केन्द्रीय खनन् 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/346

Dated: 08 July 1997.

M/s. HANSU CONTROLS LIMITED
4-420, T.T.C. Industrial Area
M.I.D.C., MAHAPE
NAVI, MUMBAI-400 701.

Sub:- Flameproof Testing as per IS:2148-1981 of your Flameproof - cum - Weatherproof Enclosure for 7 Nos. Push Button Station/Pendent in cast aluminium alloy LM-6 construction, designated by Type : HT-52. - REPORT ON.

Your Ref. No. CMRI/5899 Dated 17/06/97.

Dear Sirs,

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

Charges of Rs.10.100/- (Rupees Ten thousand One hundred) only involved towards the testing issuing the schedule 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.

Youre faithfully,

(C Bandopadhyay)
Scientist-in-charge
Testing Cell

Encl : As above.

Test Report in Triplicate.

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

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केo खo अo सo परीक्षण प्रकोष्ठ CMRI TESTING CELL

# केन्द्रीय खनन अनुसंधान संस्थान
# CENTRAL MINING RESEARCH INSTITUTE

( Council of Scientific & Industrial Research )

बरवा रोड, धनबाद-८२६००१ (भारत) BARWA ROAD, DHANBAD-826001 (India)

CMRI

परीक्षण प्रमाण पत्र TEST CERTIFICATE

## FIRST SCHEDULE

[For association with the report of tests sent (under cover of this office letter No.CMRI/TC/...344...dated.28..July 1997) to M/s. HANSU CONTROLS LIMITED, 4-420, T.T.C. INDUSTRIAL AREA M.I.D.C., MAHAPE, NAVI MUMBAI-400 701, in respect of the equipment mentioned below submitted to CMRI for test.]

APPARATUS : Flameproof cum Weatherproof Enclosures for Push Button Station (7 Nos.) is having two flameproof enclosures cast integrally but separated by a common partition wall. One is the main enclosure for push buttons and the other is the terminal box enclosure. Each enclosure has its independent bolted cover having spigotted joints.

The main enclosure cover, which is fitted with relevant push buttons having flameproof joints & gaps as per the relevant standard, is fixed by 5 Nos. M6 x 25 mm long socket head cap screws with spring washers. The terminal box cover without any mounting on it is also fixed by M6 x 25 mm long socket head cap screws with spring washers. The no. of bolts in this case is only 4 Nos. The heads of these bolts are all effectively shrouded.

Flameproof terminals of sealed type are provided through the partition wall in between two enclosures. Endless neoprene "O"-rings are provided on each cover, outside the effective flamepath for IP-65 protection.

Name, ratings & warning inscription plate made of brass/ss is fixed permanently on the covers by rivets, stating "ISOLATE SUPPLY BEFORE OPENING".

The external cable entries are maximum 3 Nos. and shall be applied through certified flameproof double compression type cable glands. The entry sizes shall be 1/2", 3/4" ET/BSC/NPT/BSP or 2 Nos. 1" ET/BSC/NPT/BSP or their any combination.

The push button station is also certified for use as a indicating lamp or rotary switches, based on test & evaluation. The details are covered by the Second Schedule.

The electrical ratings of the unit, as declared by the applicant are above 16 Amps & 500 volts.

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 drawings conforming to the requirements of IS:2148-1981.

DRG. NO. : HT 52 Rev. "0" dated 18/03/97.

TEST CERTIFICATE

**MANUFACTURER & APPLICANT** : M/s. HANSU CONTROLS LIMITED
A-420, TTC INDUSTRIAL AREA
MIDC, MAHAPE,
NAVI MUMBAI-400 701

**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 & performance. | : Not Declared. |
| (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 (For IP-65).

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

**NOTES** : (i) For group I application, the material of construction of the enclosure shall be of cast iron only, fitted with appropriate & approved cable sealing box & gland of Mining Type.

(ii) 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)

**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 upto 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.

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 alternative permissible variations to otherwise identical unit covered by this Test Report :

1. The alternate material of construction of the Push Button Station / Pendent may be cast iron instead of cast aluminium alloy LM-6 for application in Groups I, IIA & IIB atmosphere.

By replacement of Main Enclosure Cover (7 Nos. Push Button Station), the unit may be used as given below with their respective type designation :-

(i) FLP/WP Enclosure for 7 Nos. Indicating Lamp, Type : HT-53
(Result of test enclosed)

(ii) FLP/WP Enclosure for 5 Nos. Push button + 1 No. indicating lamp, Type : HS-52.

