



**CONTROLS & INSTRUMENTATION (FB)
PRE-QUALIFICATION REQUIREMENT (PQR)**

**CI:PE:PQR: MFM
Rev. No: 00
Dt. : 15-10-2021**

Coriolis Mass Flow Meter

Sl. No.	Description	Bid Requirements	Vendor compliance
1.	Vendor Capability	Vendor shall be the Original Equipment Manufacturer (OEM) of Coriolis Mass Flow Meters.	
2.	Proven Track record	The offered Coriolis Mass Flow meter models, should be of proven design, already supplied to power plants in India and the same shall be working satisfactorily for a period of minimum 2 years as on the date of technocommercial bid opening.	
3.	Past experience / Reference Projects	<ul style="list-style-type: none">• Vendor to submit signed copy of the reference list of projects, where the offered Coriolis Mass Flow meter, were supplied earlier in the past five years. The reference list should contain the following details, Name of the projects, Customer, Capacity of the plant, location, model number of the mass flow meter, application, year of commissioning and contact details along with relevant PO copies.• Vendor shall submit the performance Certificates from End User/ Principal Contractor (if the supplies were through agencies other than BHEL).	
4.	Service & Spares support	Spares & service support shall be available in India.	

BHARAT HEAVY ELECTRICALS LIMITED

HIGH PRESSURE BOILER PLANT, TIRUCHIRAPALLI - 620 014

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



TCI:1727/MFM




PAGE 1 OF 5

CORIOLIS MASS FLOW METER

for

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

REVISION HISTORY

REV. No.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
00	25-09-2020	Initial Release	 (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
1.3	Relative humidity	73%
2.0	Type of Flow Meter	
2.1	Measuring Principle	Coriolis Mass Flow – Direct Measurement
2.2	Wetted Parts	SS316
2.3	Sensor Housing	Weather Proof with SS304 Housing (Minimum)
2.4	Flange Dimensions	Flanges, to be matched with purchaser's line size & mating flanges with reducer and expander if required (forged type) shall also be supplied along with mounting hardware.
2.5	Flange Rating	300 LBS
2.6	Flange Material	A105
2.7	Permissible Sediment Size	300 microns (Minimum)
2.8	Enclosure	IP65
2.9	Terminal Block	Suitable for 1.5 mm ² cable
2.10	Hazardous Duty Version	FM Standards
2.11	Cables	Special Cables required between flow sensor and electronic transmitter up to 15 metre shall be offered
2.12	Process Connection	ANSI 300 RF
2.13	Electrical Connection	¾" ET
2.14	Process Condition	Refer Datasheet DS/1727/MFM
2.15	Heat Tracing for HFO Application	a) Integrated steam jacket suitable for max 18 Kg/cm ² steam pressure. b) ½" ANSI 300# A105 flanged connection with counter flange.
3.0	Field Mounted Transmitter	
3.1	Enclosure Protection	IP 65 or better suitable for Explosion Proof for NEC Class I, Division 1 area.

Sl. No.	Characteristics	Requirements
3.2	Power Supply	90- 250V AC, 1 PH, 50 Hz UPS power supply will be provided at one point. Distribution to the sensor electronics, derivation of any other supply for the electronics by the Vendor.
3.3	Local Display	Local LCD display required to read the process variables, to get communication parameters, reset flow totalizers and to view diagnostic messages
3.4	Input Signal	From the mass flow meter (sensor)
3.5	Outputs	Two nos. 4-20 mA DC, galvanically isolated signal selectable from four measured quantities.
3.6	Load	750 Ω
4.0	Performance Parameters	
4.1	Turn Down	100:1
4.2	Max. Pressure loss allowed	< 0.5 Bar across the meter
4.3	Flow Accuracy	± 0.200 % or better
4.4	Flow Repeatability	± 0.100 % or better
4.5	Density Accuracy	± 0.004 g/cm ³ or better
4.6	Density Repeatability	± 0.002 g/cm ³ or better
4.7	Temperature Accuracy	$\pm 1^{\circ}\text{C}$
4.8	Temperature Repeatability	$\pm 0.05^{\circ}\text{C}$
4.9	Terminal Blocks	Suitable for 1.5 mm ² size cable
4.10	Electrical connection	2 Nos. of 1/2 "size (min.) Double compression flame proof cable glands for the cable entries to be provided.
5.0	Documents	
5.1	To be submitted along with offer	a) Sub Delivery Enquiry Deviation indicating the Description, Specification, Quality Plan, Packing Procedure reference. b) Flow Accuracy, Pressure Drop and other details in tabular/ graphical form for the whole range of Flow(e.g., 10%, 20%, 30%,...100 % of Maximum Flow)



