

Exe Enclosures for Harsh and Hazardous Locations



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Enclosures for Harsh & Hazardous locations

Hawke International have been producing Exe enclosures for over 30 years which are very highly regarded for their quality and exceptional strength – something extremely important in the demanding environments of the Oil & Gas, Petrochemical and Harsh and Hazardous industries.

For help in selecting the correct enclosure for your application see page 6



Glass Reinforced Polyester PL Range - General information

These enclosures are a self coloured black anti-static glass reinforced polyester design that meet the requirements of Exe II and ExtD to IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1. The PL6 Series Enclosures are of a robust design with a very high impact strength of up to 20Nm.



Stainless Steel S Range - General information

These enclosures are a stainless steel design that meets the requirements of Exe II and ExtD to IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1. The material qualities and electropolished finish provide a very high corrosion resistance.

Enclosure Applications

Hawke International's enclosures may be supplied with fitted terminals or as an empty component approved enclosure. If supplied as the latter, then final certification by the customer after fitting their own equipment must be obtained. In this case, the prefix 'Z' is used when ordering.

i.e. ZSize1 (ZS1).

Enclosure selection overview

The table below shows an overview of the terminal options available in each of the enclosures manufactured by Hawke International.

We understand the specification of a suitable enclosure can at first seem complex and daunting. The information below may help in the selection of a suitable enclosure using just the minimum amount of available information, such as the number of terminals needed, operating temperature or the maximum conductor acceptance.

Please see individual datasheets for full enclosure specifications

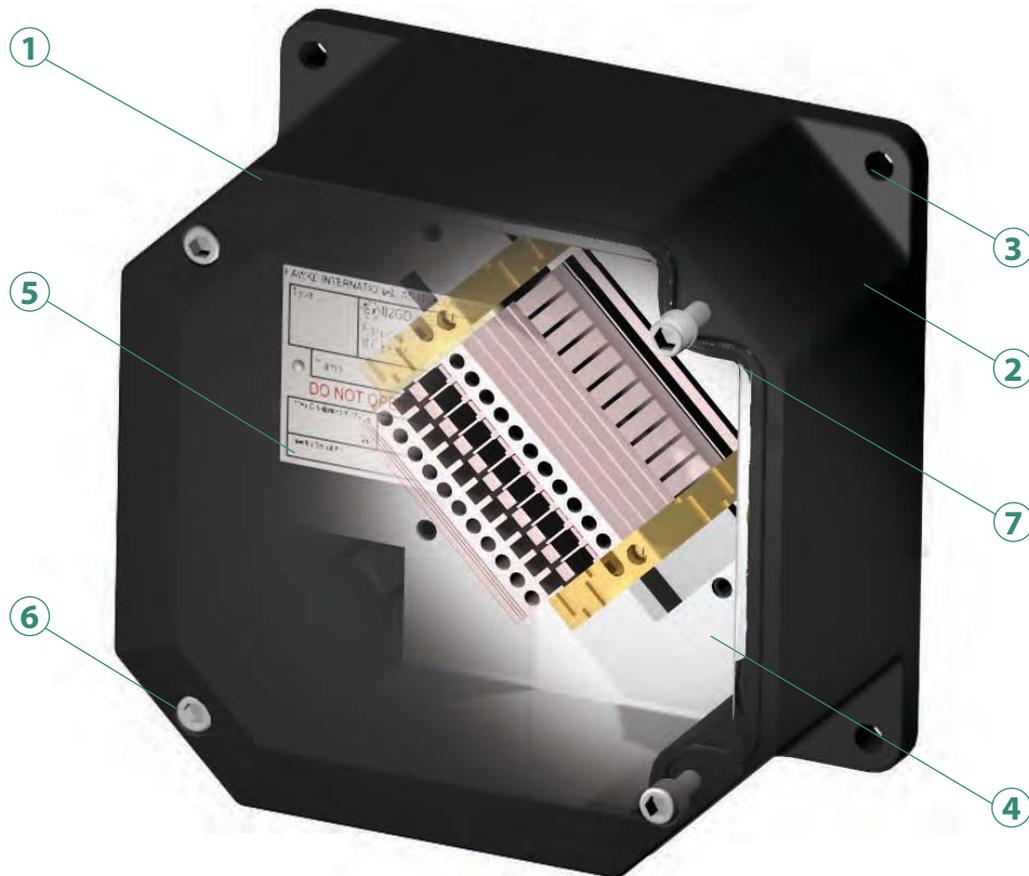
Selection Table								
	Max M20 entries	Max number of 2.5 terminals	Max terminal conductor size	Min operating temp °C	Max operating temp °C	Max voltage (V)	Available with viewing window	Standard Material
PL612	8	12*	10mm ²	-60	+75	690	NO	GRP
PL712	8	12*	10mm ²	-60	+75	690	NO	GRP
PL615	8	14	16mm ²	-60	+75	690	NO	GRP
PL722	14	35	10mm ²	-60	+75	690	NO	GRP
PL620	24	24	70mm ²	-60	+75	690	NO	GRP
PL626	24	38	35mm ²	-60	+75	690	NO	GRP
PL630	40	76	70mm ²	-60	+75	690	NO	GRP
EJB 1	16	12	10mm ²	-60	+80	690	NO	316L
EJB 2	22	18	16mm ²	-60	+80	690	NO	316L
S1	12	30	35mm ²	-60	+80	690	NO	316L
S2	28	78	70mm ²	-60	+80	1100	YES	316L
S2L	34	117	70mm ²	-60	+80	1100	YES	316L
S3	48	126	70mm ²	-60	+80	1100	YES	316L
S4	54	189	150mm ²	-60	+80	1100	YES	316L
S4L	78	252	150mm ²	-60	+80	1100	YES	316L
S5	90	249	150mm ²	-60	+80	1100	YES	316L
S6	150	416	300mm ²	-60	+80	1100	YES	316L
S7	182	640	300mm ²	-60	+80	1100	YES	316L
S8	200	912	300mm ²	-60	+80	1100	YES	316L
S9	228	1232	300mm ²	-60	+80	1100	YES	316L
Eze22	20	76*	50mm ²	-40	+80	690	NO	316L
Eze42	40	114*	50mm ²	-40	+80	690	NO	316L
Eze62	60	190*	50mm	-40	+80	690	NO	316L

*WDU 2.5N

Information contained above is for quick reference only - see individual datasheets for specific information

PL-Range GRP Enclosures





1 The Ultimate in Robust GRP Construction

Designed to withstand impact resistance up to 20Nm for PL6 series (7Nm for PL7 series). GRP construction provides a high degree of resistance to corrosive atmospheres.

2 Anti-Static Properties

Removes the risk of ignition sources through static induced sparking resistivity. Insulation resistance less than 1GΩ.

3 External Mounting Feet

Eliminates the need to remove the lid when mounting the enclosure on the wall.

4 Earth Continuity Plate

Optional.

5 Stainless Steel Rating Label

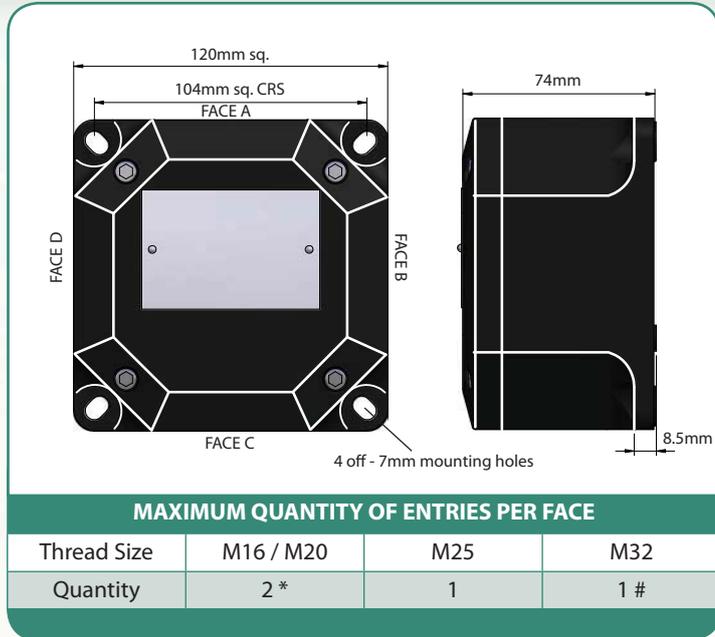
Highly durable and corrosion resistant.

6 Corrosion Resistant Stainless Steel Lid Fixing Screws with Nylon Retaining Washers

Prevents loss of screws during assembly and maintenance.

7 One Piece Durable Captive Moulded Silicone Gasket

DTS01 deluge protection. Provides Ingress Protection to IP66 and IP67. Optimum performance at low and high temperature extremes.



Technical Data

- Increased Safety Ex II 2 GD Exe II ExtD.
- PL612 Certificate No's: Baseefa06ATEX0117X and IECEx BAS 06.0028X.
- ZPL612 Certificate No's: Baseefa06ATEX0116U and IECEx BAS 06.0027U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 and IP67 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +75°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 273.
- Alternative certification options available:



* Shroud not possible with Earth Continuity Plate option.
 # Not possible with an Earth Continuity Plate.
 Optional: Earth Continuity Plate

For full technical specification, see Page 16

TERMINAL CAPACITY								
Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps		
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps	
WDU 2.5N	0.5	2.5	420	12	16	10	17	
WDU 2.5	0.5	2.5	550	10	17	10	17	
WDU 4	0.5	4	690	10	21	10	22	
WDU 6	0.5	6	550	7	29	7	29	
WDU 10	1.5	10	550	6	39	5	40	
BK 6	1	4	275	1	20	N/A	N/A	
MK 6/6	1	6	420	1	26	N/A	N/A	
HTB 6	0.5	Max. per Pillar	550	1	Conductor Size mm ²	Max. Amps per Pillar	N/A	N/A
		2 x 10mm ²			0.5	1		
		3 x 6mm ²			0.75	1		
		4 x 4mm ²			1	8		
		4 x 0.5mm ² Min.			1.5	10		
		See certificate for more options			2.5	15		
					4	21		
	6	26						
	10	37						

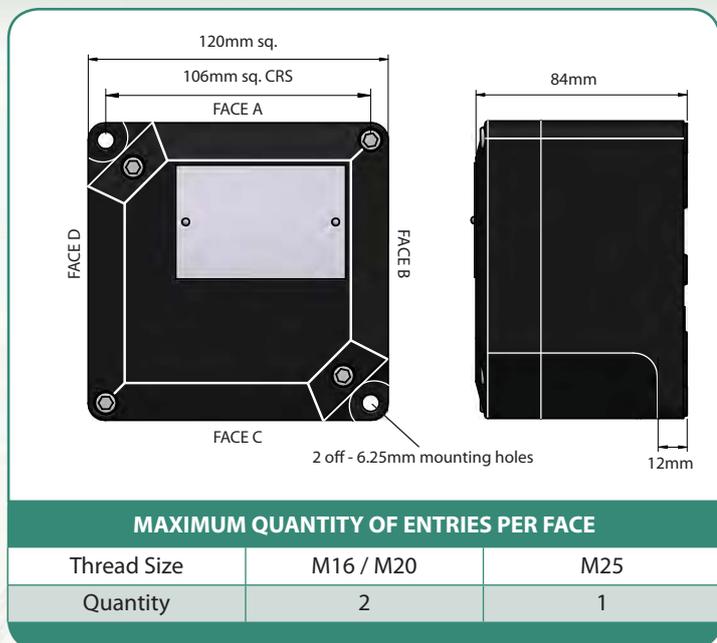
Note: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
 An earth terminal equal to that of the largest power terminal will be fitted.
 The terminals listed are restricted to a minimum operating temperature of -50°C.

Enclosure Type: PL712

Glass Reinforced Polyester

Increased Safety Exe Dual Certified ATEX / IECEx

PL Series GRP Enclosures



Optional: Earth Continuity Plate.

Technical Data

- Increased Safety II 2 GD Exe IIC Gb, Extb IIIC Db.
- PL712 Certificate No's: Baseefa08ATEX0272X and IECEx BAS 08.0091X.
- ZPL712 Certificate No's: Baseefa08ATEX0271U and IECEx BAS 08.0090U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 and IP67 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +75°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 285.
- Alternative certification options available:

AExe II / Exe II

GOST R-Exe IIU

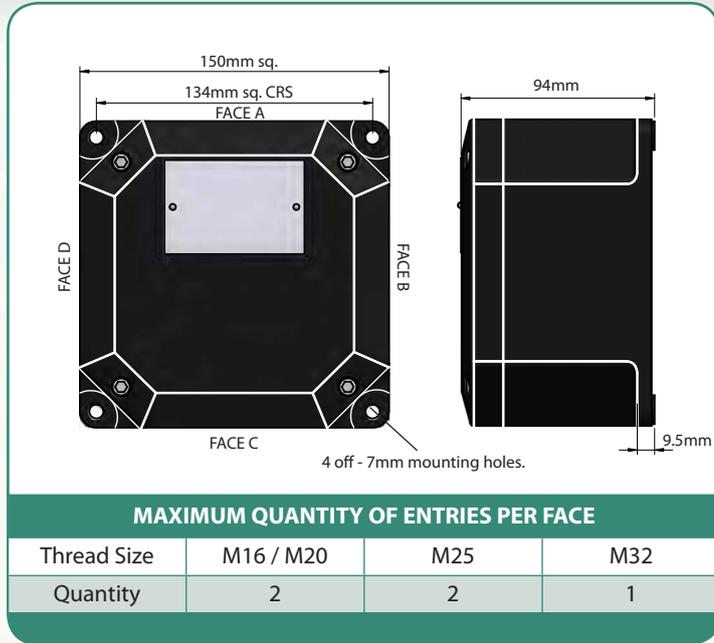
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For full technical specification, see Page 16

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5N	0.5	2.5	420	12	14	8	17
WDU 2.5	0.5	2.5	550	10	15	8	17
WDU 4	0.5	4	690	10	18	7	22
WDU 6	0.5	6	550	7	25	5	29
WDU 10	1.5	10	550	6	34	4	40
BK 6	1	4	275	1	20	N/A	N/A
MK 6/6	1	6	420	1	26	N/A	N/A
		Max. per Pillar			Conductor Size mm ²	Max. Amps per Pillar	
HTB 6	0.5	2 x 10mm ² 3 x 6mm ² 4 x 4mm ² 4 x 0.5mm ² Min. See certificate for more options	550	1	0.5 0.75 1 1.5 2.5 4 6 10	1 1 8 10 15 21 26 37	N/A

Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
An earth terminal equal to that of the largest power terminal will be fitted.
The terminals listed are restricted to a minimum operating temperature of -50°C.



Optional: Earth Continuity Plate.

Technical Data

- Increased Safety Ex II 2 GD Exe II ExtD.
- PL615 Certificate No's: Baseefa06ATEX0117X and IECEx BAS 06.0028X.
- ZPL615 Certificate No's: Baseefa06ATEX0116U and IECEx BAS 06.0027U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 and IP67 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +75°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 273.
- Alternative certification options available:



For full technical specification, see Page 16

TERMINAL CAPACITY								
Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps		
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps	
WDU 2.5	0.5	2.5	550	14	16	13	17	
WDU 4	0.5	4	690	12	21	11	22	
WDU 6	0.5	6	550	9	29	9	29	
WDU 10	1.5	10	550	7	40	7	40	
WDU 16	1.5	16	690	6	53	6	53	
HTB 6	0.5	Max. per Pillar	550	1	Conductor Size mm ²	Max. Amps per Pillar	N/A	N/A
		2 x 10mm ²			0.5	1		
		3 x 6mm ²			0.75	1		
		4 x 4mm ²			1	8		
		4 x 0.5mm ² Min.			1.5	10		
		See certificate for more options			2.5	15		
					4	21		
	6	26						
	10	37						

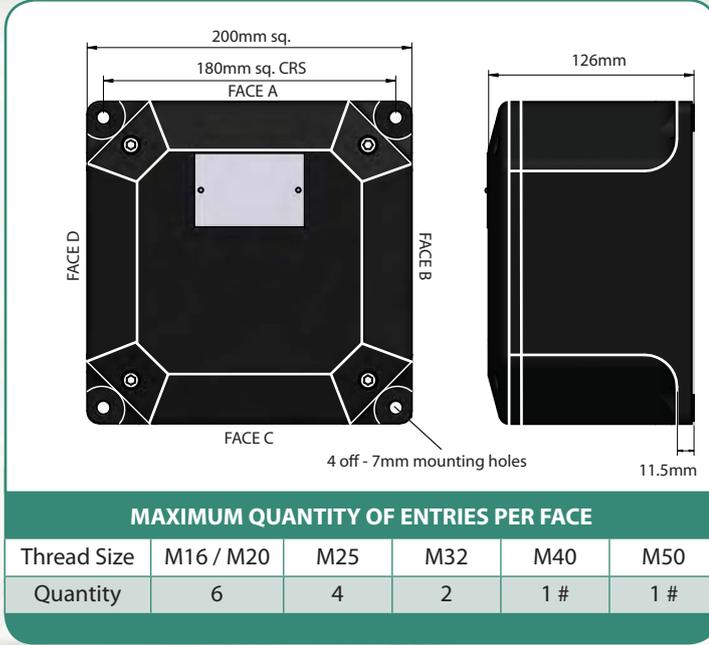
Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
An earth terminal equal to that of the largest power terminal will be fitted.
The terminals listed are restricted to a minimum operating temperature of -50°C.

Enclosure Type: PL620

Glass Reinforced Polyester

Increased Safety Exe Dual Certified ATEX / IECEx

PL Series GRP Enclosures



Technical Data

- Increased Safety Ex II 2 GD Exe II ExtD.
- PL620 Certificate No's: Baseefa06ATEX0117X and IECEx BAS 06.0028X.
- ZPL620 Certificate No's: Baseefa06ATEX0116U and IECEx BAS 06.0027U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 and IP67 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +75°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 273.
- Alternative certification options available:



Exe II



UL AExe II / Exe II



GOST R-Exe IIU

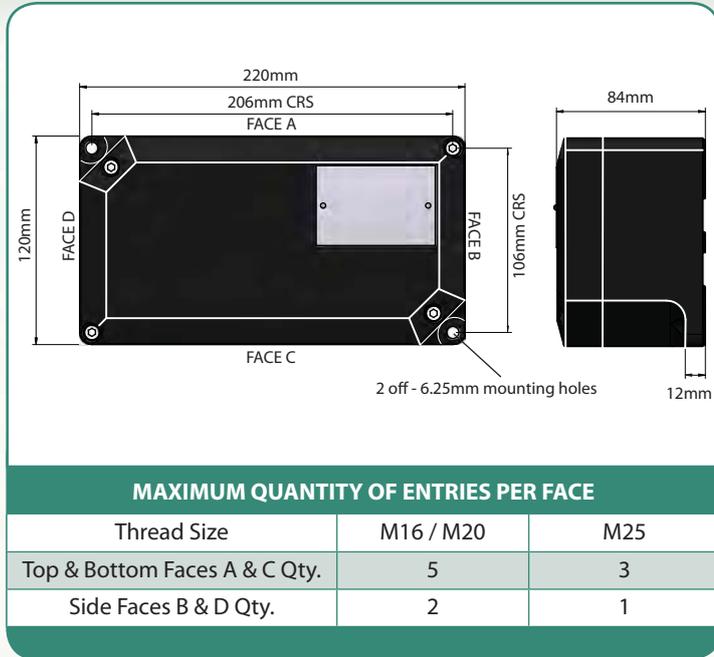


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TERMINAL CAPACITY							
Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	24	15	18	17
WDU 4	0.5	4	690	20	20	16	22
WDU 6	0.5	6	550	15	27	12	29
WDU 10	1.5	10	550	12	38	10	40
WDU 16	1.5	16	690	9	53	9	53
WDU 35	2.5	35	690	6	87	6	87
WDU 50N	6	50	690	5	88	5	88
WDU 70	10	70	690	4	134	4	134

Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
 An earth terminal equal to that of the largest power terminal will be fitted.
 The terminals listed are restricted to a minimum operating temperature of -50°C.



Optional: Earth Continuity Plate.

Technical Data

- Increased Safety Ex II 2 GD Exe IIC Gb, Extb IIIC Db
- PL712 Certificate No's: Baseefa08ATEX0272X and IECEx BAS 08.0091X.
- ZPL712 Certificate No's: Baseefa08ATEX0271U and IECEx BAS 08.0090U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 and IP67 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +75°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 285.
- Alternative certification options available:



UL AExe II / Exe II



GOST R-Exe IIU



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TERMINAL CAPACITY							
Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	35	8	9	17
WDU 4	0.5	4	690	29	11	8	22
WDU 6	0.5	6	550	22	15	6	29
WDU 10	1.5	10	550	17	22	5	40

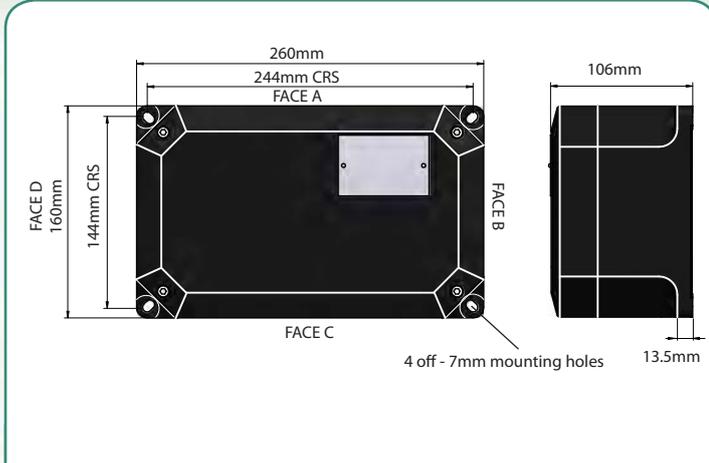
Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
 An earth terminal equal to that of the largest power terminal will be fitted.
 The terminals listed are restricted to a minimum operating temperature of -50°C.

Enclosure Type: PL626

Glass Reinforced Polyester

Increased Safety Exe Dual Certified ATEX / IECEx

PL Series GRP Enclosures

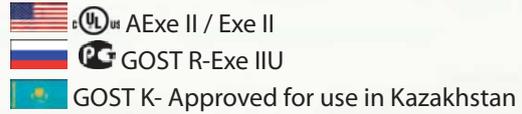


MAXIMUM QUANTITY OF ENTRIES PER FACE			
Thread Size	M16 / M20	M25	M32
Face A / C	9	4	3
Face B / D	3	2	1

Optional: Earth Continuity Plate.

