



PRODUCT STANDARD

PROJECT ENGINEERING & SYSTEMS DIVISION

HYDERABAD

Std. / Doc. Number

PY 56489Rev. No. **00**

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Specification for Turbine Flow Meter

1. SCOPE

This technical specification covers the Design, Engineering, Manufacturing, Assembly, testing at vendor works, inspection by purchaser, packing and transportation to site with necessary documentation like data sheets, statutory approvals, O&M manuals etc., as required for TURBINE FLOW METER.

2. Proven Track Record

The items being offered as per specification should be operating satisfactorily in captive power plant applications / hydrocarbon industries like Refinery, Petrochemical and gas processing plants under similar process conditions for at least 4000 Hours. The above criteria shall be applicable to main equipment, sub- components as well as bought out items if any.

Vendor shall submit necessary supporting documents / past users confirmation supporting to above PTR requirements along with technical offer.

If offered instruments / equipments are supplied to BHEL PE&SD within last 5 years, above PTR clause is not applicable.

3. INSTRUCTIONS TO BIDDERS

3.1 Bidders **are advised to contact BHEL for essential technical queries in writing within one week of issue of Enquiry**. In the event of any conflict between these specifications, data sheets, related standards, codes etc. the vendor shall refer the matter to the purchaser for clarifications before bid submission and the decision of Purchaser shall be final & binding on Bidder, without any cost & delivery implications. In the event of conflict, most stringent requirements shall be followed in general.

3.2 Offers with incomplete information will not be considered for evaluation, and are likely to be rejected outright without any further interaction with the Bidder.

3.3 Any technical features [over & above BHEL enquiry specification requirements] proposed by Bidder will not be given preference for the purpose of evaluation.

3.4 Bidder shall submit the "Duly filled & Signed copy of Check list" compulsorily along with technical offer without which offer is liable for rejection without any further interaction with the Bidder

4. GAS COMPOSITION – shall be as per Annexure-[1] of this specification.

5. PRICE FORMAT - shall be as per Annexure-[2] of this specification.

6. APPLICABLE STANDARDS

The meter shall conform to following standards (Latest editions) for designing of flow meter.

Standard	Description of Standard
AGA-10	Speed of sound in Natural Gas & Other related hydrocarbon gasses.
API 2540	All calculations, conversions and corrections.
IEC79-01	Electrical apparatus for Flame proof / Explosive proof applications.
IEC79-11	Electrical apparatus for intrinsic safe applications.
IEC 801	Electromagnetic capabilities for Industrial process measurement and control equipment.
ANSI B2.1	Threaded end connections.
ANSI B16.5	Flange dimensions and ratings.
ANSIB 31.8	Gas transmission and distribution piping systems.
IEC529/ IS2147	Classification of degrees of protection provided.
IS 1554	For PVC insulated cables.
IS 2148	Flameproof enclosures for electrical apparatus.
ISO 12765	Measurement of Fluid Flow in Closed Conduits – Methods using Transit Time Ultrasonic Flow meters
ISO 2186	Fluid Flow In closed conduits – Connections for Pressure Signal Transmissions between Primary and Secondary Elements.
ISO 6976	Natural Gas – Calculation of Calorific Value, Density and Relative Density.

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Revisions:

Refer to record of revisions

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Date :

05.11.20



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7. CHECK LIST (To be filled by BIDDER and submitted along with Technical offer is compulsorily)

Vendor shall submit the following documents mandatorily as part of COMPLETE technical offer.

Enquiry No. / Date :

Name of the Bidder :

Project Name :

Item Description :

S. No	Document	Bidder confirmation (Yes/No)	Remarks
1	Technical offer complies with the specifications and its associated annexures, pre-bid clarifications in Toto and there are no technical deviations. Signed and stamped copy of this specification along with annexures enclosed along with technical offer.		
2	In case of deviation, vendor to confirm that these are technically not feasible deviations and same are submitted in BHEL format . In case technically feasible deviations are proposed by the bidder and subsequently withdrawn, <u>no commercial implications can be claimed by the bidder</u>		
3	All items are manufactured conforming to latest version of material grade standard and manufacturing standard mentioned in this specifications		
4	Bidder to quote as per BHEL price format only. No other format is acceptable. Bidder to attach un-priced price bid format by indicating "QUOTED" against each item and submit with technical offer duly signed & stamped.		
5	For addition/reduction of quantity, unit rate quoted in the present offer shall be considered during ordering and shall be valid up to execution of the contract to the extent of + 10% and -30% of order Value.		
6	Bidder to agree that Bill of materials / list of equipment furnished in the offer is only for information; Vendor shall supply all the material to meet the performance, sizing & technical requirement as per specification & its Annexures, scope matrix etc.		
7	All the equipments / items / etc., supplied by bidder are having valid statutory approval certificates and same will be produced at any stage of contract execution to BHEL. The same were eligible to take local statutory regulatory body approval during commissioning of the system		

