WELCOME TO HAWKE INTERNATIONAL – INTERACTIVE CATALOGUE

This interactive catalogue has been designed with ease of use in mind. The pages are interactive and contain links or 'hotspots' that can be clicked to take the user to the relevant information or page.

INSTRUCTIONS FOR USE

It is recommended that you print out these instructions for reference.

LINKS

A link is signalled when the mouse pointer changes from a hand to a pointing finger. For example where a page number is referenced.

FIT TO SCREEN

The default for each page is fit to screen, which allows a full view of the page without the need to scroll.

TO ENLARGE THE PAGE

1. Select the magnifying glass icon from the toolbar and click on the page until the required size is reached.
2. To enlarge a particular section of the page, click and hold down the left mouse button, drag the bounding box over the section you wish to enlarge and release the mouse button.

STEP THROUGH EACH PAGE IN SEQUENCE

Use the and buttons, usually found on the toolbar at the top of the screen, to move backwards and forwards through the pages. There is a page counter at the bottom left of the screen that indicates where you are in the sequence. You can also move to other pages by highlighting the page numbers and typing in a number.

RETURN TO PREVIOUS VIEW

Clicking the button found in the toolbar at the top of the screen will return you to the previous view i.e. whatever was displayed previously on the screen. This would shrink the page if you had enlarged it, or return you to a previous page if you had just left it.

Hawke International is committed to providing you, the end user, with software products that are easy to use, that provide you with the information you are seeking in a quick and efficient manner and are of benefit to you. If you have any comments/suggestions about our software products please do not hesitate to contact Hawke International

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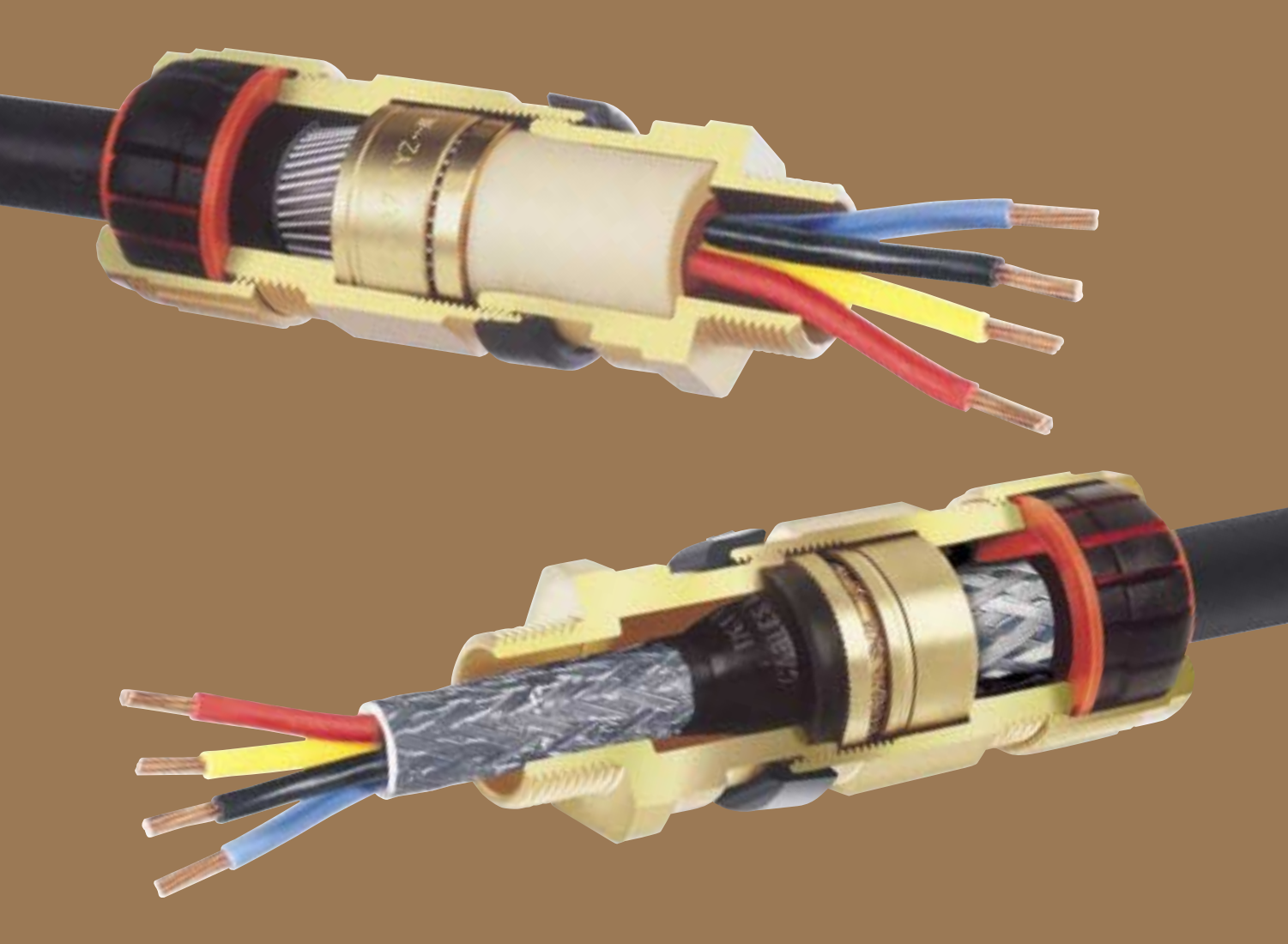

Cable Glands for Worldwide Applications

Featuring the New **ATEX** *range*

HAWKE International

FOR CUSTOMERS WHO DEMAND THE BEST

For those who demand quality, reliability and above all, safety, Hawke International is the obvious choice.

Smarter Products

Hawke International has provided peace of mind to contractors, installers and end users for over 50 years. Our innovative range of cable connection and termination products, specifically designed with the customer in mind, have gained worldwide approval and credibility for the testing conditions of hazardous (classified) locations and hostile environments.
The customers requirements for sustained safety and reliability under extreme conditions are therefore Hawke's primary objectives. Furthermore our superior designs allow ease of installation, use long life materials and are manufactured to rigorous quality standards. All this provides the customer with unparalleled benefits of the lowest lifetime cost of purchase.

Worldwide

Located in Manchester, UK, Hawke International has subsidiary locations in Houston, USA and Singapore, along with direct representation in Brazil, the Middle East, Canada and China. Hawke International is supported worldwide by the Hubbell Group along with a global network of agents and distributors.

Product Development

Hawke International recognises that the demands of the customer base never stand still and we are therefore committed to the ongoing development of our products and features to provide improved safety, versatility, reliability and ease of use.

First Choice

Predominantly used on Offshore and Onshore oil and gas exploration, production and processing facilities. Hawke's products are the 'First Choice' for the world's major oil, gas and petrochemical companies.

A Quality Company

Hawke International's products are designed and manufactured under a quality system not only complying with ISO 9001 but also with the latest international standards. Rigorous and regular in-house testing ensures that every product manufactured meets the highest quality standards expected by the market.

Hawke International

"Leading the way in the design of worldwide connection solutions"

Hawke Cable Glands Contents

Flameproof/Increased Safety and Industrial

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Hawke Cable Glands Contents

Flameproof/Increased Safety and Industrial

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Cable Gland Selection Chart

Cable Gland Type	Colour Code/ Page	Application/Cable Type	Sealing/Ingress Protection	Material	Certification	Protection Concept
501/421	11	Indoor/outdoor Non-armoured cable	Outer cable sheath seal IP66/67/68 Deluge	Brass Stainless Steel	EC IEC, PG, AUS, Marine Approval.	Flameproof and Increased Safety
501/423	12	Indoor/outdoor Non-armoured cable	Two outer cable sheath seals IP66/67/68 Deluge	Brass	EC IEC, AUS, Marine Approval.	Flameproof and Increased Safety
501/453/Universal	13	Indoor/outdoor Armoured/braided cable with inner and outer sheath	Inner (diaphragm) and outer cable sheath seals IP66/67/68 Deluge	Brass Stainless Steel	EC IEC, PG, AUS, Marine Approval.	Flameproof and Increased Safety
501/453/RAC	14	Indoor/outdoor Armoured/braided cable with inner and outer sheath	Inner and outer cable sheath seals IP66/67/68 (Deluge option)	Brass Stainless Steel	EC IEC, PG, AUS, Marine Approval.	Flameproof and Increased Safety
501/453/RAC/L	15	Indoor/outdoor Armoured/braided cable with inner lead sheath and outer sheath	Inner lead sheath seal/electrical bond and outer cable sheath seal IP66/67/68 (Deluge option)	Brass	EC IEC, PG, Marine Approval.	Flameproof and Increased Safety
PSG 553/RAC	16	Indoor/outdoor Armoured/braided cable with inner (optional) and outer sheath	Individual conductor seal and outer cable sheath seal IP66/67/68 (Deluge option)	Brass	EC IEC	Flameproof and Increased Safety
ICG 623	17	Indoor/outdoor Non-armoured cable	Inner (compound) and outer cable sheath seals IP66/67/68 Deluge	Brass	EC IEC, AUS, Marine Approval.	Flameproof and Increased Safety
ICG 653/Universal	18	Indoor/outdoor Armoured/braided cable with inner (optional) and outer sheath	Inner (compound) and outer cable sheath seals IP66/67/68 Deluge	Brass Stainless Steel	EC IEC, PG, AUS, Marine Approval.	Flameproof and Increased Safety

Cable Gland Selection Chart

Cable Gland Type	Colour Code/ Page	Application/Cable Type	Sealing/Ingress Protection	Material	Certification	Protection Concept
ICG 653/UNIV/L	19	Indoor/outdoor Armoured/braided cable with inner lead sheath and outer sheath	Inner lead sheath seal/electrical bond and outer cable sheath seal IP66/67/68 Deluge	Brass	EC IEC, Marine Approval.	Flameproof and Increased Safety
501/414	20	Indoor/outdoor Non-armoured cable, conduit system	Outer cable sheath seal IP66/67/68 Deluge	Brass	EC IEC, Marine Approval.	Flameproof and Increased Safety
SB 474	21	Indoor/outdoor Individual conductors, conduit system	Individual conductor seal IP66/67/68 Deluge	Brass	EC IEC, Marine Approval.	Flameproof and Increased Safety
CSB 656	22	Indoor/outdoor Individual conductors, conduit system	Individual conductor (compound) seal IP66/67/68 Deluge	Brass	EC IEC, AUS, Marine Approval.	Flameproof and Increased Safety
Oversize G, H & J and Increased Safety Cable Glands	23	PLEASE REFER TO INDIVIDUAL DATA SHEETS FOR DETAILS				
653/Universal Group I Mining	25	Indoor/outdoor Armoured/braided cable with inner (optional) and outer sheath	Inner (compound) and outer cable sheath seals IP66/67/68 Deluge	Brass, Stainless Steel	——	Group I Mining

