

केन्द्रीय खनन अनुसंधान संस्थान
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्)
बरवा रोड, धनबाद-826 001
बिहार, भारत



Central Mining Research Institute
(Council of Scientific & Industrial Research)
BARWA ROAD, DHANBAD-826 001
BIHAR, INDIA

NO. CMRI/TC/.....

Dated:.....March, 1996

To,
M/s. HANSU CONTROLS LIMITED
A-420, T.T.C. IND. AREA. MIDC. MAHAPE
NEW BOMBAY-400 701.

Sub:- Flameproof Testing as per IS:2148-1981 and Weatherproof
(IP-65) Testing as per IS:2147-1962 of your Flameproof -
cum - Weatherproof (IP-65) START / STOP PUSH BUTTON STATION
WITH AMMETER, in cast aluminium alloy LM-6 construction,
rated at upto 16 Amps upto 500 Volts AC, TYPE HG-51, for
application in explosive atmospheres of Gas Groups of I,
IIA & IIB in accordance with IS:2148-1981.- REPORT ON.

Your application Ref.No. L/CMRS/1699 Dated January 29, 1996.

Dear Sirs,

Please find enclosed the test report (prototype) of the
above prototype sample, submitted by you.

Charges of Rs.6875/- (Rupees Six thousand Eight hundred
Seventy five) only including contingency involved towards the
testing have been adjusted against the advance deposit made by
you.

Kindly arrange to collect the sample within 90 days from the
date of receipt of this letter failing which CMRI would dispose
off the sample by public auction without further notice.

Kindly acknowledge receipt.

Thanking you.

Yours faithfully,

(C. Bandopadhyay)
Scientist-in-charge
Testing Cell

Encl : As above.

Test Report in Triplicate.

Copy to (1) Sri J. Achari, Sc. E-II

फोन-निदेशक, Director पी. ए. एक्स, PAX
Phone - Off, 822156 832087, 832088, 832101

तार - मिनसर्च, धनबाद
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कार्यालय के दिन : सोमवार से शुक्रवार तक Working days : Monday to Friday



CMRI

के. म. प्र. सं. परीक्षण प्रकोष्ठ **CMRI TESTING CELL**
 केन्द्रीय खनन अनुसंधान संस्थान
CENTRAL MINING RESEARCH INSTITUTE
 (Council of Scientific & Industrial Research)
 बरवा रोड, धनबाद-826001 (भारत) BARWA ROAD, DHANBAD-826001 (India)



परीक्षण प्रमाण पत्र **TEST CERTIFICATE**

FIRST SCHEDULE

[For association with the report of tests sent (under cover of this office letter No. CMRI/TC/... dated... March, 1996) to M/s. HANSU CONTROLS LIMITED, A-420 T.T.C. IND. AREA. M.I.D.C MAHAPE, NEW BOMBAY-400 701, in respect of the equipment mentioned below submitted to CMRI for test.]

APPARATUS :

TYPE HG-51, FLAMEPROOF-CUM-WEATHERPROOF (IP-65) START/STOP PUSH BUTTON STATION WITH AMMETER, in cast aluminium alloy LM-6 construction, rated at upto 16 Amps upto 500 volts AC.

The unit is flameproof to IS:2148-1981 with IP-65 degree of protection as per IS:2147-1962. The unit is designed & constructed in a rectangular shape body consisted with integrally cast main enclosure and terminal enclosure in LM-6.

(a) Main Enclosure contains push button elements and ammeter. The push button cover and ammeter cover are each fixed on the main enclosure by 4 Nos. - M6 x 25 mm long high tensile steel socket head allen screws with spring washers of spring steel. The heads of these screws are effectively shrouded. A warning plate of brass advising "ISOLATE ELSEWHERE BEFORE OPENING COVER" is affixed permanently on both covers by hammer-drive stainless steel rivets with minimum 3 mm metal thickness left at the bottom of these rivets holes. The minimum length of the flamepath between both spigotted joint covers and main enclosure is 15 mm and maximum diametral clearance is 0.15 mm, excluding neoprene rubber "O"-ring provided to ensure IP-65 degree of protection. Two start / stop push button operating spindles (brass) pass through two press fitted brass bushed holes in the push button cover to ensure operation of the start/stop push button elements housed within the main enclosure.

