at 150° C in opacity and in dust concentration.
- Analyser system shall be complete with—electronics for source, reflector, digital indicator, power supply unit, purging / cooling air system for source and reflector unit, instrument air connection with required air connection. with separate source and reflector unit.
- Analyser system (with all its sub-systems) as being offered / supplied should have been installed and operating satisfactorily in a captive power plant application for at least 4000 hrs or a period of 2 years.
- Output signals Analog : 4-20 mA DC isolated
- Output signal Binary : 2NO+2NC (Potential free)
- Zero and span adjustment : To be provided with range selection facility
- Indication in local control unit : Digital Alphanumeric Display. Display of reading in engineering units shall be provided. Keypad shall be provided for field adjustment.
- Enclosure : Weather and dust proof (IP 65) Die cast Aluminum / SS. Rain Canopy shall be provided for all enclosures
- Type of Electronics : Microprocessor based with self-diagnostic.
- Digital Signal Transmission :
HART /RS 485 Port Modbus Protocol/ Ethernet TCP/IP protocol for communication of stack emission data to CEMS PC to be provided. CEMS PC is not in vendor scope.
- Error Diagnostic : To be Provided.
- Non-linearity detection facility shall also be provided in the analyser.
- Compliance to standards : TUV or U.K. MCERTS certification or equivalent.
- Measurement range : 0-200 mg/Nm3 selectable at any value in between.
- Accuracy : $\pm 2\%$ of Full Scale.
- Response time : 90% within 5 Sec. Or less
- Calibration Error : Less than 2%
- Fail safe shutter : Automatic fail safe shutter against power and air failure.
- Drift :
 - a) Zero Drift (24 hours) shall be $< 1\%$ of span/week
 - b) Calibration Drift (24 hours) shall be less than 1%
- Operating temperature range : 0-300°C.
- Filter : To be provided
- Accessories :
 - a) Purging system to be provided with heavy duty blowers along with all required accessories & Automatic isolation of lens during purge air failure to be provided.
Individual blowers to be provided for each i.e. transmitter and reflector.
 - b) Remote indicating and mounting unit for flush panel mount
 - c) Auto cleaning of reflector/transceiver units.
 - d) Projector transformer
 - e) Trans-receiver & reflector assemblies with weather proof housing.

- f) All cable termination shall be through nickel plated brass double compression cable glands and the same is in vendor's scope.
 - g) Mounting pads/gaskets suitable for mounting Trans receiver and reflector units on duct flanges etc.
- Online compensation of temperature measurement shall be provided with necessary temperature sensor.
- Calibration: The system shall have automatic in-situ calibration (for zero and span) facility with periodicity selectable between 2-, 4-, 8- or 24- hours from the converter module. The auto calibration system shall check the zero and span readings at selected intervals. There shall be facility for zero correction and span correction. Vendor shall specify auto calibration interval and cleaning/maintenance intervals for guaranteed performance. Manual override facility shall also be provided for calibration.
- Mounting: Counter flange (ANSI B16.5) including mounting accessories for measuring head and reflector to be matched with BHEL's tapping point flanges (Refer drg no 4-97-288-94293 Rev 00) and to be supplied by the vendor. If the flange size is different, both flange and counter flange and required number of fixing fasteners for measuring head and reflector to be provided by the vendor.
- Diagnosis facility shall be available and Alarm for failure of air supply or sensing signal etc., to be initiated and given with necessary alarm contacts.
- The converter unit shall convert the transceiver signal to dust concentration (SPM) in mg/Nm³. It shall also incorporate the correction of opacity measurement according to the ratio of stack exit diameter to the depth of the effluent at the measurement site. The converter unit shall have an integrally mounted indicator to display opacity.
- Facilities provided by the purchaser at site:
 - a. BHEL will terminate power supply (240V, 1 ph, 50 Hz AC supply) at one point near analyser. All further distribution to analyser, purging unit, etc. are in vendor scope. Any other power supply required for the system shall be derived by vendor from this power supply.
 - b. 4-20mA signal output to DCS cables alone in BHEL scope. Any convertors required shall be in vendor scope.
- All interconnecting cables required in between equipment of the analyser and upto field JB are in vendor's scope. Length and specification of the same are to be indicated in the offer itself. Minimum distance upto field JB shall be considered as 20m. Any special cable required for the system is also in vendor scope.
- RS-485 output cable between analyser and CEMS PC is in vendor scope. Distance for the same shall be taken as 170m.
- Any special hardware and software required for report generation and calibration purposes at operator station shall be supplied. Operator station is not in vendor's scope.
- Erection and Commissioning for offered system: Supervision of Erection, Total Commissioning and Handing over of the offered system to Owner / End user shall be in vendor scope. Lump sum price for commissioning of the analyser system to be quoted in the offer. Vendor to bring required commissioning spares including calibration filters & accessories at the time of commissioning. Commissioning and after sale service support should be available in India.
- Training: Vendor shall provide training to owner personnel in the field of operation, engineering and maintenance for the analyser system at site to 7 persons for 3 days.
- The entire system including analysers, probes and all critical components etc. offered shall be sourced from/ assembled at Original Analyser Manufacturer (OAM) works. Further all other

analyser accessories and miscellaneous items shall be supplied from customer approved sources only.

