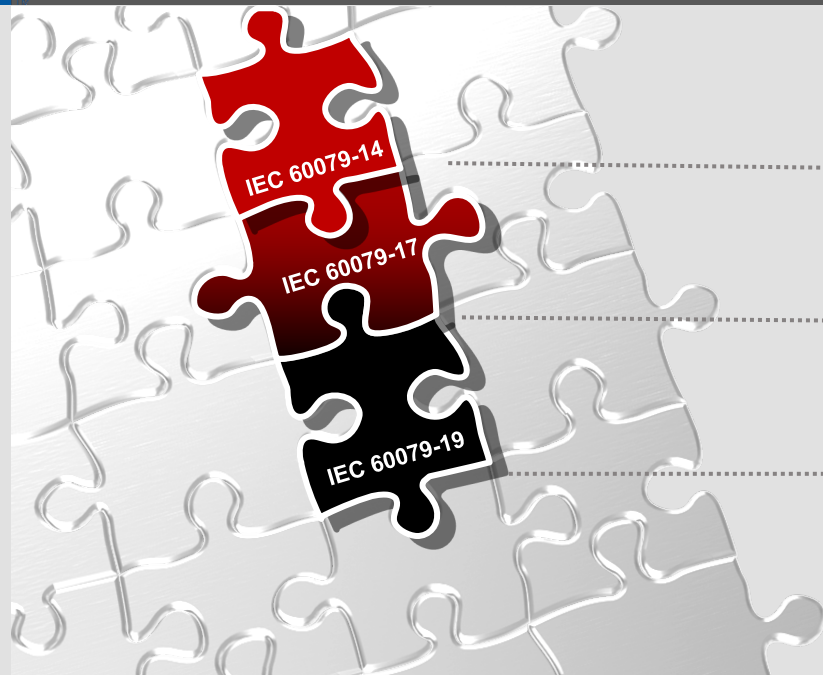




Symposium 16. September 2026 Beijing

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

工业研讨会 2026年9月16日 北京
**防爆电器设备的设计、选型、
安装和初始检查**



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

电器设备的设计、选型、安装和初始检查

**Electrical installations
inspection and
maintenance**

电气装置的检查与维护

**Equipment repair, overhaul
and reclamation**

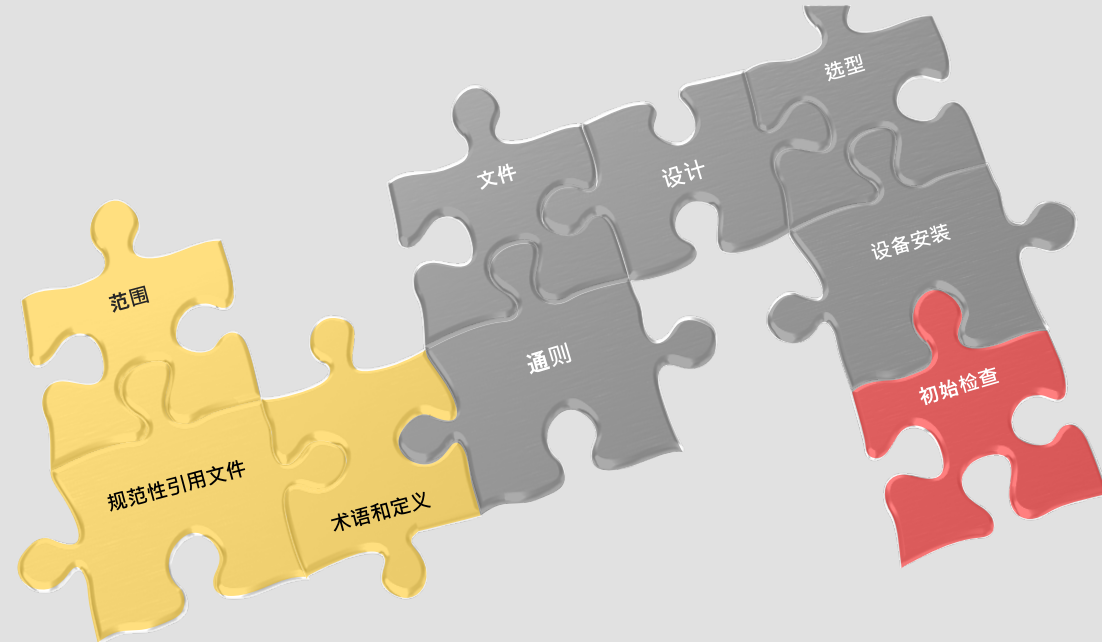
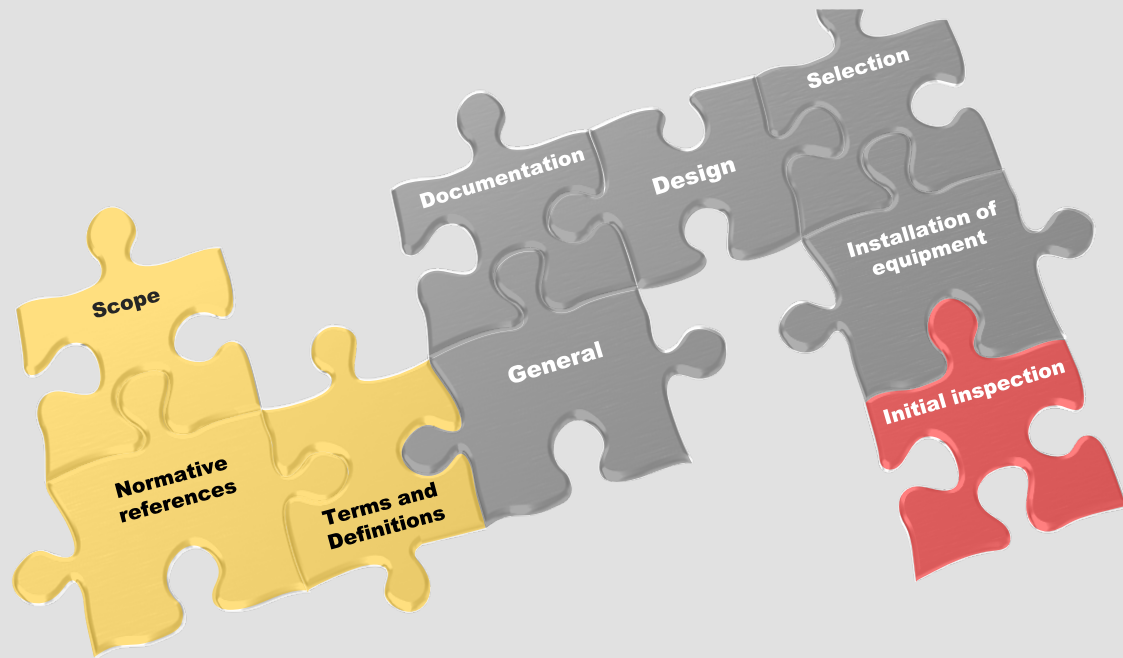
设备的维修、大修与翻新

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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

**Atmosphères explosives –
Partie 14: Conception des installations électriques, sélection et installation des
appareils, comprenant l'inspection initiale**









The focus is on the following topics

- Specific Conditions of Use
 - Documentation
 - Equipotential bonding
 - Selection criteria for explosionproof equipment
 - Cables and cable entries
- 具体使用条款
 - 文件资料
 - 等电位连接
 - 防爆设备选型标准
 - 电缆与电缆引入口

4. General / 通则

4.2.2 Specific Conditions of Use

A symbol 'X' to the certificate number used to indicate 'Specific Conditions of Use'.

The symbol 'X' is used to indicate that the certificate contains essential information for

- Design and selection
- Installation and initial inspection
- Operation
- Maintenance
- Repair

证书编号中带有符号“X”，用于表示“特殊使用条件”。

符号“X”表示证书中包含对于以下方面至关重要的信息：

- 设计与选型
- 安装与初步检查
- 操作
- 维护
- 维修

monitoring is carried out by temperature controllers and safety temperature limiters in the type of protection 'Flame-proof Enclosure db' or 'Intrinsic Safety ia'.

Technical data and nomenclature see attachment.

SPECIFIC CONDITIONS OF USE: YES as shown below:

1. The temperature class / the maximum surface temperature of the heating unit have to be defined with a thermal routine test. Factors to be considered include the specific local and operating conditions (installed position, ambient temperature, self-heating rate, heat conduction, maximum admissible working temperatures of components / elements used, etc.), and the intended purpose.
2. The design of safety devices used (temperature, level, etc.) must have been tested for function and reliability on the basis of the relevant rules and regulations
3. The sensors of the temperature limiters must be positioned so that phase failure in three-phase systems will be accounted for.
4. When heating liquids, sufficient cover must be provided. To comply with this condition, a level monitoring unit or comparable protection devices may be installed.
5. For flowing media, an additional monitoring feature (flow controller) may be required, which is to safeguard a minimum throughput.
6. Due consideration must above all be given to safety features when heating closed systems.
7. For temperatures in the terminal box $> +70^{\circ}\text{C}$, a note on the use of corresponding temperature-resistant connection cables is required.
8. The operating instructions provided by the manufacturer must be observed.

