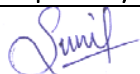
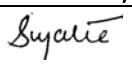
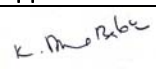


ESP-001- 2A Rev. 00 	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number													
			PY 56217													
			Rev. No.	00												
			Sheet 1 of 23													
<u>Specification for Field Instrument Package [FIP]</u> 1. SCOPE This technical specification covers 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 Field Instruments like transmitters, switches, gauges, etc. 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 <u>at least 4000 Hours</u>. 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. Field Instrument package BOM and Price format shall be as per Annexure-[1] of this specification. 5. DESIGN VARIABLES to be provided after P.O. Placement / during drawing approval: Following variables to be finalized during drawing approval and vendor shall comply the same without any commercial implication: <table border="1"> <tr> <td>a)</td> <td>Calibration Ranges of all instruments (like PTs, DPTs, PGs, RTDs, TGs, etc.)</td> <td>:</td> <td>Shall be intimated after P.O. placement</td> </tr> <tr> <td>b)</td> <td>Thermowell U – length</td> <td>:</td> <td>Shall be in the range of 280 mm to 400 mm. Actual length shall be intimated during drawing approval</td> </tr> <tr> <td>c)</td> <td>Safe working/Static pressure of DPGs, DPTs, etc</td> <td>:</td> <td>Shall be intimated after P.O. placement</td> </tr> </table>					a)	Calibration Ranges of all instruments (like PTs, DPTs, PGs, RTDs, TGs, etc.)	:	Shall be intimated after P.O. placement	b)	Thermowell U – length	:	Shall be in the range of 280 mm to 400 mm. Actual length shall be intimated during drawing approval	c)	Safe working/Static pressure of DPGs, DPTs, etc	:	Shall be intimated after P.O. placement
a)	Calibration Ranges of all instruments (like PTs, DPTs, PGs, RTDs, TGs, etc.)	:	Shall be intimated after P.O. placement													
b)	Thermowell U – length	:	Shall be in the range of 280 mm to 400 mm. Actual length shall be intimated during drawing approval													
c)	Safe working/Static pressure of DPGs, DPTs, etc	:	Shall be intimated after P.O. placement													
Revisions: Refer to record of revisions																
Prepared By:  Sunil Gautam		Checked By :  Sujatha Sapavat		Approved :  K. Anand Babu												
				Date : 20.05.17												

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED,
 It must not be used directly or indirectly in any way detrimental to the interest of the company.



PRODUCT STANDARD
PROJECT ENGINEERING & SYSTEMS DIVISION
HYDERABAD

Std. / Doc. Number

PY 56217

Rev. No.

00

Sheet 2 of 23

6. 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 COMPLTE 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		

COPYRIGHT AND CONFIDENTIAL

The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED .
 It must not be used directly or indirectly in any way detrimental to the interest of the company.

 (Bidder's Signature and stamp with date)



PRODUCT STANDARD
PROJECT ENGINEERING & SYSTEMS DIVISION
HYDERABAD

Std. / Doc. Number

PY 56217

Rev. No. 00

Sheet 3 of 23

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

COPYRIGHT AND CONFIDENTIAL

The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED .
 It must not be used directly or indirectly in any way detrimental to the interest of the company.

ESP-001- 2A Rev . 00		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	Std. / Doc. Number PY 56217 Rev. No. 00 Sheet 4 of 23
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.			
7. SUPERVISION OF ERECTION & COMMISSIONING 7.1 Vendor shall provide supervision of Erection & commissioning services as per "Annexure-[1] of this specification". 7.2 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 7.3 Number of man days and number of visits as specified in the "Annexure-[1] of this specification" 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. 7.4 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. 7.5 Above services shall be ordered by BHEL Site at the time of commissioning. However vendor shall submit the price offer for services as per "Annexure-[1] of this specification" and same shall be considered for L1 evaluation. 8. MANDATORY SPARES - Spares requirement shall be as per enquiry & Annexure-[1] of this specification. 9. DOCUMENTATION 9.1 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 (if applicable) - Bill of materials (only for information) 9.2 Documentation submission within 2 weeks of placement of LOI (for approval by BHEL and / or BHEL's customer in 4 sets) - Consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval. - Detail GA drawings - Type tests, statutory certificates - Comprehensive Quality Assurance plan (QAP). NOTES:: - BHEL Shall provide the following inputs to vendor immediately (within 7 days) after placement P.O. / LOI: <u>Instrument schedule</u> with tag no's, ranges, site identification no's, etc <u>Typical Cover page for pressure Gauge</u>: This is to be used for all instruments with necessary modification for each variety of instrument - Following points to be noted while submitting drgs & data sheets for approval: - Each instrument data sheet to be submitted along with cover page & tag list. - All extra quantities to be marked as "E.spares". - All data sheets & drgs to be submitted in soft copy first and once it is cleared for manufacturing, then same shall be submitted in spiral hard copies for formal approval. Do not submit drgs/data sheets in loose papers as well as in bits & pieces for approval. - All data sheets & drgs to be submitted in two strokes for approval as listed below and multiple submissions to be avoided: - All OEM instrument data sheets – 1st stroke - All non-OEM instrument data sheets – 2nd stroke			

ESP-001-
2A Rev . 00

PRODUCT STANDARD

PROJECT ENGINEERING & SYSTEMS DIVISION

HYDERABAD

Std. / Doc. Number

PY 56217

Rev. No.
00

Sheet 5 of 23

COPYRIGHT AND CONFIDENTIAL

 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED .
 It must not be used directly or indirectly in any way detrimental to the interest of the company.

c) *All vendor documents of FIP and its sub-items shall be submitted to Customer / Consultant for approval during order execution (if applicable). Any comment furnished by Customer / Consultant / BHEL shall be taken care by vendor during ordering execution.*

d) Further BHEL will provide comments on vendor submitted document within 07 working days for revision & resubmission. Vendor shall follow up with BHEL for non-receipt of comments/approvals.

e) Revised drawings / Documents shall be submitted by Bidder in 07 days of receipt of comments / observations from BHEL. BHEL shall revert within 7 days on receipt of these revised documents / drawings from vendor for approvals.

f) All the approvals required for manufacturing shall be completed within 2 months from P.O to meet the P.O delivery schedule. Accordingly vendor shall ensure the submission of approval category documents (which are required for manufacturing) and obtain their approvals.

g) Vendor shall obtain final approvals on all technical + quality aspect documents before inspection dates.

h) It is vendor's responsibility to obtain approvals from BHEL as earliest as possible to meet PO delivery schedules. Accordingly vendor to plan and execute the supplies in time.

9.3 Documents to be submitted during final shop testing and before equipment dispatch. **(Note: submission of these documents are commercially linked)** - all in 16 sets (2 sets to be included with item dispatch and balance to BHEL purchase department).

a) Complete O& M manual.

b) Approved Engg documents

c) As-Shipped documents

d) As-Built documents

e) Guarantee and all test certificates for review and acceptance by BHEL and / or BHEL's Customer

3 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).

10. NAME PLATE

Each equipment shall have a 316 SS nameplate attached firmly to it at a visible place furnishing the following information:

- a) Instrument range & Tag number.
- b) Manufacturer's name and emblem.
- c) Manufacturer's model number.

11. MARKING, PACKING AND DESPATCH

11.1 All items shall be marked (stamped/etched) in accordance with the applicable code/standard/specification. In addition, the item code, if available, shall also be marked.

11.2 For ease of identification, the color of painted strip (wherever required) shall be as per the applicable standard.

11.3 Part number/Dispatch link-up of all the equipment's/items supplied and also their co-relation with system/drawing/approved BOQ.

11.4 Paint or ink for marking shall not contain any harmful metal or metal salts which can cause corrosive attack either ordinarily or in service. Special items/smaller items shall have attached corrosion resistant tag providing salient features.

11.5 The equipment shall be transported to site by the vendor in fully assembled condition. However, in case some components are liable to be damaged during transit, the same shall be dismantled and supplied separately, to be reassembled at site the vendor. Assembly of the item supplied loose at site and repairing of any item damaged during transport shall be in the vendor's scope. The vendor shall send each consignment to site with a detailed packing list.

11.6 All the equipment shall be divided into several sections for protection and ease of handling during transportation. The equipment shall be properly packed for transportation by ship/rail or trailer. The equipment shall be wrapped in polythene sheets before being placed in crates/cases to prevent damage to the finish. Crates/cases shall have skid bottom for handling.

ESP-001- 2A Rev . 00		बी एच ई एल 		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number PY 56217	
				Rev. No.		00	
						Sheet 6 of 23	
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		11.7		Special notations such as 'Fragile', 'This side up', 'Center of gravity', 'Weight', 'Owner's particulars', 'PO Nos.' etc. shall be clearly marked on the package together with other details as per purchaser order.			
		11.8		The equipment/items may be stored outdoors for long periods before installation. The packing shall be completely suitable for outdoor storage in areas with heavy rains/high ambient temperature, unless otherwise agreed.			
		11.9		The following minimum packing procedures shall be followed:-			
				d) All items shall be dry, clean and free from moisture, dirt and loose foreign material of all kinds.			
				e) All items shall be protected from rust, corrosion, and mechanical damage during transportation and handling.			
				f) Each variety and size of item shall be supplied in separate packaging marked with the purchase order no., item code (if available), and the salient specifications.			
				g) All electrical, instrumentation etc., shall be properly packed to prevent damage during transport, storage, handling at site.			
				h) All the items which the Bidders considered liable to be damaged during shipment or storage, shall be packaged for separate shipment. If instruments are removed from the panel, they and their connection shall be suitably tagged to ensure simple re installation at the job site. Each instrument shall be sealed in plastic bags containing moisture absorbing dessicants.			
				i) It shall be bidder’s sole responsibility to protect all the material during period of dispatch, storage and erection against corrosion, incidental damage due to vermin, sunlight, rain, high temperature, humid atmosphere, rough handling in transit and including delays in transit.			
				j) Mandatory Spare parts shall be packaged separately and clearly marked as ‘Mandatory Spares’ .			
				k) Commissioning spares, Tools & tackles to be packed separately & suitably tagged.			
		11.10		If mandatory spare items are ordered, same shall be sent in pre-decided lots in containers /secure boxes distinctly marked in Red color with boldly written "S "mark on each face of the containers /secure boxes			
		11.11		Loose vendor items sent by vendor to sites shall be quantified/numbered/tagged and not merely mentioned as ONE lot of loose items.			
		11.12		A packing list covering items having shelf life are to be intimated to site. Also, shelf life items shall be packed separately in black color painted box for easy identification at site.			