Cable Gland Selection Chart

Cable Gland Selection Chart

Cable Gland Type	Colour Code/ Page	Application/Cable Type	Sealing/Ingress Protection	Material	Certification	Protection Concept
653/T Group I Mining	26	Indoor/outdoor Pliable wire armoured, elastomer and plastic insulated cable	Inner (compound) and outer cable sheath seals IP66/67/68 Deluge	Brass	—	Group I Mining
623 Group I Mining	27	Indoor/outdoor Non-armoured elastomer and plastic insulated cable.	Inner (compound) and outer cable sheath seals IP66/67/68 Deluge	Brass	—	Group I Mining
Accessories Group I Mining	28	PLEASE REFER TO INDIVIDUAL DATA SHEETS FOR DETAILS				
Adaptors/Reducers Group I	29	PLEASE REFER TO INDIVIDUAL DATA SHEETS FOR DETAILS				
121	32	Indoor/outdoor Non-armoured cable	Outer cable sheath seal IP66/67/68 Deluge	Brass	—	Industrial
123	33	Indoor/outdoor Non-armoured cable	Two outer cable sheath seals IP66/67/68 Deluge	Brass	—	Industrial
153/Universal	34	Indoor/outdoor Armoured/braided cable with inner and outer sheath	Inner (diaphragm) and outer cable sheath seals IP66/67/68 Deluge	Brass Stainless Steel	—	Industrial
153/RAC	35	Indoor/outdoor Armour/braided cable with inner and outer cable sheath	Inner and outer cable sheath seals IP66/67/68 (Deluge option)	Brass Stainless Steel	—	Industrial

Cable Gland Selection Chart

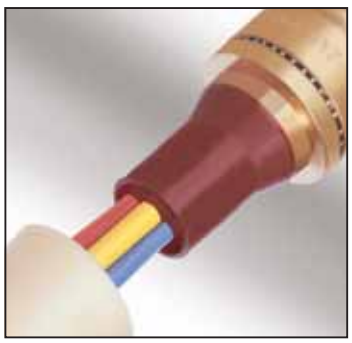
Cable Gland Type	Colour Code/ Page	Application/Cable Type	Sealing/Ingress Protection	Material	Certification	Protection Concept
153/RAC/L	36	Indoor/outdoor Armoured/braided cable with inner lead sheath and outer sheath	Inner lead sheath seal/electrical bond and outer cable sheath seal IP66/67/68 (Deluge option)	Brass	———	Industrial
150/RAC	37	Dry Indoor/outdoor Armoured/braided cable with inner (optional) and outer sheath	———	Brass	———	Industrial
151/RAC	38	Indoor/outdoor Armoured/braided cable with inner (optional) and outer sheath	Outer cable sheath seal IP66 (Deluge option)	Brass	———	Industrial
114	39	Indoor/outdoor Non-armoured cable, conduit system	Outer cable sheath seal IP66/67/68 Deluge	Brass	———	Industrial
710	42	Indoor/outdoor Non-armoured cable	Inner (compound) and outer cable jacket seals IP66/67/68 NEMA 4X & Deluge	Brass with Nickel Plated Entry	Marine Approval. Marine Approval.	Explosion Proof
711 and 713	43	Indoor/outdoor Type MCHL and Teck cables	Inner (compound) and outer cable jacket seals IP66/67/68 NEMA 4X & Deluge	Brass with Nickel Plated Entry	Marine Approval. Marine Approval.	Explosion Proof
753	44	Indoor/outdoor Armoured Marine Shipboard cable	Inner (compound) and outer cable jacket seals IP66/67/68 NEMA 4X & Deluge	Brass with Nickel Plated Entry and Stainless Steel	Marine Approval. Marine Approval.	Explosion Proof
755	45	Indoor/outdoor Steel Wire Armoured cable with inner (option) and outer jacket	Inner (compound) and outer cable jacket seals IP66/67/68 NEMA 4X & Deluge	Brass with Nickel Plated Entry	Marine Approval. Marine Approval.	Explosion Proof

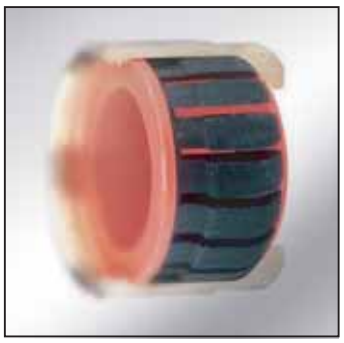
Cable Gland Selection Chart

Cable Gland Type	Colour Code/ Page	Application/Cable Type	Sealing/Ingres Protection	Material	Certification	Protection Concept
153/X	46	Indoor/outdoor Armoured marine shipboard jacketed or non-jacketed cable	Inner and outer cable jacket seals IP66/67/68 NEMA 4X & (Deluge option)	Brass with Nickel Plated Entry	Marine Approval. Marine Approval.	General Purpose
701	47	Indoor/outdoor Type MC and Teck cables	Outer cable jacket seal IP66/67/68 NEMA 4X & Deluge	Brass with Nickel Plated Entry	Marine Approval. Marine Approval.	General Purpose
Accessories	49-52	PLEASE REFER TO INDIVIDUAL DATA SHEETS FOR DETAILS				
Accessories	49-52	PLEASE REFER TO INDIVIDUAL DATA SHEETS FOR DETAILS				
Accessories	49-52	PLEASE REFER TO INDIVIDUAL DATA SHEETS FOR DETAILS				
Accessories	49-52	PLEASE REFER TO INDIVIDUAL DATA SHEETS FOR DETAILS				
Adaptors and Reducers	53	PLEASE REFER TO INDIVIDUAL DATA SHEETS FOR DETAILS				
Technical Data Hawke Cable Glands and Enclosures	54-83	PLEASE REFER TO INDIVIDUAL DATA SHEETS FOR DETAILS				

Cable Gland Selection Chart

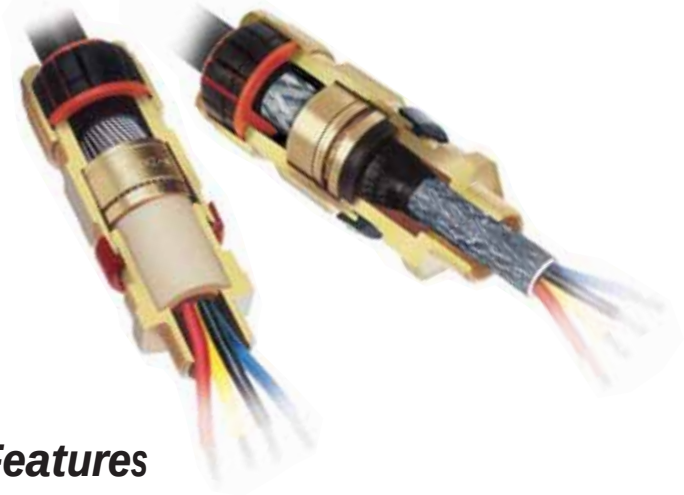
Hazardous Area Cable Glands





Hazardous Area Cable Glands

Flameproof and Increased Safety



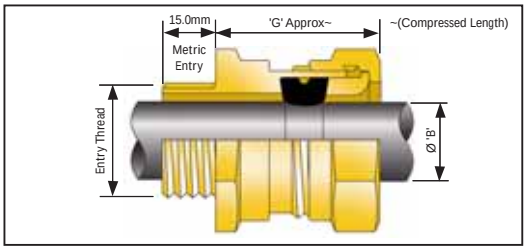
Features

- **Unique Rear Sealing System**
  This arrangement offers IP66, IP67, IP68 (30 metres for 7 days), NEMA 4X and Deluge (DTS01) Ingress Protection. The seal is manufactured from a silicone material, has LSFZH properties, is ozone and oil resistant and is suitable for use at both high and low temperatures.The Rear Sealing System covers the entire range of cable diameters without the need for special seals and the cable acceptance range is stamped on the backnut for ease of inspection. The backnut can be hand tightened, with only one further spanner turn required to ensure IP66, IP67, IP68 and NEMA 4X.

- **Unique Inspectable Compound Chamber**
  The revolutionary Hawke compound chamber has been designed with inspectability in mind. The pre-lubricated compound chamber can be removed once the compound has fully cured, allowing full inspection of the flameproof seal. If required minor surface voids can be repaired in situ. This unique patented compound chamber now forms the compound as well as providing a flameproof seal, resulting in reduced piece parts, as there is no longer a requirement to separate the seal from the compound chamber.

- **Zero Cable Damage**
  The unique Hawke diaphragm sealing system does not damage cable with 'Cold Flow' characteristics. The diaphragm type seal is the only elastomeric seal to comply fully with EN 60079-14 and IEC 60079-14 and is therefore suitable on cables which would otherwise require barrier style cable glands.
  The Hawke diaphragm seal is also unique in that it is the only flameproof elastomeric seal that can be visually inspected in operation - A real benefit to ATEX inspectors.

- **The Original Reversible Armour Clamp**
  The original RAC clamping system was invented by Hawke over 10 years ago and is a well established proven performer in all conditions. Simply by reversing the clamping ring, the cable gland can adjust to accomodate all types of cable armour or braid. Unlike many of our competitors the correct clamping orientation is marked clearly with a 'W', 'Z' or 'X' and backed up by the presence of a groove in the component. Hawke's RAC clamping system is also fully inspectable when positioned on the cable.
- **Inspectable Deluge Seal**
  Hawke's inspectable deluge seal offers IP66 and IP67 sealing and is certified as 'deluge proof' by ITS in accordance with DTS01. Indeed Hawke's deluge seal is so good that it exceeds the expectations of the offshore industry by not only preventing ingress into the equipment, but also into the cable gland, which could potentially corrode the cable armour.



Cable Gland Type 501/421

IECEx ATEX Ex CE

Flameproof and Increased Safety

501/421 Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details – Outer Sheath 'B'				'G'	Hexagon Dimensions	
			Standard Seal		Alternative Seal (S)				
	Metric	NPT* Std./ Option	Min.	Max.	Min.	Max.		Across Flats	Across Corners
2K	M16	-	3.0	8.0	-	-	27	19.0	21.2
Os	M20[2]	½"	3.0	8.0	-	-	32.8	24.0	27.7
O	M20[2]	½"	7.5	11.9	-	-	32.8	24.0	27.7
A	M20	¾"/½"	11.0	14.3	8.5	13.4	32.8	30.0	34.6
B	M25	1"/¾"	13.0	20.2	9.5	15.4	33.8	36.0	41.6
C	M32	1¼"/1"	19.0	26.5	15.5	21.2	35.2	46.0	53.1
C2	M40	1½"/1¼"	25.0	32.5	22.0	28.0	36.5	55.0	63.5
D	M50	2"/1½"	31.5	44.4/42.3[1]	27.5	34.8	47.9	65.0	75.1
E	M63	2½"/2"	42.5	56.3/54.3[1]	39.0	46.5	46.2	80.0	92.4
F	M75	3"/2½"	54.5	68.2/65.3[1]	48.5	58.3	48	95.0	109.6
G	M80	3½"	67.0	73.0	-	-	41	106.4	123.0
H	M90	3½"	67.0	77.6	-	-	41	115.0	132.8
J	M100	4"	75.0	91.6	-	-	41	127.0	146.7

[1] Smaller value is applicable when selecting reduced NPT entry option.

[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable outer sheath diameter is 10.9mm.