Annex:

[COCA_PTB20.0031X_I0.pdf](#)

The designer is responsible for ensuring that the ‘Special Conditions of Use’ can be implemented in the application. If the ‘Special Conditions of Use’ cannot be implemented, a different Ex Equipment must be selected.

Example

The Ex Equipment is not UV-resistant, therefore it cannot be used outdoors.

设计人员负责确保“特殊使用条件”能够在实际应用中得以实施。

如果“特殊使用条件”无法满足，则必须选用其他防爆电气设备。

示例：

某防爆电气设备不耐紫外线，因此不能在户外使用。

5. Documentation / 文件

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.

设备必须符合防爆电气设备的相关证书、本文件以及安装的所有要求。

每套安装的设备都应编制一份安装文件档案，以证明其符合性。

该安装文件档案必须在装置的整个运行寿命期间保持更新。档案可以采用纸质或电子形式。

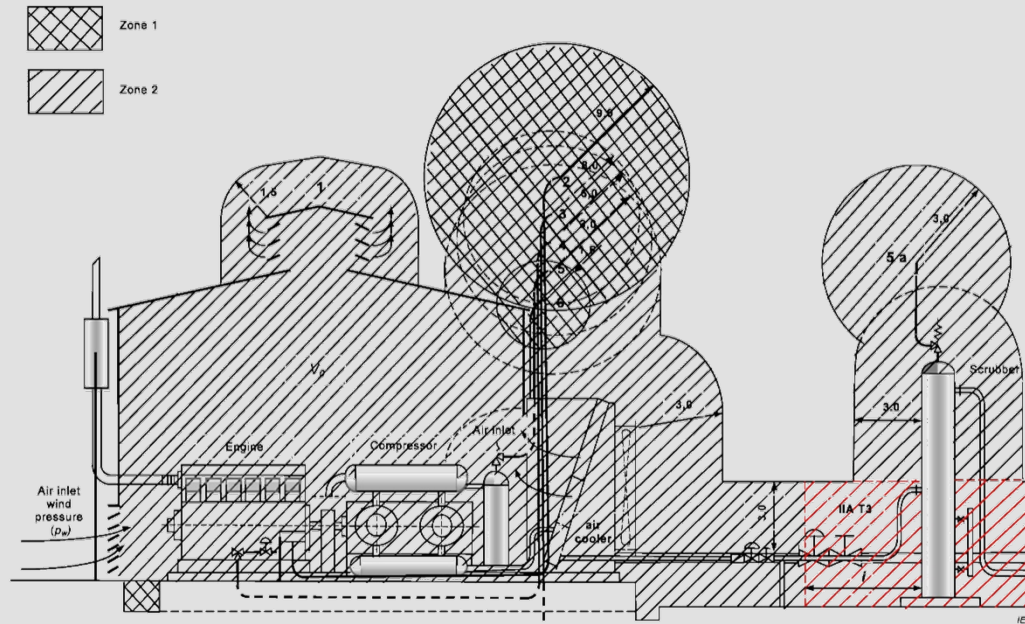
5.2 Information about the location

- 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
- 用于**划分**潜在爆炸性环境的文件，包括（适用时）温度组别或引燃温度以及设备组别；
 - 设备保护级别的确定；
 - 任何已识别的外部影响；
 - **环境温度范围**，包括太阳辐射的影响；
 - 对实施设备设计、选型、安装及初始检查的人员能力的证明。

