# IECEx Certificate of Conformity

## INTERNATIONAL ELECTROTECHNICAL COMMISSION
## IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

| | | |
|---|---|---|
| Certificate No.: | IECEx TSA 08.0044X issue No.:2 | Certificate history: Issue No. 2 (2010-7-30) Issue No. 1 (2010-4-19) Issue No. 0 (2009-7-20) |
| Status: | Current | |
| Date of Issue: | 2010-07-30 | Page 1 of 4 |

Applicant: **Compac Industries Ltd**
52 Walls Road, Penrose, Auckland 1061
**New Zealand**

Electrical Apparatus: **Flameproof Power Supply Type C4000**
*Optional accessory:* **Integral blanking plug 'BA-PLUG-20E', and integral cable gland assembly 'BA-GLND-C4I'.**

Type of Protection: **Ex d [ib]**

Marking:
**Compac Industries Ltd**
**C4000 Power Supply**
**V:220-240 Vac**
**A: 10 A**
**Ex d [ib IIA Gb] IIA T4 Gb (-25 °C ≤ Ta ≤ 55 °C) IP66**
**IECEx TSA 08.0044X**
**Serial No:**

*Approved for issue on behalf of the IECEx Certification Body:* Ujen Singh

*Position:* Quality and Certification Manager

*Signature: (for printed version)*

*Date:* 30 JULY 2010.

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

**TestSafe Australia**
**919 Londonderry Road**
**Londonderry NSW 2753**
**Australia**

Test Safe AUSTRALIA

# IECEx Certificate of Conformity

Certificate No.: IECEx TSA 08.0044X

Date of Issue: **2010-07-30** Issue No.: **2**



Manufacturer: **Compac Industries Ltd**
52 Walls Road, Penrose, Auckland 1061
**New Zealand**

Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

**STANDARDS:**
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

| | |
|---|---|
| **IEC 60079-0 : 2004**<br>Edition: 4.0 | Electrical apparatus for explosive gas atmospheres - Part 0: General requirements |
| **IEC 60079-0 : 2007-10**<br>Edition: 5 | Explosive atmospheres - Part 0:Equipment - General requirements |
| **IEC 60079-1 : 2007-04**<br>Edition: 6 | Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d" |
| **IEC 60079-11 : 2006**<br>Edition: 5 | Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i" |

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

**TEST & ASSESSMENT REPORTS:**
*A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in*

Test Report:

AU/TSA/ExTR08.0062/00
AU/TSA/ExTR08.0062/01
AU/TSA/ExTR08.0062/02
AU/TSA/ExTR10.0011/00

Quality Assessment Report:
AU/TSA/QAR08.0008/00
AU/TSA/QAR08.0008/01

# IECEx Certificate of Conformity

Certificate No.: IECEx TSA 08.0044X

Date of Issue: 2010-07-30 Issue No.: 2



**Schedule**

**EQUIPMENT:**
*Equipment and systems covered by this certificate are as follows:*

Refer to Annexe_IECEx TSA 08_0044X for the equipment description.

**CONDITIONS OF CERTIFICATION: YES as shown below:**

Refer to Annexe_IECEx TSA 08_0044X for the conditions of certification.

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**DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):**

Refer to Annexe_IECEx TSA 08_0044X for the details of changes in certification.

**Annexe:** Annexe_IECEx TSA 08_0044X-02...pdf

# IECEx Certificate of Conformity Annexe

| Annexe for Certificate No.: | IECEx TSA 08.0044X | Issue No.: | 2 |
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**Equipment pertaining to Issue 0 of this Certificate:**

The Flameproof Power Supply Type C4000 is manufactured from cast aluminium and comprises a base assembly and a lid retained by 16 M10 socket head cap screws. The base assembly has up to ten M20 x 1.5 entries on the top of side walls and one M20 x 1.5 entry on the bottom of side wall. All eleven cable gland entries use only suitable certified cable glands or adaptors. The unused cable entries are closed by supplied Ex d plugs or other suitable certified blanking elements that are provided by the installer. The flameproof enclosure houses power supply components and/or electrical connections rated for operation at up to and including 240 V and 10 A AC. An 'O'-ring seal between the base and lid provides protection against the ingress of dust and water.

The flange joint with minimum flamepath width $L$ = 21.7 mm and maximum gap $i_c$ = 0.1 mm is utilised between the cover and the base body.

The C4000 Power Supply Unit p.c.b. CI138 & CI139 comprises two printed circuit boards. The two boards CI138 & CI139, interconnected by plug and socket connectors. The apparatus is designed to be mounted in an enclosure providing suitable hazardous area protection. The apparatus provides power supply rails suitable for both the Intrinsically Safe circuits and the Non Intrinsically Safe circuits of the C4000 Fuel Meter.