- Flue gas data:
 1. Particulate Emission : 10 mg/Nm³
 2. Particulate Emission range : 0-100 mg/Nm³
 3. Flow at chimney inlet : 507.4 Tonnes/Hr
 4. Operating temperature : 156 Deg Celcius
 5. Maximum temperature :180 Deg Celcius
 6. Operating Pressure : 0 mmwc
 7. Maximum Flue gas velocity : 16 m/s
 8. Chimney Dimension (Please refer chimney GA drawings attached for details)
 - a) Inner diameter : 3.5 m
 - b) Wall Thickness : 8mm
 - c) Height : 120 m
- Ambient conditions
 1. Temperature : 0-50 Deg. Celcius
 2. Relative Humidity : 0-100%
 3. Dust level : High
- Inspection and testing requirements: Vendor shall submit Vendor quality plan (VQP) for approval. The same shall be reviewed and approved by purchaser.
- Packing: Analyser components shall be properly packed using thermocoal box. Such box shall be placed in carton/metal/wooden case with adequate cushioning to withstand transit risks. At the time of shipment equipment shall be clean inside and outside. The vendor shall pack all equipment and materials furnished by him in such a manner as to ensure protection against damage and deterioration during shipment and storage which includes local transportation and site storage. Modules, or electronic equipment shall be wrapped and sealed in plastic to protect from water entry and dust. The plastic wrapping shall include, as required, the use of a desiccant to protect the equipment from excessive moisture. The items shall be treated and packed for long storage under the climatic conditions prevailing at site. Each item part shall clearly be marked or labelled on the outside of the packing in single case. Adequate instructions for handling shall be provided in the package.
- Guarantee: The equipment contractor shall guarantee that the materials, workmanship and performance of the apparatus supplied under this specification are perfect in every respect and that shall make good of any defects which may develop within 18 months from the date of supply or 12 months from the date of commissioning whichever is later.
- MANDATORY SPARES OF DUST ANALYSER: - Vendor shall furnish list and optional price for recommended spares for five (05) years continuous operation. Minimum required items/quantities are mentioned below. Vendor shall include all the other applicable items, if any, in the recommended spare list.

SL NO.	DESCRIPTION	QTY
1	Electronic modules for each type of analyser	10% of installed Qty. or Min. one number of each type.
2	Cooling & purging air blower unit.	One No. for each analyser.
3	Light Source & Detector Unit	One Set
4	Power supply Module	One no. of each type for each analyser.
5	Signal Processing Unit	One no. for each type of analyser.
6	Set of filters	One no. of each type for each analyser.
7	Accessories like transmitter lens, receiver lens, protection windows, integral pressure & temperature sensors, signal processing unit etc.	One no. of each type for each analyser

Note : - If exact items as indicated in the mandatory spares list are not available for the offered analyser then functionally equivalent items to be offered against each line item. The unit rates will be used for addition/ deletion during execution.

- Following documents shall be furnished by the vendor.

a) Along with offer:

1. Technical brochure.
2. BOM with unit price
3. Overall arrangement drawing of the total system
4. Interconnection cabling and power supply requirement details (wiring diagram)
5. Electrical power consumption
6. Detailed break-up of all utility consumptions.
7. Purge blower details
8. Total weight of the system with break-up
9. Any special control and interlock requirement with schematics
10. O & M spares with unit prices

b) After ordering:

1. Overall arrangement drawing of the total system
2. Analyser detailed installation GA drawings.
3. Detailed Interconnection and wiring drawing.
4. BOM
5. Total weight of the system with break-up
6. Test certificates & Calibration certificates.
7. All applicable certifications of the analyser.
8. Complete O & M manuals

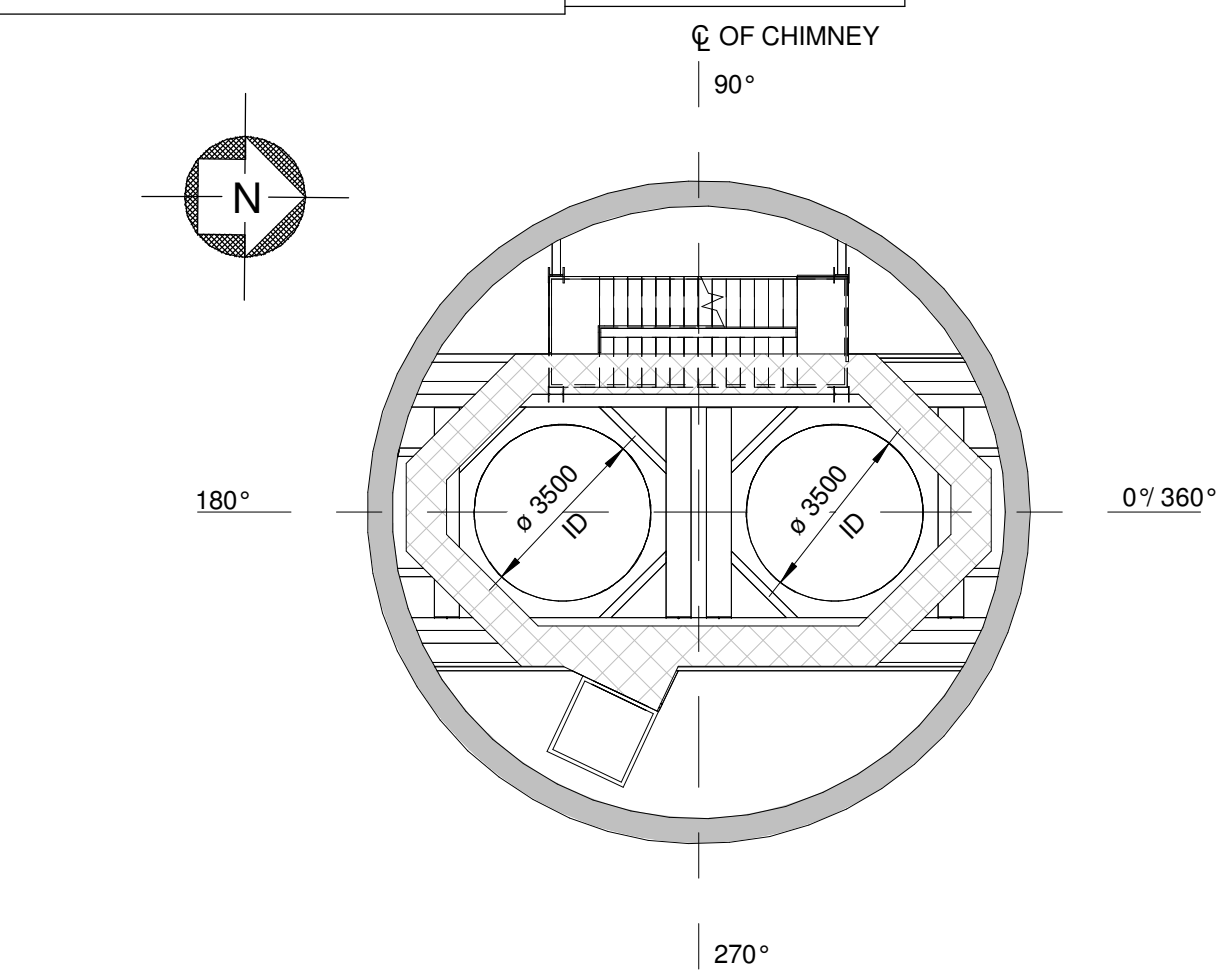
• PRICING SHEET- DUST ANALYZER:

SL. NO.	DESCRIPTION	QTY/ UNIT	TOTAL QTY	UNIT	UNIT PRICE (RS.)	TOTAL PRICE (RS.)
1	Dust Analyzer	01	02	SETS		
2	Accessories for the system like tubing, cables, mounting flanges (mating & counter flanges with fasteners), & stubs	01	02	SETS		
3	Erection Supervision and commissioning	01	02	SETS		

UNIT PRICES OF CABLES:

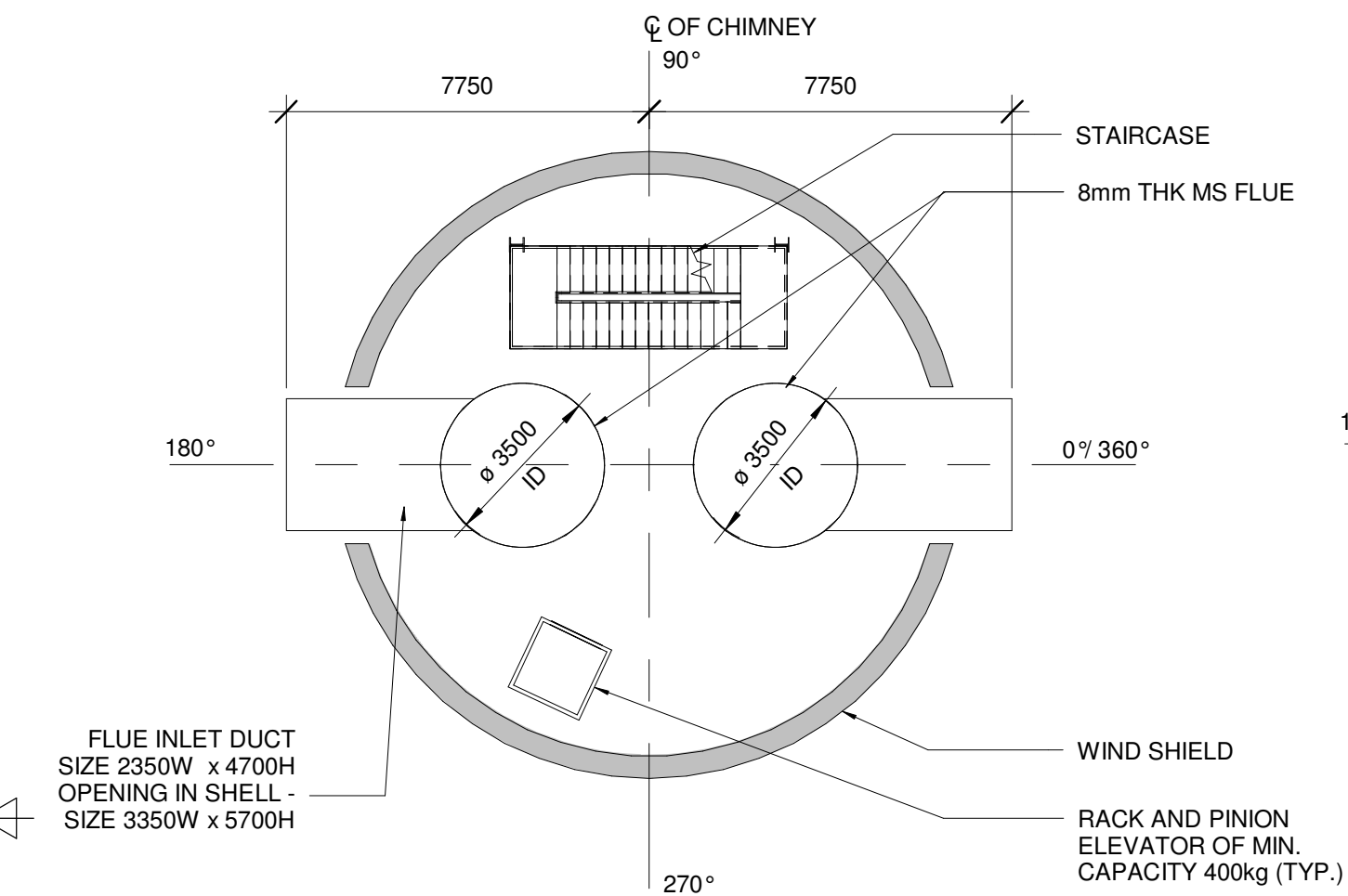
SL NO.	Description	Unit	Unit Price
1	Unit Rates for addition / deletion of Interconnecting Cables of each type for Dust Analyzer	Meter	