General Information

2K - F size metric entry threads are 1.5mm pitch as standard.
For G size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes 2K to F and 20mm for sizes G to J.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 307.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 501/421cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

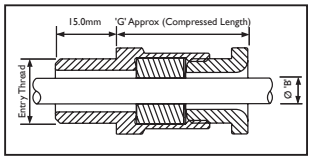
Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 501/421/C/M32
501/421/C/1¼" NPT

Cable Gland with Alternative Seal (S)

e.g. 501/421/C/M32/S
501/421/C/1¼" NPT/S



2K Size Cable Gland Design

Application

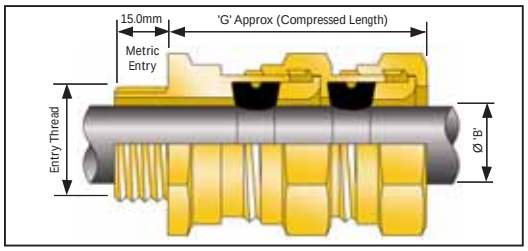
- Outdoor or Indoor use.
- For use with non-armoured elastomer and plastic insulated cables.
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a cable retention seal onto the cables outer sheath.
- When used in increased safety applications, this cable gland may be used with braided cable where the braid and the cables outer sheath pass into the enclosure.
  The braid must be suitably terminated inside the enclosure.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex II 2 GD
- Baseefa 06ATEX0056X.
- IECEx BAS06.0013X.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1. IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN 60529 and NEMA 4X.
- DTS01 deluge protection certified by ITS. Additional deluge protection seal also available.
- Operating temperature range -60°C to +100°C as standard.
- Alternative Certification Options Available.
  - Exd IIC/Exe II.
  - CEPEL BR-Exd IIC/Exe II.
  - GOST R-Exd IICU/Exe IIU.
  - Approved for use in Kazakhstan.
  - Exd IIC/Exe II/DIP A21 IP66.
  - Marine Approval.
  - ABS Marine Approval.



Cable Gland Type 501/423

IECEx ATEX Ex CE

Flameproof and Increased Safety

501/423 Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details – Outer Sheath 'B'				'G'	Hexagon Dimensions	
			Standard Seal		Alternative Seal (S)				
	Metric	NPT* Std./ Option	Min.	Max.	Min.	Max.		Across Flats	Across Corners
Os	M20[2]	½"	3.0	8.0	-	-	52.3	24.0	27.7
O	M20[2]	½"	7.5	11.9	-	-	52.3	24.0	27.7
A	M20	¾"/½"	11.0	14.3	8.5	13.4	51.5	30.0	34.6
B	M25	1"/¾"	13.0	20.2	9.5	15.4	54.7	36.0	41.6
C	M32	1¼"/1"	19.0	26.5	15.5	21.2	55.9	46.0	53.1
C2	M40	1½"/1¼"	25.0	32.5	22.0	28.0	58.1	55.0	63.5
D	M50	2"/1½"	31.5	44.4/42.3[1]	27.5	34.8	74.3	65.0	75.1
E	M63	2½"/2"	42.5	56.3/54.3[1]	39.0	46.5	73.2	80.0	92.4
F	M75	3"/2½"	54.5	68.2/65.3[1]	48.5	58.3	75	95.0	109.6
G	M80	3½"	67.0	73.0	-	-	68	106.4	123.0
H	M90	3½"	67.0	77.6	-	-	68	115.0	132.8
J	M100	4"	75.0	91.6	-	-	68	127.0	146.7

[1] Smaller value is applicable when selecting reduced NPT entry option.
[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable outer sheath diameter is 10.9mm.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For G size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F and 20mm for sizes G to J.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 306.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 501/423 cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 501/423/C/M32
501/423/C/1¼" NPT

Cable Gland with Alternative Seal (S)

e.g. 501/423/C/M32/S
501/423/C/1¼" NPT/S

Application

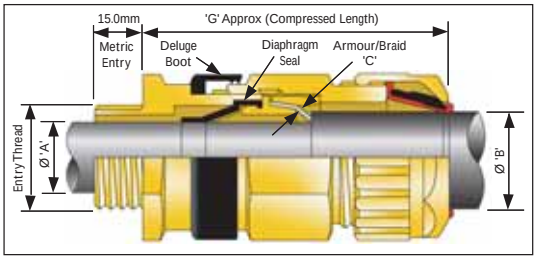
- Outdoor or Indoor use.
- For use with non-armoured elastomer and plastic insulated cables.
- May be used on cables incorporating inner and outer cable sheaths.
- See technical section of catalogue for installation rules and regulations.

Features

- Provides a cable retention seal onto the cables outer sheath at two independent sealing points.
- When used in increased safety applications, this cable gland may be used with braided cable where the braid and the cables outer sheath pass into the enclosure.
  The braid must be suitably terminated inside the enclosure.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex II 2 GD
- Baseefa 06ATEX0056X.
- IECEx BAS06.0013X.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1.
  IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN 60529 and NEMA 4X.
- DTS01 deluge protection certified by ITS. Additional deluge protection seal also available.
- Operating temperature range -60°C to +100°C as standard.
- Alternative Certification Options Available.
  - Exd IIC/Exe II.
  - CEPEL BR-Exd IIC/Exe II.
  - AUS-Exd IIC/Exe II.
  - Marine Approval.



Cable Gland Type 501/453/Universal

IECEx ATEX Ex CE

Flameproof and Increased Safety

501/453/Universal Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details						'G'	Hexagon Dimensions	
			Inner Sheath 'A'		Outer Sheath 'B'		'C' Armour/Braid				
	Metric	NPT* Std./ Option	Min.	Max.	Min.	Max.	Orientation 1	Orientation 2		Across Flats	Across Corners
Os	M20[2]	½"	3.0	8.1	5.5	12.0	0.9/1.25	0/0.7	64.4	24.0	27.7
O	M20[2]	½"	6.5	11.9	9.5	16.0	0.9/1.25	0/0.7	64.4	24.0	27.7
A	M20	¾"/½"	8.4	14.3	12.5	20.5	0.9/1.25	0/0.7	65.4	30.0	34.6
B	M25	1"/¾"	11.1	20.2	16.9	26.0	1.25/1.6	0/0.7	71	36.0	41.6
C	M32	1¼"/1"	17.6	26.5	22.0	33.0	1.6/2.0	0/0.7	76	46.0	53.1
C2	M40	1½"/1¼"	23.1	32.5	28.0	41.0	1.6/2.0	0/0.7	78.1	55.0	63.5
D	M50	2"/1½"	28.9	44.4/42.3[1]	36.0	52.6	1.8/2.5	0/1.0	93.1	65.0	75.1
E	M63	2½"/2"	39.9	56.3/54.3[1]	46.0	65.3	1.8/2.5	0/1.0	99	80.0	92.4
F	M75	3"/2½"	50.5	68.2/65.3[1]	57.0	78.0	1.8/2.5	0/1.0	101.9	95.0	109.6

Larger cable glands available in 501/453 design with a compression type inner seal.

G	M80	3½"	67.0	73.0	75.0	89.5	#	#	90.6	106.4	123.0
H	M90	3½"	67.0	77.6	75.0	89.5	#	#	90.6	115.0	132.8
J	M100	4"	75.0	91.6	88.0	104.5	#	#	90.6	127.0	146.7

[1] Smaller value is applicable when selecting reduced NPT entry option.
[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 10.9mm.
Dedicated armour clamping rings are fitted. Please specify armour type and size when ordering.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For G size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F and 20mm for sizes G to J.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 300 for sizes Os to F.
Assembly instruction data sheet No. A.I. 303 for sizes G to J.

Alternative Reversible Armour Clamping Rings (RAC)

SELECTION TABLE		
Size Ref.	Steel Wire Armour/Braid/Tape	
	Orientation 1	Orientation 2
O/Os	0.8 - 1.0	0.4 - 0.8
A	0.8 - 1.0	0.4 - 0.8
B	0.9 - 1.25	0.5 - 0.9
C	1.2 - 1.6	0.6 - 1.2
C2	1.2 - 1.6	0.6 - 1.2
D	1.45 - 1.8	1.0 - 1.45
E	1.45 - 1.8	1.0 - 1.45
F	1.45 - 1.8	1.0 - 1.45

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 501/453/Universal cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 501/453/UNIV/C/M32
501/453/UNIV/C/1¼" NPT

Cable Gland with Alternative Clamping Ring (AR)

e.g. 501/453/UNIV/C/M32/AR
501/453/UNIV/C/1¼" NPT/AR

Application

- Outdoor or Indoor use.
- For use with single wire armoured 'W', wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables.

For particular use with :-
Cables that exhibit "Cold Flow" characteristics.

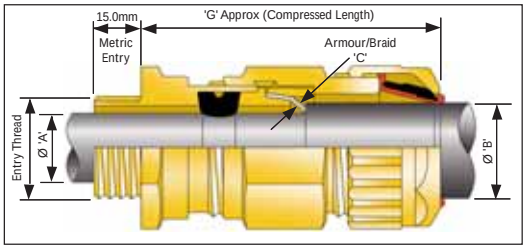
- See technical section of catalogue for installation rules and regulations.

Features

- Provides armour clamping using one clamping arrangement for all armour/braid types.
- Provides a diaphragm seal on the cables inner sheath which will not damage cable that has "Cold Flow" characteristics.
- Provides an outer deluge seal to prevent moisture ingress to the cable armour/braid.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Flameproof Exd and Increased Safety Exe Ex II 2 GD
- Baseefa 06ATEX0057X for sizes Os to F.
- IECEx BAS06.0014X for sizes Os to F.
- Baseefa 06ATEX0056X for sizes G to J.
- IECEx BAS06.0013X for sizes G to J.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIBand IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1. IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN 60529 and NEMA 4X.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +80°C as standard.
- Alternative Certification Options Available.
  - Exd IIC/Exe II.
  - CEPEL
  - GOST R-Exd IICU/Exe IIU.
  - Approved for use in Kazakhstan.
  - AUS-Exd IIC/Exe II.
  - Marine Approval.



Cable Gland Type 501/453/RAC

IECEx ATEX Ex CE

Flameproof and Increased Safety

501/453/RAC Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details								'G'	Hexagon Dimensions	
			Inner Sheath 'A'				Outer Sheath 'B'		'C' Armour/Braid				
			Standard Seal		Alternative Seal (S)								
	Metric	NPT* Std./ Option	Min.	Max.	Min.	Max.	Min.	Max.	Orientation 1	Orientation 2		Across Flats	Across Corners
Os	M20[2]	½"	3.0	8.0	-	-	5.5	12.0	0.9/1.25	0/0.7	65.1	24.0	27.7
O	M20[2]	½"	6.5	11.9	-	-	9.5	16.0	0.9/1.25	0/0.7	65.1	24.0	27.7
A	M20	¾"/½"	10.0	14.3	8.5	13.4	12.5	20.5	0.9/1.25	0/0.7	66.1	30.0	34.6
B	M25	1"/¾"	12.5	20.2	9.5	15.4	16.9	26.0	1.25/1.6	0/0.7	71.4	36.0	41.6
C	M32	1¼"/1"	19.0	26.5	14.5	21.2	22.0	33.0	1.6/2.0	0/0.7	75.2	46.0	53.1
C2	M40	1½"/1¼"	25.0	32.5	22.0	28.0	28.0	41.0	1.6/2.0	0/0.7	77.1	55.0	63.5
D	M50	2"/1½"	31.5	44.4/42.3[1]	27.5	34.8	36.0	52.6	1.8/2.5	0/1.0	90.3	65.0	75.1
E	M63	2½"/2"	42.5	56.3/54.3[1]	39.0	46.5	46.0	65.3	1.8/2.5	0/1.0	96.7	80.0	92.4
F	M75	3"/2½"	54.5	68.2/65.3[1]	48.5	58.3	57.0	78.0	1.8/2.5	0/1.0	96	95.0	109.6

Larger cable glands available in 501/453 design.

