PSCI PHARMACEUTICAL SUPPLY CHAIN INITIATIVE
Building responsible supply chains

制药行业防爆电气设备选型、安装与检查要点

Key Points for Selection, Installation and Inspection of Explosion-proof Electrical Equipment in Pharmaceutical Industry

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- ✓ 第三方检测认证行业从业经验11年
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- ✓ 领域：电气安全、机械安全、功能安全、防爆安全
- ✓ 工艺过程安全领域专家：HAZOP, LOPA分析SIL定级, QRA定量风险评估



南德认证检测防爆团队服务内容

Our core services for Explosion protection in Greater China:
TÜV SÜD Greater China, division IDP Explosion Protection

针对防爆产品制造厂商的服务	针对终端用户的服务
产品测试与认证 (ATEX / IECEx / Hazloc / ECASEx / INMEx / ...)	防爆现场的安全检查 (包含爆炸事故调查)
防爆质量体系的检查 (QAN/QAR / Hazloc工厂检查....)	防爆分区
保护类装置的测试和认证 (例如隔爆阀，无焰泄放装置，阻火器，旋转阀...)	点燃源风险评估
安全设备检测和认证 (比如 EN 50495, SIL)	使用R32/R290/R600a等制冷产品的生产线安全检查
用于制冷设备电气部件的测试 (R32/R290/R600a)	粉尘爆炸特性测试 (MIE, Pmax, Kst, ...)
用于潜在爆炸环境下的机械设备安全评估 (例如硫化床，造粒机，气体压缩机 ...)	防爆安全文档整理，依据欧盟防爆指令 (ATEX 1999/92/EC)
机械设备的北美市场Hazloc认证 (北美 / 加拿大地区)	针对现有防爆设备和产线的危险性评估
本安(Ex i)防爆技术培训和产品认证 (IEC 60079-11)	IECEx 05 人员资质的培训、考试和发证
防爆产品维修车间的认证 (IEC 60079-19)	过程安全评估
预测试服务，实验室型式测试	静电风险评估
培训	培训

南德认证过程安全风险评估服务概览

HAZID



- Structured qualitative workshop to systematically discover potential safety & environmental hazards.
- Pinpoint risks in early design and lay foundation for subsequent risk analysis & safety design optimization.

HAZOP



- Systematic industrial risk identification & safety consulting service for process hazard analysis.
- IEC 61882 Ed 2.0 2016. Hazard and operability studies (HAZOP studies) – Application guide

LOPA (SIL Determination)



- A risk assessment service to determine safety integrity level for safety instrumented systems after HAZOP analysis.
- Carry out Layer of Protection Analysis (LOPA) to implement Safety Integrity Level (SIL) determination for safety instrumented functions.

QRA (Quantitative risk analysis)



- Quantitative risk analysis calculating individual and societal accident risks for industrial sites.
- Quantify risk level and support risk reduction & safety decision-making.

南德认证过程安全风险评估服务概览

RAM



- Systematic study to evaluate equipment long-term running performance.
- Predict downtime, optimize maintenance and guarantee stable operation.

Emergency Management and Risk Assessment



- Emergency management and risk assessment cover hazard evaluation and standardized response to unexpected incidents.
- Reduce safety risks, protect staff and guarantee stable plant operation.

PSSR Pre-Start Safety Review



- Systematic inspection conducted before new/modified facilities start operation.
- Confirm all safety measures are in place to eliminate hidden dangers before startup.

SIL Verification



- Calculation check on SIF reliability after equipment selection.
- Confirm the loop meets the target SIL rating via PFDavg assessment.
- SIF: Safety Instrumented Function

议程 Agenda

ATEX 1999/92/EC指令与GB 3836.15/16标准

防爆分区基础知识，基于IEC 60079-10-1，IEC 60079-10-2

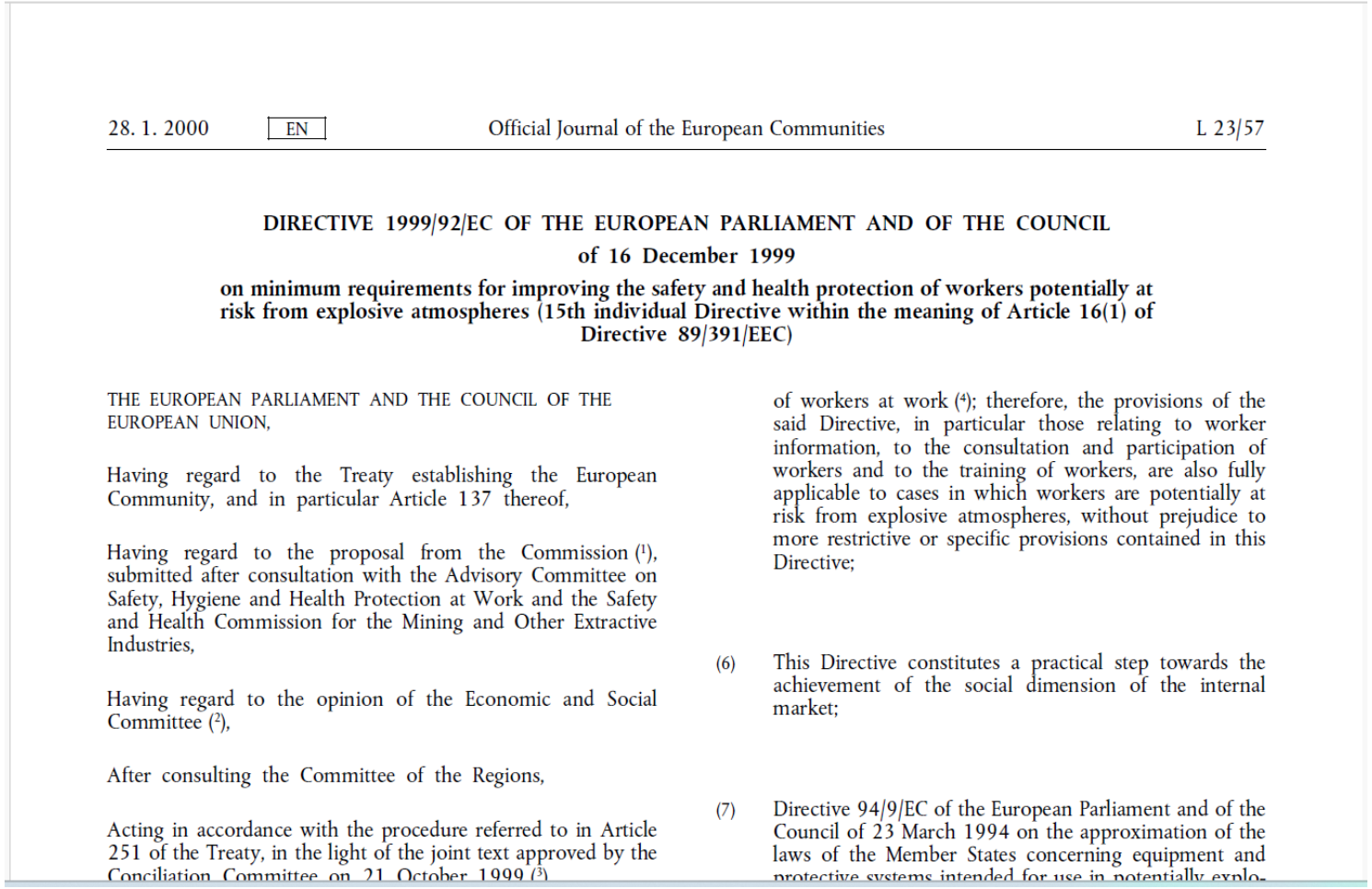
防爆设备选型要求，

防爆电气安装

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提问与回答环节

ATEX 1999/92/EC指令



28. 1. 2000 EN Official Journal of the European Communities L 23/57

DIRECTIVE 1999/92/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 16 December 1999
on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres (15th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 137 thereof,

Having regard to the proposal from the Commission (1), submitted after consultation with the Advisory Committee on Safety, Hygiene and Health Protection at Work and the Safety and Health Commission for the Mining and Other Extractive Industries,

Having regard to the opinion of the Economic and Social Committee (2),

After consulting the Committee of the Regions,

Acting in accordance with the procedure referred to in Article 251 of the Treaty, in the light of the joint text approved by the Conciliation Committee on 21 October 1999 (3)

of workers at work (4); therefore, the provisions of the said Directive, in particular those relating to worker information, to the consultation and participation of workers and to the training of workers, are also fully applicable to cases in which workers are potentially at risk from explosive atmospheres, without prejudice to more restrictive or specific provisions contained in this Directive;