Note 3: - Unit rates of all major items to be quoted. These unit rates will be used for addition/deletion during execution



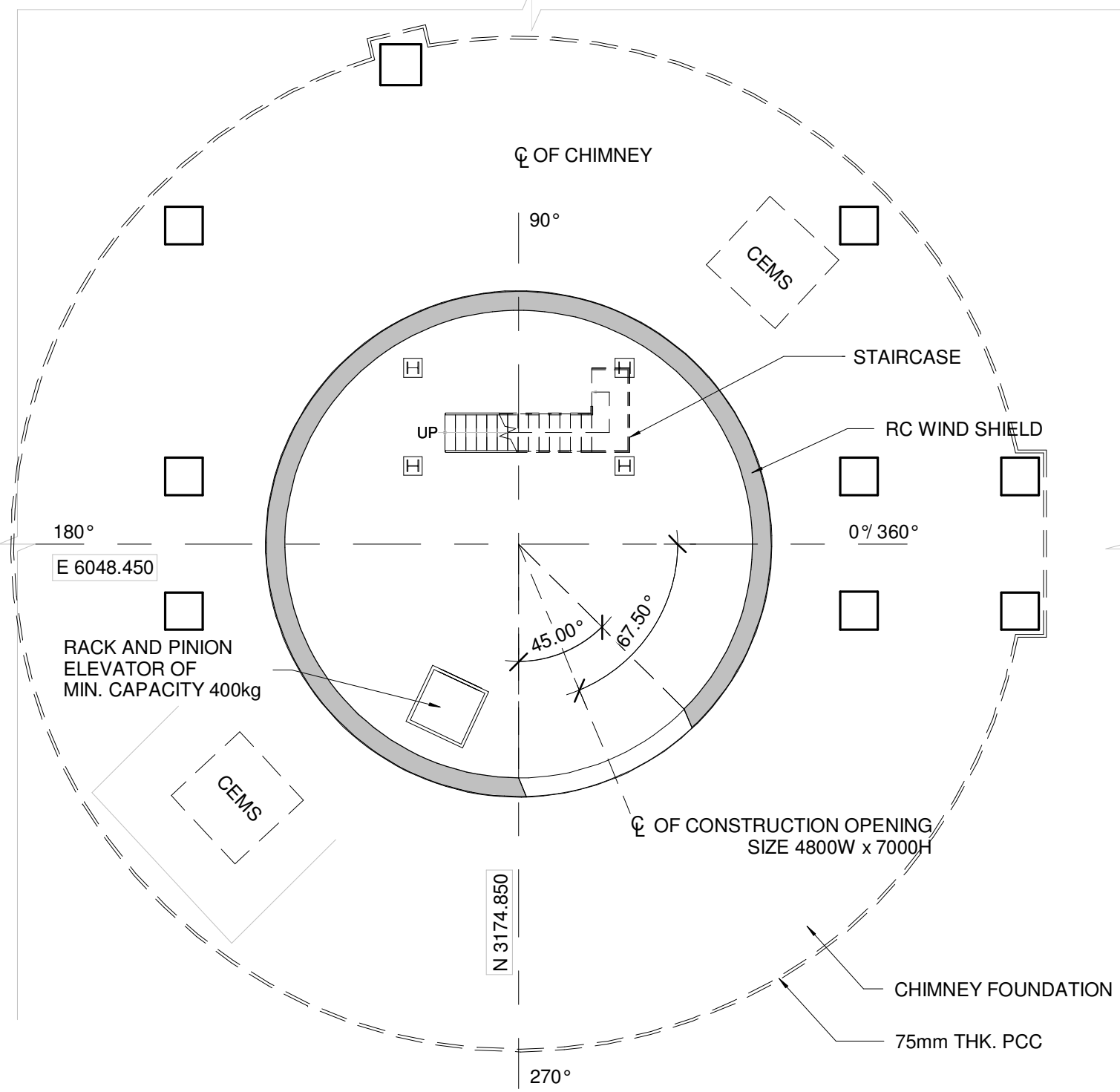
PLAN AT EL : +17.500M & EL : +45.000M SUPPORT PLATFORM / EL : +60.000M RESTRAINT PLATFORM