Printed circuit board CI138 provides ten low current TRIACS circuits for switching external loads, two of which can be used to drive high current TRIACS. Also provided is a COMS interface circuit for data communication with external equipment. The Safe Area circuit connections to the printed circuit board CI138 are made at the following terminals on the PCB:

CI138: J8 and CI138:J11 fused for mains, phase & neutral supply.
CI138: J10-1 and CI138:J10-2 unfused, phase and neutral mains supply for high current TRIAC loads.
CI138: J6 and CI138:J7, switched high current TRIAC external loads (for motors)
CI138: J1 to CI138:J5 low current triac circuits (for solenoid valve actuators and gate circuits for Hi Triacs)
CI138: J12 Comms and Modem

The Intrinsically Safe Interface printed circuit board CI139 provides an infallible, mains isolation transformer (T2), rectification and smoothing for three supplies and also ten TRIAC signals. Duplicated active voltage clamping and current limitation circuits for an Intrinsically Safe MICRO output and two other Intrinsically Safe outputs PERIPH and POK are derived from this source. The PERIPH output is resistively current limited and taken from duplicated active voltage clamped circuit. The POK out put is resistively current limited and voltage clamped with duplicated zener diodes. MICRO output is actively current limited.

The printed circuit board CI139 also provides a Non Intrinsically Safe +5V supply from a separate mains transformer (T1), for connection to the microprocessor, triac and communication circuits which are not related to the hazardous area circuits. The hazardous area outputs from the printed circuit board CI139 are at three PCB mounted plugs,

CI139: J5 Pin 4 (POK), CI139:J5 Pins 5 & 6, (T10, T11)
CI139: J6 Pins 1 to 8 (T12 to T19)
CI139: J7 Pins 3&4 (MICRO), CI139:J7 Pins 7 & 8 (PERIPH)

Two Boards are interconnected with plug and socket connections, CI138:J13 & CI139:J1, CI138:J14 & CI139:J2, CI138:J15 & CI139: J3.

Either of two communication pcbs (CI143 or CI157) may be optionally mounted on to the power supply board CI139 and connected to CI139:J4. Unspecified safe area equipment, comms connections to CI138:J12 pins 2 to 10 pass to CI138 J15, CI139:J3 to CI139:J4. The IS pcb CI139 J4 may be optionally connected to either CI143:J1 of the Comms Interface board or CI157:Con2 of the RS232 Interface board. Both these boards provide a communication interface between the safe area equipment and the hazardous area circuits. The Hazardous area connections are CI143:J2 for the Comms Interface board and CI157:CON1 for the RS232 Interface board.

**Drawing list pertaining to Issue 0 of this Certificate:**

**Drawing list pertaining to TestSafe test report 30599:**

| Document No. | Sheets | Document Title | Issue | Date (yyyy-mm-dd) |
|---|---|---|---|---|
| AP341 | 1/1 | C4000 Power Supply Label | D | 2009-07-08 |
| AP342 | 2 pages | Installation & Safety Data Sheet for C4000 Power Supply | H | 2009-07-08 |
| SW049 | 1 | C4000 Flameproof Box - C4000 Flameproof Box | G | 2003-11-07 |
| SW049 | 2 | C4000 Flameproof Box - C4000 Flameproof Box | H | 2008-09-26 |
| SW049 | 3 | C4000 Flameproof Box - C4000 Flameproof Box | G | 2008-09-19 |
| SW049 | 4 | C4000 Flameproof Box - C4000 FP Box Lid | E | 2008-11-07 |
| SW049 | 9 | C4000 Flameproof Box - C4000 Flameproof Box Gear Plate | G | 2009-07-02 |
| SW050 | 8 | C4000 Flameproof Box – C4000 Blanking Plug | F | 2008-09-19 |

**Drawing list pertaining to TestSafe test report 30487:**

| Document No. | Sheets | Document Title | Issue | Date (yyyy-mm-dd) |
|---|---|---|---|---|
| AP301 | 1 of 23 | C4000 Cabling Power Supply Connections | N | 2008/09/18 |
| AP301 | 2 of 23 | C4000 Cabling Power Supply to Microprocessor Cable | N | 2008/09/18 |
| AP301 | 3 of 23 | C4000 Cabling CI139 (with RS232 Option) to CI140 | N | 2008/09/18 |
| AP301 | 4 of 23 | C4000 Cabling Gilbarco & RS232 I/F Connections | N | 2008/09/18 |
| AP301 | 14 of 23 | C4000 Cabling Power output Terminals | N | 2008/09/18 |