Technical Data

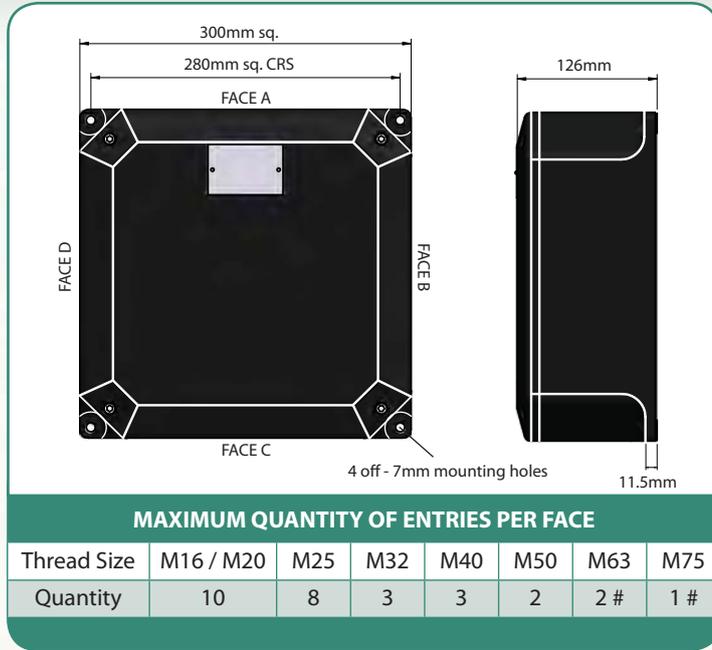
- Increased Safety Ⓜ II 2 GD Exe II ExtD.
- PL626 Certificate No's: Baseefa06ATEX0117X and IECEx BAS 06.0028X.
- ZPL626 Certificate No's: Baseefa06ATEX0116U and IECEx BAS 06.0027U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 and IP67 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +75°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 273.
- Alternative certification options available:



For full technical specification, see Page 16

TERMINAL CAPACITY							
Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	38	11	15	17
WDU 4	0.5	4	690	32	15	14	22
WDU 6	0.5	6	550	24	20	11	29
WDU 10	1.5	10	550	19	28	9	40
WDU 16	1.5	16	690	16	39	8	53
WDU 35	2.5	35	690	12	62	6	87

Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
 An earth terminal equal to that of the largest power terminal will be fitted.
 The terminals listed are restricted to a minimum operating temperature of -50°C.



Not possible with an Earth Continuity Plate.
Optional: Earth Continuity Plate.

Technical Data

- Increased Safety Ex II 2 GD Exe II ExtD.
- PL630 Certificate No's: Baseefa06ATEX0117X and IECEx BAS 06.0028X.
- ZPL630 Certificate No's: Baseefa06ATEX0116U and IECEx BAS 06.0027U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 and IP67 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +75°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 273.
- Alternative certification options available:



Exe II



UL AExe II / Exe II



GOST R-Exe IIU



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TERMINAL CAPACITY							
Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	76	9	23	17
WDU 4	0.5	4	690	64	12	21	22
WDU 6	0.5	6	550	48	17	17	29
WDU 10	1.5	10	550	36	25	14	40
WDU 16	1.5	16	690	30	34	12	53
WDU 35	2.5	35	690	22	55	9	87
WDU 50N	6	50	690	11	88	11	88
WDU 70N	10	70	690	11	108	7	134

Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
An earth terminal equal to that of the largest power terminal will be fitted.
The terminals listed are restricted to a minimum operating temperature of -50°C.

- To ensure that the maximum temperature as permitted by certification is not exceeded, the Dissipated Wattage Factor Formula is used: $W = N \times F \times I^2$ (See Page 43 for enclosure wattage).
- It is not permitted to fit more than one conductor per side in rail or direct mounted terminals unless using an insulated Bootlace Ferrule.
- Linked and mixed terminal arrangements other than those specified in the data tables are available, but the voltage and current figures may be affected to ensure the maximum certified wattage factor is not exceeded. Please contact Hawke Technical Sales for more information.
- When connecting a terminal with a conductor that is less than maximum size permitted for that terminal type, the maximum amps per pole must be reduced to suit i.e. an WDU10 (10mm²) terminal fitted with a 4mm² conductor will have the current rating reduced to that of the current rating permitted through the WDU4 (4mm²) terminal.
- For Intrinsically Safe Applications, Exe power terminals can be supplied in blue on request. (Note: the enclosure will remain Exe certified).
- An earth terminal must be fitted inside the enclosure. (Note: Power terminals may be used as 'clean earths').
- The enclosure has tapped metric entry threads as standard. Tapered threads are not permitted in plastic enclosures due to risk of stress cracking.
- The customer may drill and tap entry holes in the enclosure providing they are in accordance with the relevant code of practice and comply with the certification, Contact Hawke Technical Sales for more information.
- When mixed entries are required on a face, contact Hawke Technical Sales for more information.
- Entries into the enclosure must be via a suitable, approved entry device.
- All unused entry holes must be fitted with a stopping plug as listed on the enclosure certificate.

Specification For PL6 & PL7 Series

Certification :	PL6 - Ⓢ II 2 GD Exe II ExtD. PL7 - Ⓢ II2 GD Exe IIC Gb, Extb IIIC, Db.
Zones of Use :	Zone 1, Zone 2, Zone 21 & Zone 22.
Temperature Class & Ambients :	T6 40°C as standard. Optional T5 with ambients up to 65°C.
Operating Temperature Range :	-60°C to +75°C.
PL6 - Degree of Protection :	IP66, IP67 and Deluge proof to DTS01.
PL7 - Degree of Protection :	IP66 and Deluge proof to DTS01.
Material :	Glass Reinforced Polyester. Flame Retardant to (IEC92.1 clause 2.38).
Finish :	Natural Black.
Impact Resistance :	PL6 - Up to 20Nm. PL7 - Up to 7Nm.
Weatherproofing :	By captive moulded clear silicone gasket.
Certification Label :	Stainless Steel or optional certified self adhesive foil.
Lid Fixing Screws :	Stainless Steel (complete with nylon retaining washer).
Additional Options :	Breather/Drain devices. Internal/external earth stud. Epoxy paint finish for colour coding. EMI/RFI coating for EMC requirements.
Additional Labels :	Stainless Steel or laminated plastic (traffolyte) for external use only or optional (certified) self adhesive foil for external and/or internal use.

Earth Continuity

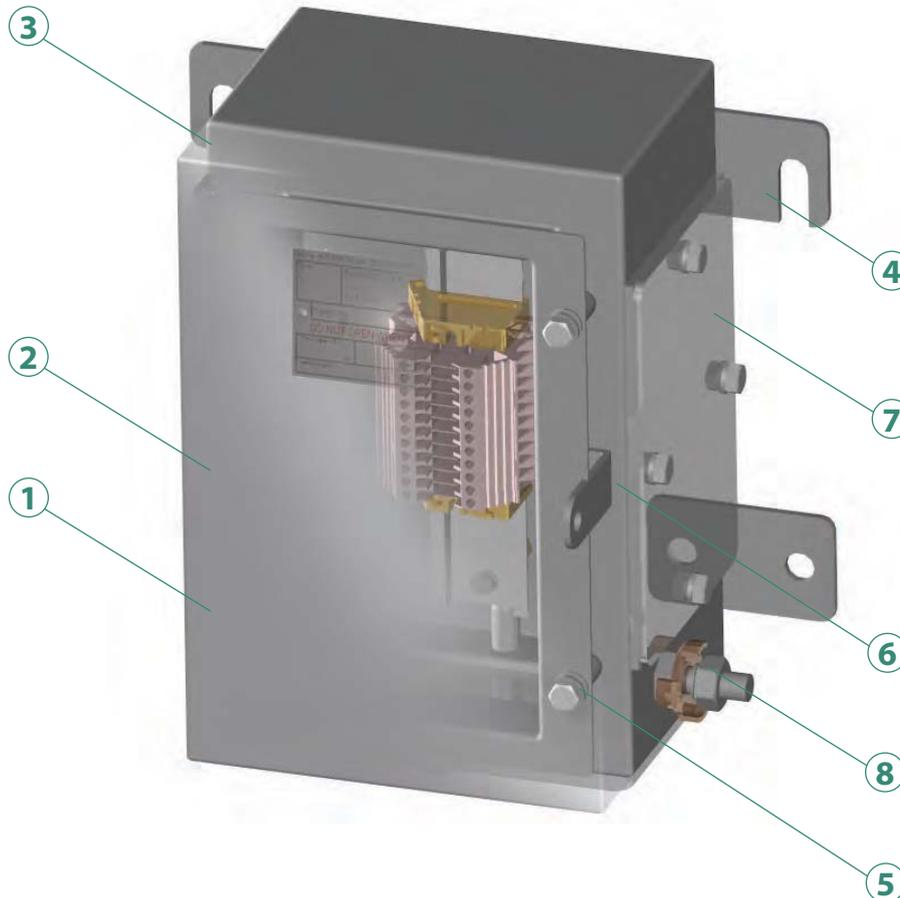
These enclosures may be fitted with an Earth Continuity Plate in plated mild steel as standard or optional brass when requested by the customer.

Note: A locknut is required on cable glands and metal stopping plugs to ensure earth continuity through the plate.

S-Series

Stainless Steel Enclosures





1 Robust Stainless Steel Construction

Enclosure material thickness ranges between 1.2 – 2.0mm with 2 – 3mm thick gland plates. Durable stainless steel rating label.

2 Electropolished Surface Finish

Provides high levels of corrosion resistance.

3 Softer Finished Rounded Edges

Safer manual handling of enclosure and gland plates.

4 Rigid Slotted External Mounting Feet

Allows enclosure to be hung onto the structure.

5 Stainless Steel Lid Fixing Screws with Nylon Retaining Washers

Prevents loss of screws during assembly and maintenance.

6 Superior One Piece Silicone Sponge Gaskets

DTS01 deluge protection.

Provides Ingress Protection to IP66.

Durable with excellent UV stability and chemical resistance. – EMC mesh option.

7 Extensive Range of Enclosure Sizes Available

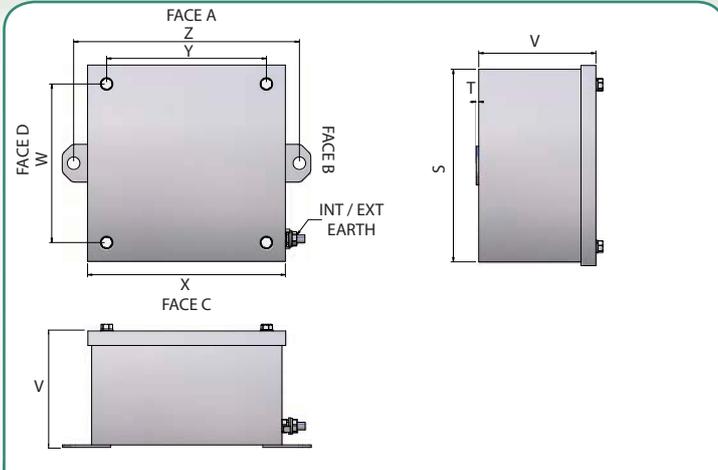
Eleven standard enclosure sizes available.

Sizes range from 153 x 233 x 130 to 740 x 1000 x 210.

Gland plates offered on two sides (Faces B & D)

and bottom (Face C) of each enclosure. Alternatively, boxes are available with gland plates on Face C only.

8 Internal/External Earth Stud Fitted



MAXIMUM QUANTITY OF ENTRIES PER FACE

Thread Size	M16		M20		M25		M32		M40		M50	
Box Type	EJB 1	EJB 2										
Face A / C	6	10	6	8	3	3	2	3	2	2	0	1
Face B	4	8	4	6	2	2	1	2	1	2	0	1
Face D	6	10	6	8	3	3	2	3	2	2	0	1

Technical Data

- Increased Safety Ⓢ II 2 GD Exe II C Gb Extb, III C Db.
- EJB 1 Certificate No's: Baseefa 08ATEX 0208X and IECEx BAS08.0065X.
- ZEJB 1 Certificate No's: Baseefa 08ATEX0207U and IECEx BAS08.0064U
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI – Pending.

For full technical specification, see Page 32

Dimension	EJB1 Size (mm)	EJB2 Size (mm)
S	120	150
T	2	2
V	80.5	90.5
W	96	126
X	126	156
Y	96	126
Z	148	178

TERMINAL CAPACITY

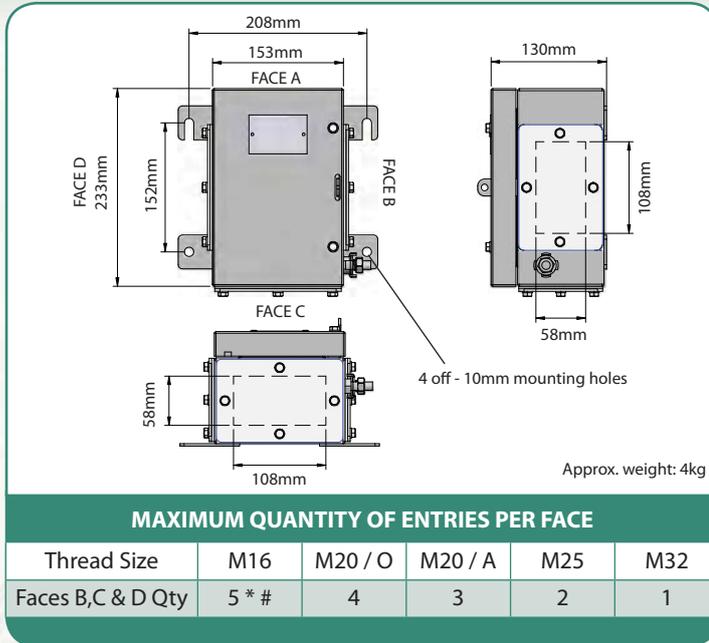
Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content				Reduced Terminal Content at Max. Terminal Amps			
	Min.	Max.		Terminal Qty.		Amps		Terminal Qty.		Amps	
				EJB 1	EJB 2	EJB 1	EJB 2	EJB 1	EJB 2	EJB 1	EJB 2
WDU 2.5N	0.5	2.5	420	12	18	15	13	9	11	17	17
WDU 2.5	0.5	2.5	550	12	18	15	13	9	11	17	17
WDU 4	0.5	4	690	10	15	20	18	8	10	22	22
WDU 6	0.5	6	550	7	11	28	24	6	8	29	29
WDU 10	1.5	10	550	6	9	38	34	5	6	40	40
WDU16	1.5	16	550	-	7	-	47	-	-	-	-
BK 6	1	4	275	1	-	21	-	-	-	-	-
MK 6/6	1	6	420	1	-	26	-	-	-	-	-
		Max. per Pillar				Conductor Size mm ²	Max. Amps per Pillar	Conductor Size mm ²	Max. Amps per Pillar		
HTB 6	0.5	2 x 10mm ² 3 x 6mm ² 4 x 4mm ² 4 x 0.5mm ² (Min) See certificate for more options	550	1	1	0.5	1	0.5	1	N/A	1
						0.75	1	0.75	1		
						1	8	1	8		
						1.5	10	1.5	10		
						2.5	15	2.5	15		
						4	21	4	21		
						6	26	6	26		
						10	37	10	37		

Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44 The box is supplied with an integral internal / external earth stud assembly. The terminals listed are restricted to a minimum operating temperature of -50°C.

Enclosure Type: Size 1 (S1) Stainless Steel

S Series Enclosures

Increased Safety Exe Dual Certified ATEX / IECEx



Technical Data

- Increased Safety Ex II 2 GD Exe II ExtD.
- Size 1 (S1) Certificate No's: Baseefa08ATEX0208X and IECEx BAS 08.0065X.
- Z Size 1 (ZS1) Certificate No's: Baseefa08ATEX0207U and IECEx BAS 08.0064U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 266.
- 210mm deep option available.
- Alternative certification options available:



Exe II



AExe II / Exe II



GOST R-Exe IIU



GOST K- Approved for use in Kazakhstan

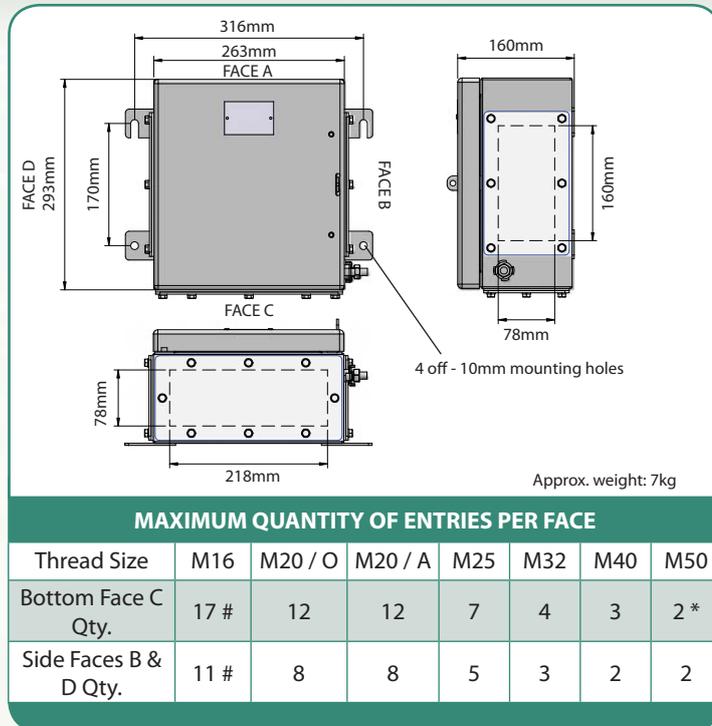
For full technical specification, see Page 32

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	30	13	18	17
WDU 4	0.5	4	690	25	17	16	22
WDU 6	0.5	6	550	19	24	13	29
WDU 10	1.5	10	550	15	34	11	40
WDU 16	1.5	16	690	13	45	9	53
WDU 35	2.5	35	690	9	75	6	87

Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
The box is supplied with an integral internal / external earth stud assembly.
The terminals listed are restricted to a minimum operating temperature of -50°C.

Increased Safety Exe Dual Certified ATEX / IECEx



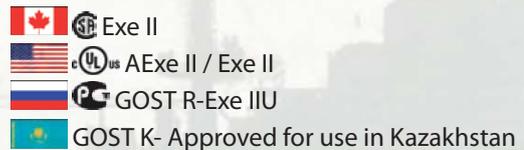
MAXIMUM QUANTITY OF ENTRIES PER FACE

Thread Size	M16	M20 / O	M20 / A	M25	M32	M40	M50
Bottom Face C Qty.	17 #	12	12	7	4	3	2 *
Side Faces B & D Qty.	11 #	8	8	5	3	2	2

Serrated Washers / Locknuts with large outside diameters may foul on adjacent glands.
* Serrated Washers / Locknuts must not foul on aperture wall.

Technical Data

- Increased Safety Ex II 2 GD Exe II ExtD.
- Size 2 (S2) Certificate No's: Baseefa08ATEX0208X and IECEx BAS 08.0065X.
- Z Size 2 (ZS2) Certificate No's: Baseefa08ATEX0207U and IECEx BAS 08.0064U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 266.
- 210mm deep option available.
- Alternative certification options available:



For full technical specification, see Page 32

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	78	8	17	17
WDU 4	0.5	4	690	50	12	16	22
WDU 6	0.5	6	550	42	16	13	29
WDU 10	1.5	10	550	36	22	11	40
WDU 16	1.5	16	690	28	31	10	53
WDU 35	2.5	35	690	20	52	7	87
WDU 50N	6	50	690	16	69	9	88
WDU 70N	10	70	690	8	113	5	134
WFF 35	2.5	35	1100	6	76	6	76

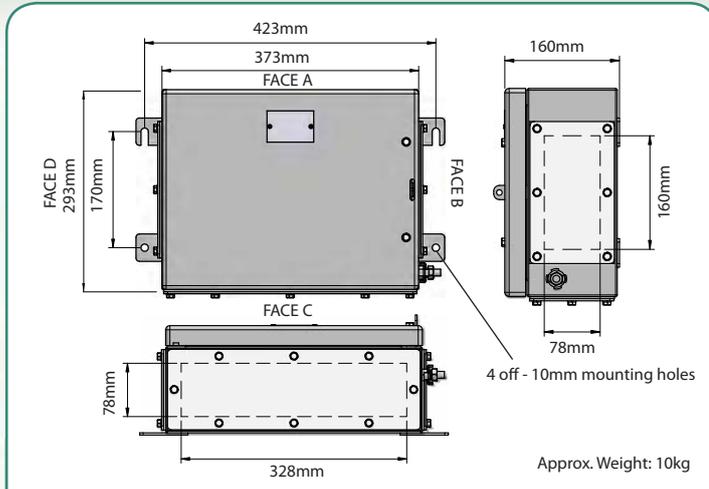
Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
The box is supplied with an integral internal / external earth stud assembly.
The terminals listed are restricted to a minimum operating temperature of -50°C.

Enclosure Type: Size 2L (S2L) Stainless Steel

S Series Enclosures

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Increased Safety Exe Dual Certified ATEX / IECEx



MAXIMUM QUANTITY OF ENTRIES PER FACE

Thread Size	M16	M20 / O	M20 / A	M25	M32	M40	M50
Bottom Face C Qty.	26 #	18	18	11	6	5	4 *
Side Faces B & D Qty.	11 #	8	8	5	3	2	2

Serrated Washers / Locknuts with large outside diameters may foul on adjacent glands.

* Serrated Washers / Locknuts must not foul on aperture wall.

