

उत्पाद मानक

TG60530

पृष्ठ का

Page 1 Of 7

PRODUCT STANDARD

हस्ताक्षर एवं तिथि  
SIGN & DATE



सुपेर्सिडिंग नंबर  
SUPERSEDES INVENTORY NO.

संशोधक का नाम  
आविष्कारकर्ता का नाम

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.

स्वत्वाधिकार एवं गोपनीय  
इस दस्तावेज में कोई भी सूचना या तथ्य बिना अनुमति के प्रकाशित नहीं किया जा सकता है।

हस्ताक्षर एवं तिथि  
SIGN & DATE

संशोधक का नाम  
आविष्कारकर्ता का नाम

**GENERATOR GAS ANALYSER CABINET (MICROPROCESSOR BASED)**

**1.0 INTRODUCTION:-**

This standard specifies the requirement of intrinsically safe , non-purge type, non-sparking , microprocessor based H2 gas analyzer housed in properly ventilated cabinet. Alternatively, explosion proof , intrinsically safe gas analyzer housed in properly ventilated cabinet may be offered.

**2.0 COMPLIANCE WITH STANDARD:-** There is no national/international standard available on the above subject. However this standard is based on BHEL's experience.

**3.0 TECHNICAL DETAILS OF FABRICATED CABINET:-**

The cabinet shall preferably be of Rittal / Pyrotech make conforming to international/national standards and will be meeting general aesthetics and other technical requirements. The cabinet structure shall be close type with serviceable double door on front side. The rear side of the cabinet may be provided with door or cover. The cabinet will be with doors/covers of material CRCA galvanised steel sheet. The cabinet dimensions shall be preferably be 1000(W)x800(D) with standard height( including base frame height) of 2200(H). The sheet thickness shall not be less than 2.0 mm or as specified in enquiry/order. The paint shades will be as specified in the enquiry /order. The paint thickness shall not be less than 100 micron or as specified in enquiry/order. The degree of protection of the cabinet will be IP 54 (As per IS 13947 (part-1) (assuming blanking of canopy for this purpose ).

The sheet steel (enclosure) shall be pre treated through chemical cleaning (7 tank) process of rinsing, de-greasing, rinsing, de-rusting, rinsing, phosphating and rinsing. After surface preparation, one coat of Zinc phosphate primer conforming to IS2074, shall be applied. After the first coat is dried up completely, second coat of red oxide primer shall be applied. The dry film thickness of each coat shall be minimum 30 microns. Synthetic enamel paint conforming to IS2932 shall be used for finish coats. Minimum 2 coats of synthetic enamel with proper drying intervals shall be applied. The minimum paint thickness shall be 100 microns.

				नाम NAME	दिनांक एवं हस्ताक्षर SIGNATURE & DATE
			अनुवादक TRANSLATED BY		
TSX	D.L. Oberoi		निर्माता WORKED BY	SATISH KUMAR	29/07/98
QAX	S.K. ARORA		जांचकर्ता CHECKED BY	M.R. BHARDWAJ	
सहायक विभाग GREED DEPT	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षक SUPERVISED BY	M.R. BHARDWAJ	
			स्वीकृति APPROVED	DGM (CIE)	GR. NO 3.50
REV. NO. 07			तैयार PREPARED	CIE	29.07.98
DL03-06-09			जारी ISSUED	TSX	DATE

दिनांक एवं संख्या SIGN & DATE 	<b>उत्पाद मानक (हीप - हरिद्वार)</b> <b>PRODUCT STANDARD (HEEP - HARDWAR)</b>	<b>TG60530</b> पृष्ठ का <b>Page 2 of 7</b>