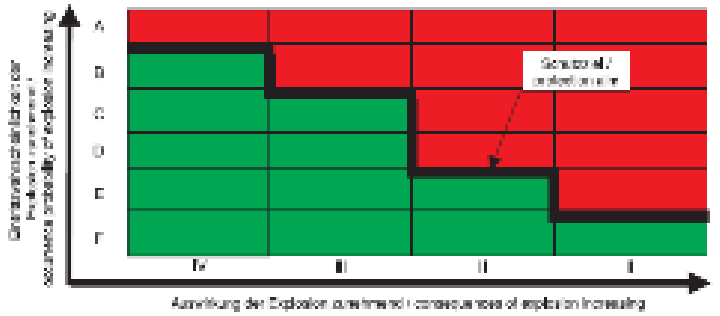
(6) This Directive constitutes a practical step towards the achievement of the social dimension of the internal market;

(7) Directive 94/9/EC of the European Parliament and of the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explo-

DIRECTIVE 1999/92/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 1999 on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres

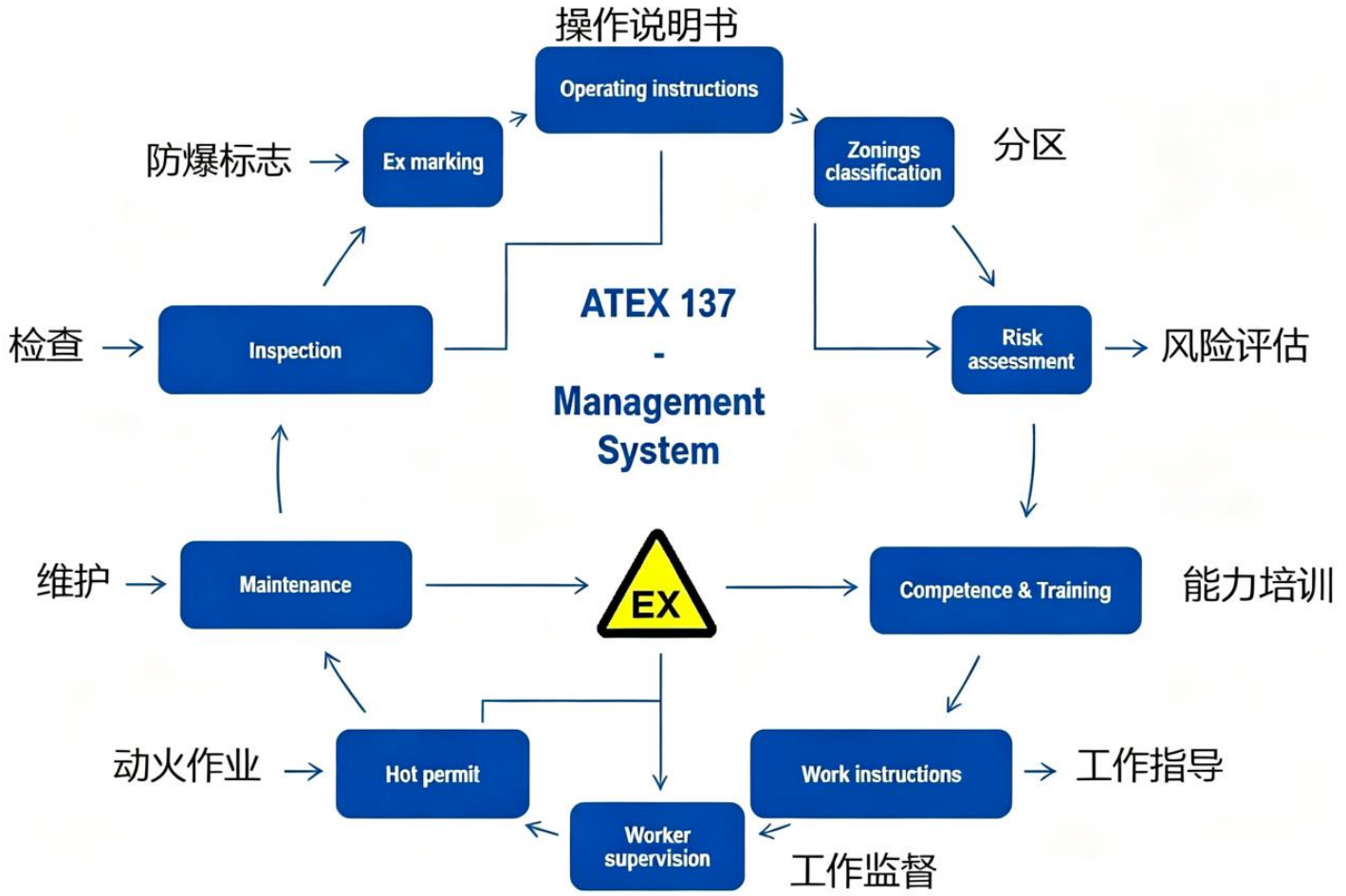
Explosion Protection Document (EPD)

1. Define the workplaces and working areas 工作地点和区域
2. Written process description (drawings, PID, ...) 过程描述(如:图纸, PID)
3. Substances used / safety parameters (MSDS, …) 使用物质 / 安全数据(如:MSDS)
4. Zoning classification study and report 区域类别的学习及报告
5. When applicable: Hazardous zonings plan 如适用: 危险区域分区图
6. Initial Ignition Hazard Risk Analysis 点燃源风险分析
7. Explosion protection measures taken 采取的防爆措施
7.1 Technical measures 技术措施
7.2 Organizational measures 组织措施
8. Final Conclusion Ignition Hazard Risk Analysis 点火风险分析的结论
9. Implementation – who will be responsible for what? 执行 – 谁负责什么
10. Coordination duties 协调任务
11. Annex(s) 附录



Acceptance level

防爆现场检查所需要准备的材料



ATEX 1999/92/EC principles



	Explosion Protection 防爆
Primary measures 一级措施	Avoidance or limitations of ATEX 避免或限制爆炸性环境的形成
Secondary measures 二级措施	Prevention of ignition 遏制点燃
Tertiary measures 三级措施	Reduction of impacts 降低影响

风险评估设备/过程

Zone 2 / 22



Ignition sources to be avoided in **normal operation**

正常情况下避免产生点燃源

Zone 1 / 21

Ignition sources to be avoided in **normal operation and malfunction**

正常和潜在故障情况下避免产生点燃源

Zone 0 / 20

Ignition sources to be avoided in **normal operation, malfunction and in the event of rare malfunctions**