 (Bidder's Signature and stamp with date)



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DEVIATION FORMAT

Enquiry No.:Item:Name of Bidder:Offer Ref. No.:

Sl. No.	Clause no. & Spec. no.	Description as per Specification	Deviation taken	Nature of Deviation	Remarks

NOTES:

1. Technical offer of the bidder will be evaluated only on the basis of Deviation Schedule. Deviation Schedule constitutes this sheet (with these Notes) duly signed and stamped.
2. Deviations, if any, shall be clearly brought out only in this format. Deviations mentioned / taken elsewhere or in any other format will be ignored.
3. Additional sheets in the same format can be attached by the vendor, if necessary.
4. Nature of Deviations shall only be of Design / Manufacturing constraints and non-availability of items / components / makes in market.
5. No price implications shall be entertained for deviations withdrawn during the technical scrutiny. If any deviations are accepted by BHEL during technical scrutiny then also there will be no price implication. Hence, in no case there will be consideration of Price implications.
6. Reasons for the deviations shall be specified in the Remarks column.
7. If there are no deviations from the specifications, bidder still has to submit the signed copy of this format by writing "NO Deviations" on this format.
8. If the "Deviation Schedule" is not submitted along with the offer, the bidder's offer is likely to be rejected without any further interaction with the bidder. Only the accepted deviations in conjunction with the original tender shall constitute the contract document for the award of job to the bidder

SIGNATURE OF THE BIDDER_____

NAME_____

DESIGNATION_____

DATE_____

COMPANY SEAL



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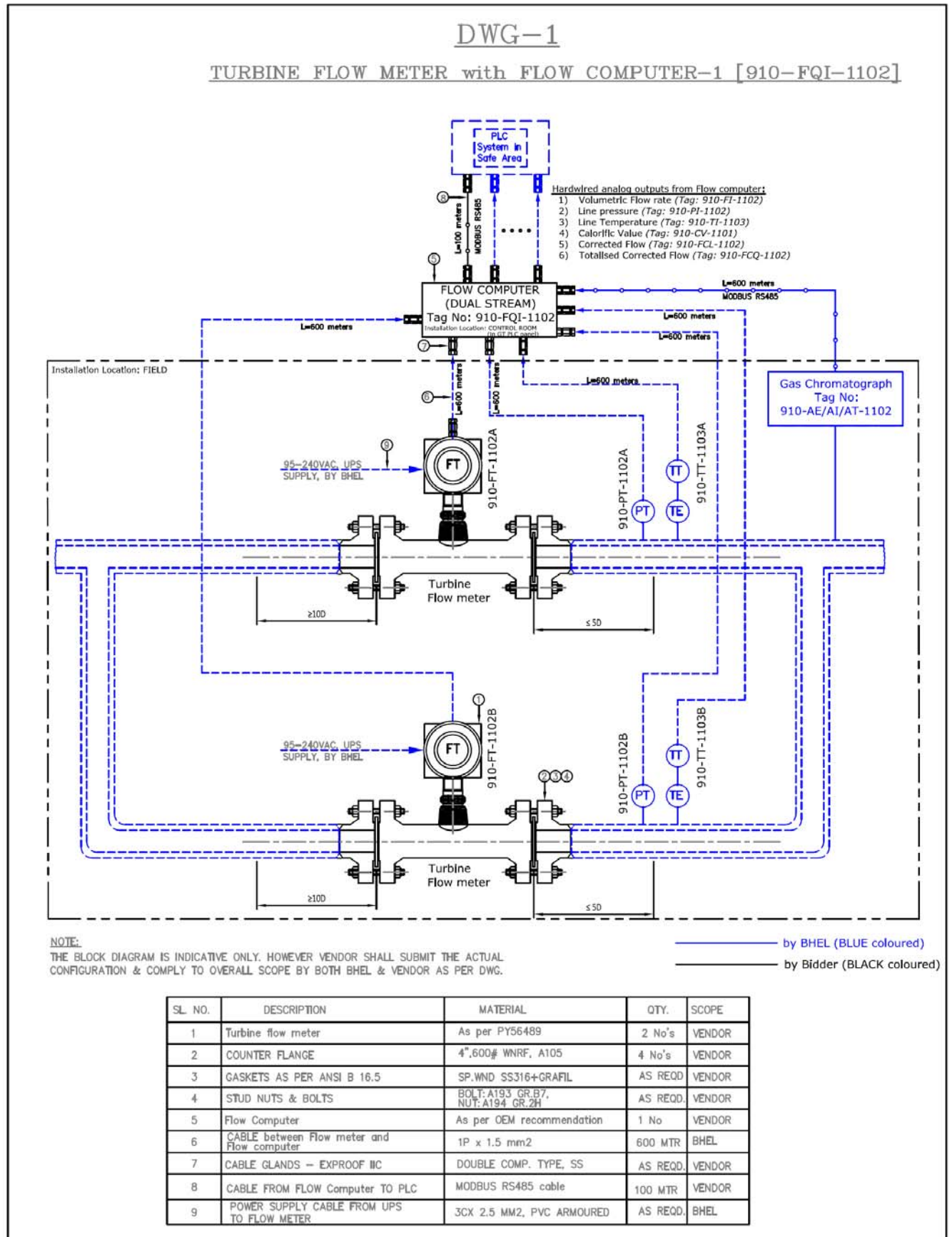
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8. TECHNICAL SPECIFICATIONS

