IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

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

Certificate No.: **IECEx CML 21.0005X** Page 1 of 3 Certificate history:

Status: **Current** Issue No: 0

Date of Issue: 2022-01-18

Applicant: **Abtech Ltd**
199 Newhall Road
Lower Don Valley
Sheffield, S9 2QJ
United Kingdom

Equipment: **Zag Junction Boxes**

Optional accessory:

Type of Protection: **Increased Safety "eb", Intrinsic Safety "ia"/"ib", Optical Radiation "op is"/"op pr"/ "op sh", Dust Ignition "ta"/"tb"**

Marking: Ex ia IIC T_1 Ga Ex e IIC T_1 Gb Ex ib IIC T_1 Gb

Ex ta IIIC T_2 Da IP6X Ex tb IIIC T_2 Db IP6X Ex tb IIIC T_2 Db IP6X

Ambient Range: Up to Ta= -65°C≤Ta≤+150°C, dependant on parts fitted - °C [as per Note 3 below] to +°C [as per Note 4 below]

1. The temperature class may be T6, T5, T4 or T3 depending on the application, see Tables 2 or 3 in the Annex.
2. The maximum surface temperature for dust may be T85°C, T100°C, T135°C or T180°C depending on the application, see Table 2 in the description.
3. The minimum ambient temperature may be either -60°C or -65°C depending upon the use of a glass window. If the equipment is without the window the minimum ambient may be -65°C.
4. The maximum ambient temperature may be either +40°C, +55°C, +70°C, +90°C, +105°C, +135°C or +150°C, depending on the application see Tables 2 or 3 in the description.
5. Marking to include db if fitted with flameproof connector, plug or socket / mb when fitted with encapsulated fuse terminal.
6. When fitted with fibre optic cassette, marking to include either op is, op pr or op sh. See Table 3 in product description.
7. Ambient temperature range may be limited by the limitations of any utilised Ex Components.

Approved for issue on behalf of the IECEx Certification Body: **R C Marshall**

Position: **Operations Manager**

Signature: (for printed version)

Date: 2022-01-18

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 www.iecex.com or use of this QR Code.

Certificate issued by:

Eurofins E&E CML Limited
Unit 1, Newport Business Park
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Ellesmere Port, CH65 4LZ
United Kingdom

IECEx Certificate of Conformity

Certificate No.: **IECEx CML 21.0005X**

Date of issue: 2022-01-18 Issue No: 0

Manufacturer: **Abtech Ltd**
199 Newhall Road
Lower Don Valley
Sheffield, S9 2QJ
United Kingdom

Additional manufacturing locations:

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 equipment 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 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-11:2011 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition:6.0

IEC 60079-28:2015 Explosive atmospheres - Part 28: Protection of equipment and transmission systems using optical radiation
Edition:2

IEC 60079-31:2013 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
Edition:2

IEC 60079-7:2017 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
Edition:5.1

This Certificate **does not** indicate compliance with 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:

GB/CML/ExTR21.0007/00

Quality Assessment Report:

GB/CML/QAR16.0021/07

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EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

The ZAG range of junction boxes are electrical or optical terminal boxes, utilising the Ex Component certified aluminium alloy enclosures covered by certificate number IECEx CML 21.0010U.

Refer to Annex for full description and conditions of manufacture.

SPECIFIC CONDITIONS OF USE: YES as shown below:
Refer to Annex for specific conditions of use

Annex:

IECEx CML 21.0005X Iss. 0 Certificate Annex.pdf

Annexe to: IECEx CML 21.0005X Issue 0

Applicant: Abtech Ltd.

Apparatus: ZAG range of junction boxes

Description

The ZAG range of junction boxes are electrical or optical terminal boxes, utilising the Ex Component certified aluminium alloy enclosures covered by certificate number IECEx CML 21.0010U.