Technical Data

- Increased Safety Ex II 2 GD Exe II ExtD.
- Size 2 (S2L) Certificate No's: Baseefa08ATEX0208X and IECEx BAS 08.0065X.
- Z Size 2 (ZS2L) Certificate No's: Baseefa08ATEX0207U and IECEx BAS 08.0064U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 266.
- 210mm deep option available.
- Alternative certification options available:



Exe II



AExe II / Exe II



GOST R-Exe IIU



GOST K- Approved for use in Kazakhstan

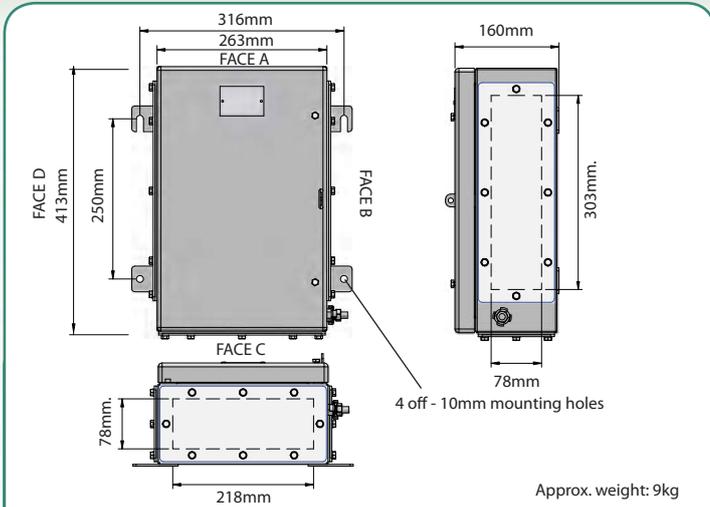
For full technical specification, see Page 32

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	117	6	15	17
WDU 4	0.5	4	690	75	9	14	22
WDU 6	0.5	6	550	63	12	11	29
WDU 10	1.5	10	550	54	17	10	40
WDU 16	1.5	16	690	42	24	8	53
WDU 35	2.5	35	690	30	40	6	87
WDU 50N	6	50	690	24	53	8	88
WDU 70N	10	70	690	16	16	5	134
WFF 35	2.5	35	1100	6	76	6	76

Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
The box is supplied with an integral internal / external earth stud assembly.
The terminals listed are restricted to a minimum operating temperature of -50°C.

Increased Safety Exe Dual Certified ATEX / IECEx



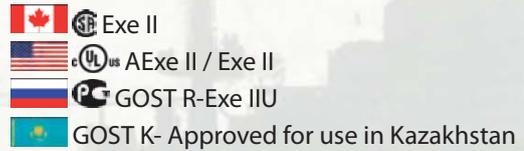
MAXIMUM QUANTITY OF ENTRIES PER FACE

Thread Size	M16	M20 / O	M20 / A	M25	M32	M40	M50
Bottom Face C Qty.	17 #	12	12	7	4	3	2
Side Faces B & D Qty.	23 #	16	16	9	5	4	3

Serrated Washers / Locknuts with large outside diameters may foul on adjacent glands.

Technical Data

- Increased Safety Ex II 2 GD Exe II ExtD A21.
- Size 3 (S3) Certificate No's: Baseefa08ATEX0208X and IECEx BAS 08.0065X.
- Z Size 3 (ZS3) Certificate No's: Baseefa08ATEX0207U and IECEx BAS 08.0064U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 266.
- 210mm deep option available.
- Alternative certification options available:



For full technical specification, see Page32

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	126	6	19	17
WDU 4	0.5	4	690	94	9	17	22
WDU 6	0.5	6	550	72	13	15	29
WDU 10	1.5	10	550	56	19	12	40
WDU 16	1.5	16	690	48	25	11	53
WDU 35	2.5	35	690	36	41	8	87
WDU 50	6	50	690	28	56	11	88
WDU 70N	10	70	690	14	90	6	134
WFF 35	2.5	35	1100	11	76	11	76

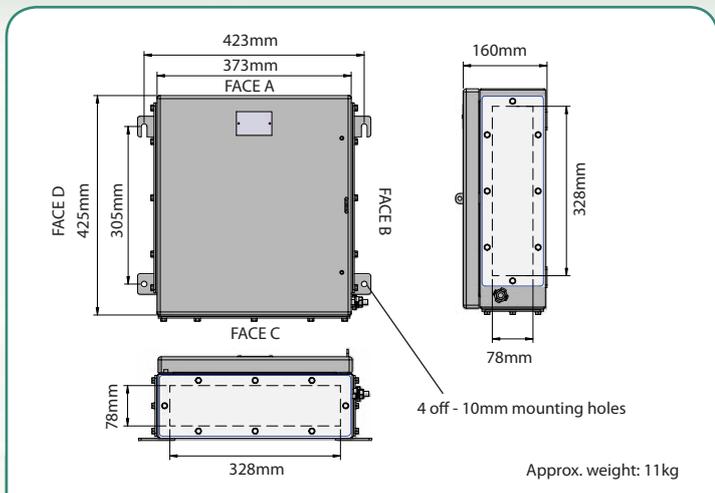
Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
The box is supplied with an integral internal / external earth stud assembly.
The terminals listed are restricted to a minimum operating temperature of -50°C.

Enclosure Type: Size 4 (S4) Stainless Steel

S Series Enclosures

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Increased Safety Exe Dual Certified ATEX / IECEx



MAXIMUM QUANTITY OF ENTRIES PER FACE

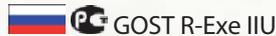
Thread Size	M16	M20 / O	M20 / A	M25	M32	M40	M50
Faces B, C & D Qty.	26 #	18	18	11	6	5	4 *

Serrated Washers / Locknuts with large outside diameters may foul on adjacent glands.

* Serrated Washers / Locknuts must not foul on aperture wall.

Technical Data

- Increased Safety Ex II 2 GD Exe II ExtD.
- Size 4 (S4) Certificate No's: Baseefa08ATEX0208X and IECEx BAS 08.0065X.
- Z Size 4 (ZS4) Certificate No's: Baseefa08ATEX0207U and IECEx BAS 08.0064U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 266.
- 210mm deep option available.
- Alternative certification options available:



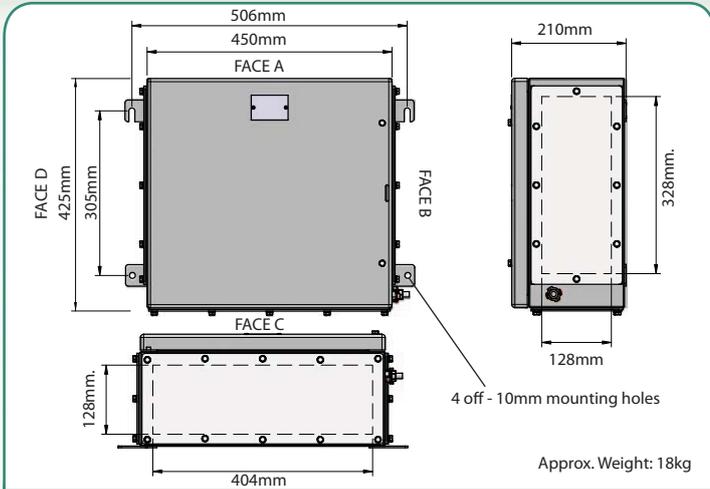
For full technical specification, see Page 32

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	189	5	22	17
WDU 4	0.5	4	690	141	8	20	22
WDU 6	0.5	6	550	108	11	17	29
WDU 10	1.5	10	550	84	16	14	40
WDU 16	1.5	16	690	72	22	13	53
WDU 35	2.5	35	690	54	36	9	87
WDU 50	6	50	690	42	49	13	88
WDU 70N	10	70	690	30	67	7	134
WDU 70 / 95	16	70	690	11	94	6	134
WDU 70 / 95	16	95	690	11	104	8	134
WDU 120 / 150	35	120	690	9	144	7	162
WDU 120 / 150	35	150	690	9	153	7	162
WFF 35	2.5	35	1100	11	76	11	76
WFF 70	2.5	70	1100	9	116	9	116
WFF 120	6	120	1100	7	162	7	162

Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
The box is supplied with an integral internal / external earth stud assembly.
The terminals listed are restricted to a minimum operating temperature of -50°C.

Increased Safety Exe Dual Certified ATEX / IECEx



MAXIMUM QUANTITY OF ENTRIES PER FACE

Thread Size	M16	M20 / O	M20 / A	M25	M32	M40	M50	M63	M75
Bottom Face C Qty.	44 #	42	32	26	14	11	6	4	3
Side Faces B & D Qty.	26 #	18	18	11	6	5	4 *	2	1

Serrated Washers / Locknuts with large outside diameters may foul on adjacent glands.
* Serrated Washers / Locknuts must not foul on aperture wall.

Technical Data

- Increased Safety Ex II 2 GD Exe II ExtD.
- Size 4 (S4L) Certificate No's: Baseefa08ATEX0208X and IECEx BAS 08.0065X.
- Z Size 4 (ZS4L) Certificate No's: Baseefa08ATEX0207U and IECEx BAS 08.0064U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 266.
- Alternative certification options available:
 - Exe II
 - AExe II / Exe II
 - GOST R-Exe IIIU
 - GOST K- Approved for use in Kazakhstan

For full technical specification, see Page 32

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	252	4	19	17
WDU 4	0.5	4	690	188	6	18	22
WDU 6	0.5	6	550	144	9	15	29
WDU 10	1.5	10	550	112	13	13	40
WDU 16	1.5	16	690	96	18	11	53
WDU 35	2.5	35	690	72	30	8	87
WDU 50	6	50	690	60	39	11	88
WDU 70N	10	70	690	45	52	7	134
WDU 70 / 95	16	70	690	11	100	6	134
WDU 70 / 95	16	95	690	11	116	8	134
WDU 120 / 150	35	120	690	9	139	6	162
WDU 120 / 150	35	150	690	9	148	8	153
WFF 35	2.5	35	1100	22	58	13	76
WFF 70	2.5	70	1100	9	116	9	116
WFF 120	6	120	1100	7	163	7	162

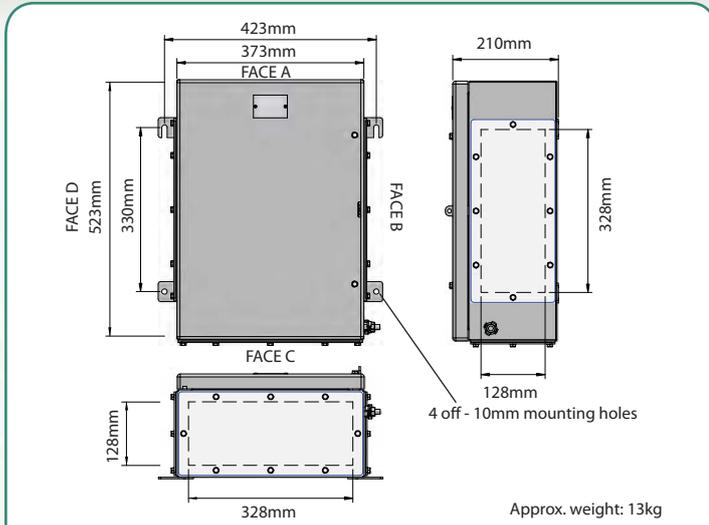
Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
The box is supplied with an integral internal / external earth stud assembly.
The terminals listed are restricted to a minimum operating temperature of -50°C.

Enclosure Type: Size 5 (S5) Stainless Steel

S Series Enclosures

26

Increased Safety Exe Dual Certified ATEX / IECEx



MAXIMUM QUANTITY OF ENTRIES PER FACE

Thread Size	M16	M20 / O	M20 / A	M25	M32	M40	M50	M63	M75
Faces B, C & D Qty.	40 #	30	28	20	11	8 # *	5 *	3	2

Serrated Washers / Locknuts with large outside diameters may foul on adjacent glands.
* Serrated Washers / Locknuts must not foul on aperture wall.

Technical Data

- Increased Safety Ⓢ II 2 GD Exe II ExtD A21.
- Size 5 (S5) Certificate No's: Baseefa08ATEX0208X and IECEx BAS 08.0065X.
- Z Size 5 (ZS5) Certificate No's: Baseefa08ATEX0207U and IECEx BAS 08.0064U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 266.
- Alternative certification options available:



Exe II



AExe II / Exe II



GOST R-Exe IIU



GOST K- Approved for use in Kazakhstan

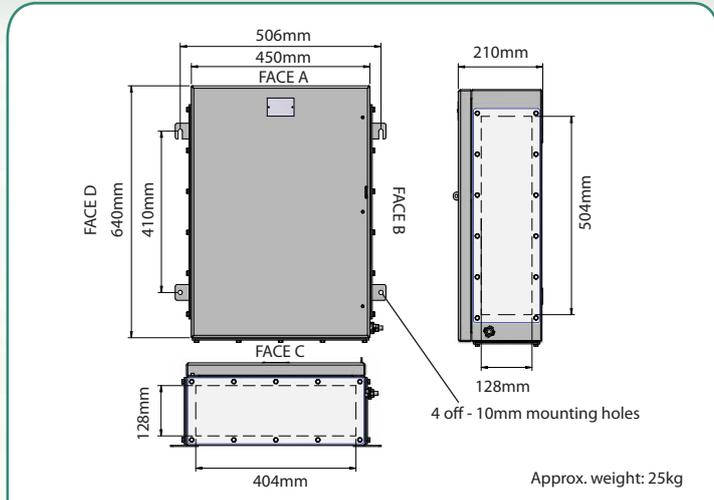
For full technical specification, see Page 32

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	249	5	21	17
WDU 4	0.5	4	690	192	7	20	22
WDU 6	0.5	6	550	144	9	16	29
WDU 10	1.5	10	550	120	13	14	40
WDU 16	1.5	16	690	96	19	12	53
WDU 35	2.5	35	690	72	31	9	87
WDU 50	6	50	690	56	42	13	88
WDU 70N	10	70	690	40	58	7	134
WDU 70 / 95	16	70	690	15	93	7	134
WDU 70 / 95	16	95	690	15	105	9	134
WDU 120 / 150	35	120	690	12	126	7	162
WDU 120 / 150	35	150	690	12	134	8	162
WFF 35	2.5	35	1100	15	75	14	76
WFF 70	2.5	70	1100	12	114	11	116
WFF 120	6	120	1100	9	163	9	162

Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
The box is supplied with an integral internal / external earth stud assembly.
The terminals listed are restricted to a minimum operating temperature of -50°C.

Increased Safety Exe Dual Certified ATEX / IECEx

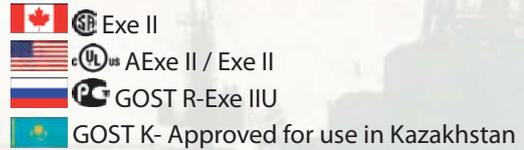


MAXIMUM QUANTITY OF ENTRIES PER FACE

Thread Size	M16	M20 / O	M20 / A	M25	M32	M40	M50	M63	M75
Bottom Face C Qty.	44 #	42	32	26	14	11	6	4	3
Side Faces B & D Qty.	56 # *	54	40	33	18	14	8	5	4

Technical Data

- Increased Safety Ⓢ II 2 GD Exe II ExtD.
- Size 6 (S6) Certificate No's: Baseefa08ATEX0208X and IECEx BAS 08.0065X.
- Z Size 6 (ZS6) Certificate No's: Baseefa08ATEX0207U and IECEx BAS 08.0064U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 266.
- Alternative certification options available:



For full technical specification, see Page 32

Serrated Washers / Locknuts with large outside diameters may foul on adjacent glands.
* Serrated Washers / Locknuts must not foul on aperture wall.

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	416	3	22	17
WDU 4	0.5	4	690	320	5	20	22
WDU 6	0.5	6	550	240	7	17	29
WDU 10	1.5	10	550	200	11	15	40
WDU 16	1.5	16	690	160	15	13	53
WDU 35	2.5	35	690	120	25	10	87
WDU 50	6	50	690	96	33	13	88
WDU 70N	10	70	690	50	54	9	134
WDU 70 / 95	16	70	690	19	86	8	134
WDU 70 / 95	16	95	690	19	97	11	134
WDU 120 / 150	35	120	690	16	114	9	162
WDU 120 / 150	35	150	690	16	120	10	162
WFF 35	2.5	35	1100	38	48	16	76
WFF 70	2.5	70	1100	16	100	13	116
WFF 120	6	120	1100	12	152	11	162
WFF 185	10	185	1100	9	212	7	234
WFF 300	25	300	1100	9	255	6	316

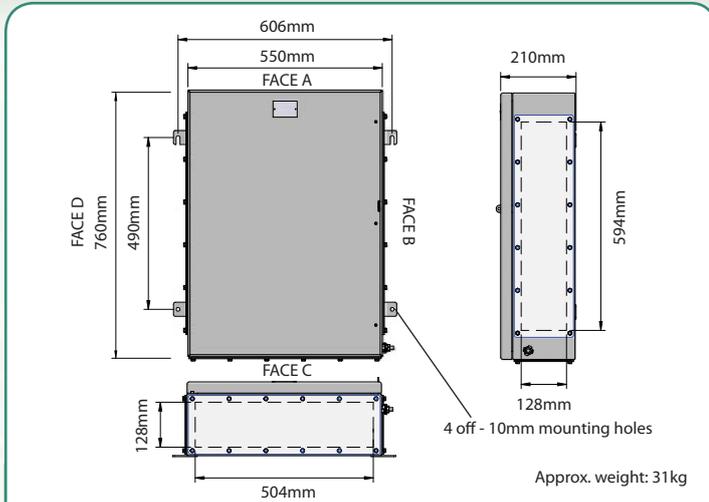
Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44
The box is supplied with an integral internal / external earth stud assembly.
The terminals listed are restricted to a minimum operating temperature of -50°C.

Enclosure Type: Size 7 (S7) Stainless Steel

S Series Enclosures

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Increased Safety Exe Dual Certified ATEX / IECEx



MAXIMUM QUANTITY OF ENTRIES PER FACE

Thread Size	M16	M20 / O	M20 / A	M25	M32	M40	M50	M63	M75
Bottom Face C Qty.	56 #*	54	45	33	18	14	8	5	4
Side Faces B & D Qty.	64 #*	64 #*	56	36	20	16	9	6	4

Serrated Washers / Locknuts with large outside diameters may foul on adjacent glands.
* Serrated Washers / Locknuts must not foul on aperture wall.

Technical Data

- Increased Safety Ⓢ II 2 GD Exe II ExtD A21.
- Size 7 (S7) Certificate No's: Baseefa08ATEX0208X and IECEx BAS 08.0065X.
- Z Size 7 (ZS7) Certificate No's: Baseefa08ATEX0207U and IECEx BAS 08.0064U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 266.
- Alternative certification options available



Exe II



AExe II / Exe II



GOST R-Exe IIU



GOST K- Approved for use in Kazakhstan

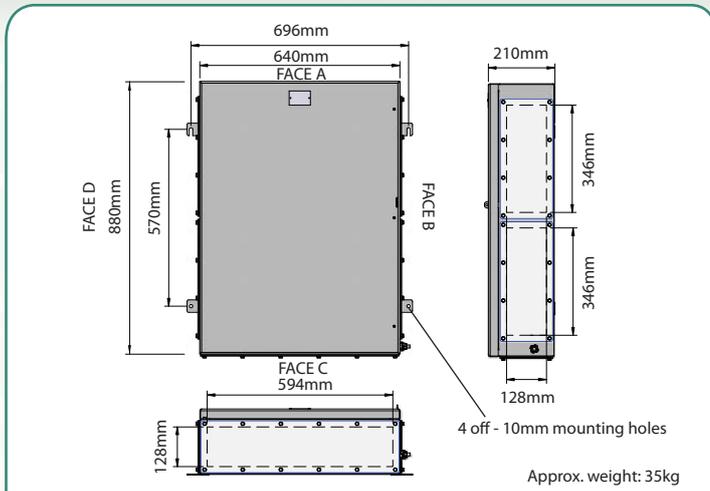
For full technical specification, see Page 32

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	640	3	24	17
WDU 4	0.5	4	690	515	5	23	22
WDU 6	0.5	6	550	380	6	19	29
WDU 10	1.5	10	550	300	9	16	40
WDU 16	1.5	16	690	250	12	14	53
WDU 35	2.5	35	690	190	21	11	87
WDU 50	6	50	690	155	27	15	88
WDU 70N	10	70	690	93	42	9	134
WDU 70 / 95	16	70	690	23	83	8	134
WDU 70 / 95	16	95	690	23	94	11	134
WDU 120 / 150	35	120	690	20	110	9	162
WDU 120 / 150	35	150	690	20	117	10	162
WFF 35	2.5	35	1100	46	45	16	76
WFF 70	2.5	70	1100	40	67	13	116
WFF 120	6	120	1100	15	145	11	162
WFF 185	10	185	1100	11	203	8	234
WFF 300	25	300	1100	11	227	6	316

Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44 The box is supplied with an integral internal / external earth stud assembly. The terminals listed are restricted to a minimum operating temperature of -50°C.

Increased Safety Exe Dual Certified ATEX / IECEx



MAXIMUM QUANTITY OF ENTRIES PER FACE

Thread Size	M16	M20 / O	M20 / A	M25	M32	M40	M50	M63	M75
Bottom Face C Qty.	64 # *	64	42	42	21	16	9	6	4
Side Faces B & D Qty.	72 # *	68	54	48	24	18	18	12	8

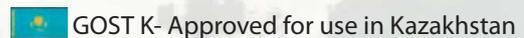
Serrated Washers / Locknuts with large outside diameters may foul on adjacent glands.

* Serrated Washers / Locknuts must not foul on aperture wall.

Notes: Entry quantities shown for faces B & D are split over two gland plates.