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**Londonderry NSW 2753 Australia**

# IECEx Certificate of Conformity Annexe

| Annexe for Certificate No.: | IECEx TSA 08.0044X | Issue No.: | 2 |
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| Document No. | Sheets | Document Title | Issue | Date (yyyy-mm-dd) |
|---|---|---|---|---|
| AP323 | 1 | C4000 Power Supply Transformer | C | 2008/08/26 |
| AP341 | 1/ 1 | C4000 Power Supply Label | D | 2009-07-08 |
| AP342 | 2 | Installation & Safety Data for C4000 Power Supply | H | 2009-07-08 |
| | | **C4000 NON IS POWER SUPPLY** | | |
| CI138 Sheet 1 | Sheet 1 of 4 | C4000 Non IS Power Supply (Schematic) | D | 2001/08/01 |
| CI138 Top Overlay | Sheet 2 of 4 | Non-IS Power Supply (C4000) | D | 2001/08/01 |
| CI138 Top Layer | Sheet 3 of 4 | Non-IS Power Supply (C4000) | D | 2001/08/01 |
| CI138 Bottom Layer | Sheet 4 of 4 | Non-IS Power Supply (C4000) | D | 2001/08/01 |
| CI138P | Sheet 1 of 1 | Non IS Power Supply (Bill of Materials) | D | 2003/03/19 |
| | | **C4000 IS POWER SUPPLY** | | |
| CI139_1 | Sheet 1 of 5 | C4000 IS Power Supply (schematic) | E | 2008/08/05 |
| CI139_2 | Sheet 2 of 5 | C4000 IS Power Supply (Schematic) | E | 2005/07/18 |
| CI139 | Sheet 3 of 5 | C4000 IS Power Supply (C4000) (Top Overlay) | E | 2005/07/18 |
| CI139 | Sheet 4 of 5 | C4000 IS Power Supply (C4000) (Top Layer) | E | 2005/07/18 |
| CI139 | Sheet 5 of 5 | C4000 IS Power Supply (C4000) (Bottom Layer) | E | 2005/07/18 |
| CI139P | 4 Sheets | C4000 IS Power Supply (Bill of Materials) | E1 | 2008/08/28 |
| | | **GILBARCO INTERFACE** | | |
| CI143 | Sheet 1 of 4 | Gilbarco Interface to C4000 | A | 1998/05/09 |
| CI143 | Sheet 2 of 4 | Gilbarco Interface to C4000 Component Reference | A | 1998/05/09 |
| CI143 | Sheet 3 of 4 | Gilbarco Interface to C4000 Top Layer | A | 1998/05/09 |
| CI143 | Sheet 4 of 4 | Gilbarco Interface to C4000 Bottom Layer- | A | 1998/05/09 |
| CI143P | Sheet 1 of 1 | Gilbarco-- I/F (Bill of Materials) | A | 2003/05/01 |
| | | **FUTRA RS232 INTERFACE** | | |
| CI157 | Sheet 1 of 4 | Futra RS232 Interface (Schematic) | C | 2001/08/01 |

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| Annexe for Certificate No.: | IECEx TSA 08.0044X | Issue No.: | 2 |
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| Document No. | Sheets | Document Title | Issue | Date (yyyy-mm-dd) |
|---|---|---|---|---|
| CI157 Top Overlay | Sheet 2 of 4 | Futra RS232 Interface | C | 2001/08/01 |
| CI157 Top Layer | Sheet 3 of 4 | Futra RS232 Interface | C | 2001/08/01 |
| CI157 Bottom Layer | Sheet 4 of 4 | Futra RS232 Interface | C | 2001/08/01 |
| CI157P | Sheet 1 of 1 | RS232 I/F Bill of Materials) | C | 2003/05/05 |

**Conditions of Certification pertaining to Issue 0 of this Certificate:**

Condition of manufacture:

1) It is a condition of manufacture that the infallible transformer T2 of schematic number CI139_1 must be routinely tested as per clause 11.2 of IEC 60079-11:2006.

