

PRE QUALIFICATION REQUIREMENT

Orifice Plate Assembly

Sl. No.	PQR REQUIREMENTS	Vendor's compliance
1.	The bidder should be an original manufacturer of Orifice Plate Assembly.	
2.	The bidder shall submit minimum one copy of the earlier Purchase Orders executed in the last five years, for supply of Orifice Plate Assembly in Power Plant Applications.	

BHARAT HEAVY ELECTRICALS LIMITED

HIGH PRESSURE BOILER PLANT, TIRUCHIRAPALLI – 620 014

TECHNICAL DELIVERY CONDITIONS FOR SUB - DELIVERY COMPONENTS OF CONTROLS AND INSTRUMENTATION



TCI:1727/SBOPA

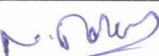
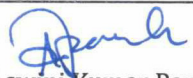
PAGE 1 OF 4

SOOT BLOWER ORIFICE PLATE ASSEMBLY

for

Project: MAHAGENCO Bhusawal, 1 x 660 MW
Customer Nos.: 1727

REVISION HISTORY

REV. No.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
00	27-08-2020	Initial Release	--sd--	--sd--	--sd--
01	16-06-2021	QP revised	 (N.Rakesh)	 (N.Rakesh)	 (Aswini Kumar Panda)

1.0 TECHNICAL SPECIFICATION

Sl. No.	Characteristics	Requirements
1.0	Site Condition	
1.1	Altitude above mean sea level	316 m above MSL
1.2	Ambient temperature	13 - 41 °C
1.4	Relative humidity	73%
2.0	Type of Flow Element	Concentric Square Edge Orifice plate with Flanges
2.1	Reference Standard	ASME PTC-19.5 (Part-II), ISO 5167
3.0	Flange Details	
3.1	Type of Flange	Weld Neck Raised Face (WNRF) Flange
3.2	Flange Tapping Details	Three pairs of tapping (120° apart) having end connection 1/2" NPT(F)
3.3	Flange Dimensions	Suitable to butt weld with the pipe as per pipe size indicated in the data sheet reference.
3.4	Flange Rating	900 LBS
3.5	Flange Material	A182 F22
4.0	Orifice Plate Details	
4.1	Orifice Material	SS 316
4.2	Orifice Plate Thickness	6 mm for Wall Blower , LRSB and 10 mm for common SB line
4.3	Vent & Drain	Vent & Drain Holes are to be provided
5.0	Performance Parameters	
5.1	Beta (β) ratio	Between 0.3 to 0.7 (To be determined by the Vendor)
5.2	Max. Pr. loss allowed	40 - 60 % of Max. Diff. Pressure.
5.3	Accuracy	± 1.0 % of full scale
5.4	Uncertainty in flow measurement	As per standard ISO 5167 & same to be proved in calibration.
6.0	Design Aspects	1. Flange bore diameter shall be the same as pipe's internal diameter. 2. Orifice to be designed for operating flow at normal operating pressure and temperature. 3. All the orifice plates shall be fabricated with a collar, which shall extend outside the mounting flange.

Sl. No.	Characteristics	Requirements
7.0	Mounting Accessories	- Accessories like gaskets, flanges, flange bolts, nuts, jack screws etc. to be provided. - Flanges & Fasteners shall be with red oxide primer paint
8.0	Engraving	Tag no., orifice plate bore diameter, upstream (+) and downstream (-) side marking and plate material shall be engraved on the handle of the orifice plate.
9.0	Documents	
9.1	To be submitted along with offer	Sub Delivery Enquiry Deviation indicating the Description, Specification, Quality Plan, Packing Procedure reference.
9.2	To be submitted After Placement of Purchase Order for Approval	- Orifice Plate Design Calculation Sheet. - DP Vs Flow Curve in mmWC & Kg/Hr. - Orifice Plate with Flange Assembly GA drawing
9.3	To be submitted during Inspection	- IBR form III- C Certificate for complete assembly. - Calibration test report from NABL approved lab for one Orifice plate per each service. - Material certificates for all items.
10.0	Quality Plan	CI:QA:1727:CQP:15/01
11.0	Packing Procedure	QA:CI:STD:PR:04

Note:

- Vendor to duly sign and stamp for compliance/confirmation for the BHEL's specification.
- In case of any deviation it shall be mentioned only in BHEL's Sub-Delivery Enquiry Deviation Format.
- The entire system and accessories should not contain any asbestos material.

