EXPLOLABS (Pty) Ltd
Explosion Prevention Services
Certex, TÜV Rheinland and SGS (SA)
Appointed Ex Laboratory Reg No: 1999/027771/07

Government Approved
Inspection Authority

SANAS ACCREDITED LABORATORY
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# ASSESMENT AND TEST REPORT No.: XPL/8834/07262

**PHAMBILI**
**PO BOX 193**
**EDENVALE**
**1610**

**Our Reference:** J8834
**Enquiries:** D Maree
**Date:** 6 November 2007


**VTR PEDRO- TERMINAL BOXES**

## 1 STANDARD

IEC/SANS 60079-0: 2005 “Electrical apparatus for explosive gas atmospheres, Part 0:General Requirements”
IEC/SANS 60079-7: 2003 “Electrical apparatus for explosive gas atmospheres, Part 7: Increased Safety “e””

## 2 PRODUCT DESCRIPTION

| | |
|---|---|
| Supplier | : Phambili |
| Type of Product | : VTR Pedro- Terminal boxes |
| Model | : VTR01 Cieco;VTR01 Oblo to VTR06 Cieco; VTR06 Oblo |
| Volts | : 380V |
| Amps | : 10A |
| Termination Cross Section | : Maximum 4mm$^2$ |
| Sample Number(s) | : XPL/091006/DM01 |
| Sample Model | : VTR01 OBLO |

## 3 ASSESSMENT REQUIRED

| | |
|---|---|
| Batch/Type Approval | : Type Approval |
| Batch Size | : N/A |

## 4 CONCLUSION

The sample(s) as described in Paragraph 2 above have COMPLIED with the requirements as set out in Paragraph 1.

The approved explosion protection rating of the equipment is: **Ex e II T5**
The following Inspection Authority Certificate Number:**S–XPL/07262**

NOTE: See conditions under Clause 8 of this report.

## 5 ASSESSMENT AND TESTING

### 5.1 GENERAL

The enclosure tested was one of a range of enclosures which are manufactured in Italy. The enclosures are manufactured out of fibre glass and are white in colour. The range of enclosures consisted out of two types: a) OBLO (This type of enclosure makes provision for a transparent window) and b) CIECO.

Each enclosure consisted of a body and a lid. Each lid had a rubber type seal fitted into a groove and sealed the enclosure when closed and locked into position. Each locking mechanism of the lid can only be operated with a triangular tool. Each lid was secured onto the enclosure by means of two hinges.

Dimensions and accessories for the above mentioned enclosures are described in the Pedro catalogue and the certificate of approval no. CA02.02704.

The following power dissipation indications was extracted from the IMQ Certificate:

| | |
|---|---|
| **Series** | BOCCHIOTTI |
| **Type Reference** | VTR01 CIECO – VTRO 01 OBLO |
| **Article/Catalogue Reference** | VTR01 CIECO – VTRO 01 OBLO |
| **Number of dimensions/modules** | 300 x 265 x 165 mm |
| **Power loss** | 36W |
| **Series** | BOCCHIOTTI |
| **Type Reference** | VTR02 CIECO – VTRO 02 OBLO |
| **Article/Catalogue Reference** | VTR02 CIECO – VTRO 021 OBLO |
| **Number of dimensions/modules** | 425 x 325 x 180 mm |
| **Power loss** | 52W |
| **Series** | BOCCHIOTTI |
| **Type Reference** | VTR02 OBLO– VTRO 02 CIECI |
| **Article/Catalogue Reference** | VTR02 OBLO– VTRO 02 CIECI |
| **Number of dimensions/modules** | 36 mod. 425 x 325 x 180 mm |
| **Power loss** | 34W |
| **Series** | BOCCHIOTTI |
| **Type Reference** | VTR03 CIECO – VTRO 03 OBLO |
| **Article/Catalogue Reference** | VTR03 CIECO – VTRO 03 OBLO |
| **Number of dimensions/modules** | 500 x 430 x 210 mm |
| **Power loss** | 111W |
| **Series** | BOCCHIOTTI |
| **Type Reference** | VTR03 OBLO– VTRO 03 CIECI |
| **Article/Catalogue Reference** | VTR03 OBLO– VTRO 03 CIECI |
| **Number of dimensions/modules** | 54 mod. 500 x 430 x 210 mm |
| **Power loss** | 72W |
| **Series** | BOCCHIOTTI |
| **Type Reference** | VTR04 CIECO – VTRO 04 OBLO |
| **Article/Catalogue Reference** | VTR04 CIECO – VTRO 04 OBLO |
| **Number of dimensions/modules** | 650 x 430 x 210 mm |
| **Power loss** | 122W |
| **Series** | BOCCHIOTTI |
| **Type Reference** | VTR04 OBLO– VTRO 04 CIECI |
| **Article/Catalogue Reference** | VTR04 OBLO– VTRO 04 CIECI |
| **Number of dimensions/modules** | 72 mod. 650 x 430 x 210 mm |
| **Power loss** | 81W |