INTERNATIONAL STANDARD

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

Area classification – Basic Example



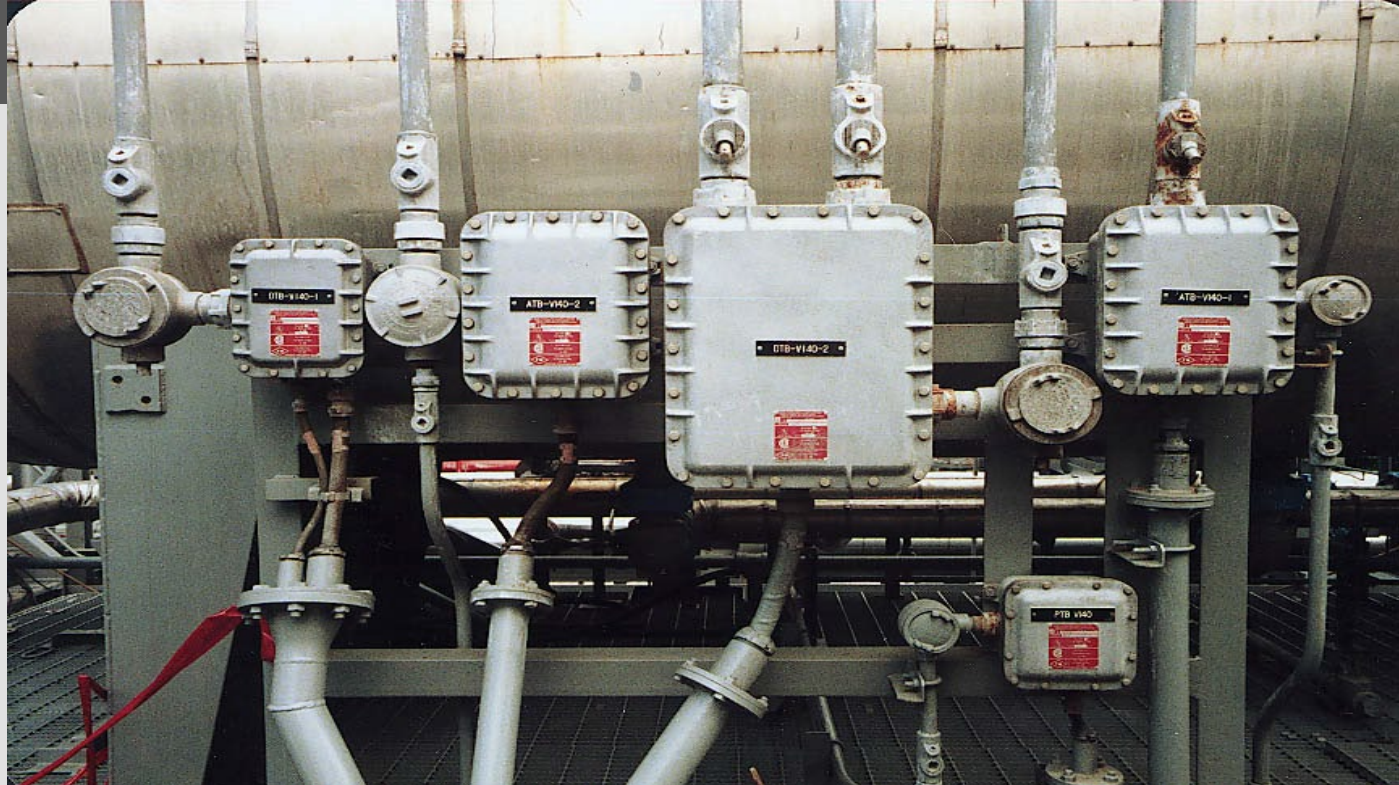
Zones and Equipment Protection Level

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

- ***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
- **防爆电气设备制造商的操作说明书**，其中包含有关预期用途、安装与初始测试以及（如适用）维护与维修的信息；
- 带有**特殊使用条件**的防爆电气设备文件；
- **本质安全系统的描述性系统文件**；
- 计算或相关信息，例如增安型（Ex ‘e’）计算以及正压设备的吹扫流量数据。

- 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
- 制造商说明书；
- 关于防爆电气设备对其所处区域及环境适用性的文件，例如温度等级、防爆型式、防护等级（IP）、耐腐蚀性；
- **显示布线系统类型及电缆敷设细节的图纸；**
- 电缆、电缆引入装置及导管的选型标准记录，以证明其符合特定防爆型式的要求。

- **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
-
- **导管敷设及密封接头位置的图纸；**
 - 有关回路标识的图纸和明细表；
 - 初始检查记录；
 - 安装人员/合格人员的声明。



6. Design / 设计

6.2.6 Protective equipotential bonding conductor

The **main 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:

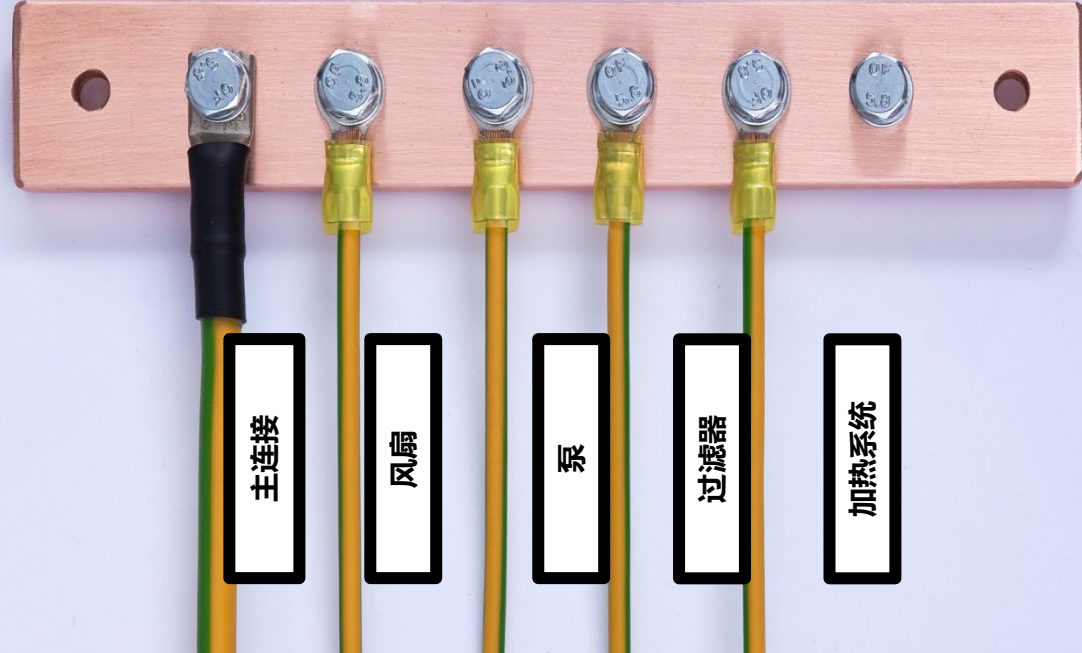
- secured against self-loosening and
- be protected against corrosion

根据 IEC 60364-5-54 标准，保护等电位联结导体的截面积至少为 6 mm²（以铜的电导率为基准），而附加连接点的截面积至少为 4 mm²。

连接时必须考虑机械强度，可能需要 16 mm² 或 25 mm² 的截面积。

连接必须满足以下要求：

- 防止自行松动；
- 并采取防腐蚀保护。





6.2.6.2 Temporary protective equipotential bonding



7. Selection / 选型

7.3.1 Information requirements

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
- The external influences
- The ambient temperature

为潜在爆炸性环境选择合适的防爆电气设备，需要以下信息：

- 潜在爆炸性环境的划分，包括设备保护级别（EPL）；
- 与防爆电气设备组别或子组别相关的气体、蒸气或粉尘分级；
- 相关气体或蒸气的温度组别或引燃温度；
- 外部影响；
- 环境温度。

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

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

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

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}

$-30\text{ °C} \leq T_{amb} \leq 65\text{ °C}$

Note

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

如果电器的标志中未规定环境温度范围，则该电器仅适用于 **-20 °C 至 40 °C** 的温度范围。

示例：扩展环境温度范围 T_{amb}

$-30\text{ °C} \leq T_{amb} \leq 65\text{ °C}$

注：IEC 60079-0 第 8 版要求对所有温度范围（包括 -20 °C 至 40 °C）都进行环境温度标志！

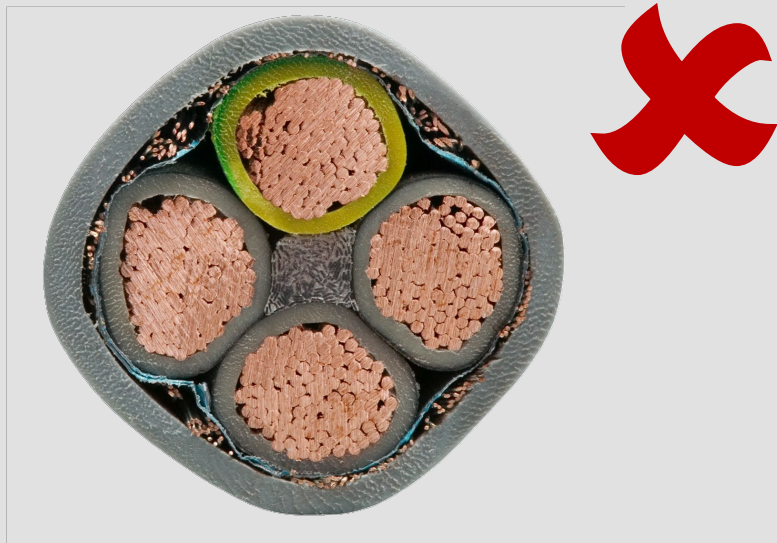


The construction of the cable must either

- 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

电缆的结构必须满足以下任一条件：

- 标称圆形，配合根据第7.5节选择的电缆引入装置进行安装，以保持防爆电气设备的防护等级（IP代码）；或者
- 非圆形（扁平）电缆，与特定的电缆引入装置一同选用，以保持防爆电气设备的防护等级（IP代码）。