G	M80	3½"	67.0	73.0	-	-	75.0	89.5	#	#	95.6	106.4	123.0
H	M90	3½"	67.0	77.6	-	-	75.0	89.5	#	#	95.6	115.0	132.8
J	M100	4"	75.0	91.6	-	-	88.0	104.5	#	#	95.6	127.0	146.7

[1] Smaller value is applicable when selecting reduced NPT entry option.
[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 10.9mm.
[3] This cable gland type is also available for use with lead sheath cables - 501/453/RAC/L. Contact Hawke sales for more information.
[4] Deluge protection option available.
Dedicated armour clamping rings are fitted. Please specify armour type and size when ordering.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For G size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F and 20mm for sizes G to J.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 302.

Alternative Reversible Armour Clamping Rings (RAC)

SELECTION TABLE		
Size Ref.	Steel Wire Armour/Braid/Tape	
	Orientation 1	Orientation 2
O/Os	0.8 - 1.0	0.4 - 0.8
A	0.8 - 1.0	0.4 - 0.8
B	0.9 - 1.25	0.5 - 0.9
C	1.2 - 1.6	0.6 - 1.2
C2	1.2 - 1.6	0.6 - 1.2
D	1.45 - 1.8	1.0 - 1.45
E	1.45 - 1.8	1.0 - 1.45
F	1.45 - 1.8	1.0 - 1.45

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 501/453/RAC cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 501/453/RAC/C/M32
501/453/RAC/C/1¼" NPT

Cable Gland with Alternative Seal (S)

e.g. 501/453/RAC/C/M32/S
501/453/RAC/C/1¼" NPT/S

Cable Gland with Alternative Clamping Ring (AR)

e.g. 501/453/RAC/C/M32/AR
501/453/RAC/C/1¼" NPT/AR

Application

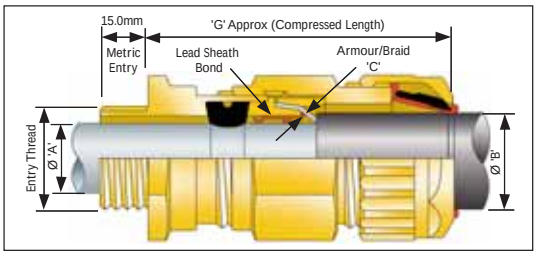
- Outdoor or Indoor use.
- For use with single wire armoured 'W', wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables.
- See technical section of catalogue for installation rules and regulations.

Features

- Provides armour clamping using one clamping arrangement for all armour/ braid types.
- Provides a seal on the cables inner sheath.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex II 2 GD
- Baseefa 06ATEX0056X.
- IECEx BAS06.0013X.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1. IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN 60529 and NEMA 4X.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +80°C as standard.
- Alternative Certification Options Available.
  - Exd IIC/Exe II.
  - CEPEL
  - GOST R-Exd IICU/Exe IIU.
  - Approved for use in Kazakhstan.
  - AUS-Exd IIC/Exe II.
  - Marine Approval.



Cable Gland Type 501/453/RAC/L

For Lead Sheath Cables

IECEx ATEX Ex CE

Flameproof and Increased Safety

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details								'G'	Hexagon Dimensions	
			Inner Lead Sheath 'A'				Outer Sheath 'B'		'C' Armour/Braid				
			Standard (L) Seal+Bond		Alternative (K) Seal+Bond								
	Metric	NPT* Std./ Option	Min.	Max.	Min.	Max.	Min.	Max.	Orientation 1	Orientation 2		Across Flats	Across Corners
O	M20[2]	½"	6.5	10.5	4.0	8.0	9.5	16.0	0.9/1.25	0/0.7	65.1	24.0	27.7
A	M20	¾"/½"	-	-	8.5	13.0	12.5	20.5	0.9/1.25	0/0.7	66.1	30.0	34.6
B	M25	1"/¾"	12.5	19.0	9.5	15.4	16.9	26.0	1.25/1.6	0/0.7	71.4	36.0	41.6
C	M32	1¼"/1"	19.0	25.0	14.5	21.2	22.0	33.0	1.6/2.0	0/0.7	75.2	46.0	53.1
C2	M40	1½"/1¼"	25.0	31.2	22.0	28.0	28.0	41.0	1.6/2.0	0/0.7	77.1	55.0	63.5
D	M50	2"/1½"	31.5	42.3/42.8[1]	27.5	34.8	36.0	52.6	1.8/2.5	0/1.0	90.3	65.0	75.1
E	M63	2½"/2"	42.5	53.3/54.5[1]	39.0	46.5	46.0	65.3	1.8/2.5	0/1.0	96.7	80.0	92.4
F	M75	3"/2½"	54.5	66.0/64.3[1]	48.5	58.3	57.0	78.0	1.8/2.5	0/1.0	96	95.0	109.6

Larger cable glands available in 501/453/L design.

G	M80	3½"	67.0	70.0	-	-	75.0	89.5	#	#	95.6	106.4	123.0
H	M90	3½"	67.0	75.0	-	-	75.0	89.5	#	#	95.6	115.0	132.8
J	M100	4"	75.0	89.5	-	-	88.0	104.5	#	#	95.6	127.0	146.7

[2]Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 10.9mm.
[4]Deluge protection option available.
Dedicated armour clamping rings are fitted. Please specify armour type and size when ordering.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For G size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes O to F and 20mm for sizes G to J.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 302 + 336 for sizes Os to F.
Assembly instruction data sheet No. A.I. 303 + 336 for sizes G to J.

Alternative Reversible Armour Clamping Rings (RAC)

SELECTION TABLE		
Size Ref.	Steel Wire Armour/Braid/Tape	
	Orientation 1	Orientation 2
O/Os	0.8 - 1.0	0.4 - 0.8
A	0.8 - 1.0	0.4 - 0.8
B	0.9 - 1.25	0.5 - 0.9
C	1.2 - 1.6	0.6 - 1.2
C2	1.2 - 1.6	0.6 - 1.2
D	1.45 - 1.8	1.0 - 1.45
E	1.45 - 1.8	1.0 - 1.45
F	1.45 - 1.8	1.0 - 1.45

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 501/453/RAC/L cable gland is manufactured in brass(standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread/ Standard Inner Seal + Bond

e.g. 501/453/RAC/C/M32/L
501/453/RAC/C/1¼" NPT/L

Cable Gland with Alternative Inner Seal + Bond

e.g. 501/453/RAC/C/M32/K
501/453/RAC/C/1¼" NPT/K

Cable Gland with Alternative Clamping Ring (AR)

e.g. 501/453/RAC/C/M32/L/AR
501/453/RAC/C/1¼" NPT/L/AR

Application

- Outdoor or Indoor use.
- For use with single wire armoured 'W' wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables with a lead inner sheath.
- See technical section of catalogue for installation rules and regulations.

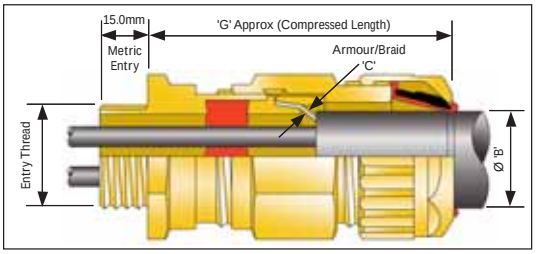
Features

- Provides armour clamping using one clamping arrangement for all armour /braid types.
- Provides a seal and an electrical bond on the cables lead inner sheath.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex II 2 GD
- Baseefa 06ATEX0056X.
- IECEx BAS06.0013X.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1.
  IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN 60529 and NEMA 4X.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +80°C as standard.
- Alternative Certification Options Available.
  - Exd IIC/Exe II.
  - CEPEL BR-Exd IIC/Exe II.
  - GOST R-Exd IICU/Exe IIU.
  - Approved for use in Kazakhstan.
  - Marine Approval.

501/453/RAC/L Cable Gland



Cable Gland Type PSG 553/RAC

IECEx ATEX Ex CE

Flameproof and Increased Safety

PSG 553/RAC Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details				'G'	Hexagon Dimensions	
			Outer Sheath 'B'		'C' Armour/Braid				
	Metric	NPT* Std./ Option	Min.	Max.	Orientation 1	Orientation 2		Across Flats	Across Corners
A	M20	¾"/½"	12.5	20.5	0.9/1.25	0/0.7	61.1	30.0	34.6
B	M25	1"/¾"	16.9	26.0	1.25/1.6	0/0.7	66.4	36.0	41.6
C	M32	1¼"/1"	22.0	33.0	1.6/2.0	0/0.7	70.2	46.0	53.1

CABLE GLAND SIZE FOR CORE SIZE & NUMBER

Maximum No. of Cores	Cores Cross Sectional Area mm²				
	1.5	2.5	4.0	6.0	10.0
7	A & B	A & B	B & C	C	C
4	-	-	-	B	-
3	-	-	-	-	B

PUNCH TOOL SIZE DETAILS

Punch Ref.	No.1	No.2	No.3
Core C.S.A. mm²	1.5 - 2.5	4.0 - 6.0	10.0

[4]Deluge protection option available.

General Information

A - C size metric entry threads are 1.5mm pitch as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes A to C.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 312.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The PSG 553/RAC cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. PSG 553/RAC/C/M32
PSG 553/RAC/C/1¼" NPT

Punch Tool Ordering Example

e.g. Punch Tool Number 1.

Application

- Outdoor or Indoor use.
- For use with single wire armoured 'W', wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables.

For particular use with :-

a) Cables that are not effectively filled, compact and/or circular, have tape bedding or have hygroscopic fillers.
b) Cables that exhibit "Cold Flow" characteristics.
c) Enclosures for gas group IIC, under 2 litres in volume and containing an ignition source.
d) Enclosures for gas groups IIA or IIB, which are greater than 2 litres in volume and contain an ignition source.

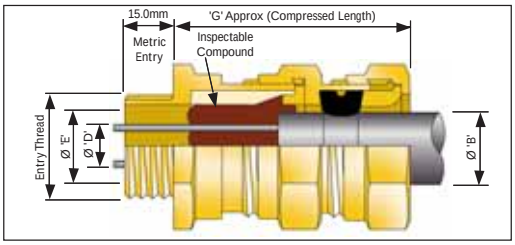
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a barrier seal to the individual insulated cores within the cable and prevents entry of the products of an explosion into the cable.
- The required number of holes for the cores are punched in the seal by means of a special tool to suit the core size.
- Provides armour clamping using one clamping arrangement for all armour/ braid types.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex II 2 GD
- Baseefa 06ATEX0056X.
- IECEx BAS06.0013X.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1. IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529 and EN 60529.
- Operating temperature range -60°C to +80°C as standard.