ESP-001-2A Rev.00			PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD			Std. / Doc. Number		
						PY 56217		
						Rev. No.	00	
						Sheet	7 of 23	
Pressure Transmitter (PT) Technical Data Sheet								
GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)		ACCESSORIES	28	Mounting Bracket	Reqd, For 2" pipe mounting, SS304
	2	Type	Electronic Smart, Ex-proof & intrinsic safe EX ‘i’ type			29	U Clamp+Fastner	Reqd, SS 304
	3					30	Cable Glands	2 No's SS Double Compression+Flameproof
	4	Ambient Temp Limit	- 40 to 80°C			31	Cable entry Plugs	Reqd, SS 304 (1 No)
	5	Process Temp. Limit	- 40 to 120°C			32	Vent/Drain Plugs	Reqd, SS 304 (1 No)
SENSOR	6	Accuracy	For a rangeability of 1:10 a) Equal or Above 760 mmWC: ± 0.075 % b) Less than 760 mmWC: ± 0.15 %		TEST REPORT/CERTIFICATE	33	Tag Plate	Reqd, SS 304 (1 No)
	7	Response Time	As per OEM recommendation			34	Bolts + Nuts	Reqd. A193GrB7 + A194Gr2H
	8	Stability	As per OEM recommendation			35		
TRANSMITTER	9	Turn Down Ratio	As per OEM recommendation			36		
	10	Process Connection	1/2" NPT (F)			37		
	11	Electrical Connection	2 No's of 1/2" NPT (F)			38	Bill of Material (model, Tag no's)	100% Witness
	12	Power Supply	24V DC, Loop Powered			39	Spares (BOM, part no's)	100% Witness (if ordered)
	13	Over Range Protection	> 130% of range.			40	Statutory approvals like PESO, BIS, etc	100% Review (if applicable)
	14	Protection	IP 65			41	Material compliance certificate	100% Review
	15	Zero & Span adjustment	Required.			42	Five point calibration	100% review & 10% or min 2no's witness with random selection.
	16	Display	Integral LCD Digital (in Engg Units & in %).		43	Functional test (Output, HART, accuracy, Diagnosis, display)	100% review & 10% or min 2no's witness with random selection.	
	17	Impulse Entry	As per OEM recommendation		44	Hydro test for pressure parts	100% Review	
	18	Load Resistance	600Q @ 24 VDC		45	Internal IR test for all cards, assembly	100% Review	
	19	Output	4-20mA + HART		46	Ingress Protection Test	100% Review	
	20	Diagnostic Features	Required.		47	Intrinsic Safety Test	100% Review	
MATERIAL	21	Hazardous area class	Zone-1, IIA/IIB, T3.		PROJECT SPECIFIC	48		
	22	Body	SS316			49		
	23	Element	SS316 (or) better			50	Certification	As per OEM recommendation
	24	Sensor O-Ring	Glass-filled PTFE/Teflon			51	Compartments	As per OEM recommendation
	25	Electronic Housing	Die-cast Aluminum			52	Manifold Type	Non-Coplanar, Integral 2-Way, 1/2" NPT(F), SS 316
	26	Sensor fill fluid	Silicon Oil			53	Statutory Approvals	PESO (For Instrument+Glands+Plugs)
	27	Humidity	0 - 100% RH			54	Sensor Type	Non-Inductive type.
NOTES:: 1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement 2 Tag list shall be furnished by BHEL after P.O. palcement 3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval. 4 Vendor shall not submit any data sheet for approval after P.O. placement. 5 GA drawings shall be submitted for approval (if applicable)	Approved Makes / Vendors	EMERSON PROCESS MGT (I) PVT LTD		CHEMTROLS LTD. (FOR FUJII LTD.) INDIA				
		ABB INDIA LIMITED, HYD		ABB KENT ITALY				
		YOKOGAWA INDIA LIMITED		YAMATAKE HONEYWELL JAPAN				
		ENDRESS + HAUSER (INDIA) PVT. LTD.		HARTMAN & BRAUN GERMANY				
		HONEYWELL AUTOMATION INDIA LIMITED		SIEMENS AG (P, DP, T) (NORMAL TYPE) GERMANY				
		ABB AUTOMATION PRODUCTS GMBH GERMANY		EMECON CONTROLS PVT LTD (FOR SPRINO MAKE) INDIA				
		EMERSON PROCES MGMT ASIA PACIFIC PTE LTD SINGAPORE		CHINO-LAX SONS INDIA LTD. (FOR SMAR MAKE) INDIA				
		ENDRESS+HAUSER WETZER GMBH+ CO.KG GERMANY		SUPREME TECHNOLOGY (FOR SIEMENS MAKE) INDIA				
		ENDRESS+HAUSER GMBH+CO. KG GERMANY		FORBES MARSHALL (FOR MOORE MAKE) INDIA				
		FUJII ELECTRIC SYSTEMS CO. LTD JAPAN		EMERSON PROCESS MANAGEMENT INTERNATIONAL				
		HONEYWELL INC. UNITED STATES		YOKOGAWA INTERNATIONAL				
		INVENSYS INDIA PRIVATE LIMITED INDIA		HONEYWELL AUTOMATION INTERNATIONAL				
		YOKOGAWA ELECTRIC CORPORATION JAPAN		YAMATAKE CORPORATION (P, DP, VOL. SEAL P & DP) JAPAN				
		M-SYSTEM (T) JAPANFUJII ELECTRIC INSTRUMENTS CO. LTD. INDIA		SMARSINGAPORE PTE. LTD. (P, DP) SINGAPORE				
				MOORE PRODUCTS COMPANY (P, DP, VOL. SEAL P & DP) UNITED STATES				

ESP-001-2A Rev.00		बी एच ई एल BHEL		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number PY 56217																															
				Rev. No.		00																															
				Sheet		8 of 23																															
Diaphragm seal - Pressure Transmitter (PTD) Technical Data Sheet																																					
GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)	ACCESSORIES	32	Mounting Bracket	Reqd, For 2" pipe mounting, SS304																														
	2	Type	Electronic Smart, Ex-proof & intrinsic safe EX "i" type		33	U Clamp+Fastner	Reqd, SS 304																														
	3				34	Cable Glands	2 No's SS Double Compression+Flameproof																														
	4	Ambient Temp Limit	- 40 to 80°C		35	Cable entry Plugs	Reqd, SS 304 (1 No)																														
	5	Process Temp. Limit	- 40 to 120°C		36																																
SENSOR	6		For a rangeability of 1:10	TEST REPORT/CERTIFICATE	37	Tag Plate	Reqd, SS 304 (1 No)																														
	7	Accuracy	a) Equal or Above 500 mmWC: ±0.25 %		38	Spacer Ring & plug	Required, SS, with Vent/Drain Plugs																														
	8		b) Less than 500 mmWC: ±0.5 %		39	Diaphragm Assembly	SS316L, Flush flange type (Refer fig.1)																														
	9	Response Time	As per OEM recommendation		40	Armoured Capillary	Reqd. 3 Mts, SS316L with PVC Coat																														
	10	Stability	As per OEM recommendation		41	Gasket	Reqd. Sprial Wound, SS																														
	11				42	Stud+Nuts+Bolts	Reqd. A194Gr2H+A193GrB7 (Min 120mm long)																														
	12				43																																
TRANSMITTER	13	Turn Down Ratio	As per OEM recommendation	PROJECT SPECIFIC	44	Bill of Material (model, Tag no's)	100% Witness																														
	14	Process Connection	Raise flanged, 1½" , class 300#		45	Spares (BOM, part no's)	100% Witness (if ordered)																														
	15	Electrical Connection	2 No's of 1/2" NPT (F)		46	Statutory approvals like PESO, BIS, etc	100% Review (if applicable)																														
	16	Power Supply	24V DC, Loop Powered		47	Material compliance certificate	100% Review																														
	17	Over Range Protection	> 130% of range.		48	Five point calibration	100% review & 10% or min 2no's witness with random selection.																														
	18	Protection	IP 65		49	Functional test (Output, HART, accuracy, Diagnosis, display)	100% review & 10% or min 2no's witness with random selection.																														
	19	Zero & Span adjustment	Required.		50	Hydro test for pressure parts	100% Review																														
	20	Display	Integral LCD Digital (in Engg Units & in %).		51	Internal IR test for all cards, assembly	100% Review																														
	21	Impulse Entry	As per OEM recommendation		52	Ingress Protection Test	100% Review																														
	22	Load Resistance	600Ω @ 24 VDC		53	Intrinsic Safety Test	100% Review																														
	23	Output	4-20mA + HART		54																																
	24	Diagnostic Features	Required.		55																																
MATERIAL	25	Hazardous area class	Zone-1, IIA/IIB, T3.	Approved Makes / Vendors	56	Certification	As per OEM recommendation																														
	26	Body	SS316		57	Compartments	As per OEM recommendation																														
	27	Element	SS316 (or) better		58	Manifold Type	Not applicable																														
	28	Sensor O-Ring	Glass-filled PTFE/Teflon		59	Statutory Approvals	PESO (For Instrument+Glands+Plugs)																														
	29	Electronic Housing	Die-cast Aluminum		60	Sensor Type	Non-inductive type.																														
	30	Sensor fill fluid	Silicon Oil		61	Corrosive Protection	Required																														
	31	Humidity	0 - 100% RH		62	Terminal Block type	Integral, Non-fly leads																														
UPPER HOUSING WELDED CAPILLARY CONNECTION TO TRANSMITTER DIAPHRAGM FLANGE DIAPHRAGM ISOLATION PLUG SPACER RING GASKET FLUSHING CONNECTION RING (LOWER HOUSING) PROCESS PIPE FIGURE - 1																																					
NOTES:: 1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement 2 Tag list shall be furnished by BHEL after P.O. palcement 3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval. 4 Vendor shall not submit any data sheet for approval after P.O. placement. 5 GA drawings shall be submitted for approval (if applicable)				<table><tr><td>EMERSON PROCESS MGMT (I) PVT LTD</td><td>CHEMTROLS LTD. (FOR FUJI LTD.) INDIA</td></tr><tr><td>ABB INDIA LIMITED, HYD</td><td>ABB KENT ITALY</td></tr><tr><td>YOKOGAWA INDIA LIMITED</td><td>YAMATAKE HONEYWELL JAPAN</td></tr><tr><td>ENDRESS + HAUSER (INDIA) PVT. LTD.</td><td>HARTMAN & BRAUN GERMANY</td></tr><tr><td>HONEYWELL AUTOMATION INDIA LIMITED</td><td>SIEMENS AG (P, DP, T) (NORMAL TYPE) GERMANY</td></tr><tr><td>ABB AUTOMATION PRODUCTS GMBH GERMANY</td><td>EMECON CONTROLS PVT LTD (FOR SPRINO MAKE) INDIA</td></tr><tr><td>EMERSON PROCES MGMT ASIA PACIFIC PTE LTD SINGAPORE</td><td>CHINO-LAX SONS INDIA LTD. (FOR SMAR MAKE) INDIA</td></tr><tr><td>ENDRESS+HAUSER WETZER GMBH+ CO.KG GERMANY</td><td>SUPREME TECHNOLOGY (FOR SIEMENS MAKE) INDIA</td></tr><tr><td>ENDRESS+HAUSER GMBH+CO. KG GERMANY</td><td>FORBES MARSHALL (FOR MOORE MAKE) INDIA</td></tr><tr><td>FUJI ELECTRIC SYSTEMS CO. LTD JAPAN</td><td>EMERSON PROCESS MANAGEMENT INTERNATIONAL</td></tr><tr><td>HONEYWELL INC. UNITED STATES</td><td>YOKOGAWA INTERNATIONAL</td></tr><tr><td>INVENSYS INDIA PRIVATE LIMITED INDIA</td><td>HONEYWELL AUTOMATION INTERNATIONAL</td></tr><tr><td>YOKOGAWA ELECTRIC CORPORATION JAPAN</td><td>YAMATAKE CORPORATION (P, DP, VOL. SEAL P & DP) JAPAN</td></tr><tr><td>M-SYSTEM (T) JAPANFUJI ELECTRIC INSTRUMENTS CO. LTD. INDIA</td><td>SMARSINGAPOREPTE. LTD. (P, DP) SINGAPORE</td></tr><tr><td></td><td>MOORE PRODUCTS COMPANY (P, DP, VOL. SEAL P & DP) UNITED STATES</td></tr></table>				EMERSON PROCESS MGMT (I) PVT LTD	CHEMTROLS LTD. (FOR FUJI LTD.) INDIA	ABB INDIA LIMITED, HYD	ABB KENT ITALY	YOKOGAWA INDIA LIMITED	YAMATAKE HONEYWELL JAPAN	ENDRESS + HAUSER (INDIA) PVT. LTD.	HARTMAN & BRAUN GERMANY	HONEYWELL AUTOMATION INDIA LIMITED	SIEMENS AG (P, DP, T) (NORMAL TYPE) GERMANY	ABB AUTOMATION PRODUCTS GMBH GERMANY	EMECON CONTROLS PVT LTD (FOR SPRINO MAKE) INDIA	EMERSON PROCES MGMT ASIA PACIFIC PTE LTD SINGAPORE	CHINO-LAX SONS INDIA LTD. (FOR SMAR MAKE) INDIA	ENDRESS+HAUSER WETZER GMBH+ CO.KG GERMANY	SUPREME TECHNOLOGY (FOR SIEMENS MAKE) INDIA	ENDRESS+HAUSER GMBH+CO. KG GERMANY	FORBES MARSHALL (FOR MOORE MAKE) INDIA	FUJI ELECTRIC SYSTEMS CO. LTD JAPAN	EMERSON PROCESS MANAGEMENT INTERNATIONAL	HONEYWELL INC. UNITED STATES	YOKOGAWA INTERNATIONAL	INVENSYS INDIA PRIVATE LIMITED INDIA	HONEYWELL AUTOMATION INTERNATIONAL	YOKOGAWA ELECTRIC CORPORATION JAPAN	YAMATAKE CORPORATION (P, DP, VOL. SEAL P & DP) JAPAN	M-SYSTEM (T) JAPANFUJI ELECTRIC INSTRUMENTS CO. LTD. INDIA	SMARSINGAPOREPTE. LTD. (P, DP) SINGAPORE		MOORE PRODUCTS COMPANY (P, DP, VOL. SEAL P & DP) UNITED STATES
EMERSON PROCESS MGMT (I) PVT LTD	CHEMTROLS LTD. (FOR FUJI LTD.) INDIA																																				
ABB INDIA LIMITED, HYD	ABB KENT ITALY																																				
YOKOGAWA INDIA LIMITED	YAMATAKE HONEYWELL JAPAN																																				
ENDRESS + HAUSER (INDIA) PVT. LTD.	HARTMAN & BRAUN GERMANY																																				
HONEYWELL AUTOMATION INDIA LIMITED	SIEMENS AG (P, DP, T) (NORMAL TYPE) GERMANY																																				
ABB AUTOMATION PRODUCTS GMBH GERMANY	EMECON CONTROLS PVT LTD (FOR SPRINO MAKE) INDIA																																				
EMERSON PROCES MGMT ASIA PACIFIC PTE LTD SINGAPORE	CHINO-LAX SONS INDIA LTD. (FOR SMAR MAKE) INDIA																																				
ENDRESS+HAUSER WETZER GMBH+ CO.KG GERMANY	SUPREME TECHNOLOGY (FOR SIEMENS MAKE) INDIA																																				
ENDRESS+HAUSER GMBH+CO. KG GERMANY	FORBES MARSHALL (FOR MOORE MAKE) INDIA																																				
FUJI ELECTRIC SYSTEMS CO. LTD JAPAN	EMERSON PROCESS MANAGEMENT INTERNATIONAL																																				
HONEYWELL INC. UNITED STATES	YOKOGAWA INTERNATIONAL																																				
INVENSYS INDIA PRIVATE LIMITED INDIA	HONEYWELL AUTOMATION INTERNATIONAL																																				
YOKOGAWA ELECTRIC CORPORATION JAPAN	YAMATAKE CORPORATION (P, DP, VOL. SEAL P & DP) JAPAN																																				
M-SYSTEM (T) JAPANFUJI ELECTRIC INSTRUMENTS CO. LTD. INDIA	SMARSINGAPOREPTE. LTD. (P, DP) SINGAPORE																																				
	MOORE PRODUCTS COMPANY (P, DP, VOL. SEAL P & DP) UNITED STATES																																				