SCALE 1:150



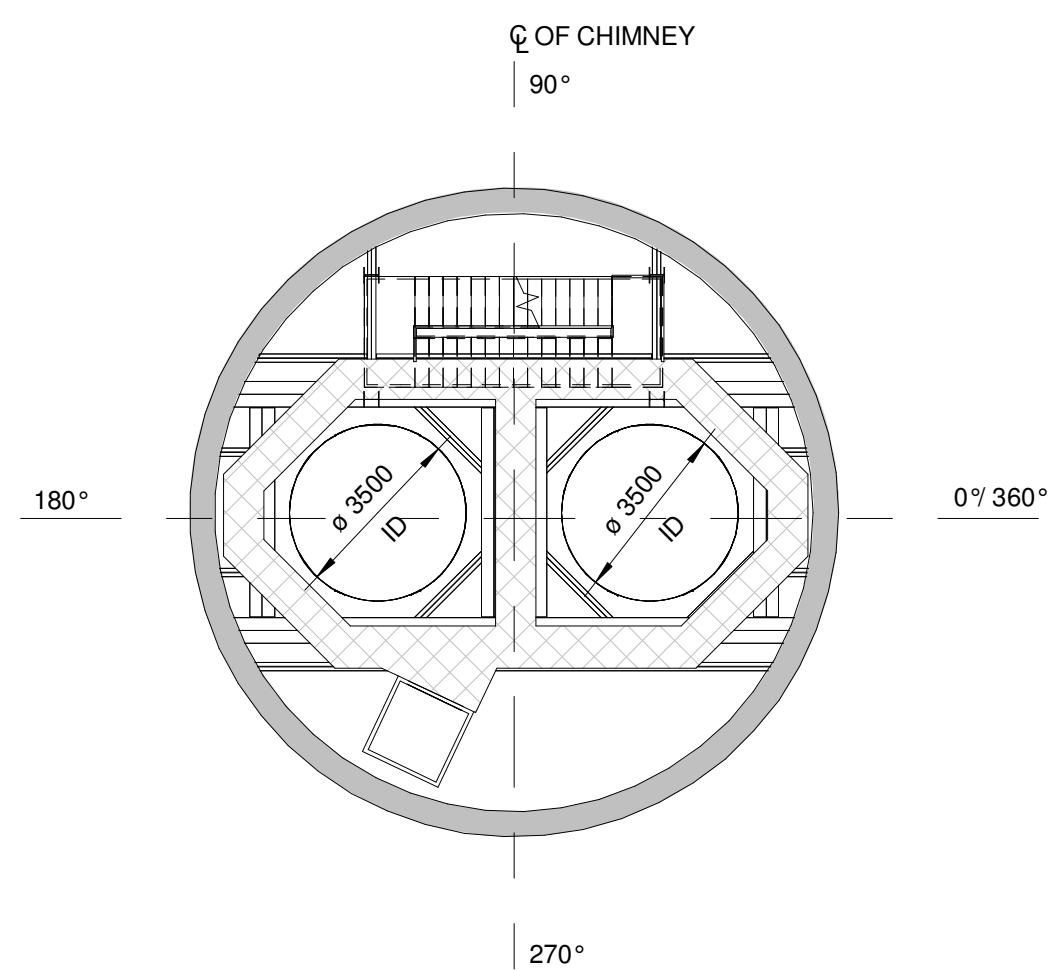
PLAN AT EL : +12.000M

SCALE 1:150



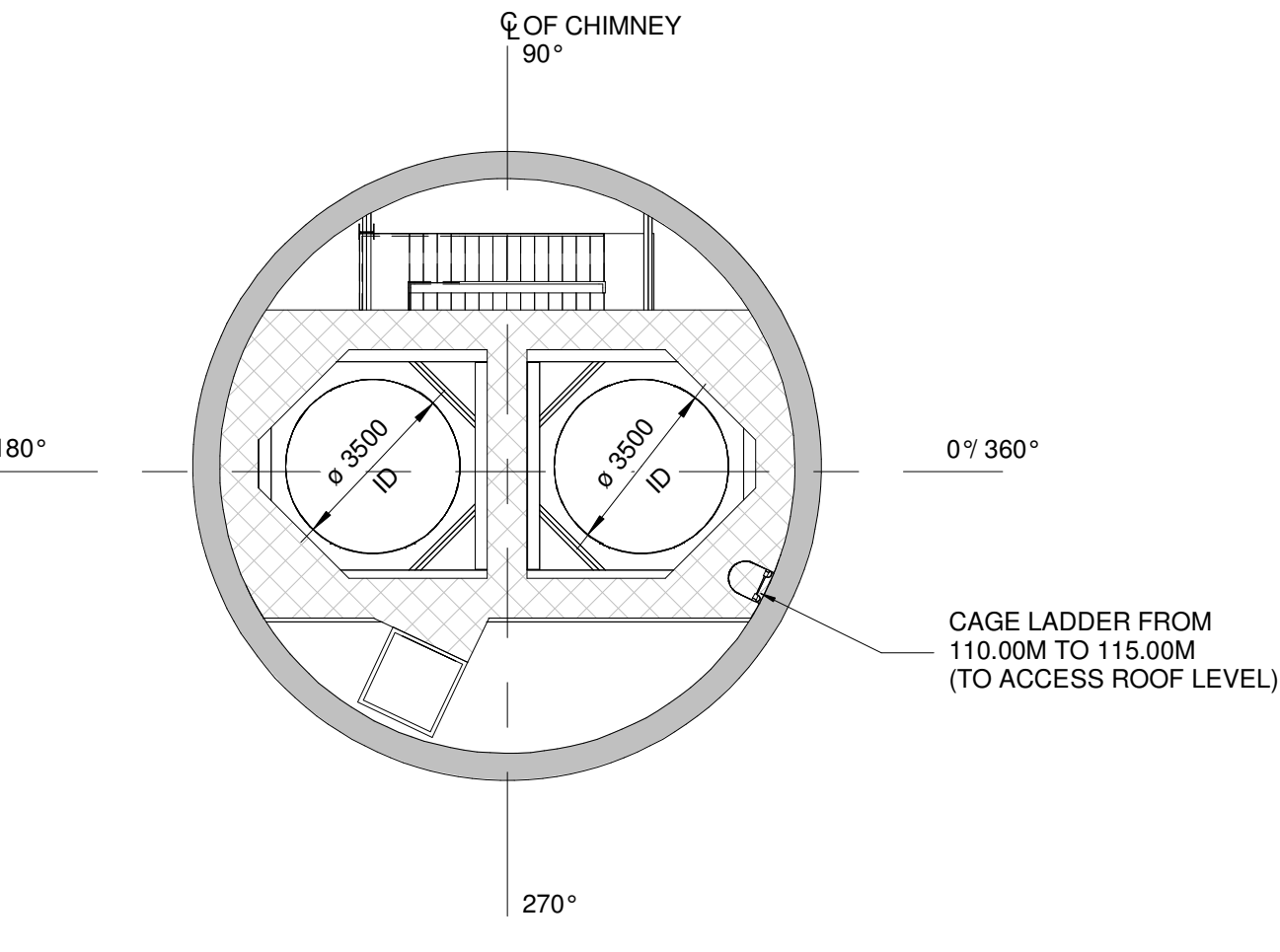
PLAN AT EL : (±) 0.000M

SCALE 1:150



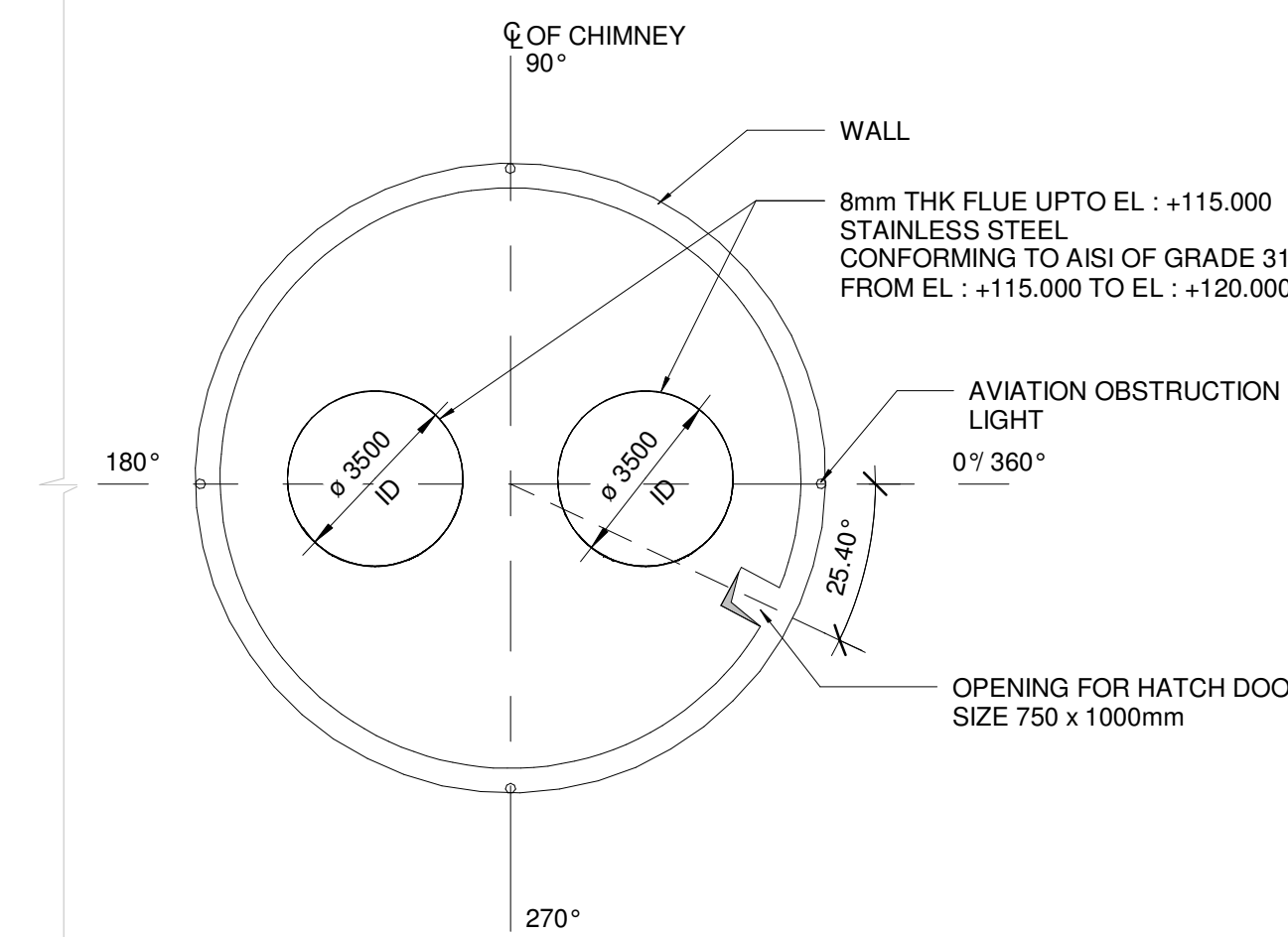
PLAN AT EL : +80.000M