Cable Gland Type ICG 623

IECEx ATEX Ex CE

Flameproof and Increased Safety

ICG 623 Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details							'G'	Hexagon Dimensions	
			Inner Sheath/ Cores			Outer Sheath 'B'						
						Standard Seal		Alternative Seal (S)				
	Metric	NPT* Std./ Option	'D' Max. Over Cores	'E' Max. Inner Sheath	Max. No. Of Cores	Min.	Max.	Min.	Max.		Across Flats	Across Corners
Os	M20	½"	8.0	8.0	6	3.0	8.0	-	-	57.5	24.0	27.7
O	M20	½"	8.9	10.0	6	7.5	11.9	-	-	57.5	24.0	27.7
A	M20	¾"/½"	11.0	12.5	10	11.0	14.3	8.5	13.4	56.3	30.0	34.6
B	M25	1"/¾"	16.2	18.4	21	13.0	20.2	9.5	15.4	58.9	36.0	41.6
C	M32	1¼"/1"	21.9	24.7	42	19.0	26.5	15.5	21.2	61.7	46.0	53.1
C2	M40	1½"/1¼"	26.3	29.7	60	25.0	32.5	22.0	28.0	62.6	55.0	63.5
D	M50	2"/1½"	37.1	41.7	80	31.5	44.4	27.5	34.8	72.8	65.0	75.1
E	M63	2½"/2"	47.8	53.5	100	42.5	56.3	39.0	46.5	75.7	80.0	92.4
F	M75	3"/2½"	59.0	66.2/65.3[1]	120	54.5	68.2	48.5	58.3	77.7	95.0	109.6

[1] Smaller value is applicable when selecting reduced NPT entry option.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F.
All dimensions in millimetres (except* where dimensions are in inches).
Two part sealing compound and assembly instructions are supplied with the cable gland.
Assembly instruction data sheet No. A.I. 305.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The ICG 623 cable gland is manufactured in brass(standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. ICG 623/C/M32
ICG 623/C/1¼" NPT

Cable Gland with Alternative Seal (S)

e.g. ICG 623/C/M32/S
ICG 623/C/1¼" NPT/S

Application

- Outdoor or Indoor use.
- For use with non-armoured elastomer and plastic insulated cables.

For particular use with :-

a) Cables that are not effectively filled, compact and/or circular, have tape bedding or have hygroscopic fillers.
b) Cables that exhibit "Cold Flow" characteristics.
c) Enclosures containing an ignition source in gas group II C areas or containing an ignition source in a Zone 1 area and exceeding 2 litres in volume.

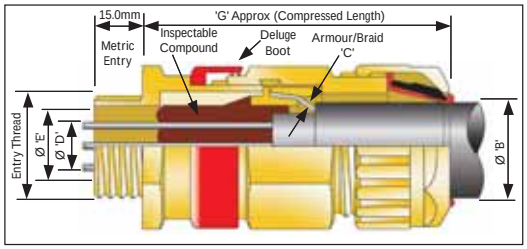
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a barrier seal between the individual insulated cores within the cable and prevents entry of the products of an explosion into the cable.
- Assembly of the cable gland compresses and distributes the compound evenly to create a barrier seal at the point of entry into the enclosure.
- The compound chamber may be seperated from the cured compound to ensure that the chamber has been effectively filled. If required, external voids can be repaired.
- Provides a cable retention seal onto the cables outer sheath.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex II 2 GD
- Baseefa 06ATEX0058X. • IECEx BAS06.0015X.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1. IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN 60529 and NEMA 4X.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +80°C as standard.
- Alternative Certification Options Available.
  - Exd IIC/Exe II.
  - CEPEL BR-Exd IIC/Exe II.
  - AUS-Exd IIC/Exe II.
  - Marine Approval.



Cable Gland Type ICG 653/Universal

IECEx ATEX Ex CE

Flameproof and Increased Safety

ICG 653/Universal Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details							'G'	Hexagon Dimensions	
			Inner Sheath/ Cores			Outer Sheath 'B'		'C' Armour/Braid				
	Metric	NPT* Std./ Option	'D' Max. Over Cores	'E' Max. Inner Sheath	Max. No. Of Cores	Min.	Max.	Orientation 1	Orientation 2		Across Flats	Across Corners
Os	M20	½"	8.9	10.0	6	5.5	12.0	0.9/1.25	0/0.7	72.8	24.0	27.7
O	M20	½"	8.9	10.0	6	9.5	16.0	0.9/1.25	0/0.7	72.8	24.0	27.7
A	M20	¾"/½"	11.0	12.5	10	12.5	20.5	0.9/1.25	0/0.7	73.8	30.0	34.6
B	M25	1"/¾"	16.2	18.4	21	16.9	26.0	1.25/1.6	0/0.7	78.1	36.0	41.6
C	M32	1¼"/1"	21.9	24.7	42	22.0	33.0	1.6/2.0	0/0.7	83.0	46.0	53.1
C2	M40	1½"/1¼"	26.3	29.7	60	28.0	41.0	1.6/2.0	0/0.7	84.1	55.0	63.5
D	M50	2"/1½"	37.1	41.7	80	36.0	52.6	1.8/2.5	0/1.0	91.3	65.0	75.1
E	M63	2½"/2"	47.8	53.3	100	46.0	65.3	1.8/2.5	0/1.0	101.8	80.0	92.4
F	M75	3"/2½"	59.0	66.2/65.3[1]	120	57.0	78.0	1.8/2.5	0/1.0	101.2	95.0	109.6

[1] Smaller value is applicable when selecting reduced NPT entry option.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F.
All dimensions in millimetres (except* where dimensions are in inches).
Two part sealing compound and assembly instructions are supplied with the cable gland.
Assembly instruction data sheet No. A.I. 301.

Alternative Reversible Armour Clamping Rings (RAC)

SELECTION TABLE		
Size Ref.	Steel Wire Armour/Braid/Tape	
	Orientation 1	Orientation 2
O/Os	0.8 - 1.0	0.4 - 0.8
A	0.8 - 1.0	0.4 - 0.8
B	0.9 - 1.25	0.5 - 0.9
C	1.2 - 1.6	0.6 - 1.2
C2	1.2 - 1.6	0.6 - 1.2
D	1.45 - 1.8	1.0 - 1.45
E	1.45 - 1.8	1.0 - 1.45
F	1.45 - 1.8	1.0 - 1.45

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The ICG 653/Universal cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. ICG 653/UNIV/C/M32
ICG 653/UNIV/C/1¼" NPT

Cable Gland with Alternative Clamping Ring (AR)

e.g. ICG 653/UNIV/C/M32/AR
ICG 653/UNIV/C/1¼" NPT/AR

Application

- Outdoor or Indoor use.
- For use with single wire armoured 'W', wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables.

For particular use with :-

a) Cables that are not effectively filled, compact and/or circular, have tape bedding or have hygroscopic fillers.
b) Cables that exhibit "Cold Flow" characteristics.
c) Enclosures containing an ignition source in gas group II C areas or containing an ignition source in a Zone 1 area.

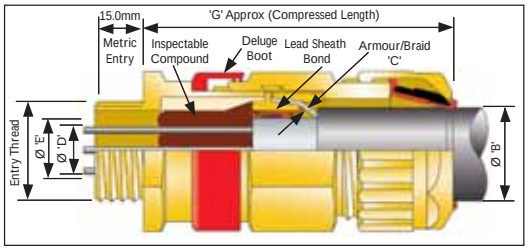
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a barrier seal between the individual insulated cores within the cable and prevents entry of the products of an explosion into the cable.
- Assembly of the cable gland compresses and distributes the compound evenly to create a barrier seal at the point of entry into the enclosure.
- The compound chamber may be seperated from the cured compound to ensure that the chamber has been effectively filled. If required, external voids can be repaired.
- Provides armour clamping, using one clamping arrangement for all armour/braid types.
- Provides an outer deluge seal to prevent moisture ingress to the cable armour/braid.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex II 2 GD
- Baseefa 06ATEX0058X. • IECEx BAS06.0015X.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1. IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN 60529 and NEMA 4X.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +80°C as standard.
- Alternative Certification Options Available.
  - Exd IIC/Exe II.
  - CEPEL BR-Exd IIC/Exe II.
  - GOST R-Exd IICU/Exe IIU.
  - AUS-Exd IIC/Exe II.
  - Marine Approval.



Cable Gland Type ICG 653/Universal/L

For Lead Sheath Cables

IECEx ATEX Ex CE

Flameproof and Increased Safety

ICG 653/Universal/L Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details								'G'	Hexagon Dimensions	
			Inner Sheath/ Cores				Outer Sheath 'B'		'C' Armour/Braid				
	Metric	NPT* Std./ Option	'D' Max. Over Cores	'E' Min. Inner Sheath	'E' Max. Inner Sheath	Max. No. Of Cores	Min.	Max.	Orientation 1	Orientation 2		Across Flats	Across Corners
Os	M20	½"	8.5	4.0	10.0	6	5.5	12.0	0.9/1.25	0/0.7	72.8	24.0	27.7
O	M20	½"	8.5	4.0	10.0	6	9.5	16.0	0.9/1.25	0/0.7	72.8	24.0	27.7
A	M20	¾"/½"	10.8	7.4	12.5	10	12.5	20.5	0.9/1.25	0/0.7	73.8	30.0	34.6
B	M25	1"/¾"	16.2	11.0	18.4	21	16.9	26.0	1.25/1.6	0/0.7	78.1	36.0	41.6
C	M32	1¼"/1"	21.9	14.0	24.7	42	22.0	33.0	1.6/2.0	0/0.7	83.0	46.0	53.1
C2	M40	1½"/1¼"	26.3	21.0	29.7	60	28.0	41.0	1.6/2.0	0/0.7	84.1	55.0	63.5
D	M50	2"/1½"	37.1	27.0	41.7	80	36.0	52.6	1.8/2.5	0/1.0	91.3	65.0	75.1
E	M63	2½"/2"	47.8	39.0	53.3	100	46.0	65.3	1.8/2.5	0/1.0	101.8	80.0	92.4
F	M75	3"/2½"	59.0	51.0	64.0	120	57.0	78.0	1.8/2.5	0/1.0	101.2	95.0	109.6

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F.
All dimensions in millimetres (except* where dimensions are in inches).
Two part sealing compound and assembly instructions are supplied with the cable gland.
Assembly instruction data sheet No. A.I. 301 + 336.

