Explosion Proof Double Girder Overhead Crane Knowledge

DGCRANE

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Where explosion-proof double girder overhead cranes are needed

Explosion-proof double girder overhead cranes are suitable for use in ports, chemical plants, power plants, flour mills, pharmaceutical factories, mines, petrochemicals, railways, metallurgical chemicals, marine engineering, airport construction, military, aviation, aerospace, and other industry sectors.

Approximately 2/3 of the places in coal mines, about 60% to 80% of the places in oil extraction sites and refineries, and over 80% of the workshops in the chemical industry belong to flammable and explosive hazardous areas.

Flammable and explosive hazardous areas mainly refer to the tunnels and chambers of mines, workshops, or warehouses in factories where explosive dangerous gases (or liquids, vapors) are mixed with air to form explosive gas mixtures. These areas can produce combustion or explosion when an ignition source is present.

In these areas, it is necessary to use explosion-proof double girder overhead cranes and other types of explosion-proof electrical equipment, otherwise, there is a possibility of triggering explosive accidents, which can cause loss of life and property to the workers.

When containers filled with explosive substances are placed in non-hazardous areas, there is still a potential danger in abnormal situations (such as leakage, misoperation, high temperature, etc.). Therefore, the use of explosion-proof double girder overhead cranes should also be considered in these areas to avoid accidental dangers.

Explosion-Proof double girder overhead crane's Marking

On the exterior of the lifting mechanism and electrical equipment of an explosion-proof double girder overhead crane, a clear and permanent embossed or debossed marking of "Ex" should be placed prominently.

Classification Of Explosion-Proof Double Girder Overhead Crane

Explosive gas & vapour	I:coal mines	
	II:places other than coal mines	II A (methane)
		II B (ethylene)
		II C (hydrogen&acetylene)
Combustible dust	III:Explosive dust environments other than coal mines	III A(Inflammable catkins)
		III B(Non-conductive dust)
		III C(Conductive dust)

Notes:

- This is the latest standard JB/T 5897-2014.
- IIB class explosion-proof double girder overhead cranes can be used under conditions suitable for IIA class explosion-proof double girder overhead cranes; IIC class can be used under conditions for both IIA and IIB class explosion-proof double girder overhead cranes.

Explosion-Proof Zone

When an explosion-proof double girder overhead crane operates in an explosive gas environment, its working area is classified as Zone 1 or Zone 2 as defined in GB 3836.14-2000.

When an explosion-proof double girder overhead crane operates in a combustible dust environment, its working area is classified as Zone 21 or Zone 22 as specified in GB 12476.3-2007.

Gas & Vapour	Zone 0	Places where explosive gas mixtures are continuously present, appear frequently for short periods, or exist for long periods.

	Zone 1	Places where explosive gas atmospheres may occur.
	Zone 2	Places where an explosive gas atmosphere is unlikely to occur. If it does occur, it is only occasional and for a short duration.
Dust	Zone 20	Places where combustible dust is continuously or frequently present.
	Zone 21	Places where mixtures of combustible dust and air may occur.
	Zone 22	Occasions where combustible dust appears occasionally and exists only for a short duration.

Classifications for Temperature

Explosive temperature is the highest temperature of a surface of an explosion-proof electrical products when this explosion-proof electrical products work normally.

As we know, explosion-proof electrical products is still an electrical products which will produce heat when normal operated, but if the temperature of surface of explosion-proof electrical products is higher than spontaneous ignition temperature of the outside combustible gas or dust, this electrical products will ignite the combustible gas or dust outside the enclosure directly, in a word, explosion-proof electrical products have become an ignition source itself even electrical circuits inside the enclosure are explosion-proof type. So the temperature group may be classified into different groups.

Note: When we intended to install an explosion-proof electrical products in an gas or dust atmosphere where the spontaneous ignition temperature is 200℃(T3), so we could exactly install explosion-proof electrical products whose temperature group is 135℃(T4) but we could not install explosion-proof electrical products whose temperature group is 300℃(T2).

- The maximum surface temperature of Class I explosion-proof electrical equipment should not exceed:

——150°C：when coal dust may accumulate on the surface of the electrical equipment;
——450°C： when there is no accumulation of coal dust on the surface of the electrical equipment or measures are taken to prevent such accumulation.

- The temperature group of the explosion-proof double girder overhead crane is divided into T1-T4 according to the regulations.