| | |
|---|---|
| **Series** | BOCCHIOTTI |
| **Type Reference** | VTR05 CIECO – VTRO 05 OBLO |
| **Article/Catalogue Reference** | VTR05 CIECO – VTRO 05 OBLO |
| **Number of dimensions/modules** | 650 x 540 x 260 mm |
| **Power loss** | 129W |
| **Series** | BOCCHIOTTI |
| **Type Reference** | VTR05 OBLO– VTRO 05 CIECI |
| **Article/Catalogue Reference** | VTR05 OBLO– VTRO 05 CIECI |
| **Number of dimensions/modules** | 96 mod. 650 x 540 x 260 mm |
| **Power loss** | 84W |
| **Series** | BOCCHIOTTI |
| **Type Reference** | VTR06 CIECO – VTRO 06 OBLO |
| **Article/Catalogue Reference** | VTR06 CIECO – VTRO 06 OBLO |
| **Number of dimensions/modules** | 800 x 615 x 315 mm |
| **Power loss** | 207W |
| **Series** | BOCCHIOTTI |
| **Type Reference** | VTR06 OBLO– VTRO 06 CIECI |
| **Article/Catalogue Reference** | VTR06 OBLO– VTRO 06 CIECI |
| **Number of dimensions/modules** | 140 mod. 800 x 615 x 315 mm |
| **Power loss** | 135W |

### 5.2 TEST PARAMETERS

Environment: Gas: Group II
Temperature: 135°C
Zone: Zone 1
Hazardous locations on surface.

### 5.3 RESULTS

| *CLAUSE* | **DESCRIPTION** | **RESULT** | **VERDICT** |
|---|---|---|---|
| | **IEC/SANS 60079-0** | | |
| **1** | **Scope** | | |
| **2** | **Normative references** | | |
| **3** | **Definitions** | | |
| 4 | Apparatus grouping and temperature classification | *Ex e II T5* | C |
| **5** | **TEMPERATURES** | | |
| 5.1.1 | Ambient temperatures | *Group II only* | N/A |
| 5.1.2 | External source of heating or cooling | *None.* | N/A |
| 5.2 | Service temperature | *-20°C to 40°C ambient* | C |
| 5.3 | Maximum surface temperature | *A tempreture test was conducted on a enclosure with 110 10A Weidmuller terminals inside. The max tempreture was 86ºC.* | C |
| 5.5 | Small component temperature | *No components fitted* | N/A |
| **7** | **NON-METAL ENCLOSURES AND NON-METAL PARTS** | | |
| 7.1 | Non-metallic enclosures and non-metallic parts of enclosures | *Tests conducted* | C |
| 7.2 | Thermal endurance | The box was tested for thermal endurance to heat and cold. Refer to tests in Clause 26.8 and 26.9. | C |
| 7.3 | Electrostatic charges on enclosures or parts of enclosures | *Tests were conducted. Refer t o clause 26.14* | C |

