

**TECHNICAL SPECIFICATION
FOR
FLOW ORIFICE ASSEMBLY with
ACCESSORIES
(RATE CONTRACT)**

VOLUME - IIB

SECTIONS-C & D

SPECIFICATION No: PE-TS-20-145-I105A



**BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT DIVISION
NOIDA, INDIA**



Technical specification for
Flow Orifice Assembly with Accessories
 (RATE CONTRACT)

SPEC NO.: PE-TS-20-145-I105A

VOLUME II B

REV. NO. 00

DATE 18.03.20

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 (RATE CONTRACT)

SPEC NO.: PE-TS-20-145-I105A

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SECTION C

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SECTION – C

- **SPECIFIC TECHNICAL REQUIREMENTS**
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SPECIFIC TECHNICAL REQUIREMENTS

- 1.0** This specification is intended for finalization of rate contract between BHEL-PEM and Bidder. Standard technical detail as indicated in the specification shall be agreed upon between BHEL-PEM and Bidder. Project specific technical detail shall be made available to the bidder along with project enquiry.
- 2.0** This specification covers the Design, Manufacture, Calibration (at approved labs), Inspection and testing at manufacturer's works, proper packing for transportation and delivery to site of the complete Orifice Plate assembly, Start-up/Commissioning Spares as mentioned in different sections of this specification.
- 3.0** The bids shall be evaluated as per NIT. Ordering shall be done separately for each project.
- 4.0** The quality plan enclosed forms the minimum requirement but not limited to be adhered to by the bidder.
- 5.0 GENERAL INSTRUCTIONS**
- I. It is not the intent here to specify all the details of design and manufacture. However, the equipment shall conform in all respects to high standard of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to the customer / consultant, who will interpret the meaning of drawing and specification and shall be entitled to reject any component or material which in his judgment is not in full accordance herewith.
 - II. The omission of specific reference to any component / accessory necessary for the proper performance of the equipment's shall not relieve the supplier of the responsibility of providing such facilities to complete the supply within the quoted prices.
 - III. BHEL's / Customer representatives shall be given access to the shop in which the equipment's are being manufactured or tested and all test records shall be made available to them.
 - IV. The Equipment covered under this specification shall not be dispatched unless the same have been finally inspected, accepted and Material Dispatch Clearance Certificate (MDCC) is issued by BHEL / Customer.
 - V. **The bidder to quote for items as per price schedule attached. The quantity as mentioned in the BOQ is only for evaluation purpose. However actual ordered quantity may vary from project to project throughout the year.**
 - VI. Rates quoted by bidder shall be valid for a period of 2 years from the date of issue of rate contract for the equipment.
 - VII. During rate contract in force; any other BHEL unit may also make use of rates if their specification is identical to spec of rate contract.
 - VIII. Inspection shall be carried out in line with preapproved project specific drawings/data sheet/QP.

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IX. Quality plan to be duly signed and stamped and to be furnished along with the bid as a token of acceptance. **Any deviation w.r.t Quality Plan shall not be acceptable and bid / offer shall be rejected.**

X. Wherever in data sheet more than one options are marked, bidder to comply for all the options. However, bidder to note that one option shall be selected by BHEL for a specific project and the same shall be supplied by bidder without any commercial implication with respect to rate contract.

XI. In case of any discrepancy in the requirement within the same or different section, as noted by the bidder in the specification, the same will be brought to the notice of BHEL in the form of pre- bid clarification. In absence of any pre-bid clarification, the more stringent requirement as per interpretation of BHEL/customer shall prevail without any commercial implication.

XII. Scope of supply shall include flow element orifice assembly including flange with nut & bolt, stub, nipples, plug, pair of gasket, spares etc. as indicated in the specification.

6.0 Bidder to note that thickness of the pipe for various sizes may vary from project to project. Same shall be informed during project specific order. No commercial implication shall be acceptable for the same.

7.0 Bidder to note that CALIBRATION TEST is required to be conducted on one type per size for a specific project and the requirement shall be informed during project specific order. BHEL reserves the right to withdraw the calibration test for any project based on customer requirements.

8.0 For vertical installation of Orifices (if any), the S-bent impulse pipe shall be supplied by bidder without any commercial implication. The same shall be informed by BHEL during project specific order.