Technical Data

- Increased Safety Ⓢ II 2 GD Exe II ExtD.
- Size 8 (S8) Certificate No's: Baseefa08ATEX0208X and IECEx BAS 08.0065X.
- Z Size 8 (ZS8) Certificate No's: Baseefa08ATEX0207U and IECEx BAS 08.0064U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 266.
- Alternative certification options available:



For full technical specification, see Page 32

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	912	2	26	17
WDU 4	0.5	4	690	720	4	25	22
WDU 6	0.5	6	550	540	5	21	29
WDU 10	1.5	10	550	438	8	18	40
WDU 16	1.5	16	690	360	11	16	53
WDU 35	2.5	35	690	270	18	12	87
WDU 50	6	50	690	216	24	17	88
WDU 70N	10	70	690	108	41	10	134
WDU 70 / 95	16	70	690	56	56	9	134
WDU 70 / 95	16	95	690	56	62	12	134
WDU 120 / 150	35	120	690	46	77	10	162
WDU 120 / 150	35	150	690	46	82	12	162
WFF 35 *	2.5	35	1100	84	35	18	76
WFF 70 *	2.5	70	1100	46	66	14	116
WFF 120 *	6	120	1100	36	98	13	162
WFF 185 *	10	185	1100	13	197	9	234
WFF 300 *	25	300	1100	13	221	7	316

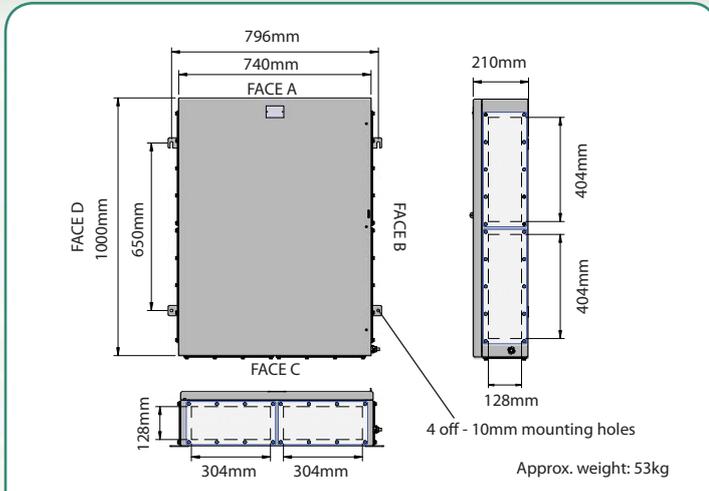
Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44 The box is supplied with an integral internal / external earth stud assembly. The terminals listed are restricted to a minimum operating temperature of -50°C.

Enclosure Type: Size 9 (S9) Stainless Steel

S Series Enclosures

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Increased Safety Exe Dual Certified ATEX / IECEx



MAXIMUM QUANTITY OF ENTRIES PER FACE

Thread Size	M16	M20 / O	M20 / A	M25	M32	M40	M50	M63	M75
Bottom Face C Qty.	64 # *	60	52	42	20	16	8	6	4
Side Faces B & D Qty.	88 # *	84	68	54	28	22	12	8	6

Serrated Washers / Locknuts with large outside diameters may foul on adjacent glands.

* Serrated Washers / Locknuts must not foul on aperture wall.

Notes: Entry quantities shown for faces B,C & D are split over two gland plates.

Technical Data

- Increased Safety Ex II 2 GD Exe II ExtD A21.
- Size 9 (S9) Certificate No's: Baseefa08ATEX0208X and IECEx BAS 08.0065X.
- Z Size 9 (ZS9) Certificate No's: Baseefa08ATEX0207U and IECEx BAS 08.0064U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -60°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 266.
- Alternative certification options available:
 - Exe II
 - AExe II / Exe II
 - GOST R-Exe IIU
 - GOST K- Approved for use in Kazakhstan

For full technical specification, see Page 32

TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Max. Physical Terminal Content		Reduced Terminal Content at Max. Terminal Amps	
	Min.	Max.		Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5	0.5	2.5	550	1232	2	28	17
WDU 4	0.5	4	690	980	3	27	22
WDU 6	0.5	6	550	735	5	23	29
WDU 10	1.5	10	550	595	7	20	40
WDU 16	1.5	16	690	490	10	17	53
WDU 35	2.5	35	690	371	16	13	87
WDU 50	6	50	690	308	21	18	88
WDU 70N	10	70	690	172	34	11	134
WDU 70 / 95	16	70	690	64	55	10	134
WDU 70 / 95	16	95	690	64	63	14	134
WDU 120 / 150	35	120	690	54	75	11	162
WDU 120 / 150	35	150	690	54	81	13	162
WFF 35 *	2.5	35	1100	96	34	19	76
WFF 70 *	2.5	70	1100	81	52	16	116
WFF 120 *	6	120	1100	42	94	14	162
WFF 185 *	10	185	1100	32	131	10	234
WFF 300 *	25	300	1100	32	162	8	316

Notes: For Junction Box Wattage Factor and Combined Terminal Resistance, see Pages 43 & 44.

The box is supplied with an integral internal / external earth stud assembly.

The terminals listed are restricted to a minimum operating temperature of -50°C.

Z-Series Enclosures

The S-Series, EJB range, GRP range and Eze enclosures are all available as empty component certified enclosures, allowing for even greater flexibility in their use. If supplied as component certified only, the customer must obtain final certification after fitting their own equipment. Component approved enclosures are denoted by the inclusion of the prefix "Z" i.e. ZS2, ZPL615.

Optional Lid Windows

All enclosure lids for stainless steel enclosures for sizes 2 to 9 in the S-Series and ZS-Series are available with an optional glass viewing window. The windows are manufactured from 6mm thick toughened glass with a 316L stainless steel frame and silicone sponge gaskets which maintain the IP66 rating.

Bespoke Enclosure Design

Should you require a stainless steel enclosure outside of our standard range of products listed, please contact Hawke International to discuss the feasibility of producing an enclosure to your requirements.

"Drop-in" Mounting Plate

The stainless steel enclosures, sizes 1 through 9, are available with an optional "drop-in" mounting plate, making the installation and termination of cabling and associated termination equipment possible. Please see page 41 for more details.

Internal Document Pockets

The S-Series and ZS-Series enclosures are available with an optional steel internal document pocket upon request. Please contact Hawke International for further details.

- To ensure that the maximum temperature as permitted by certification is not exceeded, the Dissipated Wattage Factor Formula is used: $W = N \times F \times I^2$ (See Page 43 for enclosure wattage).
- It is not permitted to fit more than one conductor per side in rail or direct mounted terminals unless using an insulated Bootlace Ferrule.
- Linked and mixed terminal arrangements other than those specified in the data tables are available, but the voltage and current figures may be affected to ensure the maximum certified wattage factor is not exceeded. Please contact Hawke Technical Sales for more information.
- For Intrinsically Safe Applications, Exe power terminals can be supplied in blue on request. (Note: the enclosure will remain Exe certified).
- The enclosure is provided with an integral internal / external earth stud assembly, but when required, one or more rail mounted earth terminals may be fitted inside the enclosure but the quantity of power terminals shall be reduced accordingly. (Note: power terminals may be used as 'clean earths').
- The enclosure has metric clearance / plain entry holes as standard. Alternative clearance holes are available provided they are to a recognised standard e.g. BSPP, ET etc. (Parallel threads only). Plain entry holes must maintain the following:
 - a) The plain hole shall be no larger than 0.7mm above the major diameter of the entry thread.
 - b) The gland or stopping plug is secured internally by a locknut, such that the gland or stopping plug will not be dislodged by a 7Nm impact.
 - c) The enclosure should be maintained at IP66 by the use of a suitable sealing washer under the shoulder of the cable gland.
- The customer may drill plain entry holes in the enclosure providing they are in accordance with the relevant code of practice and comply with the certification, contact Hawke Technical Sales for more information.
- When mixed entries are required on a face, contact Hawke Technical Sales for more information.
- All unused entry holes must be fitted with a stopping plug as listed on the enclosure certificate. The stopping plug shall be held in place by a locknut.

Specification

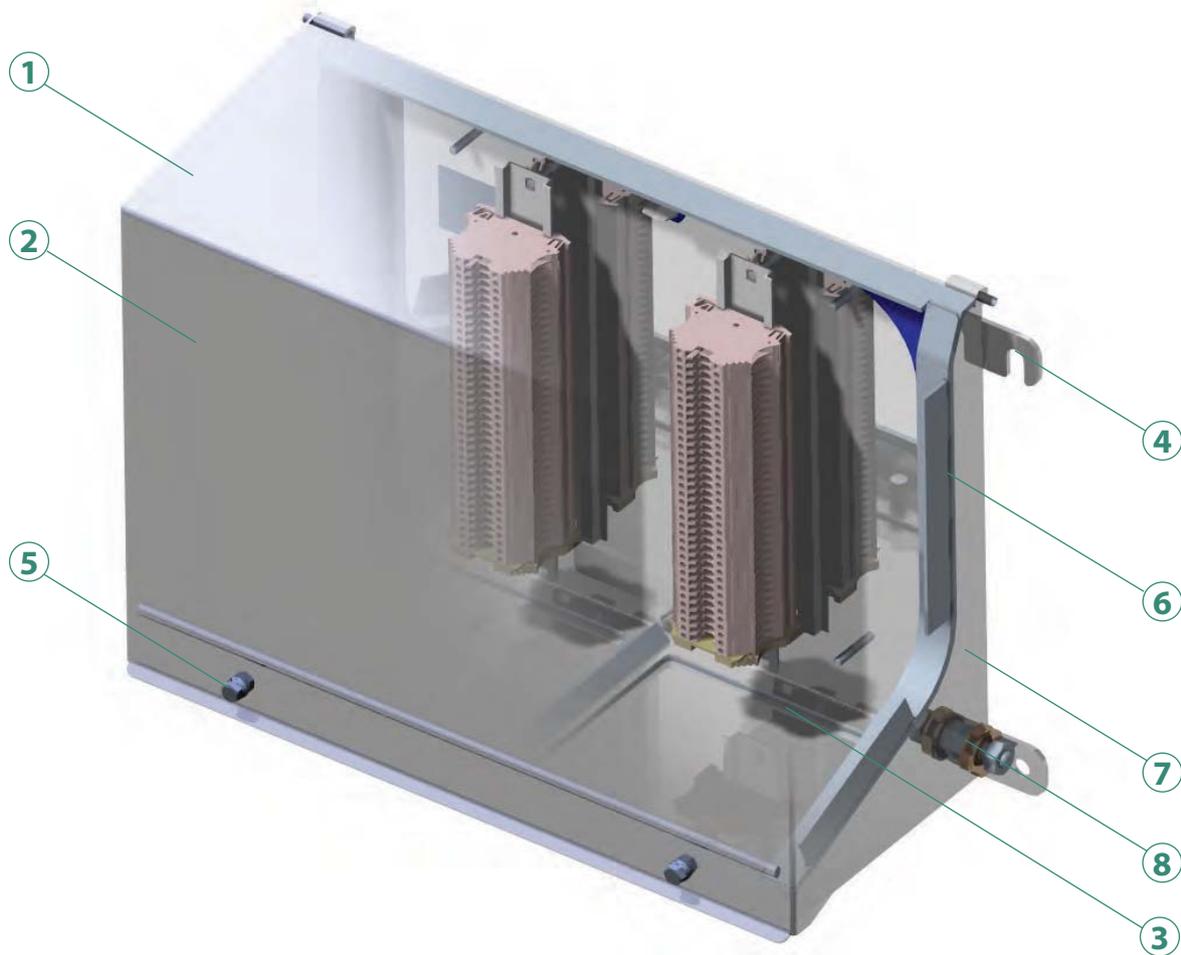
Certification :	S Series - Ⓢ II2 GD Exe II ExtD. EJB Series - Certificate No's Baseefa 08ATEX0208X and IECEx BAS08.0065X.
Zones of Use :	Zone 1, Zone 2, Zone 21 & Zone 22.
Temperature Class & Ambients :	T6 40°C as standard. Optional T5 with ambients up to 65°C.
Operating Temperature Range :	-60°C to +80°C.
Degree of Protection :	IP66 and Deluge proof to DTS01.
Material :	Stainless Steel.
Finish :	Electro-polished as standard (optional – unpolished finish).
Impact Resistance :	Up to 7Nm.
Weatherproofing :	By bonded silicone sponge lid and gland plate gaskets.
Certification Label :	Stainless Steel or optional certified self adhesive foil.
Lid Fixing Screws :	Stainless Steel (complete with nylon retaining washer).
Additional Options :	Breather/Drain devices. Epoxy paint finish for colour coding. EMI/RFI wire mesh on lid gasket for EMC requirements.
Additional Labels :	Stainless Steel or laminated plastic (traffolyte) for external use only or optional (certified) self adhesive foil for external and/or internal use.
Window:	Windows available for S2 / ZS2 to S9 / ZS9 Stainless Steel Boxes. Windows will be located in the lid and are manufactured from 6mm thick toughened glass with a Stainless Steel Grade 316L frame and silicone sponge gaskets which provide IP66 Ingress Protection.
Internal Mounting Plates:	The S / ZS Series boxes can be supplied with an internal plated steel or stainless steel mounting plate.

Earth Continuity

These enclosures have an integral internal / external earth stud assembly.

Eze Stainless Steel Enclosures





1 Robust Stainless Steel Construction

Enclosure material thickness ranges between 1.2 – 2.0mm with 2 – 3mm thick gland plates. Durable stainless steel rating label.

2 Electropolished Surface Finish

Provides high levels of corrosion resistance.

3 Softer Finished Rounded Edges

Safer manual handling of enclosure and gland plates.

4 Rigid Slotted External Mounting Feet

Allows enclosure to be hung onto the structure.

5 Stainless Steel Lid Fixing Screws with Nylon Retaining Washers

Prevents loss of screws during assembly and maintenance.

6 Superior One Piece Silicone Sponge Gaskets

DTS01 deluge protection.

Provides Ingress Protection to IP66.

Durable with excellent UV stability and chemical resistance. Good chemical resistance – EMC mesh option.

7 Extensive Range of Enclosure Sizes Available

Three standard enclosure sizes available, Sizes range from 224 x 310 x 183 to 624 x 310 x 183.

Gland plate on face C only.

8 Internal/External Earth Stud

Increased Safety Exe Dual Certified ATEX / IECEx

248mm
224mm
260mm
310mm
183mm
175mm
135mm
4 off - 10mm mounting holes
Approx. weight: 6.1kg

MAXIMUM QUANTITY OF ENTRIES PER FACE							
Thread Size	M16	M20 / Os & O	M20 / A	M25	M32	M40	M50
Bottom Face Qty.	20	20	14 (12 *)	9 (8 *)	6	4	2

Technical Data

- Increased Safety Ex II 2 GD Exe II, ExtD
- Eze 22 Certificate No's: Baseefa08ATEX0364X and IECEx BAS 08.0125X.
- ZEze 22 Certificate No's: Baseefa08ATEX0363U and IECEx BAS 08.0124U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -40°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 280.
- Alternative certification options available:
 - GOST R-Exe IIU
 - GOST K- Approved for use in Kazakhstan

For full technical specification, see Page 38

* Recommended maximum for cable gland installation.

TERMINAL CAPACITY									
Terminal Type	Conductor Size (mm ²)		Max. Volts	Typical Terminal Arrangements					
	Min	Max		1 Vertical Rail (Max. Physical)		1 Vertical Rail (Max. Current)		2 Vertical Rails * (Max. Physical)	
				Terminal Qty.	Amps	Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5N	0.5	2.5	420	38	11	17	17	76	8
WDU 2.5	0.5	2.5	550	38	11	17	17	-	-
WDU 4	0.5	4	690	32	15	16	22	-	-
WDU 6	0.5	6	550	24	21	13	29	-	-
WDU 10	1.5	10	550	19	30	11	40	-	-
WDU 16	1.5	16	690	16	41	9	53	-	-
WDU 35	2.5	35	690	12	67	7	87	-	-
WDU 50	6	50	690	9	88	9	88	-	-

Information in the table above is based on the maximum conductor size permitted for the terminal. If earth terminals are required, the quantity should be taken from the maximum physical terminal quantity.

* Special box arrangement with rail heights staggered.

Notes: A combination of different sized entries is possible. The table above gives an indication of potential terminal arrangements. Other arrangements, different sized terminals or other terminal types and empty enclosures are available. Please contact Hawke International for more information.

Enclosure Type: Eze 42 Stainless Steel

Eze Series Enclosures

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Increased Safety Exe Dual Certified ATEX / IECEx

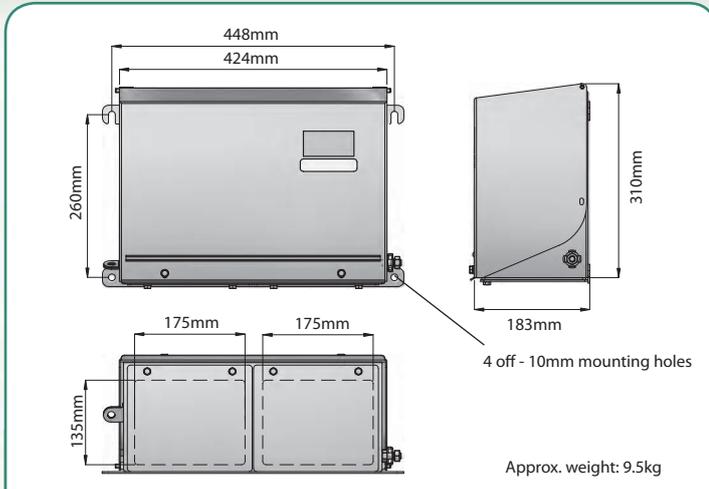
Technical Data

- Increased Safety $\text{Ex} \text{II} 2 \text{GD} \text{Exe II, ExtD}$.
- Eze 42 Certificate No's: Baseefa08ATEX0364X and IECEx BAS 08.0125X.
- ZEze 42 Certificate No's: Baseefa08ATEX0363U and IECEx BAS 08.0124U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -40°C to $+80^{\circ}\text{C}$.
- Temperature Class and Ambient: T6 40°C , optional T5 with ambients up to 65°C .
- Assembly Instruction Sheet: AI 280.
- Alternative certification options available:

 GOST R-Exe IIIU

 GOST K- Approved for use in Kazakhstan

For full technical specification, see Page 38



MAXIMUM QUANTITY OF ENTRIES PER FACE

Thread Size	M16	M20 / Os & O	M20 / A	M25	M32	M40	M50
Bottom Face Qty.	40	40	28 (24 *)	18 (16 *)	12	8	4

* Recommended maximum for cable gland installation

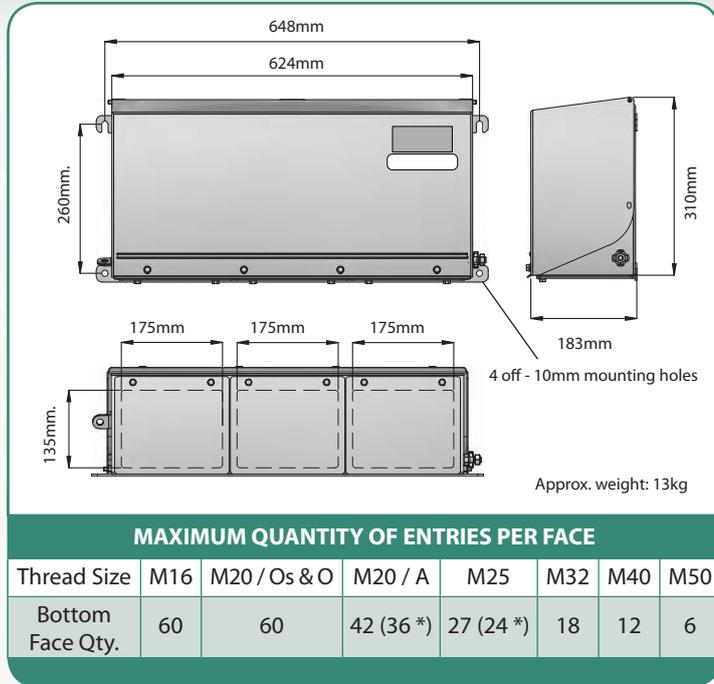
TERMINAL CAPACITY

Terminal Type	Conductor Size (mm ²)		Max. Volts	Typical Terminal Arrangements					
				2 Vertical Rails (Max. Physical)		2 Vertical Rails (Max. Current)		3 Vertical Rails (Max. Physical)	
	Min	Max		Terminal Qty.	Amps	Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5N	0.5	2.5	420	76	8	20	17	114	7
WDU 2.5	0.5	2.5	550	76	8	20	17	114	7
WDU 4	0.5	4	690	64	12	19	22	96	10
WDU 6	0.5	6	550	48	16	16	29	72	13
WDU 10	1.5	10	550	38	24	13	40	-	-
WDU 16	1.5	16	690	32	32	12	53	-	-
WDU 35	2.5	35	690	24	53	9	87	-	-
WDU 50	6	50	690	20	61	12	88	-	-

Information in the table above is based on the maximum conductor size permitted for the terminal. If earth terminals are required, the quantity should be taken from the maximum physical terminal quantity.

NOTES: A combination of different sized entries is possible. The table above gives an indication of potential terminal arrangements. Other arrangements, different sized terminals or other terminal types and empty enclosures are available. Please contact Hawke International for more information.

Increased Safety Exe Dual Certified ATEX / IECEx



Technical Data

- Increased Safety Ex II 2 GD Exe II, ExtD.
- Eze 62 Certificate No's: Baseefa08ATEX0364X and IECEx BAS 08.0125X.
- ZEze 62 Certificate No's: Baseefa08ATEX0363U and IECEx BAS 08.0124U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1.
- Ingress Protection: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.
- Operating Temperature Range: -40°C to +80°C.
- Temperature Class and Ambient: T6 40°C, optional T5 with ambients up to 65°C.
- Assembly Instruction Sheet: AI 280.
- Alternative certification options available:
 - GOST R-Exe IIIU
 - GOST K- Approved for use in Kazakhstan

* Recommended maximum for cable gland installation

For full technical specification, see Page 38

TERMINAL CAPACITY											
Terminal Type	Conductor Size (mm ²)		Max. Volts	Typical Terminal Arrangements							
				3 Vertical Rails (Max. Physical)		3 Vertical Rails (Max. Current)		4 Vertical Rails (Max. Physical)		5 Vertical Rails (Max. Physical)	
	Min	Max		Terminal Qty.	Amps	Terminal Qty.	Amps	Terminal Qty.	Amps	Terminal Qty.	Amps
WDU 2.5N	0.5	2.5	420	114	6	19	17	152	6	190	5
WDU 2.5	0.5	2.5	550	114	6	19	17	152	6	190	5
WDU 4	0.5	4	690	96	9	17	22	128	8	160	7
WDU 6	0.5	6	550	72	13	14	29	96	13	120	10
WDU 10	1.5	10	550	57	19	12	40	-	-	-	-
WDU 16	1.5	16	690	48	25	10	53	-	-	-	-
WDU 35	2.5	35	690	36	42	8	87	-	-	-	-
WDU 50	6	50	690	30	54	11	88	-	-	-	-

Information in the table above is based on the maximum conductor size permitted for the terminal. If earth terminals are required, the quantity should be taken from the maximum physical terminal quantity.

NOTES: A combination of different sized entries is possible. The table above gives an indication of potential terminal arrangements. Other arrangements, different sized terminals or other terminal types and empty enclosures are available. Please contact Hawke for more information.