SUPERSEDES INVENTORY NO.  संपूर्ण सूची संख्या को अधिगणित करें &	<p><b>4.0 TECHNICAL PARAMETERS OF GAS ANALYSER EQUIPMENT</b></p> <p>4.1 The gas analyser shall be of micro processor based design.</p> <p>4.2 The measurement may be based on thermal conductivity / gas density principles ( with typical schematics as per Figure-1 / 2 respectively ) unless specified otherwise in enquiry /order.</p> <p>4.3 The three range gas analyser shall have local display of following measuring ranges:-          i) 0-100 Vol % CO<sub>2</sub> in air          ii) 100-0 / 0-100 Vol % H<sub>2</sub> in CO<sub>2</sub>. ( any one)          iii) <del>00-100 / 05-100 / 100-00</del> 90-100 Vol % H<sub>2</sub> in air ( any one)</p> <p>4.4 The outputs shall be conditioned to provide 4-20 mA galvanically isolated, linear output for range (iii) and quasi-linear output for other ranges.</p> <p>4.5 Separate 4-20mA outputs for three ranges or one 4-20mA output and potential free contacts to identify the each of active range will be provided to ensure correlation of the range with output.</p> <p>4.6 Explosion proof JB will be provided in the cabinet for external connections terminations.</p> <p><b>5.0 MOUNTING ACCESSORIES:-</b></p> <p>5.1 Set of shut off / needle valves (Material SS/Brass, Makes Excel Hydro/JVD)</p> <p>5.2 Pr. regulator &amp; relief valve ( Material SS ,Makes Tescom, Baldota,Excel Hydro,Span Gas)</p> <p>5.3 Needle valves / NRVs /Multi way valves ( Material SS/Brass, Makes Baldota, Excel Hydro /JVD, Whitey)</p> <p>5.4 Drying filter ( Make Nupro Dynex, Shavo Norgren)</p> <p>5.5 Flow meter ( Make Placka)</p> <p>5.6 Bulk head connectors (Material SS/Brass)</p> <p>5.7 Explosion proof JB / electrical accessories required for the system.</p> <p>5.8 An oil separating vessel with transparent cover and drain valve may be provided in the cabinet. The inlet port of the vessel may be connected to sample inlet from the generator. The outlet port may be taken as sample gas to the analyser.</p> <p>5.9 Test gas cylinders of H<sub>2</sub> gas ( 80/85/90% H<sub>2</sub> in N<sub>2</sub> - whichever is applicable) and 100% H<sub>2</sub> gas shall be provided for calibration checking at zero /span limits at site. Additionally , CO<sub>2</sub> cylinder with 100%CO<sub>2</sub> will be supplied if it is required for calibration setting of the analyser. All these cylinders will be with tubing for internal / external mounting.</p> <p>5.10 An acrylic/ stainless steel name plate with inscription "GENERATOR GAS ANALYSER CABINET" will be provided in front top of the cabinet</p> <p>5.11 Suitable flame arrestors may be provided at sampling inlet/outlet of the analyzer to avoid possibility of fire propagation.</p> <p>5.12 Items at 5.1 to 5.8 to be suitably mounted inside the GA cabinet and should be firmly secured to avoid any damage due to vibration / shock during transportation.</p> <p>5.13 All above accessories shall be of makes as indicated. The alternate makes will be subject to approval from BHEL. The vendor will furnish complete BOM along with offer for approval. The GA drawing /BOM will be approved by BHEL/Client.</p>
COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company	
स्वयंपादिका एंव गोपनीय इस प्रलेख में दी गई सूचना भारत भारती इलेक्ट्रिकल्स की संपत्ति है इसमें प्रकृत एवं अज्ञात रूप से किसी भी तरह प्रयोग, उसे कि कंपनी के हित में इस्तेमाल करने की गतिमा जाए ।	
दिनांक एवं संख्या SIGN & DATE 17/5	

संपूर्ण सूची संख्या INVENTORY NO. <b>P-6163</b>	REV.NO. <b>07</b>	निर्माणकर्ता WORKED BY <b>SATISH KUMAR</b>	05/05/05
		जांचकर्ता CHECKED BY <b>M.R.BHARDWAJ</b>	05/05/05

उत्पाद मानक (हीप - हार्डवार)

TG60530



PRODUCT STANDARD (HEEP - HARDWAR)

पृष्ठ का  
Page 3 of 7

निर्माण एवं  
SIGN & DATE

SUPERSEDES  
INVENTORY NO.

समाप्ति सूची संख्या एवं  
अंतिम/प्राथमिक संख्या

**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

स्वातंत्र्यधिकार एवं गोपनीय  
इस प्रलेख में दी गई सूचना भारत भारती इंजीनियरिंग लिमिटेड की संपत्ति है। इसका प्रयोग एवं  
आपका उपयोग केवल केवल के लिए ही किया जा सकता है। इसमें किसी भी प्रकार का कॉपीराइट सुरक्षा के बिना है।

निर्माण एवं दिनांक  
SIGN & DATE

**6.0 POWER SUPPLY**

The system shall be suitable for 240 VAC +/- 10%, 50 Hz +/- 5% or as specified in the enquiry /order. Alternatively, analyzer with 24VDC +/-10% supply may also be considered.

**7.0 ACCURACY**

The parameters within the limits as specified below.

- Drift <= 1 % of span /week.
- Inherent linear drift <=0.2% of span/week.
- Repeatability/Accuracy <= 1% of span
- Temperature effect <= 1 % of span per 10 degree cel based on temp at the time of calibration
- Flow effect <=0.2 % of span for variation in flow by +/- 10L/hr from rated flow.