正常情况下、潜在故障和罕见故障情况下，避免产生点燃源

议程 Agenda

ATEX 1999/92/EC指令与GB 3836.15/16标准

防爆分区基础知识，基于IEC 60079-10-1，IEC 60079-10-2

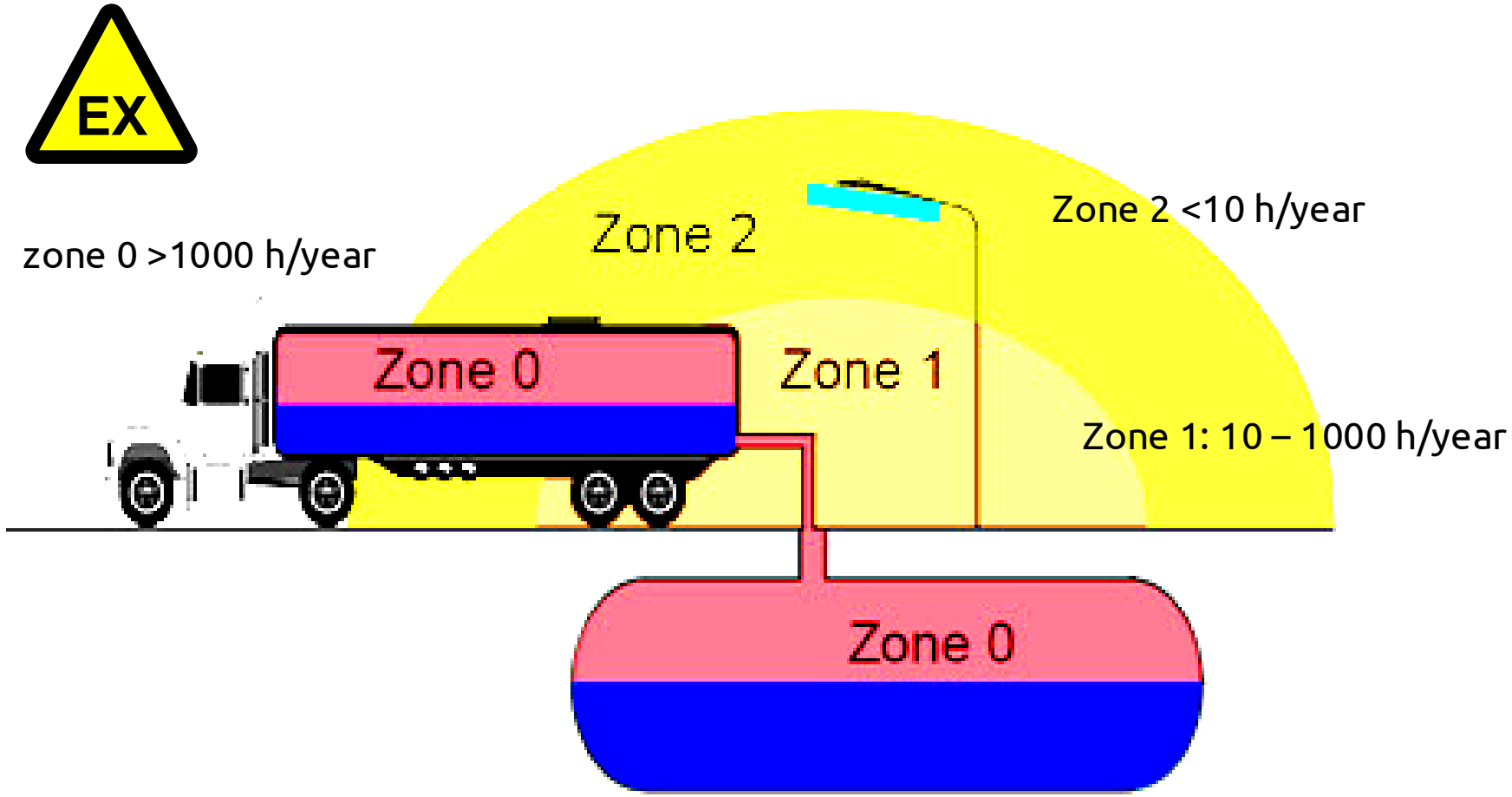
防爆设备选型要求，

防爆电气安装

常见问题以及如何避免

提问与回答环节

防爆分区示例


EX
zone 0 >1000 h/year
Zone 2
Zone 2 <10 h/year
Zone 0
Zone 1
Zone 1: 10 – 1000 h/year
Zone 0

气体分区参数

MSDS

Relevant for zoning classification:

Flashpoint
Lower Explosive Limit (LEL)
Upper Explosive Limit (UEL)
Relative density
Vapor pressure

Relevant for Equipment selection:

Ignition temperature (MIT)	点燃温度
Gasgroup (I, IIA, IIB, IIC)	气体分组
Explosion pressure	爆炸压力

可燃性气体MSDS

Isopropanol 异丙醇

Physical State:	Clear liquid
Color:	APHA: 10 max
Odor:	alcohol-like - pleasant odor
pH:	7 (1% aq. sol.)
Vapor Pressure:	43mmHg @20 deg C
Viscosity:	2.27 mPa.s @20 deg C
Boiling Point:	81 - 83 deg C @760mmHg
Freezing/Melting Point:	-89.5 deg C (-129.10°F)
Autoignition Temperature:	425 deg C (797.00 deg F)
Flash Point:	12 deg C (53.60 deg F)
Explosion Limits: Lower:	2 Vol %
Explosion Limits: Upper:	12 Vol %
Decomposition Temperature:	Not available
Solubility in water:	Miscible
Specific Gravity/Density:	0.780 g/cc
Molecular Formula:	C3H8O
Molecular Weight:	60.1

Classification into Gas Zone‘s (G) – Decission makers

- Substances: flammable?
- Operational conditions and temperatures
- Emission sources
- Outside / Inside
- Obstructions
- Wind speed / velocity
- Ventilation / Extraction / SIL-SIS
- Relative density
- Technical measures
- Organizational measures
- Toxcity of gases
- Other

- 物质：可燃?
- 运行条件和温度
- 泄漏源
- 室外/室内
- 障碍物
- 风速
- 通风/排风/功能安全
- 相对密度
- 技术措施
- 管理措施
- 气体毒性
- 其他

Classification into Ex zones: Parameters DUST zones

粉尘分区参数

MSDS	
Lower Explosive Limit (LEL)	爆炸下限
Upper Explosive Limit (UEL)	爆炸上限
Auto Ignition Temperature (AIT)	自燃温度
Ignition temperature dust layer (T5mm)	粉尘层点燃温度
Minimum Ignitition Energy (MIE)	最小点燃能量
Explosion pressure (Pmax)	爆炸压力
St. value (Kst 1, Kst 2, Kst3)	爆炸传播速度等级
Particle size	颗粒尺寸
Conductivity	导电性
Humidity	湿度

Powder dust key Ex parameters

Name of sample	:	Resin 95
Moisture content	:	1.00%
Particle size distribution	:	d(0.1) = 1.881 µm
		d(0.5) = 11.687 µm
		d(0.9) = 35.655 µm
Appearance	:	Cream white powder
Specific surface area	:	1.41 m^2/g
Average particle size by surface area	:	4.269 µm
Average particle size by volume	:	15.655 µm
Conductivity	:	Non-conductivity (measured ρ > 10^3 ohm*m)
MIE	:	5.9 mJ
MIT	:	400 deg C
Pmax	:	8.1 bar
Kst	:	222 m bar/s
LEL	:	250 g/m^3

Emission source classification

The emission sources must be classified into C – P - S

Continuously (C)
Will result into Zone 0 or 20

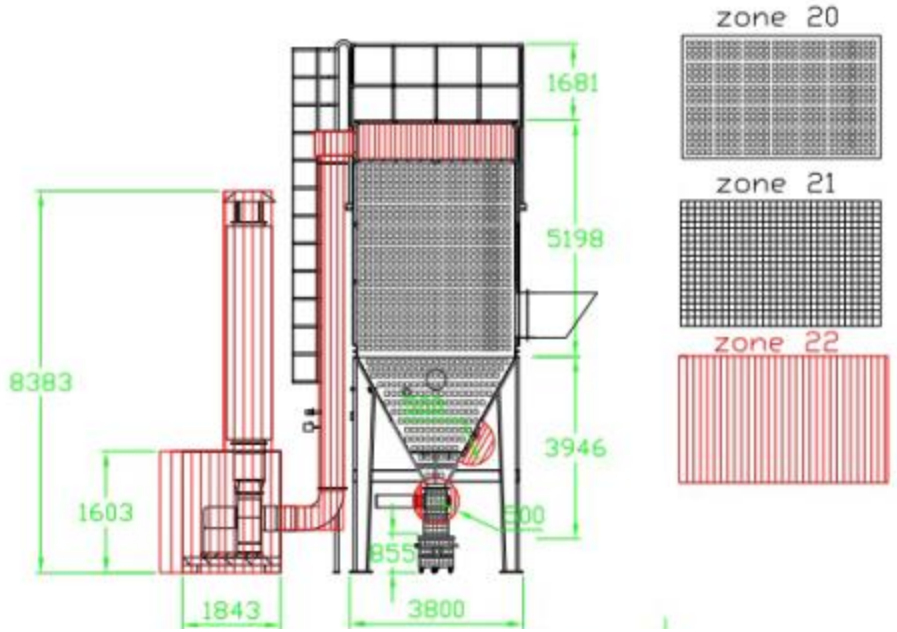
Primary (P)
Will result into Zone 1 or 21

Secondary (S)
Will result into Zone 2 or 22

Zoningsplan of tesa Dust collector - EN/IEC 60079-10-2

Step 1: Emission source analysis 泄漏源分析

Step 2: Hazardous area plan 分区图



除尘器分区图



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ATEX 1999/92/EC指令与GB 3836.15/16标准

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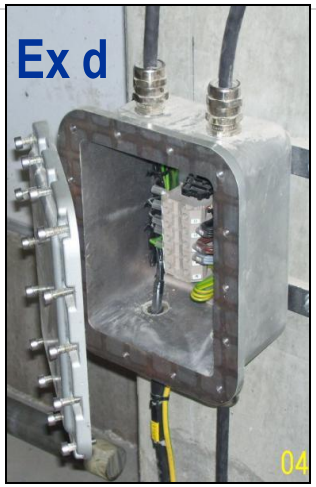
防爆设备选型要求

防爆电气安装

常见问题以及如何避免

提问与回答环节

防爆电气设备



Electrical enclosure



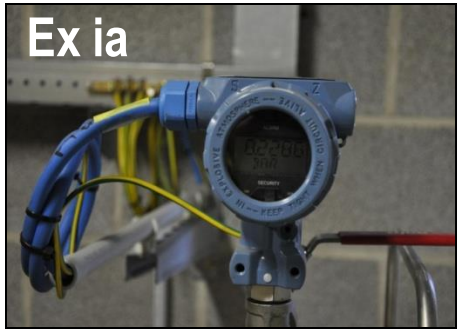
Lighting (E.g. LED Light)