The junction boxes may be provided with cable entry holes. The holes may be located either through the side walls or the rear of the enclosure base. The holes may be provided with a metric parallel thread, NPT taper thread or without thread (clearance hole). Suitably certified blanking plugs, reducers and adapters and breather/drains may be fitted provided into the enclosure via threaded or clearance holes, provided they meet the minimum IP requirements marked on the enclosure. Through the wall of the enclosure may be provided an internal or external or internal and external threaded earth stud of a minimum size of M6. Alternatively a suitable earth clamp may be provided. Additionally, suitably certified 'Ex db' plugs and/or sockets may be fitted

The ZAG range of junction boxes are fitted with an arrangement of suitably certified terminals. The ZAG range of enclosures are available in the following sizes:

Table 1 - Enclosure Sizes

ZAG Box Ref.	Width (mm)	Height (mm)	Depth (mm)	ZAG Box Ref.	Width (mm)	Height (mm)	Depth (mm)
2	58	64	34	10/9	220	120	90
3	98	64	34	11	160	160	90
4	150	64	34	12	260	160	90
5	75	80	57	13	360	160	90
6	125	80	57	14	560	160	90
7	175	80	57	15	202	230	110
8	250	80	56	16	330	230	110
9	122	120	80				
9/9	122	120	90				
10	220	120	80				

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Before the junction box is installed, its total dissipated power for the particular application will be calculated in accordance with IEC 60079-7 Ed 5.1, Annex E, E.2 and will not exceed the values given in the tables below (junction boxes of size not specified in the tables may be manufactured subject to the maximum dissipated power being based on a smaller enclosure):

Table 2a - Applicable Max. Power Dissipations, Ambient Temperature Ranges, Temperature Classes and Max. Surface Temperatures for Dust (Db)

	EPL Ga Gb Db				
ZAG ref.		Temperature Classification and Maximum Ambient			
	(*)T6/T85°C - Ta +40°C (*)T5/100°C - Ta +55°C (*)T4/T135°C - Ta +90°C (*)T3/T180°C - Ta +135°C	(*)T6/T85°C - Ta +55°C (*)T4/T135°C - Ta +105°C	(*)T6/T85°C - Ta +60°C (*)T5/T100°C - Ta +70°C	(*)T6/T85°C - Ta +65°C	(*)T3/T180°C - Ta +150°C
		Maximum Power Dissipation (W)			
2	6.413	1.67	1.30	1.30	3.207
3	8.551	2.00	1.70	1.45	4.276
4	8.551	2.00	1.70	1.45	4.276
5	8.390	2.23	1.73	1.45	4.195
6	8.551	2.00	1.70	1.45	4.276
7	9.378	2.00	1.70	1.45	4.689
8	10.500	2.30	1.70	1.10	5.25
9	8.833	2.30	1.70	1.10	4.417
9/9	9.378	2.00	1.70	1.45	4.689
10	9.260	2.00	1.70	1.10	4.63
10/9	9.378	2.00	1.70	1.45	4.689
11	10.348	2.00	1.70	1.10	5.174
12	11.933	2.30	1.70	1.10	5.967
13	13.793	4.50	3.29	2.10	6.897
14	18.338	6.68	5.20	4.00	9.169
15	11.933	2.30	1.70	1.10	5.967
16	13.793	4.50	3.29	2.10	6.897

Notes:
The table above relate to the limiting temperature of the terminal insulation, refer to the 'Conditions of Manufacture'.
***For given T ratings, ambient temperature may be reduced to allow terminals with lower limiting temperatures to be fitted.**

Table 2b - Applicable Max. Power Dissipations, Ambient Temperature Ranges and Max. Surface Temperatures for Dust (Da)