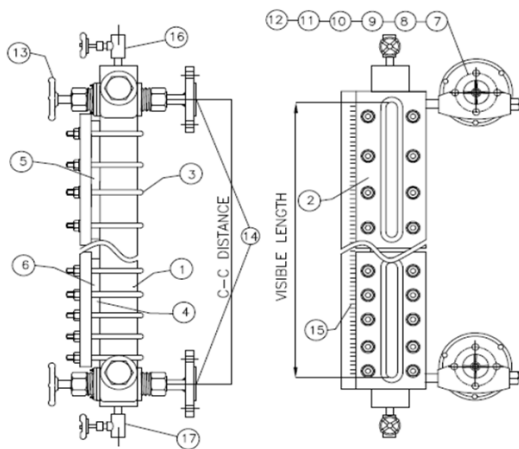
ESP-001-2A Rev.00		बी एस ई एम		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number PY 56217 Rev. No. 00 Sheet 10 of 23																															
Diaphragm seal - Differential Pressure Transmitter (DPT-2D) Technical Data Sheet																																					
GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)		33	Mounting Bracket	Reqd, For 2" pipe mounting, SS304																														
	2	Type	Electronic Smart, Ex-proof & intrinsic safe EX "i" type		34	U Clamp+Fastner	Reqd, SS 304																														
	3				35	Cable Glands	2 No's SS Double Compression+Flameproof																														
	4	Ambient Temp Limit	- 40 to 80°C		36	Cable entry Plugs	Reqd, SS 304 (1 No)																														
	5	Process Temp. Limit	- 40 to 120°C		37																																
SENSOR	6	Accuracy	For a rangeability of 1:10		38	Tag Plate	Reqd, SS 304 (1 No)																														
	7		a) Equal or Above 500 mmWC: ±0.25 %		39	Spacer Ring & plug	Required, SS, with Vent/Drain Plugs																														
	8		b) Less than 500 mmWC: ±0.5 %		40	Diaphragm Assembly	SS316L, Flush flange type (Refer fig.1)																														
	9	Response Time	As per OEM recommendation		41	Armoured Capillary	Reqd. 3 Mts, SS316L with PVC Coat																														
	10	Stability	As per OEM recommendation		42	Gasket	Reqd. Spiral Wound, SS																														
	11				43	Stud+Nuts+Bolts	Reqd. A194Gr2H+A193GrB7 (Min 120mm long)																														
	12				44																																
TRANSMITTER	13	Turn Down Ratio	As per OEM recommendation		45	Bill of Material (model, Tag no's)	100% Witness																														
	14	Process Connection	Raise flanged, 3", class 300#		46	Spares (BOM, part no's)	100% Witness (if ordered)																														
	15	Electrical Connection	2 No's of 1/2" NPT (F)		47	Statutory approvals like PESO, BIS, etc	100% Review (if applicable)																														
	16	Power Supply	24V DC, Loop Powered		48	Material compliance certificate	100% Review																														
	17	Over Range Protection	> 130% of range.		49	Five point calibration	100% review & 10% or min 2no's witness with random selection.																														
	18	Protection	IP 65		50	Functional test (Output, HART, accuracy, Diagnosis, display)	100% review & 10% or min 2no's witness with random selection.																														
	19	Zero & Span adjustment	Required.		51	Hydro test for pressure parts	100% Review																														
	20	Display	Integral LCD Digital (in Engg Units & in %).		52	Internal IR test for all cards, assembly	100% Review																														
	21	Impulse Entry	As per OEM recommendation		53	Ingress Protection Test	100% Review																														
	22	Load Resistance	600Ω @ 24 VDC		54	Intrinsic Safety Test	100% Review																														
	23	Output	4-20mA + HART		55																																
	24	Diagnostic Features	Required.		56																																
	MATERIAL	25	Remote Seal Assembly	Diaphragm on HP side & capillary on LP side		57																															
26		Hazardous area class	Zone-1, IIA/IIB, T3.		58	Certification	As per OEM recommendation																														
27		Body	SS316		59	Compartments	As per OEM recommendation																														
28		Element	SS316 (or) better		60	Manifold Type	Not applicable																														
29		Sensor O-Ring	Glass-filled PTFE/Teflon		61	Statutory Approvals	PESO (For Instrument+Glands+Plugs)																														
30		Electronic Housing	Die-cast Aluminum		62	Sensor Type	Non-Inductive type.																														
31		Sensor fill fluid	Silicon Oil		63	Corrosive Protection	Required																														
32		Humidity	0 - 100% RH		64	Terminal Block type	Integral, Non-fly leads																														
FIGURE - I																																					
NOTES:: 1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement 2 Tag list shall be furnished by BHEL after P.O. placement 3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval. 4 Vendor shall not submit any data sheet for approval after P.O. placement. 5 GA drawings shall be submitted for approval (if applicable)				Approved Makes / Vendors <table><tr><td>EMERSON PROCESS MGT (I) PVT LTD</td><td>CHEMTROLS LTD. (FOR FUJII LTD.) INDIA</td></tr><tr><td>ABB INDIA LIMITED, HYD</td><td>ABB KENT ITALY</td></tr><tr><td>YOKOGAWA INDIA LIMITED</td><td>YAMATAKE HONEYWELL JAPAN</td></tr><tr><td>ENDRESS + HAUSER (INDIA) PVT. LTD.</td><td>HARTMAN & BRAUN GERMANY</td></tr><tr><td>HONEYWELL AUTOMATION INDIA LIMITED</td><td>SIEMENS AG (P, DP, T) (NORMAL TYPE) GERMANY</td></tr><tr><td>ABB AUTOMATION PRODUCTS GMBH GERMANY</td><td>EMECON CONTROLS PVT LTD (FOR SPRING MAKE) INDIA</td></tr><tr><td>EMERSON PROCES MGMT ASIA PACIFIC PTE LTD SINGAPORE</td><td>CHINO-LAX SONS INDIA LTD. (FOR SMAR MAKE) INDIA</td></tr><tr><td>ENDRESS+HAUSER WETZER GMBH+ CO.KG GERMANY</td><td>SUPREME TECHNOLOGY (FOR SIEMENS MAKE) INDIA</td></tr><tr><td>ENDRESS+HAUSER GMBH+CO. KG GERMANY</td><td>FORBES MARSHALL (FOR MOORE MAKE) INDIA</td></tr><tr><td>FUJII ELECTRIC SYSTEMS CO. LTD JAPAN</td><td>EMERSON PROCESS MANAGEMENT INTERNATIONAL</td></tr><tr><td>HONEYWELL INC. UNITED STATES</td><td>YOKOGAWA INTERNATIONAL</td></tr><tr><td>INVENSYS INDIA PRIVATE LIMITED INDIA</td><td>HONEYWELL AUTOMATION INTERNATIONAL</td></tr><tr><td>YOKOGAWA ELECTRIC CORPORATION JAPAN</td><td>YAMATAKE CORPORATION (P, DP, VOL. SEAL P & DP) JAPAN</td></tr><tr><td>M-SYSTEM (T) JAPAN/FUJII ELECTRIC INSTRUMENTS CO. LTD. INDIA</td><td>SMARSINGAPOREPTE. LTD. (P, DP) SINGAPORE</td></tr><tr><td></td><td>MOORE PRODUCTS COMPANY (P, DP, VOL. SEAL P & DP) UNITED STATES</td></tr></table>				EMERSON PROCESS MGT (I) PVT LTD	CHEMTROLS LTD. (FOR FUJII LTD.) INDIA	ABB INDIA LIMITED, HYD	ABB KENT ITALY	YOKOGAWA INDIA LIMITED	YAMATAKE HONEYWELL JAPAN	ENDRESS + HAUSER (INDIA) PVT. LTD.	HARTMAN & BRAUN GERMANY	HONEYWELL AUTOMATION INDIA LIMITED	SIEMENS AG (P, DP, T) (NORMAL TYPE) GERMANY	ABB AUTOMATION PRODUCTS GMBH GERMANY	EMECON CONTROLS PVT LTD (FOR SPRING MAKE) INDIA	EMERSON PROCES MGMT ASIA PACIFIC PTE LTD SINGAPORE	CHINO-LAX SONS INDIA LTD. (FOR SMAR MAKE) INDIA	ENDRESS+HAUSER WETZER GMBH+ CO.KG GERMANY	SUPREME TECHNOLOGY (FOR SIEMENS MAKE) INDIA	ENDRESS+HAUSER GMBH+CO. KG GERMANY	FORBES MARSHALL (FOR MOORE MAKE) INDIA	FUJII ELECTRIC SYSTEMS CO. LTD JAPAN	EMERSON PROCESS MANAGEMENT INTERNATIONAL	HONEYWELL INC. UNITED STATES	YOKOGAWA INTERNATIONAL	INVENSYS INDIA PRIVATE LIMITED INDIA	HONEYWELL AUTOMATION INTERNATIONAL	YOKOGAWA ELECTRIC CORPORATION JAPAN	YAMATAKE CORPORATION (P, DP, VOL. SEAL P & DP) JAPAN	M-SYSTEM (T) JAPAN/FUJII ELECTRIC INSTRUMENTS CO. LTD. INDIA	SMARSINGAPOREPTE. LTD. (P, DP) SINGAPORE		MOORE PRODUCTS COMPANY (P, DP, VOL. SEAL P & DP) UNITED STATES
EMERSON PROCESS MGT (I) PVT LTD	CHEMTROLS LTD. (FOR FUJII LTD.) INDIA																																				
ABB INDIA LIMITED, HYD	ABB KENT ITALY																																				
YOKOGAWA INDIA LIMITED	YAMATAKE HONEYWELL JAPAN																																				
ENDRESS + HAUSER (INDIA) PVT. LTD.	HARTMAN & BRAUN GERMANY																																				
HONEYWELL AUTOMATION INDIA LIMITED	SIEMENS AG (P, DP, T) (NORMAL TYPE) GERMANY																																				
ABB AUTOMATION PRODUCTS GMBH GERMANY	EMECON CONTROLS PVT LTD (FOR SPRING MAKE) INDIA																																				
EMERSON PROCES MGMT ASIA PACIFIC PTE LTD SINGAPORE	CHINO-LAX SONS INDIA LTD. (FOR SMAR MAKE) INDIA																																				
ENDRESS+HAUSER WETZER GMBH+ CO.KG GERMANY	SUPREME TECHNOLOGY (FOR SIEMENS MAKE) INDIA																																				
ENDRESS+HAUSER GMBH+CO. KG GERMANY	FORBES MARSHALL (FOR MOORE MAKE) INDIA																																				
FUJII ELECTRIC SYSTEMS CO. LTD JAPAN	EMERSON PROCESS MANAGEMENT INTERNATIONAL																																				
HONEYWELL INC. UNITED STATES	YOKOGAWA INTERNATIONAL																																				
INVENSYS INDIA PRIVATE LIMITED INDIA	HONEYWELL AUTOMATION INTERNATIONAL																																				
YOKOGAWA ELECTRIC CORPORATION JAPAN	YAMATAKE CORPORATION (P, DP, VOL. SEAL P & DP) JAPAN																																				
M-SYSTEM (T) JAPAN/FUJII ELECTRIC INSTRUMENTS CO. LTD. INDIA	SMARSINGAPOREPTE. LTD. (P, DP) SINGAPORE																																				
	MOORE PRODUCTS COMPANY (P, DP, VOL. SEAL P & DP) UNITED STATES																																				