9.0 Process pressure, temperature & flow may vary for a particular service from project to project. Bidder to comply with these process parameters without any commercial implication. Maximum possible design pressure & temperature shall be informed during project specific order.

10.0 Extra pressure tapping (in addition to THREE pair no's tapping) shall be provided in case to case basis for a specific project (if required) by the bidder without any commercial implication. Associated accessories for this particular extra tapping like nipple shall be supplied by the bidder as per the unit price quoted in the price format.

11.0 If extra Nipples etc are to be provided, same shall be supplied by the bidder as per the unit price quoted in the price format.

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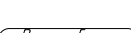
12.0 Inspection will be conducted by BHEL, end customer and/or their authorized representatives as per the agreed inspection schedule. The inspection schedule will be submitted by the bidder for BHEL's approval at contract stage. The cost of all tests and inspections will be deemed to have been included in the rate contract. For all the type tests "Type Test Certificates" shall be furnished. In the absence of the same, such Type Tests shall be arranged at the Vendor's works in the presence of BHEL, end customer and/or their authorized representatives or in independent Test House/ Laboratory approved by BHEL.

13.0 Sea/Air worthy packing (if applicable) for a specific project shall be provided by the bidder without any commercial implication. Same shall be informed by BHEL during project specific order. Inspection of the sea/air worthy packing shall be done as per the project specific sea/air worthy packing specification by Customer/BHEL/BHEL appointed Inspection party.

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CUSTOMER'S SPECIFICATION

Same shall be informed by BHEL during project specific order (if any)

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Tag No. : ORIFICE ASSEMBLY AS PER TYPE “A” OF THE PRICE FORMAT

Date Sheet No. 1

DATA SHEET – A		
ELEMENT	SERVICE MAKE : MODEL TYPE STANDARD* DESIGN# MATERIAL BETA RATIO BORE DIAMETER VENT HOLE DRAIN HOLE	SHALL BE FURNISHED DURING PROJECT BIDDER TO FURNISH DURING PROJECT [] BS-1042 / [] ISO 5167 CONCENTRIC SQUARE EDGE SS316 0.4 to 0.7 BIDDER TO FURNISH DURING PROJECT YES NO
END CONNECTION	TYPE FLANGE TYPE FLANGE RATING : MATERIAL TAPPING LOCATION NUMBER OF TAPPINGS NIPPLE: QTY : SIZE : MATERIAL : RATING ROOT VALVE QTY.	[] FLANGED, [] BUTT WELD END WELDNECK ANSI-300 : ASTM A105 ON FLANGE 3 PAIR 06 : 15NB : SS316 : SCH.80 250mm Long NIL
PROCESS DATA	FLUID* FLOW (T/HR) PRESSURE (KG/CM ² (A)) TEMPERATURE (DEG. C.) MAX. ALLOWABLE PRESS LOSS DESIGN PRESS : TEMP DIFF. PRESS AT MAX FLOW	[] CONDENSATE / [] DMCW / [] CW / [] ACW / [] RAW WATER MAXIMUM NORMAL MINIMUM SHALL BE FURNISHED DURING PROJECT BIDDER TO FURNISH DURING PROJECT
PIPE LINE DATA	PIPE SIZE (OD X THK) mm PIPE MATERIAL* BORE DIAMETER MIN. AVAILABLE STRAIGHT LENGTH UPSTREAM:DOWNSTREAM FLOW DIRECTION*	<u>AS PER PRICE SCHEDULE</u> [] SA106GR.B / [] SA106GR.C / [] CS AS PER IS 2062 GR.B / [] CS AS PER IS 1239 BIDDER TO FURNISH DURING PROJECT 15D 10D : 5D [] HORIZONTAL / [] VERTICAL ^{\$}
OTHER DATA	APPROX. WEIGHT OF ASSEMBLY COMMISSIONING SPARE	BIDDER TO FURNISH DURING PROJECT ONE PAIR OF GASKET FOR EACH ORIFICE ASSEMBLY
PACKING	SEA WORTHY PACKING*	[] YES / [] NO

\$ S-bent to be provided for vertical flow direction
* Project specific data shall be informed by BHEL during project ordering
Carrier ring design shall be provided (if required in a specific project) for line size <=2 inches

BIDDER TO QUOTE IN COLUMN “A” OF PRICE FORMAT FOR DETAILS SPECIFIED ABOVE

BIDDER TO NOTE THE FOLLOWING FOR EACH ORIFICE ASSEMBLY:

A) In case additional pair of tappings is required, extra 2 no's nipples per pair of tappings shall be supplied by the bidder. Additional price for the same shall be as per unit price quoted in the price schedule under column D.