SCALE 1:150



PLAN AT EL : +110.000M

SCALE 1:150



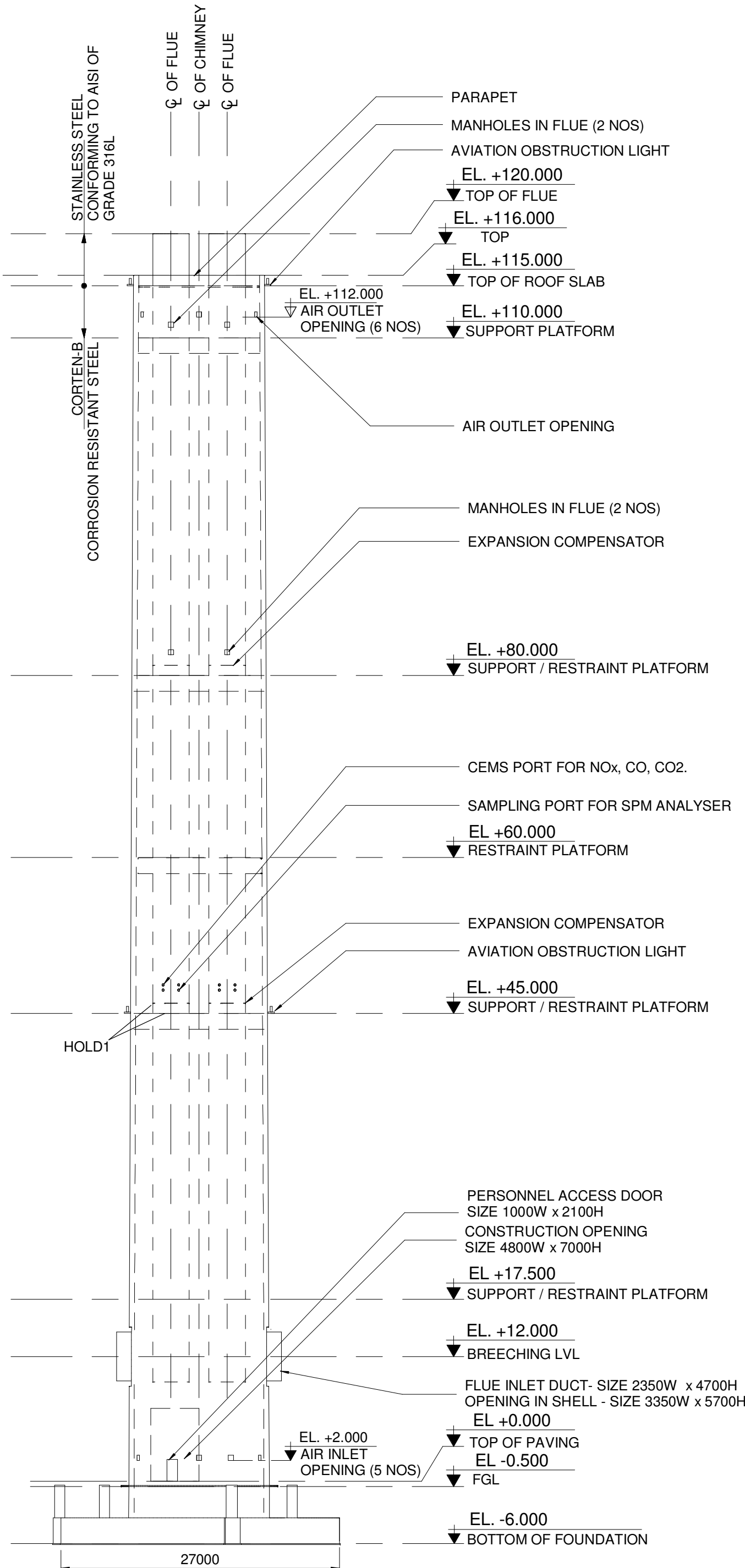
PLAN AT EL : +115.000M (TOC)

SCALE 1:150

HOLD LIST

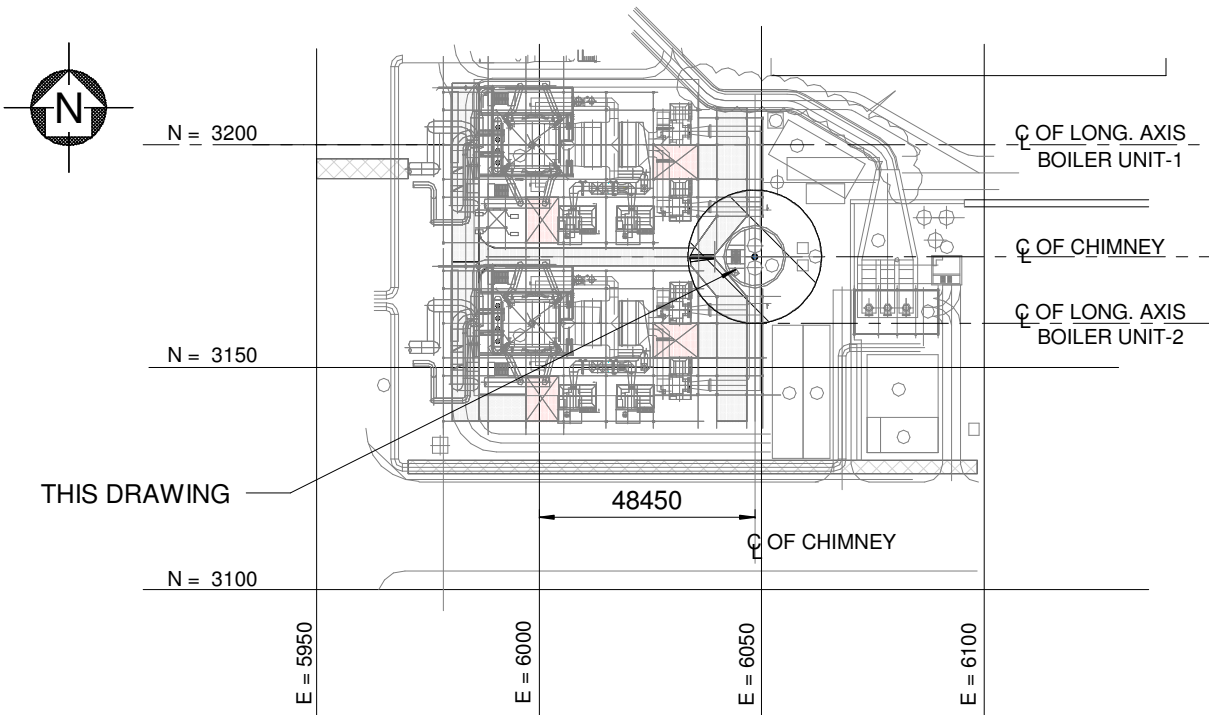
1. HOLD 1 - SAMPLING PORT SHOWN IN FLUE CAN IS INDICATIVE. LOCATION, NUMBERS & ELEVATION TO BE CONFIRMED BY BHEL

12600	500	115.000
12639	500	110.000
12874	500	80.000
13031	500	60.000
13148	500	45.000
13364	500	17.500
13407	500	12.000
13500	500	0.000
13528	500	-3.500
OUTSIDE DIA	THICKNESS	LEVEL



