2024 IECEx International Hydrogen Conference
Singapore 29th May

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

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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

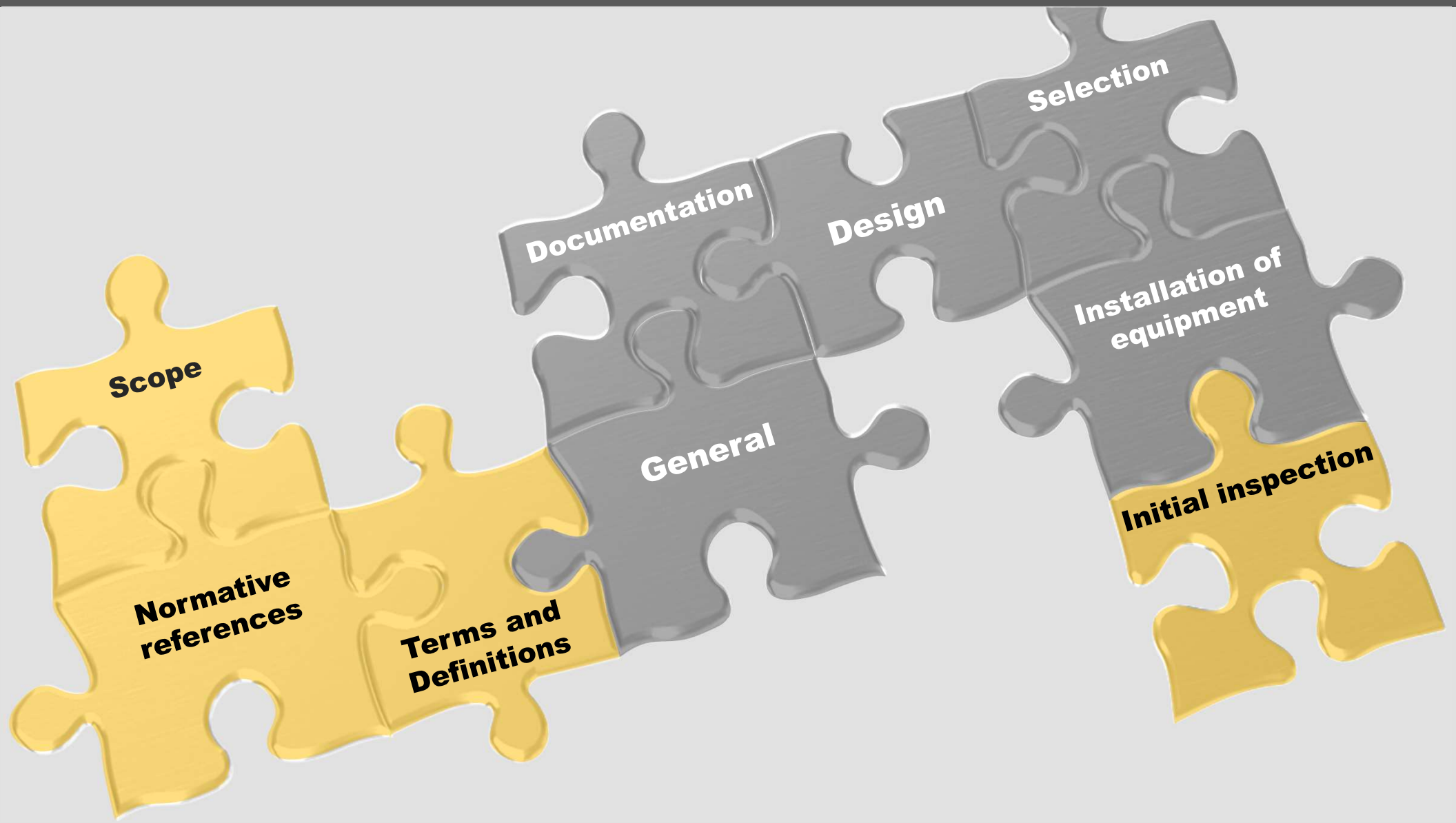
IEC 60079-14

Edition 6.0 2024-04

PRE-RELEASE VERSION (FDIS)

Explosive atmospheres –
Part 14: Electrical installation design, selection and installation of equipment, including initial inspection

Content IEC 60079-14:2024




HYDROGEN
ENERGY
HYDROGEN
ENERGY


ZERO EMISSION
GREEN HYDROGEN
POWERED by
HYDROSPIDER
23
1049
UN 1049 WASSERSTOFF, VERDICHTET
höchstzulässiger Fülldruck bei 15° C: 350bar
Tankcode: C525BN


ZH·2409
Ich fahre mit Wasserstoff
sauber – sicher – zukunftsorientiert
BUCHER CityCat H2


NOT
AUS

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

4.1.2 Requirements for all Ex Equipment

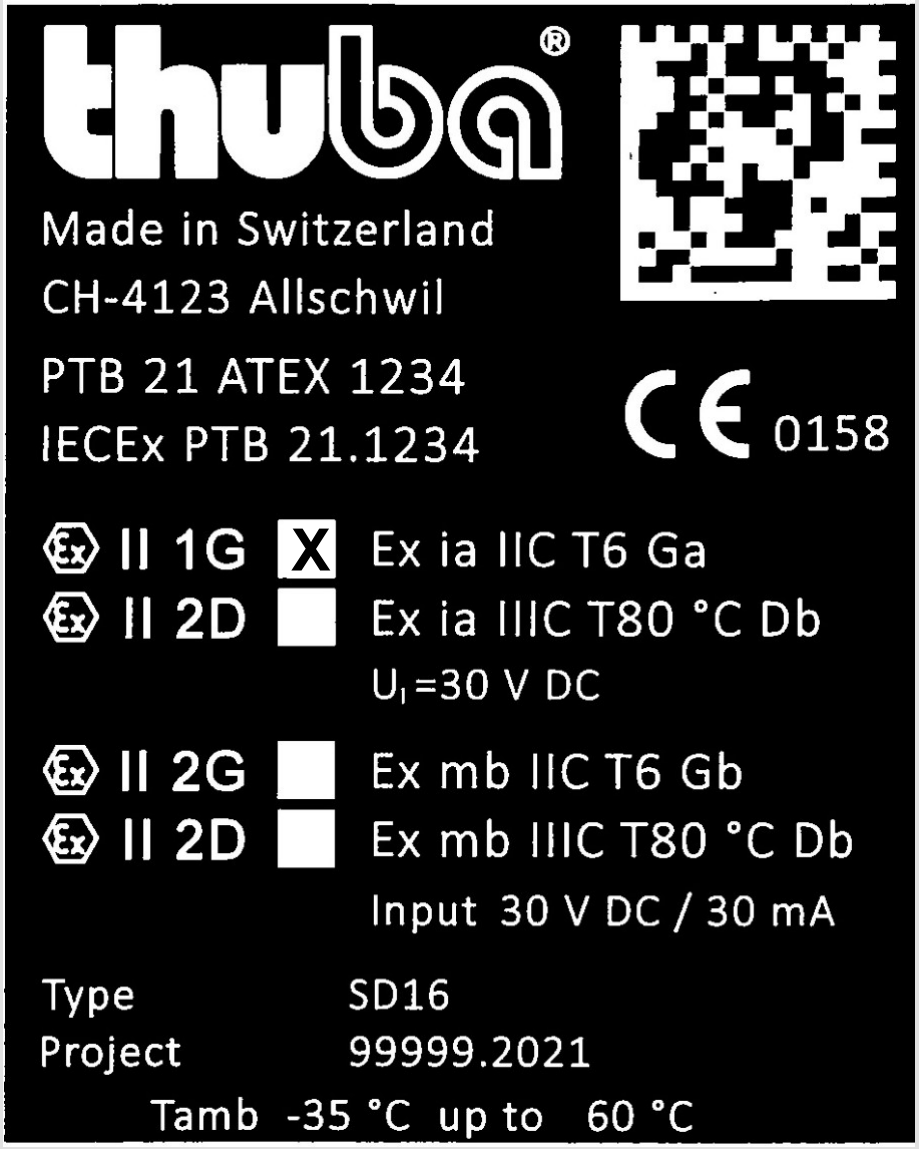
Electrical installations in potentially explosive atmospheres must ***additionally*** comply with the corresponding requirements for ***electrical installations in non-hazardous atmospheres.***

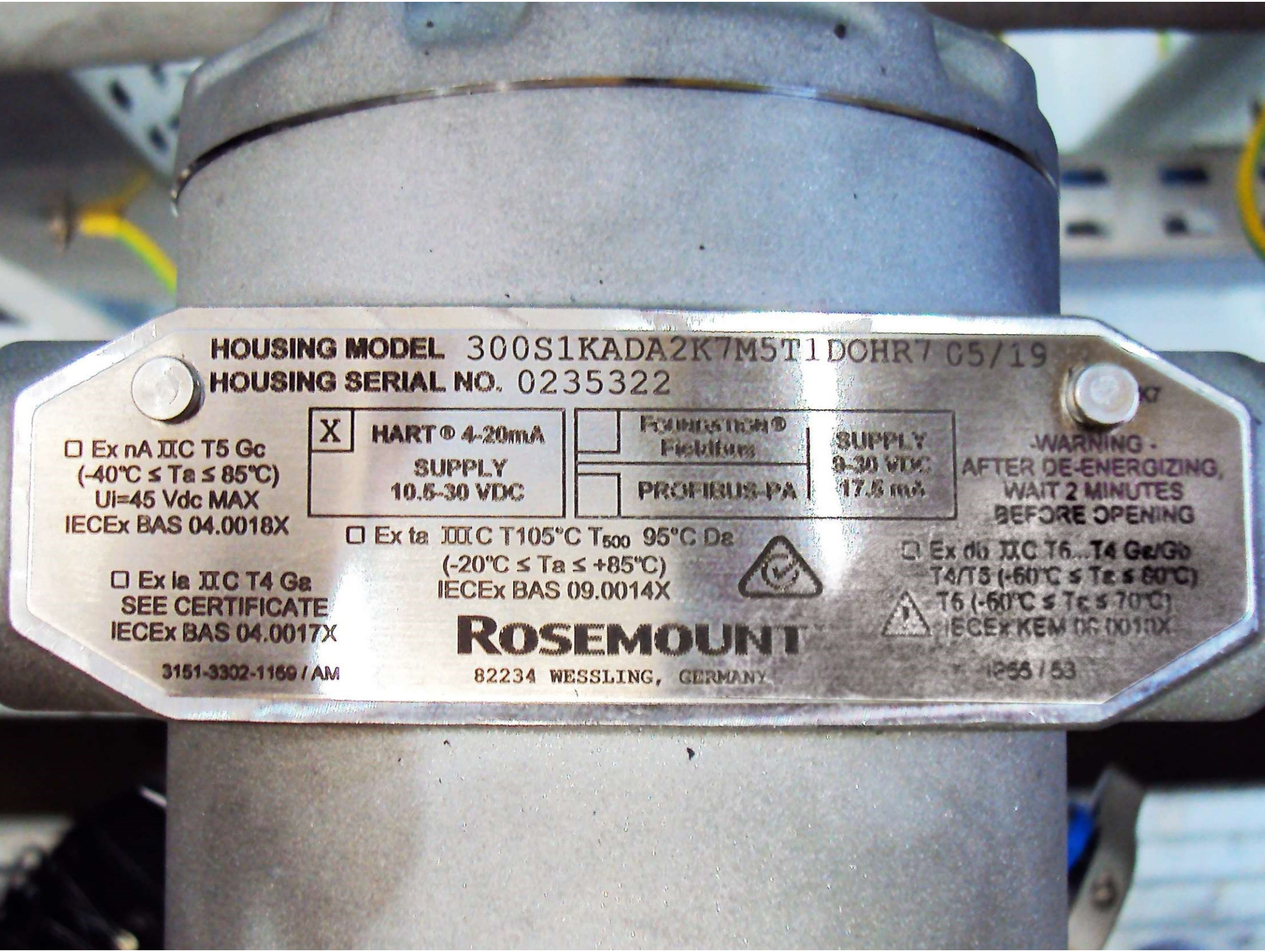
If additional protection is required to meet other environmental conditions, such as protection against water ingress and corrosion resistance, the method used shall not compromise the integrity of the Ex Equipment.

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




HOUSING MODEL 300S1KADA2K7M5T1DOHR7 05/19
HOUSING SERIAL NO. 0235322
X
HART® 4-20mA
SUPPLY
10.5-30 VDC
FOUNDATION® Fieldbus
PROFIBUS-PA
SUPPLY
9-30 VDC
17.5 mA
-WARNING -
AFTER DE-ENERGIZING,
WAIT 2 MINUTES
BEFORE OPENING
☐ Ex nA IIC T5 Gc
(-40°C ≤ Ta ≤ 85°C)
Ui=45 Vdc MAX
IECEx BAS 04.0018X
☐ Ex ta IIIC T105°C T500 95°C Da
(-20°C ≤ Ta ≤ +85°C)
IECEx BAS 09.0014X
☐ Ex ia IIC T4 Ga
SEE CERTIFICATE
IECEx BAS 04.0017X
☐ Ex da IIC T6...T4 Ga/Gb
T4/T3 (-60°C ≤ Ta ≤ 80°C)
T6 (-60°C ≤ Ta ≤ 70°C)
IECEx KEM 06.0010X
3151-3302-1169 / AM
ROSEMOUNT
82234 WESSLING, GERMANY

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 23.0016U**	Page 1 of 3	Certificate history:
Status:	**Current**	Issue No: 0	
Date of Issue:	2023-10-02		
Applicant:	**thuba Ltd.** Stockbrunnenrain 9 4123 Allschwil **Switzerland**		
Ex Component:	Empty enclosure type eCAM ** ** **		

This component 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:	**Increased safety "e"; Dust ignition "t"**
Marking:	Ex eb IIC Gb Ex tb IIIC Db


thuba
CH-4123 Allschwil Made in Switzerland
0158
II 2G
II 2D
BVS 23 ATEX E 026 U
IECEx BVS 23.0016U
Ex eb IIC Gb
Ex tb IIIC Db
Type eCAM 30 30 15
Project 14325.2024
Service Temp. -55 °C up to 100 °C

4.2.3 Use of Ex Components

Ex Equipment
IECEx BVS 21.0075X

Ex Component
IECEx PTB 19.0036U

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.