Mobile phone



Motor / Rotating machinery



Pressure transmitter



Junction boxes

防爆非电气设备



Shaft Coupling



Rotary Valve



Pump



Fluid Bed Dryer



Gas Compression Station



Exhaust Fan

防爆非电气设备



Printing machines



Pump motor assembly



Painting Robots



Bottling machines



Pharmaceutical machinery



Bucket elevator

防爆分区与防爆设备选型

表 1　区域标识与适用的设备保护级别(EPL)

区域	设备保护级别（EPL）
0 区	Ga
1 区	Ga 或 Gb
2 区	Ga、Gb 或 Gc
20 区	Da
21 区	Da 或 Db
22 区	Da、Db 或 Dc

防爆电气气体组别选型

5.3 根据设备类别设计、选型

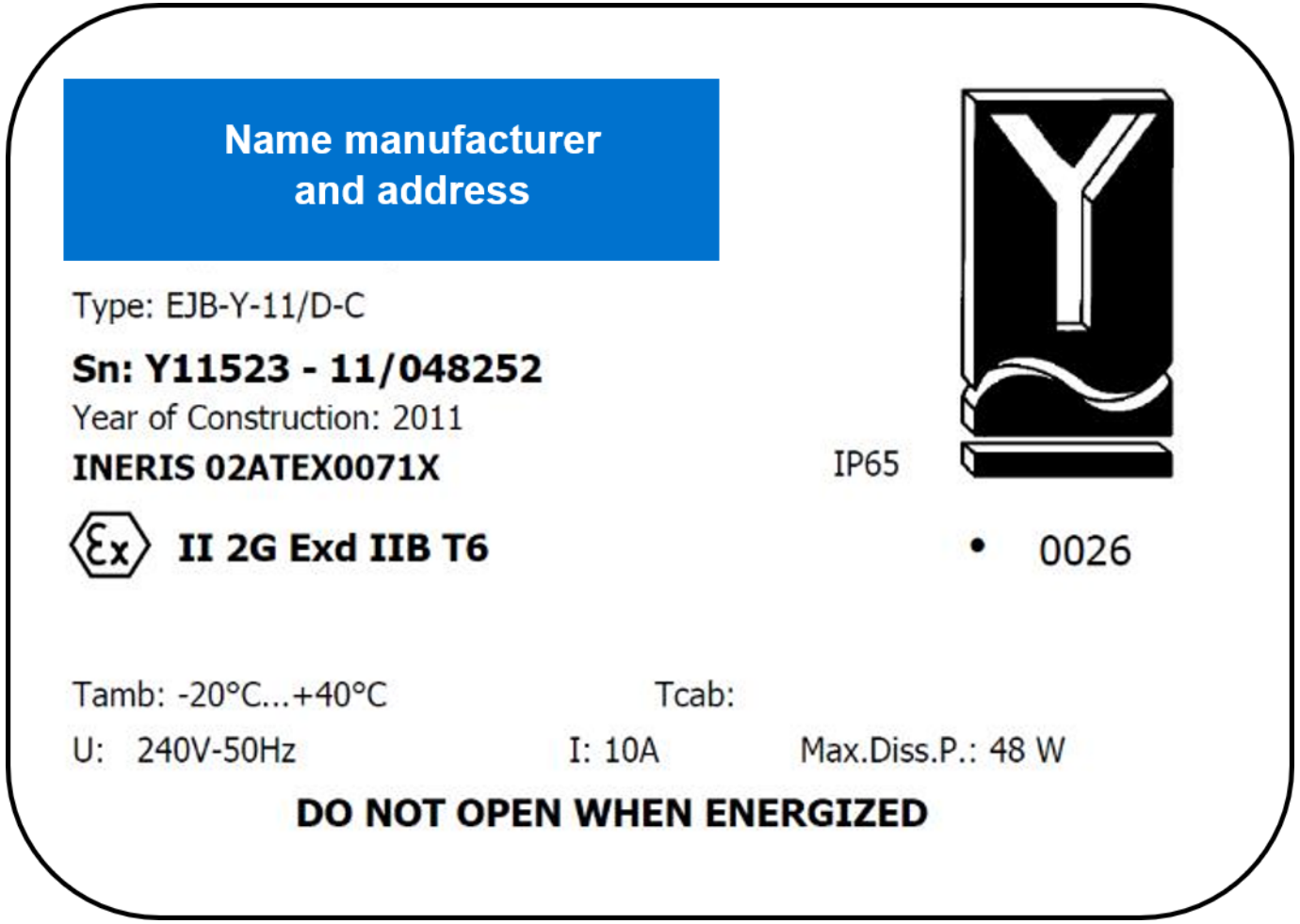
电气设备应按照表 3 选型。

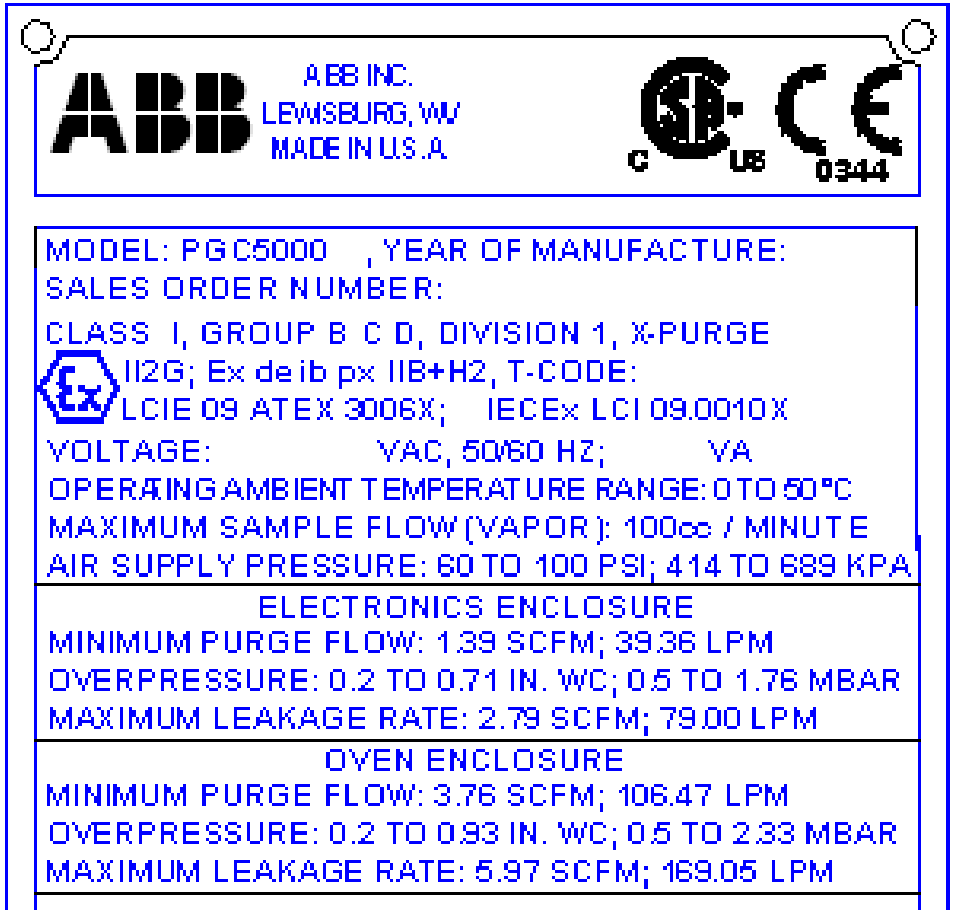
表 3 气体或蒸气或粉尘分类与设备类别之间的关系

场所气体/蒸气或粉尘分类	允许的设备类别
ⅡA	ⅡA、ⅡB或ⅡC
ⅡB	ⅡB或ⅡC
ⅡC	ⅡC
ⅢA	ⅢA、ⅢB或ⅢC
ⅢB	ⅢB或ⅢC
ⅢC	ⅢC

当电气设备标志为适用于特定气体或蒸气，在没有经过有能力检验机构的全面评定且评定结果证明适合时，不应与其他气体或蒸气一起使用。

防爆电气设备标签 - 示例


Name manufacturer
and address
Type: EJB-Y-11/D-C
Sn: Y11523 - 11/048252
Year of Construction: 2011
INERIS 02ATEX0071X
IP65
II 2G Exd IIB T6
0026
Tamb: -20°C...+40°C
Tcab:
U: 240V-50Hz
I: 10A
Max.Diss.P.: 48 W
DO NOT OPEN WHEN ENERGIZED