ESP-001-2A Rev.00				PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number	
						PY 56217	
						Rev. No.	00
						Sheet	11 of 23
Temperature Transmitter (TT) Technical Data Sheet							
GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)	ACCESSORIES	30	Mounting Bracket	Reqd, For 2" pipe mounting, SS304
	2	Type	Electronic Smart, Ex-proof & intrinsic safe EX 'i" type		31	U Clamp+Fastner	Reqd, SS 304
	3	Ambient Temp Limit	- 40 to 75°C		32	Cable Glands	2 No's SS Double Compression+Flameproof
	4				33		
TRANSMITTER	5	Input	3 wire RTD/Thermocouple (k-type) with dual i/p provision	TEST REPORT/CERTIFICATE	34	Tag Plate	Reqd, SS 304 (1 No)
	6	Dual sensor inputs	Bumpless automatic switchover		35	Bolts + Nuts	Reqd. A193GrB7 + A194Gr2H
	7	Accuracy	As per OEM recommendation		36		
	8	Updated Time	500msec.		37		
	9	Ref. Junction Compensation	Required (automatic for thermocouple sensors).		38		
	10	Burnout protection	Required and selectable UP scale / DOWN scale		39		
	11	Process Connection	1/2" NPT (F)		40	Bill of Material (model, Tag no's)	100% Witness
	12	Electrical Connection	2 Nos of 1/2" NPT (F)		41	Spares (BOM, part no's)	100% Witness (if ordered)
	13	Power Supply	24V DC, Loop Powered		42	Statutory approvals like PESO, BIS, etc	100% Review (if applicable)
	14	Configuration	By Hand Held Calibrator.		43	Material compliance certificate	100% Review
	15	Surge & Lightening Protection	In built	44	Five point calibration	100% review & 10% or min 2no's witness with random selection.	
	16	Protection	IP 65	45	Functional test (Output, HART, accuracy, Diagnosis, display)	100% review & 10% or min 2no's witness with random selection.	
	17	Impulse Entry	Not applicable	46	Hydro test for pressure parts	100% Review	
	18	Display	Integral LCD Digital (in Engg Units & in %).	47	Conformity & update time test	100% Review	
	19	Damping	0-32 Sec Adjustable	48	Ingress Protection Test	100% Review	
	20	Load Resistance	600Ω @ 24 VDC	49	Intrinsic Safety Test	100% Review	
	21	Output	4-20mA+HART, Linearised.	50	PMI Test (for SS & AS Materials)	100% Review	
	22	Diagnostic Features	Required.	PROJECT SPECIFIC	51	Certification	As per OEM recommendation
	23				52	Compartments	Dual
	24				53	Statutory Approvals	PESO (For Instrument+Glands+Plugs)
MATERIAL	25	Hazardous area class	Zone-1, IIA/IIB, T3.		54	Corrosive Protection	Required
	26	Humidity	0 - 100% RH		55	Terminal Block type	Integral, Non-fly leads
	27	Electronic Housing	Die-cast Aluminum		56		
	28				57		
	29				58		
NOTES:: 1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement 2 Tag list shall be furnished by BHEL after P.O. placement 3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval. 4 Vendor shall not submit any data sheet for approval after P.O. placement. 5 GA drawings shall be submitted for approval (if applicable)				Approved Makes / Vendors	EMERSON PROCESS MGT (I) PVT LTD		CHEMTROLS LTD. (FOR FUJI LTD.) INDIA
					ABB INDIA LIMITED, HYD		ABB KENT ITALY
					YOKOGAWA INDIA LIMITED		YAMATAKE HONEYWELL JAPAN
					ENDRESS + HAUSER (INDIA) PVT. LTD.		HARTMAN & BRAUN GERMANY
					HONEYWELL AUTOMATION INDIA LIMITED		SIEMENS AG (P, DP, T) (NORMAL TYPE) GERMANY
					ABB AUTOMATION PRODUCTS GMBH GERMANY		EMECON CONTROLS PVT LTD (FOR SPRINO MAKE) INDIA
					EMERSON PROCES MGMT ASIA PACIFIC PTE LTD SINGAPORE		CHINO-LAX SONS INDIA LTD. (FOR SMAR MAKE) INDIA
					ENDRESS+HAUSER WETZER GMBH+ CO.KG GERMANY		SUPREME TECHNOLOGY (FOR SIEMENS MAKE) INDIA
					ENDRESS+HAUSER GMBH+CO. KG GERMANY		FORBES MARSHALL (FOR MOORE MAKE) INDIA
					FUJI ELECTRIC SYSTEMS CO. LTD JAPAN		EMERSON PROCESS MANAGEMENT INTERNATIONAL
					HONEYWELL INC. UNITED STATES		YOKOGAWA INTERNATIONAL
					INVENSYS INDIA PRIVATE LIMITED INDIA		HONEYWELL AUTOMATION INTERNATIONAL
					YOKOGAWA ELECTRIC CORPORATION JAPAN		YAMATAKE CORPORATION (P, DP, VOL. SEAL P & DP) JAPAN
					M-SYSTEM (T) JAPANFUJI ELECTRIC INSTRUMENTS CO. LTD. INDIA		SMARSINGAPORE PTE. LTD. (P, DP) SINGAPORE
							MOORE PRODUCTS COMPANY (P, DP, VOL. SEAL P & DP) UNITED STATES