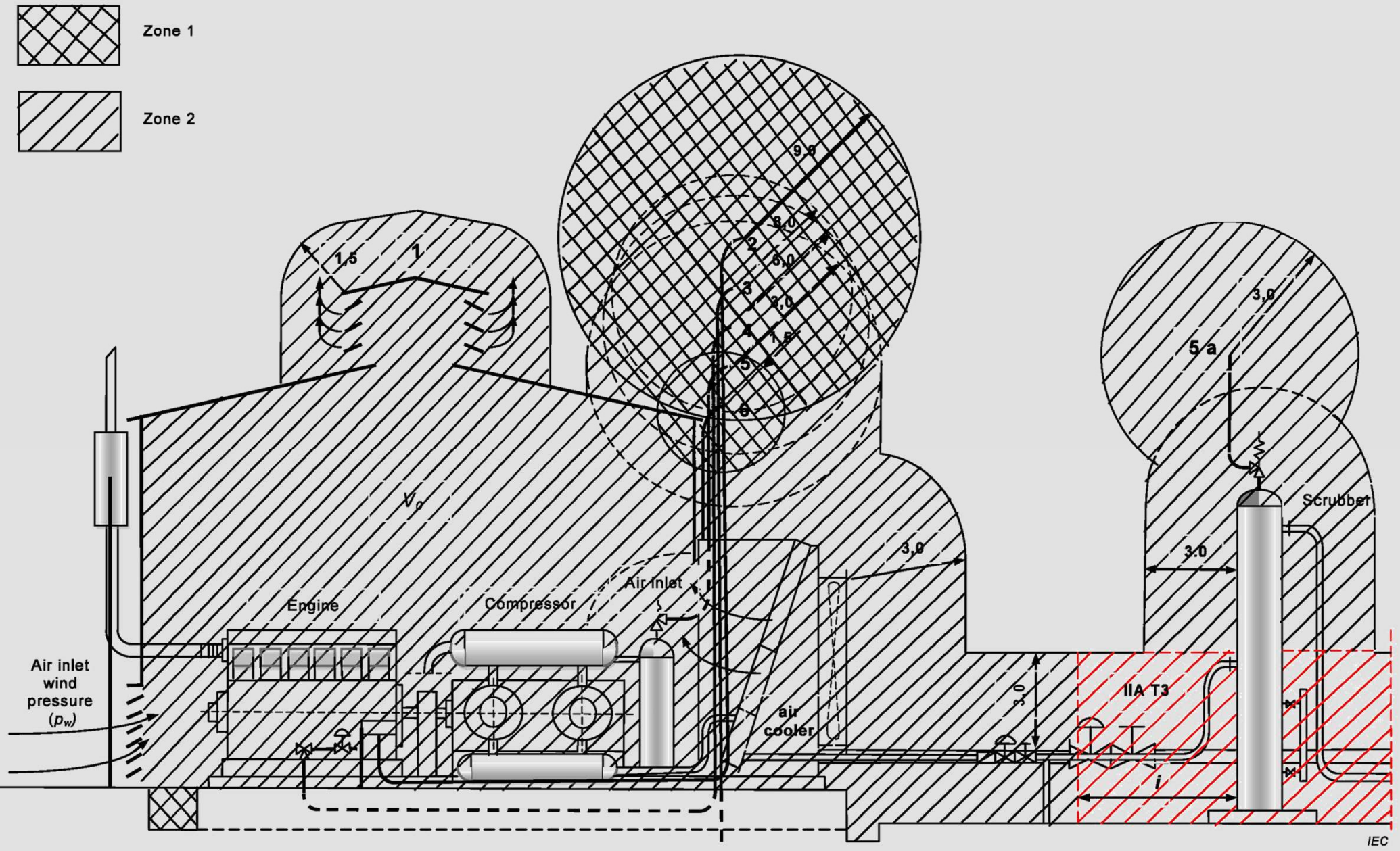
IEC 60079-10-1

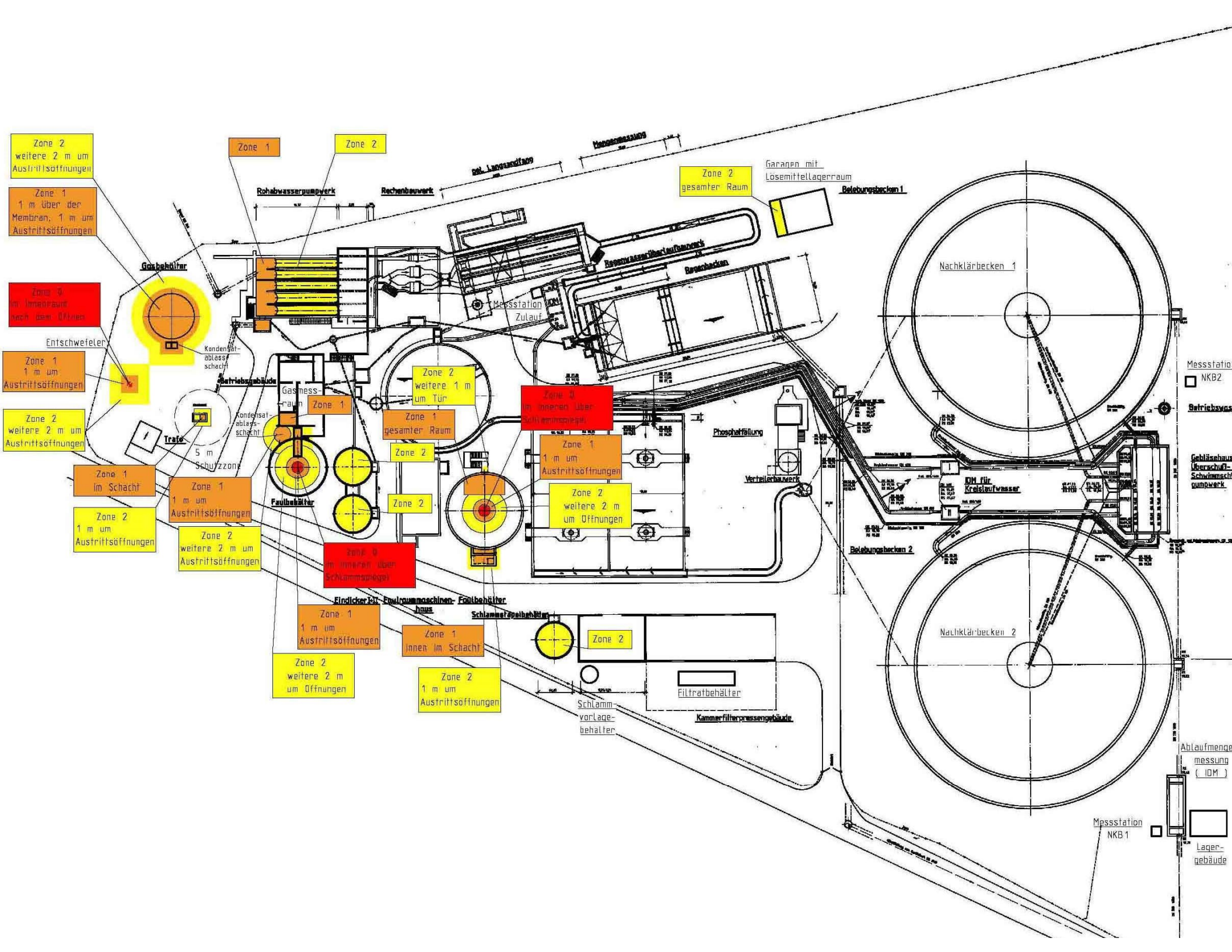
Edition 2.0 2015-09

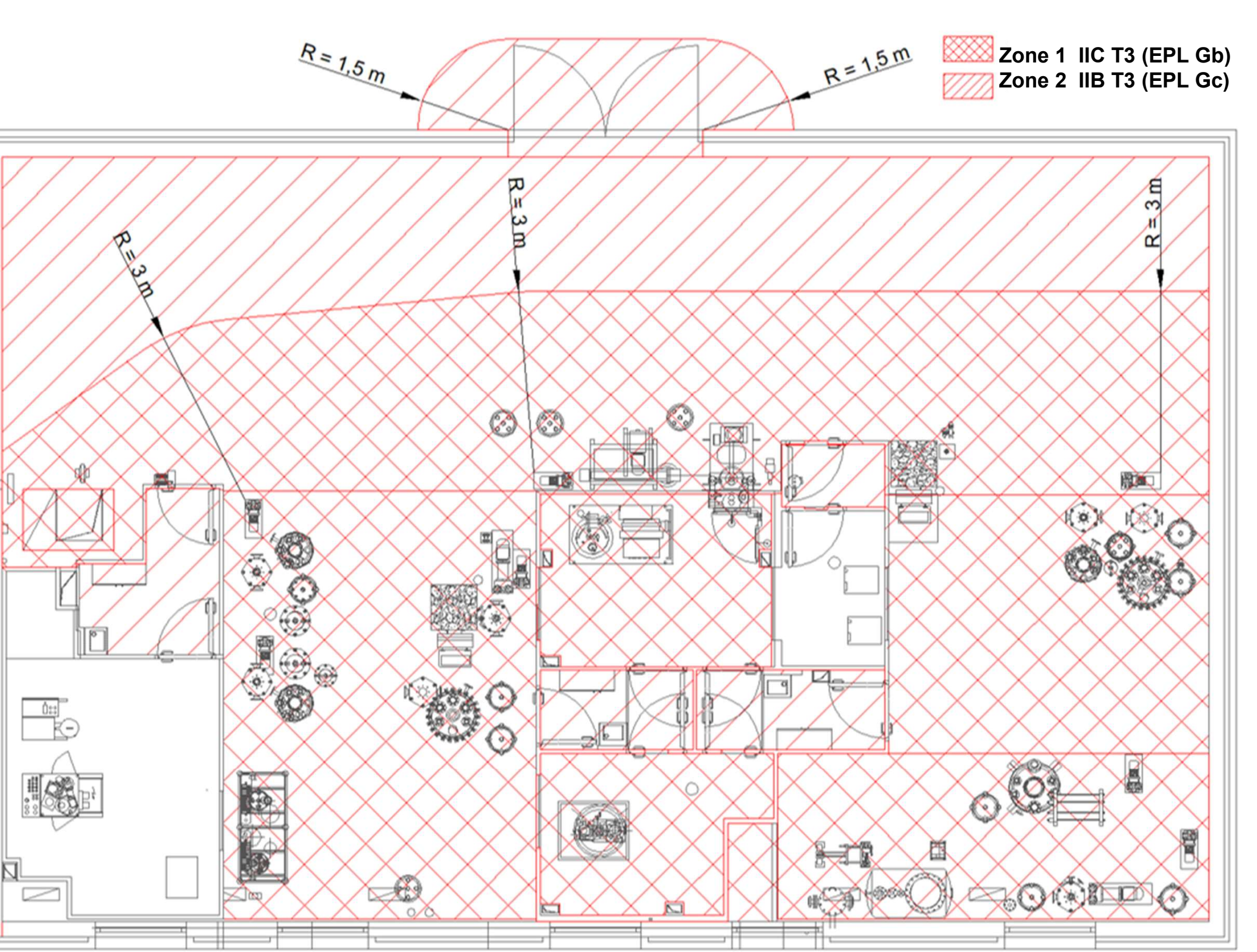
INTERNATIONAL STANDARD

Explosive atmospheres –
Part 10-1: Classification of areas – Explosive gas atmospheres

Area classification – Basic Example




Zone 2
weitere 2 m um
Austrittsöffnungen
Zone 1
1 m über der
Membran, 1 m um
Austrittsöffnungen
Zone 0
im Innenraum
nach dem Öffnen
Zone 1
1 m um
Austrittsöffnungen
Zone 2
weitere 2 m um
Austrittsöffnungen
Zone 1
im Schacht
Zone 2
1 m um
Austrittsöffnungen
Zone 1
1 m um
Austrittsöffnungen
Zone 2
weitere 2 m um
Austrittsöffnungen
Zone 1
Zone 2
Rohabwasserpumpwerk
Rechenbauwerk
Gasbehälter
Entschwefeler
Kondensat-
ablaß-
schacht
Betriebsgebäude
Gasmess-
raum
Zone 1
Trafo
5 m
Schutzzone
Kondensat-
ablass-
schacht
Faulbehälter
Zone 2
weitere 1 m
um Tür
Zone 1
gesamter Raum
Zone 2
Zone 2
Zone 0
im Inneren über
Schlammspiegel
Zone 1
1 m um
Austrittsöffnungen
Zone 2
weitere 2 m
um Öffnungen
Phosphatfällung
Verteilerbauwerk
Zone 0
im Inneren über
Schlammspiegel
Eindickerhaus
Faulraummaschinen-
haus
Faulbehälter
Schlammstapelbehälter
Zone 1
1 m um
Austrittsöffnungen
Zone 1
innen im Schacht
Zone 2
weitere 2 m
um Öffnungen
Zone 2
1 m um
Austrittsöffnungen
Zone 2
Filtratbehälter
Kammerfilterpressengebäude
Schlamm-
vorlage-
behälter
Zone 2
gesamter Raum
Garagen mit
Lösemittellagerraum
Belebungsbecken 1
Regenwasserüberlaufbauwerk
Regenbecken
Messstation
Zulauf
Nachklärbecken 1
IDM für
Kreislaufwasser
Belebungsbecken 2
Nachklärbecken 2
Messstation
NKB 1
Ablaufmenge
messung
(IDM)
Lager-
gebäude


R = 1,5 m
R = 1,5 m
R = 3 m
R = 3 m
R = 3 m
Zone 1 IIC T3 (EPL Gb)
Zone 2 IIB T3 (EPL Gc)

5.3 Documentation – Ex Equipment

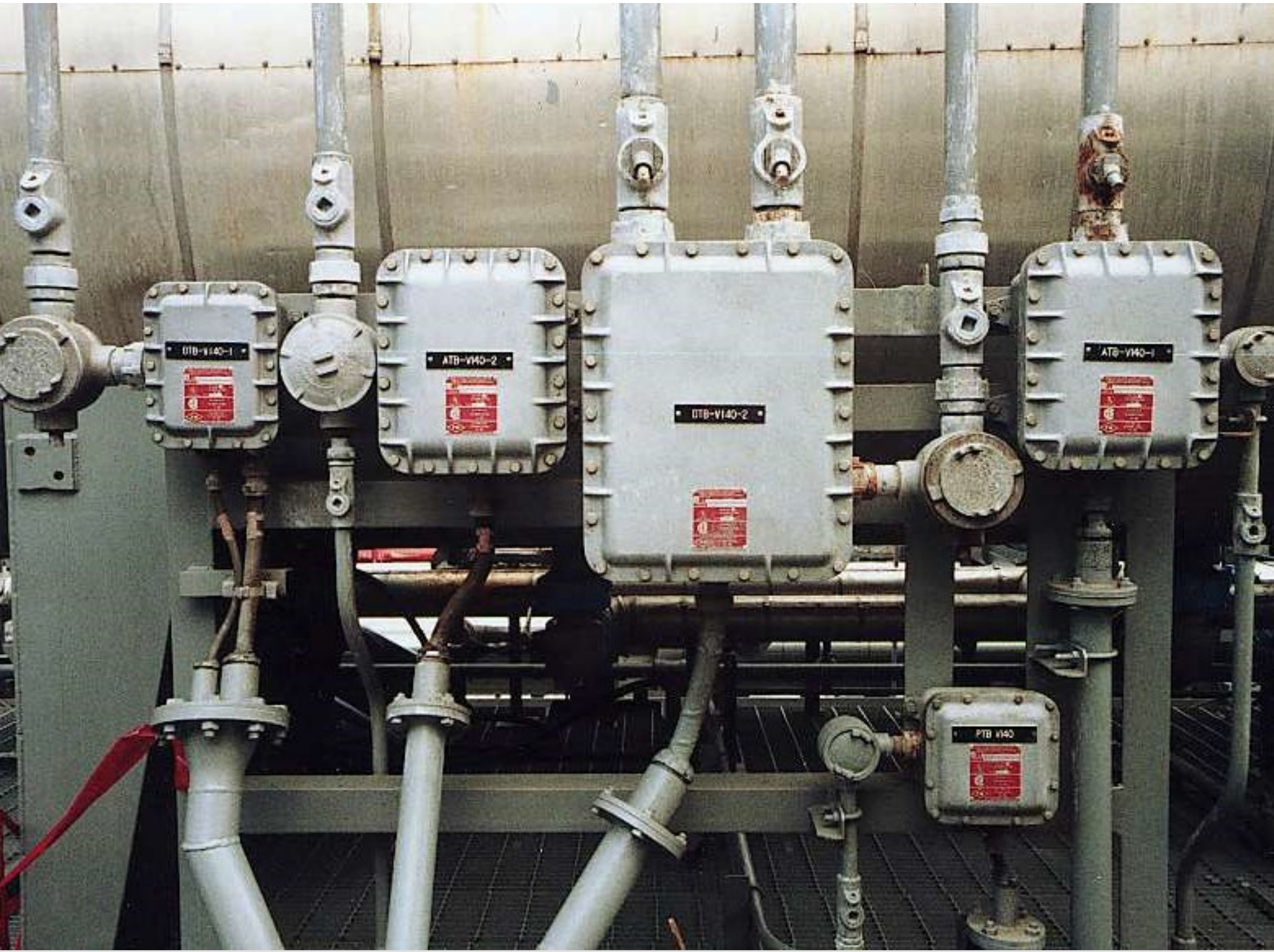
- Operating instructions of the Ex Equipment manufacturers with information on the intended use, for installation and initial testing, for maintenance and repair, if applicable
- Documents for Ex Equipment with **Specific Conditions of Use**
- Descriptive system documents for intrinsically safe systems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


DTB-VI40-1
ATB-VI40-2
DTB-VI40-2
ATB-VI40-1
PTB VI40

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.

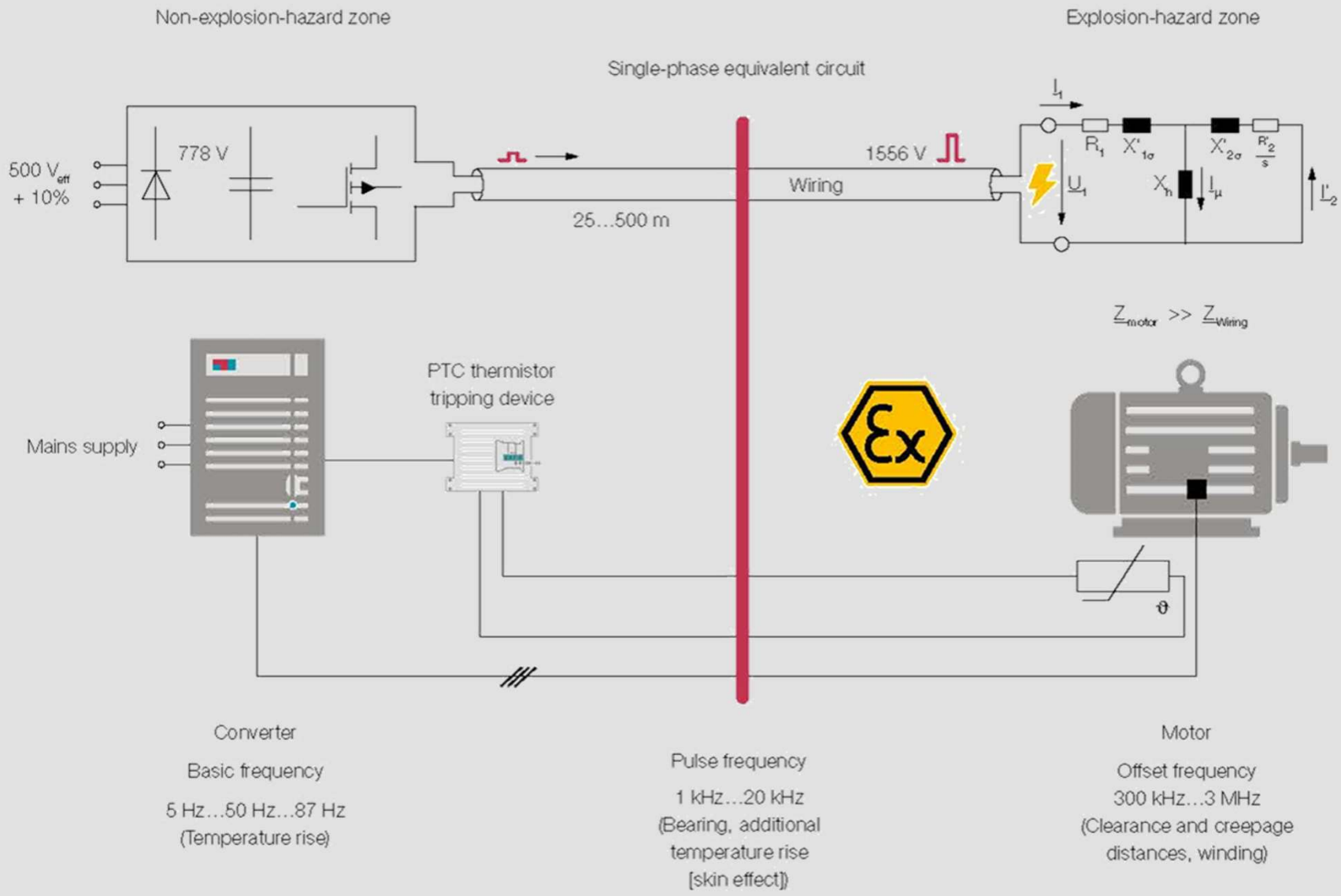
The connections must meet the following requirements:

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

6.7.3.4 Electrical machines with converter supply (1)

When using converter 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 converter supply (2)



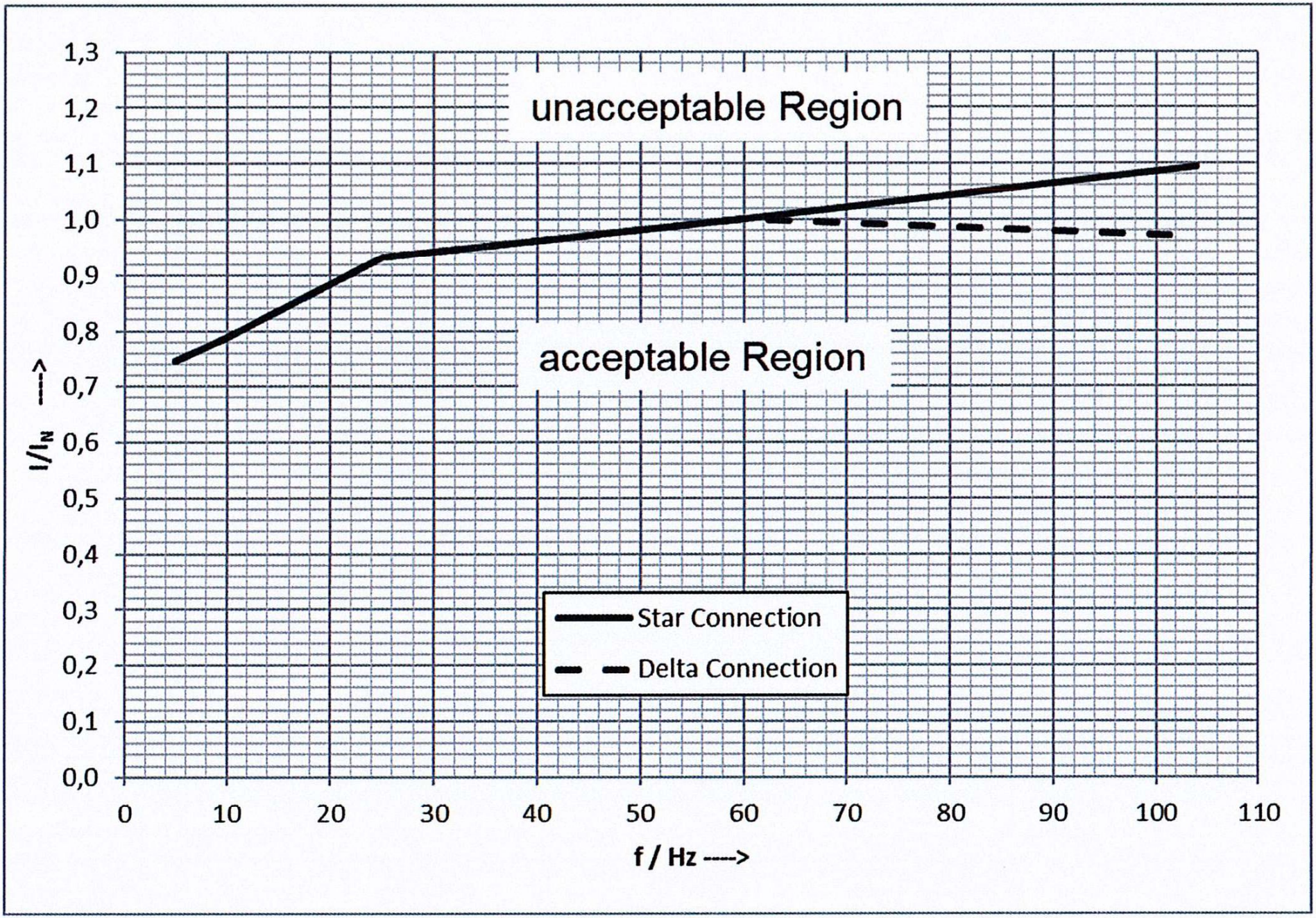
6.7.3.4 Electrical machines with converter supply (3)

Electric machines with an converter supply require either:

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

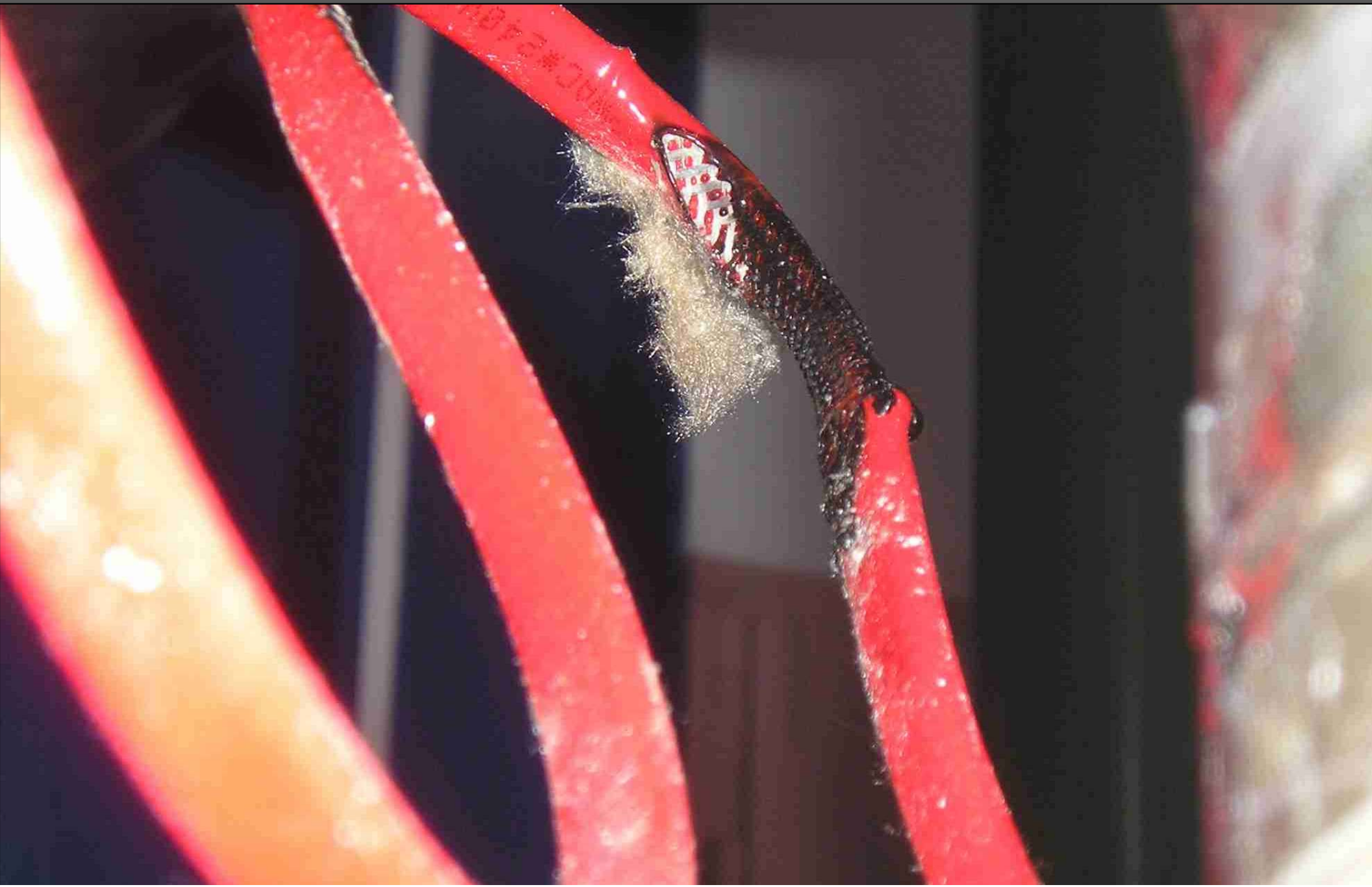
6.7.3.4 Electrical machines with converter supply (4)

b. Electrical machines that have been tested for converter operation, but where the type and manufacturer of the converter is not specified. In this case, the characteristics of the selected converter, the maximum converter input voltage and the converter settings must match the specifications of the electrical machine manufacturer.



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.

b) For an IT type system, a suitable insulation monitoring device (IMD) in accordance with IEC 61557-8 shall be used.

6.8.4 Limiting the surface temperature

This must be secured by one of the following means:

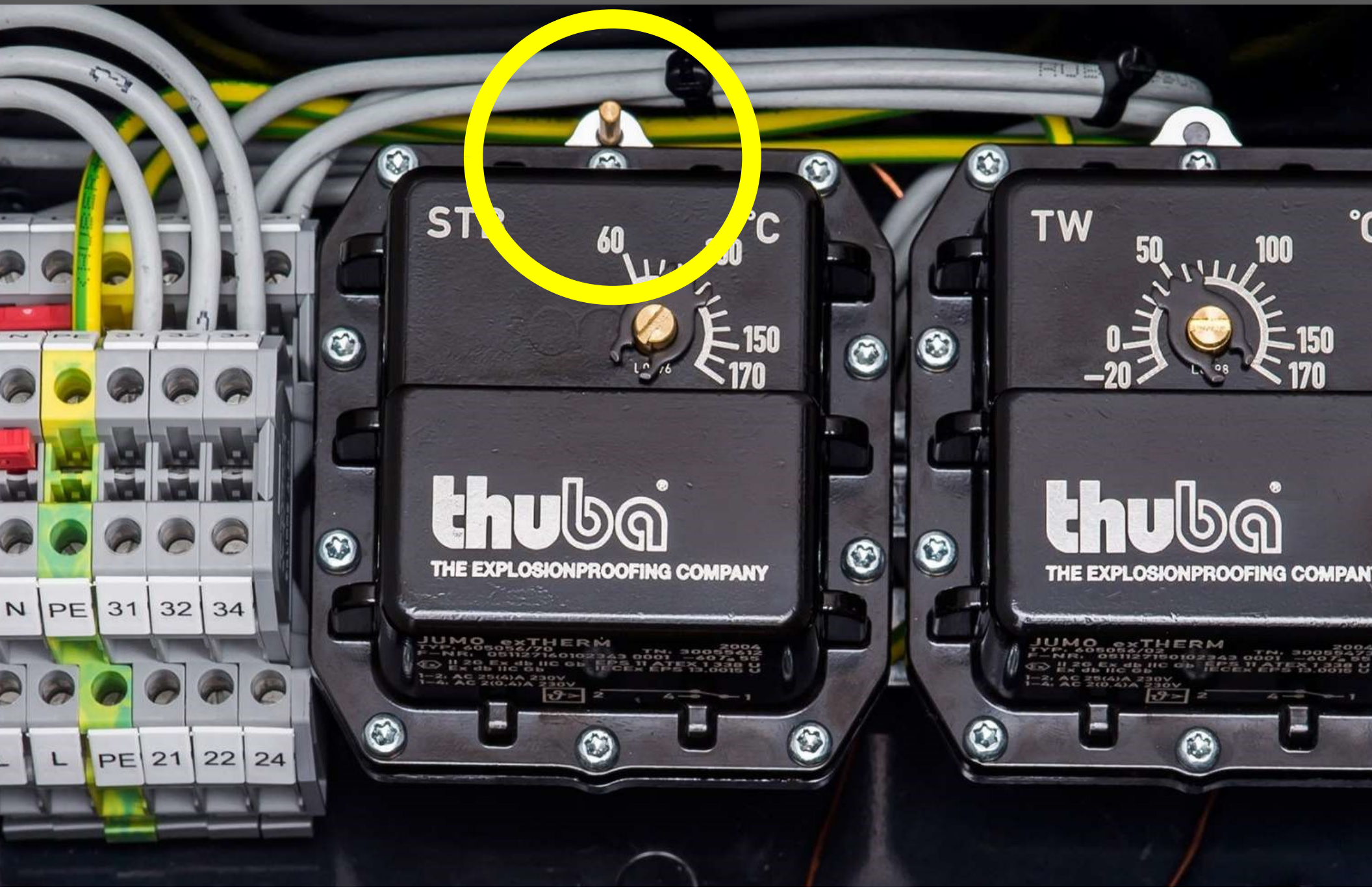
a) Stabilised operation:

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

   2. a stabilised design of a heating system with low power output.

b) Controlled operation:
   with a temperature controller and a safety temperature limiter.

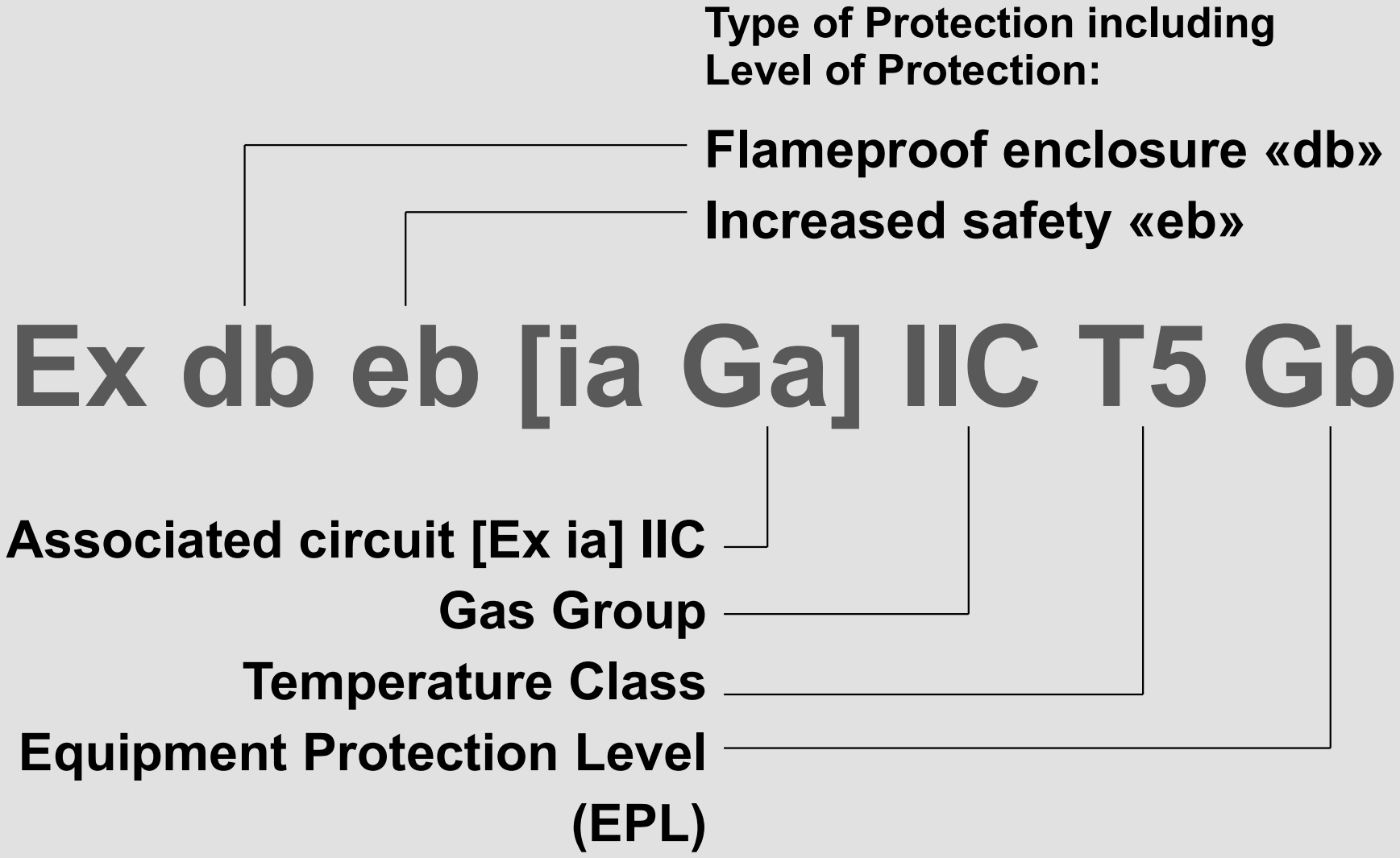
6.8.4 Limiting the surface temperature



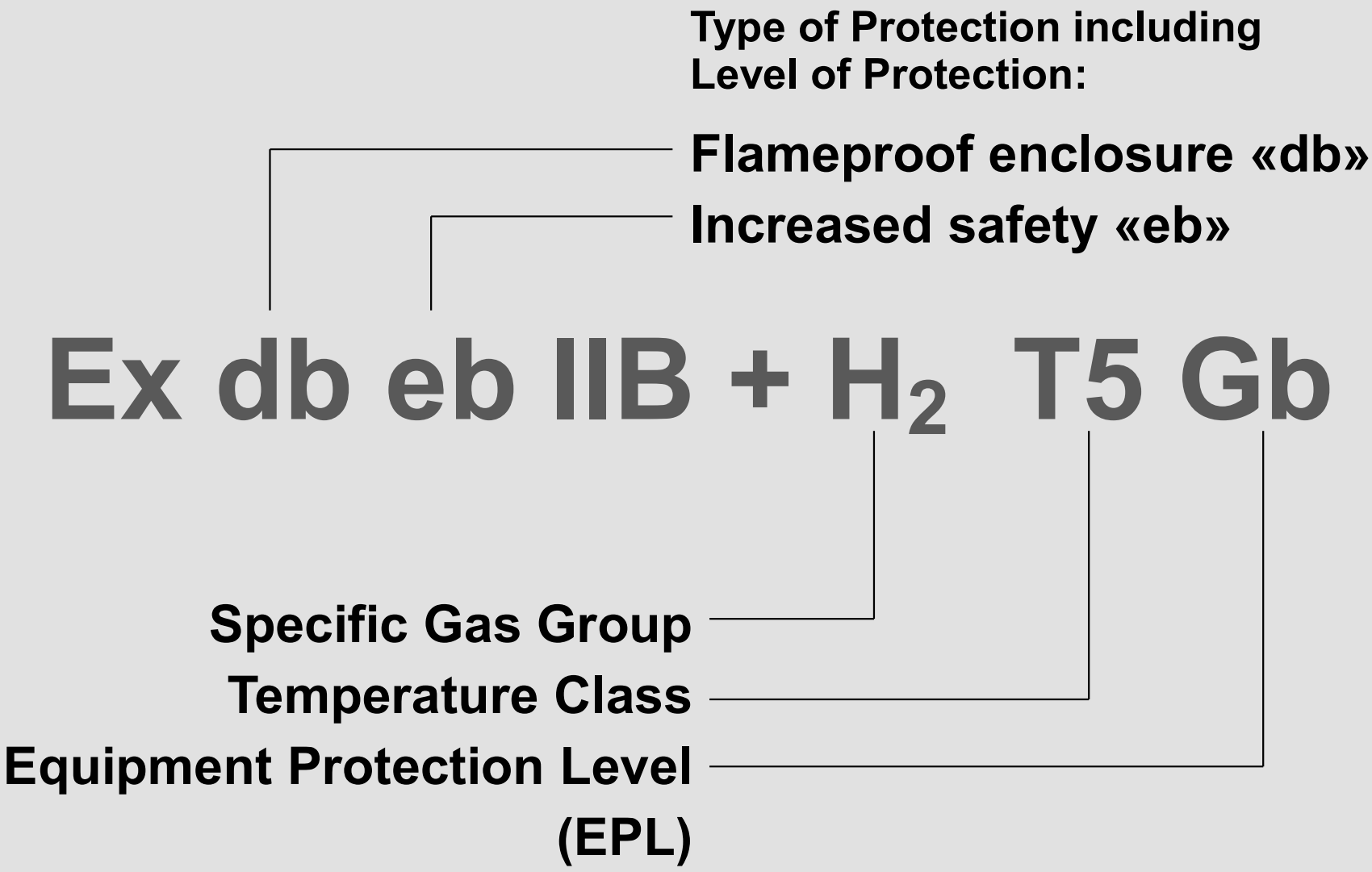
6.12 Flameproof enclosures “d”

Ex Equipment marked “IIB + H_2” and used in a hydrogen atmosphere shall be installed as Ex Equipment of Group IIC.