(iii) FLP/WP Enclosure for 4 Nos. Switch, Type : HE-58.
(Result of test enclosed)

(iv) FLP/WP Enclosure for 1 No. Switch, Type : HE-55.

(v) FLP/WP DOL Starter for 10 HP Motor with 2 Nos. Push Button, Type : HF-56.

(vi) FLP/WP Enclosure for Pole Box with Plain Cover, Type: HB-52

(vii) FLP/WP Enclosure for Digital Temperature Indicator Control Box / Electronic circuit, Type HY-58.
(Result of test enclosure)

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केन्द्रीय खनन अनुसंधान संस्थान परीक्षण प्रकोष्ठ
CMRI TESTING CELL

TEST CERTIFICATE

Continuation Sheet

# ROUTINE TEST

(Preliminary Pressure Test and Final External Ignition Test)

(Accompanies this office letter no. CMRI/TC/346 dt. 08 July 1997 and pertains to cast aluminium alloy LM-6 constructed flame-proof enclosures for 07 Nos. Push Button Station/Pendent, designated by Type : HT-52 & its associated alternative enclosures, manufactured & submitted for test by M/s. Hansu Controls Ltd., MIDC, Mahape, Navi Mumbai-400 701.)

Date(s) of Test : 02/07/97

Conditions of Test :

| 1. Explosive mixture used | | Gas | % in air |
|---|---|---|---|
| (a)Preliminary Pressure Test | - Internal | Hydrogen/Methane 85:15 | 24.0 |
| (b)Final External Ignition Test | - Internal | -do- | 20.0 |
| | External | -do- | 18.0 |

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 Bar | Time of Pressure rise in millisecs | Remarks |
|---|---|---|---|---|---|
| (A) Test for observation & pressure recording : | | | | | |
| (i) **Main Enclosure cover fitted with 7 Nos. push button** | | | | | |
| PPM/139498 Body | Body | 2.52 | 10.2 | | No evidence of distress |
| PPM/139499 Body | Body | 2.34 | 13.5 | | -do- |
| PPM/139500 Body | Body | 3.04 | 6.0 | | -do- |
| (ii) **Main Enclosure cover fitted with 7 Nos. indicating lamp** | | | | | |
| PPM/139504 Body | Body | 2.32 | 11.8 | | -do- |
| PPM/139505 Body | Body | 2.17 | 11.7 | | -do- |
| PPM/139506 Body | Body | 2.31 | 11.6 | | -do- |
| (iii) **Main enclosure cover fitted with 4 Nos. swtich** | | | | | |
| PPM/139507 Body | Body | 2.31 | 11.6 | | -do- |
| PPM/139508 Body | Body | 2.31 | 11.6 | | -do- |
| PPM/139509 Body | Body | 2.22 | 11.6 | | -do- |

(iv) Main enclosure cover fitted with glass window for indicator

| | | | | |
|---|---|---|---|---|
| PPM/139510 Body | Body | 2.30 | 11.6 | -do- |
| PPM/139511 Body | Body | 2.38 | 11.8 | -do- |
| PPM/139512 Body | Body | 2.18 | 11.4 | -do- |

(v) Terminal Box

| | | | | |
|---|---|---|---|---|
| PPM/139501 Body | Body | 1.66 | 10.8 | -do- |
| PPM/139502 Body | Body | 1.67 | 11.1 | -do- |
| PPM/139503 Body | Body | 1.82 | 11.1 | -do- |

(B) Tests with surrounding explosive atmosphere :

(i) Main Enclosure cover fitted with 7 Nos. push button

| | |
|---|---|
| EIT/139513 | No external Ignition. |
| EIT/139514 | No external Ignition. |
| EIT/139515 | No external Ignition. |
| EIT/139516 | No external Ignition. |
| EIT/139517 | No external Ignition. |

(ii) Main Enclosure cover fitted with 7 Nos. indicating lamp

| | |
|---|---|
| EIT/139523 | No external Ignition. |
| EIT/139524 | No external Ignition. |
| EIT/139525 | No external Ignition. |
| EIT/139526 | No external Ignition. |
| EIT/139527 | No external Ignition. |

(iii)Main enclosure cover fitted with 4 Nos. switch

| | |
|---|---|
| EIT/139528 | No external Ignition. |
| EIT/139529 | No external Ignition. |
| EIT/139530 | No external Ignition. |
| EIT/139531 | No external Ignition. |
| EIT/139532 | No external Ignition. |