ESP-001-2A Rev.00		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number	
				PY 56217	
				Rev. No.	00
				Sheet	12 of 23

REFLEX type LEVEL GAUGE (SIDE MOUNTED) Technical Data Sheet

GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)	ACCESSORIES	11	Vent & Drain needle valve	2 No's; MOC: SS316; Size : ½” NPT(F)
	2	Type	Field mounted, Weather proof to IP 65		12	Tag Plate	Required, SS 316
	3	Ambient Temp Limit	0 to 50°C and 95% RH max; suitable for tropical climate, ambient of Ammonia & Sulphur; Copper and copper alloys shall be avoided for all the parts exposed to atmosphere.		13	Bolts + Nuts	Required. A193GrB7 + A194Gr2H
14							
15							
	16						
LEVEL GAUGE	4	Type	Reflex type	TEST REPORT/CERTIFICATE	17	Hydraulic test	100% Review
	5	Body material	SS 316		18	Radiography for butt weld joints	100% Review
	6	Cover plate	SS 316		19	IBR in Form IIIC	100% Review (if applicable)
	7	Glass	Toughened Borosilicate (Klinger/Moxos/Bont)		20	Ingress Protection Test	100% Review
	8	Gauge Valves	Required at top & bottom of gauge with auto shutoff ball check arrangement		21	Bill of Material (model, dim., Tag no's)	100% Witness
	9	Minimum Visible length	Shall be intimated after P.O. placement.		22	Spares (BOM, part no's)	100% Witness (if ordered)
	10	Hydraulic test pressure	For services rated ANSI #300 : 77 kg/cm2(g) at room temp		23	Material compliance certificate	100% Review
			For services rated ANSI #600 : 150 kg/cm2(g) at room temp		24	PMI Test (for SS & AS Materials)	100% Review
					25		
					26		
					27		
					28		



BILL OF MATERIAL		
S.NO.	DESCRIPTION	MATERIAL
1	CHAMBER	S.S-316
2	COVER PLATE	S.S-316
3	U-BOLTS/NUTS	ASTM A193 Gr.-B7/A194 Gr.2H
4	GASKET	NON ASBESTOS
5	CUSHION	NON ASBESTOS
6	GLASS	TOUGHENED BOROSILICATE
7	VALVE BODY	S.S-316
8	VALVE BONNET	S.S-316
9	SPINDLE (TRIM)	S.S-316
10	BALL CHECK	S.S-316
11	RENEWABLE SEAT	S.S-316
12	VALVE PACKING	GRAFOIL
13	HAND WHEEL	C.S
14	PROCESS CONN. (1"x300# RF)	S.S-316
15	SCALE	S.S-304
16	VENT NEEDLE VALVE 1/2" NPT(F)	S.S-316
17	DRAIN NEEDLE VALVE 1/2" NPT (F)	S.S-316

NOTES::

- This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement
- Tag list shall be furnished by BHEL after P.O. placement
- Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval.
- Vendor shall not submit any data sheet for approval after P.O. placement.
- GA drawings shall be submitted for approval (if applicable)

Approved Makes / Vendors

V AUTOMAT. AND INSTRUMENTS PVT LTD
 BLISS ANAND PVT. LTD.,
 SCIENTIFIC DEVICES (BOMBAY) PVT. LT
 TECNOMATIC (INDIA) PRIVATE LIMITED,
 PRATOLINA INSTRUMENTS PVT.LTD.
 CHEMTROLS INDUSTRIES LTD.,
 PUNE TECHTROL PVT LTD
 NISAN SCIENTIFIC PROCESS
 GAUGES BOURDON INDIA
 LEVCON INSTRUMENTS(P) LTD
 D.K.INSTRUMENTS (P) LTD.,

ESP-001-2A Rev.00		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number	
				PY 56217	
				Rev. No.	00
		Sheet	13	of 23	

Pressure Gauge (PG) Technical Data Sheet						
GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)			
	2	Type	Surface mount /Local Gauge			
	3	Ambient Temp Limit	0 to 65°C			
	4					
GAUGE	5	Sensor Type	Bourdon Tube			
	6	Dial Size	250MM for 4 No's of enquiry & 150MM (6") for the rest			
	7	Accuracy	±1% of URV			
	8	Process Connection	1/2" NPT (M), Bottom entry.			
	9	Blow out Disc	Required.			
	10	Solid Front Case	Required for ranges > 60Kg/Cm2.			
	11	Over Range Protection	> 130% of full scale.			
	12	Protection	IP 65			
	13	Zero & Span adjustment	External Required.			
	14	Anti-corrossive Dial	Aluminum, White with black figure & shall confirm to IS-3624			
	15	Micro meter Adjustment	Required for pointers.			
	16	Scale type	Concentric, Graduated units			
	17	Pointer-270° Deflection	Yes, Metal with Black Finish			
	18	Pointer Stop	Required at both end			
	19	Bezel ring	Bayonet Lock Type			
	20	Movement	Geared / Cam-roller type			
	21					
	22					
	23					
	MATERIAL	24	Case Material	SS304		
		25	Element Material	SS316		
		26	Window Glass	Shatter Proof.		
		27	Pointer	Alluminium.		
28		Blow out Disc	Neoprene			
29		Tag Plate	Reqd, SS 304			
30		Bezel ring	SS 304			
31		Movement	SS 304			
32		Socket Material	SS 304			
33						
ACCESSORIES		34	Pulsation Damper	Required, 1 No per Gauge, SS 316		
		35	Snubber	Required, 1 No per Gauge, SS 316		
	36	Tag Plate	Required, 1 No per Gauge, SS304			
	37					
TEST REPORT/CERTIFICATE	38	Bill of Material (model, dim., Tag no's)	100% Witness			
	39	Spares (BOM, part no's)	100% Witness (if ordered)			
	40	Material compliance certificate	100% Review			
	41	Calibration	10% witness or min. 2 of each range			
	42	Over Protection Test for 30 min.	10% witness or min. 2 of each range			
	43	Accuracy Test	10% witness or min. 2 of each range			
	44	Vibration test	100% Review			
	45	Ingress Protection Test	100% Review			
	46	PMI Test (for SS & AS Materials)	100% Review			
Approved Makes / Vendors	FORBES MARSHALL (HYD) PVT LIMITED,					
	PRECISION MASS PRODUCTS PVT LTD					
	H.GURU INSTRUMENTS(S.I)PVT.LTD					
	WALCHANDNAGAR INDUSTRIES LIMITED					
	SCIENTIFIC DEVICES (BOMBAY) PVT. LTD					
	BAUMER TECHNOLOGIES					
	GAUGES BOURDON INDIA					
	A.N. INSTRUMENTS PVT. LTD.,					
	PROTECH CONTROL INSTRUMENTS					

NOTES:: 1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement 2 Tag list shall be furnished by BHEL after P.O. placement 3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval. 4 Vendor shall not submit any data sheet for approval after P.O. placement. 5 GA drawings shall be submitted for approval (if applicable)
--

REMARKS: (1) The elastic element material shall be as follows: (a) For range ≤ 60 Kg/cm2 - AISI-316 seamless drawn stainless steel tube, argon arc welded at AISI-316 forged or wrought stain less steel tube anchorage and tube end piece. (b) For range > 60 Kg/cm2 - AISI-316 bored stainless steel.

ESP-001-2A Rev.00			PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number		
					PY 56217		
					Rev. No.	00	
					Sheet	14 of 23	
Diaphragm seal - Pressure Gauge (PGD) Technical Data Sheet							
GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)	MATERIAL	26	Case Material	SS304
	2	Type / Std	Diaphragm Sealed / IS3624		27	Element Material	SS316
	3	Ambient Temp Limit	0 to 65°C		28	Window Glass	Shatter Proof.
	4				29	Pointer	Alluminium.
GAUGE	5	Sensing Element	Diaphragm, SS 316		30	Blow out Disc	Neoprene
	6	Dial Size	150MM (6")		31	Tag Plate	Reqd, SS 304
	7	Accuracy	±1% of full scale deflection		32	Bezel ring	SS 304
	8	Process Connection	1.5" RF, Min 300#, SS 316		33	Movement	SS 304
	9	Instrument connection	1/2" NPT(M)		34	Socket Material	SS 304
	10	Blow out Disc	Required.	35			
	11	Over Range Protection	> 130% of full scale.	ACCESSORIES	36	Tag Plate	Reqquired, 1 No per Gauge, SS304
	12	Protection	IP 65		37	Spacer Ring	Required, SS
	13	Zero & Span adjustment	External Required.		38	Vent+Drain plugs	Required, SS, In built to Spacer
	14	Anti-corrossive Dial	Aluminum, White with black figure & shall confirm to IS-3624		39	Armoured Capillary	Reqd. 3 Mts, SS316L with PVC Coat
	15	Micro meter Adjustment	Required for pointers.		40	Stud Nuts+Bolts	Reqd. A194Gr2H+A193GrB7 (Min 120mm long)
	16	Scale type	Concentric, Graduated units		41	Gasket	Reqd. Spriral Wound, SS
	17	Pointer-270° Deflection	Yes,Metal with Black Finish		42	Bill of Material (model, dim., Tag no's)	100% Witness
	18	Pointer Stop	Required at both end		43	Spare (BOM, part no's)	100% Witness (if ordered)
	19	Bezel ring	Bayonet Lock Type		44	Material compliance certificate	100% Review
	20	Movement	Geared / Cam-roller type		45	Calibration	10% witness or min. 2 of each range
	21	Fill fluid	Silicon	TEST REPORT/CERTIFICATE	46	Over Protection Test for 30 min.	10% witness or min. 2 of each range
	22				47	Accuracy Test	10% witness or min. 2 of each range
	23				48	Vibration test	100% Review
	24				49	Ingress Protection Test	100% Review
25			50		PMI Test (for SS & AS Materials)	100% Review	
NOTES:: 1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement 2 Tag list shall be furnished by BHEL after P.O. placement 3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval. 4 Vendor shall not submit any data sheet for approval after P.O. placement. 5 GA drawings shall be submitted for approval (if applicable)			Approved Makes / Vendors		FORBES MARSHALL (HYD) PVT LIMITED,		
					PRECISION MASS PRODUCTS PVT LTD		
					H.GURU INSTRUMENTS(S.I.)PVT.LTD		
					WALCHANDNAGAR INDUSTRIES LIMITED		
					SCIENTIFIC DEVICES (BOMBAY) PVT. LTD		
				BAUMER TECHNOLOGIES			
				GAUGES BOURDON INDIA			
				A.N. INSTRUMENTS PVT. LTD.,			
				PROTECH CONTROL INSTRUMENTS			
NOTES: (1) The elastic element material shall be as follows: (a) For range ≤ 60 Kg/cm ² - AISI-316 seamless drawn stainless steel tube, argon arc welded at AISI-316 forged or wrought stain less steel tube anchorage and tube end piece. (b) For range > 60 Kg/cm ² - AISI-316 bored stainless steel.							