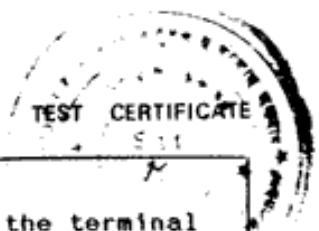
The minimum length of the flamepath between Start / Stop push button operating spindles (brass) and press-fitted brass bushed holes in push button cover is 15 mm and maximum diametral clearance is 0.15 mm.

A 8.0 mm thick toughened glass window for observation of ammeter is permanently sealed in the ammeter cover from the inside with the help of litharge + glycerine cement in conformance with IS:2148-1981. The exposed area of the glass window is less than 50 cm² without guard.

(b) Terminal Enclosure contains 6 way terminals; with a spigotted joint blind cover secured by 4-M6 x 25 long high tensile steel socket head allen screws with washers, the heads of these screws are effectively shrouded. A name / rating / warning plate of brass is affixed permanently on the terminal cover by hammer-drive stainless steel rivets with minimum 3 mm metal thickness left at the bottom of these rivets holes.

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For cabling access into the main enclosure via. the terminal enclosure, a multi-conductor sealed type line bushing in the form of a screwed-in type 3/4" ET MS plug is fitted into the partition wall of the enclosures, having un-interrupted & engaged axial length of the threaded metal-to-metal flamepath 25 mm. Fibre glass or Silicon coated fibre glass wires are permanently sealed into the holes of the line bushing or M.S. plug with the help of araldite adhesive or quick-setting type epoxy-resin compound.

2 Nos. 3/4" or 1" ET/BSC or 1/2" or 3/4" BSP/NPT cable entries are provided in the terminal enclosure by drilling & tapping through an integral boss on the bottom wall of the termination enclosure, with minimum axial threaded length 25 mm, for the attachment of the certified & approved double compression type flameproof-cum-weatherproof (IP-65) cable glands. Unused threaded apertures for cable entries shall be closed by suitable certified & approved FLP / WP blanking plugs of types removable by only special tools or alternatively shall be left unworked at the time of manufacture.

The minimum length of the flamepath between spigotted joint terminal cover and terminal enclosure is 15 mm and maximum diametral clearance is 0.15 mm, excluding neoprene rubber "O"-ring to ensure IP-65 Degree of protection as per IS:2148-1981.

VOLUME

ENCLOSURE	VOLUME	
	Gross Volume	Nett Volume
Main Enclosure	1100 cm ³	1000 cm ³
Terminal Enclosure	550 cm ³	500 cm ³

ELECTRICAL RATINGS

UPTO 16 AMPS
 UPTO 500 VOLTS AC.

OVERALL DIMENSIONS OF THE BODY

Length with boss for cable entry = 395 mm
 Width with centre holes of mounting lugs = 145 mm *As per drawing*
 Height with push button cover & ammeter cover = 88 mm
 Height with terminal cover = 72 mm

As per drawing

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For further details, the drawing mentioned below may be consulted.

D R A W I N G :

The unit is designed and constructed as flameproof in accordance with the following drawing conforming to the requirements of IS:2148-1981.

DRG. NO. : (i) HG-51 (Rev.0) (Sheet 1 of 2) Dated 2/11/95
(ii) HG-51 (Rev.0) (Sheet 2 of 2) Dated 2/11/95.

MANUFACTURER : M/s. HANSU CONTROLS LIMITED
A-420 T.T.C. IND. AREA. MIDC. MAHAPE
NEW BOMBAY-400 701.
=====

APPLICANT : M/s. HANSU CONTROLS LIMITED
A-420 T.T.C. IND. AREA. MIDC. MAHAPE
NEW BOMBAY-400 701.
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Declarations by the applicant/manufacturers as to standards with which the apparatus complies in respects of :-

- (a) As to flameproof construction : IS:2148-1981
(b) As to general design rating : Not Declared.
& performance.
(c) As to weatherproof construction : IS:2147-1962(For IP-65)

Note: The CMRI has however not checked and tested the compliance of the apparatus to any standards other than IS 2148-1981 and IS:2147-1962.

Group Classification: Groups I, IIA & IIB only as per IS:2148-1981.

NOTES :

(i) The unit under reference has been tested with Group IIC gas mixture i.e. one group higher than the Gas Group IIB for which it is certified to meet DGMS approval.

(ii) For group I application, the material of construction of the enclosure shall be of cast iron, fitted with appropriate & approved cable sealing box & gland.