ABB INC.
LEWISBURG, WV
MADE IN U.S.A
0344
MODEL: PGC5000 , YEAR OF MANUFACTURE:
SALES ORDER NUMBER:
CLASS I, GROUP B C D, DIVISION 1, X-PURGE
II2G; Ex de ib px IIB+H2, T-CODE:
LCIE 09 ATEX 3006X; IECEx LCI 09.0010X
VOLTAGE: VAC, 50/60 HZ; VA
OPERATING AMBIENT TEMPERATURE RANGE: 0 TO 50°C
MAXIMUM SAMPLE FLOW (VAPOR): 100cc / MINUTE
AIR SUPPLY PRESSURE: 60 TO 100 PSI; 414 TO 689 KPA
ELECTRONICS ENCLOSURE
MINIMUM PURGE FLOW: 1.39 SCFM; 39.36 LPM
OVERPRESSURE: 0.2 TO 0.71 IN. WC; 0.5 TO 1.76 MBAR
MAXIMUM LEAKAGE RATE: 2.79 SCFM; 79.00 LPM
OVEN ENCLOSURE
MINIMUM PURGE FLOW: 3.76 SCFM; 106.47 LPM
OVERPRESSURE: 0.2 TO 0.93 IN. WC; 0.5 TO 2.33 MBAR
MAXIMUM LEAKAGE RATE: 5.97 SCFM; 169.05 LPM

议程 Agenda

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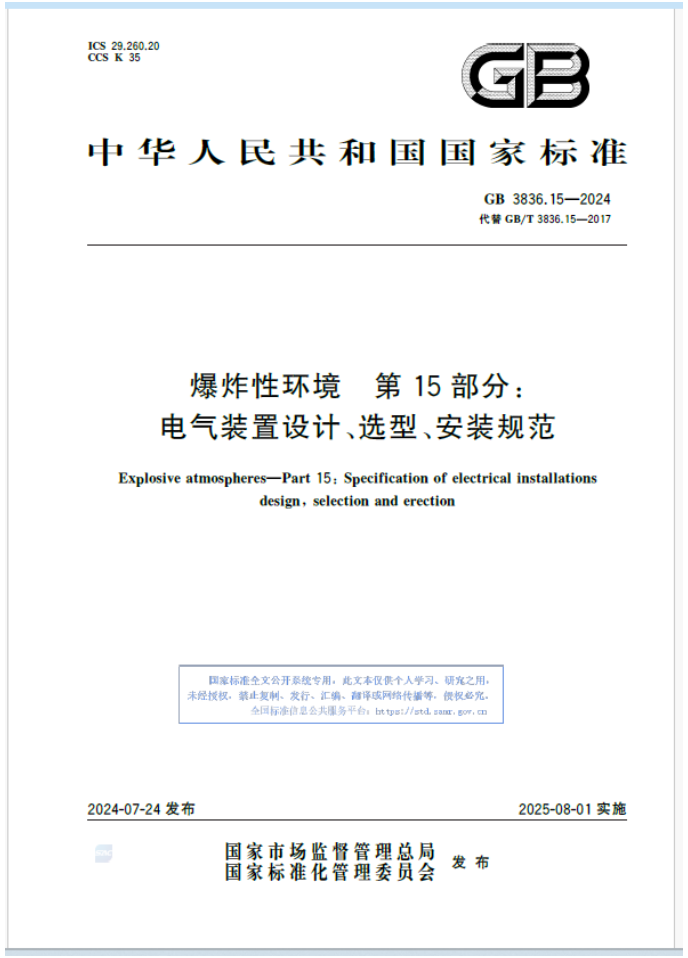
防爆设备选型要求

防爆电气安装

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提问与回答环节

防爆设备安装和选型



ICS 29.260.20
CCS K 35

中华人民共和国国家标准

GB 3836.15—2024
代替 GB/T 3836.15—2017

爆炸性环境　第 15 部分：
电气装置设计、选型、安装规范

Explosive atmospheres—Part 15: Specification of electrical installations design, selection and erection

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国家标准化管理委员会　发布

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电缆引入装置选型 - 安装过程中的要求

表 9　根据外壳防爆型式选择引入装置、接头和封堵元件防爆型式

设备防爆型式	引入装置、管接头封堵元件防爆型式			
	Ex“d” （见 6.4.5）	Ex“e”	Ex“n”	Ex “t” （见 6.4.6）
Ex“d”	√	—	—	—
Ex“e”	√	√	—	—
Ex“i”（Ⅱ类[a]）	√	√	√（见 7.3.4）	—
Ex“i”（Ⅲ类[a]）	—	—	—	√（见 7.3.4）
Ex“m”	Ex“m”通常不适用于布线连接。连接的保护技术应适合所用的布线系统			
Ex“n” 对 Ex“nR”，另见 6.4.7	√	√	√	—
Ex“o”	Ex“o”通常不适用于布线连接。连接的保护技术应适合所用的布线系统			
Ex“p”（Ⅱ类）	√	√	√[b]	—
Ex“p”（Ⅲ类）	—	—	—	√
Ex“q”	Ex“q”通常不适用于布线连接。连接的保护技术应适合所用的布线系统			
Ex“s”	仅在证书条件允许的情况下			
Ex“t”	—	—	—	√

注：√表示允许使用。

[a] 如果只使用一个本质安全电路，则对电缆引入装置没有规定要求。

[b] 只对 EPL Gc 级装置允许。

Ex d设备安装时候额外要求

7.1 对隔爆外壳“d”的附加要求

7.1.1 用于特定气体的设备

标示用于特定气体的设备，或者标示设备类别和特定气体的设备，用于特定气体环境时，安装应符合对特定气体设备类别的要求。例如，标志“ⅡB+H_2”用于氢气环境的设备，应按ⅡC设备安装。

7.1.2 固体障碍物

安装设备时，平面隔爆接合面和任何不是设备一部分的固体障碍物（例如钢架、墙、气候防护罩、安装板、管道或其他电气设备）之间的距离应满足表11的规定。

注： 防爆合格证注明有特殊安装条件的设备按其要求进行安装。

表11 与危险场所气体类别有关的平面隔爆接合面与障碍物间的最小距离

气体分类	最小距离 mm
ⅡA	10
ⅡB	30
ⅡC	40

Ex e增安型防爆设备安装额外要求

7.2 对增安型“e”的附加要求

对通用接线盒和分线盒中端子和导体的组合，应确保壳体内功率损耗引起的发热不会导致温度超过设备规定的温度组别。可采取下列措施之一：

a) 遵循制造商给出的允许端子数量、导体尺寸和最大电流的规定；

b) 检查采用制造商提供的参数计算出的功率损耗是否小于额定最大功率损耗。

导体的长度不应超过外壳对角线长度的一半。

导线束不应超过 6 根导线。

制造商的文件应包括每个端子尺寸、允许的端子数量、导体尺寸和最大电流。

除非防爆合格证中另有规定：

——接线盒外壳中仅应包含 Ex“e”端子；

——不应使用其他部件；

——每个连接点只允许有一根导体。

Ex i本安型防爆设备安装额外要求

7.3.1.1　**设备**

在符合 EPL“Gb”要求的安装中，本质安全装置以及关联装置的本质安全部分应至少为“ib”等级。

在符合 EPL“Gc”要求的安装中，本质安全装置以及关联装置的本质安全部分应至少为“ic”等级。

在符合 EPL“Db”要求的安装中，本质安全装置和关联装置的本质安全部分应至少为“ib”等级。

在符合 EPL“Dc”要求的安装中，本质安全装置和关联装置的本质安全部分应至少为“ic”等级。

连接到关联装置非本质安全接线端子的电气设备所施加的电压，不应超过关联装置铭牌规定的最高电压 U_m。电源预期短路电流不应超过 1 500 A。当预期短路电流较高时，应在上游设置熔断器或其他保护措施。当在关联装置上标志的最高电压 U_m 小于 250 V 时，应按照下列方法之一进行安装：

a）　当最高电压 U_m 不大于 50 V a.c.或 120 V d.c.时，安装在 SELV 或 PELV 系统中；

b）　通过符合标准要求的安全隔离变压器进行安装；

c）　直接连接到符合标准要求的装置上；

d）　直接由电池供电。

设备检查清单

附　录　B

（规范性）

设备初始检查表

Ex“d”、Ex“e”、Ex“n”、Ex“t”、Ex“i”、Ex“p”、Ex“o”装置检查一览表见表 B.1～表 B.4。对于 Ex“m”、Ex“q”、Ex“op”型电气设备的检查可参照表 B.1 做适当的修改，以适应这些防爆型式的保护外壳和内容的专门检查。

表 B.1　Ex“d”、Ex“e”、Ex“n”和 Ex“t”装置检查一览表

检查		Ex“d”	Ex“e”	Ex“n”、Ex“t”
A	通用(所有设备)			
1	设备适合于 EPL/安装区域要求	√	√	√
2	设备类别正确	√	√	√
3	设备温度组别正确(仅对气体)	√	√	Ex“n”
4	设备最高表面温度正确			Ex“t”
5	设备 IP 等级适合于保护等级/类别/导电性	√	√	√
6	设备电路标识正确	√	√	√
7	设备电路标识清晰	√	√	√
8	外壳、透明件及透明件与金属密封垫和/或黏结剂符合要求	√	√	√
9	不存在损坏或未经批准的修改	√	√	√
10	不存在未经批准的修改的证据			
11	螺栓、电缆引入装置(直接或间接引入)和封堵件的类型正确、完整并紧固			