ESP-001-2A Rev.00				PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number PY 56217 Rev. No. 00 Sheet 16 of 23				
Diaphragm seal - Differential Pressure Gauge (DPGD) Technical Data Sheet										
GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)		ACCESSORIES	28	Mounting Bracket	Reqd, For 2" pipe mounting, SS304		
	2	Type	Bottom entry, 2" Pipe mounting			29	U Clamp+Fastner	Reqd, SS 304		
	3	Ambient Temp Limit	0 to 65°C			30	Cable Glands	Not applicable		
	4	Static Pressure	Shall be intimated after P.O. placement			31	Cable entry Plugs	Not applicable		
	5					32	Tag Plate	Requidred, 1 No per Gauge, SS304		
GAUGE	6	Sensing material	Diaphragm in SS 316		TEST REPORT/CERTIFICATE	33	Bolts + Nuts	Reqd. A193GrB7 + A194Gr2H		
		Dial Size	150MM (6")			34	Spacer Ring	Required, SS		
			Case & Bezel	SS 304, Bayonet type bezel		35	Vent/Drain Plugs	Required, SS, In built to Spacer		
	7	Windows	Toughened Glass with rubber ring			36	Armoured Capillary	Reqd. 3 Mts, SS316L with PVC Coat		
	8	Accuracy	±1.6% of full scale deflection or Better			37	Gasket	Reqd. Spiral Wound, SS		
	9	Process Connection	3" RF, Min 300#, SS 316			38	Bill of Material (model, Tag no's)	100% Witness		
	10	Blow out Disc	Required.			39	Spares (BOM, part no's)	100% Witness (if ordered)		
	11	Over Range Protection	> 130% of full scale.			40	Material compliance certificate	100% Review		
	12	Ingress Protection	IP 65			41	Calibration	10% witness or min. 2 of each range		
	13	Zero & Span adjustment	External Required.			42	Over Protection Test for 30 min.	10% witness or min. 2 of each range		
	14	Anti-corrosive Dial	Aluminum, White with black figure & shall confirm to IS-3624			43	Accuracy Test	10% witness or min. 2 of each range		
	15	Micro meter Adjustment	Required for pointers.			44	Vibration test	100% Review		
	16	Scale type	Concentric, Graduated units			45	Ingress Protection Test	100% Review		
	17	Pointer-2700 Deflection	Yes, Metal with Black Finish			46	PMI Test (for SS & AS Materials)	100% Review		
	18	Pointer Stop	Required at both end			47				
	19	Bezel ring	Bayonet Lock Type			48				
	20	Movement	Geared / Cam-roller type			49				
	MATERIAL	21	Fill Fluid	Silicon		PROJECT SPECIFIC	50			
		22	Case Material	SS304			51	Manifold Type	Not applicable	
		23	Element & Wetted parts	SS316			52	StatutoryApprovals	Not applicable	
24		Windows	Shatter Proof.		53					
25		Pointer	Aluminum.		54					
26		Movement	SS 304		55					
27		Socket Material	SS 316		56					
NOTES:: 1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement 2 Tag list shall be furnished by BHEL after P.O. palcement 3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval. 4 Vendor shall not submit any data sheet for approval after P.O. placement. 5 GA drawings shall be submitted for approval (if applicable)					Approved Makes / Vendors PRECISION MASS PRODUCTS PVT LTD WALCHANDNAGAR INDUSTRIES LIMITED BAUMER TECHNOLOGIES HIRLEKAR PRECISION ENGG. PVT. LTD. SAMSON CONTROLS PVT LTD., GAUGES BOURDON INDIA SWITZER PROCESS INSTRUMENTS A.N. INSTRUMENTS PVT. LTD., 					

ESP-001-2A Rev.00				PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number PY 56217 Rev. No. 00 Sheet 17 of 23		
Temperature Gauge (TG) With ThermoWell (TW) Technical Data Sheet								
GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)		THERMOWELL	32	TW Const.	Drilled Bar Stock
	2	Type	Surface mount /Local Gauge			33	TW material	SS 316 /446 & Inconel for temp > 600°C
	3	Ambient Temp Limit	- 40 to 80°C			34	Insertion length "U" (Note-1)	Refer BOM (Annexure-I of this specification)
	4					35	Dimension	Tapered from 21mm to 16 mm
	5					36	Process Conn.	1.5" flanged for services rated ≤ 600 # 2" flanged for services rated > 600 #
GAUGE SPECIFICATION	6	Sensor Type	Bi-Metallic for Temp ≤ 350°C & Gas Filled for Temp > 350°C & underground locations like sump		THERMOWELL	37		
	7	Dial Size	150MM (6")			38	Flange rating	Refer BOM (Annexure-I of this specification)
	8	Accuracy	±1% of full scale deflection			39		
	9	Instrument connection	1/2" NPT(M)			40	Flange material	Refer BOM (Annexure-I of this specification)
	10	Over Range Protection	> 130% of full scale.			41	Instrument connection	½" NPT(F)
	11	Protection	IP 65			42	Bore diameter	Suitable to TG/TE stem dia (i.e. 9MM)
	12	Zero & Span adjustment	External Required.			43		
	13	Anti-corrosive Dial	Aluminum, White with black figure & shall conform to IS-3624			44		
	14	Micro meter Adjustment	Required for pointers.			45		
	15	Scale type	Concentric, Graduated units			46		
	16	Pointer-270° Deflection	Yes,Metal with Black Finish			47	Bill of Material (model, Tag no's)	100% Witness
	17	Stem outer dia	8 MM			48	Spares (BOM, part no's)	100% Witness (if ordered)
	18	Adjustable, 3-piece union	Required for 150 MM.			49	Compatibility (TG+TW)	10% or min. 2 of each range / type
	19	Immersion Adjustment	Required, 100mm to 300mm			50	Material compliance (TG+TW)	100% Review
	MATERIAL	20	Bezel ring	Bayonet Lock Type		TEST REPORT/CERTIFICATE	51	Internal Test Reports
21		Movement	Geared / Cam-roller type		52		Calibration & Accuracy test for TG	10% or min. 2 of each range / type
22		Pointer Stop	Required at both end		53		Functional test for TG	100% Review
23					54		Ingress Protection Test for TG	100% Review
24		Case	SS304		55		Over Temp Stability for TG	100% Review
25		Stem	SS316		56		Dimensional Check	10% or min. 2 of each type
26		Window Glass	Shatter Proof.		57		Radiography for weld joints	100% Review
27		Tag Plate	SS 304.		58		Hydrotest	100% Review
28		3 piece Union	SS304		59		Liquidd penetration test	100% Review for weld joints
29		Pointer	Alluminium.		60		IBR Form-IIIC (TW)	100% Review
30		Bezel Ring	SS 304		61		PMI Test (for SS & AS materials)	100% Review
31		Temperature Bulb	Min. SS 316		62		Wake Frequency calc.	100% Review as per PTC 19.3 TW: 2010
NOTES:: 1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement 2 Tag list shall be furnished by BHEL after P.O. palcement 3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval. 4 Vendor shall not submit any data sheet for approval after P.O. placement. 5 GA drawings shall be submitted for approval (if applicable)					Approved Makes / Vendors	FORBES MARSHALL (HYD) PVT LIMITED, GOA INSTRUMENTS INDUSTRIES PRECISION MASS PRODUCTS PVT LTD H.GURU INSTRUMENTS(S.I)PVT.LTD WALCHANDNAGAR INDUSTRIES LIMITED SCIENTIFIC DEVICES (BOMBAY) PVT. LT BAUMER TECHNOLOGIES GAUGES BOURDON INDIA A.N. INSTRUMENTS PVT. LTD., PROTECH CONTROL INSTRUMENTS		
REMARKS:								
(1) For Vibration services, U length shall be more than 500 mm								

ESP-001-2A Rev.00			PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number		
					PY 56217		
					Rev. No.	00	
					Sheet	18 of 23	
Thermocouple (TC) With ThermoWell (TW) Technical Data Sheet							
GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)	THERMOWELL	35	TW Const.	Drilled Bar Stock
	2	Type	K-Type, Ex-proof & intrinsic safe EX "i" type.		36	TW material	SS 316 / 446 & Inconel for temp > 600°C
	3	Ambient Temp Limit	- 40 to 80°C		37	Insertion length "U"	Refer BOM (Annexure-I of this specification)
	4				38	Dimension	Tapered from 21mm to 16 mm
	5				39	Process Conn.	1.5" flanged for services rated ≤ 600 # 2" flanged for services rated > 600 #
	6				40	Flange rating	Refer BOM (Annexure-I of this specification)
	7						
ELEMENT SPECIFICATION	8	Sensor Type	Duplex, Insulated, filled with MgO	TEST REPORT / CERTIFICATE	41	Flange material	Refer BOM (Annexure-I of this specification)
	9	Leads	Hermitically sealed		42	Instrument connection	½" NPT(F)
	10	Accuracy	Class A / Class 1 as per IEC 751 / 584-2		43	Bore diameter	Suitable to TG/TC stem dia (i.e. 9MM)
	11	Instrument connection	1/2" NPT(M)		44		
	12	Head Type/Connection	Screwed / 1/2" NPT (F)		45		
	13	Protection	IP 65		46	Bill of Material (model, Tag no's)	100% Witness
	14	Sensor Wire Size	16 AWG		47	Spares (BOM, part no's)	100% Witness (if ordered)
	15	Element outer dia	8 MM		48	Compatibility (TC+TW)	10% or min. 2 of each range / type
	16	Element Length	Suitable to reach at bottom of TW		49	Material compliance (TC+TW)	100% Review
	17	Hot Junction	Ungrounded		50	Internal Test Reports	100% Review
	ACCESSORIES	18	Terminal Block		Screw Type	51	Calibration & Accuracy test for TC
19		Electrical Connection	2 Nos of 1/2" NPT (F)	52	Functional test for TC	100% Review	
20		Immersion Adjustment	Required, 100mm to 300mm	53	Ingress Protection Test for TC	100% Review	
21		Thermoelectric properties	as per ANSI MC 96.1	54	Over Temp Stability for TC	100% Review	
22				55	Dimensional Check	10% or min. 2 of each type	
23		Adjustable, 3-piece union	Required for 150 MM.	56	Radiography for weld joints	100% Review	
24		Cable Glands	2 No's SS Double Compression+FlameProof	57	Hydrotest	100% Review	
MATERIAL	25	Cable entry Plugs	Reqd, SS 304 (1 No)	58	Liquid penetration test	100% Review for weld joints	
	26	Cap Chain	Reqd, SS 304	59	IBR Form-IIIC (TW)	100% Review	
	27	FRP canopy	1 No per instrument	60	PMI Test (for SS & AS materials)	100% Review	
	28	Hazardous area class	Zone-1, IIA/IIB, T3.	61	Wake Frequency calc.	100% Review as per PTC 19.3 TW: 2010	
	29	Case	SS304	62	Statutory approvals like PESO, BIS, etc	100% Review (if applicable) PESO (For Instrument+Glands+Plugs)	
	30	Sheath	SS316	63			
	31	Head	SS304	64			
NOTES:: 1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement 2 Tag list shall be furnished by BHEL after P.O. placement 3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make / models of instruments, etc for approval. 4 Vendor shall not submit any data sheet for approval after P.O. placement. 5 GA drawings shall be submitted for approval (if applicable)	Approved Makes / Vendors	32	Terminal Block	Heat Resist Ceramic	65		
		33	Tag Plate	SS			
		34					
REMARKS: (1) For Vibration services, U length shall be more than 500 mm							