Conditions of safe use:

1) It is a condition of safe use that the fasteners used to assemble the flameproof enclosure shall have a minimum grade A2-70 (yield stress 450 N/mm²).
2) It is a condition of safe use that the maximum constructional gap ($i_c$) of flameproof joints shall be in accordance with the following table:

| Joint Type | Joint Location | Max. Gap $i_c$ (mm) |
|---|---|---|
| Flange | Cover / Box body | 0.1 |

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3) It is a condition of safe use that the following input / output parameters must be taken into account when installed:

**Safe Area External connections to CI138; C4000 Non IS Power supply Board;**
J1 (Lo Triacs outputs, Hi Triacs input)
J2, J3, J4, J4, J5 (Lo Traics outputs)
J6, J7 (Hi Triacs Load, outputs)
J8 Pin 1 to Pin 6 (Logic Phase, Input)
J9 Pin 1 to Pin 4 (Triac Phase Input)
J10 Pin 1 to Pin 2 (Incoming Phase and Neutral)
J11 Pin 1 to Pin 6(Neutral)
J12 Pin 1 to Pin 10 (Comms Interface)

Um = 264VAC

**Safe Area Internal Connection between CI138, C4000 Non IS Power Supply board and the CI139, C4000 IS Power supply board;**

J13 of CI138 to J1 of CI139, (Pin 1 to Pin 4)
J14 of CI138 to J2 of CI139, (Pin 1 to Pin 4)
J15 of CI138 to J3 of CI139, (Pin 1 to Pin 20)

Um = 264VAC

**Intrinsically Safe Area Connections;**

The MICRO and PERIPH output are considered independent outputs. At the J7 terminal, they are segregated by earth pins and the 25 way cable has insulation thickness of 0.5 mm between cores.

**Connector J7 (Pin 3 and Pin 4) MICRO, CI139, IS Power Supply (C4000)**
Uo = 15.86 V
Io = 1.13 A (Resistively limited)
Io = 185 mA (Actively limited)
Po = 2.34 Watts
Co = 11.3 µF; Lo= 0 µH
Or Co = 5.65 µF; Lo = 160 µH

**Connector J7 (Pin 7 and Pin 8) PERIPH, CI139, IS Power Supply (C4000)**
Uo = 15.86 V
Io = 1.855 A (Resistively limited)
Po = 7.355 Watts
Co = 11.3 µF; Lo/Ro= 38 µH/Ω
Co = 5.65 µF; Lo = 41.33 µH
Or Co = 0.113 µF; Lo = 82.66 µH

All the other intrinsically safe connectors mentioned below are part of the one common VCC low voltage circuit (derived from the MICRO in the C4000 Microprocessor System board CI140) with a maximum voltage of 5.38 V

Connector J5 (Pin 1 to Pin 6), CI139, IS Power Supply (C4000)

Connector J6 (Pin 1 to Pin 8), CI139, IS Power Supply (C4000)

RS232 Output Port, CON 1 of CI157

GILBARCO output Port, J2 of CI143

Printer Power Supply output Port of CI125

RS485 output Port of CI210 (considered in report 32127)

Triscan I/F Output Port CON1 of CI184 (considered in report 32127)

## Schedule of Variations

**Variations Permitted by Issue 1:**

**Variations Permitted by TestSafe test report 31732:**

1. Inclusion of one M20 compression cable gland assembly (part number BA-GLND-C4I) on the bottom of the enclosure sidewall, for the output power electronic circuitry.
2. Inclusion of an optional sealant/adhesive Cyberbond 2008 which secures the O-ring assemblies on the top flange of the enclosure.
3. Correction of the equipment description to include part number BA-PLUG-20E for the supplied Ex d integral M20 blanking plug. This M20 blanking plug was without the part number in the original certificate description. The relevant drawing SW050 was already assessed and included as the certification drawing in IECEx TSA08.0044X Issue 0.

**Variations Permitted by TestSafe test report 32127:**

1. Introduction of two new PCBs, Triscan I/F-CI184 and RS485 I/F –CI210.
   Either of two new PCBs is to be plugged on to the J4 header of the CI139 board of the C4000 Power Supply Unit. The output of each PCB (CI184 and CI210) is taken out via the cable gland of the metal enclosure. Both these boards provide a communication interface between the safe area equipment and hazardous area circuits.

2. The changes to the CI157 schematic and bill of materials.
   The clearance and creepage notes have been added to the schematic. In the bill of materials critical components are now underlined. The PCB artwork remains unchanged.

3. The changes to the CI143 schematic and bill of materials.
The value of R2 is changed to 100 Ω and transistor TR1 is changed to ZTX1056. Those are not safety components. In the bill of materials critical components are now underlined. The PCB artwork remains unchanged.