- To ensure that the maximum temperature as permitted by certification is not exceeded, the Dissipated Wattage Factor Formula is used: $W = N \times F \times I^2$ (See Page 43 for enclosure wattage).
- It is not permitted to fit more than one conductor per side in rail or direct mounted terminals unless using an insulated Bootlace Ferrule.
- Linked and mixed terminal arrangements other than those specified in the data tables are available, but the voltage and current figures may be affected to ensure the maximum certified wattage factor is not exceeded. Please contact Hawke Technical Sales for more information.
- For Intrinsically Safe Applications, Exe power terminals can be supplied in blue on request. (Note: the enclosure will remain Exe certified).
- The enclosure is provided with an integral internal / external earth stud assembly, but when required, one or more rail mounted earth terminals may be fitted inside the enclosure but the quantity of power terminals shall be reduced accordingly. (Note: power terminals may be used as 'clean earths').
- The enclosure has metric clearance / plain entry holes as standard. Alternative clearance holes are available provided they are to a recognised standard e.g. BSPP, ET etc. (Parallel threads only).
Plain entry holes must maintain the following:
 - a) The plain hole shall be no larger than 0.7mm above the major diameter of the entry thread.
 - b) The gland or stopping plug is secured internally by a locknut, such that the gland or stopping plug will not be dislodged by a 7Nm impact.
 - c) The enclosure should be maintained at IP66 by the use of a suitable sealing washer under the shoulder of the cable gland.
- The customer may drill plain entry holes in the enclosure providing they are in accordance with the relevant code of practice and comply with the certification, Contact Hawke Technical Sales for more information.
- The customer may drill and tap entry holes in the enclosure providing they are in accordance with the relevant code of practice and comply with the certification, Contact Hawke Technical Sales for more information.
- When mixed entries are required on a face, Contact Hawke Technical Sales for more information.
- All unused entry holes must be fitted with a stopping plug as listed on the enclosure certificate. The stopping plug shall be held in place by a locknut.

Specification

Certification :	Eze Series - Ⓢ II2 GD Exe II ExtD (GOST and Ⓢ options available).
Zones of Use :	Zone 1, Zone 2, Zone 21 & Zone 22.
Temperature Class & Ambients :	T6 40°C as standard. Optional T5 with ambients up to 65°C.
Operating Temperature Range :	-40°C to +80°C.
Degree of Protection :	IP66 and Deluge proof to DTS01.
Material :	Stainless Steel.
Finish :	Electro-polished as standard (optional – unpolished finish).
Impact Resistance :	Up to 7Nm.
Weatherproofing :	By bonded silicone sponge lid and gland plate gaskets.
Certification Label :	Stainless Steel or optional certified self adhesive foil.
Lid Fixing Screws :	Stainless Steel (complete with nylon retaining washer).
Additional Options :	Breather/Drain devices. Epoxy paint finish for colour coding. EMI/RFI wire mesh on lid gasket for EMC requirements.
Additional Labels :	Stainless Steel or laminated plastic (traffolyte) for external use only or optional (certified) self adhesive foil for external and/or internal use.
Internal Mounting Plates:	The Eze / ZEze Series boxes can be supplied with an internal plated steel or stainless steel mounting plate.

Earth Continuity

These enclosures have an integral internal / external earth stud assembly.

Enclosure Accessories





Internal / External Earth stud (Included in PL box certification) Technical Data

- Increased Safety M6 or M8 Stainless Steel Stud.
- Ingress Protection for PL6 Series Enclosures: IP66 and IP67 to IEC/EN 60529.
- Ingress Protection for PL7 Series Enclosures: IP66 to IEC/EN 60529.
- Deluge Protection to DTS01.



Breather / Drain Device Technical Data

- Fits M20 (standard) or M25 entry positions.
- ATEX component approved and listed on Hawke ATEX IECEx Exe enclosures.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Ingress Protection: IP66 to IEC/EN 60529.
- Operating Temperature Range: -50°C to +85°C.



Terminal Block Type: HTB6 Technical Data

- Increased Safety Ⓢ II 2 GD.
- Certificate No's: Baseefa08ATEX0266U and IECEx BAS 08.0085U.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7.
- Assembly Instruction Sheet: AI 388.

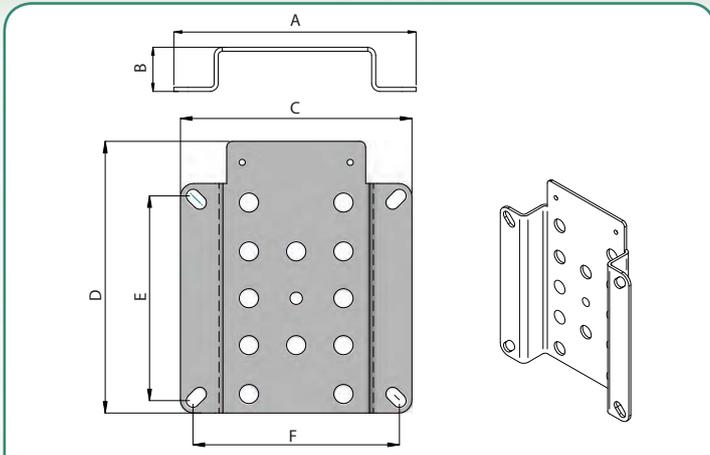
Note: Approved Component available from Hawke.



Pillar Earth Terminal Type: PET5 Technical Data

- Increased Safety Ⓢ II 2 GD.
- Certificate No's: Baseefa09ATEX0035U and IECEx BAS 09.0010U.
- Construction and Test Standards: IEC/EN 60079-0, IEC/EN 60079-7.
- Assembly Instruction Sheet: AI 387.

Note: Approved Component available from Hawke.



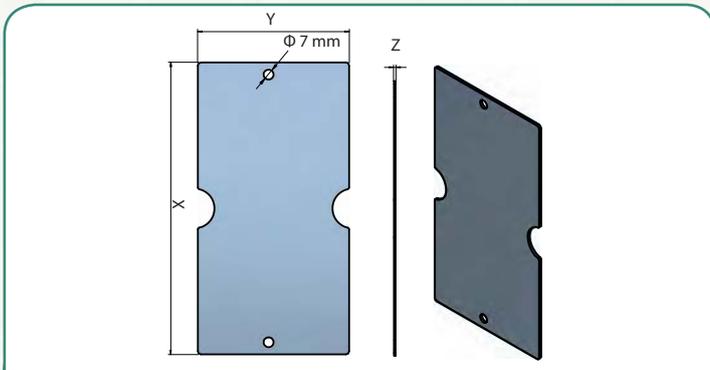
DIM	PLATE NO. (Size in mm)					
	9450	9451	9452	9453	9454	9455
A	80	110	150	200	180	180
B	22	22	22	22	22	22
C	120	150	200	300	260	220
D	142	172	222	322	182	142
E	107	134	180	280	144	106
F	107	134	180	280	244	206
ENCLOSURE	PL612/712	PL615	PL620	PL630	PL626	PL722

Back Plate / Mounting Plate

The GRP enclosures, manufactured by Hawke International, are the ultimate in robust GRP construction - well above the levels required for certification. Certain GRP enclosures are designed to withstand impact resistance up to 20Nm with the requirement for Exe enclosures at just 7Nm.

The GRP Range, combined with the new Hawke mounting plate, offers the installer even greater ease of fitting. The external mounting feet of the range eliminates the need to remove the lid when mounting the enclosure on the Hawke mounting plate, preventing any foreign materials entering the enclosure during installation and eliminating the need for hot work permits

Hawke mounting plates are available to mount any of the PL6 or PL7 series range of enclosures and can be used on walls, pipes as well as unistrut, is stainless steel in construction and has multiple mounting holes allowing greater on-site flexibility. The mounting plates also allow for the fitting of customer labels.



Box Size	Height (X)	Width (Y)	Thick (Z)
Size 1	176	91	1.6
Size 2	236	194	1.6
Size 3	356	194	1.6
Size 4	368	304	1.6
Size 5	466	304	1.6
Size 6	583	379	1.6
Size 7	703	479	1.6
Size 8	823	569	1.6
Size 9	943	669	1.6
Size 2L	236	304	1.6
Size 4L	368	378	1.6

Drop In Plate

The stainless steel enclosures, sizes 1 through 9, are available with an optional "drop-in" mounting plate, facilitating the installation and termination of cabling and associated termination equipment.

The plates, constructed from galvanised steel as standard, will allow the easy mounting of various equipment sizes and types. All complex termination, wiring and mounting procedures can then take place outside of the confines of the enclosure.

For sizes S1, the plate is fitted with two fixing positions, all other sizes have four fixing positions.

Technical Information



ENCLOSURE DISSIPATED WATTAGE

Enclosure Type	Temperature Class				
	T6 40°C & T5 55°C	T6 55°C	T5 40°C	T6 65°C	T5 65°C
PL 612 GRP	4.1	2.5	5.6	1.5	3
PL 615 GRP	6.4	4	8.8	2.4	4.8
PL 620 GRP	11.4	7.1	15.6	4.2	8.5
PL 626 GRP	11.4	7.1	15.6	4.2	8.5
PL 630 GRP	20.8	13	28.6	7.8	15.6
PL 712 GRP	3.35	2.14	4.6	1.2	2.4
PL 722 GRP	5.31	3.32	7.3	1.9	3.9
Size 1 (S1) St./St.	13.95	8.7	19.1	5.2	10.4
Size 2 (S2) St./St.	18.15	11.3	24.9	6.8	13.6
Size 2L (S2L) St./St. x 2 Long	18.15	11.3	24.9	6.8	13.6
Size 3 (S3) St./St.	23.7	14.8	32.5	8.8	17.7
Size 4 (S4) St./St.	29.95	18.7	41.1	11.2	22.4
Size 4L (S4L) St./St. x 4 Long	29.95	18.7	41.1	11.2	22.4
Size 5 (S5) St./St.	32.85	20.5	45.1	12.3	24.6
Size 6 (S6) St./St.	40	25	55	15	30
Size 7 (S7) St./St.	52	23.5	71.5	19.5	39
Size 8 (S8) St./St.	65	40.6	89.3	24.3	48.7
Size 9 (S9) St./St.	79.35	49.5	109.1	29.7	59.5
Eze 22 St./St.	17.7	11	24.3	6.6	13.3
Eze 42 St./St.	27	16.9	37	10.1	20.2
Eze 62 St./St.	31.5	19.9	43.7	11.9	23.8
EJB 1 St./St.	4.74	2.96	6.51	1.778	3.55
EJB 2 St./St.	6.64	4.15	9.13	2.49	4.98

DISSIPATED WATTAGE FACTOR

The Dissipated Wattage Factor of the enclosures has been established by test to ensure that the maximum temperature as permitted by temperature certification is not exceeded.

When terminal quantities greater than those at maximum amps are required (up to maximum physical quantity only) then the current shall be reduced accordingly to remain within the Dissipated Wattage Factor of the enclosure.

COMBINED TERMINAL RESISTANCE FACTOR (See Page 44)

This factor is used to determine the number of terminals that can be accommodated within the enclosure without exceeding the Wattage Factor. The Combined Terminal Resistance Factor is the sum of the individual terminal resistances and the resistance of the cable core equal in length to the enclosure maximum diagonal. (Core Resistance is taken from BS 6360).

WATTAGE TO BE DISSIPATED = N X F X I²

N = Number of Terminals

F - Combined Terminal Resistance Factor

I = Maximum Current

e.g. Number of terminals in a PL 630 enclosure at 20.8 Watts:

10 x WDU 2.5 (I = 17 amps), 2 x WDU 6 (I = 29 amps)

(10 x 0.003035 x 17² = 8.77 watts) + (2 x 0.001404 x 29²) = 2.36 watts)

Total Watts = 8.77 + 2.36 = 11.13 watts.

Therefore, this terminal combination is acceptable as the wattage is less than that of the PL 630 maximum of 20.8 watts.

NOTE: If a smaller than maximum permitted conductor is fitted into a power terminal, then the smaller conductor resistance must be used when calculating the combined terminal resistance.

TRANSPosed FORMULA:

$$W = N \times I^2$$

$$N \times \frac{W}{F \times I^2}$$

$$I \sqrt{\frac{W}{N \times F}}$$

Combined Terminal Resistance

Increased Safety Exe Dual Certified ATEX / IECEx

Technical Calculations

PL Series GRP Enclosures

COMBINED TERMINAL RESISTANCE 'F' (Ohms)							
Terminal Type	Enclosure Type						
	PL 612	PL 615	PL 620	PL 626	PL 630	PL 712	PL 722
WDU 2.5N	0.001301	0.001657	0.002138	0.002398	0.003065	0.001412	0.002035
WDU 2.5N	0.001271	0.001627	0.002108	0.002368	0.003035	0.001382	0.002005
WDU 4	0.000895	0.001117	0.001416	0.001578	0.001993	0.000965	0.001352
WDU 6	0.000671	0.000819	0.001019	0.001127	0.001404	0.000717	0.000976
WDU 10	0.000432	0.000520	0.000639	0.000703	0.000868	0.000460	0.000614
WDU 16	-	0.000351	0.000426	0.000466	0.000570	-	-
WDU 35	-	-	0.000226	0.000244	0.000291	-	-
WDU 50N	-	-	0.000164	-	0.0002113	-	-
WDU 70N	-	-	0.000124	-	0.000158	-	-

Eze Series

COMBINED TERMINAL RESISTANCE 'F' (Ohms)			
Terminal Type	Enclosure Type		
	Eze 22	Eze 42	Eze 62
WDU 2.5N	0.003509	0.004473	0.005688
WDU 2.5	0.003479	0.004443	0.005658
WDU 4	0.002269	0.002869	0.003625
WDU 6	0.001589	0.001989	0.002495
WDU 10	0.000978	0.001216	0.001516
WDU 16	0.000639	0.000788	0.000977
WDU 35	0.000323	0.000391	0.000477
WDU 50N	0.000234	0.000284	0.000348

EJB Series

COMBINED TERMINAL RESISTANCE 'F' (Ohms)		
Terminal Type	Enclosure Type	
	EJB1	EJB2
WDU 2.5N	0.001734	0.002054
WDU 2.5	0.001704	0.0002024
WDU 4	0.001164	0.001364
WDU 6	0.00085	0.000984
WDU 10	0.00054	0.000618
WDU 16	N/A	0.000413

S Series GRP Enclosures

COMBINED TERMINAL RESISTANCE 'F' (Ohms)											
Terminal Type	Enclosure Type										
	Size 1 (S1)	Size 2 (S2)	Size 2 Long (S2L)	Size 3 (S3)	Size 4 (S4)	Size 4 Long (S4L)	Size 5 (S5)	Size 6 (S6)	Size 7 (S7)	Size 8 (S8)	Size 9 (S9)
WDU 2.5N	0.002635	0.003509	0.004028	0.004176	0.004650	0.00519	0.005265	0.006229	0.007362	0.008437	0.009534
WDU 2.5	0.002605	0.003479	0.003998	0.004146	0.004620	0.00517	0.005235	0.006199	0.007332	0.008407	0.009504
WDU 4	0.001725	0.002269	0.002592	0.002684	0.002979	0.003320	0.003362	0.003961	0.004666	0.005335	0.006017
WDU 6	0.001226	0.001589	0.001805	0.001866	0.002063	0.002291	0.002319	0.002719	0.003191	0.003637	0.004093
WDU 10	0.000762	0.000978	0.001106	0.001142	0.001260	0.001394	0.001411	0.001649	0.001929	0.002195	0.002466
WDU 16	0.000503	0.000639	0.000719	0.007420	0.000816	0.000900	0.000911	0.001061	0.001237	0.001404	0.001574
WDU 35	0.000261	0.000323	0.000359	0.000370	0.000403	0.000442	0.000447	0.000515	0.000595	0.000671	0.000749
WDU 50N	-	0.000234	0.000262	0.000269	0.000294	0.000323	0.000326	0.000376	0.000436	0.000492	0.000549
WDU 70N	-	0.000174	0.000193	0.000198	0.000215	0.000235	0.000237	0.000272	0.000313	0.003520	0.000392
WDU 70 / 95	-	-	-	-	0.000225	0.000245	0.000247	0.000282	0.000323	0.000362	0.000402
WDU 70 / 95	-	-	-	-	0.000182	0.000196	0.000198	0.000223	0.000252	0.000280	0.000309
WDU 120 / 150	-	-	-	-	0.000159	0.000170	0.000171	0.000191	0.000215	0.000237	0.000259
WDU 120 / 150	-	-	-	-	0.000142	0.000151	0.000152	0.000168	0.000187	0.000205	0.000224
WFF 35	-	0.000263	0.000299	0.000310	0.000343	0.000383	0.000387	0.000455	0.000535	0.000611	0.000689
WFF 70	-	-	-	-	0.000185	0.000205	0.000207	0.000242	0.000283	0.000322	0.000362
WFF 120	-	-	-	-	0.000109	0.00012	0.000121	0.000141	0.000165	0.000187	0.000209
WFF 185	-	-	-	-	-	-	-	0.000098	0.000114	0.000128	0.000143
WFF 300	-	-	-	-	-	-	-	0.000068	0.000077	0.000086	0.000094

PL Series GRP Enclosures

W' Series and Direct Mounted Terminals in ATEX / IECEx Exe Boxes - PL6 & PL7 Series

Terminal Type	MAXIMUM PHYSICAL QUANTITY OF TERMINALS							
	Enclosure Type							
	PL 612	PL 615	PL 620	PL 626	PL 630		PL 712	PL 722
					1 diagonal	2 vertical		
WDU 2.5N	12 + 1 earth (1 central or offset entry only)	N/A	N/A	38 + 1 earth	N/A	N/A	12 + 1 earth (1 central entry only)	N/A
WDU 2.5	10 + 1 earth (1 offset entry only)	14 + 1 earth	24 + 1 earth	38 + 1 earth	50 + 1 earth	76 + 2 earths (38 + 1 earth per rail)	10 + 1 earth (1 central entry only)	35 + 1 earth (No entries on Faces B & D)
WDU 4	10 + 1 earth (1 offset entry only)	12 + 1 earth	20 + 1 earth	32 + 1 earth	42 + 1 earth	64 + 2 earths (32 + 1 earth per rail)	10 + 1 earth (1 central entry only)	29 + 1 earth (No entries on Faces B & D)
WDU 6	7 + 1 earth (1 offset entry only)	9 + 1 earth	15 + 1 earth	24 + 1 earth	30 + 1 earth	48 + 2 earths (24 + 1 earth per rail)	7 + 1 earth (1 central entry only)	22 + 1 earth (No entries on Faces B & D)
WDU 10	6 + 1 earth (1 offset entry only)	7 + 1 earth	12 + 1 earth	19 + 1 earth	25 + 1 earth	36 + 2 earths (18 + 1 earth per rail)	6 + 1 earth (1 central entry only)	17 + 1 earth (No entries on Faces B & D)
WDU 16	N/A	6 + 1 earth (1 offset entry only)	9 + 1 earth	16 + 1 earth	20 + 1 earth	30 + 2 earths (15 + 1 earth per rail)	N/A	N/A
WDU 35	N/A	N/A	6 + 1 earth	12 + 1 earth	15 + 1 earth	22 + 2 earths (11 + 1 earth per rail)	N/A	N/A
WDU 50N	N/A	N/A	5 + 1 earth	N/A	11 + 1 earth	N/A	N/A	N/A
WDU 70N	N/A	N/A	4 + 1 earth	N/A	11 + 1 earth *	N/A	N/A	N/A
BK 6	1	N/A	N/A	N/A	N/A	N/A	1	N/A
MK 6/6	1	N/A	N/A	N/A	N/A	N/A	1	N/A
HTB 6	1	1	2	N/A	N/A	N/A	1	N/A

* Conductor termination difficult, advise 9 + 1 earth

Notes: Earths: PL 612 & PL 712:

Entries: PL 612, PL 615, PL 626, PL 712 & PL 722:

PL 712:

**Rails: PL 612, PL 615, PL 620 & PL 712:
PL 626 & PL 722:
PL 630:**

The rail earths may be replaced by a pillar earth, but a bracket shall be fitted at the end of the terminal stack in its place.

Where the quantity of entries has been restricted, this is due to limited space. If multiple entries are required then the quantity of power terminals shall be reduced accordingly.

It may be possible for some maximum terminal assemblies to use two M20/O entry positions.

1 diagonal rail.
1 horizontal rail.
1 diagonal rail or 2 vertical.

Eze Series

W' Series Terminals in ATEX / IECEx Exe Boxes - Eze 22, 42 & 62 Series

Terminal Type	MAXIMUM PHYSICAL QUANTITY OF TERMINALS		
	Enclosure Type		
	Eze 22	Eze 42	Eze 62
WDU 2.5N	76 (2 rails, 38 per rail)	114 (3 rails, 38 per rail)	190 (5 rails, 38 per rail)
WDU 2.5	38 (1 rail only)	114 (3 rails, 38 per rail)	190 (5 rails, 38 per rail)
WDU 4	32 (1 rail only)	96 (3 rails, 32 per rail)	160 (5 rails, 32 per rail)
WDU 6	24 (1 rail only)	72 (3 rails, 24 per rail)	120 (5 rails, 24 per rail)
WDU 10	19 (1 rail only)	38 (2 rails, 19 per rail)	57 (3 rails, 19 per rail)
WDU 16	16 (1 rail only)	32 (2 rails, 16 per rail)	48 (3 rails, 16 per rail)
WDU 35	12 (1 rail only)	24 (2 rails, 12 per rail)	36 (3 rails, 12 per rail)
WDU 50N	9 (1 rail only)	20 (2 rails, 10 per rail)	30 (3 rails, 10 per rail)

* If earth terminals are required, the quantity should be taken from the maximum physical terminal quantity.