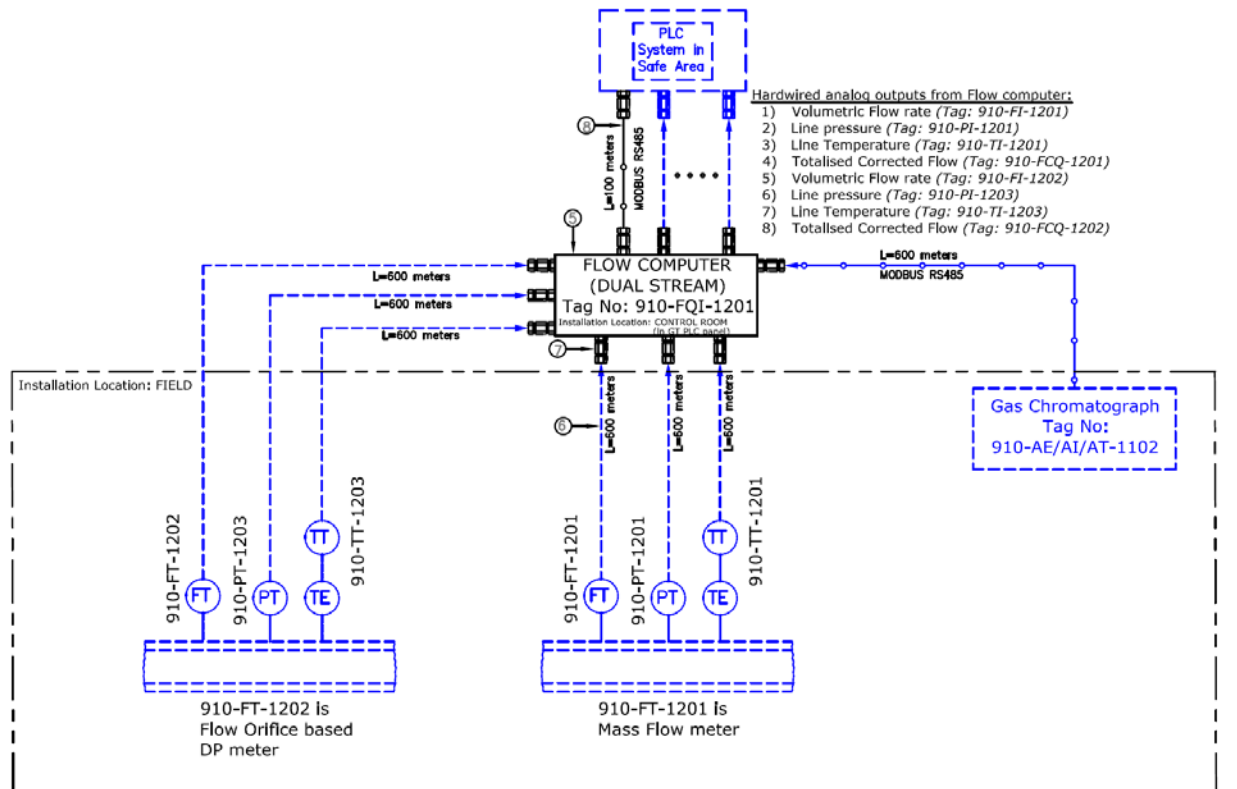
S.No.	Description	Requirement
(1)	Meter application	Non-Custody
(2)	Type of Flow meter	Turbine flow meter [Refer DWG-1]
(3)	Tag No	910-FT-1102A & 910-FT-1102B
(4)	Quantity	2 No's
(5)	Service	RLNG / SRG flow measurement
(6)	Line Number	4"-P-910-5107-DA1A
(7)	Line size/MOC/Schedule/Rating	4" / Carbon Steel / Sch STD
(8)	Location	Plant boundary, Gas supply line by EIL/GAIL
(9)	Meter Installation	Outdoor
(10)	Fluid / Fluid state	RLNG & SRG / Gaseous
(11)	Flow (Min - Nor - Max - Design)	2780/3728/4120 Nm3/Hr
(12)	Pressure (Min-Nor-Max-Design)	25/28/39/52 Kg/cm2(g)
(13)	Molecular weight	Refer attached gas composition sheet
(14)	Compressibility	Refer attached gas composition sheet
(15)	Viscosity [In Cp]	Refer attached gas composition sheet
(16)	Temp (Min - Nor - Max-Design)	4/35/55/65 Deg C
(17)	Body Material	Carbon steel.
(18)	Meter mounting	Horizontal
(19)	Accuracy	As per vendor standard
(20)	Repeatability	As per vendor standard
(21)	Meter sizing	-By Considering maximum flow rate at minimum pressure conditions. -Maximum Velocity 20 Meters/Sec.
(22)	Pressure Drop	Minimum (Less than 0.2 Kg/Cm2(g)).
(23)	End Connections [type/Size/Rating]	Flanged –WNRF / Selected meter size / 300#.