The above shall be informed by BHEL during project specific ordering

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Tag No. : ORIFICE ASSEMBLY AS PER TYPE “B” OF THE PRICE FORMAT

Date Sheet No. 2

DATA SHEET – A		
ELEMENT	SERVICE MAKE : MODEL TYPE STANDARD* DESIGN# MATERIAL BETA RATIO BORE DIAMETER VENT HOLE DRAIN HOLE	SHALL BE FURNISHED DURING PROJECT BIDDER TO FURNISH DURING PROJECT [■] BS-1042 / [■] ISO 5167 CONCENTRIC SQUARE EDGE SS316/SS316L 0.4 to 0.7 BIDDER TO FURNISH DURING PROJECT YES NO
END CONNECTION	TYPE FLANGE TYPE FLANGE RATING : MATERIAL TAPPING LOCATION NUMBER OF TAPPINGS NIPPLE: QTY : SIZE : MATERIAL : RATING ROOT VALVE QTY.	[■] FLANGED, [■] BUTT WELD END WELDNECK ANSI-300 : ASTM A182 F304/SS316/SS316L ON FLANGE 3 PAIR 06 : 15NB : SS316/SS316L : SCH.80 250mm Long NIL
PROCESS DATA	FLUID* FLOW (T/HR) PRESSURE (KG/CM ² (A)) TEMPERATURE (DEG. C.) MAX. ALLOWABLE PRESS LOSS DESIGN PRESS : TEMP DIFF. PRESS AT MAX FLOW	[■] CONDENSATE / [■] DMCW / [■] CW / [■] ACW / [■] DMW MAXIMUM NORMAL MINIMUM SHALL BE FURNISHED DURING PROJECT BIDDER TO FURNISH DURING PROJECT
PIPE LINE DATA	PIPE SIZE (OD X THK) mm PIPE MATERIAL BORE DIAMETER MIN. AVAILABLE STRAIGHT LENGTH UPSTREAM:DOWNSTREAM FLOW DIRECTION*	<u>AS PER PRICE SCHEDULE</u> SA312TP304/SS316/SS316L BIDDER TO FURNISH DURING PROJECT 15D 10D : 5D [■] HORIZONTAL / [■] VERTICAL ^{\$}
OTHER DATA	APPROX. WEIGHT OF ASSEMBLY COMMISSIONING SPARE	BIDDER TO FURNISH DURING PROJECT ONE PAIR OF GASKET FOR EACH ORIFICE ASSEMBLY
PACKING	SEA WORTHY PACKING*	[■] YES / [■] NO

\$ S-bent to be provided for vertical flow direction

* Project specific data shall be informed by BHEL during project ordering

Carrier ring design shall be provided (if required in a specific project) for line size <=2 inches

BIDDER TO QUOTE IN COLUMN “B” OF PRICE FORMAT FOR DETAILS SPECIFIED ABOVE

BIDDER TO NOTE THE FOLLOWING FOR EACH ORIFICE ASSEMBLY:

A) In case additional pair of tappings is required, extra 2 no's nipples per pair of tappings shall be supplied by the bidder. Additional price for the same shall be as per unit price quoted in the price schedule under column D.

The above shall be informed by BHEL during project specific ordering

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Date Sheet No. :