EJB Series

W' Series Terminals in ATEX / IECEx Exe Boxes - EJB1 & EJB2

Terminal Type	MAXIMUM PHYSICAL QUANTITY OF TERMINALS	
	Enclosure Type	
	EJB1	EJB2
WDU 2.5N	12 (1 rail only)	18 (1 rail only)
WDU 2.5	12 (1 rail only)	18 (1 rail only)
WDU 4	10 (1 rail only)	15 (1 rail only)
WDU 6	7 (1 rail only)	11 (1 rail only)
WDU 10	6 (1 rail only)	9 (1 rail only)
WDU 16	N/A	7 (1 rail only)

TABLE OF EARTHS

Manufacturer	Earth Terminal	Conductor Size (mm ²)		Power Terminal	Earth Terminal Fixing
		Min.	Max.		
Weidmuller	WPE 2.5N	0.5	2.5	WDU 2.5N	Rail Mounted
Weidmuller	WPE 2.5	0.5	2.5	WDU 2.5N & WDU 2.5	Rail Mounted
Weidmuller	WPE 4	0.5	4	WDU 2.5 & WDU 4	Rail Mounted
Weidmuller	WPE 6	0.5	6	WDU 6	Rail Mounted
Weidmuller	WPE 10	1.5	10	WDU 10	Rail Mounted
Weidmuller	WPE 16	1.5	16	WDU 16	Rail Mounted
Weidmuller	WPE 35	2.5	35	WDU 35 & WFF 35	Rail Mounted
Weidmuller	WPE 50N	2.5	50	WDU 50N	Rail Mounted
Weidmuller	WPE 70N	10	70	WDU 70N & WFF 70	Rail Mounted
Weidmuller	WPE 70 / 95	16	95	WDU 70 / 95	Rail Mounted
Weidmuller	WPE 120 / 150	35	120	WDU 120 / 150 & WFF 120	Rail Mounted
Hawke	PET 5 (Pillar Earth)	0.5	10	WDU 2.5N to WDU 10, HTB 6, MK 6/6 & BK 6	Direct Mounted
Hawke	IES 10 (Int/Ext. Earth Stud)	0.5	10	With Power terminals, up to 10mm ² max. only	M20 / A Gland Entry Position
WECO	DFG / 2 (Pillar Earth)	0.5	6 solid 4 stranded	PL 612 - without an earth continuity plate	Direct Mounted

Note: The junction box shall be fitted with an internal earth terminal stud that is capable of accepting a conductor equal to that of the largest power terminal. The IEC 10 internal / external earth stud shall NOT foul on any components inside the box.

Technical Information



The intent of this section of the catalogue is to identify important features that may be useful in the selection and installation of explosion protected electrical equipment.

There are numerous different regulations, codes, guidelines and standards for the design, installation and maintenance of electrical and non-electrical systems for use in potentially explosive atmospheres. The type of operational facility, geographic location, operator practice, local and national legislation, authority having jurisdiction, will determine many of the design and installation rules permitted. A fixed or floating petroleum facility located offshore for example would not be designed or classified in the same manner as an onshore petrochemical facility.

1.0 Potentially Explosive Atmospheres

An explosive atmosphere is defined as:

- Flammable substances in the form of gases, vapours, mists, dusts or fibres mixed with air and/or
- Under atmospheric conditions, which after ignition has occurred, combustion spreads to the entire unburned mixture.

2.0 Area Classification (Classification of Locations)

The purpose of area classification is to provide a basis for the correct selection, installation and location of electrical and non-electrical equipment in those areas. Areas must be classified depending on the properties of the flammable vapours, liquids, gases, mists, combustible dusts or fibres that may be present and the likelihood that a flammable or combustible concentration or quantity is present.

The aim of area classification is to avoid ignition of flammable releases that may occur in the operation of facilities. The intent is to reduce to an acceptable minimum level the probability of a flammable atmosphere and an ignition source occurring at the same time.

3.0 IEC

3.1 Area Classification

Area classification is the division of a facility into three dimensional hazardous areas and non-hazardous areas and the sub-division of the hazardous area into Zones.

Hazardous areas may be sub-divided into three Zones, as shown below:-

FLAMMABLE GASES AND VAPOURS	
Zone 0	An area in which an explosive atmosphere is constantly present, or present for long periods.
Zone 1	An area in which an explosive atmosphere is likely to occur in normal operation. (Rough Guide: 10 hours or more per year but less than 1,000 hours per year)
Zone 2	An area in which an explosive atmosphere is not likely to occur in normal operation and if it occurs it will exist only for a short time. (Rough Guide: Less than 10 hours per year)

COMBUSTIBLE DUSTS	
Zone 20	An area in which combustible dust, as a cloud, is present continuously or frequently during normal operation in sufficient quantity to be capable of producing an explosive concentration of combustible dust in a mixture with air.
Zone 21	An area in which combustible dust, as a cloud, is occasionally present during normal operation in a sufficient quantity to be capable of producing an explosive concentration of combustible dust in a mixture with air.
Zone 22	An area in which combustible dust, as a cloud, may occur infrequently and persist for only a short period, or in which accumulations of layers of combustible dust may give rise to an explosive concentration of combustible dust in a mixture with air.

For further information on the classification of hazardous areas, please refer to the following publications:-

- IEC/EN 60079-10** Electrical apparatus for explosive gas atmospheres. Classification of hazardous areas.
- Energy Institute** Model code of safe practise in the petroleum industry.
(Formerly Institute of petroleum) E115 Area Classification Code for Petroleum installations.

3.2 Classification Society

A Classification Society may also enforce requirements for the design of installations of facilities. These requirements, which are in addition to statutory requirements, may influence the design and installation of the electrical systems. Classification Societies include ABS, DNV and Lloyds Register.

3.3 Design and Installation of Electrical Systems for Hazardous (Classified) Areas

There are numerous regulation codes, guidelines and standards for the design, selection and installation of electrical equipment in potentially explosive atmospheres. These requirements are in addition to the requirements for installations in non-hazardous areas.

There are several types of protection, i.e. construction techniques, available for electrical apparatus in hazardous areas. The type of protection permitted will depend upon the applicable installation codes and rules to be adopted.

The selection of electrical apparatus should be in accordance with the following: -

- Classification of the hazardous area.
- Temperature class or ignition temperature of the gas, liquid, vapours, mist, dust or fibre.
- Where applicable, the gas, vapour or dust classification in relation to the group or sub-group of the electrical apparatus.
- External influences and ambient temperature.

3.4 Apparatus Selection According to Zones

3.4.1 Apparatus for use in Zone 0

- Intrinsic safety 'ia'.

3.4.2 Apparatus for use in Zone 1

- Electrical apparatus permitted for use in Zone 0, or
- Flameproof enclosure 'd'.
- Pressurised apparatus 'p'.
- Powder filling 'q'.
- Oil immersion 'o'.
- Increased safety 'e'.
- Intrinsic safety 'ib'.
- Encapsulation 'm'.

3.4.3 Apparatus for use in Zone 2

- Electrical apparatus permitted for use in Zone 0 and Zone 1, or
- Electrical apparatus designed specifically for Zone 2 (e.g. type of protection 'n') or
- Electrical apparatus complying with the requirements of a recognised standard for industrial electrical apparatus, which does not, in normal operation, have ignition-capable hot surface and does not in normal operation produce arcs or sparks. This equipment must be in an enclosure with a degree of protection and mechanical strength suitable for the environment and be assessed by a person who is familiar with the requirements of any relevant standards and codes of practice.

3.4.4 Apparatus for use in Zones 20, 21 and 22

- IEC/EN 61241-0– Electrical apparatus for use in the presence of combustible dust. General requirements.
- and
- IEC/EN 61241-1 – Electrical apparatus for use in the presence of combustible dust. Protection by enclosures 'tD'.

3.5 Apparatus selection according to the ignition temperature of the gas or vapour

The equipment must be selected so that its maximum surface temperature will not reach the ignition of any gas or vapour that may be present.

TEMPERATURE CLASS OF ELECTRICAL APPARATUS	MAXIMUM SURFACE TEMPERATURE OF ELECTRICAL APPARATUS	IGNITION TEMPERATURE OF GAS OR VAPOUR
T1	450°C	>450°C
T2	300°C	>300°C
T3	200°C	>200°C
T4	135°C	>135°C
T5	100°C	>100°C
T6	85°C	>85°C

If the marking of the electrical apparatus does not include an ambient temperature range, the apparatus is only for use within an ambient temperature range from -20°C to +40°C.

3.6 Apparatus selection according to apparatus grouping

The grouping of gases and vapours are classified into Group I and Group II categories. Group I is relevant to atmospheres containing firedamp (a mixture of gases, composed mostly of methane, found underground in mines).

Group II is intended for use in all other places with potentially explosive atmospheres. Group II electrical apparatus with types of protection 'd' and 'i' are further sub-divided into apparatus group IIA, IIB or IIC. Electrical apparatus with type of protection 'n' may also be sub-divided if it contains certain devices or components.

GAS / VAPOUR SUB-DIVISION	APPARATUS SUB-GROUP PERMITTED
IIA (typical gas propane)	IIA, IIB or IIC
IIB (typical gas ethylene)	IIB or IIC
IIC (typical gases acetylene and hydrogen)	IIC

3.7 Apparatus Construction Standards

- IEC/EN 60079-0 - General Requirements
- IEC/EN 60079-1 - Flameproof Enclosure 'd'
- IEC/EN 60079-2 - Pressurisation 'p'
- IEC/EN 60079-5 - Powder Filling 'q'
- IEC/EN 60079-6 - Oil Immersion 'o'
- IEC/EN 60079-7 - Increased Safety 'e'
- IEC/EN 60079-11 - Intrinsic Safety 'i'
- IEC/EN 60079-15 - Electrical Apparatus type 'n'
- IEC/EN 60079-18 - Encapsulation 'm'
- IEC/EN 61241-1 - Dust protection by enclosure

3.8 Installation Standards and Codes

There are numerous different regulations, codes, guidelines and standards for the design, installation and maintenance of electrical and non-electrical systems for use in potentially explosive atmospheres. The type of operational facility, geographic location, operator practice, local and national legislation, authority having jurisdiction etc. will determine many of the design and installation rules permitted.

For further information on the design, selection and installation of equipment for use in hazardous areas see: -

- IEC/EN 60079-14 - Explosive atmospheres. Electrical installations design, selection and erection.
- IEC/EN 61892-7 - Mobile and fixed offshore units. Electrical installations. Hazardous areas.
- IEC/EN 61241 - Electrical apparatus for use in the presence of combustible dust. Protection by enclosures 'tD'.

3.9 Inspection Standards and Codes

For information regarding the installation and maintenance of equipment for use in hazardous areas, see:-

- IEC/EN 60079-17 - Explosive atmospheres. Electrical installations inspection and maintenance.

4.0 ATEX 94/9/EC Directive

ATEX is the term used when referring to the European Union's (EU) Directive 94/9/EC.

The ATEX Directive main objectives are to guarantee the free circulation of goods within the European Union by aligning the technical and legal requirements of the Member States.

'ATEX' is derived from the French 'Atmosphères Explosibles'.

The Directive is named: - "Approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres".

The Directive covers electrical and non-electrical equipment and protective systems intended for use in potentially explosive atmospheres in mining and surface industries.

The Directive covers:-

- Equipment and products that have potential ignition sources.
- Protective systems – products that control the effects of incipient explosions.
- Safety Devices – products that may be outside a potentially explosive atmosphere but that have an explosion safety function.
- Components – products that are intended to form parts of equipment or protective systems.

To ensure compliance with the Directive, equipment must meet with the essential requirements specified in the Directive and be marked with the CE marking.

The process of ensuring that equipment complies with the Directive, conformity assessment procedure(s) must be complied with. These procedures may involve a Notified Body. A Notified body is a body that is independent of the product manufacturer and assesses conformity of the products and the manufacturer with the Directive. The Notified Body has to be approved and appointed by its government.

Conformity assessment procedures include, but are not limited by:-

- **EC Type Examination** – including testing and inspection of a product design, where appropriate.
- **Production Quality Assurance** – including the assessment, periodic auditing, testing and inspection of production samples, where appropriate, and of the manufacturers quality system.
- **Product Verification** – the inspection and/or testing of each production item for conformity with the type that was subjected to EC Type Examination.
- **Internal Control of Production** – the verification by the manufacturer that the product design and each production item conform to either harmonized European Standards or the essential requirements or a combination of the two.

The ATEX Directive came into force on a voluntary basis on 1st March 1996 and became mandatory from the 1st July 2003 and all products within its scope have to comply before being placed on the market or put into service.

The Directive classifies equipment into eight categories depending on the equipment's area of use:-

CATEGORY	DESCRIPTION
M1	Equipment intended for mining use and required to remain functional in the presence of an explosive atmosphere.
M2	Equipment intended for mining use, but is intended to be de-energised in the event of an explosive atmosphere.
1G	Non-mining equipment for use in Zone 0.
2G	Non-mining equipment for use in Zone 1.
3G	Non-mining equipment for use in Zone 2.
1D	Non-mining equipment for use in Zone 20.
2D	Non-mining equipment for use in Zone 21.
3D	Non-mining equipment for use in Zone 22.

4.1 ATEX 137 Directive 99/92/EC

The Directive covers the use of equipment in potentially explosive atmospheres and its aim is to establish minimum requirements for improving the safety and health of workers.

Article 137 of Directive 89/391/EC was published in the official journal of the EC on 28th January 2000 as Directive 99/92/EC, it is the 15th individual Directive of the framework Directive 89/391/EEC.

The article defines the: -

- Obligations of the employees re. the prevention and protection against explosions
- Assessment obligations re. the assessment of explosion risks
- General obligations re. the safety and health of worker
- Requirements for explosion protection documents

In places where potentially explosive atmospheres may occur in such quantities as to endanger the health and safety of workers, the point of entry must be marked with the sign shown in accordance with Section II, Article 7 of the Directive.



5.0 Wiring Systems

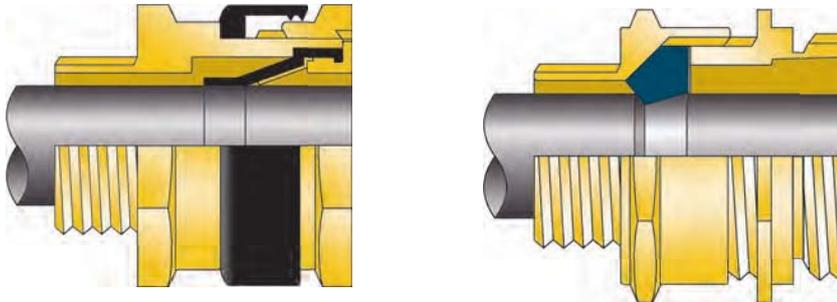
Cable systems and accessories should be installed in positions that prevent them from being subject to mechanical damage, corrosion, chemical attack, heat and other detrimental environmental conditions. Selection of the wiring system and cable type must consider these influences and where exposure to such conditions are unavoidable, protective measures such as minimising the risk of mechanical damage by the use of appropriate armoured cable types should be considered.

The connection of cables and conduits to the electrical apparatus must be in accordance with the requirements of the relevant type of protection and installation rules.

5.1 IEC Wiring Methods

With the introduction of cables incorporating new construction materials and especially cables with fire retardant or fire resistant properties such as cables complying with IEC 60331 and IEC 60332, cables may exhibit 'cold flow' characteristics. 'Cold flow' is a term used for thermoplastic materials that flow when subjected to pressure at ambient temperature. These 'cold flow' characteristics could have adverse effects on the protection of the apparatus. A suitable cable gland should be used that does not incorporate displacement/compression seals that act upon the part(s) of the cable having cold flow characteristics.

To overcome this problem, Hawke has developed cable glands that incorporate diaphragm seals that act upon the 'cold flow' cable sheath without compressing or damaging the cable. A typical cable gland incorporating displacement/compression seals and a Hawke 501/453/UNIV cable gland incorporating a diaphragm seal are shown below:



No cable damage due to Hawke 501/453 Universal diaphragm seal cable gland design.

Cable damage as found with cable gland designs incorporating compression / displacements seals

The IEC installation standard IEC/EN 60079-14 addresses 'cold flow' in clause 9.3.10.

5.2 Extract from EN60079-14: 2008 / IEC 60079-14 :2007

(Acknowledgement: Extract from BS EN 60079-14: 2008 reproduced with the permission of BSI under licence no. PD/1998 1818 and 1920. Complete editions of the standard can be obtained from www.bsi-global.com)

Installations in hazardous areas

9.3.10 Connections of cables to equipment

The connection of cables to the electrical equipment shall maintain the explosion protection integrity of the relevant type of protection.

Where the certificate for the cable gland has an 'X' marking, this cable gland shall be only used for fixed installations. If an additional clamping is required to prevent pulling and twisting of the cable

transmitting the forces to the conductor terminations inside the enclosure, a clamp shall be provided and placed within 300mm of the end of the cable gland.

Where the equipment is portable only glands without 'X' marking shall be used.

Cable glands and/or cables shall be selected to reduce the effects of 'coldflow characteristic' of the cable.

Note 1: *Cables employ materials which may exhibit 'coldflow' characteristics. 'Coldflow' in cables can be described as the movement of the cable sheath under the compressive forces created by the displacement of seals in cable glands where the compressive force applied by the seal is greater than the resistance of the cable sheath to deformation. Low smoke and/or fire resistant cables usually exhibit significant cold flow characteristics. Cold flow could give rise to a reduction in the insulation resistance of the cable and, where reasonably practical, efforts should be made to prevent this by selection of suitable cable glands.*

Cable glands with tapered threads shall not be used in enclosures having gland plates with unthreaded entries.

Note 2: *Tapered threads include NPT threads.*

Hazardous Area Information

10.4 Cable Entry Systems

10.4.1 General

It is essential that cable entry systems comply with all the requirements referred to in the equipment standard and documentation. Cable glands shall:

- Be appropriate to the type of cable employed;
- Maintain the type of protection; and
- Be in accordance with 9.3.10

Where cables enter into flameproof equipment via flameproof bushings through the wall of the enclosure which are part of the equipment (indirect entry), the parts of the bushings outside the flameproof enclosure shall be protected in accordance with one of the types of protection listed in IEC 60079-0. For example, the exposed part of the bushings are within a terminal compartment which may either be another flameproof enclosure or will be protected by type of protection 'e'. Where the terminal compartment is Ex 'd', then the cable system shall comply with 10.4.2. Where the terminal compartment is Ex 'e', then the cable system shall comply with 11.2

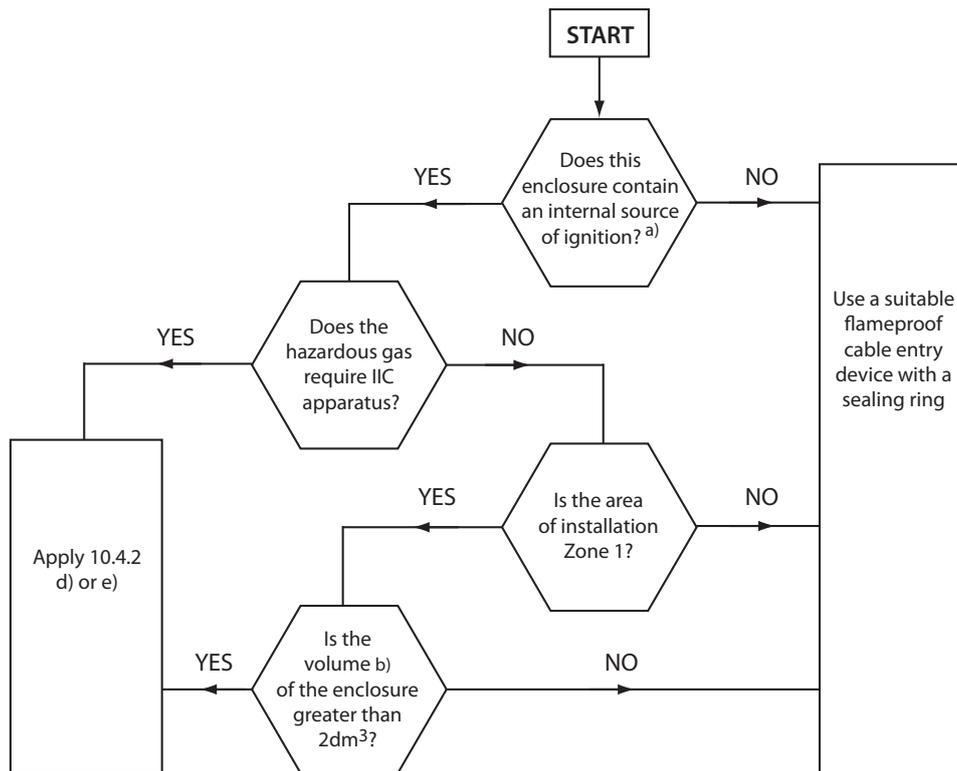
Where cables enter into flameproof equipment directly, the cable system shall comply with 10.4.2.

10.4.2 Selection of cable glands

The cable entry system shall comply with one of the following:

- a) cable glands in compliance with IEC 60079-1 and certified as part of the equipment when tested with a sample of the particular type of cable.
- b) Where a cable, in compliance with 9.3.1 (a) is substantially compact; a flameproof cable gland, in compliance with IEC 60079-1, may be utilized, providing this incorporates a sealing ring and is selected in accordance with Figure 2.

Compliance with Figure 1 is not necessary if the cable gland complies with IEC 60079-1 and has been tested with a sample of specific cable to repeated ignitions of the flammable gas inside an enclosure and shows no ignition outside the enclosure.



- a) Internal sources of ignition include sparks or equipment temperatures occurring in normal operation which can cause ignition. An enclosure containing terminals only or an indirect entry enclosure (see 10.4.1) is considered not to constitute an internal source of ignition.
- b) The term 'volume' is defined in IEC 60079-1)

Figure 2 – Selection chart for cable entry devices into flameproof enclosures for cable complying with item b) of 10.4.2

- c) Mineral-insulated metal-sheathed cable with or without plastic outer covering with appropriate flameproof cable gland complying with IEC 60079;
- d) Flameproof sealing device (for example a sealing chamber) specified in the equipment documentation or copying with IEC 60079-1 and employing a cable gland appropriate to the cables use. The sealing device shall incorporate compound or other appropriate seals which permit stopping around individual cores. The sealing device shall be fitted at the point of entry of cables to the equipment;

- e) Flameproof cable gland, specified in the equipment documentation or complying with IEC 60079-1, incorporating compound filled seals or elastomeric seals that seal around the individual cores or other equivalent sealing arrangements.

11.2 Wiring Systems

11.2.1 General

Cables and conduits shall be installed in accordance with Clause 9 of the following additional requirements concerning cable entries and conductor terminations.

Additional cable entry holes may be made into the enclosure providing this is permitted by the manufacturer's documentation.

Note 1: Threaded holes in plastic enclosures should be at right angles to the face of the enclosure (due to the possible moulding methods for plastic enclosures, the wall of the enclosure may have draw angles). Surfaces with angles do not allow the gland and associated fittings inserted in the hole to fit square to the face, resulting in ineffective sealing.