**2.0 DATA SHEET REF: DS/1727/SB/OPA**

1	Application		Main SB Line	LRSB Line	WB Line
2	Medium		Steam		
3	Instrument Tag no		HCB01CF501	HCB02CF501, HCB05CF501	HCB04CF501, HCB06CF501
4	Quantity per Boiler	Nos.	1	2	2
5	Operating Pressure	Kg/cm ²	40	40	40
6	Maximum Pressure	Kg/cm ²	40	40	40
7	Operating Temperature	°C	373	373	373
8	Maximum Temperature	°C	460	460	460
9	Maximum Flow	T/Hr.	22	9.5	3
10	Normal Flow	T/Hr.	10.9	5.45	2.52
11	Pipe size (OD X T)	mm	127 x 12.5	88.9x5.49	88.9x5.49
12	Flow Range	T/Hr.	0 - 25	0 - 15	0 - 6
13	Recommended DP	mmWC	35000	25000	10000

BHARAT HEAVY ELECTRICALS LIMITED

HIGH PRESSURE BOILER PLANT, TIRUCHIRAPALLI – 620 014

TECHNICAL DELIVERY CONDITIONS FOR SUB - DELIVERY COMPONENTS OF CONTROLS AND INSTRUMENTATION



TCI:1727-SCR/ORIFICE

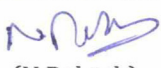
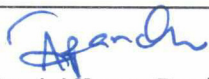
PAGE 1 OF 4

ORIFICE PLATE ASSEMBLY

for

Project: MAHAGENCO Bhusawal – SCR
Customer Nos.: 1727

REVISION HISTORY

REV. No.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
00	05-03-2021	Initial Release	--sd--	--sd--	--sd--
01	16-06-2021	QP revised	 (N.Rakesh)	 (N.Rakesh)	 (Aswini Kumar Panda)

1.0 TECHNICAL SPECIFICATION

Sl. No.	Characteristics	Requirements
1.0	Site Condition	
1.1	Altitude above mean sea level	316 m above MSL
1.2	Ambient temperature	13 - 41 °C
1.4	Relative humidity	73%
2.0	Type of Flow Element	Concentric Square Edge Orifice plate with Flanges
2.1	Reference Standard	ASME PTC-19.5 (Part-II), ISO 5167
3.0	Flange Details	
3.1	Type of Flange	Weld Neck Raised Face (WNRF) Flange
3.2	Flange Tapping Details	Three pairs of tapping (120° apart) having end connection 1/2" NPT(F)
3.3	Flange Dimensions	Suitable to butt weld with the pipe as per pipe size indicated in the data sheet reference.
3.4	Flange Rating	300 LBS
3.5	Flange Material	A105
4.0	Orifice Plate Details	
4.1	Orifice Material	SS316
4.2	Orifice Plate Thickness	3 mm
4.3	Vent & Drain	Vent & Drain Holes are to be provided as per standard.
5.0	Performance Parameters	
5.1	Beta (β) ratio	Between 0.3 to 0.7 (0.5 can be preferred)
5.2	Max. Pr. loss allowed	40 - 60 % of Max. Diff. Pressure.
5.3	Accuracy	± 1.0 % of full scale
5.4	Uncertainty in flow measurement	As per standard ISO 5167 & same to be proved in calibration.
6.0	Design Aspects	1. Flange bore diameter shall be the same as pipe's internal diameter. 2. Orifice to be designed for operating flow at normal operating pressure and temperature. 3. All the orifice plates shall be fabricated with a collar, which shall extend outside the mounting flange.

Sl. No.	Characteristics	Requirements
7.0	Mounting Accessories	1. Accessories like gaskets, flanges, flange bolts, nuts, jack screws etc. to be provided. 2. Flanges & Fasteners shall be with red oxide primer paint
8.0	Engraving	Tag no., orifice plate bore diameter, upstream (+) and downstream (-) side marking and plate material shall be engraved on the handle of the orifice plate.
9.0	Documents	
9.1	To be submitted along with offer	Sub Delivery Enquiry Deviation indicating the Description, Specification, Quality Plan, Packing Procedure reference.
9.2	To be submitted after placement of Purchase Order for approval	1. Orifice Plate Design Calculation Sheet. 2. DP Vs Flow Curve in mmWC & Kg/Hr. 3. Orifice Plate with Flange Assembly GA drawing
9.3	To be submitted during Inspection	1. Calibration test report from NABL approved lab for one Orifice plate per each service. 2. Material certificates for all items.
10.0	Quality Plan	CI:QA:1727:CQP:15/01
11.0	Packing Procedure	QA:CI:STD:PR:04

Note:

1. Vendor to duly sign and stamp for compliance/confirmation for the BHEL's specification.
2. In case of any deviation it shall be mentioned only in BHEL's Sub-Delivery Enquiry Deviation Format.
3. The entire system and accessories should not contain any asbestos material.