表 B.2　Ex“i”装置检查一览表

检查		检查等级：详细
A	设备	
1	电路和/或设备的文件适合于 EPL/区域	√
2	安装的设备是文件所规定的设备	√
3	电路和/或电气设备类别和组别正确	√
4	IP 等级适合于存在的Ⅲ类材料	√
5	设备温度组别正确	√
6	设备的环境温度范围适合于装置	√
7	设备的工作温度范围适合于装置	√
8	装置标牌清楚	√
9	外壳、透明件及透明件与金属密封垫和/或黏结剂符合要求	√
10	螺栓和封堵件的类型正确、完整并紧固	
	——物理检查	√

议程 Agenda

ATEX 1999/92/EC指令与GB 3836.15/16标准

防爆分区基础知识，基于IEC 60079-10-1，IEC 60079-10-2

防爆设备选型要求，

防爆电气安装

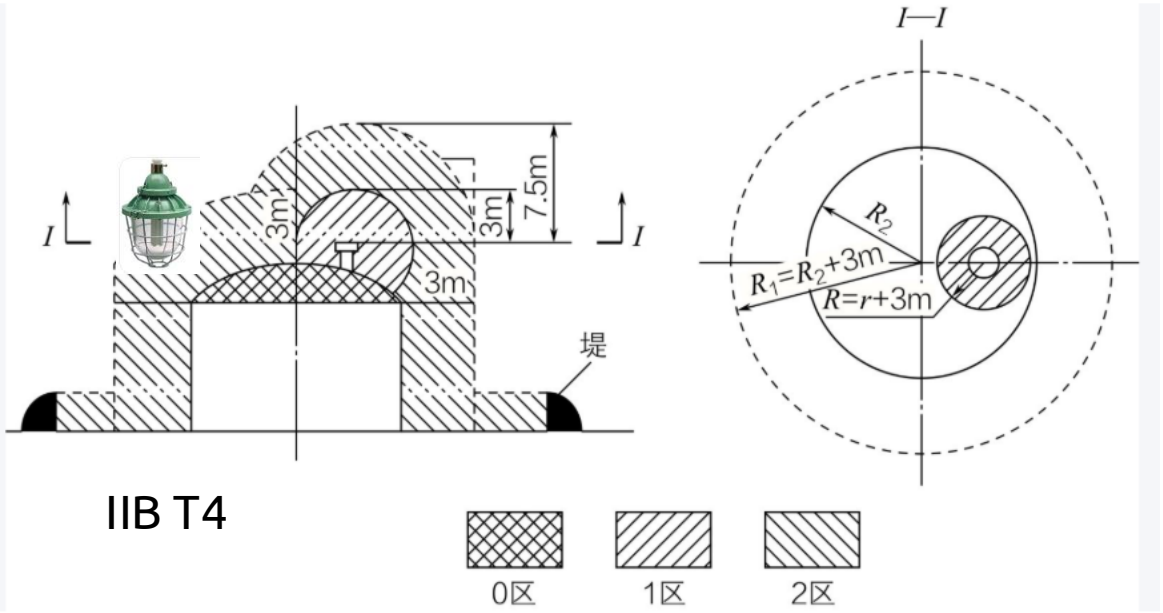
常见问题以及如何避免

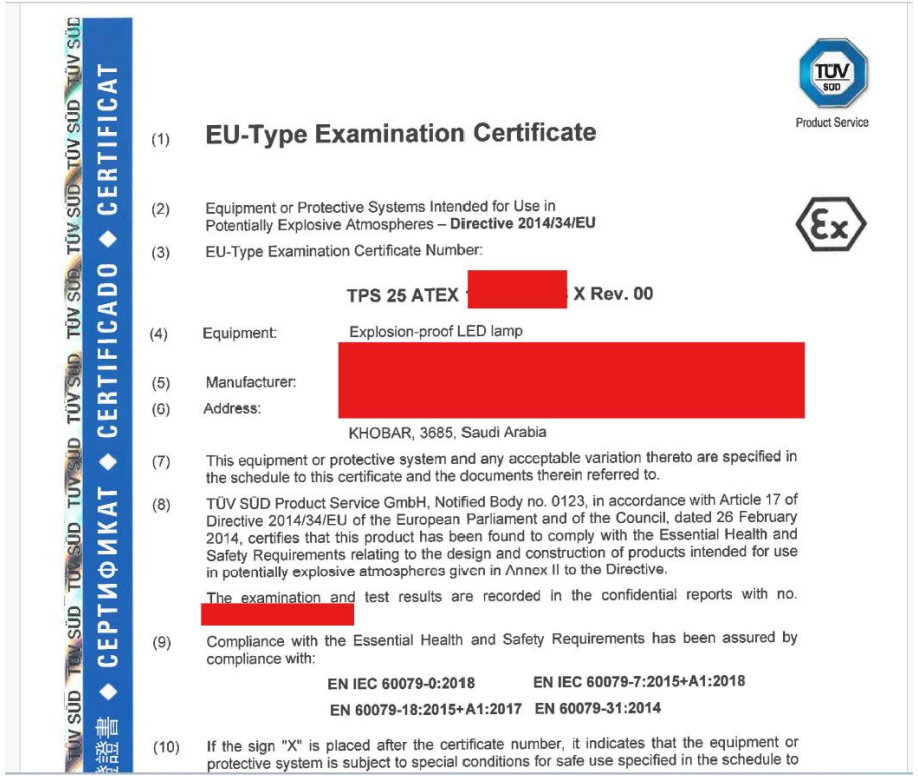
提问与回答环节

常见问题以及如何避免

错误：防爆设备选型错误，未按照EPL等级选型

避免方法：明确防爆分区，基于防爆标识选型





TÜV SÜD ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT ◆ 認證書

TÜV SÜD Product Service

(1) **EU-Type Examination Certificate**

(2) Equipment or Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

TPS 25 ATEX [redacted] X Rev. 00

(4) Equipment: Explosion-proof LED lamp

(5) Manufacturer: [redacted]

(6) Address: KHOBAR, 3685, Saudi Arabia

(7) This equipment or protective system and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) TÜV SÜD Product Service GmbH, Notified Body no. 0123, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports with no. [redacted]

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018 **EN IEC 60079-7:2015+A1:2018**

EN 60079-18:2015+A1:2017 **EN 60079-31:2014**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to