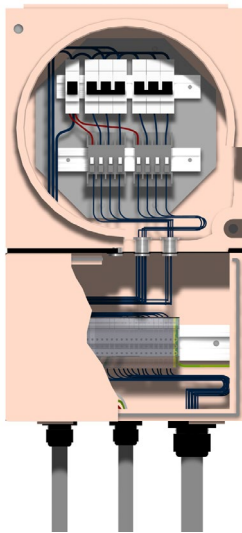


7.5.1 Selection of entry devices and other fittings

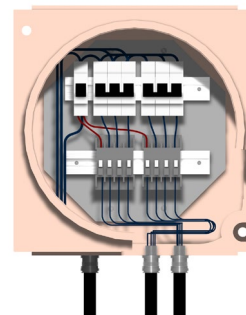
Extract from Table 15

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

7.5.6 Cable entries for Type of Protection 'd'



Indirect



Direct

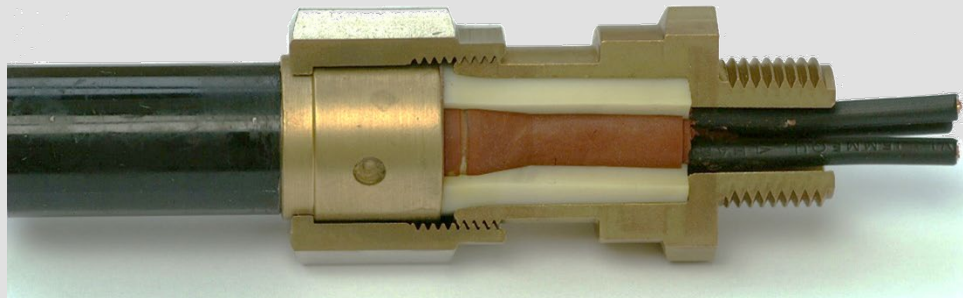
7.5.6 Cable entries for Type of Protection 'd'

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

电缆引入装置必须符合以下要求之一：

- a. 符合 IEC 60079-1 标准并经认证为设备的隔离密封格兰；或

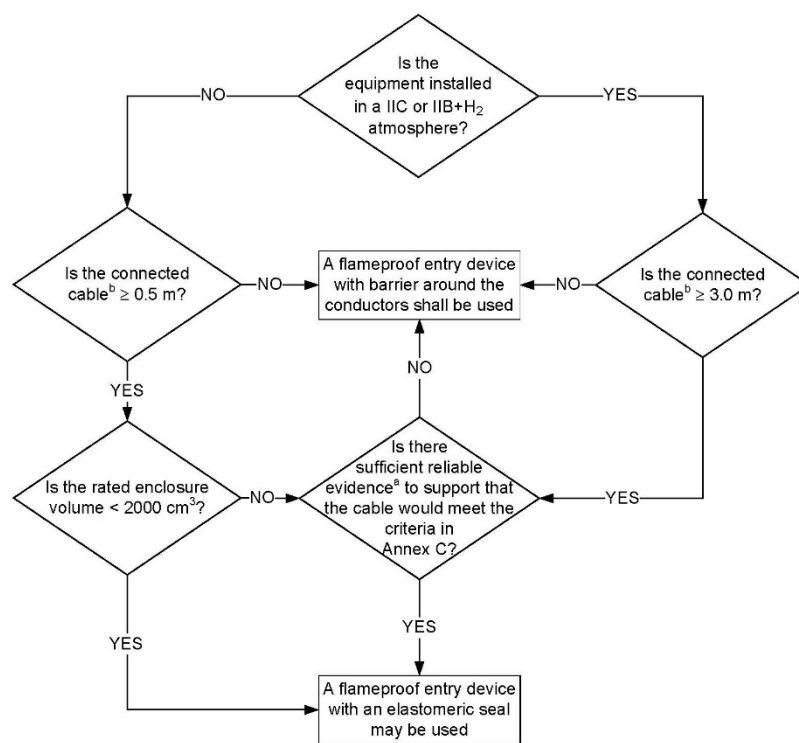




7.5.6 Cable entries for Type of Protection ‘d’

- 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.

- b. 符合 IEC 60079-1 标准、经认证为设备并按新流程图选型的电缆引入装置；或
- c. 通过隔爆型外壳与 Ex d 绝缘套管（Ex 部件）以及接线箱（例如采用增安型“Ex eb”防爆型式）组合实现的间接电缆引入。



8. Installation of the equipment /设备的安装

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.