Alternative Reversible Armour Clamping Rings (RAC)

SELECTION TABLE		
Size Ref.	Steel Wire Armour/Braid/Tape	
	Orientation 1	Orientation 2
O/Os	0.8 - 1.0	0.4 - 0.8
A	0.8 - 1.0	0.4 - 0.8
B	0.9 - 1.25	0.5 - 0.9
C	1.2 - 1.6	0.6 - 1.2
C2	1.2 - 1.6	0.6 - 1.2
D	1.45 - 1.8	1.0 - 1.45
E	1.45 - 1.8	1.0 - 1.45
F	1.45 - 1.8	1.0 - 1.45

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The ICG 653/Universal/L cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread/Bond

e.g. ICG 653/UNIV/C/M32/L
ICG 653/UNIV/C/1¼" NPT/L

Cable Gland with Alternative Clamping Ring (AR)

e.g. ICG 653/UNIV/C/M32/L/AR
ICG 653/UNIV/C/1¼" NPT/L/AR

Application

- Outdoor or Indoor use.
- For use with single wire armoured 'W', wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables with a lead inner sheath.

For particular use with :-

a) Cables that are not effectively filled, compact and/or circular, have tape bedding or have hygroscopic fillers.
b) Cables that exhibit "Cold Flow" characteristics.
c) Enclosures containing an ignition source in gas group II C areas or containing an ignition source in a Zone 1 area.

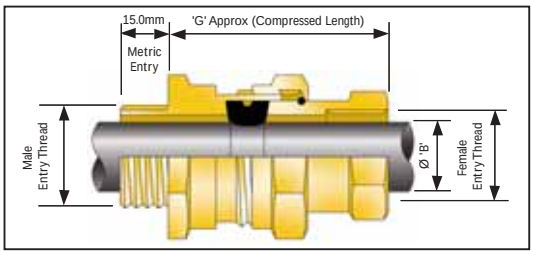
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a barrier seal between the individual insulated cores within the cable and prevents entry of the products of an explosion into the cable.
- Assembly of the cable gland compresses and distributes the compound evenly to create a barrier seal at the point of entry into the enclosure.
- The compound chamber may be seperated from the cured compound to ensure that the chamber has been effectively filled. If required, external voids can be repaired.
- Provides armour clamping, using one clamping arrangement for all armour/braid types.
- Provides a seal and an electrical bond on the cables lead inner sheath.
- Provides an outer deluge seal to prevent moisture ingress to the cable armour/braid.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex II 2 GD
- Baseefa 06ATEX0058X. • IECEx BAS06.0015X.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1. IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN 60529 and NEMA 4X.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +80°C as standard.
- Alternative Certification Options Available.
  - Exd IIC/Exe II.
  - CEPEL BR-Exd IIC/Exe II.
  - GOST R-Exd IICU/Exe IIU.
  - Marine Approval.



Cable Gland Type 501/414

IECEx ATEX Ex CE

Flameproof and Increased Safety

CABLE GLAND SELECTION TABLE

Size Ref.	Male Entry Thread Size		Female Entry Thread Size		Cable Acceptance Details Outer Sheath 'B'				'G'	Hexagon Dimensions	
					Standard Seal		Alternative Seal (S)				
	Metric	NPT* Std./ Option	Metric	NPT #	Min.	Max.	Min.	Max.		Across Flats	Across Corners
Os	M20[2]	½"	M20	-	3.0	8.0	-	-	69.0	24.0	27.7
O	M20[2]	½"	M20	-	7.5	11.9	-	-	69.0	24.0	27.7
A	M20	¾"/½"	M20	-	11.0	14.3	8.5	13.4	69.0	30.0	34.6
B	M25	1"/¾"	M25	-	13.0	20.2	9.5	15.4	61.0	36.0	41.6
C	M32	1¼"/1"	M32	-	19.0	26.5	15.5	21.2	77.0	46.0	53.1

[1]Smaller value is applicable when selecting reduced NPT entry option.
[2]Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 10.9mm.
NPT female thread sizes equivalent to those shown in the table for the male thread size are available. Hexagon dimensions as shown may alter.

General Information

Os - C size metric entry threads are 1.5mm pitch as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to C.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 310.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 501/414 cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Male Thread/ Female Thread

e.g. 501/414/C/M32/M32
501/414/C/1¼" NPT/M32

Cable Gland with Alternative Seal (S)

e.g. 501/414/C/M32/M32/S
501/414/C/1¼" NPT/M32/S

Application

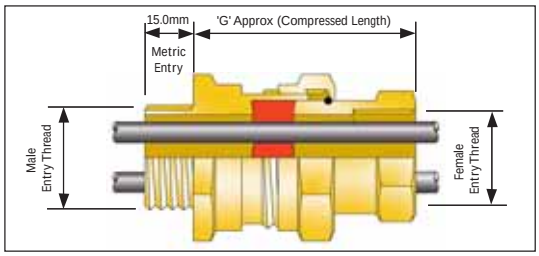
- Outdoor or Indoor use.
- For use with non-armoured elastomer and plastic insulated cables installed in conduit.
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a cable retention seal onto the cables outer sheath.
- When used in increased safety applications, this cable gland may be used with braided cable where the braid and the cables outer sheath pass into the enclosure. The braid must be suitably terminated into the enclosure.
- Provides female running coupler for cable gland or conduit entry.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex II 2 GD
- Baseefa 06ATEX0056X.
- IECEx BAS06.0013X.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1. IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529 and EN 60529.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +100°C as standard.
- Alternative Certification Options Available.
  - Exd IIC/Exe II.
  - Marine Approval.



Cable Gland Type SB 474

IECEx ATEX Ex CE

Flameproof and Increased Safety

SB 474 Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Male Entry Thread Size		Female Entry Thread Size		'G'	Hexagon Dimensions	
	Metric	NPT* Std./ Option	Metric	NPT #		Across Flats	Across Corners
A	M20	¾"/½"	M20	-	63.9	30.0	34.6
B	M25	1"/¾"	M25	-	52.8	36.0	41.6
C	M32	1¼"/1"	M32	-	69.5	46.0	53.1

CABLE GLAND SIZE FOR CORE SIZE & NUMBER

Maximum No. of Cores	Cores Cross Sectional Area mm²				
	1.5	2.5	4.0	6.0	10.0
7	A & B	A & B	B & C	C	C
4	-	-	-	B	-
3	-	-	-	-	B

PUNCH TOOL SIZE DETAILS

Punch Ref.	No.1	No.2	No.3
Core C.S.A. mm²	1.5 - 2.5	4.0 - 6.0	10.0

NPT female thread sizes equivalent to those shown in the table for the male thread size are available. Hexagon dimensions as shown may alter.

General Information

A - C size metric entry threads are 1.5mm pitch as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes A to C.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 309.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The SB 474 cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Male Thread/Female Thread

e.g. SB 474/C/M32/M32
SB 474/C/1¼" NPT/M32

Punch Tool Ordering Example

e.g. Punch Tool Number 1.

Application

- Outdoor or Indoor use.

For particular use with :-

a) Cables that are not effectively filled, compact and/or circular, have tape bedding or have hygroscopic fillers.
b) Cables that exhibit "Cold Flow" characteristics.
c) Enclosures for gas group IIC, under 2 litres in volume and containing an ignition
d) Enclosures for gas groups IIA or IIB, which are greater than 2 litres in volume and contain an ignition source.

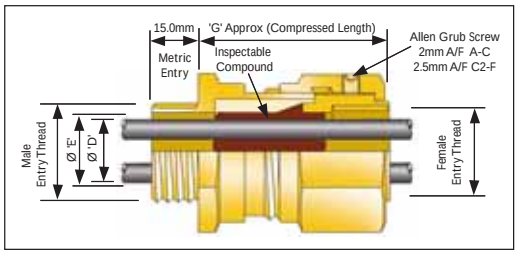
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a barrier seal to the individual insulated cores within the cable and prevents entry of the products of an explosion into the cable.
- The required number of holes for the cores are punched in the seal by means of a special tool to suit the core size.
- DTS01 deluge protection certified by ITS.
- Provides female running coupler for cable gland or conduit entry.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex II 2 GD
- Baseefa 06ATEX0056X.
- IECEx BAS06.0013X.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1. IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529 and EN 60529.
- Operating temperature range -60°C to +80°C as standard.
- Alternative Certification Options Available.
  - Marine Approval.



Cable Gland Type CSB 656

IECEx ATEX Ex CE

Flameproof and Increased Safety

CSB 656 Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Male Entry Thread Size		Female Entry Thread Size		Inner Sheath/ Cores			'G'	Hexagon Dimensions	
	Metric	NPT* Std./ Option	Metric	NPT #	'D' Max. Over Cores	'E' Max. Inner Sheath	Max. No. Of Cores		Across Flats	Across Corners
A	M20	¾"/½"	M20	-	11.0	12.5	10	53.5	30.0	34.6
B	M25	1"/¾"	M25	-	16.2	18.4	21	53.5	36.0	41.6
C	M32	1¼"/1"	M32	-	21.9	24.7	42	56.0	46.0	53.1
C2	M40	1½"/1¼"	M40	-	26.3	29.7	60	56.0	55.0	63.5
D	M50	2"/1½"	M50	-	37.1	41.7	80	61.4	65.0	75.1
E	M63	2½"/2"	M63	-	47.8	53.5	100	63.7	80.0	92.4
F	M75	3"/2½"	M75	-	59.0	66.2	120	65.7	95.0	109.6

NPT female thread sizes equivalent to those shown in the table for the male thread size are available. Hexagon dimensions as shown may alter.

General Information

A - F size metric entry threads are 1.5mm pitch as standard.
Thread length is 15mm for sizes Os to F.
All dimensions in millimetres (except* where dimensions are in inches).
Two part sealing compound and assembly instructions are supplied with the cable gland.
Assembly instruction data sheet No. A.I. 311.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The CSB 656 cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Male Thread/Female Thread

e.g. CSB 656/C/M32/M32
CSB 656/C/1¼" NPT/M32

- Alternative Certification Options Available.
  - Exd IIC/Exe II.
  - AUS-Exd IIC/Exe II.
  - Marine Approval.

Application

- Outdoor or Indoor use.
- For use with conduit incorporating individual insulated conductors or

For particular use with :-

a) Cables that are not effectively filled, compact and/or circular, have tape bedding or have hygroscopic fillers.
b) Cables that exhibit "Cold Flow" characteristics.
c) Enclosures containing an ignition source in gas group II C areas or containing an ignition source in a Zone 1 area and exceeding 2 litres in volume.

- See technical section of the catalogue for installation rules and regulations.

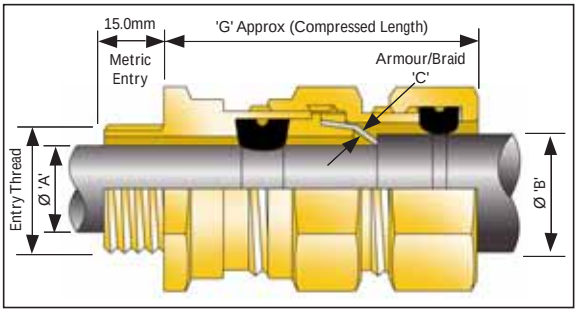
Features

- Provides a barrier seal between the individual insulated cores within the cable and prevents entry of the products of an explosion into the cable or conduit.
- Seals conductors at entry to enclosure via conduit or enables an existing cable gland to be converted to a barrier type cable gland.
- The device is fitted with a simple compound filled chamber which permits packing around individual insulated conductors.
- Assembly of the cable gland compresses and distributes the compound evenly to create a barrier seal at the point of entry into the enclosure.
- The compound chamber may be seperated from the cured compound to ensure that the chamber has been effectively filled.
- If required, external voids can be repaired. Provides female running coupler for cable gland or conduit entry.