(iii) Composition of LM-6 alloy purported to be forming the material of construction of the enclosure has been declared by the manufacturer to be as follows (no sample of the alloy was drawn from the prototype enclosure for verifying the chemical composition declared)

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COMPOSITION OF ALUMINIUM ALLOY LM-6 :

Copper	0.1% (Max)	Silicon	10 to 13% (Max)
Titanium	0.2% (Max)	Lead	0.1% (Max)
Tin	0.05% (Max)	Magnesium	0.1% (Max)
Iron	0.6% (Max)	Zinc	0.1% (Max)
Nickel	0.1% (Max)	Manganese	0.5% (Max)

Aluminium by difference 85 to 88%

As per section 5.1 of IS: 2148-1981, the enclosure may be of a material chosen for its lightness provided it does not give rise to other hazards like incentive frictional spark hazards. therefore, it should be appropriate that sample of material used for construction of the enclosure should be submitted for verification of its safe qualities as regards to frictional impact spark hazard and this test Report should be read in conjunction with the frictional spark incendivity tests report of the material of construction of the enclosure.

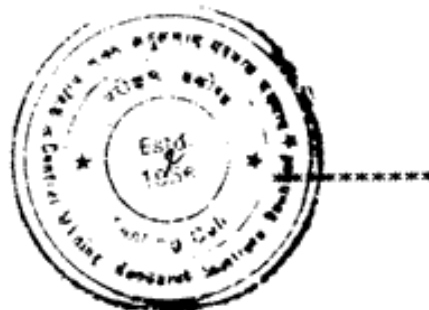
Accordingly, the applicant/manufacturer has submitted a sample for frictional incendivity test. The results of test is being issued under separate cover.

SCOPE OF CERTIFICATE :

Certificates issued by the certifying authority testify only that the apparatus has been found to comply with the Definitions of Flameproof Enclosure contained in the relevant Indian Standard specification. They do not vouch for the quality of the equipment in any other respect.

CONDITIONS OF CERTIFICATION :

This Institute reserves the right to review, amend or withdraw this Test Report at any time, if considered necessary in the interest of safety.



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S E C O N D S C H E D U L E

The following are permissible variations to otherwise identical apparatus covered by this Test Report :-

1. Alternatively, the material of construction of the enclosure may be cast iron instead of cast aluminium alloy LM-6.

(a) For Group I - cast iron.

(b) For Groups IIA & IIB- cast iron or cast aluminium alloy LM-6.

2. Flameproof-cum-Weatherproof (IP-65) Start / Stop Push Button Station with Rotary Switch / Selector Switch, rated at upto 16 Amps upto 500 volts AC, Type HE-51;

3. Flameproof-cum-Weatherproof (IP-65) FORWARD / REVERSE / STOP PUSH BUTTON STATION with Rotary Switch / Selector Switch, rated at upto 16 Amps upto 500 volts AC, Type HE-52;

4. Flameproof-cum-Weatherproof (IP-65) SELECTOR / ROTARY SWITCH WITH 65 mm dia. Ammeter / Voltmeter, rated at upto 16 Amps upto 500 volts AC, Type HE-53;

5. Flameproof-cum-Weatherproof (IP-65) START / STOP PUSH BUTTON STATION with 2 Nos. glass windows for indicating lamps or 1 No. glass window for an indicating lamp, rated at upto 9 watts 230 volts AC, Type HQ-51;

6. Flameproof-cum-Weatherproof (IP-65) 1 No. indicating lamp or 2 Nos. indicating lamps by providing glass windows accordingly, with ROTARY / SELECTOR SWITCH, rated at upto 9 watts 230 volts AC, Type HK-51;

7. Flameproof-cum-Weatherproof (IP-65) FORWARD / REVERSE / STOP PUSH BUTTON STATION WITH AMMETER / VOLTMETER DIA. 65 MM, Type HL-51;

in accordance with

Org. No. HG-51 (Rev.0) (Sheet 2 of 2) Dated 02/11/95.



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TEST CERTIFICATE



R O U T I N E T E S T

(Preliminary Pressure Test and Final External Ignition Test)

[Accompanies this office letter no. CMRI/TC/4284 dt. 14 March, 1996 and pertains to Flameproof-cum-Weatherproof START/STOP PUSH BUTTON STATION WITH AMMETER, in cast aluminium alloy LM-6 construction, rated at upto 16 Amps upto 500 volts AC, TYPE HG-51, manufactured & submitted for test by M/s. HANSU CONTROLS LIMITED, A-420 T.T.C. IND. AREA. M.I.D.C. MAHAPE, NEW BOMBAY-400 701.]