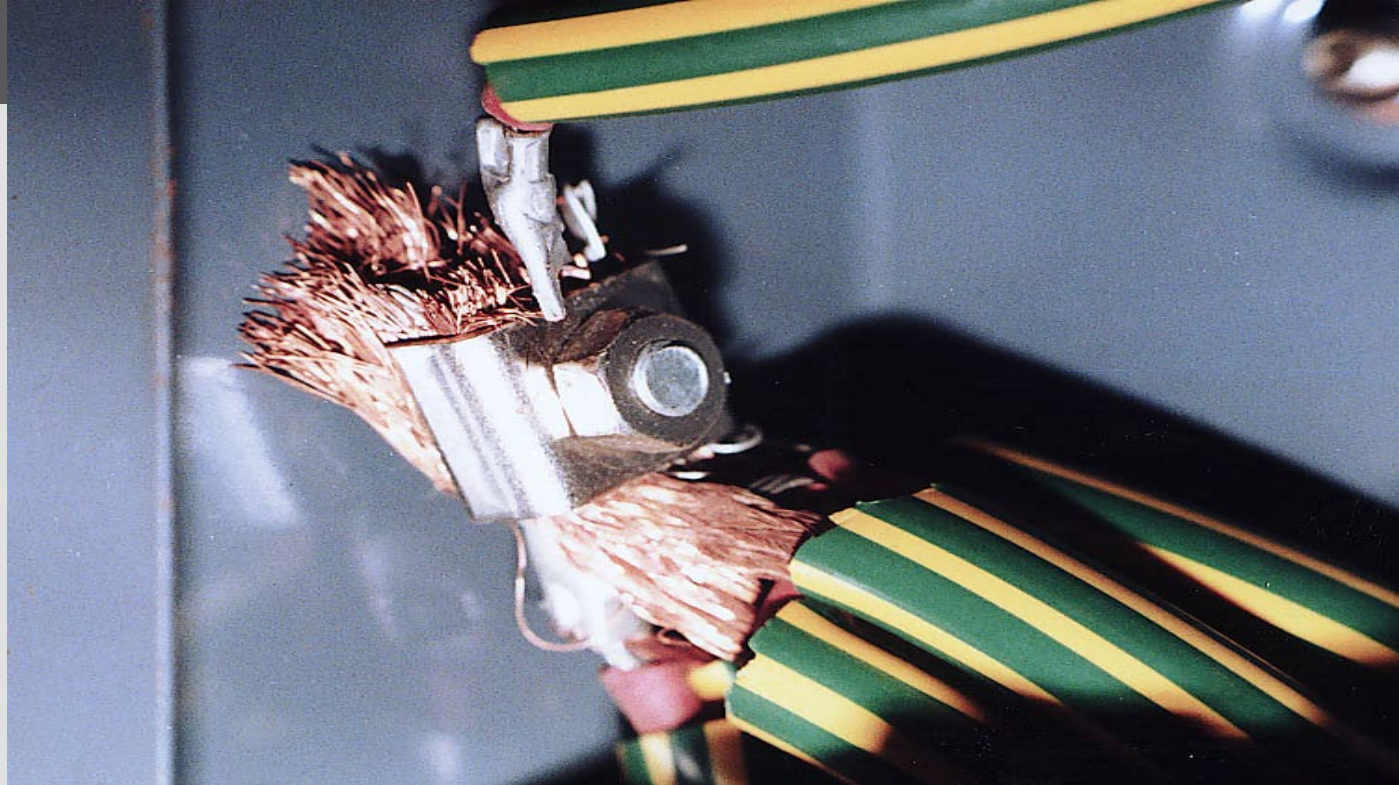
The preferred arrangement for connecting multiple equipotential bonding wires is to provide a rail that allows each item to be provided with individual equipotential bonding as required.

8.2.2 等电位连接

等电位连接应这样布置：移除单个连接不会导致其他部件的等电位联结失效。

连接多根等电位连接导线的优选布置方式是提供一个母线排，使得每个设备都能根据需要获得独立的等电位连接。







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.