Sl. No.	Characteristics	Requirements
5.2	To be submitted After Placement of Purchase Order for Approval	a) O&M manual b) Flow Accuracy, Pressure Drop and other details in tabular/ graphical form for the whole range of Flow(e.g., 10%, 20%, 30%,... 100 % of Maximum Flow)
5.3	To be submitted during Inspection	a) Type Test Certificate b) Calibration Certificate c) Material certificate
5.4	Quality Plan	QA:CI:STD:QP:72/01
5.5	Packing Procedure	QA:CI:STD:PR:04/03

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/MFM**




Sl. No.	Description	Technical Parameter	
		Light Diesel Oil (LDO)	Heavy Fuel Oil (HFO)
1.1	Service	Light Diesel Oil (LDO)	Heavy Fuel Oil (HFO)
1.2	Tag No	HJF51CF001	HJF59CF001
1.3	Operating Pressure	19.7 kg/cm ²	22.2 kg/cm ²
1.4	Operating Temp.	40 °C	120 °C
1.5	Process Temperature Range	0 - 150 °C	
1.6	Maximum operating Flow	15,200 Kg/Hr	47,600 Kg/Hr
1.7	Minimum Flow	2,028 Kg/Hr	1,890 Kg/Hr
1.8	Meter Max/ Calibration Range (4-20mA)	0 - 20,000 Kg/Hr	0 - 60,000 Kg/Hr
1.9	Line size (OD x T-mm)	NB50 (60.3X3.91)	NB100 (114.3X6.02)
1.10	Kinematic viscosity	2.5 - 15.7 cSt @ 40°C	20 cSt @ 120 °C
1.11	Viscosity Range	---	0 - 370 cSt
1.12	Density	0.85 Kg/L at 40°C	0.95 Kg/L at 67 °C
1.13	Sediment	0.1 % Volume (max.)	0.25 % weight (max.)
1.14	Pipe material	SA 106 Gr B	SA 106 Gr B
1.15	Sulphur content	1.8 % weight (max.)	4.5 % weight (max.)
1.16	Ash content	0.02 % weight (max.)	0.1 % weight (max.)
1.17	Reducer Expander (Yes/No)	Vendor to specify in their offer.	



CONTROLS AND INSTRUMENTATION/QA/FB

STANDARD QUALITY PLAN FOR

MASS FLOW METER

REV	DATE	PREPARED	REVIEWED	APPROVED	REVISION HISTORY
00	27/02/2013	Sd/-	Sd/-	Sd/-	Initial release.
01	17/06/2014	V.AVINASH 	RM.VAIRAVAN 	N.SRIDHAR 	Revised based on discussion with C&I/Engg on 17/06/14



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	Finished Product Inspection											
01	Flow Sensor	Material	Major	CHEM	Sample	-	PO, BHEL Spec	TC or COC	P	V	-	
02	Mounting Flanges	Material	Major	CHEM	Sample	-	PO, BHEL Spec	-Do-	P	V	-	
03	Sensor	Dimensional Check	Major	MEAS	100%	-	BHEL Appd Drg	TR	P	V	-	
04	Complete Unit	a. Verification of components and accessories	Major	VISU	100%	Random	PO, BHEL Appd Drg.	TR	P	W	-	
		b. Functional test including calibration for repeatability, linearity and accuracy	Major	ELEC	100%	-	BHEL Appd Drg	TR	P	V	-	
		c. Power – ON	Major	ELEC	100%	100%	Mfr. Std.	TR	P	W	-	
05	Type Tests	a. Enclosure Protection (Transmitter and Sensor)	Critical	ENVI	One of design	One of design	PO, BHEL Spec	TC or COC	P	V	-	
		b. Explosion Proof Certificate	Critical	ENVI	-Do-	-Do-	PO, BHEL Spec	TC	P	V	-	If applicable

D.NOTES:

1.LEGENDS:

ELEC	:	Electrical	MEAS	:	Measurement
TR	:	Test Report	TC	:	Test certificate
VISU	:	Visual	CHEM	:	Chemical
ENVI	:	Environment	COC	:	Certificate of compliance

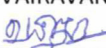

- The vendor shall arrange all testing facilities at their works. Tests for which facilities are not available are to be carried out at recognized National Test Houses like ETDC/CIL/NPL/ERTL etc., at vendor cost.
- Through Log Book / any other documents available at the vendor's works, it shall be possible 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 test are to be furnished by the vendor.
- Type test certificate shall not be earlier than 5 years from the date of Purchase Enquiry.
- 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.

**BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPPALLI**

**CONTROLS AND INSTRUMENTATION / FB
QUALITY ASSURANCE**

**STANDARD PACKING PROCEDURE
FOR
ALL INSTRUMENTS AND MISCELLEANEOUS 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.

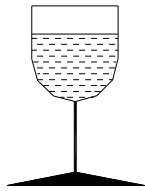
6. Caution

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

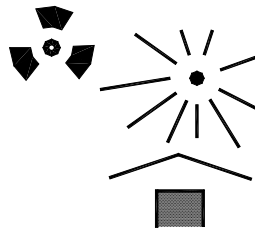
7. General

- 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



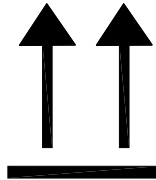
USE NO HOOKS

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



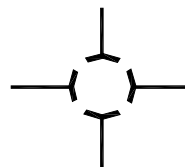
KEEP DRY

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



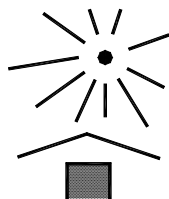
THIS WAY UP

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



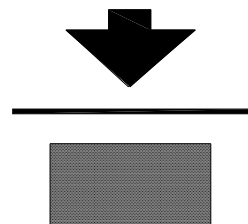
CENTRE OF GRAVITY

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).



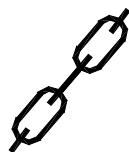
KEEP AWAY FROM HEAT

... kg max



STACKING LIMITATION

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



INTERNATIONAL "SLING HERE" SYMBOL

/ On Bidder's office letter pad /

Self-Declaration

Enquiry No.	GEM/2021/B/1731429
Enquiry Date	04.12.2021

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/1731429**

Description : **Coriolis Mass Flow Meter**

Documents : **Specification: TCI:1727/MFM Rev.00**

Drawing No. : -

Quality Plan : **QA:CI:STD:QP:72 Rev.01**

Packing Procedure : **QA:CI:STD:PR:04 Rev.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

GEM/2021/B/1731429 dt 04.12.2021

Sl no	Terms	Conditions	Vendor confirmation
1	Delivery term	Vendor shall quote unit price on FOR / Destination site bais inclusive of Packing & Forwarding, Freight & GST. Insurance will be on BHEL scope. Note: Main items are to be dispatched to Bhushawal project site & Spare items are to be dispatched to BHEL Trichy stores.	Quoted /Not quoted
2	Delivery Period	The indicated delivery days on GeM portal is from drawing approval/manufacturing clearance. Delivery days shall inclusive of all the activities like manufacturing, inspection, Packing & Forwarding and dispatch.	Accepted
3	Payment term	100% payment within 60 days of issue of consignee receipt-cum-acceptance certificate (CRAC) . MSE vendor payment will be made as per MSME act 2006. Any deviation in the above Payment Terms, any other conditions in payment terms or any other payment term will not be accepted and offers are liable to be commercially rejected.	Accepted
4	LD clause	As per present GEM T&C	Accepted
5	Guarantee period	18 months from the date of supply or 12 months from the date of commissioning whichever is earlier.	Accepted
6	HSN CODE	Indicate HSN code for quoted items	
7	GST	Pl Mention in GST % for quoted items	%
Document submission along with bid			
8	Attachments 1	Whether vendor belongs to MSE & Have you submitted Udyam registration certificate (To validate MSE status)	Yes / No
9	Attachments 2	Have you submitted filled ,sign & sealed point wise compliance for PQR with supporting documents . Please mention the corresponding page no also for each PQR point.	Yes / No
10	Attachments 3	Have you submitted Filled, signed & sealed "NIL Deviation Format" .	Yes / No
11	Attachments 4	Have you submitted signed , sealed in the all pages of tender documents like "Technical Specification, Drawing /datasheet , testing procedure, Quality Plan & packing procedure" with respect to this tender along with offer.	Yes / No
12	Attachments 5	Have you Filled local content %, signed , sealed & submitted "Self declaration format for MII clause" as per BHEL format in your company letter head.	Yes / No
Note: vendor consents that the terms & conditions accepted, in GEM alone, shall be binding between BHEL and the Vendor; and no other terms mentioned, elsewhere in the un priced offer / Quotation will be considered / accepted by BHEL.			
VENDOR DETAILS			
1	Vendor Name		
2	Office Address		
3	Contact Person Name		
4	Mobile No		
5	E mail Id		
6	GSTN		

Vendor to fill & submit this Annexure with sign & seal along with offer .