Date(s) of Test: 07/03/96

Conditions of Test :

1. Explosive mixture used	Group	IIC Gas	% in air
(a) Preliminary Pressure - Internal Test		Hydrogen	31.0
(b) Final External Ignition Test	- Internal	-do-	28.0
	External	-do-	28.0

2. Ignition by inductive break spark : Location as stated .

3. Pressure recorded by "COMPUTER" through "PIEZO ELECTRIC TRANSDUCER and CHARGE AMPLIFIER manufactured by "KISTLER" of SWITZERLAND. Position as shown.

Test Ref.No.	Ignition	Gauge Position	Max. Pressure Kg/cm ²	Time of Pressure rise in milliseconds	Remarks
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(A) Test for observation & pressure recording as per clause 25.4.1 of IS: 2148-1981 :

(i) Main Enclosure :

PPM/131781	Body	Body	6.02 <i>As per</i>	6.0	No evidence of distress
PPM/131782	Body	Body	6.02 <i>As per</i>	6.0	-do-
PPM/131783	Body	Body	6.06 <i>As per</i>	6.0	-do-
PPM/131784	Body	Body	5.82	6.0	-do-
PPM/131785	Body	Body	5.85	6.0	-do-

(ii) Terminal Enclosure :

PPM/131786	Body	Body	3.40	3.0	-do-
PPM/131787	Body	Body	3.54	3.0	-do-
PPM/131788	Body	Body	3.02	3.0	-do-
PPM/131789	Body	Body	3.40	3.0	-do-
PPM/131790	Body	Body	3.32	3.0	-do-

As per

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(B) Tests with surrounding explosive atmosphere as per clause 25.5 of IS:2148-1981

(i) Main Enclosure :

EIT/131791	No external Ignition.
EIT/131792	No external Ignition.
EIT/131793	No external Ignition.
EIT/131794	No external Ignition.
EIT/131795	No external Ignition.

(ii) Terminal Enclosure :

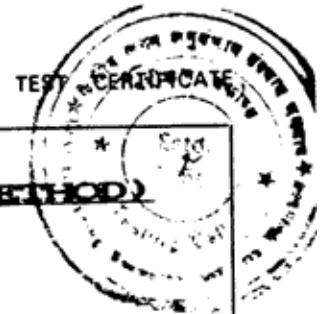
EIT/131796	No external Ignition.
EIT/131797	No external Ignition.
EIT/131798	No external Ignition.
EIT/131799	No external Ignition.
EIT/131800	No external Ignition.

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EXCESS PRESSURE TEST (STATIC METHOD)

Date(s) of Test: 07/03/96

1. Pressure applied hydraulically.
2. Pressure recorded by "Pressure-Gauge" of the Hydraulic Testing Machine.
3. Position of application of Pressure : As stated.

Test Ref.No.	Position of application of pressure	Max. Pressure (Kg/sq.cm)	Remarks
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(i) Main Enclosure :

OPM/131801	Body	10.0	No evidence of distress
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(ii) Terminal Enclosure :

OPM/131802	Body	10.5	-do-
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4. **Details of Test:** The tests were made on the above enclosures of the unit as per clause 25.4.2.3 of IS:2148-1981.

(a) A pressure of 10.0 & 10.5 Kg/cm² was applied hydraulically to the above enclosures, and the pressure being maintained for one minute in each case, as required by clause 25.4.2.3 of IS: 2148-1981.

(b) The above pressure applied in the main enclosure was equal to the pressure specified in Table 4 of IS:2148-1981, as it is more than 1.5 times reference pressure (PPM) and in the terminal enclosure was 3 times the reference pressure (PPM).

5. **OBSERVATIONS :**

The enclosures of the unit withstood the pressures applied without any visual evidence of distress.

6. **COMMENTS :**

The enclosures of the unit satisfy the test requirements of clause 25.4.2.3 of IS:2148-1981.

7. **NOTE :**

As a result of the tests the manufacturer will be required to test the enclosure to a static pressure of 10.0 & 10.5 Kg/cm² as mentioned in column III of above Table. The enclosures of the unit should not suffer any damage or deformation as a result of static pressure applied.