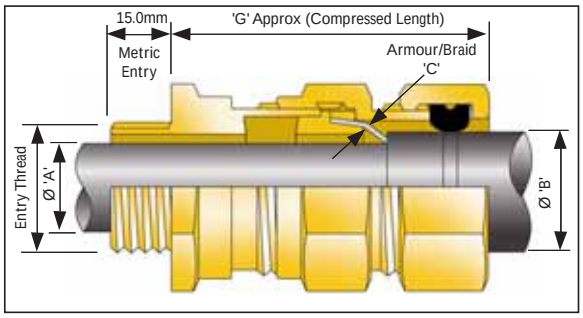
Technical Data

- Flameproof Exd and Increased Safety Exe. Ex II 2 GD
- Baseefa 06ATEX0058X. • IECEx BAS06.0015X.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards EN 50014, EN 50018, EN 50019 and EN 50281-1-1. IEC 60079-0, IEC 60079-1 and IEC 60079-7.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN 60529 and NEMA 4X.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +80°C as standard.

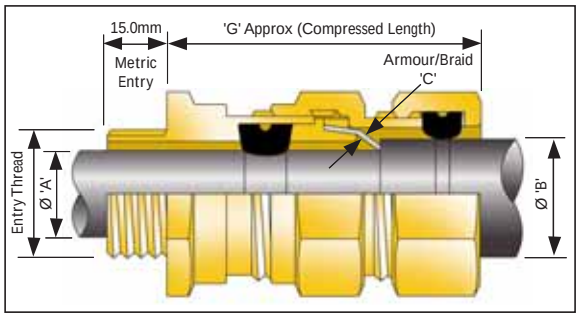
501/453 Flameproof / Increased Safety



151 Industrial



153 Industrial



501/453

Assembly instruction data sheet
No. A.I. 303.

For application, features, technical data, general information, materials/finishes and cable gland ordering examples, please refer to :-
Page 13 (501/453/Universal).
Page 14 (501/453/RAC).
Page 15 (501/453/RAC/L).

151

Assembly instruction data sheet
No. A.I. 314.

For application, features, technical data, general information, materials/finishes and cable gland ordering examples, please refer to :-
Page 42 (I51/RAC).

153

Assembly instruction data sheet
No. A.I. 303.

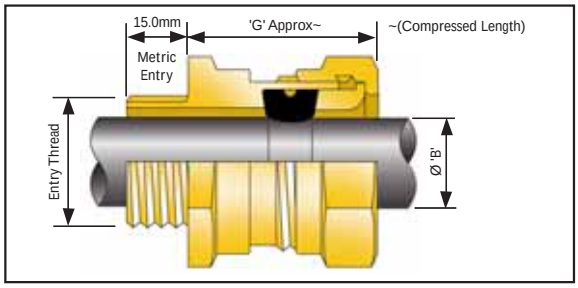
For application, features, technical data, general information, materials/finishes and cable gland ordering examples, please refer to :-
Page 39 (I53/RAC).
Page 40 (153/RAC/L).

American Series Cable Glands

'H' Size (M90) cable glands are available with the exception of the 755.
Please contact Hawke International for details.

Oversize G, H and J Cable Glands

321 Increased Safety



The 321cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

All of Hawke's Hazardous Area cable glands are dual certified (i.e. Flameproof and Increased Safety). The following cable glands are also available to Increased Safety certification only.

321

Assembly instruction data sheet
No. A.I. 307. For sizes O s to J.
Baseefa Certificate No. BAS 01 ATEX 2266X.

For application, features, technical data, general information, materials/finishes and cable gland ordering examples, please refer to :-
Page 11 (501/421).

Increased Safety Cable Glands

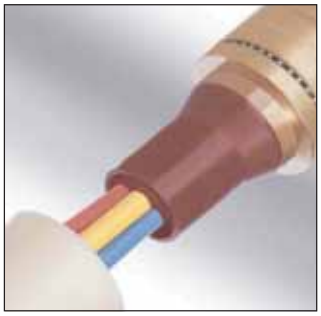
SAFETY THROUGH INSPECTABILITY

Features of Hawke's Mining Gland Range Include:-

Unique Rear Sealing System - Wide Cable Acceptance Range

This arrangement offers IP66, IP67, IP68, NEMA 4X and Deluge (DTS01) Ingress Protection.
The seal is manufactured from a silicone material, has LSFZH properties, is ozone and oil resistant and is suitable for use at both high and low temperatures.
The Rear Sealing System covers the entire range of cable diameters without the need for special seals and the cable acceptance range is stamped on the backnut for ease of inspection.
The backnut can be hand tightened, with only one further spanner turn required to ensure IP66, IP67 and NEMA 4X.

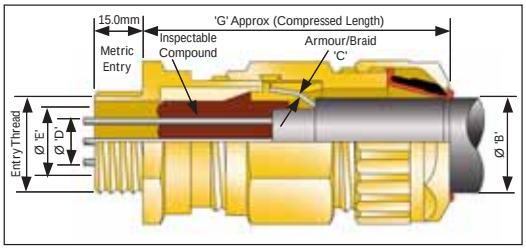
Unique Inspectable Compound Chamber - Designed for Safety



The revolutionary Hawke compound chamber has been designed with inspectability in mind.
The pre-lubricated compound chamber can be removed once the compound has fully cured, allowing full inspection of the flameproof seal.
If required minor surface voids can be repaired in situ. This unique patented compound chamber now forms the compound as well as providing a flameproof seal, resulting in reduced piece parts, as there is no longer a requirement for a separate seal and compound chamber.

Hawke International

"Leading the way in the design of worldwide connection solutions"



Group 1 Cable Gland 653/Universal

ATEX Ex CE Mining

Flameproof and Increased Safety

653/Universal Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details							'G'	Hexagon Dimensions	
			Inner Sheath/ Cores			Outer Sheath 'B'		'C' Armour/Braid				
	Metric	NPT* Std./ Option	'D' Max. Over Cores	'E' Max. Inner Sheath	Max. No. Of Cores	Min.	Max.	Orientation 1	Orientation 2		Across Flats	Across Corners
Os	M20	½"	8.9	10.0	6	5.5	12.0	0.9/1.25	0/0.7	72.8	24.0	27.7
O	M20	½"	8.9	10.0	6	9.5	16.0	0.9/1.25	0/0.7	72.8	24.0	27.7
A	M20	¾"/½"	11.0	12.5	10	12.5	20.5	0.9/1.25	0/0.7	73.8	30.0	34.6
B	M25	1"/¾"	16.2	18.4	21	16.9	26.0	1.25/1.6	0/0.7	78.1	36.0	41.6
C	M32	1¼"/1"	21.9	24.7	42	22.0	33.0	1.6/2.0	0/0.7	83.0	46.0	53.1
C2	M40	1½"/1¼"	26.3	29.7	60	28.0	41.0	1.6/2.0	0/0.7	84.1	55.0	63.5
D	M50	2"/1½"	37.1	41.7	80	36.0	52.6	1.8/2.5	0/1.0	91.3	65.0	75.1
E	M63	2½"/2"	47.8	53.3	100	46.0	65.3	1.8/2.5	0/1.0	101.8	80.0	92.4
F	M75	3"/2½"	59.0	66.2/65.3[1]	120	57.0	78.0	1.8/2.5	0/1.0	101.2	95.0	109.6

[1] Smaller value is applicable when selecting reduced NPT entry option.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F.
All dimensions in millimetres (except* where dimensions are in inches).
Two part sealing compound and assembly instructions are supplied with the cable gland.
Assembly instruction data sheet No. A.I. 301.

Alternative Reversible Armour Clamping Rings (RAC)

SELECTION TABLE		
Size Ref.	Steel Wire Armour/Braid/Tape	
	Orientation 1	Orientation 2
O/Os	0.8 - 1.0	0.4 - 0.8
A	0.8 - 1.0	0.4 - 0.8
B	0.9 - 1.25	0.5 - 0.9
C	1.2 - 1.6	0.6 - 1.2
C2	1.2 - 1.6	0.6 - 1.2
D	1.45 - 1.8	1.0 - 1.45
E	1.45 - 1.8	1.0 - 1.45
F	1.45 - 1.8	1.0 - 1.45

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The ICG 653/Universal is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 653/UNIV/C/M32
653/UNIV/C/1¼" NPT

Cable Gland with Alternative Clamping Ring (AR)

e.g. 653/UNIV/C/M32/AR
653/UNIV/C/1¼" NPT/AR

Application

- Outdoor or Indoor use.
- For use with single wire armoured 'W', wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables.

For particular in all mining applications particularly those with:-

a) Cables that are not effectively filled, compact and/or circular, have tape bedding or have hygroscopic fillers.
b) Cables that exhibit "Cold Flow" characteristics.
c) Enclosures containing an ignition source.

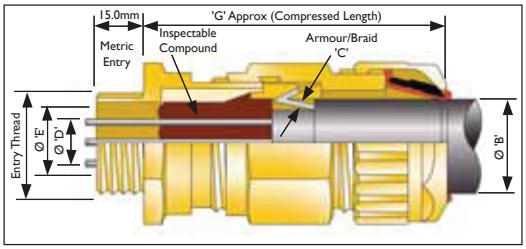
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a barrier seal between the individual insulated cores within the cable and prevents entry of the products of an explosion into the cable
- Assembly of the cable gland compresses and distributes the compound evenly to create a barrier seal at the point of entry into the enclosure.
- The compound chamber may be seperated from the cured compound to ensure that the chamber has been effectively filled. If required, external voids can be repaired.
- Provides armour clamping, using one clamping arrangement for all armour/braid types.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex IM 2
- Baseefa 02ATEX0175X.
- Suitable for use in Mines.
- Construction and test standards EN 50014, EN 50018 and EN 50019
- IP66, IP67 and IP68 ingress protection to IEC 60529 and EN 60529.
- Operating temperature range -60°C to +80°C as standard.



Group 1 Cable Gland 653/T

ATEX Ex CE Mining

Flameproof and Increased Safety

653/T Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details						'G'	Hexagon Dimensions	
			Inner Sheath/ Cores			Outer Sheath 'B'		'C' Pliable Wire Armour			
	Metric	NPT* Std./ Option	'D' Max. Over Cores	'E' Max. Inner Sheath	Max. No. Of Cores	Min.	Max.	Orientation		Across Flats	Across Corners
O	M20	½"	8.9	10.0	6	9.5	16.0	7 x 0.45	72.8	24.0	27.7
A	M20	¾"/½"	11.0	12.5	10	12.5	20.5	7 x 0.45	73.8	30.0	34.6
B	M25	1"/¾"	16.2	18.4	21	16.9	26.0	7 x 0.45	78.1	36.0	41.6
C	M32	1¼"/1"	21.9	24.7	42	22.0	33.0	7 x 0.45	83.0	46.0	53.1
C2	M40	1½"/1¼"	26.3	29.7	60	28.0	41.0	7 x 0.71	84.1	55.0	63.5
D	M50	2"/1½"	37.1	41.7	80	36.0	52.6	7 x 0.71	91.3	65.0	75.1
E	M63	2½"/2"	47.8	53.3	100	46.0	65.3	7 x 0.9	101.8	80.0	92.4
F	M75	3"/2½"	59.0	66.2/65.3[1]	120	57.0	78.0	7 x 1.25	101.2	95.0	109.6

[1] Smaller value is applicable when selecting reduced NPT entry option.