	EPL Da				
ZAG Ref.		Temperature Classification and Maximum Ambient			
	(*)T85°C - Ta +40°C (*)T100°C - Ta +55°C (*)T135°C - Ta +90°C (*)T180°C - Ta +135°C	(*)T85°C - Ta +55°C (*)T100°C - Ta +70°C (*)T135°C - Ta +105°C	(*)T85°C - Ta +60°C	(*)T85°C - Ta +65°C	(*)T180°C - Ta +150°C
		Maximum Power Dissipation (W)			
2	3.207	0.835	0.650	0.650	1.603
3	4.276	1.000	0.850	0.725	2.138
4	4.276	1.000	0.850	0.725	2.138
5	4.195	1.115	0.865	0.725	2.098
6	4.276	1.000	0.850	0.725	2.138
7	4.689	1.000	0.850	0.725	2.345
8	5.250	1.150	0.850	0.550	2.625
9	4.417	1.150	0.850	0.550	2.208
9/9	4.689	1.000	0.850	0.725	2.345
10	4.630	1.000	0.850	0.550	2.315
10/9	4.689	1.000	0.850	0.725	2.345
11	5.174	1.000	0.850	0.550	2.587
12	5.967	1.150	0.850	0.550	2.983
13	6.897	2.250	1.645	1.050	3.448
14	9.169	3.340	2.600	2.000	4.585
15	5.967	1.150	0.850	0.550	2.983
16	6.897	2.250	1.645	1.050	3.448

Notes:
The table above relate to the limiting temperature of the terminal insulation, refer to the 'Conditions of Manufacture'.
***For given T ratings, ambient temperature may be reduced to allow terminals with lower limiting temperatures to be fitted.**

Table 3– Optical Power Limits for "op pr" and "op is" applications

Optical Power	
'op pr' applications	'op is' applications
T6/T85ºC at a maximum ambient of ≤ 60ºC	T6/T85ºC at a maximum ambient of ≤ 65ºC or T4/T100ºC at a maximum ambient of ≤ 80ºC
When 'op pr' is used with or without terminals, the splice case is limited to 100mW and a -40ºC to 60ºC ambient temperature.	When 'op is' is used with or without terminals. Fibre optic source is limited for all T classes to a maximum irradiance of 5 mW/mm^2 (surface area not exceeding 400 mm^2) Signal power is limited to 15 mW @T6 and 35 mW @T4.

Notes:

- IECEx Cert No. IECEx SIR 12.0114X is superseded by this certificate.
- The product covered by Issue 0 of this certificate remains identical to that previously covered by IECEx Cert No. IECEx SIR 12.0114X
- Where IECEx Cert No. IECEx SIR 12.0114X is specified in other product certification, or other technical specifications, this certificate reference for the product shall be used in its place; updating of the other product certificate or technical specification is not required.

Conditions of Manufacture

The following are conditions of manufacture:

i. Where the product incorporates certified parts or safety critical components the manufacturer shall ensure that any changes to those parts or components do not affect the compliance of the certified product that is the subject of this certificate.

ii. Suitably certified Ex e equipment such as breathing/draining devices and blanks may be fitted to the enclosure providing the enclosure maintains compliance with IEC 60529 code IP65 or better. If the enclosures are supplied fitted with blanking plugs, reducers, adapters or breather/drains, the manufacturer shall ensure that the user/installer is provided with copies of the associated certificate for the fitted devices.

iii. When the manufacturer has equipped the junction boxes with wiring to the terminals, a routine electric strength test shall be carried out in accordance with IEC 60079-7:2017 Clause 7.1. Additionally, the cable insulation shall be rated at 30°C greater than max operation ambient.

iv. Where the equipment is marked with both 'Ga' and 'Da', the maximum allowable power indicated on the label shall be either the lower of the two or both shall be included.

v. When the junction boxes are used for intrinsically safe applications, a 3 mm separation distance between the enclosure is required, there shall also be a minimum of 6 mm between different intrinsically safe circuits.

vi. When the equipment is marked for 'op pr' the maximum ambient temperature that can be marked is -40ºC to +60ºC.

vii. When trunking is fitted, it may be sited as required and the minimum creepage and clearance distances shall still be met.

viii. When marked for 'Ex ta', if terminals fitted are not suitable for a SCCA of 10kA or above, then max short circuit current is to be marked on the label.

ix. The manufacturer will take all reasonable steps to ensure that the power dissipated by the Junction Box does not exceed the maximum value stipulated in the table detailed in the Description of Equipment, in addition, the manufacturer will supply all the relevant information that will enable the user/installer to calculate the dissipated power in Watts for each Junction Box in accordance with IEC 60079-7:2017, Annex E, E2.

x. When terminals are supplied with the enclosure, they shall be IECEx approved components, having a maximum insulation temperature as below. All terminals shall be installed in accordance with their Conditions of Safe Use/Schedule of Limitations and the relevant codes of practice/wiring regulations, specifically to the minimum creepage and clearance requirements and to any limitations to ratings that may be observed due to method of installation.