**2.0 DATA SHEET REF: DS/1727-SCR/ORIFICE**

1	Application		Reactor A- Sonic Horn - Air Flow	Reactor B- Sonic Horn - Air Flow
2	Medium		Air	
3	Instrument Tag no		HSF20CF001	HSF30CF001
4	Quantity per Boiler	Nos.	1	1
5	Maximum Pressure	Kg/cm ²	7	
6	Maximum Temperature	°C	27	
7	Maximum Flow	Nm ³ /Hr	90	
8	Pipe size (OD X T)	mm	NB50 (60.3 x 3.91 mm)	
9	Flow Range	Nm ³ /Hr	0 - 120	
10	Recommended DP at Max Flow	mmWC	100	



CONTROLS AND INSTRUMENTATION/QA/FB

BHUSAWAL TPP – 1 X 660MW
MAHARASHTRA STATE POWER GENERATION CO. LTD.

CONTRACT QUALITY PLAN FOR
ORIFICE PLATE ASSEMBLY

DEVELOPMENT CONSULTANT PVT. LTD.

Reviewed only for general conformance with contract drawings and specifications; Contractor to be responsible for any error and for fulfilment of details requirements of contract documents.

CODE:- 1

DATE:- 12-06-2021

DISTRIBUTED BY:- YUGANT

1	Approved	4	For information only
2	Approved Subject to compliance to comments, Proceed with manufacturing/construction. Revised document required to be submitted after incorporating the comments.	V	Null and Void (Not applicable)
3	Not Approved. Resubmission required		

SEE COVERING LETTER

LETTER REF.NO.:- 18V06-I01-LOT-BHEL-0219

REV	DATE	PREPARED	REVIEWED	AP
00	27/03/2021	Sd/-	Sd/-	
01	26/05/2021	B ARUNKUMAR	G V CHILAMBARASAN	B MUTHUKUMARAN

Revised based on customer comments.



Sl. No	Component & Operation	Characteristics	Class	Type of Check	Quantum of check		Ref Doc. & Acceptance STD	Format of record	AGENCY			REMARKS
					M	B/C			M	B	C	
A	RAW MATERIAL & BOUGHT OUT ITEMS INSPECTION											
01	Plates, pipes and forging	a. Material	Major	CHEM	1 sample plate for each lot	--	Spec. Appd Drg	TC	P	-	-	
		b. Forging for flow elements	Major	UT	100%	--	ASTM A388 -203.2	LGB	P	-	-	
02	Flanges	a. Type & make	Major	PHYS	100%	--	Spec. IBR Certificate	TC	P	-	-	
		b. Bore size	Major	MEAS	100%	--	Spec. Drg	LGB	P	-	-	
		c. End connection	Major	PHYS	100%	--	-Do-	LGB	P	-	-	
		d.Forging test	Major	CHEM, MECH, UT & Heat Treatment	100%	--	-Do-	TC	P	-	-	
03	Fasteners & Gaskets	a. Material, Dimension	Major	PHYS	100%	--	-Do-	LGB	P	-	-	
B	IN PROCESS INSPECTION											
03	Machining	a. Dimensions	Major	MEAS	100%	--	Spec. Drg	LGB	P	-	-	
		b. Verticality	Major	PHYS	100%	--	-Do-	LGB	P	-	-	
		c. Concentricity	Major	PHYS	100%	--	-Do-	LGB	P	-	-	
		d. Surface finish	Major	PHYS	100%	--	-Do-	LGB	P	-	-	
		e. Surface Flaw	Major	Dye Penetrant test (DPT)	100%	--	ASTM E-165 / ASME Sec VIII Div I	IR	P	-	-	
C	FINAL INSPECTION											
01	Routine tests	b. Physical and dimensional check	Major	MEAS	100%	100%	Spec. Drg	TR	P	W	W	
		c. Finish, alignment and tapping orientation	Major	MEAS VISU	100%	100%	Spec. Drg	TR	P	W	W	
		d. marking of flow direction	Major	PHYS	100%	100%	Spec. Drg	TR	P	W	W	
		e. Edge preparation	Major	PHYS	100%	100%	Spec. Drg	TR	P	W	W	
		f. Pressure taps	Major	PHYS	100%	100%	Spec. Drg	TR	P	W	W	
02	Type test	a. Accuracy(Wet Calibration)	Major	MECH	1 No./ Size	1 No./ Size	Spec. ISO 5167	TC	P	V	V	Refer Note. 8