DATA SHEET – C				
ELEMENT	SERVICE MAKE : MODEL TYPE STANDARD DESIGN MATERIAL BETA RATIO BORE DIAMETER VENT HOLE DRAIN HOLE			
END CONNECTION	TYPE FLANGE TYPE FLANGE RATING : MATERIAL TAPPING LOCATION NUMBER OF TAPPINGS NIPPLE: QTY : SIZE : MATERIAL : RATING			
PROCESS DATA	FLUID FLOW (T/HR) PRESSURE (KG/CM ² (A)) TEMPERATURE (DEG. C.) MAX. ALLOWABLE PRESS LOSS DESIGN PRESS : TEMP DIFF. PRESS AT MAX FLOW	MAXIMUM	NORMAL	MINIMUM
PIPE LINE DATA	PIPE SIZE (OD X THK) mm PIPE MATERIAL BORE DIAMETER MIN. AVAILABLE STRAIGHT LENGTH UPSTREAM:DOWNSTREAM FLOW DIRECTION			
OTHER DATA	APPROX. WEIGHT OF ASSEMBLY COMMISSIONING SPARE			
PACKING	SEA WORTHY PACKING			

	MANUFACTURER / BIDDER / SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
		CUSTOMER :		QP NO.: PE-QP-999-145-I024, Rev No.:00	DATE: 17.04.2020
		PROJECT:		PO NO.:	DATE:
		ITEM: FLOW ORIFICE	SYSTEM: C&I	SECTION:	SHEET 1 OF 2

SNo.	Component & Operations	Characteristics	Class	Type of Check	Quantum of check		Reference document	Acceptance norms	Format of record		Agency			Remarks
1.0	2	3	4	5	6		7	8	9	*	**			10
					M	C/N				D	M	C	N	
1.1	MATERIAL													
	Orifice Plate	Physical, Chemical properties	MA	Physical, Chemical tests	1/Heat	----	Approved Drg / Data Sheet	Approved Drg / data Sheet	Test Certificate	√	P, V	V	-	Refer Note-1, IBR certification(if applicable) to be verified by BHEL
		Dimensions	MA	Measurement	100%	----	Approved Drg / Data Sheet	Approved Drg / Data Sheet	Inspection Reports	√	P,V	V	-	
1.2	FLANGES													
	a. Forgings	Chemical, Mech Properties, & Heat Treatment	MA	Chemical, Mech Properties, & Heat Treatment	100%	----	ANSI B 16.34	ANSI B 16.34	MTC Cert,HT certificate	√	P, V	V	-	Refer Note-1 & 2
		UT	MA	UT test	100%	----	Material Spec as per ASTM A 388	Material Spec as per ASTM A 388	UT Certificate	√	P, V	V	-	
	b. Machining	Dimensions	MA	Measurement	100%	----	Approved Drg / Data Sheet	Approved Drg / Data Sheet	Inspection Reports	√	P, V	V	-	
2.0	IN PROCESS													
	Machine	Dimension	MA	Measurement	100%	----	Approved Drg / Data Sheet	Approved Drg / data Sheet	Inspection Reports	√	P, W	V	-	
		Surface finish	MA	Visual	100%	----	---	Mirror Finish	---	√	P, W	V	-	
		Surface flaw on machined surface	MA	Penetrant test	100%	----	ASTM 165 / IS:3658	ASTM 165 / IS:3658	Inspection Reports / Test Certificate	√	P, W	V	-	
3.0	ASSEMBLY and FINAL INSPECTION													
		Overall dimensions	MA	Measurement	100%	100%	Approved Drg / Data Sheet	Approved Drg / data Sheet	Inspection Reports	√	P, W	W	-	
		Marking, Tag no. Direction of flow	MA	Visual	100%	100%	Approved Drg / Data Sheet	Approved Drg / data Sheet	Inspection Reports	√	P, W	W	-	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:		PRAG JAIN / MAYANK KESHARWANI	Checked by:		KUNDAN PRASAD			Reviewed by:			
Reviewed by:		BHARAT SINGH	Reviewed by:		RITESH KUMAR JAISWAL			Approved by:			

	MANUFACTURER / BIDDER / SUPPLIER NAME & ADDRESS		STANDARD QUALITY PLAN		SPEC. NO:	DATE:
			CUSTOMER :		QP NO.:PE-QP-999-145-I024, Rev No.:00	DATE:17.04.2020
			PROJECT:		PO NO.:	DATE:
			ITEM: FLOW ORIFICE	SYSTEM: C&I	SECTION:	SHEET 2 OF 2