Temperature Class		Maximum surface temperature
Gas & Vapour	Dust	
T1		450℃
T2		300℃
T3		200℃
T4		135℃

Gas &Vapour				
Explosion-proof degree	T1	T2	T3	T4
IIA	Acetylene、propane、styrene、benzene、xylene、carbon monoxide、acetone、acetic acid、methyl acetate、ammonia、pyridine、ethane	Ethanol、butane、propylene、acetic acid、ethyl two lu methane、thiophene、cyclopentane、dimethylamine	Pentane、decane、ethyl cyclopentane、turpentine、naphtha、petroleum、fuel oil butyl chloride、thiophene	Acetaldehyde、trimethylamine
IIB	Propyne、acrylonitrile、hydrogen cyanide、coke oven gas	Ethylene、ethylene oxide、acrylic acid、methyl furan	dimethyl ether、acrolein、tetrahydrofuran、hydrogen sulfide	ethyl methyl ether、ethyl oxide、butyl oxide、tetrafluoroethylene
IIC	Hydrogen、carbon disulfide	Acetylene		

Dust		
Explosion-proof type	T1	T2
A or B	Magnesium、red phosphorus、calcium carbide、soap power、green fuel、phenol fuel、polyethylene、polypropylene、polyurethane、polyvinyl chloride、hard rubber、natural resin、rosin、wheat flour、corn starch、cotton fiber、staple fiber、anthracite culm、charcoal dust	rice flour、cocoa powder、malt flour、coconut powder、pulverized coal、brown coal dust、pulverized bituminous coal、coal dust for gas

Equipment Protection Level(EPL)

In accordance with the likelihood of the equipment becoming an ignition source and the distinct characteristics posed by explosive gas environments, explosive dust environments, and explosive environments in coal mines with firedamp, equipment protection levels are prescribed for the equipment.

Environment	EPL	Protection Class
Coal mine gas explosive environment	Ma	Very high
	Mb	High
Explosive gas environment	Ga	Very high
	Gb	High
	Gc	General
Explosive dust environment	Da	Very high
	Db	High
	Dc	General

Explosion-proof Marking

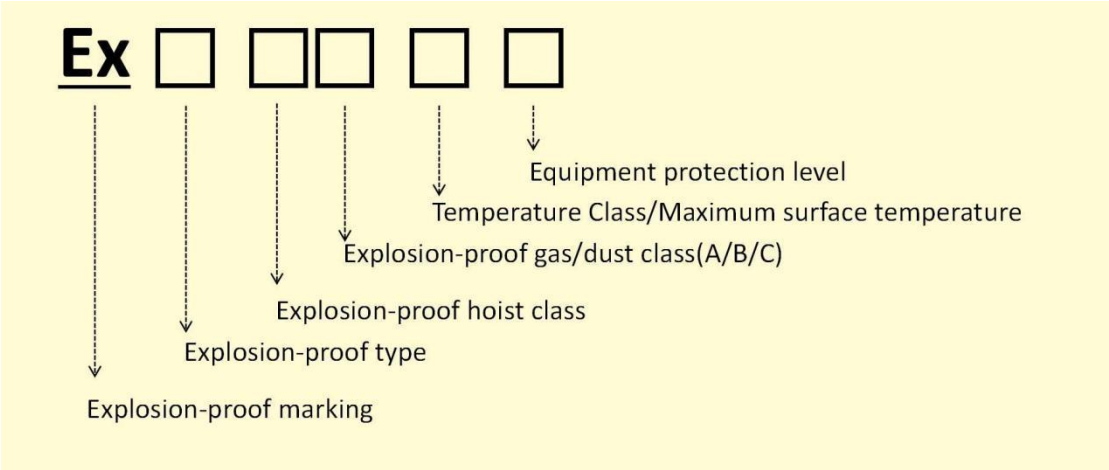
Explosion-proof mark should comply with the requirements of GB 3836.1-2021. The explosion-proof signs are implemented in the following manner:

Protection class symbol					
Explosive gas environment			Explosive dust environment		
da	flameproof enclosure	EPL Ga/Ma	ia	Intrinsic safety	EPL Da
db	flameproof enclosure	EPL Gb/Mb	ib	Intrinsic safety	EPL Db
dc	flameproof enclosure	EPL Gc	ic	Intrinsic safety	EPL Dc
eb	increased safety	EPL Gb/Mb	ma	encapsulated	EPL Da
ec	increased safety	EPL Gc	mb	encapsulated	EPL Db
ia	Intrinsic safety	EPL Ga/Ma	mc	encapsulated	EPL Dc
ib	Intrinsic safety	EPL Gb/Mb	op is	Intrinsically safe optical radiation	EPL Da、Db/Dc
ic	Intrinsic safety	EPL Gc	op pr	Protective light radiation	EPL Db/Dc
ma	encapsulated	EPL Ga/Ma	op sh	Light radiation with interlocking device	EPL Da、Db/Dc
mb	encapsulated	EPL Gb/Mb	pxb	pressurized	EPL Db

