Industry Symposium
Edinburgh 2023

Electrical installations design, selection and installation of equipment, including initial inspection

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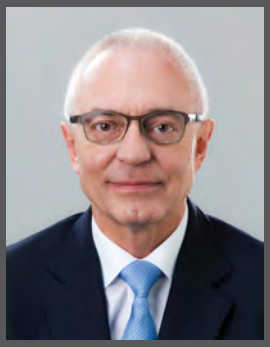

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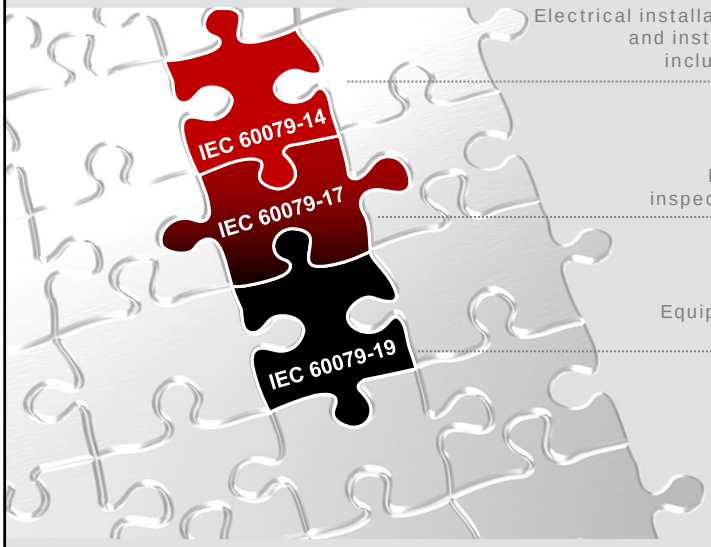
Explosive Atmospheres

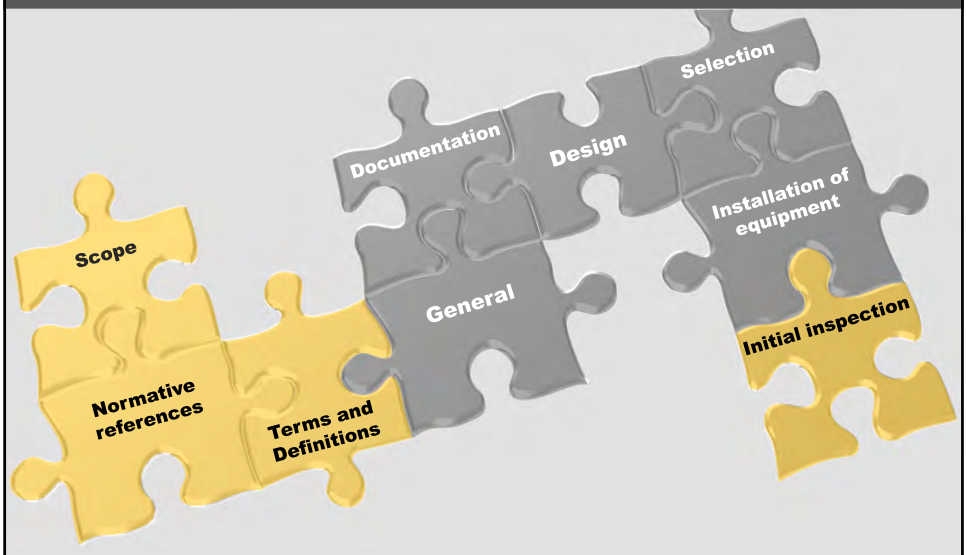


Electrical installation design, selection and installation of equipment, including initial inspection

Electrical installations inspection and maintenance

Equipment repair, overhaul and reclamation

Content IEC 60079-14:2024



31J/335/CDV

The following numbering of the Clauses corresponds to draft 31J/335/CDV. Not all requirements contained in the document are highlighted.

31J/335/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: IEC 60079-14 ED6	
DATE OF CIRCULATION: 2023-04-21	CLOSING DATE FOR VOTING: 2023-07-14
SUPERSEDES DOCUMENTS: 31J/317/CD, 31J/332/CC	

IEC SC 31J : CLASSIFICATION OF HAZARDOUS AREAS AND INSTALLATION REQUIREMENTS

4. General

4.1.1 Zones and Equipment Protection Level

Zone	Equipment Protection Level (EPL)
0	Ga
1	Gb or Ga
2	Gc, Gb or Ga
20	Da
21	Db or Da
22	Dc, Db or Da

4.1.2 Requirements for all Ex Equipment

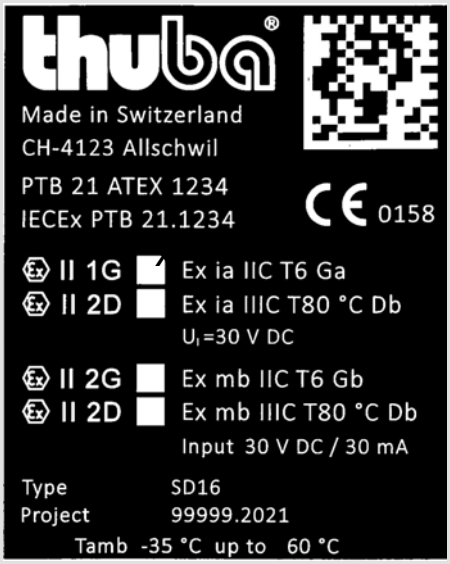
Electrical installations in potentially explosive atmospheres must *additionally* comply with the corresponding requirements for *electrical installations in non-hazardous atmospheres.*

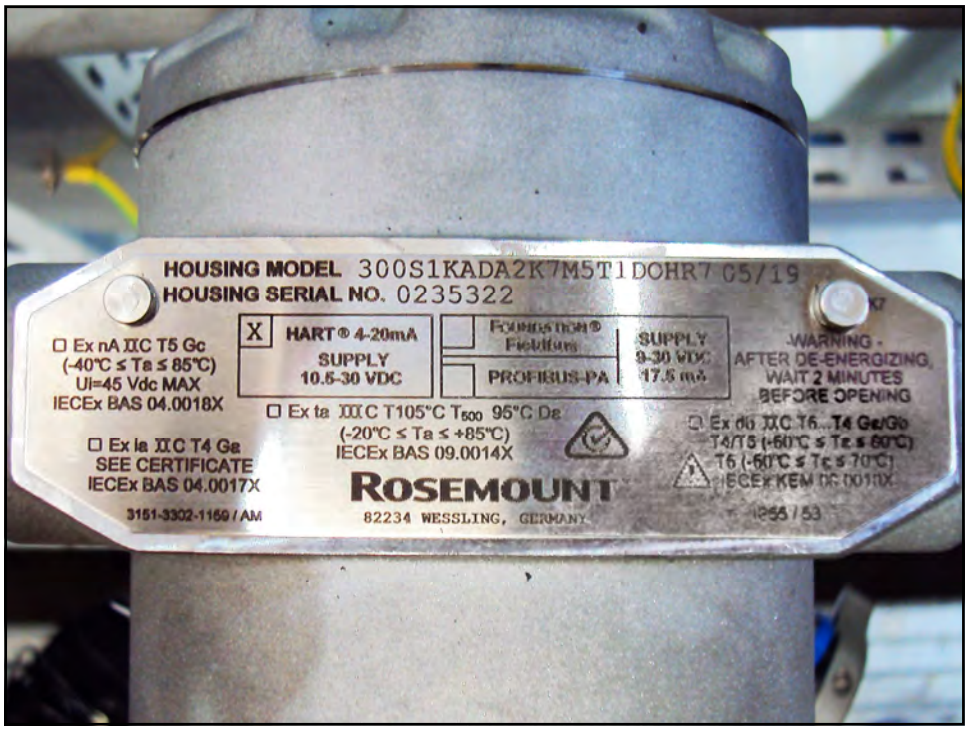
If additional protection is required to meet other environmental conditions, such as protection against water ingress and corrosion resistance, the method used shall not compromise the integrity of the Ex Equipment.

4.1.3 Electrical ratings

Ex Equipment shall be installed and used within the electrical ratings for power, voltage, current, frequency, duty cycle and other characteristics. The safety of the installation could be jeopardised if the nominal ratings are not observed.

Dual certification





4.2.2 Specific Conditions of Use

The symbol “X” is used to indicate the basic requirements for the installation, use, maintenance and repair of the Ex equipment contained in the Ex certificate, the so-called “Specific Conditions of Use”.

The “Specific Conditions of Use” listed in the Certificate must be complied with.

Task of the designer!

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

The D.C. Solenoid of series GTCE 050 AGD... , GTCE 100 AGD... and GTCE 140 AGD... is a single solenoid actuator for the actuation of hydraulic, pneumatic and special valves in areas with potentially explosive gas and dust atmospheres of zone 1 and 21. The solenoid consists of an iron housing with surface protection containing an encapsulated coil. For electrical connection, a certified mini distribution box with type of protection "e" is mounted. Further, the solenoid is dust-proof and complies with the requirements of type of protection "t" (dust ignition protection by enclosure). The solenoid series GTCE 100 AGD... is available as DC and AC model. The AC model is additionally equipped with an internal bridge rectifier.

Technical data:

Rated voltage:	6 V...230 V DC ±10 %, 60 V...230 V AC ±10 %
Rated current:	0.05 A...22.2 A
Ambient temperature:	-30 °C...+40/+50/+60 °C
Degree of protection (IP):	IP65

These values are maximum values. See Annex for detailed information.

SPECIFIC CONDITIONS OF USE: YES as shown below:
A fuse corresponding to the device's rating current (max. 3 x I_B acc. to IEC/EN 60127-2) or, respectively, a motor protective switch with short circuit and thermal rapid release (corresponding to the rating current) has to be connected in series to each solenoid.

The solenoid is suitable for an extended temperature range. The operating company has to select an appropriate connection cable according to the specifications of the manufacturer.

Nominal voltage:	6 V...230 V DC ±10 %; 60 V...230 V AC ±10 %
Rated current:	0.05 A...22.2 A DC; 0.2 A...1.06 A AC
Limiting power:	10.1 W...130 W
Ambient temperature:	-30 °C...+60 °C

These values are maximum values. See Annex for detailed information.

SPECIFIC CONDITIONS OF USE: YES as shown below:
A fuse corresponding to the device's rating current (max. 3 x I_N or, resp. I_B acc. to IEC/EN 60127-2) or, respectively, a motor protective switch with short circuit and thermal rapid release (corresponding to the rating current) has to be connected in series to each solenoid.

The solenoid is suitable for an extended temperature range. The user has to select appropriate cable glands and connection cables according to the specifications of the manufacturer.

The selected cable glands and / or blanking elements shall contain an additional seal or gasket to effectively seal threaded entries.

The terminal box with coating shall not be exposed to intense electrostatic charging processes.

Operation of the solenoid type GTCE 140 AGD... with 130 W in mode of operation S3 40 % 5 min is only permitted in conjunction with an adequate safety device for direct temperature control (e.g. a PTC thermistor relay), which has to be selected, provided and verified for Ex (hazardous location) application by the user.

Unused terminals inside the terminal box of the solenoid shall be tightened.

The interrupting transient overvoltage of solenoids without internal protective circuit shall be limited according to the specifications of the manufacturer by means of appropriate measures external to the solenoid.

4.2.3 Use of Ex Components

Ex Components, such as empty enclosures or terminals, which only have an Ex Component certificate, marked with the symbol “U”, must not be used in the hazardous area unless they are approved as part of an Ex Equipment Certificate.

Ex Components can be used if they are assessed as simple equipment and used as part of an intrinsically safe circuit.

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
Ex COMPONENT CERTIFICATE

Certificate No.: IECEx BVS 22.0034U
Page 1 of 4
Certificate history:

Status: Current
Issue No: 0

Date of Issue: 2022-10-25

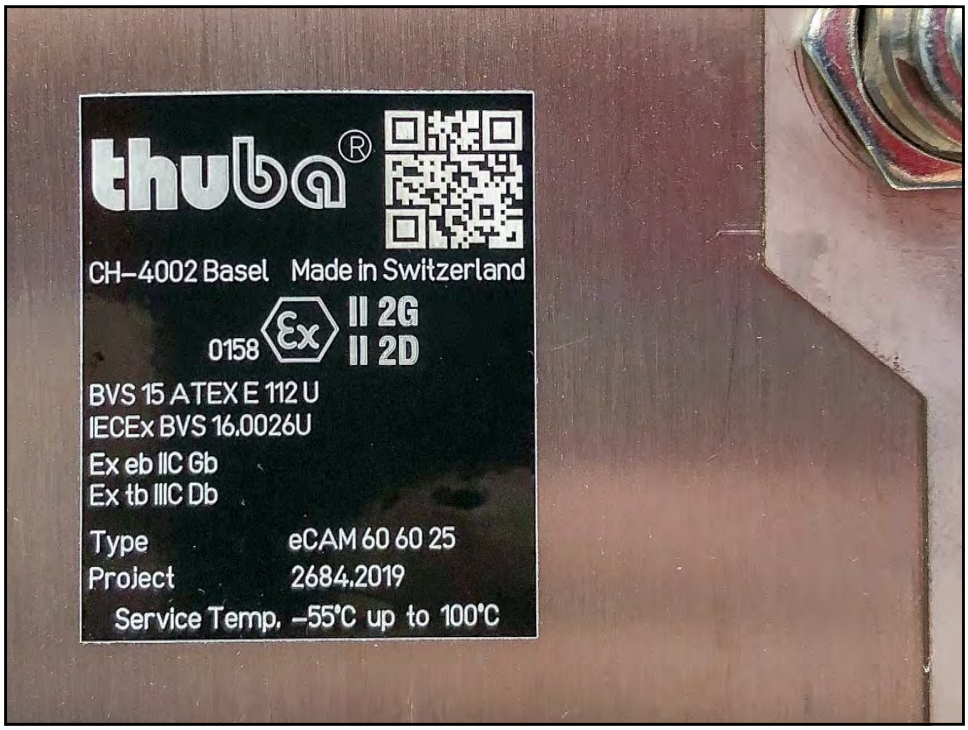
Applicant: thuba Ltd.
Stockbrunnenrain 9
4123 Allschwil
Switzerland

Ex Component: Flameproof encapsulated LED-tube type LED34U ** ****

This equipment is NOT intended to be used alone and requires additional consideration when incorporated into other equipment or systems for use in explosive atmospheres (refer to IEC 60079-0).