| *CLAUSE* | **DESCRIPTION** | **RESULT** | **VERDICT** |
|---|---|---|---|
| 7.4 | Threaded holes | *Same material used.* | C |
| **8** | **ENCLOSURES CONTAINING LIGHT METALS** | | N/A |
| **9** | **Fasteners** | *Special fasteners* | C |
| **10** | **Interlocking devices** | | N/A |
| **11** | **Bushings** | | N/A |
| **12** | **Materials used for cementing** | *None used.* | N/A |
| **13** | **Ex components** | | N/A |
| **14** | **Connection facilities and terminal compartments** | *Approved Weidmuller terminals are to be used inside the enclosure.* | C |
| **15** | **Connection facilities for earthing or bonding conductors** | *Inside of enclosure* | C |
| **16** | **Entries into enclosures** | *The Pedro range of boxes made provision for Ex e cable glands to be fitted.* | C |
| **20** | **Supplementary requirements for plugs and sockets** | *None fitted* | N/A |
| **24** | **Documentation** | *Refer to Clause 7 of this report.* | C |
| **25** | **Compliance of prototype or sample with documents** | | C |
| **26** | **TYPE TESTS** | | |
| 26.3 | Tests in explosive test mixtures | *Terminal box with approved terminals* | N/A |
| 26.4.1.1 | Order of tests – metallic enclosures | *Plastic material* | N/A |
| 26.4.1.2 | Order of tests – non-metallic enclosures | | C |
| 26.4.2 | Test for resistance to impact | *A 7J Impact test was conducted on the transparent widow of the VTR01 Oblo at a relative tempreture of 23ºC.* | *C* |
| 26.4.3 | Drop test | *Not a hand held device* | N/A |
| 26.4.5 | Tests for the degree of protection (IP) by enclosures | *The enclosure had an IP rating of IP65. The IP properties of the enclosure was verified by Explolabs and found to be satisfactory.* | C |
| 26.5.1 | Temperature measurement | *A tempreture test was conducted on a sample of the box witch was fitted with 110 10A Ex e Weidmuller terminals. The tempreture probes was fitted a follows 1) on the din rail on the inside of the enclosure 2) On the top part of the enclosure (outside) 3) On the transparent window 4) Ambient in the fascinate of the enclosure. A maximum tempreture of 86ºC was recorded at 26ºC Ambient.* | C |
| 26.5.2 | Thermal shock test | *No glass parts were fitted to the enclosure.* | N/A |
| 26.5.3 | Small component ignition test | *Only approved connector strips to be used.* | N/A |
| 26.6 | Torque test for bushings | *No bushings present* | N/A |
| 26.7.2 | Temperatures during tests | *The ambient tempreture was constantly measured.* | C |
| 26.8 | Thermal endurance to heat | *A typical example of the enclosure was placed in the environmental chamber for a period of 4 weeks at 80ºC and at a relative humidity of 95%.* | C |
| 26.9 | Thermal endurance to cold | *The enclosure was then placed in the environmental chamber for a period of 24h at a relative tempreture of –20ºC.* | C |

| *CLAUSE* | **DESCRIPTION** | **RESULT** | **VERDICT** |
|---|---|---|---|
| 26.10 | Resistance to light | | C |
| 26.11 | Resistance to chemical agents for Group I electrical apparatus | *For use in a Group II environment only* | N/A |
| 26.12 | Earth continuity | | C |
| 26.13 | Surface resistance test of parts of enclosures of non-metallic materials | | C |
| 26.14 | Charging tests | | C |
| 26.15 | Measurement of capacitance | *Test not conducted* | N/A |
| **27** | **Routine verifications and tests** | *Inspection on terminals* | C |
| **28** | **Manufacturer's responsibility** | *Under manufacturers mark scheme, all equipment to be as described in report.* | C |
| **29** | **Marking** | *A label was submitted* | C |
| **ANNEX A** | | | N/A |
| **ANNEX B** | | | N/A |
| Table B.1 – Clauses with which Ex components shall comply | | | N/A |
| **IEC/SANS 60079-7** | | | |
| **1** | **Scope** | | |
| **2** | **Normative references** | | |
| **3** | **Definitions** | | |
| **4** | **Constructional requirements for all electrical apparatus** | | |
| 4.1 | General | | C |
| 4.2 | Terminals for external connections | *An approved terminal connector is to be used and the cross sectional of the terminal is to the rated current of the electrical equipment. The max conductor size must be specified on the approved terminal.* | C |
| 4.3 | Internal connections | *The method of attaching is by means of screwed fasteners with means of locking.* | C |
| 4.4 | Clearances | *Only use approved terminals.* | C |
| 4.5 | Creepage distances | | |
| 4.5.1 | Required values of creepage distance | *Only use approved terminals* | C |
| 4.5.2 | Creepage distances between bare conductive parts at different potentials | | C |
| 4.5.3 | Effects of ribs and grooves | *Only use approved terminals* | C |
| 4.6 | Solid electrical insulating materials | | |
| 4.6.1 | Mechanical characteristics | *7J impact test was conducted on the transparent window on the lid of the enclosure as this was deemed the weakest point. The test was conducted after sertan conditionings as specified in Clause 26.8 and 26.9 of 60079-0.: No visible damage occurred.* | C |
| 4.6.2 | Insulating parts made of plastics or laminates | *Only use approved terminals* | C |
| 4.7 | Windings | No windings were present as this is a terminal box | N/A |