Marking (IEC 60079-0:2017)



Marking (IEC 60079-0:2017)



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

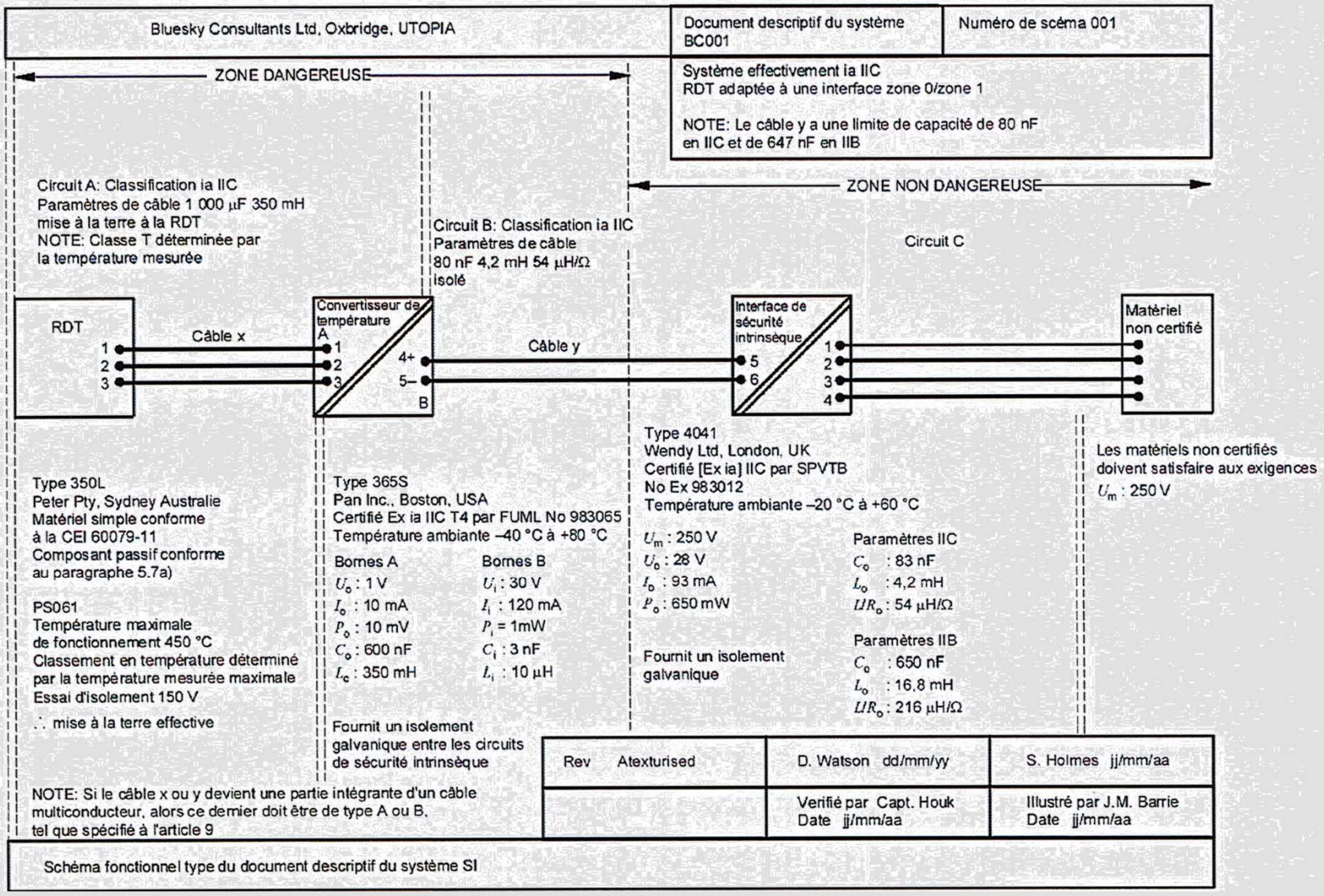
6.14.3.2 Descriptive system document

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

The form of the required system description is not specified in the standard and could be covered, 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.

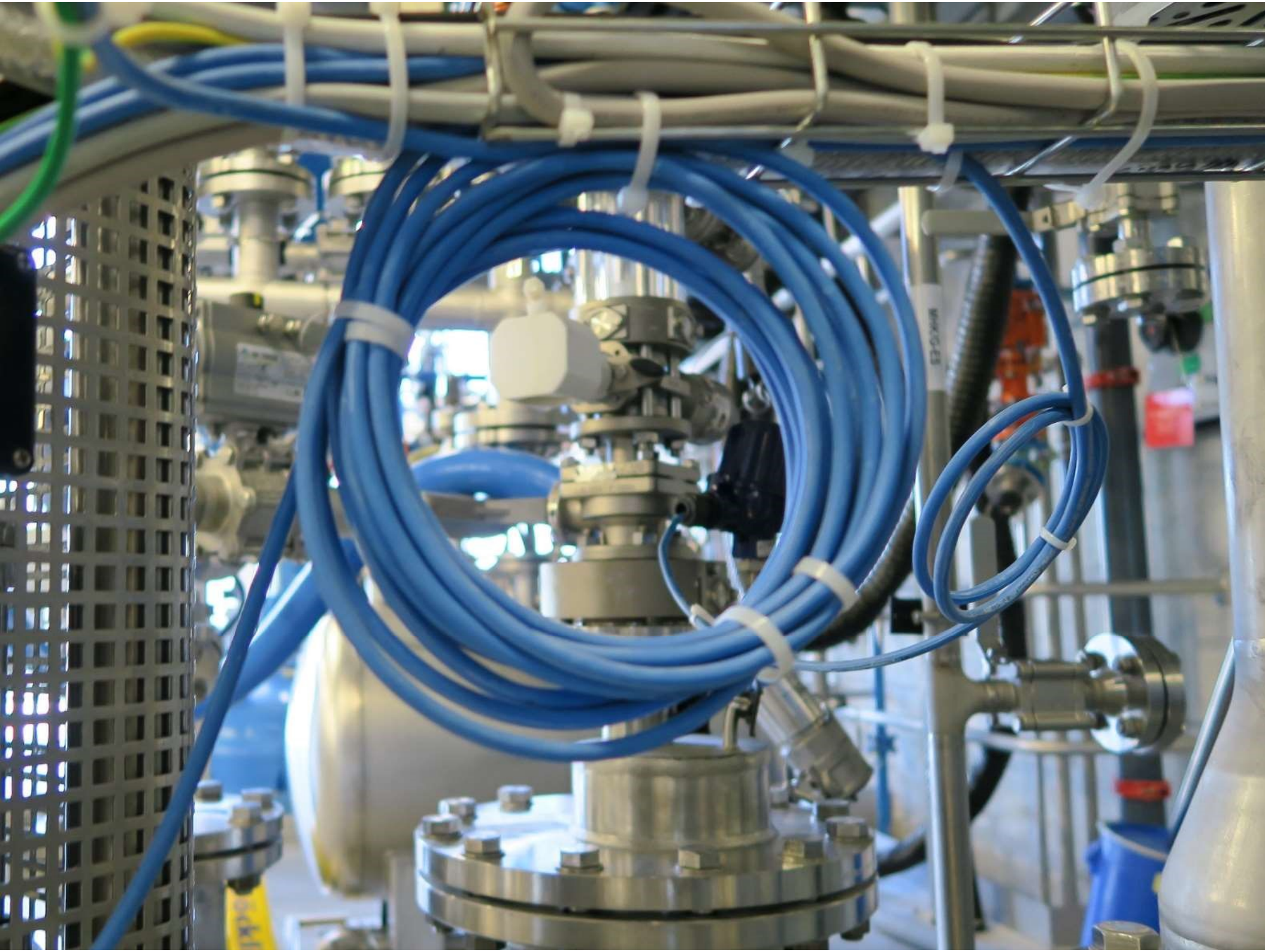
Remark:

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 Equipment;
- 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	Code	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
	Pressurization	p, pxb, pyb	IEC 60079-2
	Powder filling	q	IEC 60079-5
	Liquid immersion	o, ob	IEC 60079-6
	Increased safety	e, eb	IEC 60079-7

7.3.8 Selection according to the equipment group

Required gas/steam or dust subdivision	Permitted Equipment Group
IIA	II, IIA, IIB or IIC
IIB	II, IIB or IIC
IIC	II, IIC

Class I, Division 1 and 2

Group	Gas
A	Acetylen
B	Hydrogen
C	Ethylene
D	Propane

Gas group

NEC 500-503			NEC 505 IEC 60079-0
Class I Gas and vapours	Acetylene	Group A	Group IIC
	Hydrogen	Group B	Group IIC
	Ethylene	Group C	Group IIB
	Propane	Group D	Group IIA

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

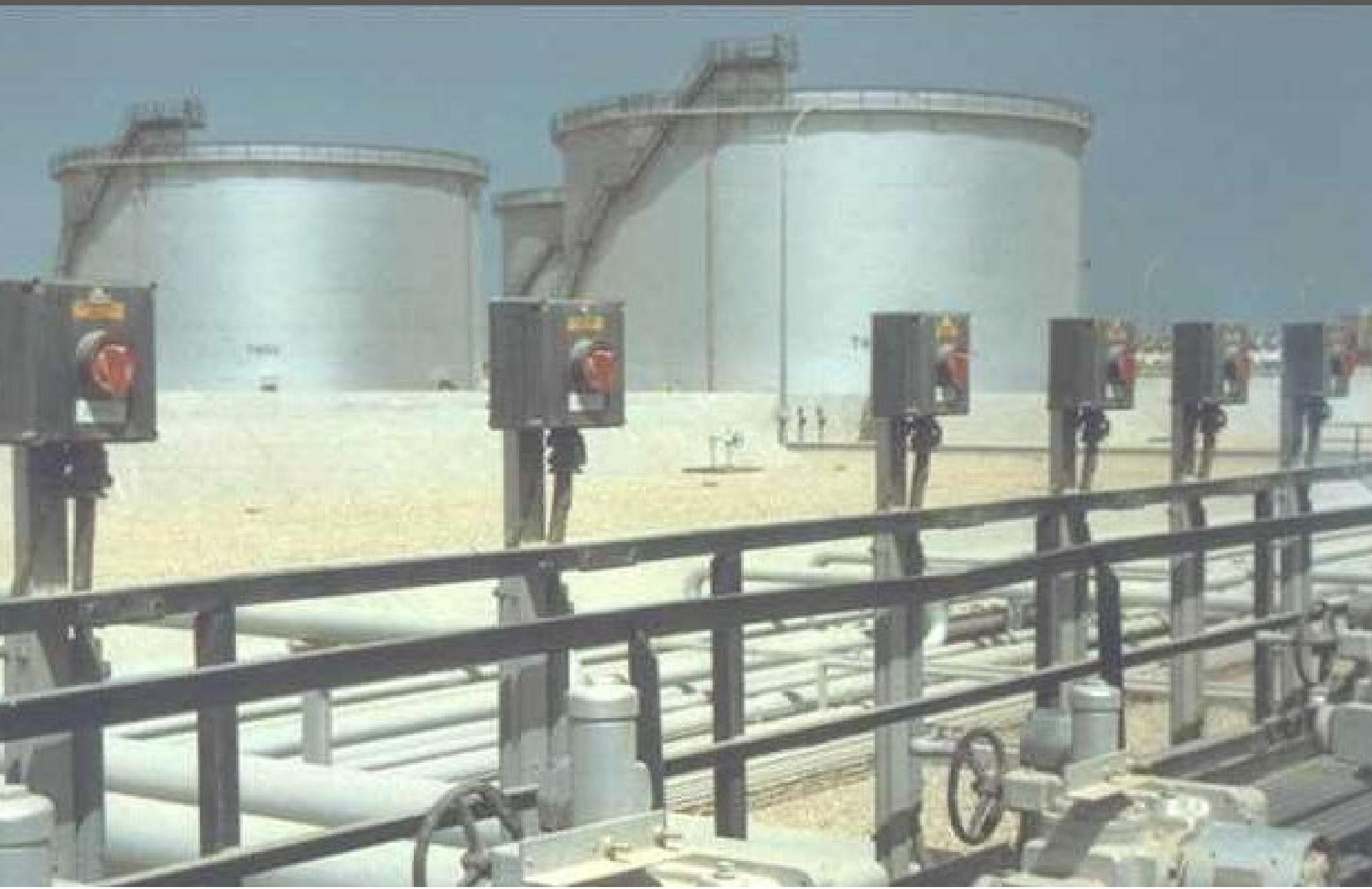
If no **ambient temperature range is** specified in the marking of the electrical appliance, then the appliance is **only intended** for use in the temperature range from
–20 °C to 40 °C.

Example
extended ambient temperature range T_{amb}

$-30\ °C \leq T_{amb} \leq 65\ °C$

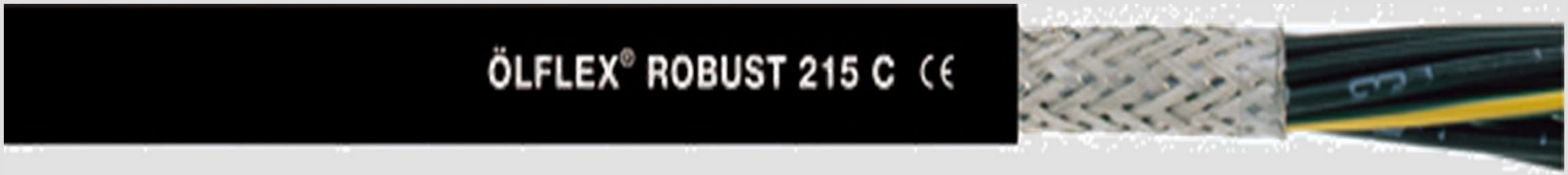
Note
IEC 60079-0 Edition 8 requires a marking for the ambient temperature for all ranges including –20 °C to 40 °C!

7.3.10 Selection according to ambient temperature range



7.4 Selection of 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 Selection of 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 degree of protection (IP Code) of the Ex Equipment; or
- non-circular (flat) cables selected together with the specific cable entry to maintain the degree of protection (IP Code) of the Ex Equipment.