(iv)Main enclosure cover fitted with glass window for indicator

| | |
|---|---|
| EIT/139533 | No external Ignition. |
| EIT/139534 | No external Ignition. |
| EIT/139535 | No external Ignition. |
| EIT/139536 | No external Ignition. |
| EIT/139537 | No external Ignition. |

(v) Terminal Box

| | |
|---|---|
| EIT/139518 | No external Ignition. |
| EIT/139519 | No external Ignition. |
| EIT/139520 | No external Ignition. |
| EIT/139521 | No external Ignition. |
| EIT/139522 | No external Ignition. |

## EXCESS PRESSURE TEST (STATIC METHOD)

Date(s) of Test : 02/07/97

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 |
|---|---|---|---|
| **(i)Main Enclosure cover fitted with 7 Nos. push button** | | | |
| OPM/139538 | Body | 10.0 | No evidence of distress |
| **(ii) Main Enclosure cover fitted with 7 Nos. indicating lamp** | | | |
| OPM/139540 | Body | 10.0 | -do- |
| **(iii) Main Enclosure cover fitted with 4 Nos. switch** | | | |
| OPM/139541 | Body | 10.0 | -do- |
| **(iv) Main Enclosure cover fitted with glass window for indicator** | | | |
| OPM/139542 | Body | 10.0 | -do- |
| **(v) Teraminal Box** | | | |
| OPM/139539 | Body | 10.0 | -do- |

4. **Details of Test**: The tests were made on the above enclosures of the unit as per clauses 25.4.2.3 of IS:2148-1981.

(a) A pressure of 10.0 Kg/cm$^2$ 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 was equal to the pressure specified in Table 4 of IS:2148-1981, as it is more than 1.5 times 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 each and every enclosure to a static pressure of 10.0 $Kg/cm^2$ 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.

**GENERAL OBSERVATIONS ON THE BEHAVIOUR OF THE ENCLOSURES DURING TEST :**

The Flameproof cum Weatherproof Enclosures for 7 Nos. Push Button Station, Type : HT-52 in cast aluminium alloy LM-6 construction, and its associated terminal box enclosure and other alternative covers, 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** :

THIS UNIT IS ONLY FLAMEPROOF WHEN ALL CABLE ENTRIES HAVE EITHER A CORRECTLY FITTED FLP BLANKING PLUG OR FLP CABLE GLAND, COMPLETE WITH CABLE TERMINATED IN THE PROPER MANNER CABLE GLANDS AND BLANKING PLUGS FITTED MUST BE OF A TYPE APPROVED FOR USE WITH THIS UNIT.

( TESTING OFFICER )

Dated: 04 July 1997

( DISCIPLINE HEAD )

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

कुमारी वैज्ञानिक
परीक्षण प्रकोष्ठ
Scientist-in-Charge
Testing Cell

समन्वय वैज्ञानिक
CO-ORDINATING SCIENTIST

# TEST FOR IP-65 DEGREE OF PROTECTION

[Accompanies this office letter No.CMRI/TC/ 346 Dated 08 July 1997 and pertains to cast aluminium alloy LM-6 constructed flameproof enclosures for 07 Nos. Push Button Station/Pendent, designated by Type : HT-52 & its associated alternative enclosures, manufactured & submitted for tests by M/s.Hansu Controls Ltd., MIDC, Mahape, Navi Mumbai-400 701.]

1. **TEST AGAINST INGRESS OF DUST AS PER REQUIREMENTS LAID DOWN AGAINST 1ST CHARACTERISTIC NUMERAL 6 OF IP-65 OF IS:2147-1962** :

The test was conducted on the Push Button Station / Pendent 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.

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

2. **TEST AGAINST INGRESS OF WATER AS PER REQUIREMENTS LAID DOWN AGAINST 2ND CHARACTERISTIC NUMERAL 5 OF IP-65 OF IS:2147-1962** :

The test was performed by washing down the Push Button Station / Pendent 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.

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

**CONCLUSION** : The Flameproof-cum-Weatherproof Push Button Station/Pendent in cast aluminium alloy LM-6 construction, designated by Type : HT-52, under reference, meets the test requirements of IS:2147-1962 in respect of IP-65 Degree of Protection.

( TESTING OFFICER )

इआरे इंजानिक
परीक्षण प्रकोष्ठ
Scientist-in-Charge
Testing Cell

( DISCIPLINE HEAD )

Dated 04 July 1997.
Flame and Explosion Laboratory,
Central Mining Research Institute (CSIR),
Barwa Road, Dhanbad-826 001 (Bihar State)

समन्वय वैज्ञानिक
CO-ORDINATING SCIENTIST