| *CLAUSE* | **DESCRIPTION** | **RESULT** | **VERDICT** |
|---|---|---|---|
| 4.8 | Temperature limitations | *The tempreture test was conducted on the inside and outside of the enclosure with the presins of 110 approved Weidmuller Exe 10A terminals connected in series.* | C |
| 4.9 | Wiring internal to apparatus | | C |
| 4.10 | Degrees of protection provided by enclosures | *The test was conducted as specified in IEC 60529. And the enclosure was previously approved fore IP65.* | C |
| 4.10.1 | Minimum degree of protection | *IP55* | C |
| 4.10.2 | Accumulation of condensation within enclosure | No drainage holes were fitted to the enclosure. | N/A |
| 4.10.3 | Covers of enclosures containing non-intrinsically-safe items shall be adequately labeled | Do not open when energized. | C |
| 4.11 | Fasteners | | C |
| **5** | **Supplementary requirements for specific electrical apparatus** | | |
| 5.7.1.4 | Connections | | |
| 5.7.1.4.1 | Requirements for intercell connectors | *Approved Ex e terminals to be used.* | C |
| 5.7.1.4.2 | Threaded joints shall be prevented from loosening | *Prevention by fitting spring washers* | C |
| 5.7.1.4.3 | Connectors shall be able to carry the current required without exceeding the limiting temperature | *Only approved Ex e terminals are to be placed inside the box* | C |
| 5.7.1.4.4 | Connectors exposed to attack by electrolytes shall be suitably protected | *Only approved Ex e terminals are to be placed inside the box* | C |
| 5.7.1.4.5 | Insulation of live parts | Although enclosure did not depend on insulating the live parts, the insulators were added. | C |
| **6** | **Type verifications and type tests** Application of tests from Clause 23 of IEC 60079-0 | *All relevant tests that were deemed necessary were conducted.* | C |
| 6.4 | Measuring instruments and instrument transformers | | N/A |
| 6.7 | General purpose connection and junction boxes | *Only approved Ex e terminals are to be placed inside the box* | C |
| 6.8 | Resistance heating devices and resistance heating units | | N/A |
| **7** | **Routine verification and routine tests** | *Inspection on box for cracks.* | C |
| **8** | **Marking and instructions** | | |
| 8.1 | General Marking | *Detailed label fitted* | C |
| 8.2 | Instructions for use | *Label inside of box for instructions* | C |
| 8.3 | Installation instructions | *Connector Torque values, and general torque values* | C |
| **Annex A** | Cage motors- Methods of test and of calculation | | N/A |
| **Annex B** | Type tests for specific forms of resistance heating devices or resistance heating units | | N/A |

### 5.3 SPECIAL CONDITIONS FOR SAFE USE (X)

None.

### 5.4 TEST RESULTS

The following tests were performed (not necessarily in the given order).

**IEC/SANS 60079-0 Clause 26.4.2: Test for resistance to impact.**

An impact test was performed on the transparent lid of the enclosure. An impact of 7J was conducted. No visible damage occurred (after conditioning requirements as set out in IEC/SANS 60079-0 Clause 26.8 and 26.9).

**IEC/SANS 60079-7 Clause 4.4 and 4.5: Creepage and clearance distances**

Only approved terminals are to be fitted inside the enclosure

**IEC/SANS 60079-7 Clause 4.8: Temperature tests**.

A tempreture test was conducted on a sample of an enclosure with 110 10A Ex e Weidmuller terminals placed inside of it. Max recorded tempreture was 86ºC at 26ºC ambient. There for at a max operating ambient of 40ºC the tempreture would be 100ºC.

**IEC/SANS 60079-0 Clause 26.13: Surface resistance test of parts of enclosure of non-metallic materials**

This test was conducted in accordant with IEC/SANS 60079-0:2005 clause 26.13. 500V was placed on the electrodes for a period of 60s a reading of 1388MΩ was measured. The standard allows a reading of 1000MΩ. There for a warning label must be placed on the enclosure. ONLY WIPE WITH DAMP CLOTH.

### 6 MARKING

The following (or similar) information had to be clearly and permanently marked on all units covered by this report:

**Prepared by Phambili**
**VTR Pedro- Terminal boxes**
**Model/Type : VTR01 Cieco;VTR01 Oblo to VTR06 Cieco; VTR06 Oblo**
**Volts : 380V**
**Amps : 10A**
**Serial No : ----**
**Ex e II T5**
**IA No. : S-XPL/07262**

### 7 DOCUMENTATION

The following documentation was submitted as part of the approval:

| No | Description | Identification |
|---|---|---|
| 1 | Approval Cert | CA02.02704 |
| 2 | Pedro catalogue | Pedro |

## 8 VALIDITY

This report covers only the unit described in Paragraph 2 of this report. Other identical units will only be covered by:

a. additional approvals covering all serial numbers, or
b. approval of certified equipment under a product certification scheme accepted by the Department of Minerals and Energy and/or the Department of Labour as relevant.