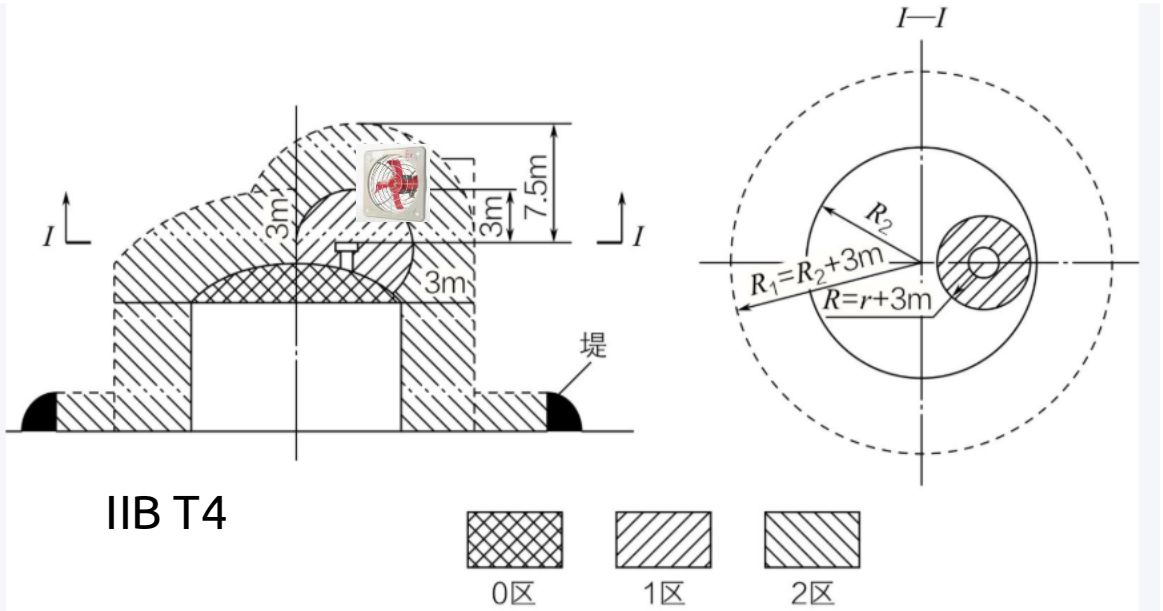
II 2G Ex eb mb IIC T6...T4 Gb

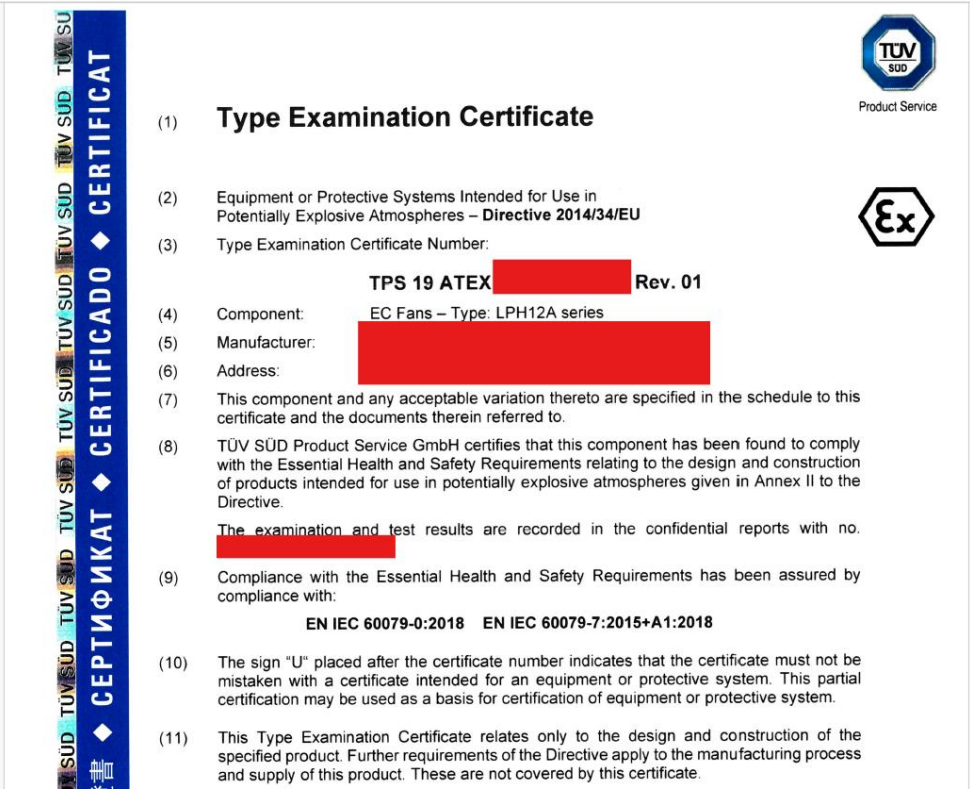
II 2D Ex tb IIIC T80°C... T100°C Db

常见问题以及如何避免

错误：防爆设备选型错误，未按照EPL等级选型

避免方法：明确防爆分区，基于防爆标识选型



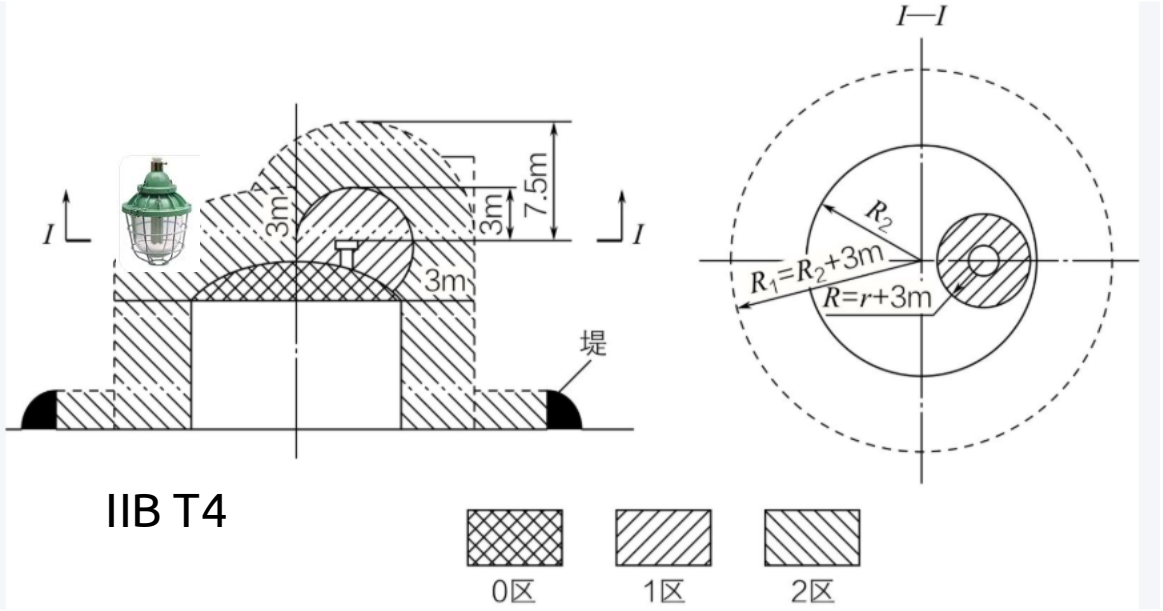


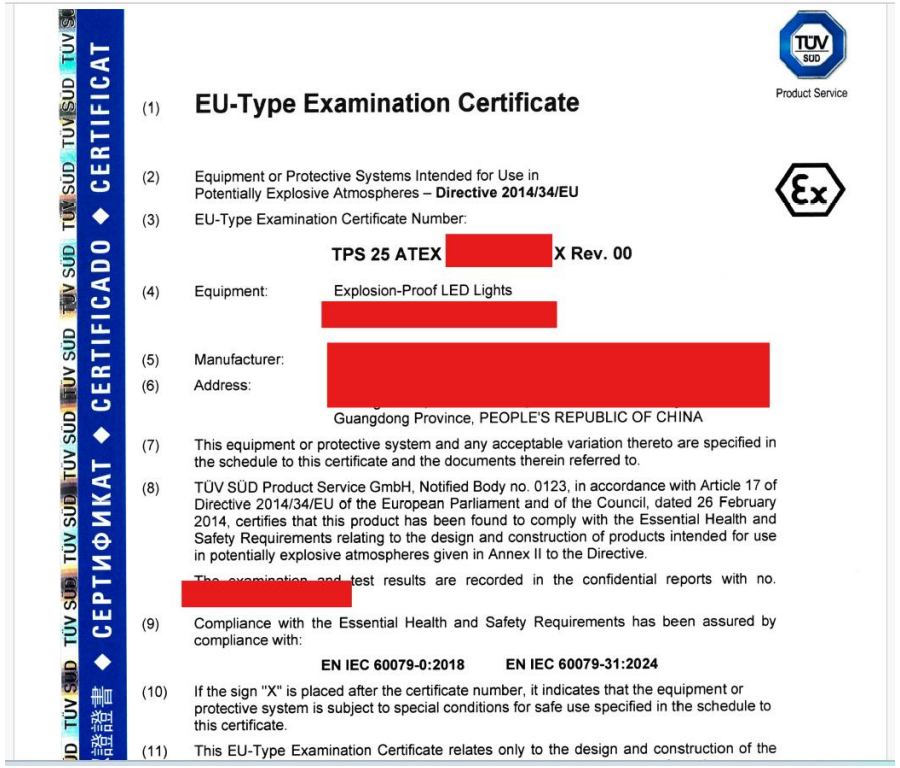
Ex II 3G Ex ec IIC Gc

常见问题以及如何避免

错误：防爆设备选型错误，未按照EPL等级选型

避免方法：明确防爆分区，基于防爆标识选型





EU-Type Examination Certificate

(1) EU-Type Examination Certificate

(2) Equipment or Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

TPS 25 ATEX [redacted] X Rev. 00

(4) Equipment: Explosion-Proof LED Lights [redacted]

(5) Manufacturer: [redacted]

(6) Address: [redacted] Guangdong Province, PEOPLE'S REPUBLIC OF CHINA

(7) This equipment or protective system and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) TÜV SÜD Product Service GmbH, Notified Body no. 0123, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports with no. [redacted]

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018 **EN IEC 60079-31:2024**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