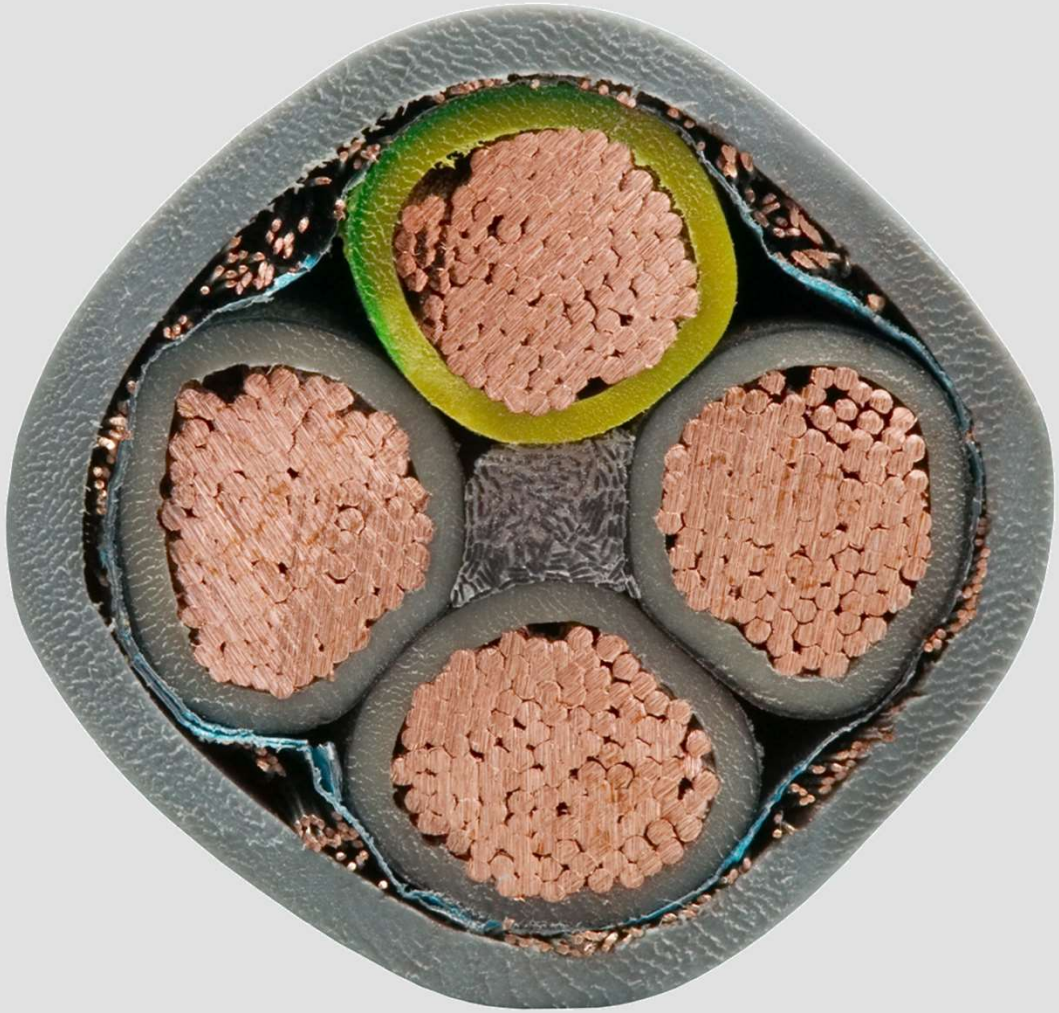
7.4 Selection of cables

7.4 Selection of 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, barrier glands, which seal around the individual conductors.

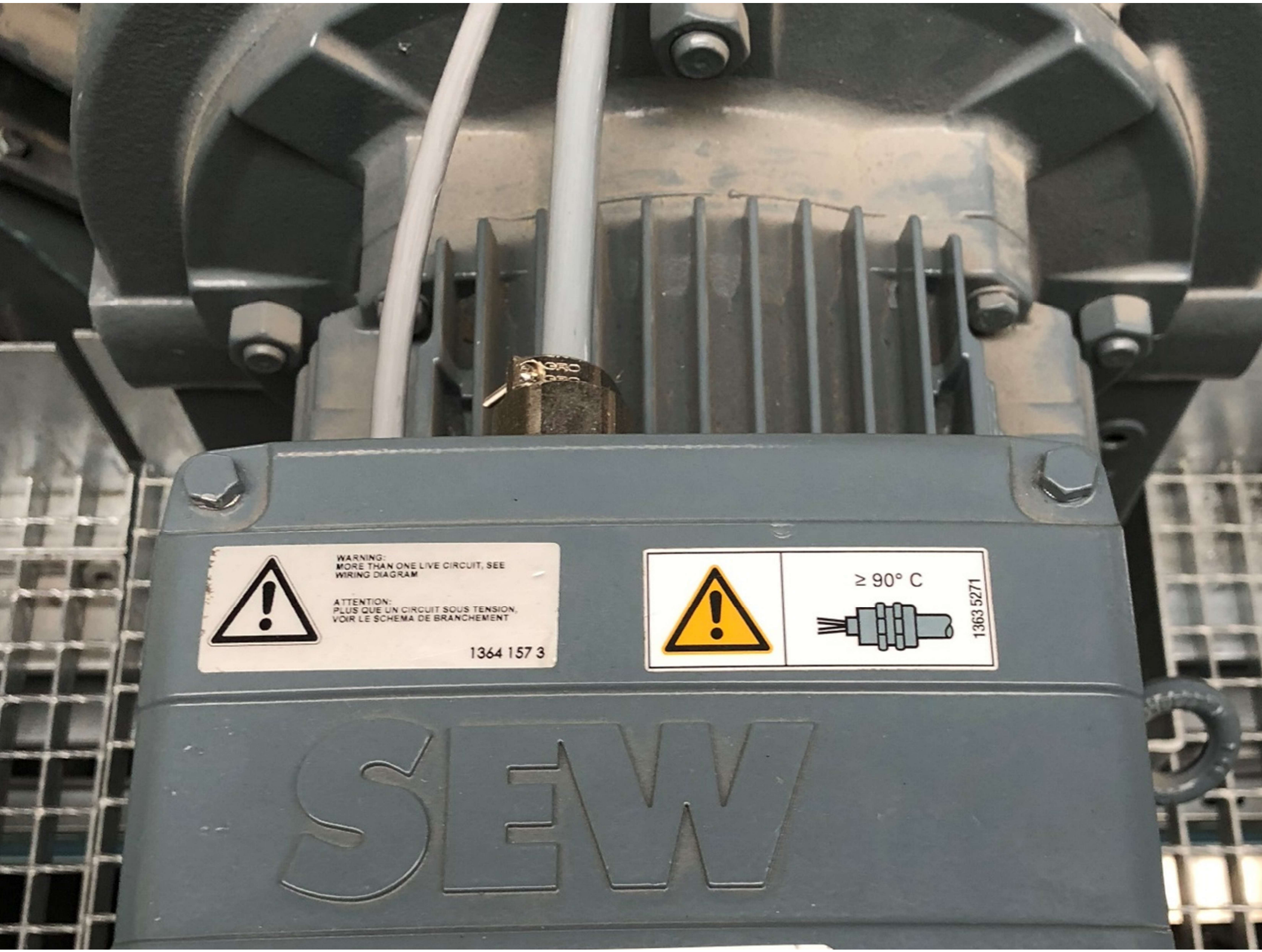
7.4 Selection of cables



7.5.1 Selection of entry devices and other fittings

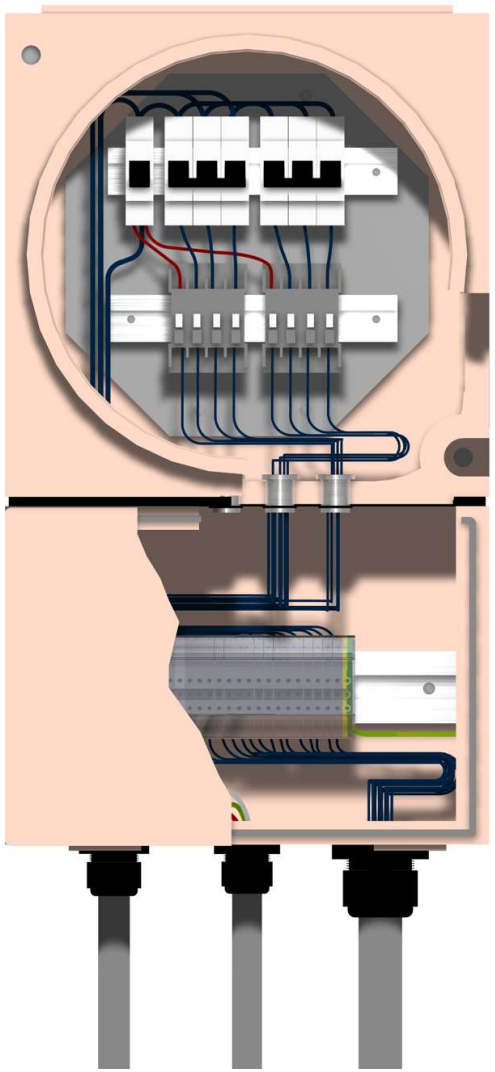
Extract from Table 15

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

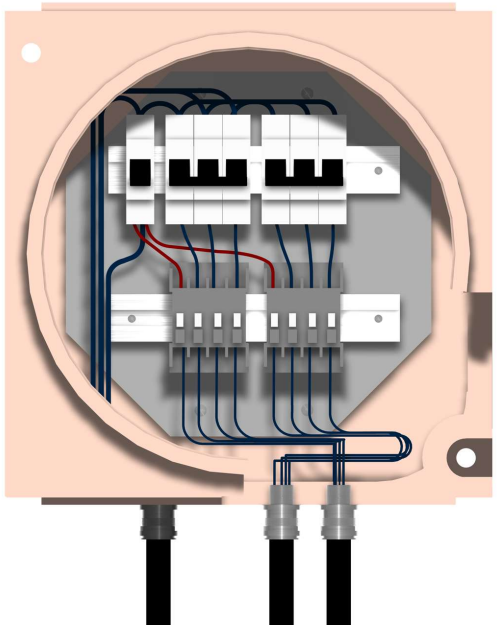

WARNING:
MORE THAN ONE LIVE CIRCUIT, SEE
WIRING DIAGRAM
ATTENTION:
PLUS QUE UN CIRCUIT SOUS TENSION,
VOIR LE SCHEMA DE BRANCHEMENT
1364 157 3
≥ 90° C
1363 5271
SEW