Type of Protection: Flameproof Enclosures "d"

Marking: Ex db IIC Gb

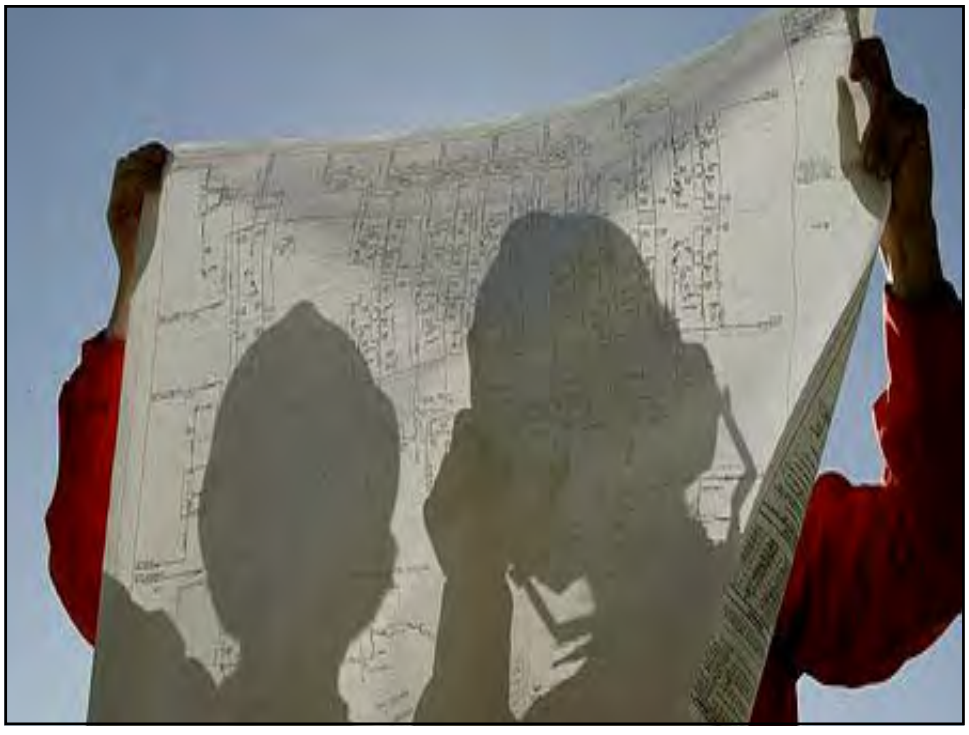


5. Documentation

5.1 General

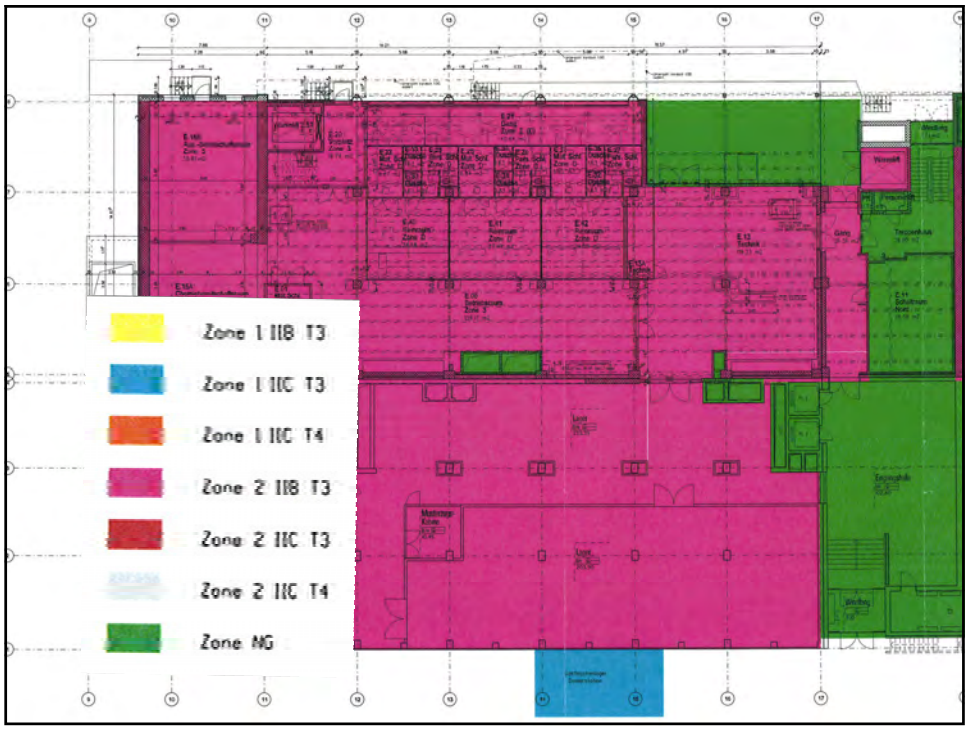
The installations must comply with the relevant certificates of the Ex Equipment, the present document and all requirements for the installation.
An installation dossier must be prepared for each installation to demonstrate compliance.

The installation dossier must be kept up to date throughout the entire operating life of the installation. The dossier may be in paper or in electronic form.



5.2 Information about the location

- **Documents for the classification of potentially explosive atmospheres including the temperature class or ignition temperature and the equipment group, where applicable;**
- **Assignment of the Equipment Protection Levels;**
- **Any identified external influences;**
- **Ambient temperature ranges, including solar radiation;**
- **Evidence of the competence of the persons who carried out the design, selection, installation of the equipment and initial inspection.**



5.3 Documentation - Ex Equipment

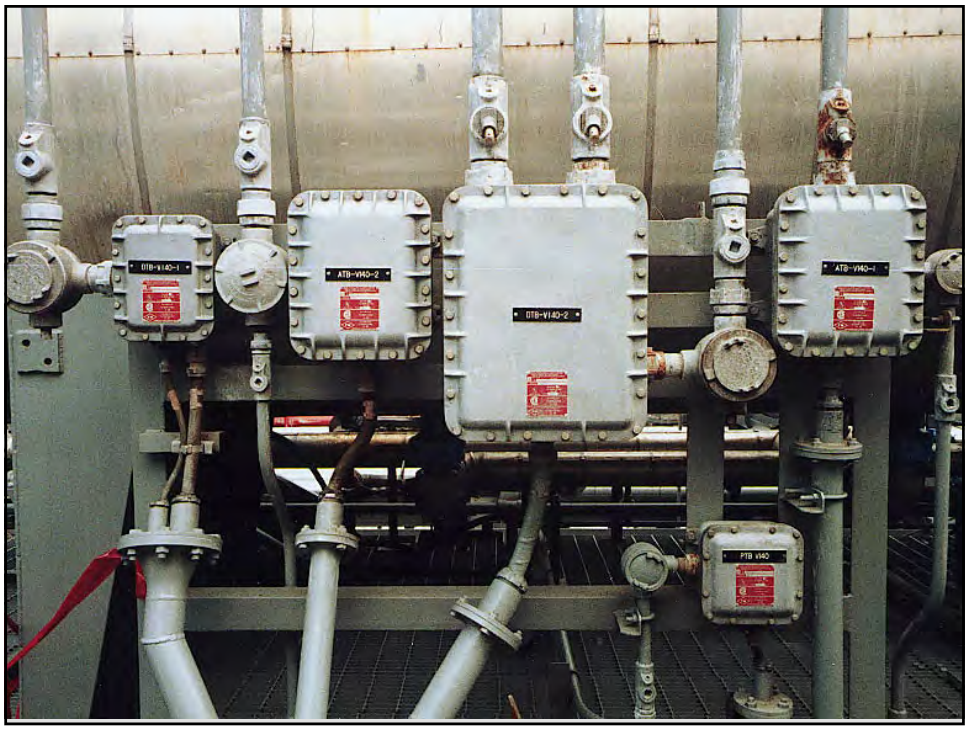
- Operating instructions of the Ex Equipment manufacturers with information on the intended use, for installation and initial testing, for maintenance and repair, if applicable
- Documents for Ex Equipment with **Specific Conditions of Use**
- Descriptive system documents for intrinsically safe systems
- Calculations or information , for example Ex “e” calculations and purging rates for pressurised equipment

5.4 Documentation - Installation (1)

- Manufacturer’s instructions
- Documentation on the suitability of the Ex Equipment for the area and environment to which it is exposed, for example temperature ratings, Type of Protection, IP rating, corrosion resistance;
- **Plans showing types and details of wiring systems and cable routing;**
- Records of selection criteria for cables, cable entry systems and conduits for compliance with the requirements for the particular Type of Protection;

5.4 Documentation - Installation (2)

- **Drawings of the conduit installation and the location of the sealing fittings;**
- Drawings and schedules relating to circuit identification;
- Records of the initial inspection;
- Installer's/qualified person's declaration



5.5 Personnel competency

The design of installation, the selection of Ex Equipment and installation accessories, installation and initial inspection covered in this document shall only be carried out by persons whose training has included instruction on the various Types of Protection and installation practices, relevant rules and regulations and on the general principles of area classification.

The competence of the person(s) must be relevant to the type of work to be carried out.

The staff must continuously undergo appropriate further education or training.

6. Design

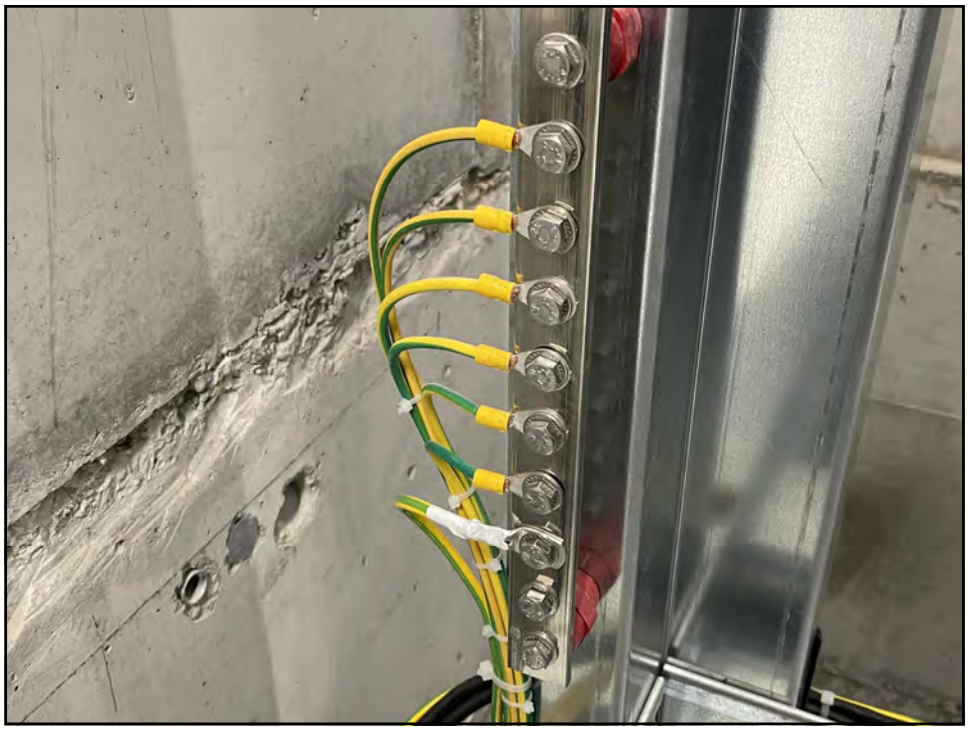
6.2.6 Protective equipotential bonding conductor

The cross-section for the protective equipotential bonding conductor is at least *6 mm²* (based on the conductance of copper) in accordance with IEC 60364-5-54 and at least *4 mm² for the* additional connections.