mc	encapsulated	EPL Gc	pyb	pressurized	EPL Db
nA	no-spark	EPL Gc	pzc	pressurized	EPL Dc
nC	Spark protection	EPL Gc	sa	special type	EPL Da
nR	Restricted breathing	EPL Gc	sb	special type	EPL Db
ob	Liquid-immersed	EPL Gb/Mb	sc	special type	EPL Dc
oc	Liquid-immersed	EPL Gc	ta	Shell protected type	EPL Da
op is	Intrinsically safe optical radiation	EPL Ga、Gb、Gc、Ma/Mb	tb	Shell protected type	EPL Db
op pr	Protective light radiation	EPL Gb、Gc/Mb	tc	Shell protected type	EPL Dc
op sh	Light radiation with interlocking device	EPL Ga、Gb、Gc、Ma/Mb			
pv	pressurized	EPL Gb/Gc			
pxb	pressurized	EPL Gb/Mb			
pyb	pressurized	EPL Gb			
pzc	pressurized	EPL Gc			
q	Sand-filled	EPL Gb/Mb			

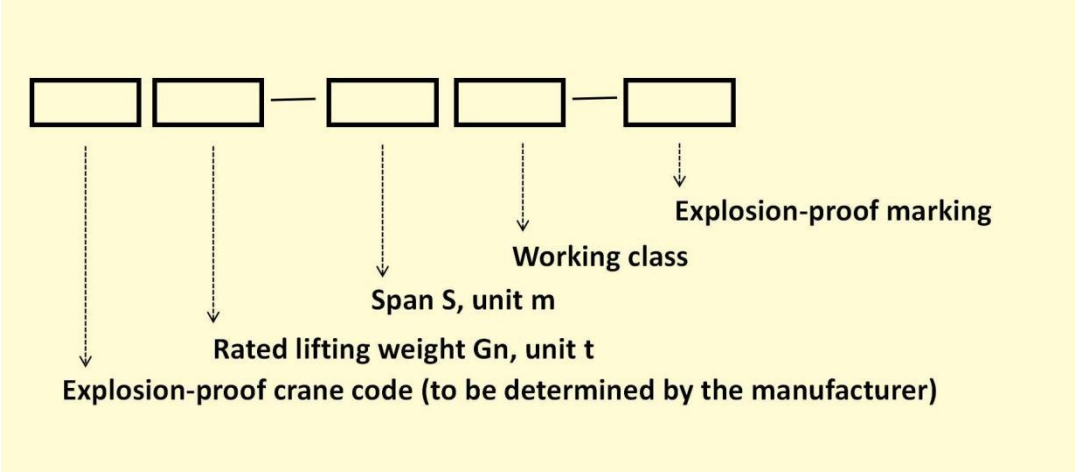
sa	special type	EPL Ga/Ma			
sb	special type	EPL Gb/Mb			
sc	special type	EPL Gc			

Examples of Markings



- Explosion-proof double girder overhead crane for explosive gas hydrogen environment, its motor, switch and other electrical parts are intended to use flameproof type ·, hydrogen level is "C", temperature group is T1, equipment protection level is Gb, so its explosion-proof mark is: Ex d IIC T1 Gb or Ex d IIC 450℃ Gb.
- Explosion-proof double girder overhead crane for explosive dust combustible flying environment, its motor, brake, switch and other electrical parts are intended to use intrinsically safe type "ia", the highest surface temperature of the equipment is 320℃, the equipment protection level is Da, the explosion-proof mark is: Ex ia IIIA T320℃ Da. When there is dust accumulation on the surface of the equipment, it is necessary to indicate the thickness of the dust layer and the maximum surface temperature of the dust layer, the thickness of the dust layer is expressed in a footnote, the unit is millimeter (mm), such as: T50 320℃.

The type expression method of explosion-proof double girder overhead crane



- In an explosive gas environment, the explosion-proof double girder bridge crane identified by a manufacturer is code-named QB, explosion-proof mark is Ex d IIC T2 Gb, rated weight is 20t, span is 22.5m, work level is A4 explosion-proof double girder bridge crane, marked as: QB20-22.5A4-Ex d IIC T2 Gb.
- Under explosive dust environment, the explosion-proof double girder bridge crane identified by a manufacturer is QB, explosion-proof mark is Ex ia IIIA T320℃ Da, rated weight 20t, span 22.5m, working class A4 explosion-proof double girder bridge crane, marked as: QB20-22.5A4-Ex ia IIIA T320℃ Da.