M- MANUFACTURER/ SUB-VENDOR; **B** - BHEL / TPI ; **C** - CUSTOMER / TPI
P - PERFORM ; **W** - WITNESS **V** - VERIFICATION ;



D.NOTES:

1.LEGENDS:

THER	:	Thermal	MEAS	:	Measurement
MECH	:	Mechanical	LGB	:	Log Book
CHEM	:	Chemical	TC	:	Test certificate
VISU	:	Visual	TR	:	Test Report
UT	:	Ultrasonic Test	RT	:	Radiographic Test

- The vendor at their works shall arrange all testing facilities. Tests for which facilities are not available are to be carried out at recognized National Test Houses like ETDC/CIL/NPL/ERTL etc., at vendor cost.
- Through Log Book / any other documents available at the vendor's works, it shall be possible to correlate the finished products with raw material and in process stage checks / inspection carried out.
- All Measuring and Testing Instruments shall be periodically calibrated from recognized test houses & certificates made available during inspection for verification.
- Test certificates for routine type tests are to be furnished by the vendor.

- Vendor to give tentative inspection program in advance and confirm exact date two weeks in advance for arranging BHEL's inspection.
- Packing shall be as per the "PACKING PROCEDURE" indicated in the specification.
- Type test certificate shall not be earlier than 5 years from the date of Purchase enquiry conducted for same Beta ratio and line size. If Type test Certificate validity is expired (or) such type test certificates not available, vendor has to conduct Fresh type test at Govt./ NABL Accredited Lab.

E. REFERENCE STANDARDS:

(For Indicated Standards Refer the Latest Version)

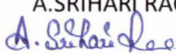
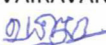
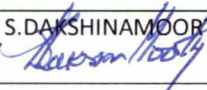
ISO 5167 : Measurement of fluid flow in pipes

CI:QA:1727:CQP:15.doc

**BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI**

**CONTROLS AND INSTRUMENTATION / FB
QUALITY ASSURANCE**

**STANDARD PACKING PROCEDURE
FOR
ALL INSTRUMENTS AND MISCELLENEOUS ITEMS
(ELECTRICAL, ELECTRONIC AND PNEUMATIC)**

Rev	Date	Prepared	Checked	Approved	Revision History
00	01.01.96	Sd/-	Sd/-	Sd/-	Initial History
01	28.03.02	Sd/-	Sd/-	Sd/-	Department name changed
02	26.02.07	Sd/-	Sd/-	Sd/-	Revised after discussion with Shipping Dept.
03	17.12.16	A.SRIHARI RAO 	RM.VAIRAVAN 	S.DAKSHINAMOORTHY 	Revised to suit all type of instruments.

1. Scope

This procedure gives minimum guidelines to be complied with for packing of Electrical, Electronic and pneumatic Instruments. This packing shall be suitable for different handling operations and for the adverse conditions during transportation and during indoor / outdoor storage for period more than one year.

2. Material for packing

The individual instrument shall be packed in carton box (specifically made for particular instrument) and grouped together inside a box made of wood or plywood as per National / International standard.

3. Packing

- Items shall be inspected for cleanliness immediately before packaging. Dirt, oil, residue, metal chips or other forms of contamination shall be removed.
- Adequate protection shall be provided against mechanical damage and atmospheric corrosion in transit and, for equipment suitable for outside storage, for prolonged storage at the site prior to installation.
- Water proof barrier material – high density polythene shall be used as a resistant to grease and water; it shall protect items from airborne and windblown soils.
- Desiccants like silica gel to be used inside the carton box. Silica gel shall conform to IS 3401. The gel is to be packed in sachets placed at different positions inside the components for absorbing moisture. The quantity of silica gel shall be adequate for storage period of one year.
- All tapped openings in equipment shall be plugged with plastic plugs to protect internal / external threads.
- Use a sturdy cardboard shipping carton, large enough for at least 3 inch foam padding around the instrument.
- Do not use loose plastic foam pieces, which can shift during transport.
- Secure the box flaps with packaging tape or box staples.

3.1) Marking & Labelling:

- Components and their containers shall be identified by marking. Shipping marks shall be on all sides of package. The shipping marks shall be at least 3 inches high where space permits. Markings are to be in black paint or ink depending on shade of the package surface.
- Cautionary symbols to be stenciled in red waterproof paint or ink.