Mechanical strength must be taken into account for the connections, this may require cross-sections of 16 or 25 mm².

The connections must meet the following requirements:

- **secured against self-loosening and**
- **be protected against corrosion.**



6.7.3.4 Electrical machines with converter supply

When using inverters with electrical machines that have terminal boxes with Type of Protection “eb”, “ec” or “nA”, make sure that any overvoltage peaks and excess temperatures that may occur in the terminal box are taken into account.

6.7.3.4 Electrical machines with inverter supply (Ex eb) (1)

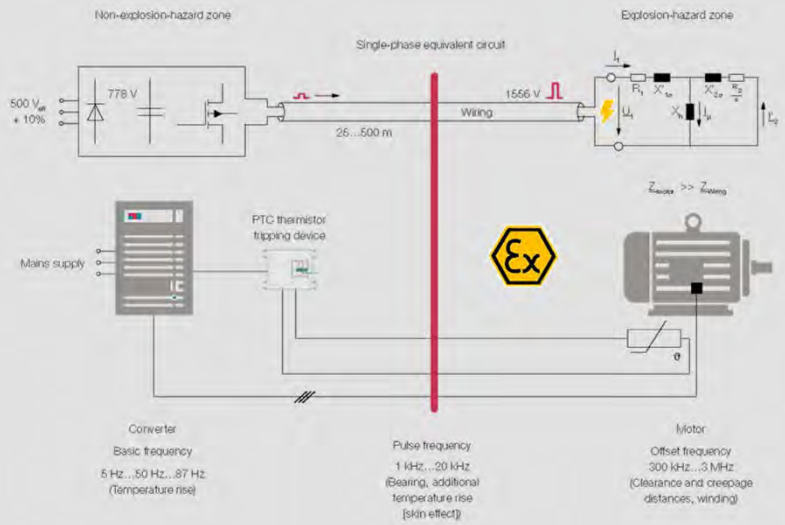
Electric machines with an inverter supply require either:

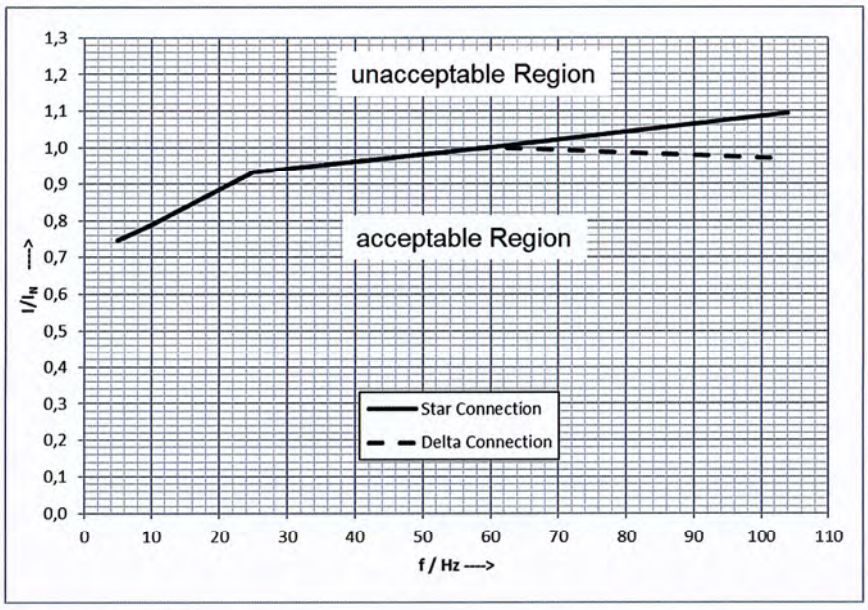
a. **Electrical machines that have been type tested with a specific inverter have been type tested for this duty in conjunction with the inverter and the protective device. The electrical machine should be used within its electrical rating and the inverter configuration should be set to match the electrical machine rating.**

6.7.3.4 Electrical machines with inverter supply (Ex eb) (2)

b. Electrical machines that have been tested for inverter operation, but where the type and manufacturer of the inverter is not specified. In this case, the characteristics of the selected inverter, the maximum inverter input voltage and the inverter settings must match the specifications of the electrical machine manufacturer. The action of the protection function shall result in effectively stopping current flowing through the electrical machine windings.

6.7.3.4 Electrical machines with inverter supply (Ex eb) (3)





Setting parameters for the continuous current limit of the frequency converter between 5 Hz and 104 Hz

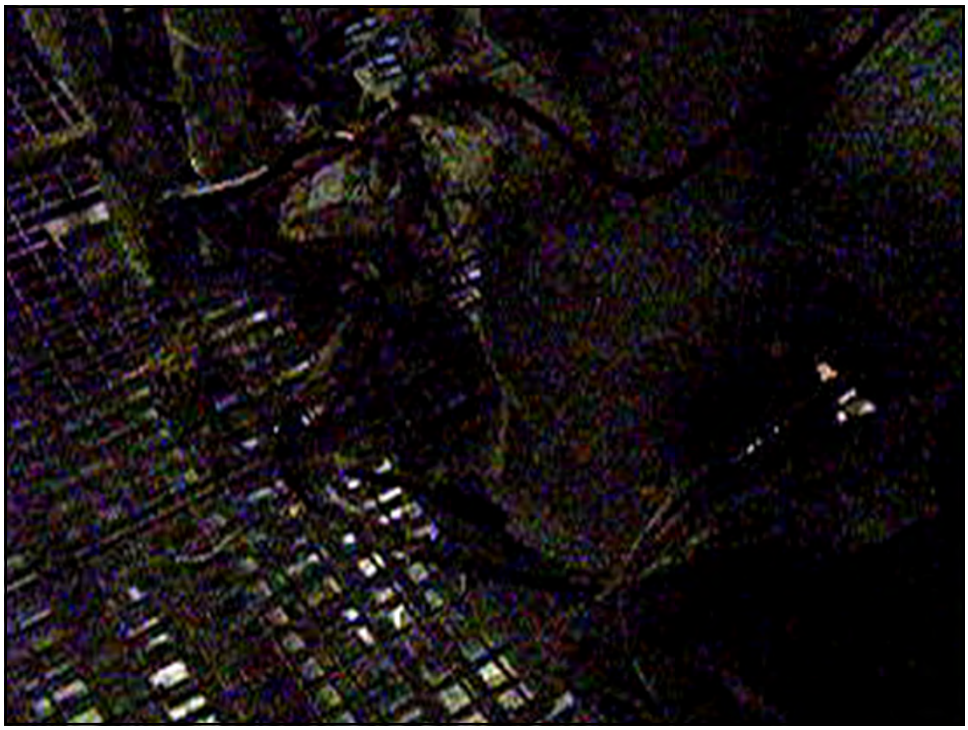
6.8 Electric heating system

6.8.2 Protection against earth fault

To limit heating due to earth fault and earth leakage currents, the following protective device must be installed in addition to the overcurrent protection:

a) **In a TT or TN system, a residual current device (RCD) must be used, the rated response residual current of which**
does not exceed 100 mA.
Residual current devices with a rated response residual current of 30 mA are preferable.

6.8.2 Protection against earth fault



6.8.4 Limiting the surface temperature

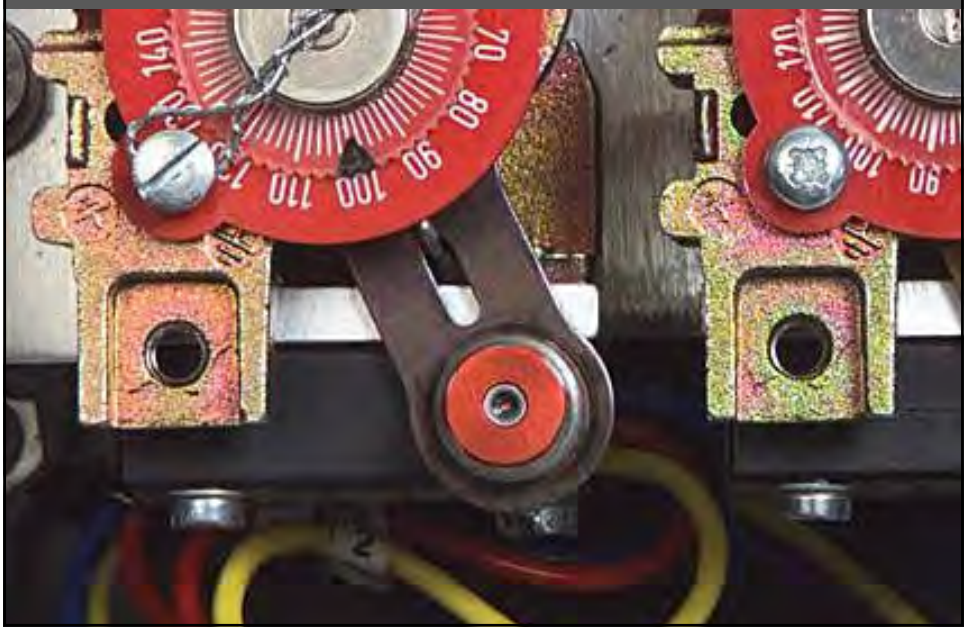
This must be secured by one of the following means:

a) **a stabilised design that uses the self-limiting temperature characteristic of the resistance heating device;**

b) **a stabilised design of a heating system**

c) **a safety device**

6.8.4 Limiting the surface temperature



6.8.5 Safety devices

Resistance heating equipment must be protected against excessive surface temperatures, if required. If so specified, protective measures shall be applied in accordance with the manufacturer's requirements and documentation.

- **the temperature of the resistance heating device or, if appropriate, its immediate surroundings; or**
- **the immediate ambient temperature and some or several other parameters.**

6.8.5 Safety devices

Examples of other parameters:

- **For liquids, the heating must be equipped with a level monitor that ensures an overlap of at least 50 mm.**
- **for flowing media such as gas and air, the standard flow rate must be ensured by a flow monitor.**

6.13.2 Maximum number of conductors

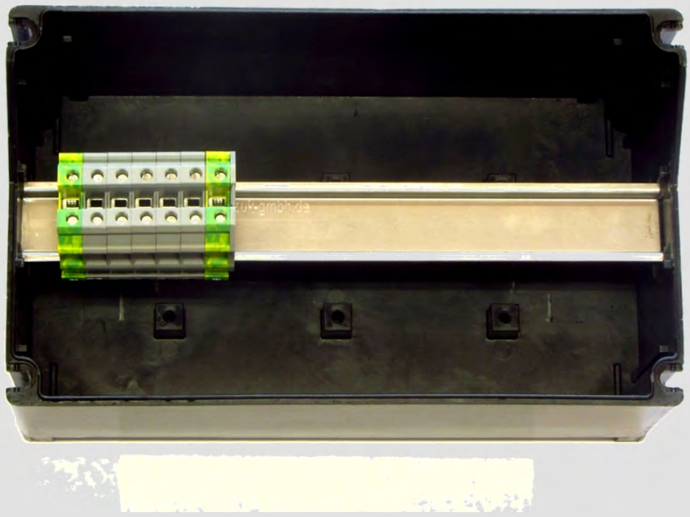
The manufacturer's operating instructions must contain the permissible number of terminals, the conductor cross-section and the maximum current for each terminal size.

If not, all terminals will be loaded simultaneously, then the load factor may be used for the calculation.

6.13.2 Maximum number of conductors

Current	Cross-section in [mm²]							
[A]	1,5	2,5	4	6	10	16	*25*	35
6	102							
10	68	102						
16	23	45	84					
20	9	26	51	64				
25		12	28	24	52			
35			8	5	52	44		
50					10	44		
63						16		
80								
100								
max. number of terminals	51	51	42	32	26	22		

6.13.2 Maximum number of conductors



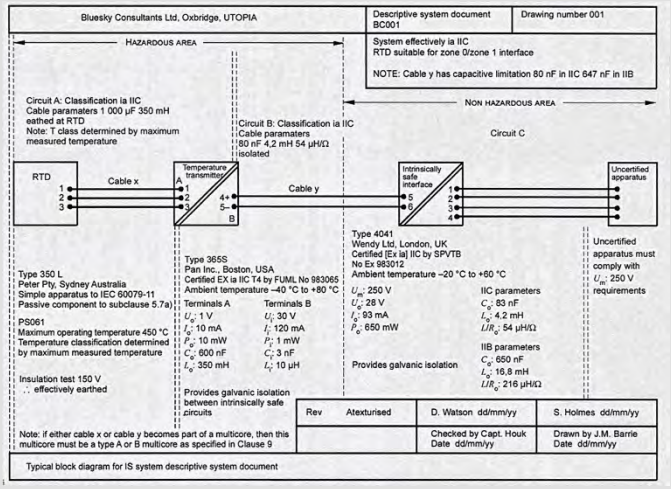
6.14.3.2 Descriptive system document

The designer must prepare a descriptive system document specifying the Ex equipment, including the simple equipment and the electrical parameters of the system, including those of the connecting cables.