**Conditions of Certification pertaining to Issue 1 of this Certificate:**

1. All previous conditions still apply.

2. It is a condition of certification that the flamepath minimum width ($L$), distance ($l$) and maximum constructional gap ($i_c$) of flameproof joints shall be in accordance with the following Table:

| Enclosure or Component | Joint Type | Location of Joint | Minimum Flamepath Width $L$ Distance (mm) | Maximum Gap $i_c$ (mm) |
|---|---|---|---|---|
| Component | Cylindrical | Gland body / Gland sleeve | 26.8 | 0.30 |

**Drawing list pertaining to Issue 1 of this Certificate:**

**Drawing list pertaining to test report 31732:**

| Drawing/ Document No. | Sheet: | Drawing / Document Title | Issue/ Revision | Date (yyyy-mm-dd) |
|---|---|---|---|---|
| AP342 | 2 pages | Installation & Safety Data for C4000 Power Supply | J | 2010-03-18 |
| AP350 | Sheet 1 | C4000 Power Supply - IS Cable Sleeve | A | 2009-10-20 |
| AP350 | Sheet 2 | C4000 Power Supply - IS Cable Gland Compression Ring | A | 2009-10-20 |
| AP350 | Sheet 3 | C4000 Power Supply - IS Cable Gland Part A | A | 2009-10-20 |
| AP350 | Sheet 4 | C4000 Power Supply - IS Cable Gland Part B | B | 2010-03-19 |
| AP350 | Sheet 5 | C4000 Power Supply - IS Cable Sealing Ring & Washer | A | 2009-10-20 |
| AP350 | Sheet 6 | C4000 Power Supply - IS Cable Gland Assembly | B | 2010-04-07 |
| SW049 | Sheet 2 | C4000 Flameproof Box - C4000 Flameproof Box | J | 2009-11-06 |
| SW050 | Sheet 8 | C4000 Glands – C4000 Blanking Plug | G | 2010-03-19 |

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**Drawing list pertaining to test report 32127:**

| Document No. | Sheets | Document Title | Issue | Date (yyyy/mm/dd) |
|---|---|---|---|---|
| | | **CI143 GILBARCO Interface Board** | | |
| CI143 Sheet 1 of 4 | 1 | GILBARCO Interface To C4000 (Schematic) | A1 | 2009/08/20 |
| CI143P | 1 | Gilbarco I/F (Bill of Materials) | A1 | 2009/11/23 |
| | | **CI 157 FUTRA RS232 Interface Board** | | |
| CI157 Sheet 1 of 4 | 1 | FUTRA RS232 Interface (Schematic) | C1 | 2009/11/23 |
| CI157P | 1 | RS232 I/F (Bill of Materials) | C1 | 2009/11/23 |
| | | **CI184 Triscan I/F** | | |
| CI184 Sheet 1 of 4 | 1 | Triscan I/F (Schematic) | D | 2010/04/01 |
| CI184P | 1 | Triscan Interface (Bill of Materials) | D | 2010/03/31 |
| CI184 Sheet 2 of 4 | 1 | Triscan I/F Top Overlay | D | 2010/04/01 |
| CI184 Sheet 3 of 4 | 1 | Triscan I/F Top Layer | D | 2010/04/01 |
| CI184 Sheet 4 of 4 | 1 | Triscan I/F Bottom Layer | D | 2010/04/01 |
| | | **CI210 C4000 RS485 I/F** | | |
| CI210 | 1 | C4000 RS485 I/F (Schematic) | C | 2009/08/16 |
| CI210P | 1 | RS485 I/F (Bill of Materials) | C | 2009/08/13 |
| CI210 Sheet 2 of 4 | 1 | RS485 I/F to C4000 Top Overlay | C | 2009/08/17 |
| CI210 Sheet 3 of 4 | 1 | RS485 I/F to C4000 Top Layer | C | 2009/08/17 |
| CI210 Sheet 4 of 4 | 1 | RS485 I/F to C4000 Bottom Layer | C | 2009/08/17 |

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**Variations Permitted by Issue 2:**

The earlier certificate had provided output parameters for the MICRO output based on assessment. These have now been increased based on a spark test, with details recorded in test report AU/TSA/ExTR08.0062/02.

Also, all the parameters have been rationalised to allow for easier compatibility with certificate IECEx TSA 09.0053X for the C4000 Control Unit.

The revised parameters have been shown Pages 5, 6 of this annexe.

The marking drawing has been revised to remove the listing of parameters on the label.

**Conditions of Certification pertaining to Issue 2 of this Certificate:**

All conditions as shown for Issue 0 and Issue 1 of this certificate apply.

**Drawing list pertaining to Issue 2 of this Certificate:**

| Drawing/ Document No. | Sheet: | Drawing / Document Title | Issue/ Revision | Date (yyyy-mm-dd) |
|---|---|---|---|---|
| AP341 | 1/ 1 | C4000 Power Supply Label | F | 2010/07/23 |
| AP342 | 2 | Installation & Safety Data for C4000 Power Supply | K | 2010/07/14 |

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