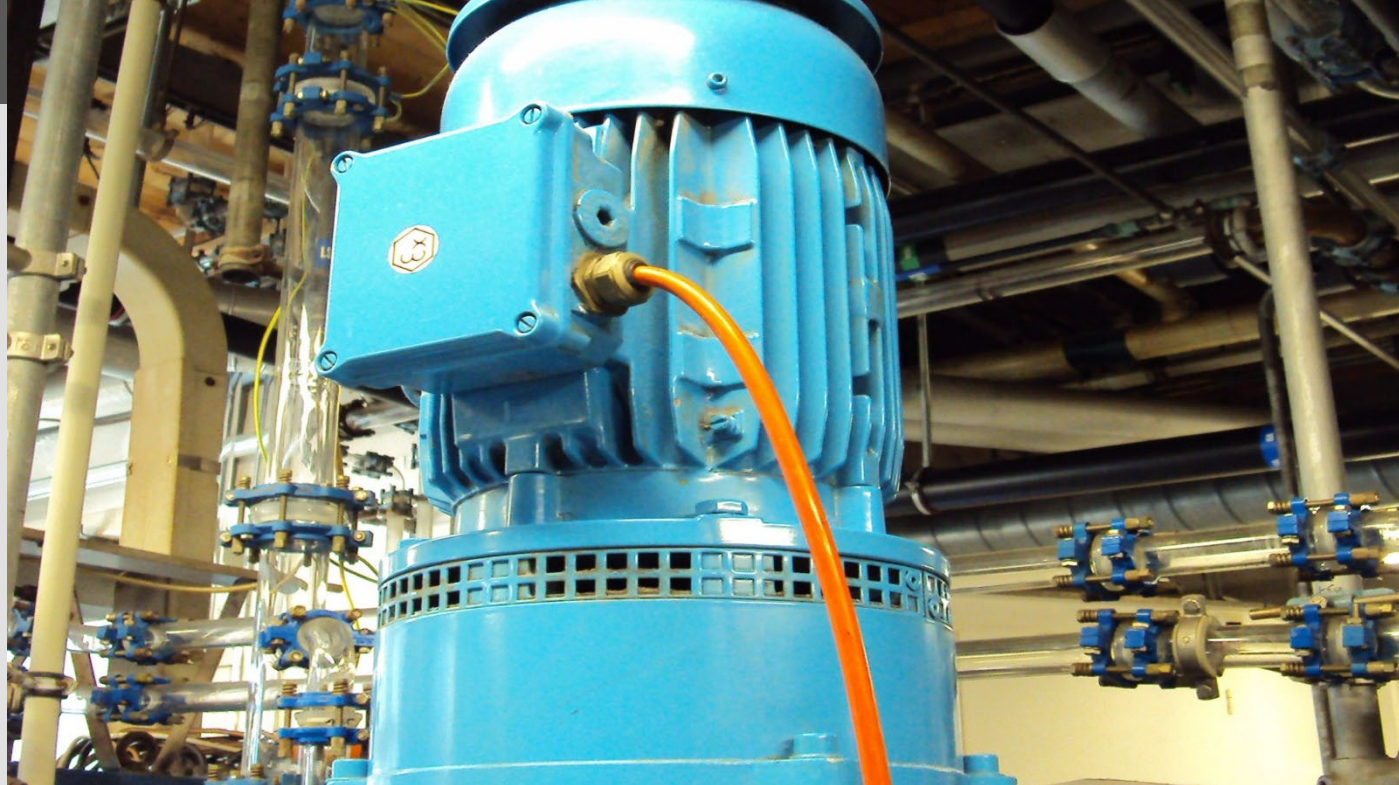
SPECIFIC CONDITIONS OF USE: YES as shown below:

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

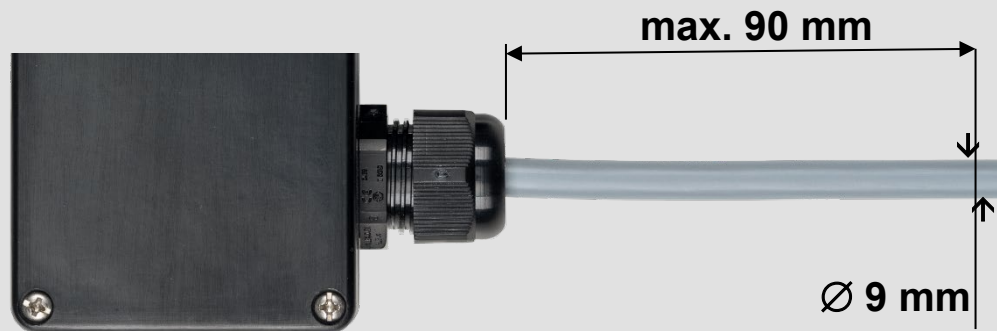
The cables must be laid straight from the cable entry to avoid lateral stresses that could affect the sealing of the cable or the degree of protection (IP Code).

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.

电缆必须从电缆引入装置处笔直敷设，以避免可能影响电缆密封或防护等级（IP代码）的侧向应力。

电缆的夹紧应设置在距离电缆引入装置**末端 10 倍电缆直径或最大 300 mm** 的范围内（取两者中的较短长度）。

8.3.2 Cable entry devices







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Thank you for your attention!