Note 2: Taper threaded holes in plastic enclosures are not recommended because the high stresses created during sealing of these threads may fracture the enclosure wall.

11.2.2 Cable Glands

The connection of cables to increased safety equipment shall be effected by means of cable glands appropriate to the type of cable used. They shall comply with the requirements of IEC 60079-0.

Note 1: To meet the ingress protection requirement it may also be necessary to seal between the cable glands and the enclosure (for example by means of a sealing washer or thread sealant).

Note 2: In order to meet the minimum requirement of IP54, threaded cable entry devices into threaded cable entry plates or enclosures of 6mm or greater thickness need no additional sealing between the cable entry devices and the entry plate or enclosure providing the axis of the cable entry device is perpendicular to the external surface of the cable entry plate or enclosure.

Where mineral-insulated metal-sheathed cables are used, the requirement to achieve creepage distances shall be maintained by using an Ex 'e' mineral insulated cable sealing device.

Threaded adaptors complying with IEC 60079-0 may be fitted into the cable entry holes to allow connection of the device or cable gland.

Unused entries in the enclosure shall be sealed by blanking elements, which comply with IEC 60079-0 and maintain the degree of ingress protection IP54 or that required by the location, whichever is the higher.

- End of Extract-

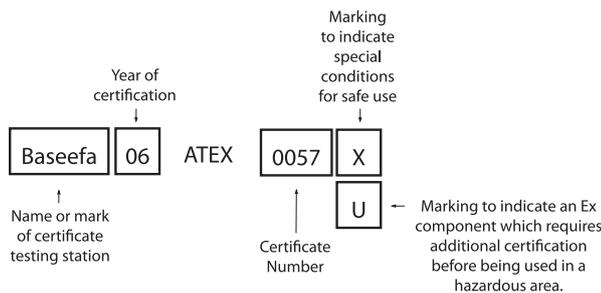
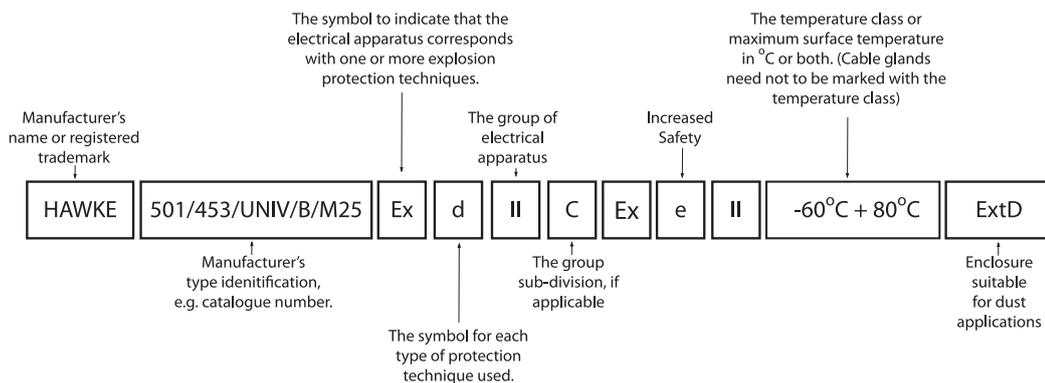
5.3 Wiring Methods for Type of Protection 'e' – Increased Safety

The cable entry device, e.g. cable gland, must comply with all the requirements referred to in the appropriate standard, be appropriate to the cable type and maintain the type 'e' integrity of the equipment.

A minimum ingress protection rating of IP54 is required for increased safety equipment. To meet with this requirement it may be necessary to provide a seal between the cable gland and the equipment, for example, by the use of a sealing washer or thread sealant. Where cable glands are fitted into non-metallic enclosures, metallic enclosures with a painted type finish or enclosures with non-threaded clearance holes, additional ingress and earthing / bonding considerations may be necessary. Please refer to the sealing washer, earhtag, serrated washer and locknut accessories shown in the catalogue.

6.0 Apparatus Marking - IEC (Group II)

6.1 ATEX Marking (Glands)



6.2 ATEX Marking (Enclosures)

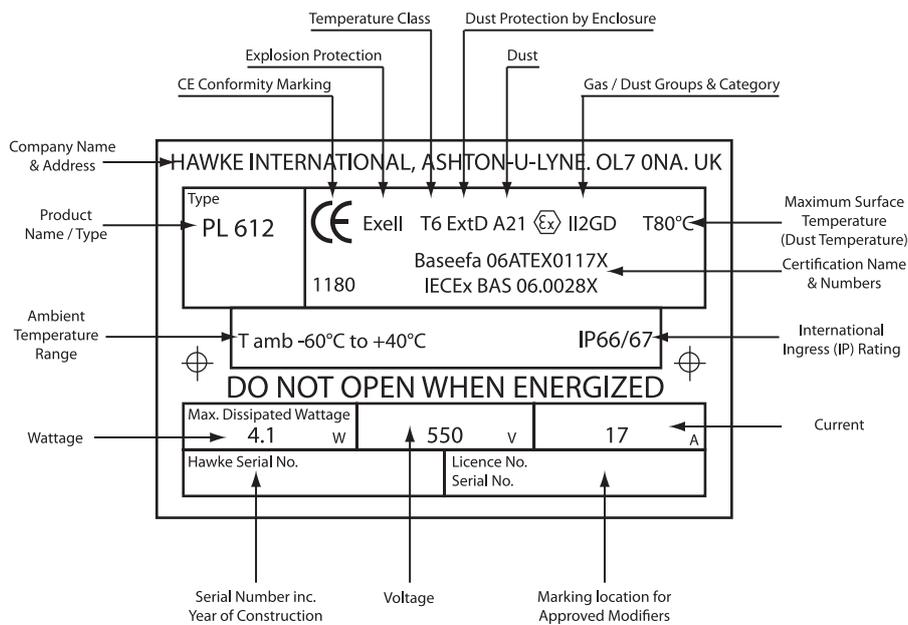
- The name and address of the manufacturer.
- Type, serial number and the year in which the equipment was constructed.
- The specific marking of explosion protection (Ex) followed by the symbol of the equipment group and the category.
- IEC/EN 60079-0, IEC/EN 60079-7, IEC/EN 61241-0 and IEC/EN 61241-1 (Optional)

- 'Exell',
- Temperature Classification,
- IP Rating,
- Certification Name and Number,
- 'DO NOT OPEN WHEN ENERGIZED',
- Maximum Dissipated Power (Watts), Volts and Amps.

Note: If the temperature range is outside the normal range of -20°C to +40°C, it must be marked on the label.

- For equipment Group II:-

The letter 'G' where explosive atmospheres caused by gases, vapour or mists are concerned and/or the letter 'D' where explosive atmospheres caused by dusts are concerned.



6.3 Additional CE Marking

The CE conformity marking must consist of the initials CE and be followed by the identification number of the notified body responsible for production control.

E.g. CE_{1180}

6.4 New Marking – EPL's (Explosion Protection Levels)

The introduction of the EPL's and changes in the EN 60079 and EN 61241 series standards has introduced new marking requirements.

6.4.1 Gas (Surface)

The gas group that was previously (II) for Increased safety in surface applications is now IIA, IIB or IIC, depending upon the certification.

6.4.2 Dust

Grouping has also been applied to dusts where the marking is differentiated from gases by the addition of another I i.e. IIIA, IIIB or IIIC.

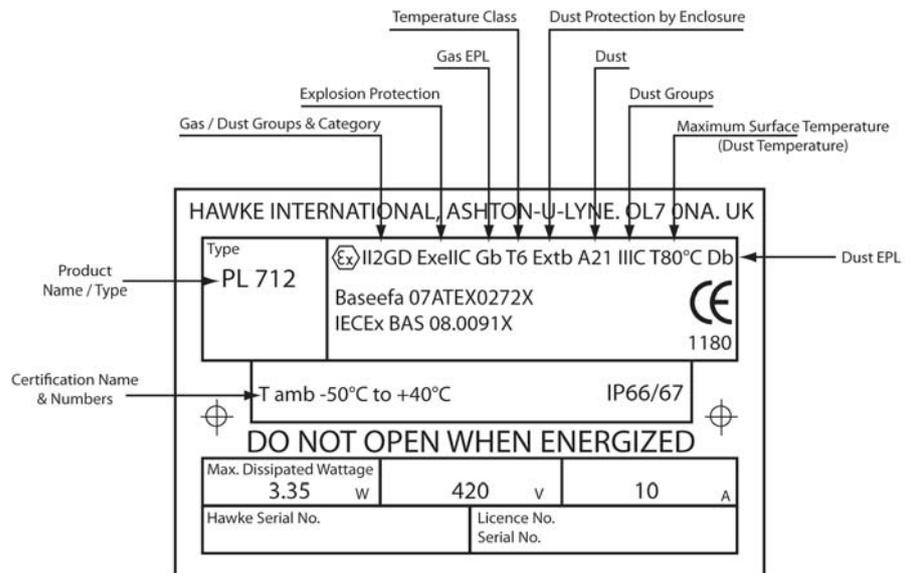
6.4.3 Explosion Protection Levels

The explosion protection levels are identified by their lettering:-

GASES	TYPICAL ZONE	DUSTS	TYPICAL ZONE
Ga	0	Da	20
Gb	1	Db	21
Gc	2	Dc	22

The protection by enclosure symbol ExtD is now being replaced by Exta, Extb or Extc.

The PL7 Series of boxes are approved to the latest standards and are marked as follows:-



7.0 CE Marking

The CE Marking is intended to facilitate the free movement of products within the European Union. By affixing CE marking to products, the manufacturer is making a legal declaration that the product meets with the appropriate requirements of all relevant European Directives. CE marking only applies to products within the scope of the Directives. It should not be applied to products if they are outside the scope of the Directives.

7.1 EMC, Electromagnetic Compatibility Directive

Most electrical and electronic products made or sold in the EU must:

- Be constructed so they do not cause excessive electromagnetic interference and are not unduly affected by electromagnetic interference;
- In the case of certain radio-transmitting equipment, be subject to EC type examination by a notified body; and
- Carry CE marking

Cable glands are not considered to come within the scope of the Directive, however Hawke International have carried out independent third-party testing on the EMC shielding effectiveness of armoured type cable glands fitted onto single wire armoured and braided-type cables. The electromagnetic ingress between the cable sample (perfect connection) and that of the cable sample fitted with the cable gland was of such a small magnitude that it could be regarded as within acceptable uncertainty of measurement. As such, it can be concluded that the shielding effectiveness of single wire armoured or braided cable is maintained when fitted with an appropriate Hawke armoured type cable gland.

7.2 Low Voltage Directive

The Low voltage Directive 73/23/EEC embodies a number of principles: -

- Only electrical equipment that does not jeopardise the safety of people, domestic animals and property, is permitted on the market.
- Only electrical equipment, that satisfies the CE marking requirements of the LVD, is in compliance.
- Electrical equipment is not required to be tested or marked for approval by an independent third party.
- Enforcement is the responsibility of each member state within its national jurisdiction.
- The regulations apply to all electrical equipment, except where extensions apply, that is designed for use between 50 and 1000 volts AC or 75 and 1500 volts DC.
- Only components, which are in themselves “electrical equipment”, need satisfy the Low Voltage Directive.

Cable glands are not in themselves “electrical equipment” and therefore do not fall within the scope of the LVD.

8.0 Certification/Listing/Approvals

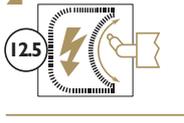
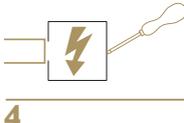
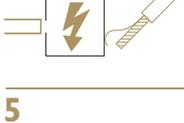
Electrical equipment for use in potentially explosive atmospheres is usually certified, listed or approved by a recognised Certification Body or Test House. In Europe, there are numerous Certification Bodies such as Baseefa and SIRA in the UK. In North America, there are many recognised Certification Bodies and testing laboratories such as UL, FM and the CSA. The definition of “Approved” by the NEC is “Acceptable to the authority having jurisdiction”. The definition “Listed” by the NEC is “Equipment, materials or services included in a list published by an organisation that is acceptable to the authority having jurisdiction”.

Further information is given in the NEC.

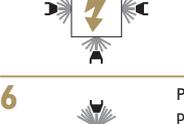
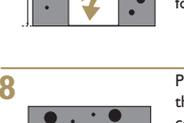
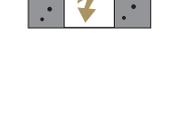
9.0 CENELEC and IEC Degree of Protection , IP Code

The standard IEC/EN 60529 describes a system for classifying the degrees of protection provided by the enclosures of electrical equipment as follows:-

First Number

0		Non-protected	Protection of persons against access to hazardous parts inside the enclosure and against solid foreign objects
1		Protected against objects of 50mm diameter and greater	An object probe, sphere of 50mm diameter, shall not fully penetrate
2		Protected against solid foreign objects of 12.5mm diameter and greater	An object probe, sphere of 12.5mm diameter, shall not fully penetrate
3		Protected against solid foreign objects of 2.5mm diameter and greater	An object probe, sphere of 2.5mm diameter, shall not penetrate at all
4		Protected against solid foreign objects of 1.0mm diameter and greater	An object probe, sphere of 1.0mm diameter, shall not penetrate at all
5		Dust-protected	Ingress of dust is not totally prevented, but dust shall not penetrate in a quantity to interfere with satisfactory operation of apparatus or to impair safety
6		Dust-tight	No ingress of dust

Second Number

0		Non-protected	Protection of the equipment inside the enclosure against harmful effects due to the ingress of water
1		Protected against vertically falling water drops	Vertically falling drops shall have no harmful effects
2		Protected against vertically falling water drops when enclosure is tilted up to 15°	Vertically falling drops shall have no harmful effects when the enclosure is tilted at any angle up to 15° on either side of the vertical
3		Protected against spraying water	Water sprayed at an angle up to 60° on either side of the vertical shall have no harmful effects
4		Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effects
5		Protected against water jets	Water projected in jets against the enclosure from any direction shall have no harmful effects
6		Protected against powered water jets	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects
7		Protected against the effects of temporary immersion in water for 30 mins	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardised conditions of pressure and time
8		Protected against the effects of continuous immersion in water	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is continuously immersed in water under conditions which shall be agreed between manufacturer and user but which are more severe than for numeral 7

Typical Designation : IP66

The protection of the enclosure and the equipment inside against external influences or conditions, such as: mechanical impacts, corrosion, corrosive solvents, solar radiation, icing moisture (e.g. produced by condensation), and explosive atmospheres, are matters that should be dealt with by the relevant product Standard.

There are additional and supplementary optional letters to the above coding; these designators are A, B, C & D and H, M, S & W, and further information can be found in the relevant Standard(s).

9.1 Deluge Ingress Protection

On offshore facilities, equipment may be located in areas subject to emergency deluge systems. Equipment that has been evaluated as certified for use in hazardous areas may not be suitable for use in these locations. A testing method for electrical equipment to be installed in areas subject to deluge systems, DTS01, has been prepared by the Explosion and Fire Hazards Group of ERA Technology (now known as ITS) in collaboration with Shell UK Exploration and Production Ltd.

Testing includes: -

- Energising the equipment (where appropriate) for 60 minutes prior to the deluge test, then interrupting the electrical power at the start of the deluge test and resuming after 60 minutes until the completion of the deluge test.
- Carrying out insulation resistance testing before and after pre-conditioning and after the deluge test, where applicable.
- Carrying out pre-conditioning by exposure to vibration and thermal ageing at 90% relative humidity and at a temperature 20k above the equipments maximum service temperature and/or at least 80°C of any appropriate seals.
- Carrying out deluge test using a deluge chamber fitted with deluge nozzles that apply a salt water solution deluge pressure within the range of 3.5 bar to 4.5 bar at a water temperature in the range of 5°C to 10°C for 3-hours.

10.0 IECEx Scheme

The objective of the IECEx Scheme is to facilitate international trade in electrical equipment intended for use in potentially explosive atmospheres by eliminating the need for multiple national certification. The IECEx Scheme provides a means for manufacturers to obtain Certificates of Conformity that will be accepted at national level in all participating countries. A Certificate of Conformity may be obtained from any certification body accepted into the scheme. The objective of the IECEx Scheme is world-wide acceptance of one standard, one certificate, and one mark.

For the IEC scheme to achieve its objective, every applicable national standard will need to be identical to the corresponding IEC standard. A transition period will be necessary to allow time for participating IECEx Scheme countries to align their national standards with the IEC standards and work towards national acceptance of IECEx Certificates of Conformity and the IECEx mark.

11.0 North American Hazardous (Classified) Locations

11.1 Area Classification

Area classification is the division of a facility into a two or three-dimensional hazardous location, a non-hazardous location and the sub-division of the hazardous location into 'Divisions' or 'Zones'.

In the United States of America, hazardous (classified) locations may be sub-divided as follows: -

For further information on the classification of hazardous (classified) locations, see:-

CLASS I: FLAMMABLE GASES, VAPOURS OR LIQUIDS	Division 1 Where ignitable concentrations of flammable gases, vapours or liquids can exist all or some of the time or some time under normal operating conditions	Zone 0 Where ignitable concentrations of flammable gases, vapours or liquids can exist all of the time or for long periods at time under normal operation conditions.
	Division 2 Where ignitable concentrations of flammable gases, vapours or liquids are not likely to exist under normal operating conditions	Zone 1 Where ignitable concentrations of flammable gases, vapours or liquids can exist all of the time or for long periods at a time under normal operating conditions
		Zone 2 Where ignitable concentrations of flammable gases, vapours or liquids are not likely to exist under normal operating conditions
CLASS II: COMBUSTIBLE DUSTS	Division 1 Where ignitable concentrations of combustible dusts can exist all or some of the time under normal operating conditions	Zone classifications do not currently apply
	Division 2 Where ignitable concentrations of combustible dusts are not likely to exist under normal operating conditions	
CLASS III: IGNITABLE FIBRES AND FLYINGS	Division 1 Where ignitable concentrations of fibres and flyings can exist all or some of the time under normal operating conditions	Zone classifications do not currently apply
	Division 2 Where ignitable concentrations of fibres and flyings are not likely to exist under normal operating conditions	

- NEC, NFPA 70 National Electric Code, NFPA 70
- NFPA 30 Flammable and Combustible Liquids Code
- NFPA 497 Recommended Practice for the Classification of Flammable Liquids, Gases or Vapours and of Hazardous (Classified) Locations for Electrical Installations in chemical Process Areas

- NFPA 499 Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
- ANSI/API RP500 Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2
- ANSI/API RP505 Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1 or Zone 2

Apparatus for use in Class I, Division 1

- Explosion-proof
- Intrinsically Safe
- Purged / Pressurised (Type X or Y)

Apparatus for use in Class I, Zone 0

- Intrinsic Safety AEx ia
- Class I, Division 1 Intrinsically Safe

Apparatus for use in Class I, Division 2

- Any Class I, Division 1 Method
- Non-incendive
- Non-sparking Device
- Purged / Pressurised (Type Z)
- Hermetically Sealed
- Oil Immersion

Apparatus for use in Class I, Zone 1

- Any Class I, Zone 0 Method
- Any Class I, Division 1 Method
- Flameproof AEx d
- Increased Safety AEx e
- Intrinsic Safety AEx ib
- Purged / Pressurized AEx p
- Powder Filling AEx q
- Oil Immersion AEx o
- Encapsulation AEx m

Apparatus for use in Class I, Zone 2

- Any Class I, Zone 0 Method
- Any Class I, Division 1 Method
- Type of Protection AEx n

11.2 Apparatus Selection According to Class I

Intrinsically safe equipment listed for use in Class I, Division 1 locations for the same gas, or as permitted by Section 505.8 of the NEC, and with suitable temperature rating is permitted in Class I, Zone 0 locations.

Equipment approved for use in Class I, Division 1, or listed for use in Class I, Zone 0 locations for the same gas, or as permitted by Section 505.8 of the NEC, and with a suitable temperature rating is permitted in Class I, Zone 1 locations.

Equipment approved for use in Class I, Division 1 or Division 2 locations for the same gas, or as permitted by Section 505.8 of the NEC, and with a suitable temperature rating is permitted in Class I, Zone 2 locations.

Equipment listed as classified for use in Class I locations is not necessarily acceptable for Class II locations as it may not be dust-tight, or operate at a safe temperature with a dust covering.

11.3 Apparatus Selection According to the Ignition Temperature of the Gas or Vapour

The equipment must be selected so that its maximum surface temperature will not reach the ignition temperature of any gas or vapour that may be present.

TEMPERATURE CLASS OF ELECTRICAL APPARATUS	MAXIMUM SURFACE TEMPERATURE OF ELECTRICAL APPARATUS	IGNITION TEMPERATURE OF GAS OR VAPOUR
T1	450°C	> 450°C
T2	300°C	> 300°C
T2A	280°C	> 280°C
T2B	260°C	> 260°C
T2C	230°C	> 230°C
T2D	215°C	> 215°C
T3	200°C	> 200°C
T3A	180°C	> 180°C
T3B	165°C	> 165°C
T3C	160°C	> 160°C
T4	135°C	> 135°C
T4A	120°C	> 120°C
T5	100°C	> 100°C
T6	85°C	> 85°C

Low ambient conditions require special consideration. Explosion proof of dust ignition proof equipment may not be suitable for use at temperatures lower than -25°C (-13°F) unless they are identified for low temperature service. Unless the equipment is marked otherwise, it is for use only in an ambient temperature range of -25°C (-13°F) to +40°C (+104°F).

Equipment that is approved for Class I and Class II should be marked with the maximum safe operating temperature.

For information regarding data for flammable gases and vapours, see NFPA 497 and NFPA 325.

11.4 Apparatus Selection According to the Ignition Temperature of the Dust

The equipment must be selected so that its maximum surface temperature will be less than the ignition temperature of the specific dust.

For information regarding data for dusts, see NFPA 499.

11.5 Apparatus Selection According to Apparatus Grouping

Equipment that is approved for Class I and Class II should be marked with the maximum safe operating temperature.