7.5.2 Adapters and blanking elements

7.5.6 Cable entries for Type of Protection “d”



Indirect

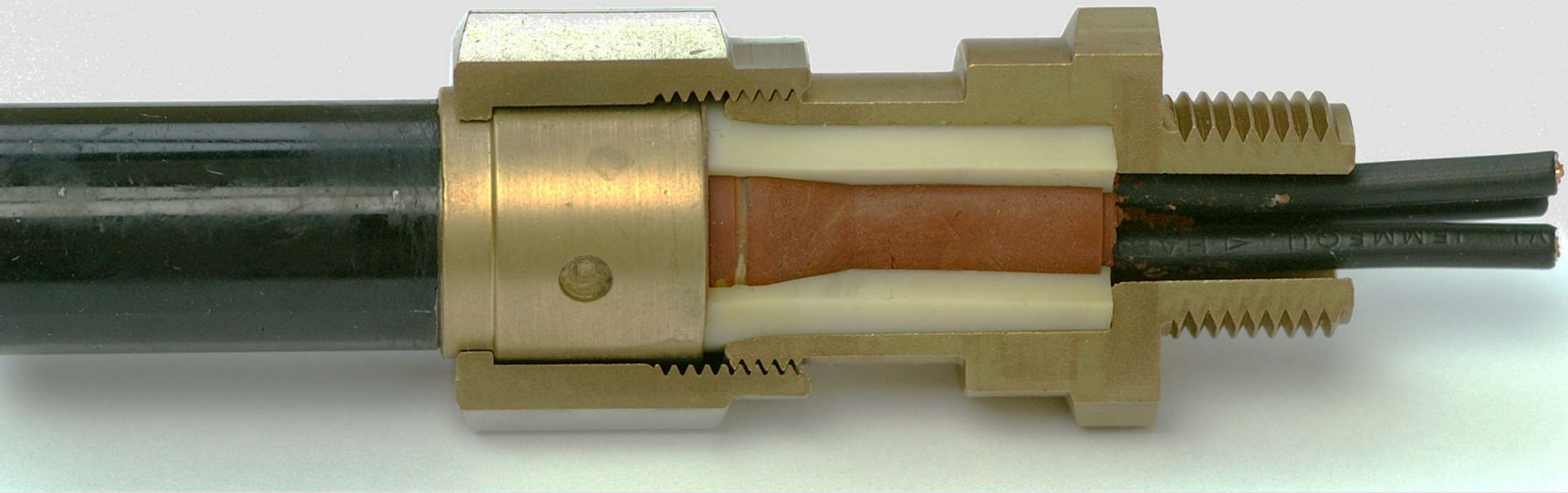


Direct

7.5.6 Cable entries for Type of Protection “d”

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

a. Barrier glands in accordance with IEC 60079-1 and certified as equipment; or

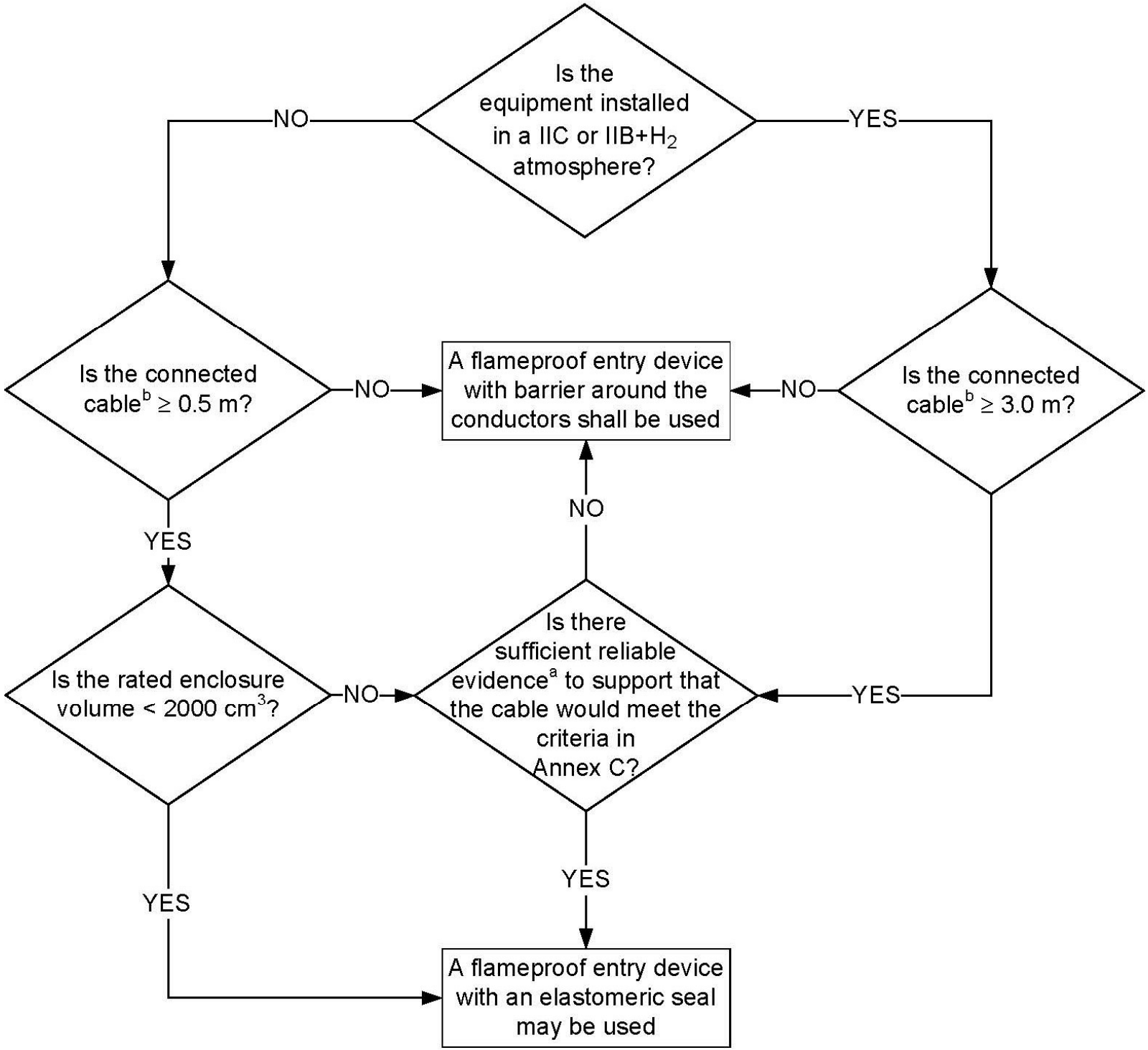


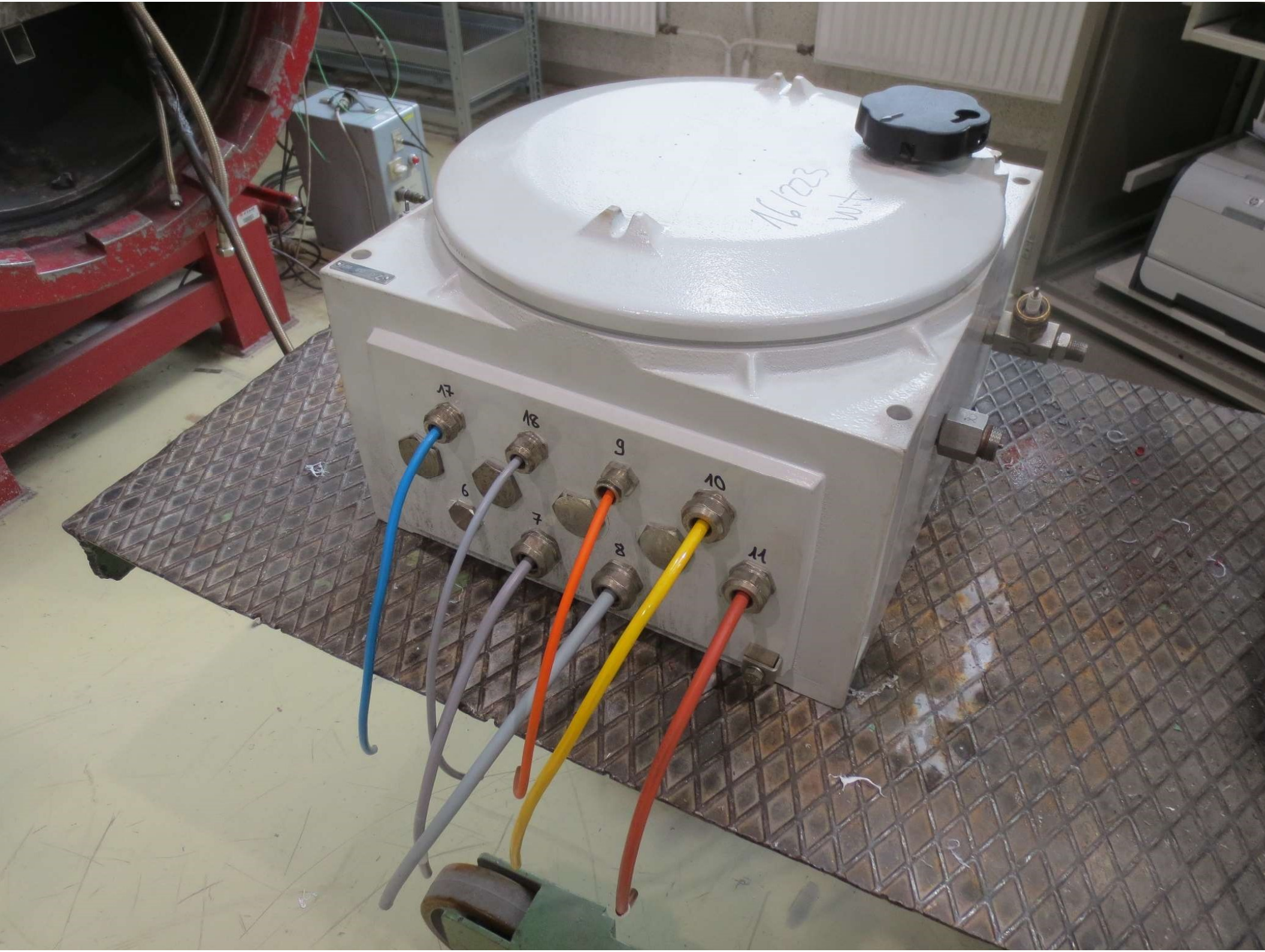

FLOWSERVE
APEX 8000

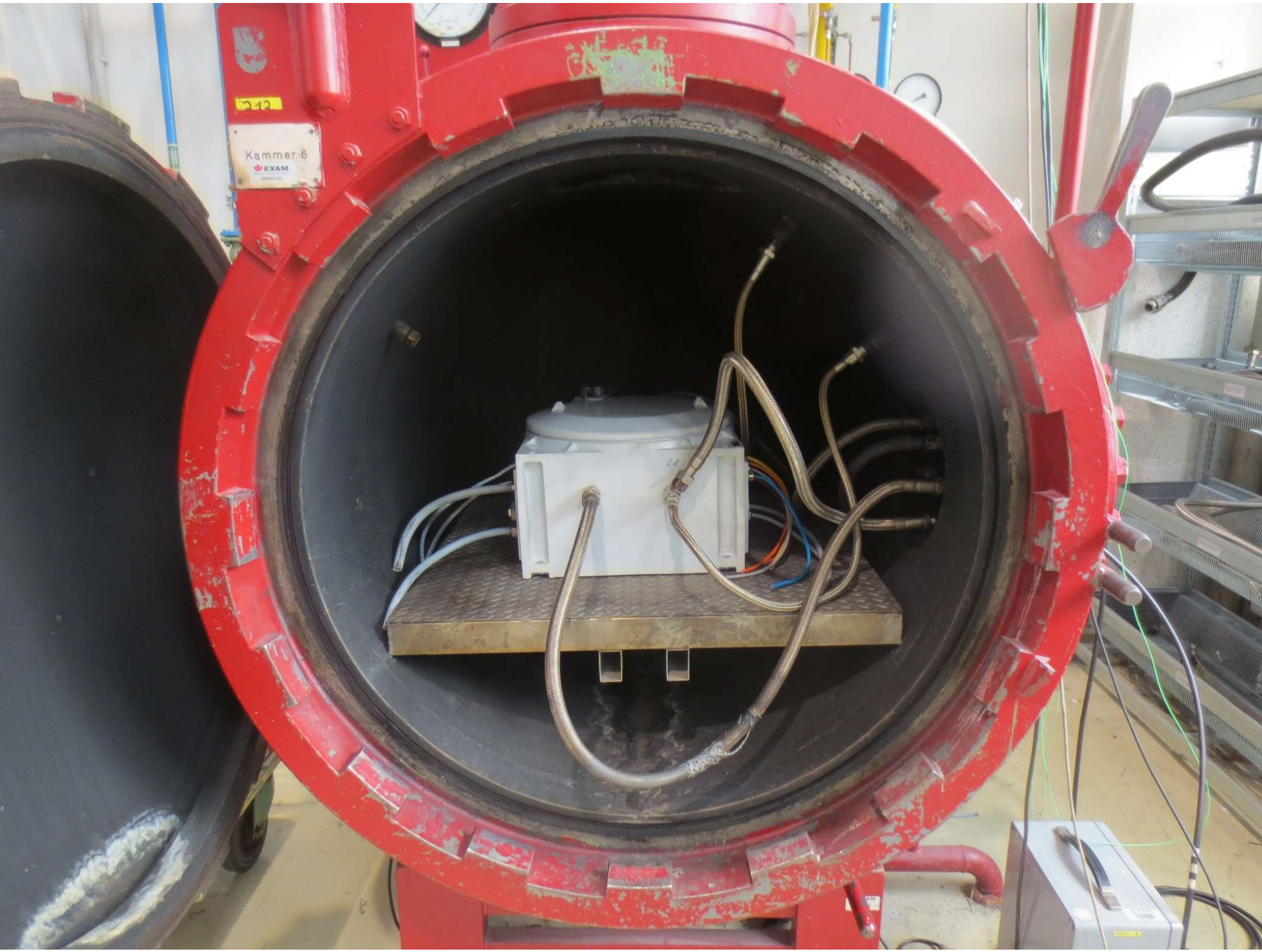
7.5.6 Cable entries for Type of Protection “d”

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.


Is the equipment installed in a IIC or IIB+H_2 atmosphere?
NO
YES
Is the connected cable[b] ≥ 0.5 m?
NO
A flameproof entry device with barrier around the conductors shall be used
NO
Is the connected cable[b] ≥ 3.0 m?
YES
NO
YES
Is the rated enclosure volume < 2000 cm^3?
NO
Is there sufficient reliable evidence[a] to support that the cable would meet the criteria in Annex C?
YES
YES
YES
A flameproof entry device with an elastomeric seal may be used


17
18
9
6
10
7
8
11


Kammer 6
EXAM

IEC SC 31J SD 001

Edition 1.0 2022-03

Background to flameproof cable gland requirements in IEC 60079-14

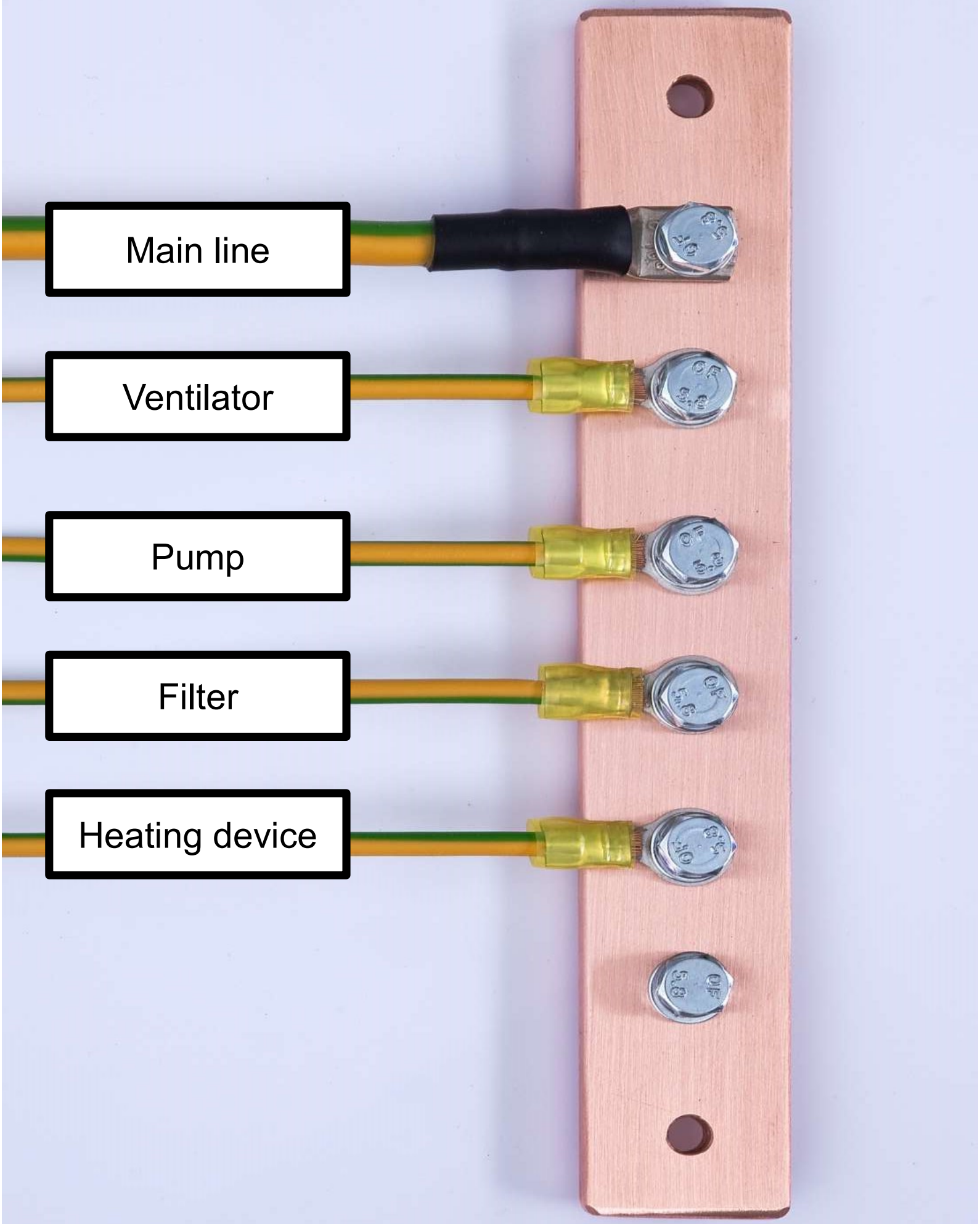
8. Installation of the equipment

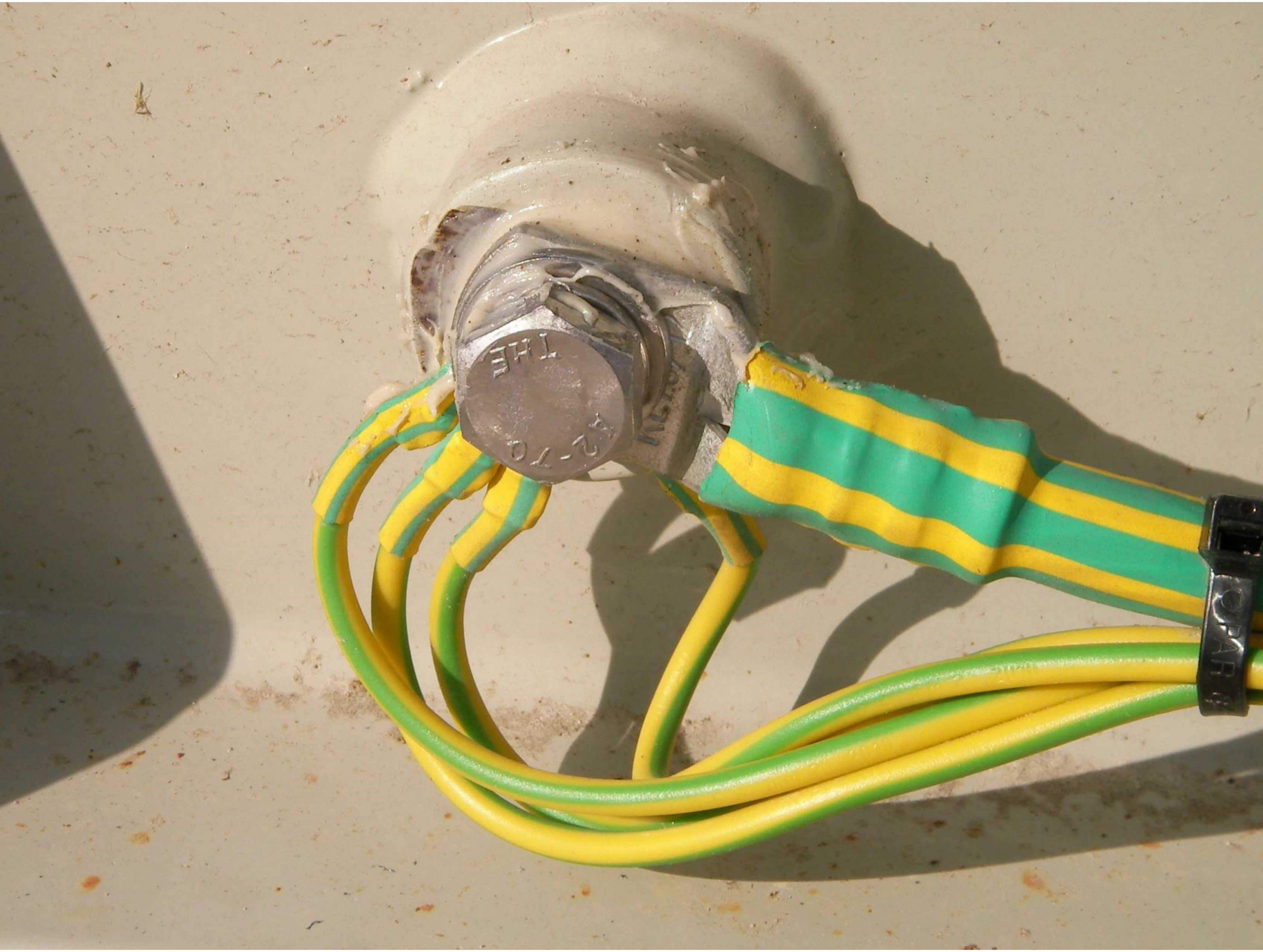
8.2 Cable and wiring systems (1)

8.2.2 Equipotential bonding connections

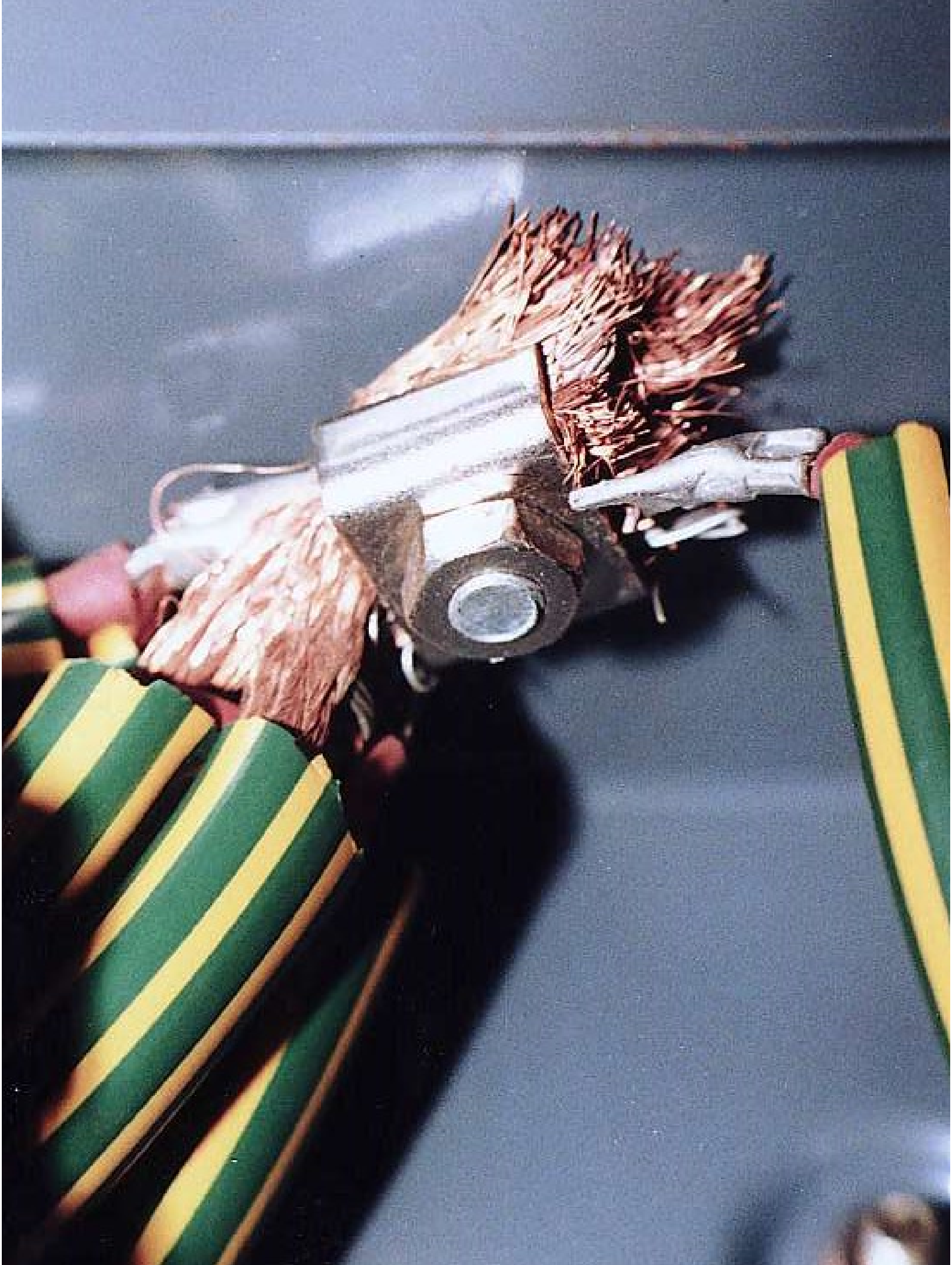
The equipotential bonding connections should be arranged in such a way that the removal of a single connection does not lead to the loss of equipotential bonding of other parts.