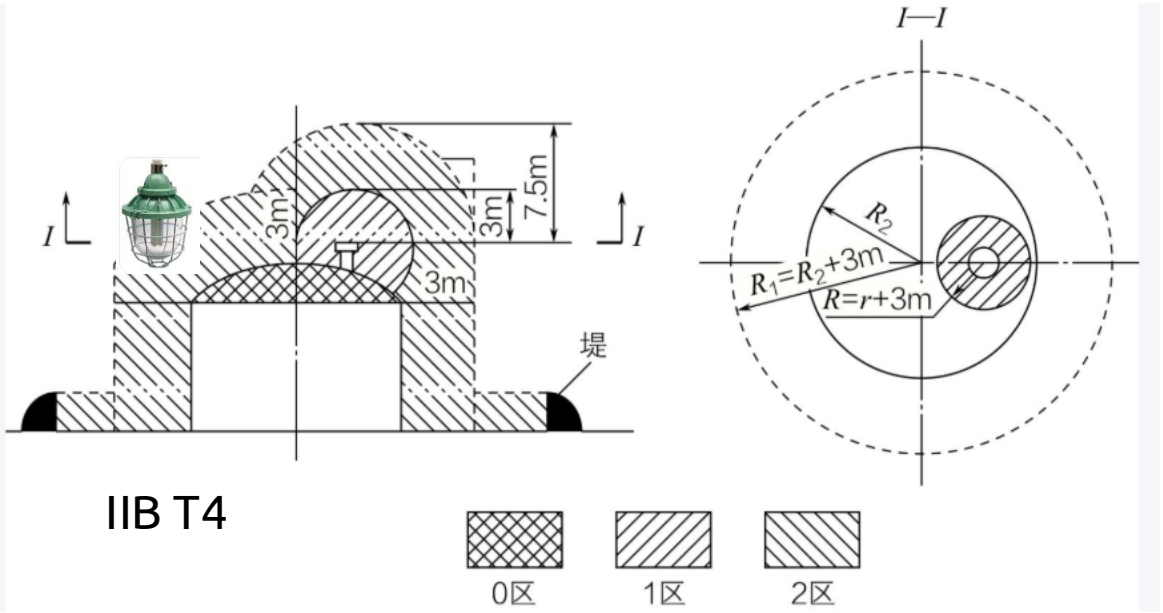
(11) This EU-Type Examination Certificate relates only to the design and construction of the

II 2D **Ex tb IIIC T95°C Db**

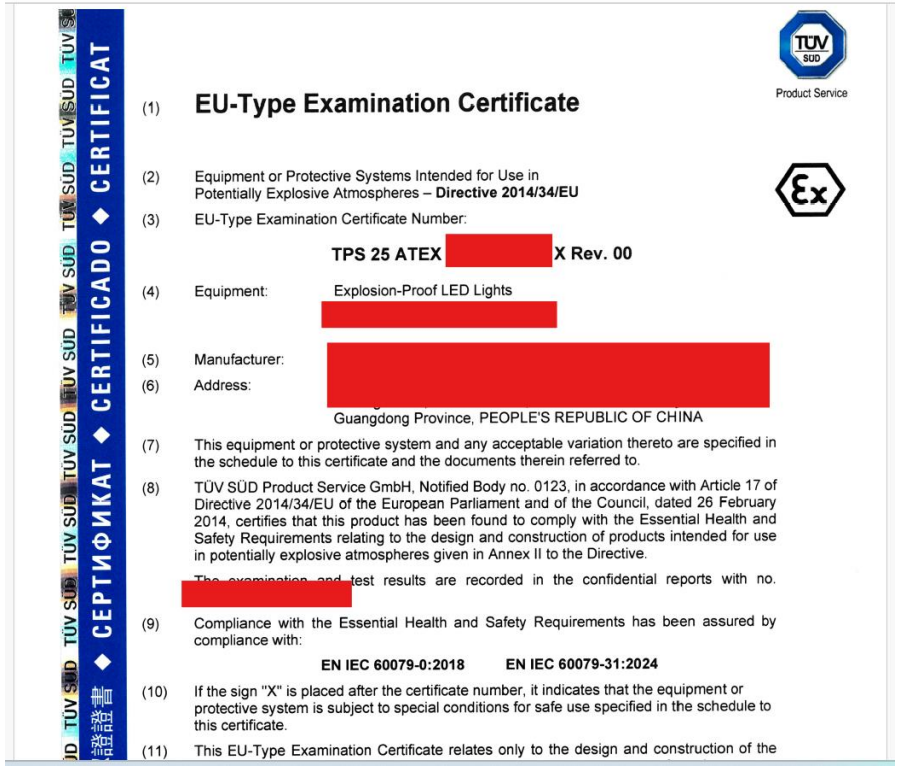
常见问题以及如何避免

错误：设备已经明显

避免方法：明确防爆分区，基于防爆标识选型



IIB T4



(1) EU-Type Examination Certificate

Product Service

(2) Equipment or Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 2014/34/EU**

(3) EU-Type Examination Certificate Number:

TPS 25 ATEX [redacted] X Rev. 00

(4) Equipment: Explosion-Proof LED Lights [redacted]

(5) Manufacturer: [redacted]

(6) Address: [redacted] Guangdong Province, PEOPLE'S REPUBLIC OF CHINA

(7) This equipment or protective system and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) TÜV SÜD Product Service GmbH, Notified Body no. 0123, in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports with no. [redacted]

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018 **EN IEC 60079-31:2024**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EU-Type Examination Certificate relates only to the design and construction of the

II 2D **Ex tb IIIC T95°C Db**

常见问题以及如何避免

裸露带电体

6.1.2　带电部件的危险

应防止裸露带电部件不慎接触，单一本质安全回路部件除外。

注：当可能同时接触一个以上的本质安全电路时，产生的火花可能有点燃能力。



常见问题以及如何避免

裸露带电体

6.1.2　带电部件的危险

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注：当可能同时接触一个以上的本质安全电路时，产生的火花可能有点燃能力。



常见问题以及如何避免

防爆格兰头的错误引用

表 9　根据外壳防爆型式选择引入装置、接头和封堵元件防爆型式

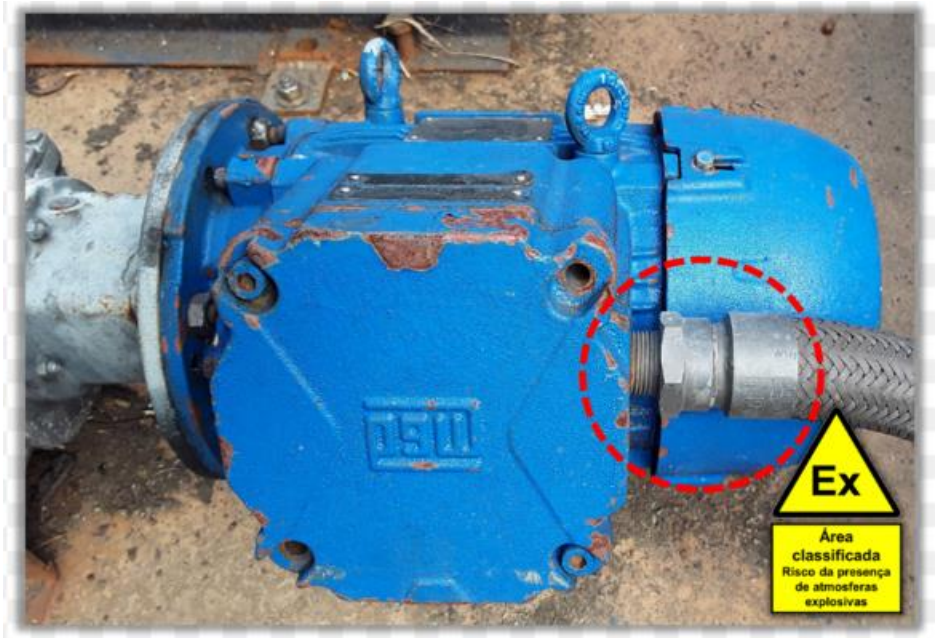
设备防爆型式	引入装置、管接头封堵元件防爆型式			
	Ex“d”（见 6.4.5）	Ex“e”	Ex“n”	Ex “t”（见 6.4.6）
Ex“d”	√	—	—	—
Ex“e”	√	√	—	—
Ex“i”（Ⅱ类[a]）	√	√	√（见 7.3.4）	—
Ex“i”（Ⅲ类[a]）	—	—	—	√（见 7.3.4）
Ex“m”	Ex“m”通常不适用于布线连接。连接的保护技术应适合所用的布线系统			
Ex“n” 对 Ex“nR”，另见 6.4.7	√	√	√	—
Ex“o”	Ex“o”通常不适用于布线连接。连接的保护技术应适合所用的布线系统			
Ex“p”（Ⅱ类）	√	√	√[b]	—
Ex“p”（Ⅲ类）	—	—	—	√
Ex“q”	Ex“q”通常不适用于布线连接。连接的保护技术应适合所用的布线系统			
Ex“s”	仅在证书条件允许的情况下			
Ex“t”	—	—	—	√
注：√表示允许使用。				
[a] 如果只使用一个本质安全电路，则对电缆引入装置没有规定要求。 [b] 只对 EPL Gc 级装置允许。				





常见问题以及如何避免

隔爆箱体随意开孔，不用防爆堵头，或者错用









提问环节 Q&A



演讲结束

感谢您的聆听