The grouping of Class I gases and vapours are classified into Categories A, B, C, & D

GAS / VAPOUR GROUP	TYPICAL GAS
A	Acetylene
B	Hydrogen
C	Ethylene
D	Propane

The grouping of Class II dusts are classified into Categories E, F & G

DUST GROUP	TYPICAL ATMOSPHERES CONTAINING
E	Combustible Metal Dusts
F	Coal Dusts
G	Grain Dusts

11.6 Apparatus Construction Standards

- ANSI / UL 1203 Explosion-Proof and Dust-Ignition-Proof Electrical. Equipment for use in Hazardous (Classified) Locations.
- ANSI/ISA-12.12.01-2007 Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations.
- ANSI/NFPA 496 Standard for Purged and Pressurised Enclosures for Electrical Equipment.
- ANSI/UL 913 Intrinsically Safe Apparatus and Associated Apparatus for use in Class I, II and III, Division 1, Hazardous Locations.
- ANSI/UL 698 Industrial Control Equipment for use in Hazardous (Classified) Locations.
- ANSI/UL 2225 Cables and Cable-Fitting for use in Hazardous (Classified) Locations.
- UL 1604 Electrical Equipment for use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations.
- ANSI/UL 60079 Electrical Equipment for use in Class I, Zone 0, 1 and 2 Hazardous (Classified) Locations,
- ISA 60079-0 Electrical Apparatus for Gas Atmospheres – Part 0: General Requirements.
- ISA 60079-1 Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures ‘d’.
- ISA 60079-7 Explosive Atmospheres – Part 7: Equipment Protection by Increased Safety ‘e’.

11.7 Installation Standards and Codes

- NEC, NFPA 70 National Electrical Code (NEC)
- USCG 45 CFR Parts 110 – 113 - Shipping, Sub-Chapter J, Electrical Engineering
- ANSI / API RP 14F Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Division 1 and 2 Locations.
- API RP 14RZ Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Zone 0, 1 and 2 Locations.

12.0 Wiring Systems

Cable systems and accessories should be installed in positions that prevent them from being subject to mechanical damage, corrosion, chemical attack, heat and other detrimental environmental conditions. Selection of the wiring system and cable type must consider these influences and where exposure to such conditions are avoidable, protective measures such as minimising the risk of mechanical damage by the use of appropriate armoured cable types should be considered.

The connection of cables and conduits to the electrical apparatus must be in accordance with the requirements of the relevant type of protection and installation rules.

12.1 National Electrical Code (NEC) Zone Wiring Methods

In Class 1, Division 1 locations, the NEC permits the following wiring methods:-

- Type MC cable, listed for use, with a gas / vapour tight continuous corrugated aluminium sheath, an overall jacket of suitable polymeric material, separate grounding conductors, in accordance with Sections 250-122 and 501.10 of the NEC, and provided with termination fittings listed for the application, e.g. Hawke type 711 cable gland/connector.
- Type ITC cable, listed for use with a gas / vapour tight continuous aluminium sheath, an overall jacket of suitable polymeric material in accordance with Section 501.10 of the NEC and provided with termination fittings listed for the application, e.g. Hawke type 711 cable gland/connector.
- Threaded rigid metal conduit, threaded steel intermediate metal conduit, or type MI cable with termination fittings approved for the location and in accordance with Section 501.10 of the NEC.

All boxes, fittings and joints must be explosion-proof.

In Class 1, Division 2 locations, the NEC permits the following wiring methods:-

- Type MC, MV, ITC, PLTC, TC or MI cable with approved termination fittings in accordance with Section 501.10 of the NEC.
- Threaded rigid metal conduit, threaded steel intermediate metal conduit.
- Non-incendive field wiring using any of the methods suitable for wiring in ordinary locations in accordance with Section 501.10 of the NEC.

Boxes, fittings and joints need not be explosion-proof except as required by the NEC code.

12.2 Cable Seals, Class 1, Division 1

Cables must be sealed at the termination. The sealing fitting, e.g. a barrier type cable gland, must provide a seal against the passage of gas or vapours through the fitting. Type MC cables with multi-conductors, a gas / vapour tight continuous corrugated aluminium sheath and an overall jacket with a suitable polymeric material must be sealed with an appropriate fitting, e.g. Hawke type 711, after removing the cables jacket and all other coverings so that the sealing compound surrounds each individual insulated conductor. Cables with twisted pairs and shielded cables require the removal of the shielded material or separation of the twisted pairs unless the fitting, e.g. cable gland, is an approved means which minimises the entrance of gases or vapours and prevents propagation of flame into the cable core. If the fitting complies with this requirement, there will be information provided in the fittings installation instructions detailing the means to achieve the seal. Additional testing may be required on the fitting and the style and type of cable to show compliance with the sealing requirements.

A NRTL approved cable sealing fitting e.g. barrier type cable gland, must be fitted onto cables that enter explosion-proof enclosures.

Further guidance is given in Section 501.5(d) of the NEC.

12.3 Cable Seals, Class 1, Division 2

Cables must be sealed at the point of entrance into enclosures that require to be approved for Class I locations. A sealing fitting must comply with the above criteria given in 'Cable Seals, Class I, Division 1'.

A NRTL approved cable sealing fitting e.g. barrier type cable gland, must be fitted onto cables where they enter explosion-proof enclosures.

12.4 United States Coast Guard Wiring Methods

Electrical installations in hazardous (classified) locations must comply with the general requirements of Section 43 of the IEEE standard 45 and either the NEC Articles 500 - 505 or IEC 60079 series publications.

In hazardous (classified) locations, the USCG 46 CFR Sub-Chapter J, permits the following wiring methods: -

- Marine shipboard cables that are permitted for use, must meet all the requirements of either IEEE standard 45, IEC 60092-3 and the applicable flammability requirements. Cables constructed to IEC 60092-3 must meet with the flammability requirements of IEC 60332-3, Category A.
- Metal-clad (type MC) cables that are permitted for use, must have a continuous corrugated gas tight, vapour-tight, and water-tight sheath of aluminium or other suitable metal that is close fitting around the conductors and with fillers. The MC cable must have an overall jacket of an impervious PVC or thermoset material and be certified or listed to UL 1569.

For information on other wiring methods permitted and further information, refer to Subpart 111-60 of the USCG 46 CFR.

Each cable entry into explosion-protected equipment must be made with an appropriate fitting or cable gland that maintains the integrity of the equipment.

12.4.1 Cables with multi-conductors that enter explosion-proof enclosures, must be sealed with an appropriate fitting, e.g. barrier type cable gland, after removing the cables jacket and all other coverings so that the sealing compound surrounds each individual insulated conductor. Cables with twisted pairs and shielded cables require the removal of the shielded material or separation of the twisted pairs unless the fitting, e.g. barrier type cable gland, is an approved means which minimises the entrance of gases or vapours and prevents propagation of flame into the cable core. If the fitting complies with this requirement, there will be information provided in the fittings installation instructions detailing the means to achieve the seal. Additional testing may be required on the fitting, and the style and type of cable to show compliance with the sealing requirements.

The equipment grounding path should be carefully considered when using Shipboard Cables or type TC cables, as these may not inherently provide a grounding means. The armour of Shipboard Cables should be grounded but can not be used as the grounding conductor. An appropriate sized grounding conductor should be included in each cable.

12.5 American Petroleum Institute Wiring Methods

12.5.1 Class 1, Division 1

The API RP 14F Recommended Practice for the design and installation of electrical systems for fixed and floating offshore petroleum facilities recommends the following wiring methods for hazardous (classified) locations.

- Type MC-HL metal clad cables as defined in UL 2225.
- Armoured marine shipboard cable with an overall impervious sheath over the armour, constructed in accordance with UL 1309, and listed as 'Shipboard Cable Marine' by a National Recognised Testing Laboratory (NRTL). This wiring method is a departure from the NEC.
- Type ITC cable that is NRTL - listed for use in Class I, Division 1 locations with a gas / vapour tight continuous corrugated aluminium sheath and with an overall PVC or other suitable polymeric jacket.
- Threaded rigid copper-free aluminium conduit.
- Threaded rigid steel, hot dipped galvanized conduit, coated with PVC, or other suitable material, and with the interior protected by an additional means.

An NRTL approved cable sealing fitting, e.g. barrier type cable gland complying with UL 2225, must be fitted onto cables where they enter explosion-proof enclosures.

For further information and other wiring methods acceptable for Division 1, refer to Clause 6.4.2.2 of the API RP14F.

For fitting requirements of cables with multi-conductors, twisted pairs or shielded conductors into explosion proof equipment. See clause 12.4.1.

12.5.2 Class 1, Division 2

- Wiring methods as recommended for use in Division 1.
- Type MC cable with a gas / vapour tight continuous corrugated aluminium sheath, an overall PVC or other suitable polymeric jacket, and grounding conductors in accordance with NEC 250-122.
- Non-armoured marine shipboard cable, with an overall impervious jacket in accordance with UL 1309 and listed as 'Shipboard Cable Marine' by a NRTL. This wiring method is a departure from the NEC.

Additional wiring methods acceptable for Division 2 include type PLTC, ITC, TC and MV cables. It is recommended that an overall PVC or other suitable polymeric material jacket is included for these cable types.

For additional information, refer to Clause 6.4.2.3 of API RP14F.

In Division 1 locations, all electrical equipment (except intrinsically safe systems and equipment inside purged enclosures) should be explosion-proof.

In Division 2 locations, the equipment does not need to be explosion-proof, except where necessary to maintain the integrity of the installation.

Further information on the use of equipment is given in Clause 6.4.7 of API RP14F.

An NRTL approved cable sealing fitting, e.g. barrier type cable gland complying with UL 2225, must be fitted onto cables where they enter explosion-proof enclosures.

For fitting requirements of cables with multi-conductors, twisted pairs or shielded conductors into explosion proof equipment. See clause 12.4.1.

12.5.3 Class 1, Zones 0, 1 and 2

The API RP 14 FZ, Recommended Practice for the design and installation of electrical systems for fixed and floating offshore petroleum facilities for unclassified and Class I, Zone 0, Zone 1 and Zone 2 locations, recommends the following wiring methods for hazardous (classified) locations.

12.5.4 Class 1, Zone 1

- Type MC-HL metal clad cables as defined in UL 2225.
- Armoured marine shipboard cable with an overall impervious sheath over the armour, constructed in accordance with UL 1309, and listed as “Shipboard Cable Marine” by a National Recognised Testing Laboratory (NRTL). This wiring method is a departure from the NEC.
- Type ITC cable that is NRTL - listed for use in Class 1, Division 1 locations with a gas/vapour tight continuous corrugated aluminium sheath and with an overall PVC or other suitable polymeric jacket.
- Threaded rigid copper-free aluminium conduit.
- Threaded rigid steel, hot dipped galvanized conduit, coated with PVC, or other suitable material, and with the interior protected by an additional means.

Non-armoured marine shipboard cable, with an overall impervious jacket in accordance with UL 1309 and listed as ‘Shipboard Cable Marine’ by a NRTL. This wiring method is a departure from the NEC.

For further information and other wiring methods acceptable for Zone 1, refer to Clause 6.4.2.2 of the API RP14FZ.

For fitting requirements of cables with multi-conductors, twisted pairs or shielded conductors into explosion proof equipment. See clause 12.4.1.

12.5.5 Class 1, Zone 2

- Wiring methods as recommended for use in Zone 1.
- Type MC cable with a gas / vapour tight continuous corrugated aluminium sheath, an overall PVC or other suitable polymeric jacket, and grounding conductors in accordance with NEC 250-122.
- Non-armoured marine shipboard cable, with an overall impervious jacket in accordance with UL 1309 and listed as ‘Shipboard Cable Marine’ by a NRTL. This wiring method is a departure from the NEC.

Additional wiring methods acceptable for Zone 2 include type PLTC, ITC, TC and MV cables. It is recommended that an overall PVC or other suitable polymeric material jacket is included for these cable types.

For additional information, refer to Clause 6.4.2.3 of API RP14FZ.

Further information on the use of equipment is given in Clause 6.4.7 of API RP14FZ.

An NRTL approved cable sealing fitting, e.g. barrier type cable gland complying with UL 2225, must be fitted onto cables where they enter explosion-proof enclosures.

For fitting requirements of cables with multi-conductors, twisted pairs or shielded conductors into explosion proof equipment. See clause 12.4.1.

Where cables enter equipment which is permitted for use in Zone 2 or unclassified areas and that is not explosion-proof, a suitable cable fitting e.g. cable gland design, need not be explosion-proof, except when necessary to maintain the integrity of the enclosure and as required by the Recommended Practice.

In unclassified and Zone 2 locations, when the metallic sheath is approved as a grounding conductor, the continuous metal sheath of the MC cable or the combined metallic sheath and grounding conductors may be used as the grounding conductor when used with termination fittings that are NRTL listed to UL 514B.

12.6 National Electrical Code (NEC) Zone Equipment Marking

Equipment that is listed for use in Class I Zones, as permitted by the NEC, should be marked as follows:-

- Class 1, Zone 0 or Class 1, Zone 1 or Class 1, Zone 2
- Applicable gas classification group(s)
- Temperature classification

E.g.

CLASS 1, ZONE 1	AEx	e	II	T6
Area Classification	Symbol for equipment built to American Standards	Type(s) of Protection	Gas Classification Groups	Temperature Classification

12.7 National Electrical Code (NEC) Division Equipment Marking

Equipment that is approved for use in Class I, Class II or Class III, Division 1 or 2 as permitted by the NEC may be marked as follows:-

- Class I or Class II or Class III, or a combination where appropriate.
- Division 1 or 2 equipment not marked to indicate a Division or marked Division 1 is suitable for both Division 1 and 2 locations as defined in the NEC.
- Group Classification.
- Operating temperature or temperature range, or as permitted by the NEC.

12.8 North American Ingress Protection

12.8.1 Non-Hazardous Locations

NEMA ENCLOSURE TYPE NO.	APPLICATIONS
1	Enclosures constructed for indoor use to provide a degree of protection to personnel against access to hazardous parts and to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt).
2	Enclosures constructed for indoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt); and to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (dripping and light splashing).
3	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow); and that will be undamaged by the external formation of ice on the enclosure.
3R	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow); and that will be undamaged by the external formation of ice on the enclosure.
3S	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow); and for which the external mechanism(s) remain operable when ice laden.
3X	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow); that provides an additional level of protection against corrosion and that will be undamaged by the external formation of ice on the enclosure.

3RX	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow); that will be undamaged by the external formation of ice on the enclosure that provides an additional level of protection against corrosion; and that will be undamaged by the external formation of ice on the enclosure.
3SX	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow); that provides an additional level of protection against corrosion; and for which the external mechanism(s) remain operable when ice laden.
4	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt and windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water); and that will be undamaged by the external formation of ice on the enclosure.
4X	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water); that provides an additional level of protection against corrosion; and that will be undamaged by the external formation of ice on the enclosure.
5	Enclosures constructed for indoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt and settling airborne dust, lint, fibres, and flyings); and to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (dripping and light splashing).
6	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (hose directed water and the entry of water during occasional temporary submersion at a limited depth); and that will be undamaged by the external formation of ice on the enclosure.

6P	Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (hose directed water and the entry of water during prolonged submersion at a limited depth); that provides an additional level of protection against corrosion and that will be undamaged by the external formation of ice on the enclosure.
12	Enclosures constructed (without knockouts) for indoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt and circulating dust, lint, fibres, and flyings); and to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (dripping and light splashing).
12K	Enclosures constructed (with knockouts) for indoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt and circulating dust, lint, fibres, and flyings); and to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (dripping and light splashing).
13	Enclosures constructed for indoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (falling dirt and circulating dust, lint, fibres, and flyings); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (dripping and light splashing); and to provide a degree of protection against the spraying, splashing, and seepage of oil and non-corrosive coolants.

12.8.2 Hazardous locations

ENCLOSURE TYPE NO.	APPLICATION
7	For indoor use in hazardous locations classified as Class I, Division 1, Groups A, B, C or D as defined in NFPA 70.
8	For indoor use in hazardous locations classified as Class II, Division 1, Groups E, F or G as defined in NFPA 70.
8	For indoor use in hazardous locations classified as Class II, Division 1, Groups E, F or G as defined in NFPA 70.

Further information can be found in NEMA Standard Publication 250 and UL 50 Standard Publication.

The enclosures are designed to protect and to provide additional protection as stated in the adjacent table:-

The IEC and CENELEC 60529 Standards and NEMA degrees of protection can not be compared as equivalent ratings. The NEMA Standard includes test for environmental conditions such as mechanical damage, corrosion, rusting, ice formation etc.

NEMA ENCLOSURE TYPE	IEC / EN 60529
1	IP10
2	IP11
3	IP54
3R	IP14
3S	IP54
4 and 4X	IP55
5	IP52
6 and 6P	IP67
12 and 12K	IP52
13	IP54

13.0 Abbreviations, Acronyms and Definitions

ABS	American Bureau of Shipping. ABS is a ship classification society involved with establishing and administering of standards and rules for marine vessels and structures.
AEx	A marking prefix for apparatus complying with one or more types of explosion protection techniques for installation in accordance with Article 505 of the NEC.
ANSI	American National Standards Institute.
API	American Petroleum Institute.
ATEX	EU Directive 94/9/EC Equipment and protective systems intended for use in potentially explosive atmospheres.
Baseefa	British Approvals Service for Electrical Equipment in Flammable Atmospheres. Provide a range of testing and certification services primarily related to equipment and systems intended for use in potentially explosive atmospheres.
CEC	Canadian Electrical Code. Part 1, CSA Standard C22.1-09, is a safety standard for the installation and maintenance of electrical equipment.
CEN	European Committee for Standardisation.

CENELEC	The European Committee for Electrotechnical Standardization was created in 1973. CENELEC is a non-profit technical organization consisting of over 30 European countries, with an additional 10 neighbouring countries participating in CENELEC work with an Affiliate status.
CEPEL	Centro de Pesquisas de Energia Electrica (Brazil). In Brazil, all electrical or electronic equipment for use in potentially explosive atmospheres should be certified by a Brazilian certification body recognised by INMETRO. CEPEL is an accredited body that is able to issue relevant certification.
CFR	Code of Federal Regulations.
Cold Flow	Certain types of cable employ materials that can exhibit 'cold flow' characteristics that could have adverse effects on the protection of the apparatus. Where such cable is used, a suitable cable entry device should be employed, for example cable entry devices not employing compression seals that act upon the part(s) of the cable having 'cold flow' characteristics. 'Cold flow' can be more fully described as thermoplastic materials that flow when subjected to pressure at ambient temperature.
CSA	Canadian Standards Association. A service offered that includes testing and certification services to US and Canadian Standards, as well as international certification through agreements with other approval authorities.
DNV	Det Norske Veritas.
EPL	Explosion Protection Level.
Ex	A marking prefix for apparatus complying with one or more types of explosion protection techniques in accordance with IEC standards.
Explosionproof	A term used to describe equipment that is capable of withstanding an explosion of a specified gas or vapour that may occur within it and preventing the ignition of a specified gas or vapour surrounding it.
Flameproof	A type of protection of electrical apparatus in which the enclosure will withstand an internal explosion of a flammable mixture which has penetrated into the interior, without suffering damage and without causing ignition, through any joints or structural openings in the enclosure, of an external explosive atmosphere consisting of one or more of gases or vapours for which it is designed.
FM Global	Factory Mutual Research Corporation (USA). Services they offer include the testing and approval of electrical equipment in accordance with US and international Standards.
Hazardous Areas	Locations where fire or explosion hazards may exist due to the presence of flammable gases, vapours, mists, ignitable fibres or dusts.

IADC	International Association of Drilling Contractors.
IEC	International Electrotechnical Commission. Founded in 1906, the IEC is the world organisation that prepares international standards for all electrical, electronic and related technologies. The membership consists of more than 70 participating countries.
IECEX	The aim of the IECEX Scheme is to facilitate international trade in electrical equipment intended for use in potentially explosive atmospheres by eliminating the need for multiple national certificates.
Increased Safety	A type of protection applied to electrical apparatus that does not produce arcs or sparks in normal service and under specified abnormal conditions, in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks.
INMETRO	Nacional de Metrologia, Normalização e Qualidade Industrial (Brazil).
Intrinsically Safe Systems	An assembly of interconnected items of apparatus which may comprise of intrinsically safe apparatus, associated apparatus and other apparatus, and interconnecting cables in which the circuits within those parts of the system that may be exposed to explosive gas atmospheres are intrinsically safe circuits.
Impervious Sheathed Cable	Cable constructed with an impervious metallic or non-metallic overall covering that prevents the entrance of gases, moisture or vapours into the insulated conductor or cable.
IP	A system of rating levels of Ingress Protection provided by the apparatus.
ISA	The International Society for Measurement and Control, a global, non-profit organization.
ISO	International Organizations for Standardization. Worldwide federation of national standard bodies from 162 countries. ISO's mission is to promote the development of standardization to facilitate international exchange of goods service.
ITS	Intertek Testing Services.
Marine Shipboard Cable	Impervious sheathed armoured or non-armoured cable constructed in accordance with UL 1209 / CSA C22.2 No. 245, except that an overall impervious sheath is required over the armoured construction, and listed as "Shipboard Cable, Marine" by a Nationally Recognised Testing Laboratory (NRTL).

Maximum Surface Temperature	The highest temperature of a surface accessible to a flammable mixture under conditions of operation and within the ratings of the equipment.
MC Cable	Metal-clad cable as defined by NEC Article 501.
MC-HL Cable	Metal-clad cable for hazardous locations as defined in UL 2225.
NEC	National Electric Code (ANSI / NFPA 70).
NEMA	National Electrical Manufacturer's Association.
NFPA	National Fire Protection Association.
NRTL	National Recognised Test Laboratories (US). Those recognised by the OSHA include CSA, FMRC and UL. The NRTL determines that the specific products meet the relevant standards of safety as required by the OSHA and that the products are safe for use in the U. S. workplace. For further information, refer to the OSHA website www.osha.gov
OSHA	Occupational Safety and Health Administration. Works with the U. S. Department of Labour National Recognised Test Laboratories (NRTL's) to ensure products safe for use in the U.S.
PLTC	Power limited tray cable as defined by NEC Article 725.
Potentially Explosive Atmosphere	A mixture with air, under atmospheric conditions, of flammable substances in the form of a gas, vapour, mist or dust in which after ignition, combustion spreads through the unconsumed mixture.
Restricted Breathing (ExnR)	Enclosure that is designed to restrict the entry of gases, vapours, dusts and mists.
SCS	SIRA Certification Service (UK). Provide a range of testing and certification services, and have agreements with other international approval authorities.
TC	Power and control cable as defined by NEC Article 336.
UL	Underwriters Laboratories Inc – USA.
ULc	Underwriters Laboratories Inc – Canada.
USCG	United States Coast Guard.