SNo.	Component & Operations	Characteristics	Class	Type of Check	Quantum of check		Reference document	Acceptance norms	Format of record		Agency			Remarks
1	2	3	4	5	6		7	8	9	*	**			10
					M	C/N				D	M	C	N	
		Calibration	MA	Performance test	One per type	---	Approved Data Sheet	Approved Data Sheet	Test Certificate	√	P, W	V	-	Refer Note 4
		Painting	MA	Visual	100%	---	Manufacturer standards	Manufacturer standards	Inspection Reports / Manufacturer records	√	P, W	V	-	
		Root valve BOQ & Access.	MA	Measurement	100%	100%	Approved Drg / Data Sheet	Approved Drg / Data Sheet	Inspection Reports	√	P, W	W	-	Quantity to be checked physically
4.0	PACKING & DISPATCH	Soundness of Packing against transit damage	MA	Visual	100%	100%	Tech. Spec / Manufacturer standards	Tech. Spec / Manufacturer standards	---	√	P	W	-	Refer Note 10

NOTE:

- All test reports & dimension reports shall be verified by BHEL wherever verification is by BHEL at the time of Final Inspection.
- Positive material identification testing (One per type) shall be performed by vendor and the same shall be witnessed by BHEL at the time of final inspection
- Minimum 2 coats of primer paint to be applied before dispatch (Painting thickness shall be as per Manufacturer's standard)
- CALIBRATION Test to be carried out at IIT-DELHI / FCRI or NABL approved laboratory.
- BHEL reserves the right to conduct repeat tests, if required.
- In case of foreign supplier, all test certificates shall be furnished by the supplier, duly witnessed / verified by supplier's TPI.
- Project specific QP will be prepared based on customer requirement
- The latest revisions / year of issue of all the standard indicated in the QP shall be referred.
- Quantum of check by BHEL / BHEL nominated inspection agency shall be indicated during project specific enquiry.
- Following to be noted for packing:
 - Material shall be packed suitably in order to avoid damage during transit and also during storage at site.
 - Photograph of flow element shall be provided, duly packed inside the wooden box just before final packing
 - Photographs of the packing (with LR No.) shall be provided as per approved packing procedure (if applicable) just before dispatch.
 - Clearance for dispatch will be given only after receipt of the photos
 - Sea worthy packing shall be provided, if called for in the Data Sheet. Acceptance norms shall be in line with technical / packing specification.

LEGEND:

*RECORDS, IDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION, **D**: DOCUMENTATION

** **M**: SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **C**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **N**: CUSTOMER,

P: PERFORM, **W**: WITNESS, **V**: VERIFICATION, AS APPROPRIATE, **MA**:MAJOR,**MI**:MINOR,**CR**:CRITICAL.

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:		PRAG JAIN / MAYANK KESHARWANI	Checked by:		KUNDAN PRASAD			Reviewed by:			
Reviewed by:		BHARAT SINGH	Reviewed by:		RITESH KUMAR JAISWAL			Approved by:			



Technical specification for
Flow Orifice Assembly with Accessories
(RATE CONTRACT)

SPECIFICATION NO.: PE-TS-20-145-I105A

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DATE :

BILL OF QUANTITY-MAIN SUPPLY

BOQ FOR RATE CONTRACT of ORIFICE ASSEMBLY (2020-21)

SL NO	DESCRIPTION	A		B		C	D
		Complete Orifice assembly with pipe line material of SA106GRB / SA106GRC / CS AS PER IS 2062 GR B/CARBON STEEL ERW,IS:1239 and flange material of ASTM A 105		Complete Orifice assembly with pipe line material of SA312TP304/SS316/SS316L and flange material of ASTM A 182 F304/SS316/SS316L		PAIR OF GASKET	NIPPLE 15Nb , SS316 , SS316L 250mm long
		A1	A4	B1	B4	C1	D1
		SCHEDULE OF PRICES for Complete Orifice assembly with THREE (3) pairs of tapping , accessories like pair of gasket , nipple, Pressure take-off points etc and commissioning spare of 1 no. pair of gasket for each assembly	CALIBRATION CHARGES for Complete Orifice assembly	SCHEDULE OF PRICES for Complete Orifice assembly with THREE (3) pairs of tapping , accessories like pair of gasket , Pressure take-off points etc and commissioning spare of 1 no. pair of gasket for each assembly	CALIBRATION CHARGES for Complete Orifice assembly	Additional items to be included based on project specific requirements (Item shall be applicable for any line size as mentioned in column A or B)	
	PIPE SIZE	QTY	No.	QTY	No.	QTY	QTY
1	40" (1000 NB)	1	1			1	1
2	36" (900 NB)	7	3				
3	32" (800 NB)	6	4				
4	28" (700 NB)	10	5				
5	24" (600 NB)	3	2				
6	20" (500 NB)	9	4	1	1		
7	18" (450 NB)	21	9	1	1		
8	16" (400 NB)	8	6	0	0		
9	14" (350 NB)	15	6	1	1		
10	12" (300 NB)	67	20	0	0		
11	10" (250 NB)	26	19	0	0		
12	8" (200 NB)	13	11	6	3		
13	6" (150 NB)	10	9	6	3		
14	4" (100 NB)	1	1	15	6		
15	< 4" (<100 NB)	1	1	0	0		