Temperature class/ Dust marking	Requirement
T6/T85°C	The terminals shall have an insulation limiting temperature of +85°C minimum.
T5/T100°C	The terminals shall have an insulation limiting temperature of +100°C minimum.
T4/T135°C	The terminals shall have an insulation limiting temperature of +130°C minimum.
T3/T180ºC	The terminals shall have an insulation limiting temperature of +180°C minimum.

xi. When plug and sockets are fitted that are certified 'Ex d e' or 'Ex db eb', then the junction box marking shall include the symbol 'd' as part of the label marking code, as well as the appropriate gas/dust group marking if not 'IIC' and 'IIIC', as defined by the plug and socket approval. Any plugs and sockets shall be equipment approved.

xii. This certificate does not cover any plug and socket arrangements that may be fitted to the enclosure. All plug and socket arrangements fitted shall be appropriately designed for this type of apparatus. Additionally, the plug and socket arrangements shall:

- Be suitable for the intended temperature range of the junction box.
- Be suitable to maintain the required creepage and clearances in accordance with IEC 60079-7.
- Have a minimum ingress protection rating of IP65
- Have a declared contact resistance or power dissipation rating.
- Be installed in accordance with their certificate conditions and the relevant codes of practice/wiring regulations.

xiii. When the optional earth bar is fitted it shall allow for a size of conductor connection in accordance with Clause 15 of IEC 60079-0.

Specific Conditions of Use

The following conditions relate to safe installation and/or use of the equipment.

i. The materials used in the construction of this equipment contain levels of Al, Mg, Ti and Zi that are greater than that allowed for EPL Ga and Gb by clause 8 of IEC 60079-0, therefore in rare cases, ignition sources due to impact and friction sparks could occur. The equipment shall therefore be protected from such impact and friction when installed

ii. When used for Ex ia, Ex ib and Ex ta applications, over-power fault protection shall be provided and shall take into account the 'EPL' fault requirements necessary:

- Ex ia – Two countable faults is to be applied to the current and/or voltage limiter.
- Ex ib or Ex ta – Gb and Da applications – One countable fault is to be applied to the current and/or voltage limiter.

iii. When used in an EPL Da (Ex ta) application, the power supply to the equipment is to be rated for a prospective short circuit current of not more than 10 kA.

iv. When fitted with 'op pr' splice case, the fibre cable outside the enclosure shall be installed such, that mechanical damage is prevented.

v. When marked ‘Ex op is’, the fibre optic source supplying this equipment shall be suitably certified as compliant with IEC 60079-28:2015 and provide an inherently safe optical source (op is), EPL Gb, subsequently the parameters in Table 3 apply.
vi. When marked ‘Ex e op pr’, the fibre ST connectors contained within the increased safety enclosure must not be separated whilst energised if an explosive atmosphere may be present.
vii. If not used fibre ST connectors within the increased safety enclosure must have dust covers fitted.
viii. The fibre cables entering or exiting the increased safety enclosure must be suitably protected from breakages and satisfy the requirements of IEC 60079-28 ‘op pr’.
ix. All optical components used with the Fibre Optic Cassette shall be suitable for the ratings and service temperature range of the cassette.
x. When marked “op sh”, the fibre optic source shall be suitably certified as compliant with IEC 60079-28:2015 and provide an interlocked optical source (op sh).
xi. Cable insulation shall be rated at 30°C greater than max operation ambient.

Components covered by Ex Certificates issued to older editions of Standards

Certificate number	Standards (incl Ed)	Assessment result
Various terminals certificates	IEC 60079-7 Ed 4	No applicable technical differences for the types of ternimals (non-lug type).