The form in which the information required to ensure safety should be kept in the system description is not precisely defined and could be covered, for example, by drawings, diagrams, operating instructions or similar documents.

Sample of descriptive system document

Extract from IEC 60079-25



can lead into areas of Zone 1 (EPL Gb) or Zone 21 (EPL Db).

15.3 **Parameters**

15.3.1 Type SB0604-*-6.51-248

15.3.1.1 Input circuit 1: terminal 1 = In 1+, terminal 2 = In 1 GND, terminals 3,4 = PA
Input circuit 2: terminal 5 = In 2+, terminal 6 = In 2 GND, terminals 6,7,8 = PA

Nominal voltage		DC	12	V
Maximum voltage	Um			
for type SB0604-1-*-*		AC/DC	60	V
for type SB0604-2-*-*		AC/DC	253	V

15.3.1.2 Output circuits, intrinsically safe level of protection Ex ib
terminal 13 = Out 1+, terminals 14, 15, 16 = Out 1 - GND
terminal 9 = Out 2+, terminals 10, 11, 12 = Out 2 – GND

Channel 1 and 2 separated, values for each channel

Voltage	Uo	DC	6,51	V
Current	Io		248	mA
Power	Po		1.13	W

Trapezoid output characteristic

The values for external inductance and external capacitance connected in acc. with the following table:

	Group IIC				Groups IIB and IIIC		
L_o	1 µH	100 µH	500 µH	710 µH	1 µH	1 mH	3.1 mH
C_o	22 µF	3 µF	1.1 µF	0.73 µF	500 µF	7.4 µF	2.6 µF

15.3.2 Type SB0605-*-13-188

15.3.2.1 Input circuit 1: terminal 1 = In 1+, terminals 2,3 = GND, PA, terminal 4 = In 1-
Input circuit 2: terminal 5 = In 2+, terminals 6,7 = GND, PA, terminal 8 = In 2-

Nominal voltage		DC	12	V
Maximum voltage	Um			
for type SB0605-1-*-*		AC/DC	60	V
for type SB0605-2-*-*		AC/DC	253	V

6.14.3.3 Intrinsically safe circuits with only one current source

If values in permissible pairs for L_o and C_o are specified in the certificate for the associated equipment, these combined inductances and capacitances can be used for the verification.

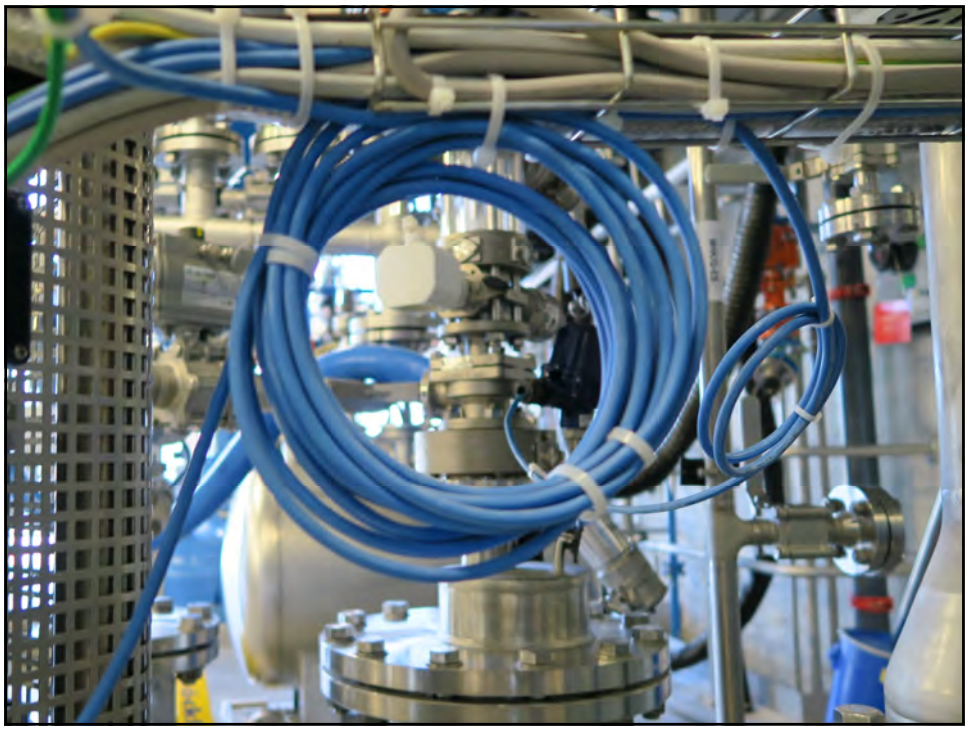
Remark:

Applies only to intrinsically safe circuits with only one current source and linear characteristic!

6.14.6 Marking of the cables

Cables containing intrinsically safe circuits shall be marked to identify them as part of an intrinsically safe circuit. If sheaths or enclosures are identified by a colour, the colour for cables containing intrinsically safe circuits shall be light blue.

For alternative possibilities see 8.9.3.2



7. Selection

7.3.1 Information requirements (1)

The following information is required for the selection of suitable Ex equipment for potentially explosive atmospheres:

- **the classification of the potentially explosive atmosphere including equipment protection level (EPL);**
- **the gas, vapour or dust classification in relation to the group or subgroup of Ex equipment;**
- **Temperature class or ignition temperature of the gas or vapour concerned;**
- **Minimum ignition temperature of the dust cloud or dust layer;**

7.3.1 Information requirements (2)

- **the intended use of the Ex device;**
- **the external influences;**
- **the ambient temperature.**

7.3.2 External influences

- **Extremely low or high ambient temperatures;**
- **High humidity;**
- **Water and humidity;**
- **Sun exposure;**
- **Corrosive atmosphere or contact with chemicals;**
- **Vibrations, mechanical stresses, friction and abrasion;**
- **Wind;**
- **Colour coatings;**
- **Dust.**

7.3.7.2 Relation between EPL and Types of Protection

EPL	Type of protection	KZ	Standard
Ga	Flameproof enclosure	da	IEC 60079-1
	Intrinsic safety	ia	IEC 60079-11
	Encapsulation	ma	IEC 60079-18
	Equipment with equipment protection level (EPL) Ga		IEC 60079-26
	Protection of equipment and transmission systems with optical radiation	op is	IEC 60079-28

7.3.7.2 Relation between EPL and Types of Protection

EPL	Type of protection	Code	Standard
Gb	Flameproof enclosure	d, db	IEC 60079-1
	Pressurised enclosure	p, pxb, pyb	IEC 60079-2
	Sand encapsulation	q	IEC 60079-5
	Liquid encapsulation	o, ob	IEC 60079-6
	Increased security	e, eb	IEC 60079-7

7.3.7.2 Relation between EPL and Types of Protection

EPL	Type of protection	KZ	Standard
Db	Pressurised enclosure	pxb	IEC 60079-2
	Intrinsic safety	ib	IEC 60079-11
	Encapsulation	mb	IEC 60079-18
	Protection through housing	tb	IEC 60079-31

7.3.8 Selection according to the equipment group

Required gas/steam or dust subdivision	Permitted device group
IIA	II, IIA, IIB or IIC
IIB	II, IIB or IIC
IIC	II, IIC
IIIA	IIIA, IIIB or IIIC
IIIB	IIIB or IIIC
IIIC	IIIC

7.3.9 Selection according to temperature class

Required temperature class	Ignition temperature of gases and vapours	Permissible temperature classes of the units
T1	> 450 °C	T1-T6
T2	> 300 °C	T2-T6
T3	> 200 °C	T3-T6
T4	> 135 °C	T4-T6
T5	> 100 °C	T5-T6
T6	> 85 °C	T6

7.3.10 Selection according to the ambient temperature

If no **ambient temperature range is** specified in the marking of the electrical appliance, then the appliance is **only intended** for use in the temperature range from
–20 °C to 40 °C.

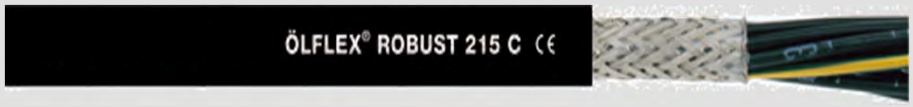
Example extended
ambient temperature range T_{amb}

–30 °C ≤ T_{amb} ≤ 65 °C

7.3.20 Selection according to ambient temperature range

7.4 Selecting the cables

The cables must be suitable for the operating conditions used and must be selected and laid in such a way that they cannot be damaged during operation.



7.4 Selecting the cables

The construction of the cable must either

- **nominally circular and installed with a cable entry selected in accordance with section 7.5 to maintain the IP rating of the Ex unit; or**
- **non-circular (flat) cables selected together with the specific cable entry to maintain the IP protection class of the Ex unit.**

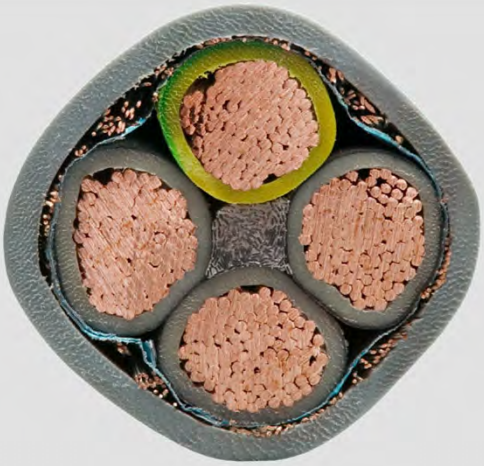
7.4 Selecting the cables

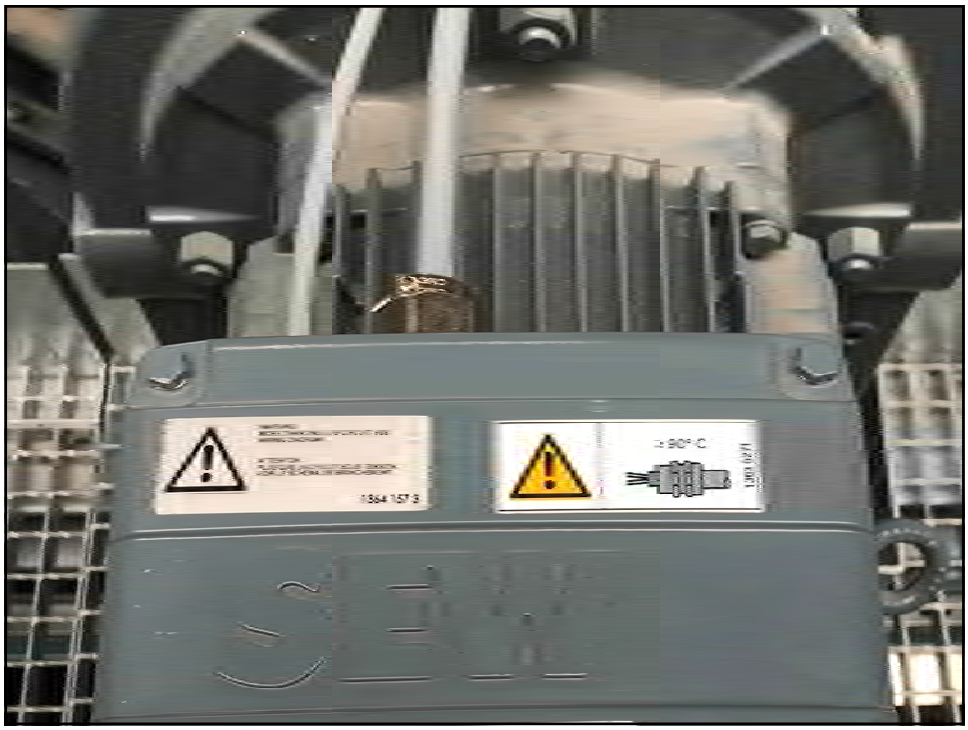
7.4 Selecting the cables

In cases where there may be gas migration through the cable due to the application and the cable enters a non-hazardous area or between different zones, the compactness of the cable must be considered.

Suitable cable entries can be, for example, potted entries (barrier glands), which seal around the individual conductors.