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BILL OF QUANTITY-SPARES**[A] LIST OF COMMISSIONING SPARES**

ONE PAIR OF GASKET FOR EACH ORIFICE ASSEMBLY
(As specified in each datasheet)

[B] LIST OF MANDATORY SPARES

NONE



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SECTION – D

EQUIPMENT SPECIFICATION



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1.0 SCOPE

This specification covers the design, manufacture, calibration, inspection and testing at the manufacturer's works, proper packing for transportation and delivery to site of flow measuring devices (orifices assembly) for use in Utility/Captive Power Station/Combined Cycle Station.

2.0 CODES AND STANDARDS

2.1 All the equipment specified herein shall comply with the requirements of the latest issue of the relevant National and International standards.

2.2 The Design and Materials used for the components shall also comply with the relevant National and International standards.

2.3 As a minimum requirement, ISO 5167 / BS 1042 standard shall be complied with for Flow Orifices.

3.0 TECHNICAL REQUIREMENTS

The orifice plates shall be used as the primary flow sensing elements. These sensing elements shall provide a safe and reliable means of creating differential pressure for use in flow measurement.

3.1 Orifice Plates

The orifice plate assemblies shall conform to the following requirements unless specified otherwise in the corresponding data sheets.

3.1.1 Type:

The Orifice plates shall be of concentric type, designed and manufactured as per BS-1042 / ISO 5167. The data sheet enclosed specifies the requirements of each orifice plate assembly. The bidder shall calculate the Beta ratio and validate suitability of the selected design for the specified application, Vent holes, if required for the specified duty shall be located at the top and drain holes at the bottom of the orifice.

3.1.2 Material: The material of the Orifice plates shall be stainless steel type SS 316, unless otherwise specified.

3.1.3 Orifice Plate thickness shall be ≥ 3 mm (min.) for pipes having diameter ≤ 250 mm and shall be ≥ 6 mm (min.) for pipes having diameter up to 500 mm and shall be ≥ 10 mm (min.) for pipes having diameter up to 1000mm unless otherwise specified for a specific project.

3.1.4 Assembly: Orifice plates shall be supplied as complete assemblies, along with companion flanges on both sides having proper end connection for welding on to the associated pipe at site, gaskets, nuts & bolts. The carrier ring assembly shall be supplied along with corner taps for orifice assembly having sizes ≤ 2 inches, if required in a specific project. End flanges along with Counter flanges shall be provided as per requirement. Concentric Square edge orifice shall be provided with downstream beveled edge.

Each flow orifice assembly shall be provided with minimum THREE pairs of pressure tapping complete with accessories, suitable for the service conditions. The pressure tapping shall be provided either on the carrier ring or on the companion flanges as the case may be.

Extra pressure tapping (other than the THREE tapping's mentioned above) complete with accessories shall be provided in case to case basis for a specific project if required.



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Each orifice plate or the carrier ring assembly (as the case may be) will also be provided with an extended handle. The Tag No. and duty will be permanently marked on both the sides of this handle.

3.1.5 Flanges: The flanges shall conform to latest revisions of ANSI B 16.5 / ASME B16.36 / ASME B16.47 (B). The companion flange and the carrier ring material shall be same as that of the main pipe. These shall be manufactured from forged material. Companion flanges shall be suitably rated for the specified service conditions.