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GENERAL OBSERVATIONS ON THE BEHAVIOUR OF THE ENCLOSURES DURING TEST :

The Type HG-51, FLAMEPROOF-CUM-WEATHERPROOF (IP-65) START/STOP PUSH BUTTON STATION WITH AMMETER, rated at upto 16 Amps upto 500 volts AC, and its associated FLP/WP (IP-65) enclosures in cast aluminium alloy LM-6 construction, sustained no damage as a result of the routine tests applied and the surrounding flammable atmosphere was not ignited. The structure also withstood the excess pressure test, when applied hydraulically, without any visual evidence of distress.

NOTE :

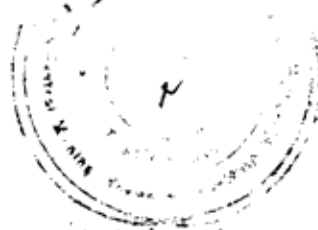
A Computer print out on "Reference Pressure Curve" for above mentioned enclosures, obtained through "KISTLER PIEZO ELECTRIC TRANSDUCER" and "CHARGE AMPLIFIER", is enclosed for your reference.

A. Anand

(TESTING OFFICER)

Dated: .. 14 .. March, 1996

Flame and Explosion Research Laboratory,
Central Mining Research Institute (CSIR)
Barwa Road, Dhanbad-826 001 (Bihar State)



J. S. Jha

(DISCIPLINE HEAD)

[Signature]
प्रबन्धी अधिकारी
परीक्षण प्रकोष्ठ,
SCIENTIST-IN-CHARGE,
TESTING CELL

[Signature] 14/3/96
उपनिदेशक
DEPUTY DIRECTOR

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TEST FOR IP-65 DEGREE OF PROTECTION

[Accompanies this office letter No. CMRI/TC/ H284 Dated 14 March, 1996 and pertains to Type HG-51, Flameproof-cum-Weatherproof (IP-65) START / STOP PUSH BUTTON STATION WITH AMMETER, rated at upto 16 Amps upto 500 volts AS, in cast aluminium alloy LM-6 construction, manufactured & submitted for test by M/s. HANSU CONTROLS LTD., A-420 T.T.C. IND. AREA, M.I.D.C. MAHAPE, NEW BOMBAY-400 701.]

1. **TEST AGAINST INGRESSES OF DUST AS PER REQUIREMENTS LAID DOWN AGAINST FIRST CHARACTERISTIC NUMERAL NO.6 OF IP-65 OF IS: 2147-1962 :**

The test was conducted on the above mentioned unit in a closed Test Chamber in which talcum powder (passing 1575 micron sieve) was maintained in suspension by an air current. The amount of talcum powder used was 2 Kg. per cubic metre of the Test Chamber. The equipment under test was hung inside the Test Chamber and was connected to a vacuum pump of the Testing set-up. The vacuum maintained inside the enclosures was a differential pressure equivalent to 200 mm column of water. This condition within the enclosures was maintained for 2 continuous hours during which time air were drawn through the joints in the enclosures. The test was then stopped.

RESULTS :

The test was repeated three times on each enclosure and on examination after each test it was observed that no dusts had entered inside the enclosures.

2. **TEST AGAINST INGRESSES OF WATER AS PER REQUIREMENTS LAID DOWN AGAINST SECOND CHARACTERISTIC NUMERAL NO.5 OF IP-65 OF IS:2147-1962 :**

The test was performed by washing down the above mentioned unit from every direction by means of a hose nozzle of 12.5 mm inside diameter which was held 3 metre away from the equipment under test with a water pressure corresponding to a head of about 10 metre of water. The duration of the test was 15 minutes.

RESULTS :

The test was repeated three times and on examination after each test it was observed that no water entered inside the enclosures.



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TEST CERTIFICATE

CONCLUSION :

The Flameproof-cum-Weatherproof (IP-65) START / STOP PUSH BUTTON STATION WITH AMMETER, Type HG-51, under reference meets the test requirements of IS:2147-1962 in respect of IP-65 Degree of Protection.

A. Anand
(TESTING OFFICER)



J. S. Jaiswal
(DISCIPLINE HEAD)

Dated 14 March, 1996.

Flame and Explosion Research Laboratory,
Central Mining Research Institute (CSIR),
Barwa Road, Dhanbad-826 001 (Bihar State).
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