7.4 Selecting the cables





7.5.1 Selection of entry devices and other fittings

Extract from Table 15

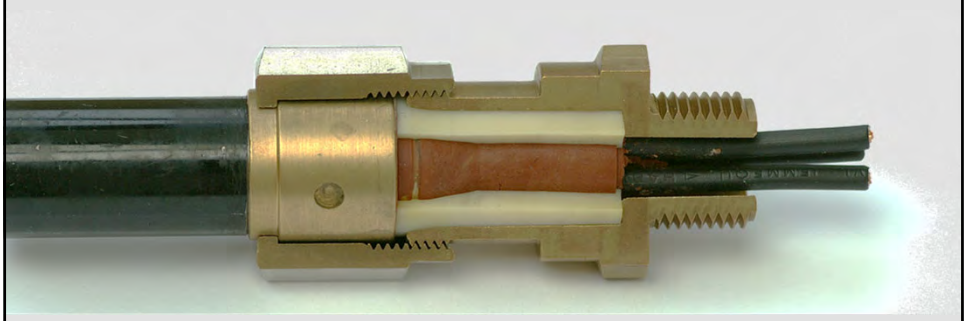
Protection technique for the equipment	Glands, adapters and blanking element protection technique			
	Ex “d”	Ex “e”	Ex “n”	Ex “t”
Ex “d”	X			
Ex “e”	X (IP 54)	X		
Group II Ex “i” / Ex “nL”	X	X	X	
Group III Ex “i”				X

7.5.2 Adapters and blanking elements

7.5.6 Cable entries for Type of Protection “d”

The cable entries must comply with one of the following requirements:

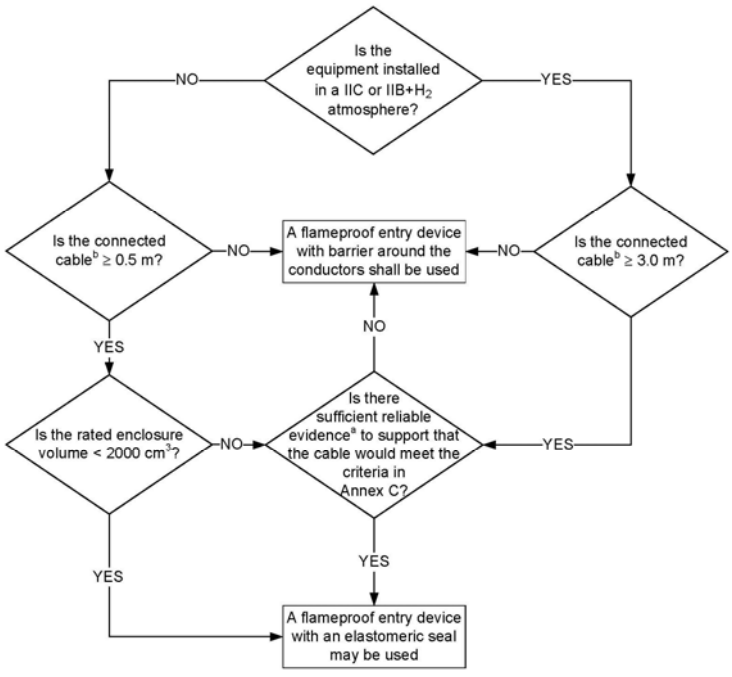
a. moulded cable entries in accordance with IEC 60079-1 and certified as equipment; or

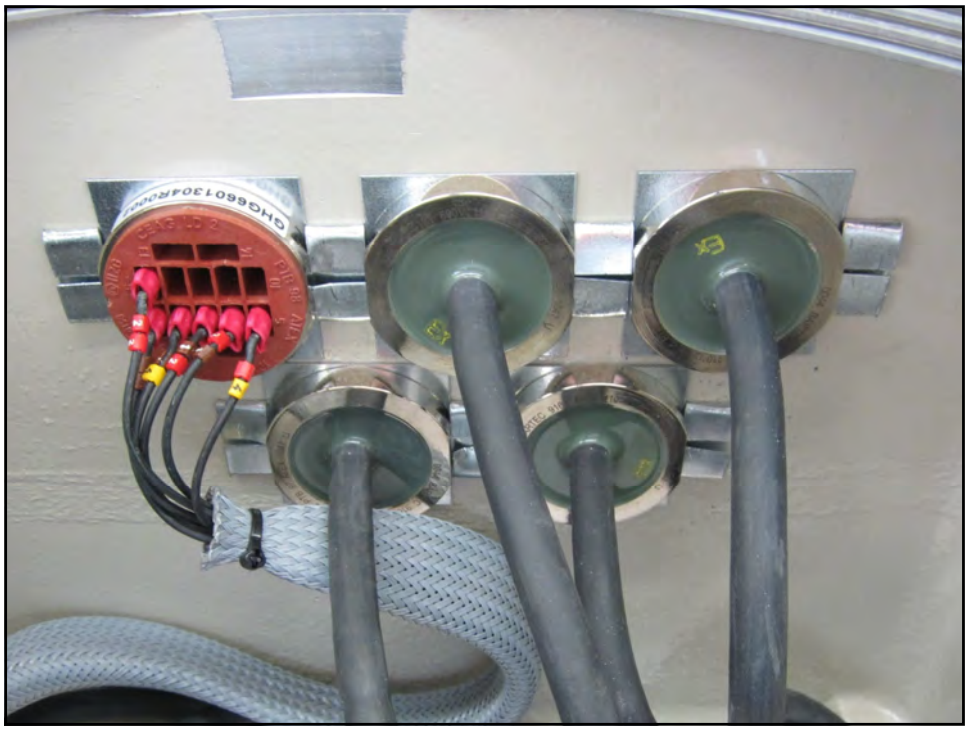


7.5.6 Cable entries for Type of Protection “d”

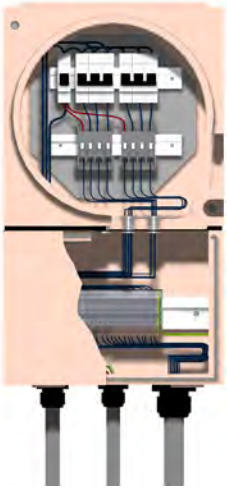
b. **Cable entries in compliance with IEC 60079-1, certified as equipment and selected according to the new flow chart; or**

c. **Indirect cable entry through a combination of a flameproof enclosure with an Ex d bushing (Ex component) and a terminal box, for example in the increased safety "Ex eb" Type of Protection.**

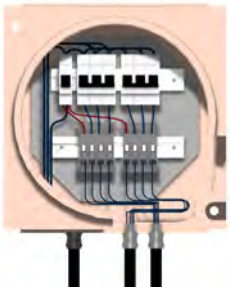




7.5.6 Cable entries for Type of Protection “d”



Indirect

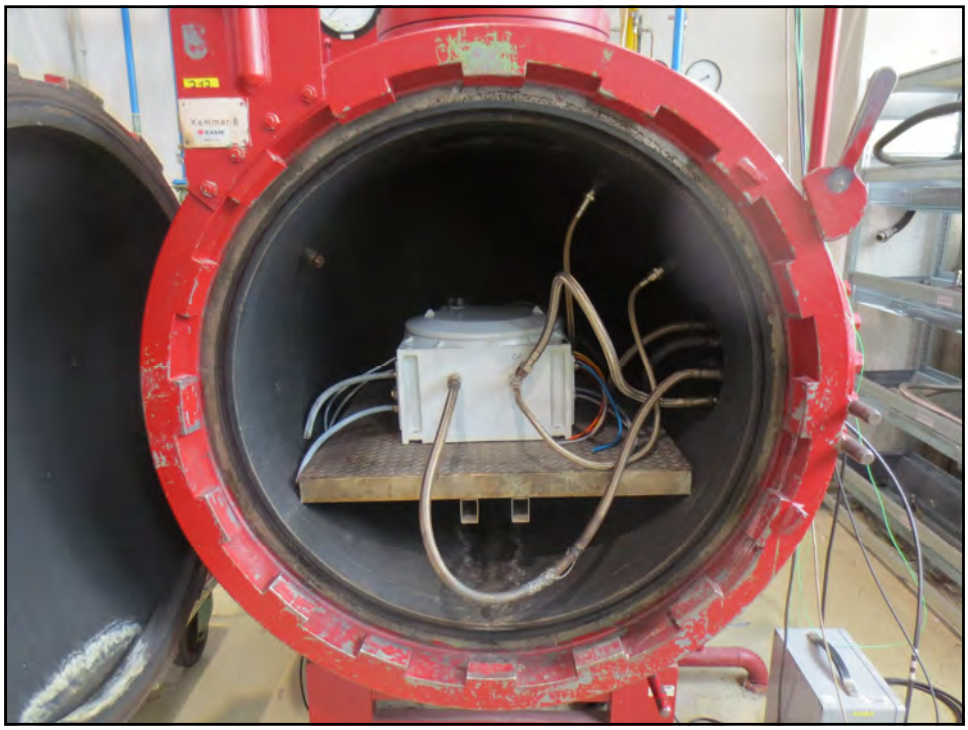


Direct

Annex C – Pressure testing for cables

Testing of the cables according to Annex C:

- **Cable length (test item) 0.5 m**
- **Tight housing with a volume of 5 l (± 0.2 l)**
- **Overpressure 0.3 kPa (3 mbar)**
- **Pressure half-life from 0.3 kPa to 0.15 kPa at least 5 seconds**