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
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



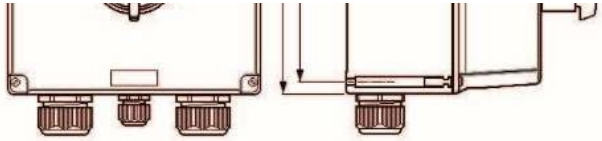
8.2 Cable and wiring systems (2)

8.2.3 Terminations

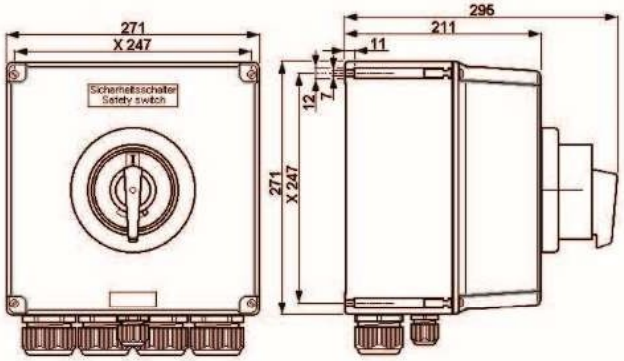
8.2.3.1 General

Connections must be made in accordance with the terminal type, degree of protection (IP Code) 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

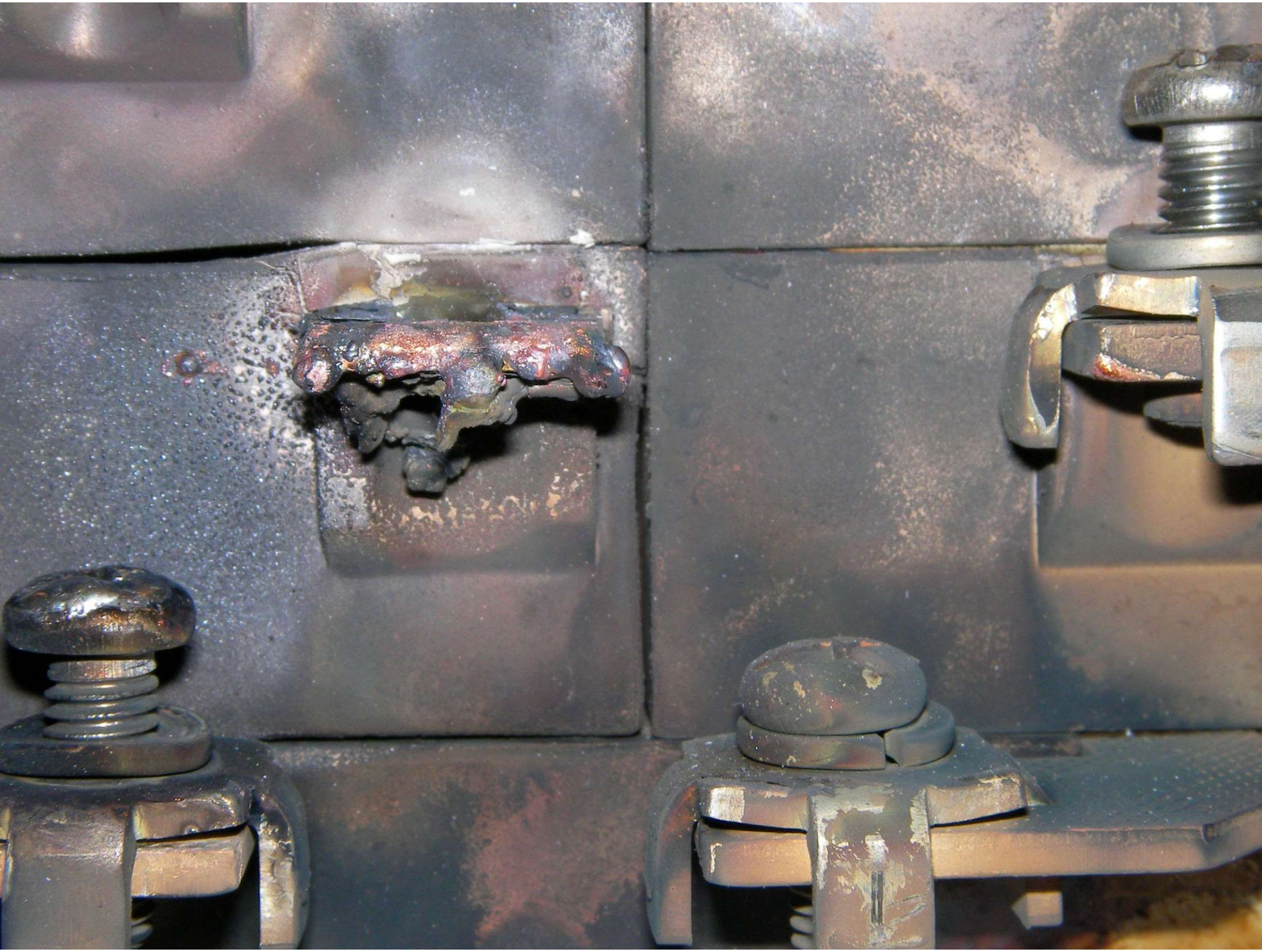


GHG 264 .., 80 A 6-pole

			Ex tb IIIC T80 °C Db		
Rated voltage:			690 V, 50/60 Hz		
Rated current:			80 A		
			up to U_N 400 V	up to U_N 500 V	up to U_N 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	

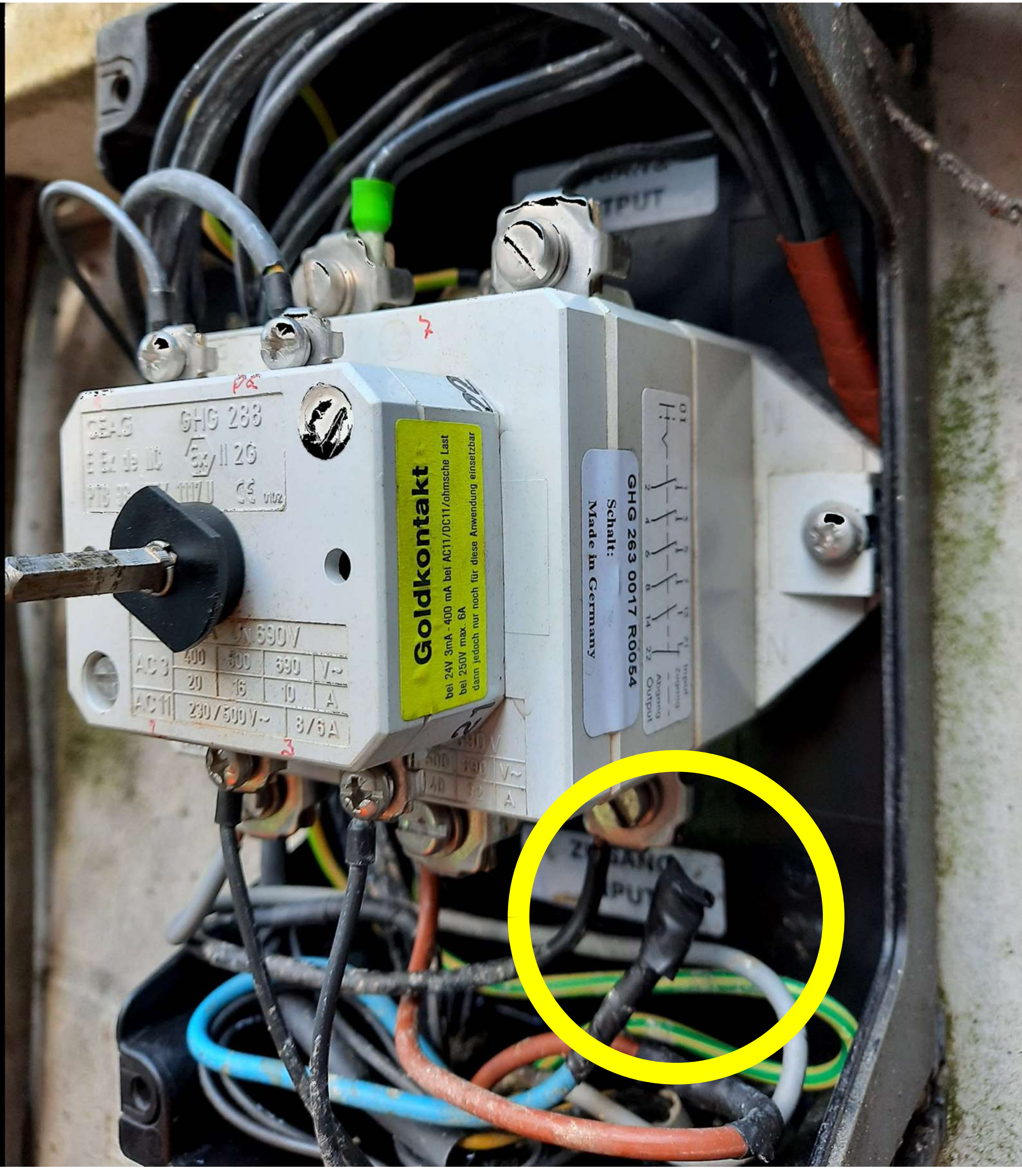


8.2 Cable and wiring systems (4)

8.2.3.2 Unused cores

The end of each unused core of cables shall either be adequately connected to terminals suitable for the Type of Protection or connected to earth.

Insulation by tape alone is not permitted for all Types of Protection. Insulation using shrink tube is not permitted inside Ex “e” and Ex “nA” enclosures.



CEAG
GHG 288
Goldkontakt
bei 24V 3mA - 400 mA bei AC11/DC11/ohmsche Last
bei 250V max. 6A
dann jedoch nur noch für diese Anwendung einsetzbar
GHG 263 0017 R0054
Schalt:
Made in Germany
Input Zugang
Abgang Output
AC3 400 500 690 V~
20 16 10 A
AC11 230/500V~ 8/6A

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.

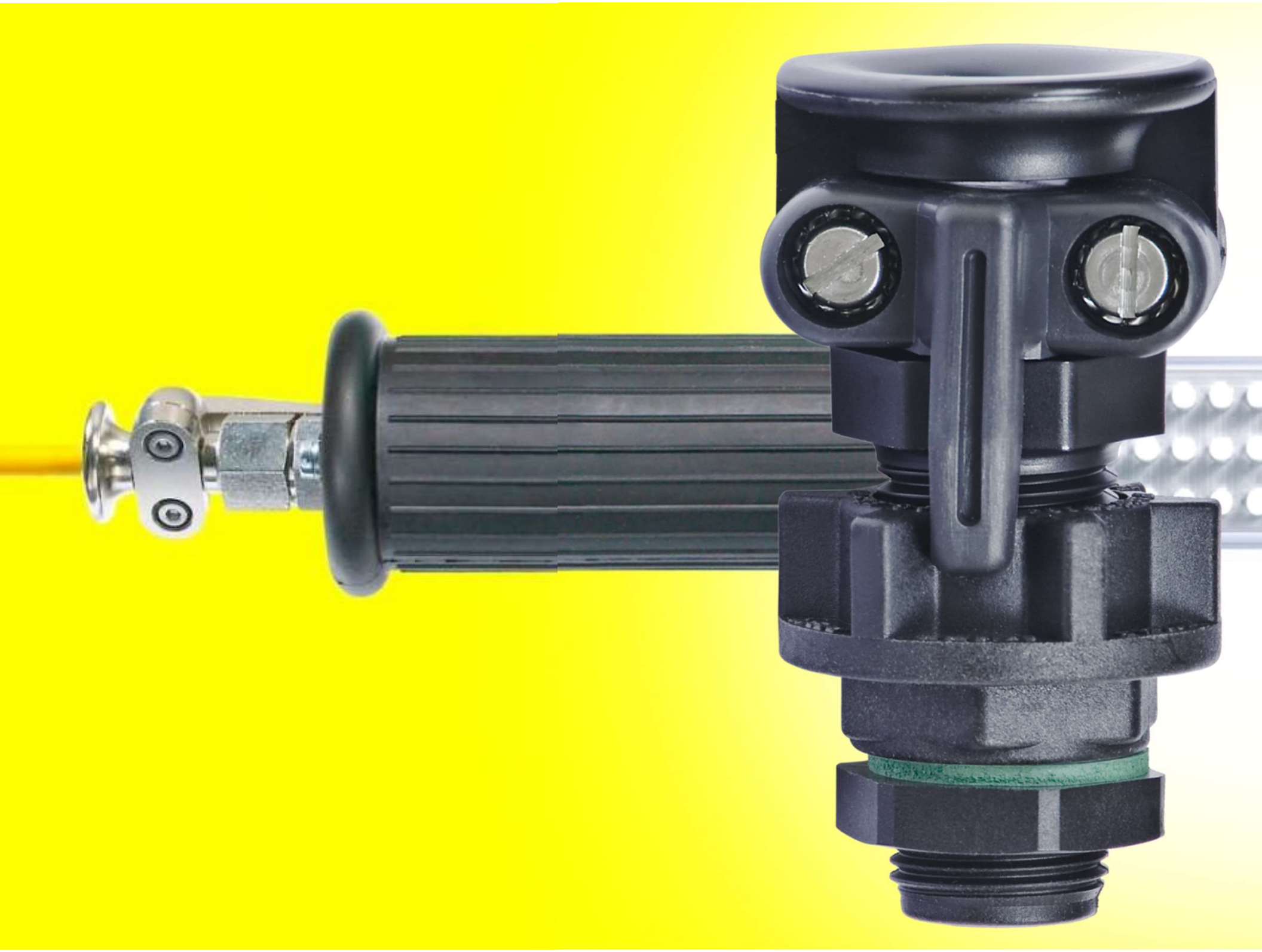
The blanking plug type GHG 960 6107 P**** resp. GHG 960 1944 R**** shall only be used with the cable glands type GHG 960 92** P**** resp. GHG 960 19** R****.

8.3.2 Cable entry devices (2)

8.3.2 Cable entry devices (3)

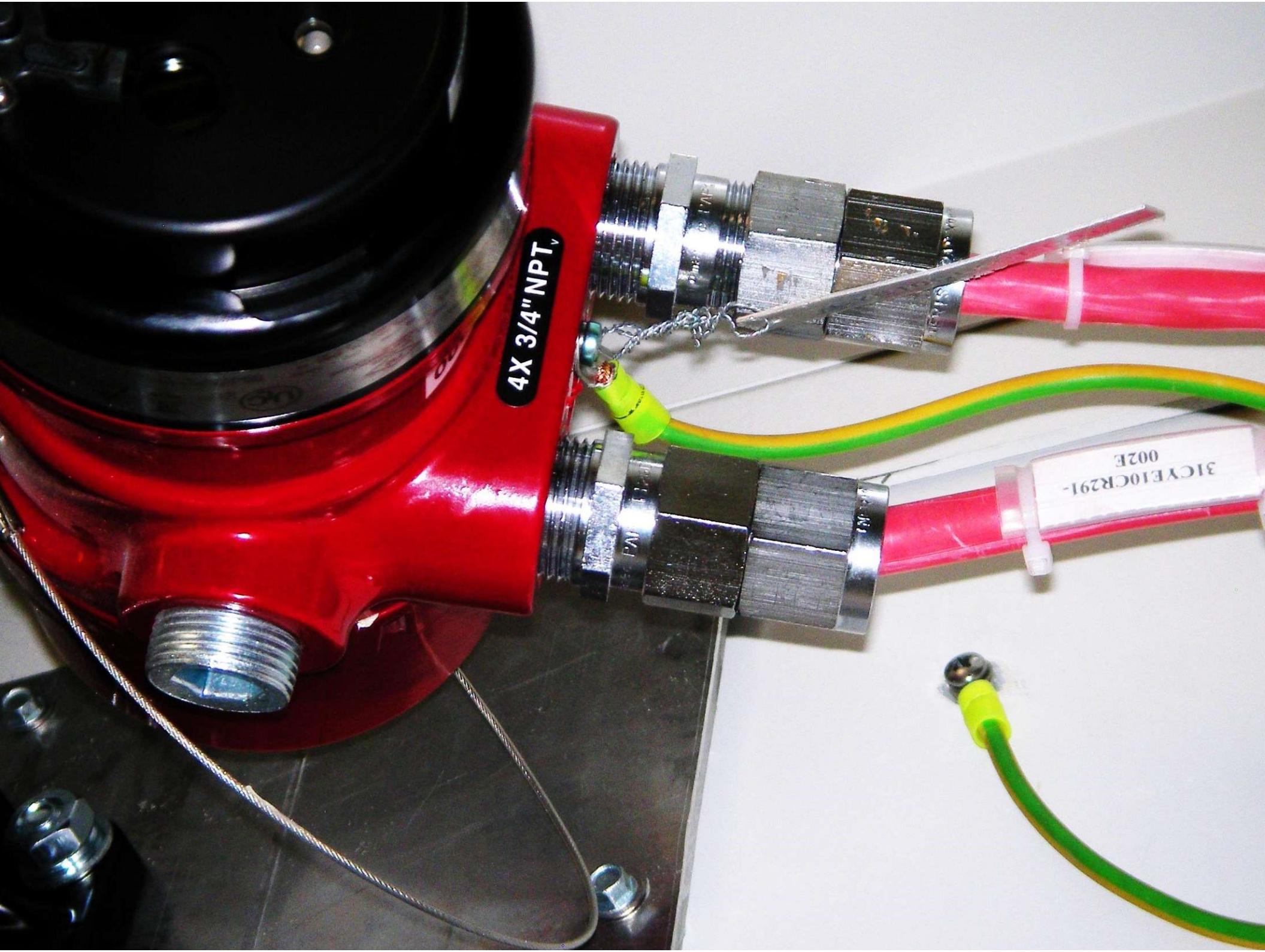
The cables must be laid straight from the cable entry to avoid lateral stresses that could affect the sealing of the cable or the degree of protection (IP Code).