ESP-001-2A Rev.00		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number		
				PY 56217		
				Rev. No.	00	
Sheet	19	of 23				
ThermoWell (TW) Technical Data Sheet						
GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)	19	Bill of Material (model, Tag no's)	100% Witness
	2	Type	Drilled Bar Stock	20	Spares (BOM, part no's)	100% Witness (if ordered)
	3	Ambient Temp Limit	-40 to 80°C	21	Material compliance	100% Review
	4			22	Internal Test Reports	100% Review
	5			23	Dimensional Check	10% or min. 2 of each type
	6			24	Radiography for weld joints	100% Review
	7			25	Hydrotest	100% Review
THERMOWELL	8	TW Const.	Drilled Bar Stock	26	Liquidd penetration test	100% Review for weld joints
	9	TW material	SS 316 /446 & Inconel for temp > 600°C	27	IBR Form-IIIC (TW)	100% Review
	10	Insertion length "U"	Refer BOM (Annexure-I of this specification)	28	PMI Test (for SS & AS materials)	100% Review
	11	Dimension	Tapered from 21mm to 16 mm	29	Wake Frequncy calc.	100% Review as per PTC 19.3 TW: 2010
	12	Process Connection	1.5" flanged for services rated ≤ 600 #	30		
	13		2" flanged for services rated > 600 #	31		
	14	Flange rating	Refer BOM (Annexure-I of this specification)	32		
	15	Flange material	Refer BOM (Annexure-I of this specification)	33		
	16	Instrument connection	½" NPT(F)	34		
	17	Bore diameter	Suitable to TG/TE stem dia (i.e. 9MM)	35		
	18			36		
NOTES:: 1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement 2 Tag list shall be furnished by BHEL after P.O. palcement 3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval. 4 Vendor shall not submit any data sheet for approval after P.O. placement. 5 GA drawings shall be submitted for approval (if applicable)			TEST REPORT/CERTIFICATE			
			Approved Makes / Vendors			
			VALUE TREK ENGINEERS,			
			CARLO DYNATECH INDUSTRIES,			
			GOA INSTRUMENTS INDUSTRIES			
			PYRO ELECTRIC INSTRUMENTS GOA			
			MICRO PRECISION PRODUCTS (P) LTD.			
			H.GURU INSTRUMENTS(S.I)PVT.LTD			
			SCIENTIFIC DEVICES (BOMBAY) PVT. LT			
			BAUMER TECHNOLOGIES			
			CHEMTROLS INDUSTRIES LTD.,			
			PRECISION ENGINEERING INDS.,			
			EXOTHERM INSTRUMENTS			
			GAUGES BOURDON INDIA			
			THERMAL INSTRUMENT INDIA			
NAV DURGA FORGING AND FITTINGS						
TEMPSENS INSTRUMENTS (I) PVT.LTD.						
PROTECH CONTROL INSTRUMENTS						
REMARKS:						
(1) For Vibration services, U length shall be more than 500 mm						

ESP-001-2A Rev.00				PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number PY 56217	
						Rev. No.	00
						Sheet	20 of 23
MAGNETIC FLOW METER (MFM) Technical Data Sheet							
GENERAL	1	Range & Qty.	Refer BOM (Annexure-I of this specification)	ACCESSORIES	27	Cable Glands with Slipper type	Nickel plated brass Double Compression type; 2 No's per transmitter
	2	Type	Field mounted, Weather proof			PVC sleeves cable shrouds	
	3	Service / Medium	Cooling water		28	Cable entry Dummy Plugs	Required, SS 304 ; 1 No per transmitter
	4	Line Size	10" x 6.35 mm (Thk), CS		29	Tag Plate	Required, SS 316
	5	Ambient Temp Limit	0 to 50°C and 95% RH max;		30	Bolts + Nuts	Required. A193GrB7 + A194Gr2H
	6	Flow Rate	Min/Nor/Max : 239/239/296 M³/Hr		31	Grounding ring	Required, 2 No's per transmitter
	7	Pressure	Min/Nor/Max/Design : 5/5/5/9.5 Kg/cm²(g)		32	Slipper type PVC hoods	Shall be provided for each cable gland
	8	Temperature	Min/Nor/Max/Design : 35/35/35/65 Deg C		33		
	9	Type	Electro Magnetic	34			
	10	Body material	Carbon Steel	35			
	11	Process connection:	10" 300 RF	36			
	12	Flange material	ASTM A 105	37			
	13	Electrode material	SS 316	38	Bill of Material (model, Tag no's)	100% Witness	
	14	Power supply	From transmitter	39	Spares (BOM, part no's)	100% Witness (if ordered)	
	15	Electrode design	As per OEM recommendation	40	Material compliance certificate	100% Review	
	16	Liner Material	Teflon / PFA (or) better	41	Functional test (Output, HART, accuracy, Diagnosis, display)	100% review & 10% or min 2no's witness with random selection.	
TRANSMITTER	17	Transmitter Housing	Die-cast Aluminum	42	Radiography / DPT for weld joints	100% Review	
	18	Accuracy	Min. 0.5% of Flow Rate or better	43	Hydro test for pressure parts	100% Review	
	19	Out put	4-20mA+HART	44	Ingress Protection Test	100% Review	
	20	Diagnostic features	Required	45			
	21	Power Supply	24V DC (or) 90 – 230 V ± 10%, 50Hz ± 3Hz UPS	46			
	22	Meter Type	Integral	47			
	23	Span Adjustment	Required.	48			
	24	Output meter	Required.	49			
	25	Cable entry size	½" NPT (F)	50			
	26	Additional requirement	Meter shall work on minimum conductivity of 5µS/cm.	51			
NOTES::			Approved Makes / Vendors		This vendor list is under approval with customer and approved list shall be provided during technical scrutiny		
1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement			ABB AUTOMATION PRODUCTS GMBH, INDIA				
2 Tag list shall be furnished by BHEL after P.O. placement			ABB LTD-FARIDABAD, INDIA				
3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval.			EMERSON PROCES MGMT ASIA PACIFIC PTE LTD, INDIA				
4 Vendor shall not submit any data sheet for approval after P.O. placement.			EMERSON PROCESS MANAGEMENT INDIA PVT LTD, INDIA				
5 GA drawings shall be submitted for approval (if applicable)			ENDRESS+ HAUSER INSTRUMENTS INTL.AG, INDIA				
			ENDRESS + HAUSER (I) PVT. LTD., INDIA				
			HEINRICHS MESSTECHNIK GMBH, GERMANY				
			INVENSYS SOFTWARE SYSTEMS(S) PTE LTD, INDIA				
			KROHNE MARSHALL PVT. LTD., INDIA				
			KROHNE MESSTECHNIK GMBH & CO KG, INDIA				
			YAMTAKE CORPORATION LTD, JAPAN				
			YOKOGAWA ELECTRIC CORPORATION, INDIA				
			YOKOGAWA INDIA LIMITED, INDIA				

ESP-001-2A Rev.00	बी एच ई एल BHEL		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number		
					PY 56217		
					Rev. No.	00	
					Sheet	21 of 23	
Universal Hand Held Configurator (HHC) Technical Data Sheet							
GENERAL	1	Qty.	Refer BOM (Annexure-I of this specification)	TEST REPORT/CERTIFICATE	16	Bill of Material (model, Tag no's)	100% Witness
	2	Support & Type	For HART Devices & Suitable for Zone-1, IIA/IIB/IIC, T4; suitable for all makes of SMART transmitters and valve positioners with all engineering capability like calibration, diagnostics, configuration, inhibition of HART signal etc		17	Spares (BOM, part no's)	100% Witness (if ordered)
	3	Ambient Temp Limit	-40 to 80°C		18	Internal Test Reports	100% Review
	4				19		
					20		
THERMOWELL	5	Configuration	Universal		21		
	6	Application requirement	Calibration & configuration of HART devices		22		
	7	Memory	As per vendor standard		23		
	8	Device data storage Capacity	As per vendor standard		24		
	9	Power supply	100-240V AC		25		
	10	Easy upgrade option	Applicable & required		26		
	11	Battery type	Rechargeable Li-ION Battery inbuilt in Base Kit		27		
	12	Battery Charger	Power Supply/Charger for NiMH/Li-Ion (100-240 VAC, 50/60Hz,)		28		
	13	Connection Leads	Applicable		29		
	14	Carrying case	Applicable		30		
	15	Battery operating time	As per vendor standard		31		
NOTES:: 1 This data sheet shall be used for inspection along with BOM sheet and Tag List. No further approval is required after P.O. placement 2 Tag list shall be furnished by BHEL after P.O. placement 3 Vendor shall submit the consolidated BOM sheet along with accessories of instruments, finalised make /models of instruments, etc for approval. 4 Vendor shall not submit any data sheet for approval after P.O. placement. 5 GA drawings shall be submitted for approval (if applicable)	EMERSON PROCESS MGT (I) PVT LTD		CHEMTROLS LTD. (FOR FUJI LTD.) INDIA				
	ABB INDIA LIMITED, HYD		ABB KENT ITALY				
	YOKOGAWA INDIA LIMITED		YAMATAKE HONEYWELL JAPAN				
	ENDRESS + HAUSER (INDIA) PVT. LTD.		HARTMAN & BRAUN GERMANY				
	HONEYWELL AUTOMATION INDIA LIMITED		SIEMENS AG (P, DP, T) (NORMAL TYPE) GERMANY				
	ABB AUTOMATION PRODUCTS GMBH GERMANY		EMECON CONTROLS PVT LTD (FOR SPRINO MAKE) INDIA				
	EMERSON PROCES MGMT ASIA PACIFIC PTE LTD SINGAPORE		CHINO-LAX SONS INDIA LTD. (FOR SMAR MAKE) INDIA				
	ENDRESS+HAUSER WETZER GMBH+ CO.KG GERMANY		SUPREME TECHNOLOGY (FOR SIEMENS MAKE) INDIA				
	ENDRESS+HAUSER GMBH+CO. KG GERMANY		FORBES MARSHALL (FOR MOORE MAKE) INDIA				
	FUJI ELECTRIC SYSTEMS CO. LTD JAPAN		EMERSON PROCESS MANAGEMENT INTERNATIONAL				
	HONEYWELL INC. UNITED STATES		YOKOGAWA INTERNATIONAL				
	INVENSYS INDIA PRIVATE LIMITED INDIA		HONEYWELL AUTOMATION INTERNATIONAL				
	YOKOGAWA ELECTRIC CORPORATION JAPAN		YAMATAKE CORPORATION (P, DP, VOL. SEAL P & DP) JAPAN				
	M-SYSTEM (T) JAPANFUJI ELECTRIC INSTRUMENTS CO. LTD. INDIA		SMARSINGAPORE PTE. LTD. (P, DP) SINGAPORE				
			MOORE PRODUCTS COMPANY (P, DP, VOL. SEAL P & DP) UNITED STATES				

[illegible]



PRODUCT STANDARD
PROJECT ENGINEERING & SYSTEMS DIVISION
HYDERABAD

Std. / Doc. Number

PY 56217

Rev. No.	00
----------	----

Sheet 23 of 23

RECORD OF REVISIONS

Rev. No.