IEC

IEC SC 31J SD 001

Edition 1.0 2022-03

Background to flameproof cable gland requirements in IEC 60079-14

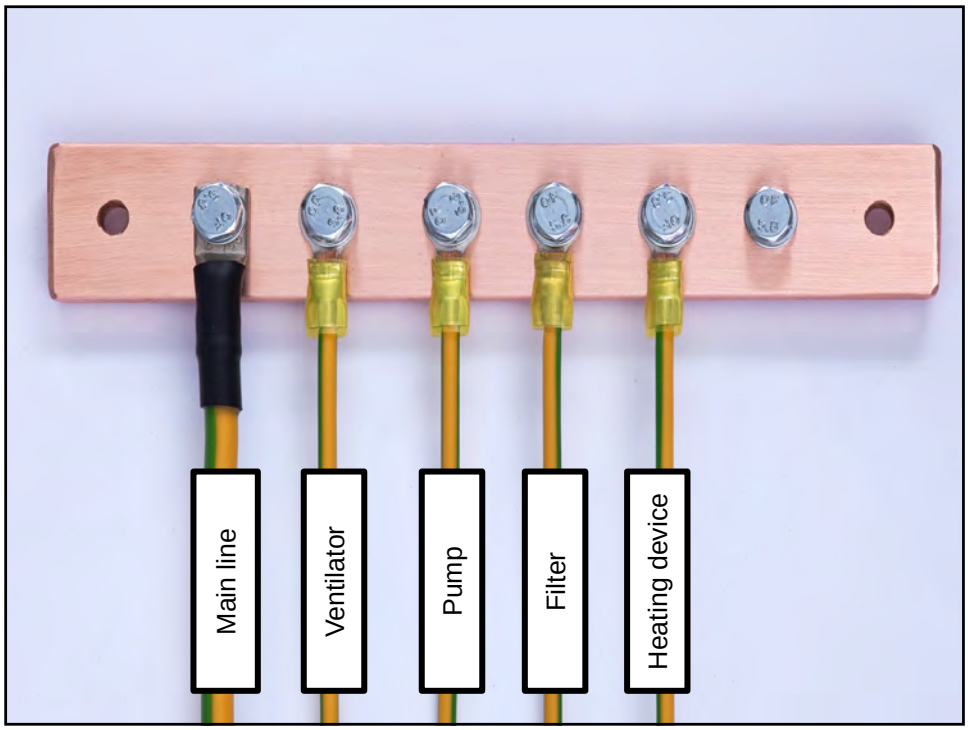
8. Installation of the units

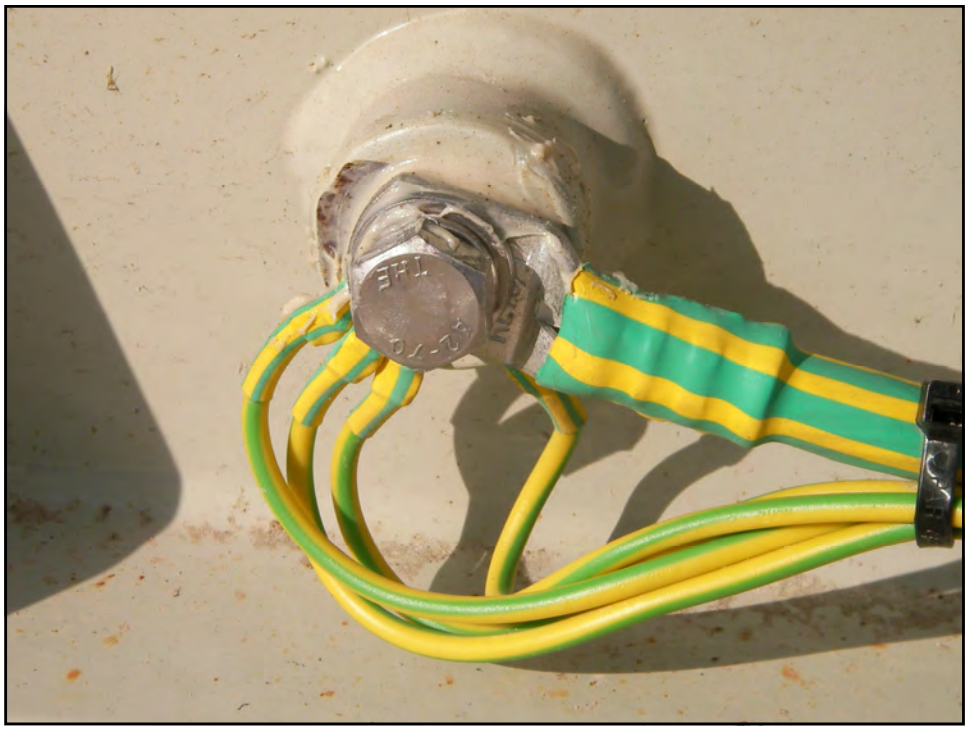
8.2 Cable and wiring systems

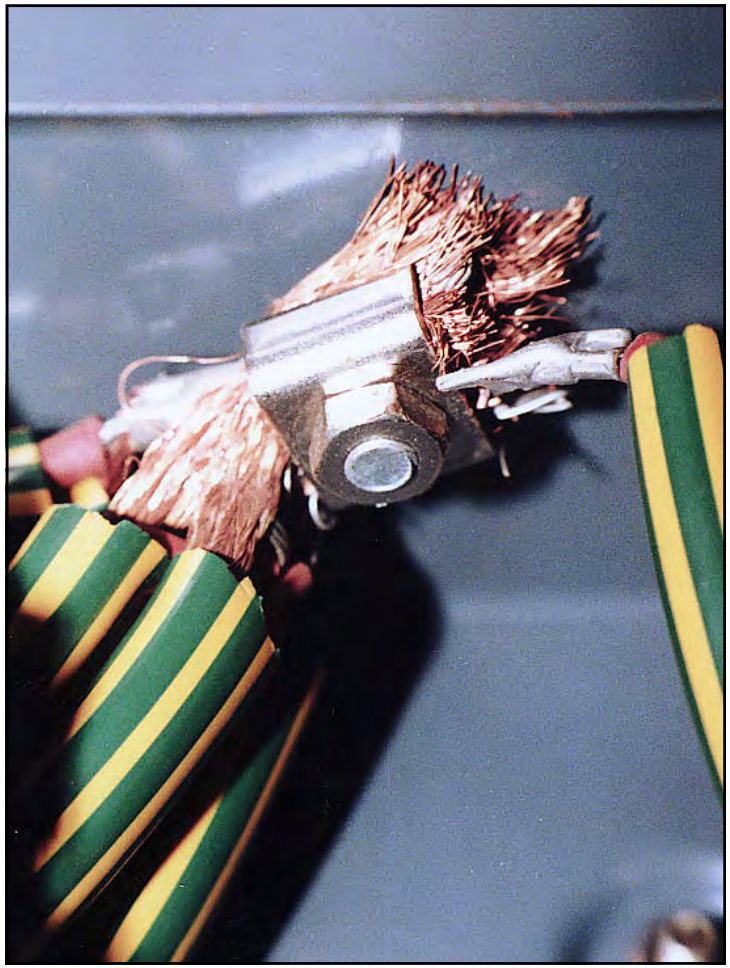
8.2.2 Equipotential bonding connections

The equipotential bonding connections should be arranged in such a way that the removal of a single connection does not lead to the loss of equipotential bonding of other parts.

The preferred arrangement for connecting multiple equipotential bonding wires is to provide a rail that allows each item to be provided with individual equipotential bonding as required.


Main line
Ventilator
Pump
Filter
Heating device





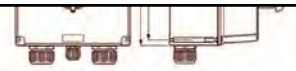

.steute
035020
Ex EM 98 DS-11 -40°C
1442493
II 2G Ex db eb IIC T6/T5 Gb
II 2D Ex tb IIIC
T80°C/T95°C Db
DMT 01 ATEX E 178
IECEx
Ex db eb IIC T6/T5 Gb
Ex tb IIIC T80°C/ T95°C Db
IECEx BVS 07.0014
250 V / 4,4 A AC-15 (T6)
250 V / 6,6 A AC-15 (T5)
-40°C ≤ Ta ≤ +70°C (T6/T5)
IP66
CE 0158
Brückenstraße 91
32584 Löhne - Germany

8.2 Cable and wiring systems

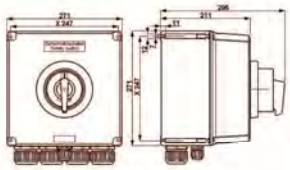
8.2.3 Connections

Connections must be made in accordance with the terminal type, degree of protection and the manufacturer's instructions to avoid undue voltages, hot spots and arcing at the terminals .

All screw and bolt connections must be *tightened to the torque specified by the manufacturer* of the Ex terminals.



GHG 264 .., 80 A 3-pole



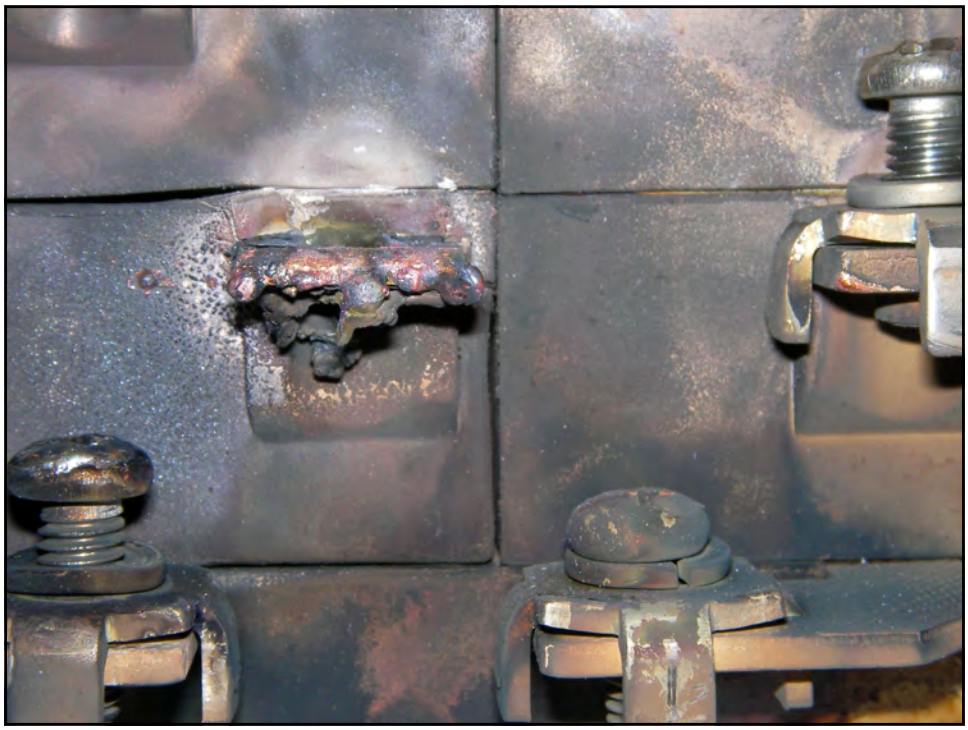
GHG 264 .., 80 A 6-pole

Ex tb IIIC T80 °C Db

Rated voltage:			690 V, 50/60 Hz		
Rated current:			80 A		
			up to U_e 400 V	up to U_e 500 V	up to U_e 690 V
Perm. short circuit back-up fuse:			160 A/gG	160 A/gG	160 A/gG
Switching capacity AC 3:			80 A	80 A	63 A
Switching capacity DC 1 / DC 23:		U_e	120 V	60 V	
		I_e	80 A	80 A	
			2 contacts in series	1 contact	
Cable entries (standard version):			3-pole version		6-pole version
			2 x M50 + 1 x M25		4 x M50 + 1 x M25
suitable cables and test torques of the pressure screw					
Cabel entry:			M25		M50
Seal 1+2+3 (Ø mm / Nm)	1 2 3	min.	8.0 / 1.5		
		max. [1]	10.0 / 2.0		
Seal 1+2 (Ø mm / Nm)	1 2	min.	10.0 / 2.3		24.0 / 6.0
		max. [1]	13.0 / 2.6		28.0 / 7.0
Seal 1 (Ø mm / Nm)	1	min.	13.5 / 1.3		28.0 / 5.0
		max. [1]	17.5 / 2.3		35.0 / 7.0
Test torque for screw in thread cable entry (Nm)			3.0		7.5

[1] The tests of clamping ranges and torque values were performed with metal mandrel. The clamping range can vary by using cables with different manufacturing tolerances and material properties. Please use a suitable combination of seals in the intermediate area, so that the cap nut can be tightened in future maintenance work on the cable entry.

Main contact terminals:			1x / 2x 4.0 - 25 mm² (with cable lug 1x 35 mm²)		
		Rated current:	Ambient temperature at T_{amb}: +40 °C	+50 °C	+55 °C
	16 mm²	≤ 63 A	T6	T6	T6
		≤ 80 A	T6	T5	–
	25 mm²	≤ 80 A	T6	T6	T6
	35 mm²	≤ 80 A	T6	T6	T6
Test torque terminals:			3.5 Nm		
Weight (standard version):			3-pole version approx. 6.50 kg		6-pole version approx. 9.00 kg



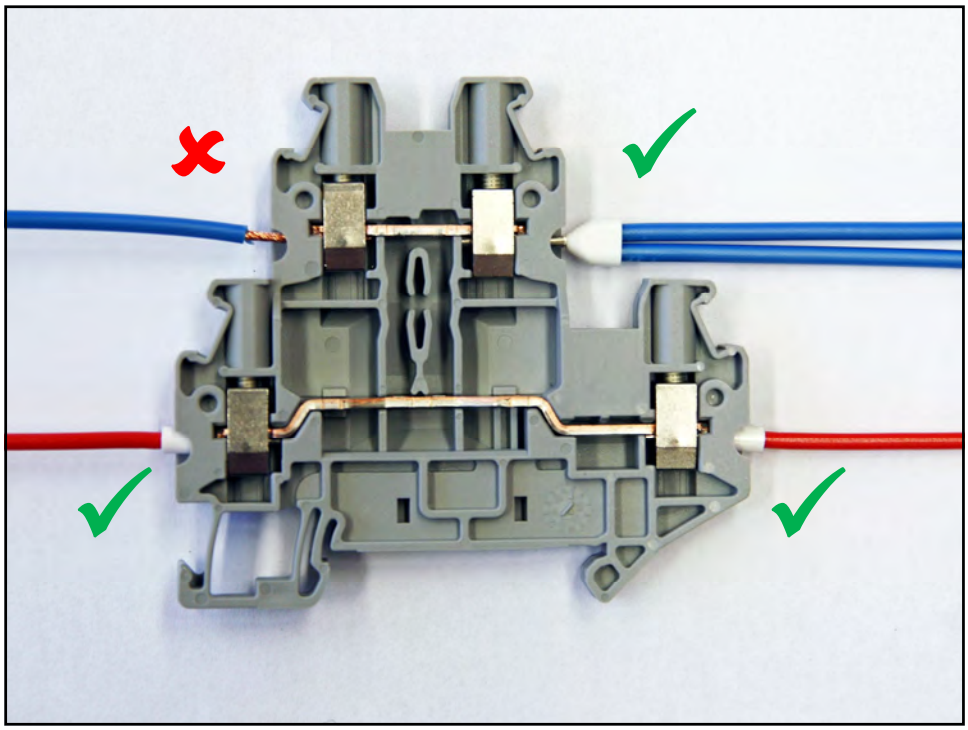
8.2 Terminations

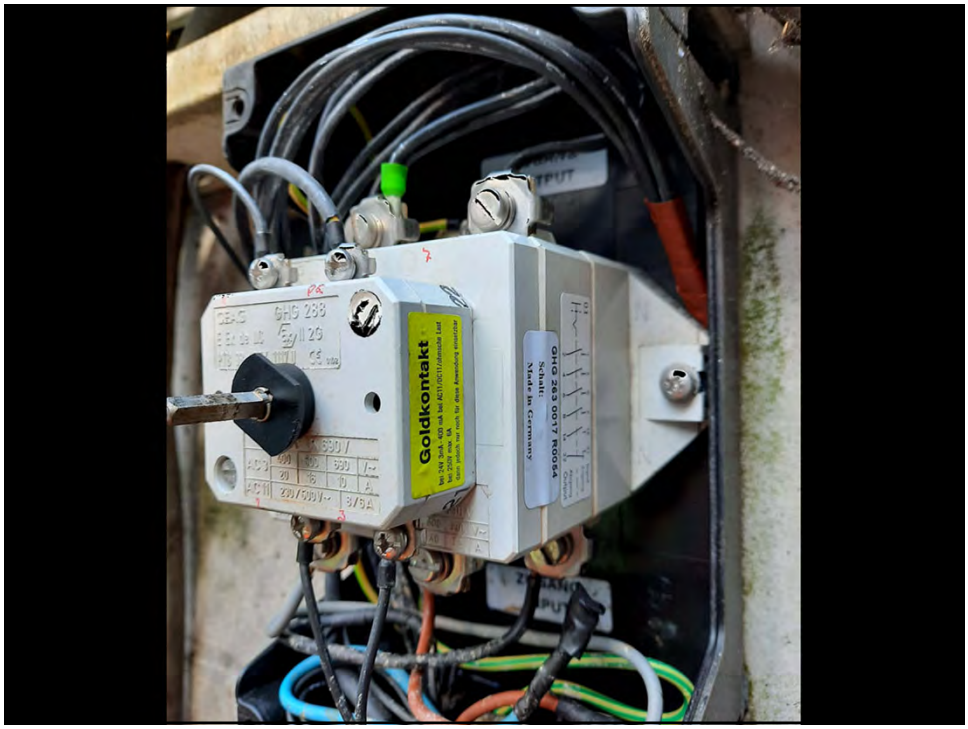
8.2.3 Connections

8.2.3.1 General

If stranded and especially fine-stranded conductors are used, the ends must be protected against separation of the strands with cable lugs, ferrules or by the type of terminal.