(24)	Power supply	Loop powered from flow computer.
(25)	Local Flow indicator	Required with Engineering units.
(26)	Self-diagnostic features	Required for monitoring the health of transducer and signal quality.
(27)	Outputs	a) 4- 20 mA, 2 wire, active/ passive (site switchable) - 1 No for volumetric flow (m3/Hr) b) RS485 (MODBUS RTU) for flow & diagnostics - 1 No to flow computer interfacing. c) Signal output required for flow computer interface – (quantity) As required.
(28)		
(29)	Calibration flow range	4120 Nm3/Hr
(30)	Enclosure	Intrinsic safe & Suitable for Zone-1, IIC, T3.
(31)	Cable Entry	As per vendor standard
(32)	Cable Glands (applicable Flow meters and flow computer)	Flame proof NI plated brass Double Compression for all cable entries
(33)	Dummy Plugs (applicable Flow meters and flow computer)	SS + Flameproof type for 50% of the cable entries
(34)	Approved makes	Bidder to select and submit PTR for BHEL approval
(35)	Tag no	910-FQI-1102 (Dual Stream) & 910-FQI-1201 (Dual Stream); Qty = 2 No's
(36)	Inputs	As per DWG-1 & 2
(37)	Outputs	As per DWG-1 & 2
(38)	Application	Flow computation of gas flow measurement. Refer DWG-1 & 2 for scope.
(39)	Location	Control room; Approx. distance from flow meter is 600 Meters.