Response time  $T_{90} < 5 \text{ sec}$

**8.0 OUTPUT**

The 4-20 mA output shall be suitable for load burden of at least up to 500 ohms. There shall not be any variation in output during burden change from short circuit to 500 ohms.

**9.0 INLET / OUTLET CONNECTIONS**

9.1 The end connection shall be 1/8" BSP or 1/4" NPT. Suitable adapters / unit nuts /bulk head connectors shall be provided for connection to minimum 6mm OD copper tubing. All connections shall be done with minimum 6mm OD, 4mm ID copper / stainless steel tubing. The outlet vents shall be joined inside the cabinet with NRV for protection of gas analyser from back pressure. Only single vent will terminate for venting purpose. The bulk head connection for vent and sample inlet/outlet shall be provided on right side or top cover of the cabinet. . Inscription plates for designations will be provided on each item in the cabinet indicating application.

9.2 Depending upon site requirements the external cable may enter from top or bottom of the cabinet. Hence the cable entry will be site selectable.




**10.0 AMBIENT TEMPERATURE**

The gas analyser equipment shall be suitable for ambient temperature 0-50 Degree Celsius and maximum relative humidity of 0-95%.

**11.0 TESTING**

11.1 **Type Testing:**-Type test certificates for suitability of the analyser for hazardous area application will be furnished with the offer. The certificates from international certifying authorities ( CENLEC/FM/CSA/TUV) will be acceptable. However, these will not be older than 5 years. The analyser has to be suitable for H2 purity measurement in generators with H2 cooling ( Zone 2 , Group IIC ,Ex ib or better application).

समाप्ति सूची संख्या INVENTORY NO. P-6163	REV.NO. 07	निर्माणकर्ता WORKED BY	SATISH KUMAR	<i>Satish</i>	05/09/05
		जांचकर्ता CHECKED BY	M.R.BHARDWAJ	<i>M.R.B</i>	05/09/05

नामी सूची संख्या SIGN & DATE		<b>उत्पाद मानक (हीप - हार्डवार)</b>  <b>PRODUCT STANDARD (HEEP - HARDWAR)</b>	<b>TG60530</b> पृष्ठ का <b>Page 4 of 7</b>		
SUPERSEDES INVENTORY NO.	नामी सूची संख्या की संशोधित संख्या है	<p>11.2 <b>Routine testing</b> : Each equipment shall be subjected to following tests at supplier's works:-</p> <p>11.21 Layout /visual checking as per approved layout / schematic drawings.</p> <p>11.22 Meggering of power parts/TB's shall be done with the help of 500V megger (electronic parts to be isolated / shorted during this testing). IR value should be more than 20 M Ohms.</p> <p>11.23 Gas tightness test for sample gas path to be done at air pressure of 5.0 Kg/cm2. No leakage should be observed in 5 minutes in case of thermal conductivity based gas analysing cabinet and one hour in case of density based gas analysing cabinet.</p> <p>11.24 Calibration test for analyzer for different composition of gas mixtures in 'H2 in air' measuring range ( minimum 5 points) will be carried out at vendor's Works. The results have to be within specified accuracy limits.</p> <p>11.24 The calibration test certificates from the principle may be verified for calibration checking for the remaining two ranges.</p> <p>11.25 Power supply variation test to check repeatability accuracy as per Clause 7.0 for H2 in air range.</p> <p>12.0 <b>ACCEPTANCE NORMS</b> :</p> <p>12.1 Compliance to clause 11.1</p> <p>12.2 Carrying out of routine tests as per clause 11.2</p> <p>13.0 <b>DOCUMENTS</b>:</p> <p>13.1 Catalogues:-Two copies of descriptive catalogues in English language giving technical details like allowable maximum load burden, response time, power consumption, dimensional details, external terminal details for customer's interconnections etc shall be furnished along with the offer.</p> <p>13.2 Drawings:- Two copies of the schematic diagram, complete BOM with make/type of accessories and wiring /layout diagram of the equipment giving terminal details and size of the terminals shall also be furnished along with the offer for approval. These shall also later form part of O&amp;M manual.</p> <p>13.3 O&amp;M Manuals:- The complete O&amp;M manuals in English version giving the details circuit diagrams, trouble shooting instructions, servicing instructions etc., shall be furnished along with main supply as per quantity mentioned in the enquiry/order. One CD-ROM for the O&amp;M will be supplied to BHEL/Hardwar.</p> <p>14.0 <b>PACKING</b>: The analyser shall be fixed with the help of technological fixtures before dispatch and packed in thermocole boxes placed in cartons or cases with adequate cushioning material to minimize movements of internals and to ensure that the equipment is capable of withstanding transit risk without damage. The package shall be adequate to withstand loading/unloading jerks and transit movements by rail/ road. The supplier may also supply the analyser / electronics as loose for assembly later at site.</p>			
<b>COPYRIGHT AND CONFIDENTIAL</b> The information on this documents is the property of Bharati Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company					
<b>स्वत्वाधिकार एवं गोपनीय</b> इस दस्तावेज में दी गई सूचना भारत भारती भारती-हार्डवार की संपत्ति है इसका प्रयोग एवं प्रसारण के बिना किसी भी प्रकार प्रयोग, जो कि कंपनी के हित में सहायकारके को न किया जाय ।					
नामी सूची संख्या SIGN & DATE	17.5.05				
नामी सूची संख्या INVENTORY NO. <b>P-6163</b>	REV.NO. <b>07</b>		निर्मापकर्ता WORKED BY <b>SATISH KUMAR</b>		<b>05/09/05</b>
		जांचकर्ता CHECKED BY <b>M.R.BHARDWAJ</b>		<b>05/09/05</b>	