Date _____

Revision Details

Revised By

Approved By

00

20.05.2017

Original issue

[illegible]

K. Anand Babu

K. M. Rube

COPYRIGHT AND CONFIDENTIAL

The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, it must not be used directly or indirectly in any way detrimental to the interest of the company.

BILL OF MATERIAL & PRICE FORMAT [for Main Supply + Mandatory Spares]**FIELD INSTRUMENT PACKAGE [BOP + UB + HRSG]****STEAM AND POWER GENERATION PACKAGE, RFCL**

ESP-001-2A Rev.00		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	Std. / Doc. Number	
			Annexure -[I] of PY 56217	
			Rev. No.	00

TABLE -1 : BOM for Material Code - PY9756217006 [MAIN SUPPLY]

S. No	Type of instrument	Main Supply Quantity (No's) [I]	Unit Rate [II]	TOTAL PRICE [I*II]	REMARKS
1	Pressure Transmitter with integral manifold [upto 100 kg/cm2(g)]	85			Note-5
2	Pressure Transmitter with integral manifold [Above 100 kg/cm2(g)]	42			Note-5
3	Pressure Transmitter with Remote seal [upto 100 kg/cm2(g)]	5			Note-5
4	Differential Pressure Transmitter with integral manifold	64			Note-5
5	Differential Pressure Transmitter Remote seal Type (Remote seal required for HP & LP)	11			Note-5
6	Temperature Transmitter	141			Note-5
7	Level Gauge [Reflex type] - Side mounted Process connection : 1" 300RF (0-350 mm)	6			
8	Level Gauge [Reflex type] - Side mounted Process connection : 1" 300RF (0-800 mm)	2			
9	Level Gauge [Reflex type] - Side mounted Process connection : 1" 300RF (0-1500 mm)	9			
10	Level Gauge [Reflex type] - Side mounted Process connection : 1" 300RF (0-1000 mm)	3			
11	Pressure Gauge (Bourdon Tube) [upto 60 kg/cm2(g)]	123			
12	Pressure Gauge (Bourdon Tube) [Above 60 kg/cm2(g)]	25			
13	Pressure Gauge (Diaphragm seal) [upto 60 kg/cm2(g)]	9			
14	Diff. Pressure Gauge (Bourdon Tube)	6			
15	Diff. Pressure Gauge (Remote Seal)	5			
16	TG (Bimetallic / Gas filled) With Thermowell [TG range upto 600 Deg C; Thermowell & flange: SS316, 1.5" 300 RF, U≤400mm]	48			
17	TG (Bimetallic / Gas filled) With Thermowell [TG range upto 600 Deg C; Thermowell & flange: SS316, 1.5" 600 RF, U≤400mm]	5			
18	TG (Bimetallic / Gas filled) With Thermowell [TG range upto 600 Deg C; Thermowell & flange: SS316, 2" 1500 RJ, U≤400mm]	7			
19	TG (Gas filled / Gas filled) With Thermowell [TG range upto 600 Deg C; Thermowell & flange: A 335 P91, 2" 2500 RJ, U≤400mm]	3			
20	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: SS316, 1.5" 300 RF; U≤400mm]	44			

BILL OF MATERIAL & PRICE FORMAT [for Main Supply + Mandatory Spares]**FIELD INSTRUMENT PACKAGE [BOP + UB + HRSG]****STEAM AND POWER GENERATION PACKAGE, RFCL**

ESP-001-2A Rev.00		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		Std. / Doc. Number	
				Annexure -[I] of PY 56217	
				Rev. No.	00

TABLE -1 : BOM for Material Code - PY9756217006 [MAIN SUPPLY]

S. No	Type of instrument	Main Supply Quantity (No's) [I]	Unit Rate [II]	TOTAL PRICE [I*II]	REMARKS
21	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: SS316, 1.5" 600 RF; U≤400mm]	7			
22	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: SS316, 2" 1500 RJ; U≤400mm]	10			
23	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: A335 P11, 2" 1500 RJ; U≤400mm]	2			
24	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: P22, 2" 2500 RJ; U≤400mm]	2			
25	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: P91, 2" 2500 RJ; U≤400mm]	8			
26	Thermowell [Thermowell & flange: SS316, U-280, 2" 1500 RJ]	8			
27	Thermowell [Thermowell & flange: P91, U-320, 2" 2500 RJ]	2			
28	FRP Canopies for Transmitters	200			
29	FRP Canopies for JBs	145			
30	FRP Canopies for Positioners	43			
31	Magnetic Flow Meter	2			
32	Universal Hand held calibrator with charger & common for all SMART instruments	4			
MAIN SUPPLY Total prices (Rs.) ::					

BILL OF MATERIAL & PRICE FORMAT [for Main Supply + Mandatory Spares]**FIELD INSTRUMENT PACKAGE [BOP + UB + HRSG]****STEAM AND POWER GENERATION PACKAGE, RFCL**

ESP-001-2A Rev.00		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	Std. / Doc. Number	
			Annexure -[I] of PY 56217	
			Rev. No.	00

TABLE -2 : BOM for Material Code - PY9756217032 [Mandatory Spares]

S. No	Type of instrument	Mandatory Spares Quantity (No's) [I]	Unit Rate [II]	TOTAL PRICE [I*II]	REMARKS
1	Pressure Transmitter with integral manifold [upto 100 kg/cm2(g)]	8			Note-5
2	Pressure Transmitter with integral manifold [Above 100 kg/cm2(g)]	4			Note-5
3	Pressure Transmitter with Remote seal [upto 100 kg/cm2(g)]	1			Note-5
4	Differential Pressure Transmitter with integral manifold	6			Note-5
5	Differential Pressure Transmitter Remote seal Type (Remote seal required for HP & LP)	1			Note-5
6	Temperature Transmitter	13			Note-5
7	Level Gauge [Reflex type] - Side mounted Process connection : 1" 300RF (0-350 mm)	1			
8	Level Gauge [Reflex type] - Side mounted Process connection : 1" 300RF (0-800 mm)	1			
9	Level Gauge [Reflex type] - Side mounted Process connection : 1" 300RF (0-1500 mm)	1			
10	Level Gauge [Reflex type] - Side mounted Process connection : 1" 300RF (0-1000 mm)	1			
11	Pressure Gauge (Bourdon Tube) [upto 60 kg/cm2(g)]	12			
12	Pressure Gauge (Bourdon Tube) [Above 60 kg/cm2(g)]	3			
13	Pressure Gauge (Diaphragm seal) [upto 60 kg/cm2(g)]	1			
14	Diff. Pressure Gauge (Bourdon Tube)	1			
15	Diff. Pressure Gauge (Remote Seal)	1			
16	TG (Bimetallic / Gas filled) With Thermowell [TG range upto 600 Deg C; Thermowell & flange: SS316, 1.5" 300 RF, U≤400mm]	5			
17	TG (Bimetallic / Gas filled) With Thermowell [TG range upto 600 Deg C; Thermowell & flange: SS316, 1.5" 600 RF, U≤400mm]	1			
18	TG (Bimetallic / Gas filled) With Thermowell [TG range upto 600 Deg C; Thermowell & flange: SS316, 2" 1500 RJ, U≤400mm]	1			
19	TG (Gas filled / Gas filled) With Thermowell [TG range upto 600 Deg C; Thermowell & flange: A 335 P91, 2" 2500 RJ, U≤400mm]	1			
20	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: SS316, 1.5" 300 RF; U≤400mm]	4			

BILL OF MATERIAL & PRICE FORMAT [for Main Supply + Mandatory Spares]**FIELD INSTRUMENT PACKAGE [BOP + UB + HRSG]****STEAM AND POWER GENERATION PACKAGE, RFCL**

ESP-001-2A Rev.00		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	Std. / Doc. Number		
			Annexure -[I] of PY 56217		
			Rev. No.	00	
TABLE -2 : BOM for Material Code - PY9756217032 [Mandatory Spares]					
S. No	Type of instrument	Mandatory Spares Quantity (No's) [I]	Unit Rate [II]	TOTAL PRICE [I*II]	REMARKS
21	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: SS316, 1.5" 600 RF; U≤400mm]	1			
22	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: SS316, 2" 1500 RJ; U≤400mm]	1			
23	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: A335 P11, 2" 1500 RJ; U≤400mm]	1			
24	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: P22, 2" 2500 RJ; U≤400mm]	1			
25	Thermocouple With Thermowell [TC range upto 600 Deg C; Thermowell & flange: P91, 2" 2500 RJ; U≤400mm]	1			
26	Thermowell [Thermowell & flange: SS316, U-280, 2" 1500 RJ]	1			
27	Thermowell [Thermowell & flange: P91, U-320, 2" 2500 RJ]	1			
MANDATORY SPARES Total prices (Rs.) ::					

NOTES ::

- This document details the price schedule format for the enquiry. **No other format will be entertained.** Applicable taxes and duties shall be indicated separately in commercial offer.
- Duly signed & stamped un-priced price schedule format shall be submitted by vendor in the technical offer as a token of concurrence that price schedule would be submitted in this format. Any tampering / modification / additions, etc. are NOT allowed and not considered binding and is liable for rejection of the offer.
- Bidders shall be evaluated on overall L1 basis.
- 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. These would include the cost up to engineering, installation of the item, wiring up in the panel and seamless integration with main system at works/site without any cost implications. All accessories required for this purpose shall be included in the price quoted.
- 20% of total transmitters shall be provided with SIL-2 certification.