EAST ELEVATION

SCALE 1:400



KEY PLAN

NOTES

- ALL DRAWINGS SHALL BE READ IN CONJUNCTION WITH CONTRACT TERMS AND CONDITIONS, SPECIFICATION.
- ALL DIMENSIONS ARE IN MILLIMETERS, LEVELS AND CO-ORDINATES ARE IN METRES.
- BOILER AREA TOP OF PAVING LEVEL IS EL(±) 0.000 WHICH CORRESPONDS TO RL 61.500M, FINISHED GROUND LEVEL IS EL(-)0.500M WHICH CORRESPONDS TO RL 61.000M.
- ORDINARY PORTLAND CEMENT (OPC) SHALL BE USED FOR RCC FOR CHIMNEY SHELL.
- GRADE OF CONCRETE SHALL BE M30 AND M20 FOR ENCASEMENT WITH 20MM DOWN GRADED AGGREGATES, UNLESS NOTED OTHERWISE.
- REINFORCEMENT STEEL SHALL BE TATA TISCON TMT RE-BARS OF GRADE Fe 500D CONFORMING TO IS 1786.
- STRUCTURAL STEEL WORK SHALL BE AS PER IS 800.
- STEEL FLUES SHALL BE FABRICATED FROM MINIMUM 8mm THICK CORROSION RESISTANT STEEL TYPE CORTEN-B, HAVING YIELD STRENGTH OF 250MPa. TOP 5.0M SHALL BE FABRICATED FROM STAINLESS STEEL CONFORMING TO AISI 316L.
- EXTERNAL SURFACE OF CHIMNEY FLUE LINER PROJECTING OVER THE CHIMNEY ROOF SHALL BE MADE OF STAINLESS STEEL CONFORMING TO AISI OF GRADE SS 316L.
- THE EXPANSION COMPENSATOR SHALL BE PROCURED FROM A SPECIALIST MANUFACTURER, APPROVED BY OWNER/ CONSULTANT. THE MATERIAL FOR EXPANSION COMPENSATOR SHALL CONFIRM TO THE REQUIREMENT OF THE TECHNICAL SPECIFICATION.
- THE ROOF SLAB SHALL BE LINED WITH 25mm THICK ACID RESISTANT TILES CONFORMING TO IS 4457 WITH BEDDING MORTAR OF AVERAGE THICKNESS 10mm CONFORMING TO IS 4832 PART I OF POTASSIUM SILICATE BASE. THE TILES SHALL BE POINTED USING PHENOLIC BASED RESIN MORTAR AND IT SHOULD BE ACID PROOF CHEMICAL RESISTANT.
- DETAILS OF ELECTRICAL ITEMS SUCH AS AVIATION WARNING LIGHTS, EARTHING ETC. SHOWN HEREIN ARE INDICATIVE ONLY. FOR DETAILS REFER SEPERATE DRAWING.
- CEMS & SAMPLING PORTS ARE SHOWN HERE INDICATIVELY, FOR EXACT DETAILS OF CEMS & SAMPLING PORTS REFER A SEPERATE DRAWING.
- THE ENTIRE EXTERNAL SURFACE OF THE CHIMNEY SHALL BE PAINTED WITH EPOXY PHENOLIC COATING AS PER SPECIFICATION IN ALTERNATE BANDS OF 'SIGNAL RED' & 'BRIGHT WHITE COLOUR'.

LEGEND:

TOC	- TOP OF CONCRETE	EL. XXX	- ELEVATION
BOC	- BOTTOM OF CONCRETE		
CL	- CENTER LINE		
EL	- ELEVATION		
FGL	- FINISHED GROUND LEVEL		
LVL	- LEVEL		
TOP	- TOP OF PARAPET		
THK	- THICKNESS		
UNO	- UNLESS NOTED OTHERWISE		

REFERENCE DRAWINGS

- LYT-23-02-00-02-339-001 - COMPOSITE PLOT PLAN
- LYT-23-02-01-02-291-010 - LAYOUT OF ID SYSTEM

CONSTRUCTION

- STW-23-02-00-05-339-004 - SHEET 1 & 2 STANDARD DETAILS FOR RCC WORKS
- STW-23-02-00-05-339-005 - STANDARD NOTES FOR STRUCTURALSTEEL WORKS

TATA STEEL LIMITED
KALINGANAGAR, ODISHA

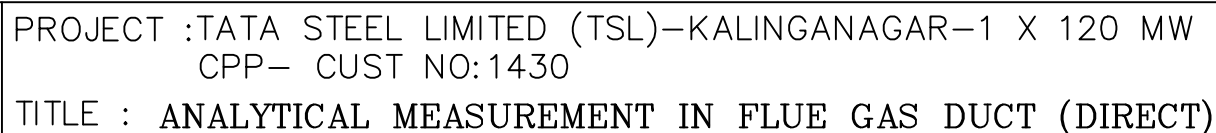
AREA BOP PACKAGE FOR 1 x 120 MW GAS BASED CAPTIVE POWER PLANT

DEPT CIVIL

DETAIL RCC CHIMNEY
GENRAL ARRANGEMENT & DETAILS

TATA DRG. NO.
CDW-23-02-08-05-339-208

REV
0



1. FLANGE DIMENSIONS EXCEPT BORE ARE AS PER ANSI-B 16.5, CLASS 150 NPS 4 INCH.
2. TOLERANCE FOR ALL MEASUREMENT: COARSE CLASS AS PER IS 2102.
3. TOLERANCE FOR LIGHT PIPE THICKNESS AS PER IS 1239(PART-I) M.S TUBES.

ALL DIMENSIONS ARE IN MM.

PRPD.	K.VIVEKANANDAN	APPD.	D.RAMACHANDRAN	DRG. NO. 4-97-288-94293	REV. 00
CHED.	SHABEER NAVAZ	DATE	15-09-2018		