उत्पाद मानक (हीप - हार्डवयर)

TG60530

पृष्ठ का

PRODUCT STANDARD (HEEP - HARDWAR)

Page 5 Of 7

निर्माता का हस्ताक्षर  
SIGN & DATE

सुपरसेड्स  
INVENTORY NO.

संश्लेषण के लिए  
अनुमति संख्या

COPYRIGHT AND CONFIDENTIAL  
The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used, disseminated or reproduced in any way detrimental to the interest of the company.

स्वत्वाधिकार एवं गोपनीय  
एक प्रतिलिपि के अतिरिक्त इस दस्तावेज़ को प्रतिलिपि में प्रसारित करना या अन्य किसी भी प्रकार प्रकाशित करना, बिना लिखित अनुमति के गैर कानूनी है।

निर्माता का हस्ताक्षर  
SIGN & DATE

संश्लेषण के लिए  
INVENTORY NO.

**15.0 SPARE PARTS:-**  
Recommended spare parts list for 3 years trouble free operation and mandatory spares / consumable will be submitted for BHEL's reference along with the offer. The offers for spares shall indicate breakup of prices for individual parts. BHEL reserves the right to order the spare parts either along with the main equipment or separately in which case the validity of the offer for spare parts shall be extended by 6 months from the date of placement of the order for main equipment.

**16.0 MARKINGS**  
16.1 The manufacturer's identification number of the instrument in the English shall be marked in suitable location and the same shall be mentioned in the relevant test certificates.  
16.2 The BHEL material code number as given in the enquiry / order shall be embossed in each item. The following details shall be marked on each packing case.  
a) Manufacturer's name  
b) BHEL order no  
c) BHEL material code no  
d) BHEL monogram will be fixed on front top (right side). This will be supplied loose by BHEL alongwith PO or during inspection.

**17.0 QUALITY PLAN & INSPECTION**  
Three copies of complete QA plan giving the details of tests to be carried out during the various stages of manufacture shall be furnished to BHEL for approval along with the offer in BHEL format. BHEL reserves its right to depute their / customer's representative during final testing at supplier's works. The supplier will arrange this inspection without any additional cost. The BOM will be as per BHEL approved schematics. The reference of the schematics may be given in the QAP.

**18.0 TEST AND GUARANTEE CERTIFICATES:**  
Three copies of test certificates for routine & type tests and guarantee certificates in English shall be furnished while executing the order. The equipment will be warranted for 12 months trouble free operation from the date of commissioning or 18 months from date of supply, whichever ever is later (unless, otherwise specified in the enquiry / order).

**19.0 ERECTION & COMMISSIONING**  
The cabinet will be erected by BHEL at site. However, the supplier will mount the equipment and complete all internal wiring / terminations & commissioning of the equipment free of cost in India.

**20.0 CROSS REFERRED STANDARDS**  
I) IS5  
II) IS9000.  
III) IS13947 (Part-I)

संश्लेषण के लिए INVENTORY NO. P-6163	REV.NO. 07	निर्माता द्वारा WORKED BY SATISH KUMAR	05/07/05
		जांचकर्ता CHECKED BY M.R.BHARDWAJ	07/07/05

दिनांक एवं  
SIGN & DATE



उत्पाद मानक (हीप - इन्डियन)

TG60530

PRODUCT STANDARD (HEEP - HARDWAR)

पृष्ठ सं  
Page 6 Of 7

सुपरग्रेड्स  
INVENTORY NO.