QA:CI:STD:PR:04 / Rev 03

- The gap between job and the box shall be filled with suitable material like jute, coir, thermo coal, etc.
- For export packing additional care shall be taken as per contract requirements if applicable. Otherwise, suitable box made of seasoned wood and / or plywood sheets of required thickness shall be used with suitable sea worthy packing protection.

4. Marking

- After completing the packing, Stencil marking, as per dispatch instructions and symbol marking as per Annexure – I shall be made. Please ensure the box is stenciled with “FRAGILE ITEM”, “HANDLE WITH CARE”.

5. Packing Slip

- A copy of the packing slip, kept in a polythene cover shall be kept inside the box. Another copy of the packing slip, kept in a polythene cover shall be kept outside the box and firmly fixed to the case.

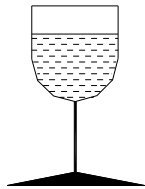
6. Caution

- Do not pack any other Mechanical items with this case.

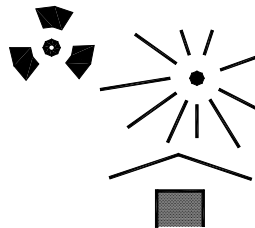
7. General

- These packing procedures are the minimum requirements in addition to the standard instructions mentioned in the Purchase Order and Specification.
- Deviation to meet the packing procedure requirements / non-clarity in packing approach in any quotation will be liable for rejection of offer.

ANNEXURE – 1



FRAGILE, HANDLE WITH CARE



PROTECT FROM HEAT AND RADIOACTIVE SOURCES



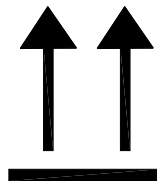
USE NO HOOKS

NOTE: The design of heavy goods packages cannot always resist top lifting by grabhooks.



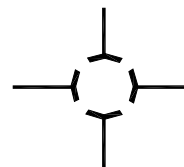
KEEP DRY

NOTE: Not all cases have waterproof internal liners: plywood used in the construction may not have a waterproof glue-line.



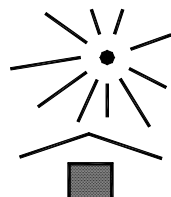
THIS WAY UP

NOTE: Certain designs of small cases make it difficult to distinguish top from bottom.

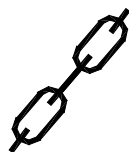


CENTRE OF GRAVITY

NOTE: This should be stencilled as a minimum on the two longest case sides (this information will normally be supplied by the manufacturer of the item(s) packed).

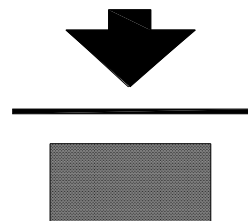


KEEP AWAY FROM HEAT



INTERNATIONAL "SLING HERE" SYMBOL

... kg max



STACKING LIMITATION

NOTE: The maximum load in kilograms should be marked above the arrow.

/ On Bidder's office letter pad /

Self-Declaration

GEM bid Enquiry No.	GEM/2021/B/1341307
Enquiry Date	08.07.2021

In line with Government public procurement order Number P-45021/2/2017-B.E-II dated 15.06.2017, and further modified order dt.04.06.2020 issued by DPIIT,

I / We hereby declare that I / We are a “Local Supplier” meeting the requirement of minimum local content (.....%) defined in the above government notification for the goods against above mentioned enquiry Number.

Details of location at which local value addition will be made is as follows:

Door No.	
Street / Address 1	
Street / Address 2	
District	
State	
Country	
PIN Code	

We also understand that the false declarations will be considered as breach of Integrity and liable for action.

For Company Name:

Seal:

Signature:

Date:

Place:

(Please fill all the yellow color field)



MATERIALS MANAGEMENT / BOI

SUB-DELIVERY ENQUIRY DEVIATION FORMAT

Page : of

Schedule of deviation to
Sub-delivery Enquiry No. : **GEM/2021/B/1341307**

Description : **ORIFICE PLATE ASSEMBLY**

Documents : **Specification: TCI:1727/SBOPA/01**
: **Specification: TCI:1727-SCR/ORIFICE/01**

Drawing No. : -

Quality Plan : **CI:QA:1727:CQP:15/01**

Packing Procedure : **QA:CI:STD:PR:04/03**

Document reference	BHEL called for	Firm's alternative offer

Certified that other than the above deviations, we are accepting all the other specifications and requirements in full to your Enquiry.

Station :

Date :

Signature of firm's representative

Firm seal

Note : 1. Deviations should be taken only in the extreme case
2. If necessary, use additional sheets with page control number