The creepage distances and clearances corresponding to the degree of protection of the Ex Equipment must not be reduced by the way the conductors are connected to the terminals.



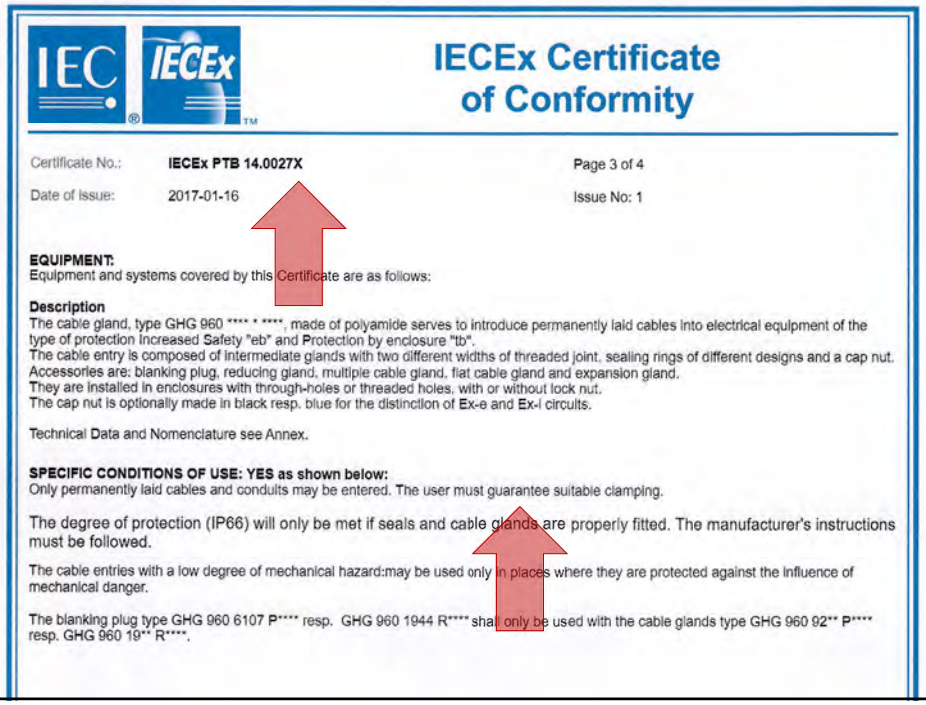

Goldkontakt

8.3.2 Cable entry devices (1)

8.3.2.1 General

If the marking of the certificate for cable entry has an "X", it may only be used for fixed installations.

An additional clamping device is required in order not to transfer tensile stresses to the conductor connections (terminals) inside the enclosures.



IECEx Certificate of Conformity

Certificate No.: IECEx PTB 14.0027X Page 3 of 4

Date of Issue: 2017-01-16 Issue No: 1

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

Description
The cable gland, type GHG 960 **** * ****, made of polyamide serves to introduce permanently laid cables into electrical equipment of the type of protection Increased Safety "eb" and Protection by enclosure "tb".
The cable entry is composed of intermediate glands with two different widths of threaded joint, sealing rings of different designs and a cap nut.
Accessories are: blanking plug, reducing gland, multiple cable gland, flat cable gland and expansion gland.
They are installed in enclosures with through-holes or threaded holes, with or without lock nut.
The cap nut is optionally made in black resp. blue for the distinction of Ex-e and Ex-i circuits.

Technical Data and Nomenclature see Annex.

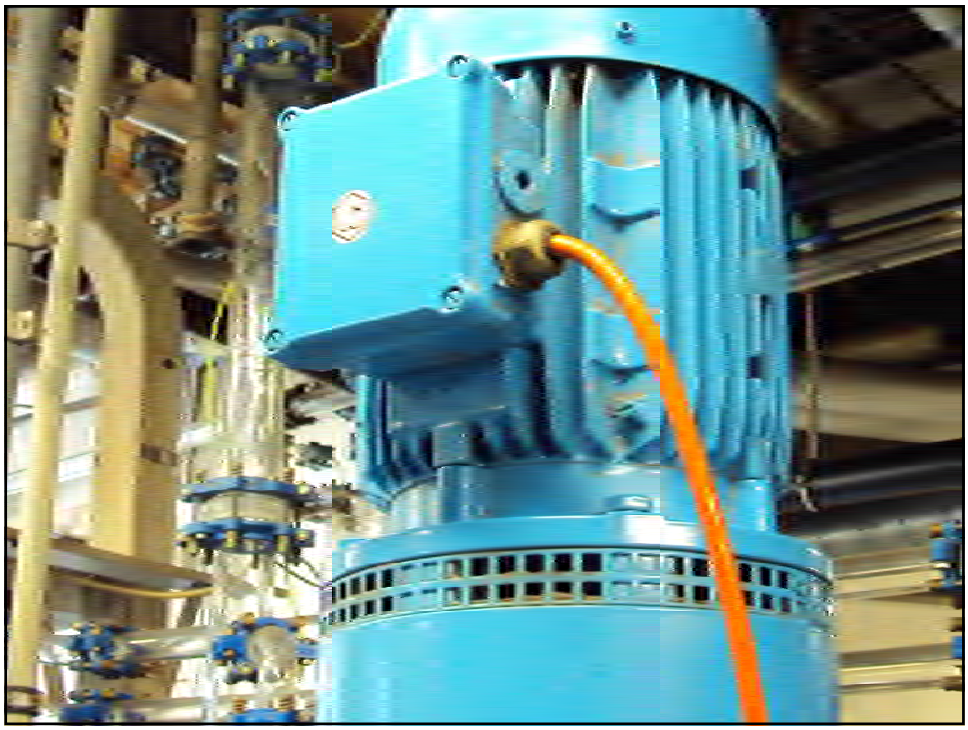
SPECIFIC CONDITIONS OF USE: YES as shown below:
Only permanently laid cables and conduits may be entered. The user must guarantee suitable clamping.

The degree of protection (IP66) will only be met if seals and cable glands are properly fitted. The manufacturer's instructions must be followed.

The cable entries with a low degree of mechanical hazard:may be used only in places where they are protected against the influence of mechanical danger.

The blanking plug type GHG 960 6107 P**** resp. GHG 960 1944 R**** shall only be used with the cable glands type GHG 960 92** P**** resp. GHG 960 19** R****.

8.3.2 Cable entry devices

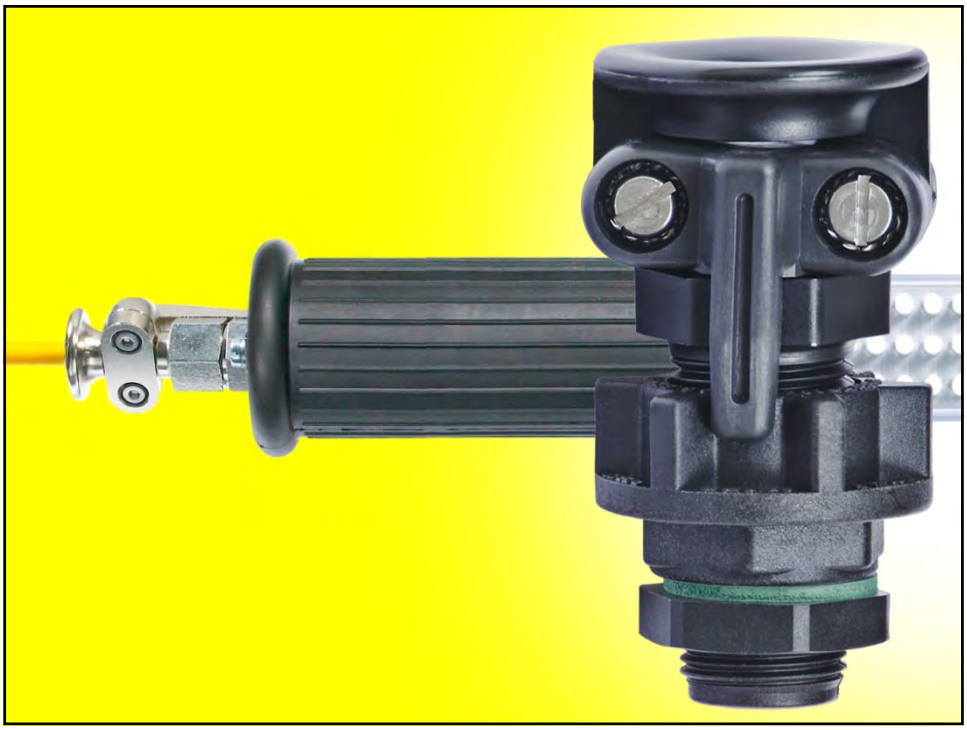


8.3.2 Cable entry devices (2)

8.3.2.1 General

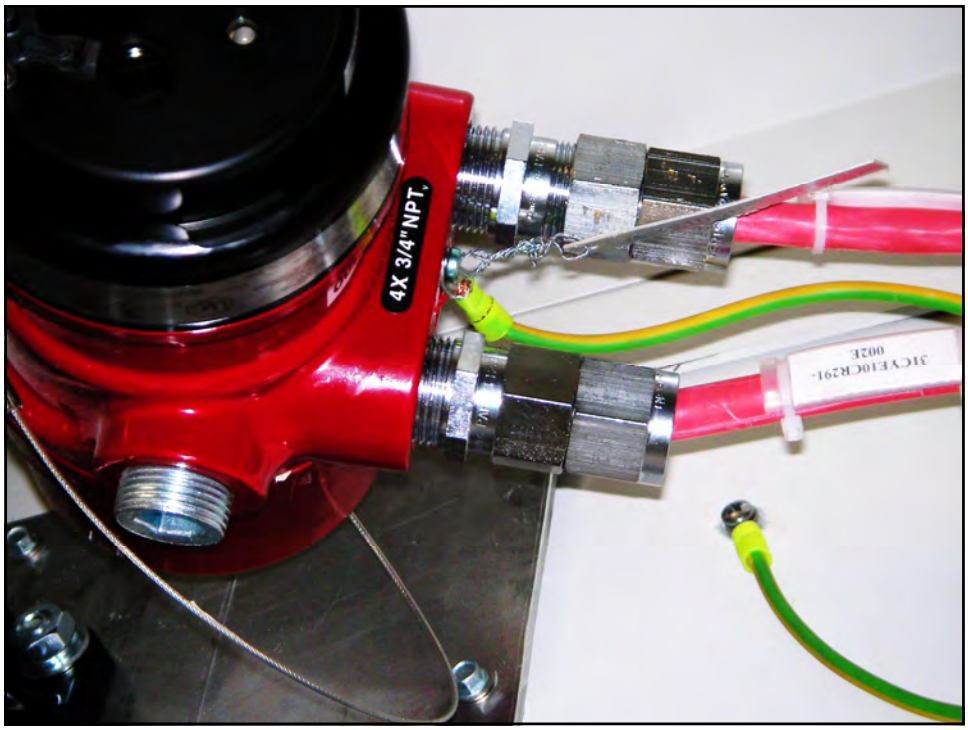
The cables must be laid straight from the cable entry to avoid lateral stresses that could affect the sealing of the cable or the IP protection class.

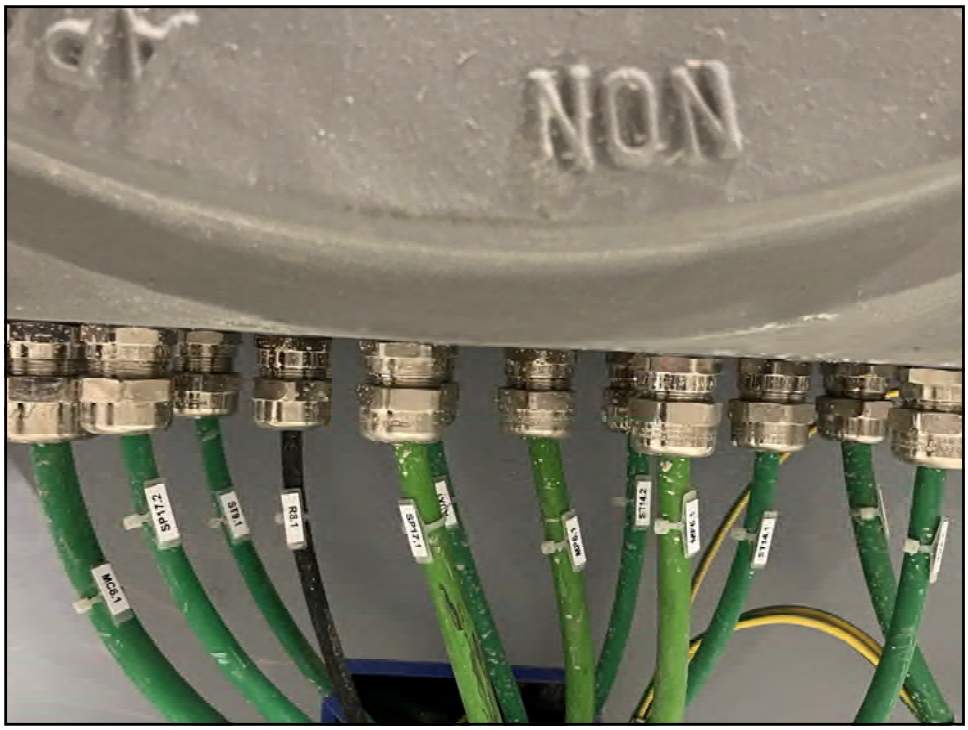
Clamping of the cables should be done *within 10 times the cable diameter or 300 mm*, whichever gives the shorter length, from the end of the cable entry.