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



WARNUNG ! WARNING ! AVERTISSEMENT !
+UH331.20
WARNUNG ! WARNING ! AVERTISSEMENT !
+UH333.20

A
B
IP66


4X 3/4"NPT
3ICYE10CR291-
002E

8.3.4 Unused openings (1)

Unused openings in the enclosure must be closed off by means of blanking elements in accordance with the respective Type of Protection and degree of protection (IP Code).

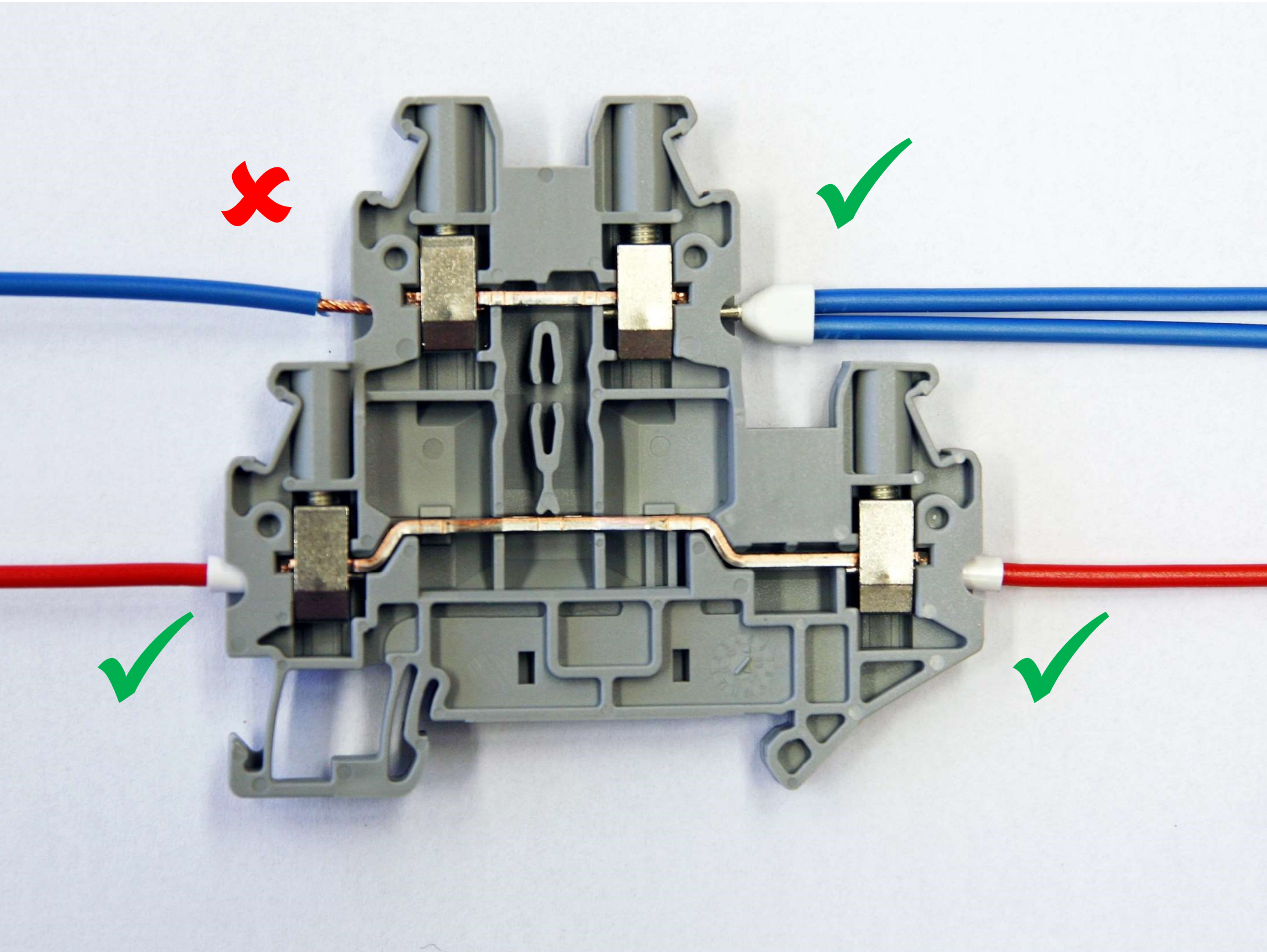
The blanking elements must comply with the requirements of IEC 60079-0 and be such that they can only be removed with the aid of a tool.

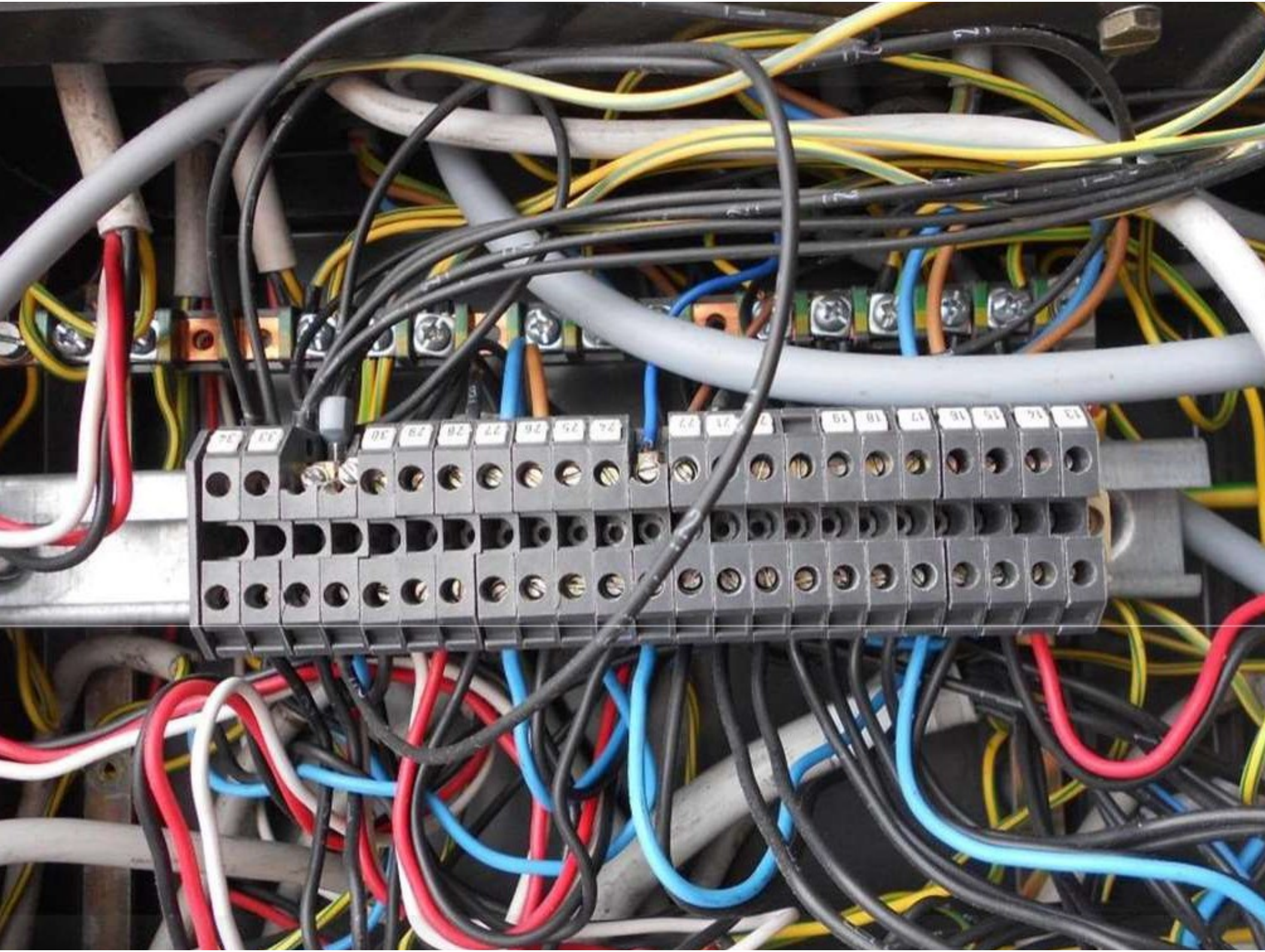
8.3.4 Unused openings (2)

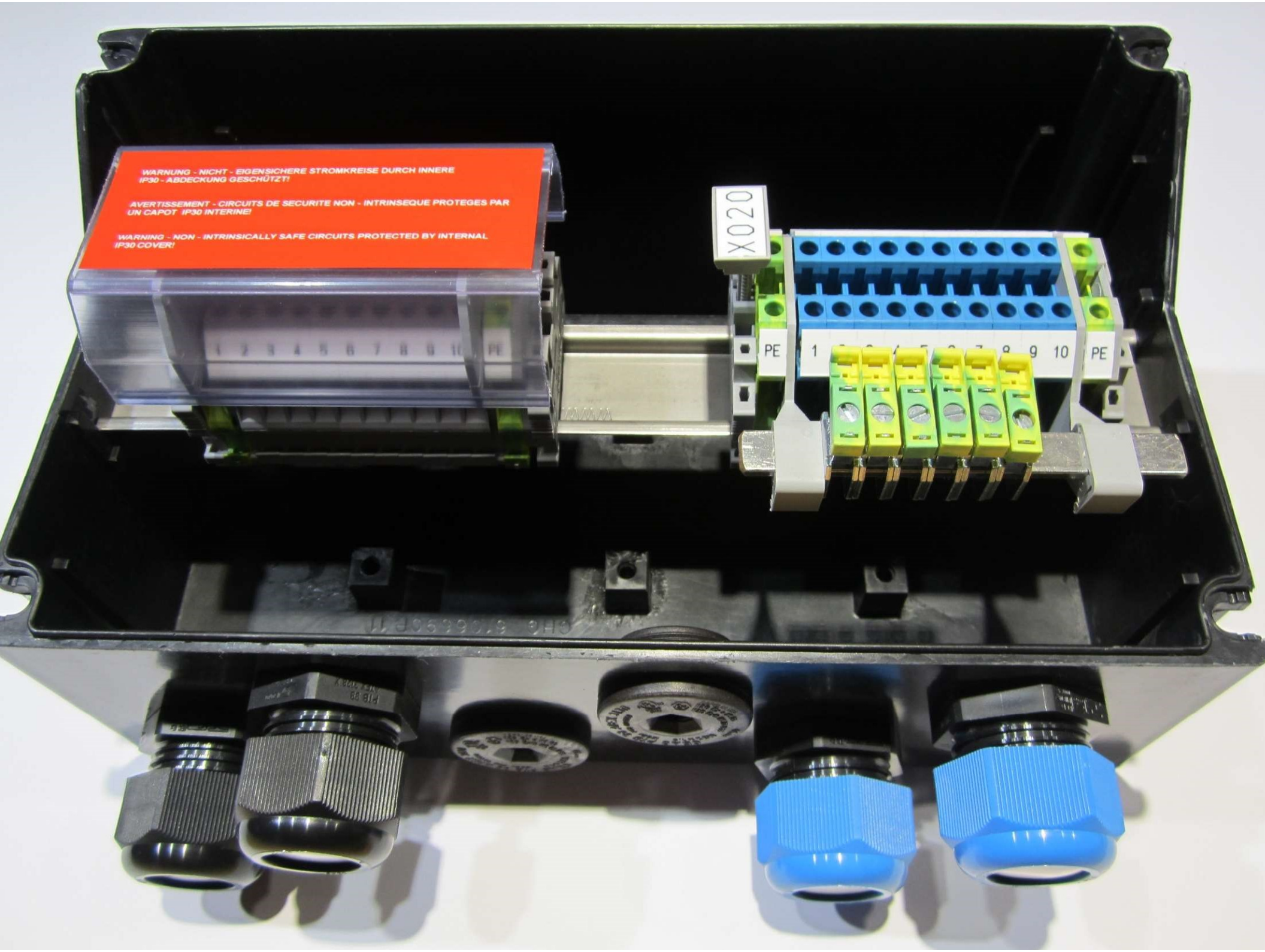

ROSEMOUNT
Rosemount

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.





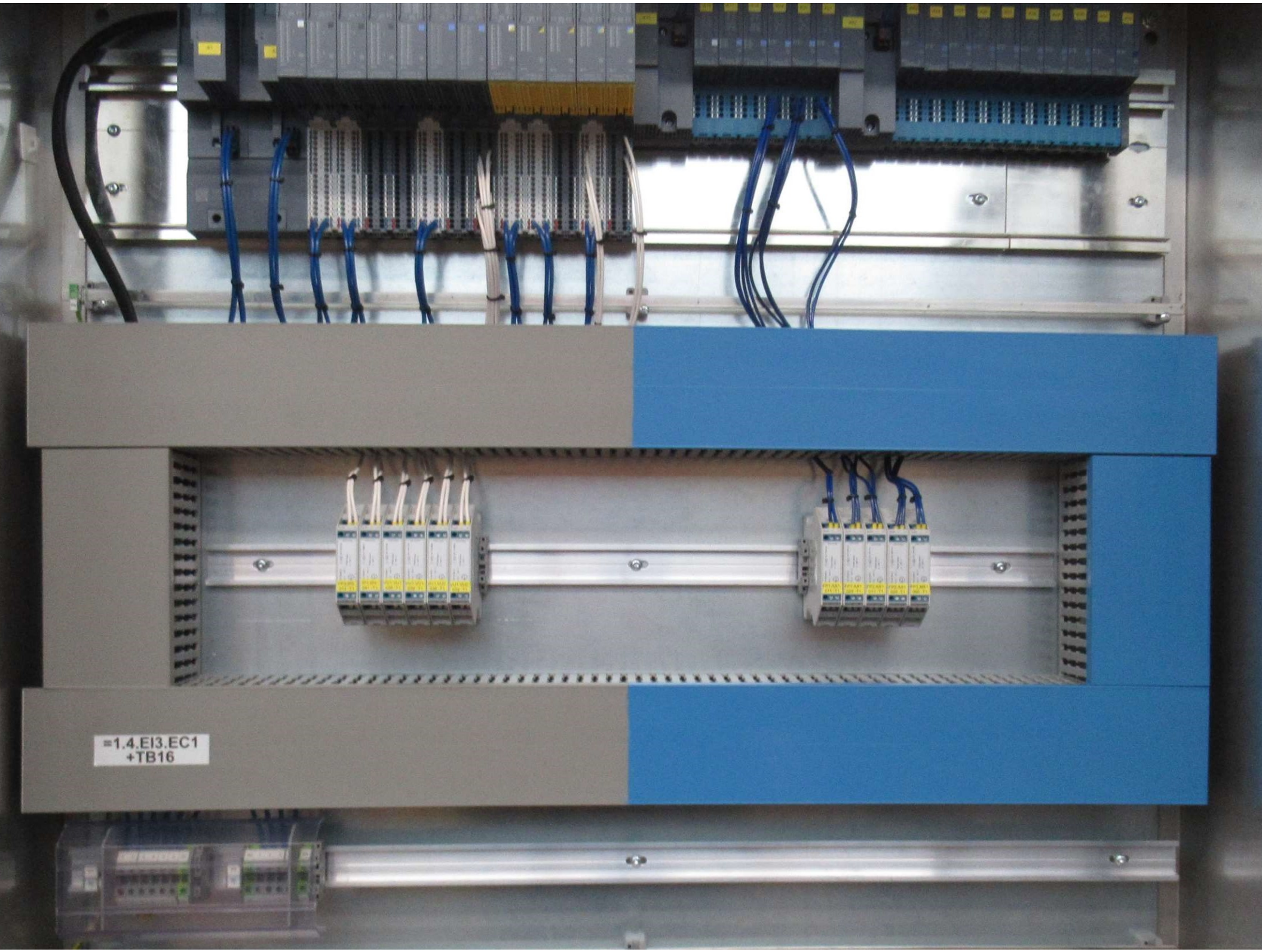

WARNUNG - NICHT - EIGENSICHERE STROMKREISE DURCH INNERE IP30 - ABDECKUNG GESCHÜTZT!
AVERTISSEMENT - CIRCUITS DE SECURITE NON - INTRINSEQUE PROTEGES PAR UN CAPOT IP30 INTERINE!
WARNING - NON - INTRINSICALLY SAFE CIRCUITS PROTECTED BY INTERNAL IP30 COVER!
X020
PE
1
9
10
PE

8.9.3.2 Marking of cables

Inside control panels and switchgear assemblies marking shall avoid confusion between cables of intrinsically safe and non-intrinsically safe circuits, in the presence of a blue neutral conductor.

Such markings include:

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


=1.4.EI3.EC1
+TB16

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.**

Annex O
(informative)

Inspection tables for initial inspections (from IEC 60079-17)

Table O.1 shows the initial inspection schedule for Ex "d", Ex "e", Ex "n" and Ex "t"/"tD" installations.

Table O.1 – Initial inspection schedule for Ex "d", Ex "e", Ex "n" and Ex "t"/"tD" installations

Check that: X = required for all types, - = not required for initial inspection, n = type "n" only, t = type "t" and "tD" only		Ex "d"	Ex "e"	Ex "n" Ex"t/tD"
		Initial Inspection		
A	**GENERAL (ALL EQUIPMENT)**			
1	Equipment is appropriate to the EPL/Zone requirements of the location	X	X	X
2	Equipment group is correct	X	X	X
3	Equipment temperature class is correct (only for gas)	X	X	n
4	Equipment maximum surface temperature is correct			t
5	Degree of protection (IP grade) of equipment is appropriate for the level of protection/group/conductivity	X	X	X
6	Equipment circuit identification is correct	X	X	X
7	Equipment circuit identification is available	X	X	X
8	Enclosure, glass parts and glass-to-metal sealing gaskets and/or compounds are satisfactory	X	X	X
9	There is no damage or unauthorized modifications	X	X	X

Thank you for your attention!