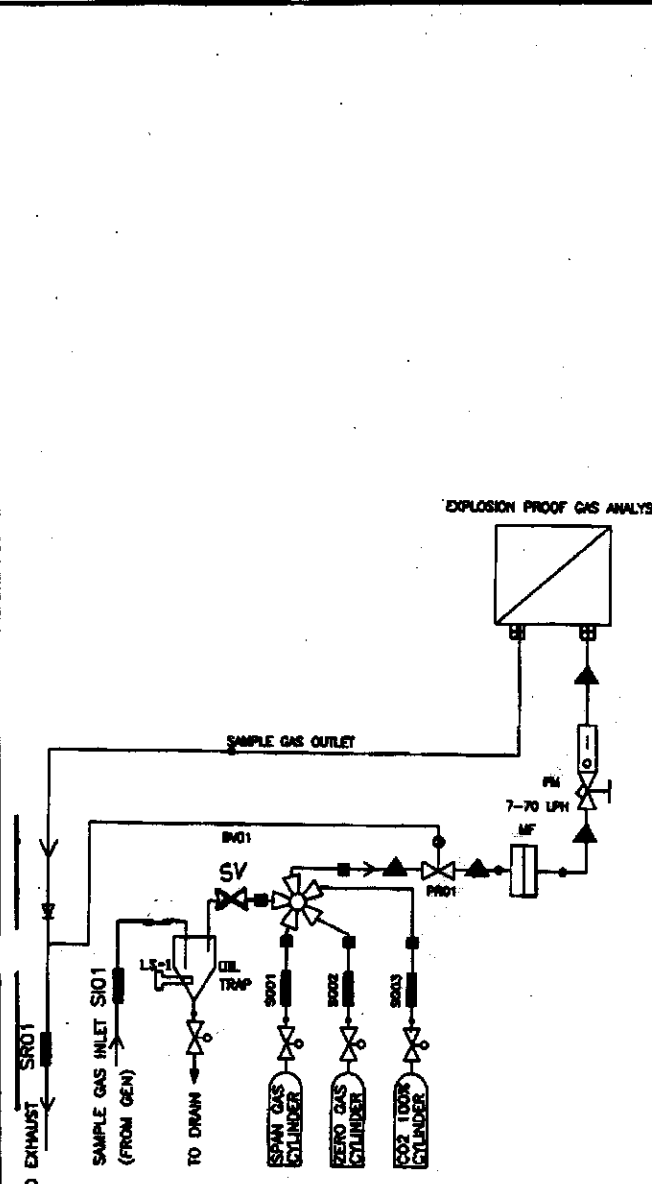
कार्गो सूची संख्या एवं  
सिग्नैचर/दिनांक

**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.

स्वातंत्र्यकार एवं गोपनीय  
एक प्रकृत में ही यह सूचना प्रकाशित की जा सकती है। अन्यथा दंडनीय।

अंतिम एवं दिनांक  
SIGN & DATE  
10.9.08

कार्गो सूची संख्या  
INVENTORY  
P-6163



**LEGENDS**

- SI01 SAMPLE GAS INLET
- SO01 SAMPLE GAS OUTLET
- SG01 ZERO GAS INLET (TEST GAS)
- SG02 SPAN GAS INLET (TEST GAS)
- SG03 CO2 GAS INLET (TEST GAS)
- BRASS MALE CONNECTOR  
1/4" BSP(M) X 6mm OD COMP.
- BRASS MALE CONNECTOR  
1/8" NPT(M) X 6mm OD COMP.
- BRASS BULK HEADCONNECTOR  
6mm OD COMP.X 6mm OD COMP.
- BRASS FEMALE CONNECTOR  
1/4" NPT(F) X 6mm ODCOMP.
- ▲ BRASS MALE CONNECTOR  
1/4" NPT(M) X 6mm ODCOMP.
- ⊠ FLAME ARRESTOR
- ∇ NRV
- CU TUBE 6 MM
- FM FLOW METER
- MF MEMBRANE FILTER
- OT OIL TRAPER WITH LIQUID SENSOR
- SV SOLENOID VALVE

Note:- TO SAVE SYSTEM FROM OIL, TYPICAL ARRANGEMENT (LEVEL SWITCH, SOLENOID VALVE etc) HAS BEEN SHOWN. VENDOR CAN OFFER ALTERNATE SCHEME (SUBJECT TO BHEL APPROVAL)

**SYSTEM CONFIGURATION FOR THERMAL CONDUCTIVITY  
BASED GAS ANALYSER**

**FIGURE-1**

REV.NO.  
07

निर्माणकर्ता WORKED BY	A.L.LYNGDOH	
जांचकर्ता CHECKED BY	SATISH KUMAR	