3.1.6 Hydraulic test pressure for Assembly shall be 1.5 times of the design pressure at normal temperature

3.1.7 While machining the ID to maintain a uniform internal diameter, care shall be taken to ensure the minimum thickness of the branch pipe as per IBR regulations.

3.2 Guarantee & Performance

The guarantee for the flow orifice assemblies shall be for 12 months continuous operation from the date of commissioning.

4.0 TESTS & INSPECTION

4.1 The equipment covered under this specification shall be subject to vendor's quality plan to be approved by the purchaser before start of manufacturing. To ensure that quality is in-built in each equipment the quality assurance system manual indicating the system followed by the vendor shall be submitted to purchaser for his review.

4.2 The quality plan forming part of this specification shall be the minimum requirements for the vendor's quality plan to be submitted with the offer. The vendor shall give at least 15 days written notice to purchaser for witnessing the tests/inspection at various stages. The expenses for all such tests/inspection shall be to manufacturer's account except for the expenses of purchaser's representatives witnessing the tests. The purchaser shall attend such tests/inspection within 15 days failing which the manufacturer may proceed with the tests which shall be deemed to have been made in purchaser's presence and shall furnish relevant test certificates to the purchaser.

4.3 One orifice plate of each type and size for each project unless specified shall be tested and calibrated by the bidder at customer/BHEL approved laboratory, within his quoted price. Details of the calibration test i.e., type of test, equipment's employed etc. shall be submitted in the bid.

4.4 IBR certification, if required for the specified service shall be obtained by the successful bidder from the concerned authority for submission to the purchaser.

4.5 The Standard QP is included in this specification to enable bidder to understand the extent of inspection and testing requirements to execute this job. The successful bidder has to follow the agreed QP, taking care of customer requirements mentioned in Sec-C and submit QP for final approval by BHEL / Customer.

5.0 DRAWINGS & DOCUMENTS

(A) For RATE CONTRACT: Following documents shall be submitted:

- a) Quality plan duly signed and stamped.
- b) Datasheets duly signed and stamped.
- c) Schedule of submission of Drg. /Doc, Manufacture, Inspection and Dispatch signed and stamped.
- d) Unpriced bid format of Price Schedule.



Technical specification for
Flow Orifice Assembly with Accessories
(RATE CONTRACT)

SPEC NO.: PE-TS-20-145-I105A

VOLUME II B

SECTION D

REV. NO.

00

DATE :

(B) After the award of project specific contract :

The documentation as listed below to be submitted, separately for respective projects.

3 sets of the following documents + 3 sets of CDs to be submitted for Approval:

- Assembly drawing of all type of Flow Element assemblies complete with all accessories indicating detailed dimensions, BOM and weights.
- Flow Element Edge preparation details.
- Installation drawings for the flow elements.
- Technical Data sheet-C completely filled-up.
- Quality Plan duly signed and stamped.
- Bore size calculations for Flow orifices for all the conditions indicated in the data sheets.
- Differential Pressure Vs Flow, curve for each Orifice.
- All relevant catalogues for the models of the Flow Element Assemblies as well as accessories finalized.
- Bar chart to indicate the time schedule for procurement, manufacture, testing and dispatch.

(C) Final documentation for a project:

Final documentation shall contain 10 sets with 5 CD-ROMS of each of the following:

- Category –I & IV Approved final drawings/data sheets, Bore sizing calculations, DP Vs Flow Curve for each Orifice.
- Verified test certificates
- Approved Quality Plan
- Calibrations Reports
- Quality Inspection Report
- Operation & Maintenance Manuals for Flow Element Assemblies and all the accessories (Containing storage & commissioning instructions).

6.0 PACKING & MARKING

6.1 Packing: Each orifice plate assembly and the associated accessories shall be packed properly with adequate protection against friction, stresses, vibrations and shocks during transportation. Each packing shall have markings as per Purchase Order / Special Condition of the Contract (SCC).

6.2 Marking: A SS name plate shall be permanently fixed on each equipment. Each flow element assembly shall be identified with the following information:

- Tag Number
- Service
- Element Material
- Beta ratio
- Line size & thickness
- Direction of flow

7.0 APPLICABLE DATA SHEET FORMS

This document shall be read with one or more of the following data sheet forms:

- Data sheet A for Flow-Orifice: DS-"X" (X==1 to 2)