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DWG-2
FLOW COMPUTER-2 [910-FQI-1201]



SL. NO.	DESCRIPTION	MATERIAL	QTY.	SCOPE
5	Flow Computer	As per OEM recommendation	1 No	VENDOR
6	CABLE between Flow meter and Flow computer	1P x 1.5 mm ²	600 MTR	BHEL
7	CABLE GLANDS — EXPROOF IIC	DOUBLE COMP. TYPE, SS	AS REQD.	VENDOR
8	CABLE FROM FLOW Computer TO PLC	MODBUS RS485 cable	100 MTR	VENDOR

9. INSPECTION & TESTING

Inspection & Testing shall include but not be limited to the following. All the tests being conducted shall clearly bring out in the Quality Assurance Plan (QAP) by Vendor. QAP shall be submitted to BHEL for approval during post order.

(1)	Dimensional and physical verification of model no, serial no and name plate	:	100 % Witness
(2)	BOM verification & Visual check	:	100 % Witness
(3)	Functional test (Power on, display configuration, etc.)	:	100 % Witness
(4)	Material test certificates	:	Certificate Review
(5)	Ex-proof & intrinsic safe certificates	:	Certificate Review
(6)	Certificate of Ingress protection	:	Certificate Review
(7)	Radiography test for joints & welds	:	Certificate Review
(8)	Hydrostatic test(1.5 times of design pressure)	:	Certificate Review
(9)	Wet calibration	:	Certificate Review
(10)	Manufacturing process in house test reports	:	100 % Review

10. WET CALIBRATION

10.1 Sensor & transmitter shall be wet calibrated in integrated manner i.e. connecting sensor & transmitter together electrically.

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10.2 Wet Calibration shall be carried out at vendor works or at any third party calibration facilities confirming to offered accuracy, this is a mandatory requirement. NABL certified In-house or third party laboratory should be certified by recognized agency for carrying out wet calibration. 11. SUPERVISION OF ERECTION & COMMISSIONING 11.1 Vendor shall provide supervision of Erection & commissioning services as per enquiry. 11.2 If it is in vendor scope, following shall be the scope of work: - Services charges shall include the travel to & fro travel from vendors work to site, lodging, boarding & local travel. Vendors shall arrange their own lodging, boarding & traveling. - Vendors shall arrange their own Test equipment's, commissioning tools, manpower etc as required 11.3 Number of man days and number of visits as specified in the "<u>Enquiry</u>" shall be considered. However, either or both of the number of man days or no of visits may increase / decrease based on the actual site requirement. 11.4 Bidder to mobilize concerned competent person for supervision of Erection & commissioning activities within a period of 6 working days of receipt of intimation in this regard from BHEL. 11.5 Above services shall be ordered by BHEL Site at the time of commissioning. However vendor shall submit the price offer for services as per "<u>Enquiry</u>" and same shall be considered for L1 evaluation. 12. MANDATORY SPARES - Spares requirement shall be as per <u>enquiry</u> of this specification. 13. DOCUMENTATION 13.1 Information to be included with offer Vendor shall make the offer in detail, with respect to every item of the Purchaser's specifications. Any offer not conforming to this shall be summarily rejected. - Duly filled & Signed copy of Check list - Deviation list, if any (as per "No deviation format" given in this specification). If there are no deviations, bidders shall submit "Deviation format" by mentioning deviations "Nil". - Unpriced price schedule (To be submitted compulsorily without fail) - Proven Track record and reference list (To be submitted compulsorily without fail in-line with cl. 3 of this specification) - Bill of materials (only for information) 13.2 Documentation submission within 2 weeks of placement of LOI (for approval by BHEL and / or BHEL's customer in 4 sets) - Bill of materials with accessories - Data sheets of each and every instrument & Detail GA drawings - Type tests, statutory certificates - Comprehensive Quality Assurance plan (QAP). 13.3 Documents to be submitted during final shop testing and before equipment dispatch. (Note: submission of these documents are commercially linked) - Complete O& M manual – all in 16 sets (14 sets to be included with item dispatch and balance to BHEL purchase department). - Approved Engg documents - Guarantee and all test certificates for review and acceptance by BHEL and / or BHEL's Customer 2 sets of CD-ROM – containing O&M manual and Engineering documents (1 set to be included with item dispatch and balance to BHEL purchase department). 14. NAME PLATE Each equipment shall have a 316 SS nameplate attached firmly to it at a visible place furnishing the following information: - Instrument range & Tag number. - Manufacturer's name and emblem. - Manufacturer's model number. 15. PACKING / SHIPPING 15.1 The equipment shall be transported to site by the vendor in fully assembled condition. 15.2 However, in case some of the components are likely to be damaged during transportation, the same shall be dismantled after inspection and supplied separately duly packed, same to be reassembled at site by the vendor without any commercial implications. 15.3 Each item shall be suitably wrapped in polythene sheets, packed in wooden crates, etc properly tagged and secured before dispatch. 15.4 The vendor shall send each consignment to site with a detailed packing list. 15.5 In case of imported/exported items, seaworthy packing shall be done as per specification no: AA00490004 (latest revision). This specification shall be obtained by vendor on request from BHEL. 15.6 <i>If mandatory spare items are ordered, same shall be sent in pre-decided lots in containers /secure boxes distinctly marked in GREEN color with boldly written "S" mark on each face of the containers /secure boxes.</i>			



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RECORD OF REVISIONS

Rev. No.

Date

Revision Details

Revised By

Approved By

00

05.11.20

Original issue

K. Anand Babu

K. M. Babu

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