This type approval report remains valid unless modifications are made to the equipment without obtaining prior approval.

**Assessed by:**

**JJ Joubert**
**SENIOR TESTING OFFICER**

**Checked by:**

**E Zuppa**
**SENIOR TESTING OFFICER**

EXPLOLABS
Explosion Prevention Services

**(Pty) Ltd**
Reg No: 1999/027771/07

## APPROVED INSPECTION AUTHORITY

**IN TERMS OF:**
**R21.17.2 OF THE MINERALS ACT (INCORPORATED IN THE MINE HEALTH AND SAFETY ACT, NO 29 OF 1996); AND EMR 8(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, NO 85 OF 1993**

# CERTIFICATE

**PHAMBILI**
**PO BOX 391076**
**BRAMLEY**
**2018**

**Issued: 6 November 2007**
***Expire: 07 May 2017**


**Equipment:** VTR Pedro- Terminal boxes
**Model:** VTR01 OBLO; VTR01 CIECO to VTR06 OBLO; VTR06 CIECO.
**Serial No:** XPL/091006/DM01 and all serial numbers of equipment covered by a valid report or an accepted product certification mark, and specified in a diagram certified by an AIA approved Ex test laboratory:

Supplied by

**Phambili**

Identified by Inspection Authority number

**S-XPL/07262**

And as described in the Explolabs test report number XPL/8834/07262 is hereby certified "Explosion Protected Ex e II T5", having been examined and inspected in accordance with the relevant requirements of South African Standards.

**IEC/SANS 60079-0: 2005 "Electrical apparatus for explosive gas atmospheres, Part 0:General Requirements"**

**IEC/SANS 60079-7: 2003 "Electrical apparatus for explosive gas atmospheres, Part 7: Increased Safety** "e""

| | | |
|---|---|---|
| Locations | Zone 2 | Gas Surface |
| Environment | Group II | Propane to Hydrogen and Acetylene |
| Frequency | | Intermittent as could occur under abnormal operation |
| Limiting Temperature | T5 | 100℃ |

*This certification indicates compliance with R21.17.2 of the Mine Health and Safety Act and/or EMR 8(1) of the Occupational Health and Safety Act, provided that the apparatus is used as relevant in accordance with:*

i) SANS 10086 requirements and SANS 61241-10 requirements as applicable;
ii) Any conditions mentioned in the above report;
iii) Any relevant requirements and codes of practice enforced in terms of the Mine Health and Safety Act or Occupational Health and Safety Act; and
iv) Any restrictions and conditions enforced by the Chief Inspector of Mines or the Principal Inspector or the Chief Inspector: Occupational Health and Safety.
v) *-New equipment may only be presented for sale between the "Issued" and "Expire" dates.

## 1. GENERAL

The enclosure tested was one of a range of enclosures which are manufactured in Italy. The enclosures are manufactured out of fibre glass and are white in colour. The range of enclosures consisted out of two types: a) OBLO (This type of enclosure makes provision for a transparent window) and b) CIECO.

Each enclosure consisted of a body and a lid. Each lid had a rubber type seal fitted into a groove and sealed the enclosure when closed and locked into position. Each locking mechanism of the lid can only be operated with a triangular tool. Each lid was secured onto the enclosure by means of two hinges.

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| **Number of dimensions/modules** | 140 mod. 800 x 615 x 315 mm |
| **Power loss** | 135W |

## 2. SPECIAL CONDITIONS FOR SAFE (X)

None.

## 3. MARKING

The following (or similar) information had to be clearly and permanently marked on all units covered by this report:

Phambili
VTR Pedro- Terminal boxes

| | |
|---|---|
| Model | : VTR01 Cieco;VTR01 Oblo to VTR06 Cieco; VTR06 Oblo |
| Volts | : 380V |
| Amps | : 10A |
| Termination Cross Section | : Maximum 4mm$^2$ |
| Serial no. | : ---- |

Ex e II T5

| | |
|---|---|
| IA No. | : S-XPL/07262 |

**JJ Joubert**
**SENIOR TESTING OFFICER**

**E Zuppa**
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