+UH331.20
+UH333.20


71-TA1.N1
CROWCON
71-TA1.N1


4X 3/4" NPT



8.3.4 Unused openings

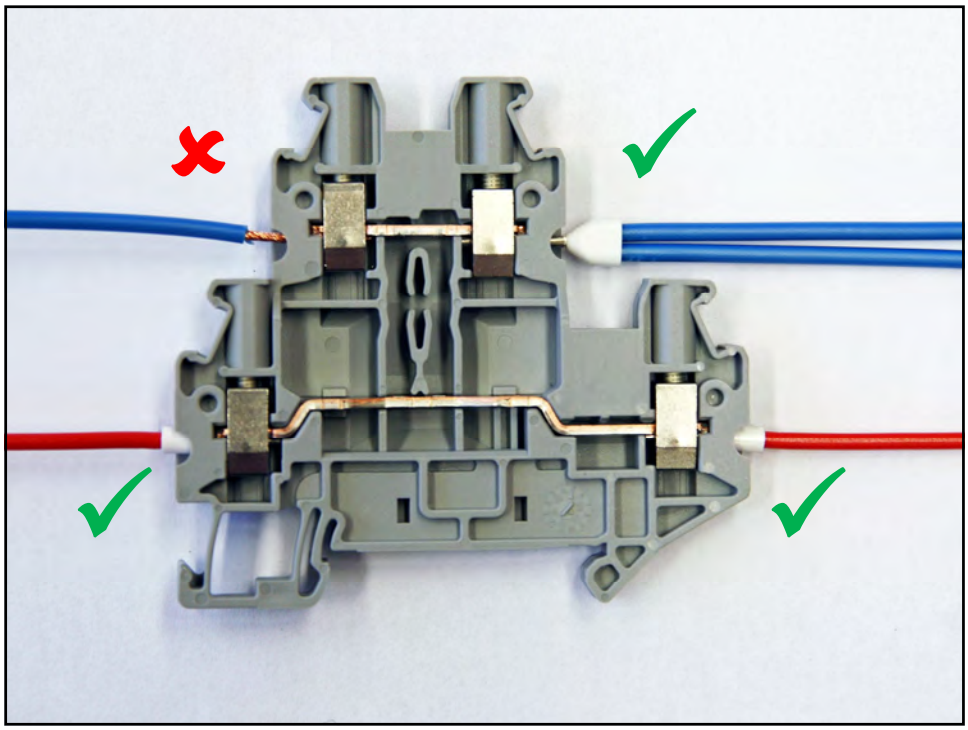
With the exception of enclosures containing only one intrinsically safe circuit, unused inputs in the enclosure must be closed off by means of closing elements in accordance with the respective type of protection, whereby the degree of protection IP 54 or the degree of protection required for the place of use, whichever is higher,
whichever is higher, must be complied with.

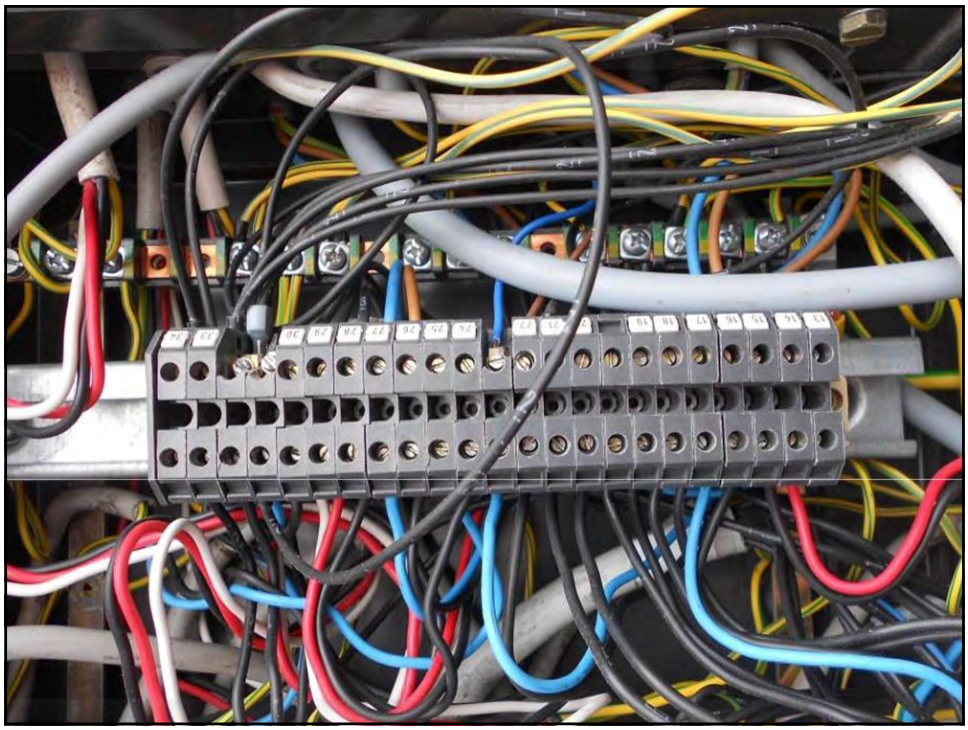
The locking elements must comply with the requirements of IEC 60079-0 and be such that they can only be removed with the aid of a tool.

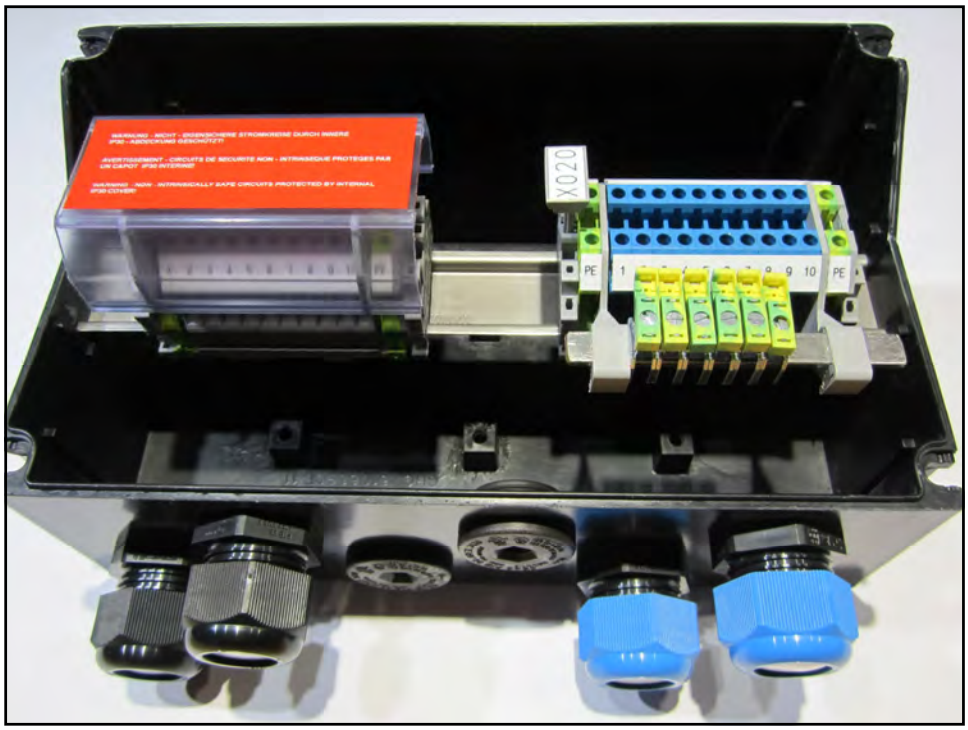
8.3.4 Unused openings

8.8.1 Conductor connections

Unless permitted in the manufacturer's operating instructions, two conductors with different cross-sections must not be connected to one terminal. Exception, the conductors are secured with a wire end sleeve (if permitted for 2 conductors) or another method specified by the manufacturer.





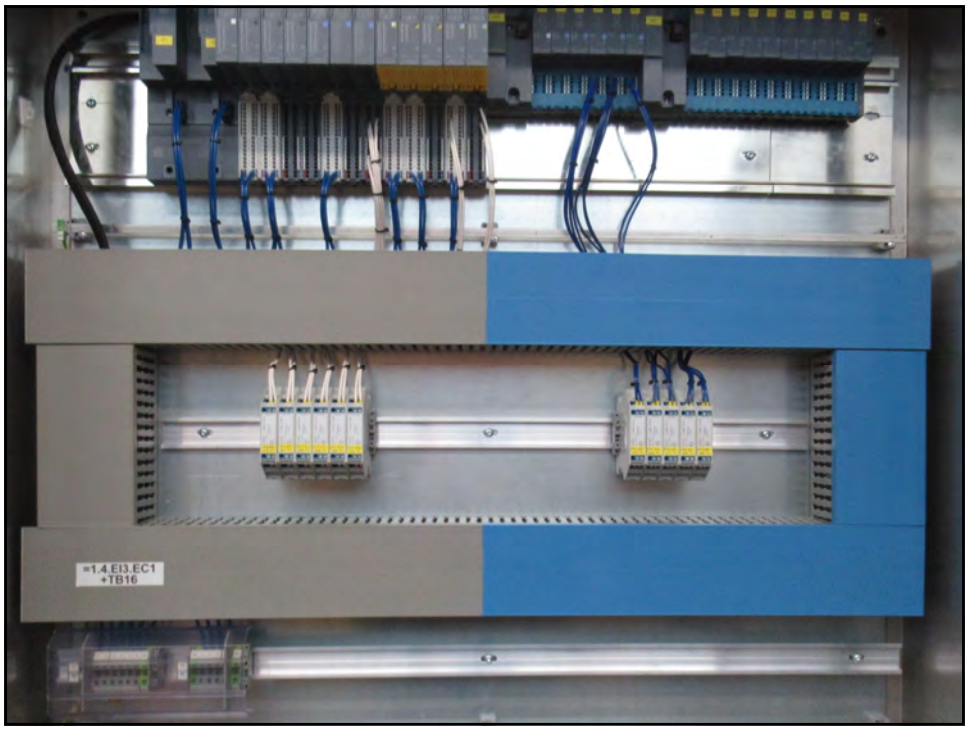


8.9.3.2 Marking of cables

Marking measures shall be taken inside measuring and control cabinets, switchgear, distribution Ex Equipment, etc. where there is a possibility of confusion between cables of intrinsically safe and non-intrinsically safe circuits, in the presence of a blue neutral conductor.

Such measures include:

- **combining the Ex "i" cores in a common light blue harness; or**
- **labelling; or**
- **clear arrangement and separation.**



9. Initial inspection

9. Initial inspection

Before workplaces where explosive atmospheres may occur are put into operation for the first time, the explosion protection of the entire installation must be checked.

The conditions necessary to ensure explosion protection must be maintained. This test must be carried out by persons who are qualified to do so by virtue of their experience and/or professional training in the field of explosion protection.

	Check that: X = required for all types, n = type "n" only, t = type "t" and "tD" only	Ex "d"			Ex "e"			Ex "n" Ex"t/tD"		
		Grade of inspection								
		D	C	V	D	C	V	D	C	V
14	Condition of enclosure gaskets is satisfactory	X			X			X		
15	There is no evidence of ingress of water or dust in the enclosure in accordance with the IP rating	X			X			X		
16	Dimensions of flanged joint gaps are: – within the limits in accordance with manufacturer's documentation or – within maximum values permitted by relevant construction standard at time of installation or – within maximum values permitted by site documentation	X								
17	Electrical connections are tight				X			X		
18	Unused terminals are tightened				X			n		
19	Enclosed-break and hermetically sealed devices are undamaged							n		
20	Encapsulated components are undamaged				X			n		
21	Flameproof components are undamaged				X			n		
22	Restricted breathing enclosure is satisfactory – (type "nR" only)							n		
23	Test port, if fitted, is functional– (type "nR" only)							n		
24	Breathing operation is satisfactory– (type "nR" only)	X			X			n		
25	Breathing and draining devices are satisfactory	X	X		X	X		n	n	
	EQUIPMENT SPECIFIC (LIGHTING)									
26	Fluorescent lamps are not indicating EOL effects				X	X	X	X	X	X