General Information

O - F size metric entry threads are 1.5mm pitch as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F.
All dimensions in millimetres (except* where dimensions are in inches).
Two part sealing compound and assembly instructions are supplied with the cable gland.
Assembly instruction data sheet No. A.I. 346.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 653/T is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 653/T/C/M32
653/T/C/1¼" NPT

Application

- Outdoor or Indoor use.
- For use with pliable wire armoured, elastomer and plastic insulated cables

For particular in all mining applications particularly those with:-

a) Cables that are not effectively filled, compact and/or circular, have tape bedding or have hygroscopic fillers.
b) Cables that exhibit "Cold Flow" characteristics.
c) Enclosures containing an ignition source.

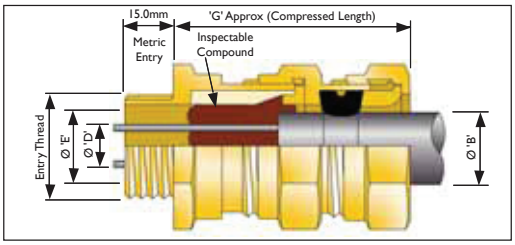
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a barrier seal between the individual insulated cores within the cable and prevents entry of the products of an explosion into the cable.
- Assembly of the cable gland compresses and distributes the compound evenly to create a barrier seal at the point of entry into the enclosure.
- The compound chamber may be seperated from the cured compound to ensure that the chamber has been effectively filled. If required, external voids can be repaired.
- Provides armour clamping, for pliable wire armour
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Flameproof Exd and Increased Safety Exe. Ex IM 2
- Baseefa 02ATEX0179X.
- Suitable for use in Mines.
- Construction and test standards EN 50014, EN 50018 and EN 50019
- IP66, IP67 and IP68 ingress protection to IEC 60529 and EN 60529.
- Operating temperature range -60°C to +80°C as standard.



Group 1 Cable Gland 623

ATEX Ex CE Mining

Flameproof and Increased Safety

623 Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details							'G'	Hexagon Dimensions	
			Inner Sheath/ Cores			Outer Sheath 'B'						
						Standard Seal		Alternative Seal (S)				
	Metric	NPT* Std./ Option	'D' Max. Over Cores	'E' Max. Inner Sheath	Max. No. Of Cores	Min.	Max.	Min.	Max.		Across Flats	Across Corners
Os	M20	½"	8.0	8.0	6	3.0	8.0	-	-	57.5	24.0	27.7
O	M20	½"	8.9	10.0	6	7.5	11.9	-	-	57.5	24.0	27.7
A	M20	¾"/½"	11.0	12.5	10	11.0	14.3	8.5	13.4	56.3	30.0	34.6
B	M25	1"/¾"	16.2	18.4	21	13.0	20.2	9.5	15.4	58.9	36.0	41.6
C	M32	1¼"/1"	21.9	24.7	42	19.0	26.5	15.5	21.2	61.7	46.0	53.1
C2	M40	1½"/1¼"	26.3	29.7	60	25.0	32.5	22.0	28.0	62.6	55.0	63.5
D	M50	2"/1½"	37.1	41.7	80	31.5	44.4	27.5	34.8	72.8	65.0	75.1
E	M63	2½"/2"	47.8	53.5	100	42.5	56.3	39.0	46.5	75.7	80.0	92.4
F	M75	3"/2½"	59.0	66.2/65.3[1]	120	54.5	68.2	48.5	58.3	77.7	95.0	109.6

[1] Smaller value is applicable when selecting reduced NPT entry option.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F.
All dimensions in millimetres (except* where dimensions are in inches).
Two part sealing compound and assembly instructions are supplied with the cable gland.
Assembly instruction data sheet No. A.I. 305.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 623 is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 623/C/M32
623/C/1¼" NPT

Cable Gland with Alternative Seal (S)

e.g. 623/C/M32/S
623/C/1¼" NPT/S

Application

- Outdoor or Indoor use.
- For use with non-armoured elastomer and plastic insulated cables.

For particular use with :-

a) Cables that are not effectively filled, compact and/or circular, have tape bedding or have hygroscopic fillers.
b) Cables that exhibit "Cold Flow" characteristics.
c) Enclosures containing an ignition source.

- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a barrier seal between the individual insulated cores within the cable and prevents entry of the products of an explosion into the cable.
- Assembly of the cable gland compresses and distributes the compound evenly to create a barrier seal at the point of entry into the enclosure.
- The compound chamber may be seperated from the cured compound to ensure that the chamber has been effectively filled. If required, external voids can be repaired.
- Provides a cable retention seal onto the cables outer sheath.

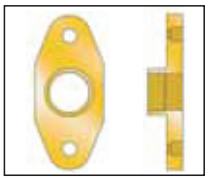
Technical Data

- Flameproof Exd and Increased Safety Exe. Ex I M2.
- Baseefa 06ATEX0177X.
- Suitable for use in Mines.
- Construction and test standards EN 50014, EN50018 and EN 50019.
- IP66, IP67 and IP68 ingress protection to IEC 60529 and EN 60529.
- Operating temperature range -60°C to +80°C as standard.

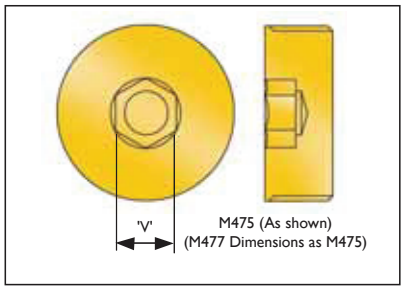
Group I Stopping Plugs and Flanges

ATEX Mining

Flameproof



M475 and M477 Flameproof



M475 AND M477 STOPPING PLUGS		
Thread Size		Hex. Key Across Flats Size 'V'
Metric x 1.5p	NPT *	
M20	½"	10.0
M25	¾"	10.0
M32	1"	14.0
M40	1¼"	14.0
M50	1½"	17.0
M63	2½"or2"	17.0
M75	3"	19.0

General Information

All dimensions in millimetres (except* where dimensions are in inches).
The M475 is tightened from outside of the enclosure.
The M477 is tightened from the inside of the enclosure.

Materials & Finishes

M475 and M477 Stopping plugs are manufactured in brass (standard).

Features

- To close unused cable gland entries and maintain the flameproof integrity of the equipment.

Technical Data

- Flameproof EExd I. Ex I M2 IP66.
- Baseefa Certificate No. Baseefa 02 ATEX 0086.
- Suitable for use in Mines.

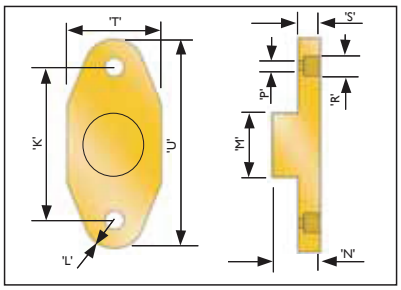
Stopping Plugs Ordering Example

Stopping Plug Type/Size/Thread

e.g. M477/M32

Mining Accessories

Blanking Flange Type 470



470 BLANKING FLANGE SELECTION TABLE									
Size Ref.	Flange Dimensions								
	K	L	M	N	P	R	S	T	U
O	44.4	12.7	19.05	26.1	6.7	11.1	7	30	70.0
A	44.4	12.7	19.05	26.1	6.7	11.1	7	30	70.0
B	57.1	12.7	25.40	26.1	6.7	11.1	7	36	82.5
C	69.8	14.3	31.75	27.7	9.1	15.1	8.7	46	98.4
C2	82.5	14.3	38.10	27.7	9.1	15.1	8.7	55	111.1
D	95.2	17.5	50.80	29.3	11.1	18.1	10.5	65	130.2
E	114.3	17.5	63.50	29.3	11.1	18.1	10.5	80	149.3
F	127.0	17.5	76.20	32.5	11.1	20.5	13.5	95	162.0

470 BLANKING FLANGE		
Size Ref.	Equipment Entry Hole Size	
	Max	Min
O/A	19.35	19.10
B	25.70	25.45
C	32.05	31.80
C2	38.40	38.15
D	51.10	50.85
E	63.80	63.55
F	76.50	76.25

General Information

All dimensions in millimetres.

Materials & Finishes

The 470 Blanking Flange is manufactured in brass (standard).

Features

- To close unused cable gland entries and maintain the flameproof integrity of the equipment.

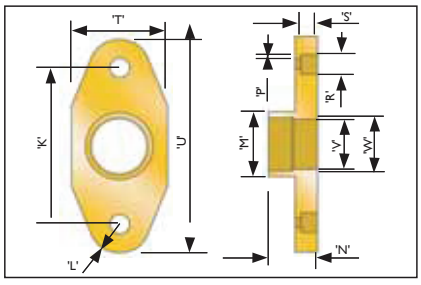
Ordering Example

Blanking Flange Type/Size e.g. 470/A

Technical Data

- Flameproof EExd I. Ex I M2
- Baseefa Certificate No. Baseefa 02 ATEX 0174U.
- Suitable for use in Mines.

Adaptor Flange Type 483



483 ADAPTOR FLANGE SELECTION TABLE												
Size Ref.	Flange Dimensions											Casting Size
	K	L	M	N	P	R	S	T	U	V	W	
O	57.1	12.7	25.40	26.1	6.7	11.1	7	36	82.5	M20	20	B
A	57.1	12.7	25.40	26.1	6.7	11.1	7	36	82.5	M20	20	B
B	69.8	14.3	31.75	27.7	9.1	15.1	8.7	46	98.4	M25	25.4	C
C	82.5	14.3	38.10	27.7	9.1	15.1	8.7	55	111.1	M32	32	C2
C2	95.2	17.5	50.80	29.3	11.1	18.1	10.5	65	130.2	M40	40	D
D	114.3	17.5	63.50	29.3	11.1	18.1	10.5	80	149.3	M50	50.7	E
E	127.0	17.5	76.20	32.5	11.1	20.5	13.5	95	162.0	M63	63.4	F
F	127.0	17.5	76.20	48.0	11.1	20.5	13.5	95	162.0	M75	66.0	F

483 ADAPTOR FLANGE		
Size Ref.	Equipment Entry Hole Size	
	Max	Min
O	25.70	25.45
A	25.70	25.45
B	32.05	31.80
C	38.40	38.15
C2	51.10	50.85
D	63.80	63.55
E	76.50	76.25
F	76.50	76.25

General Information

All dimensions in millimetres.

Materials & Finishes

The 483 Adaptor Flange is manufactured in brass (standard).

Features

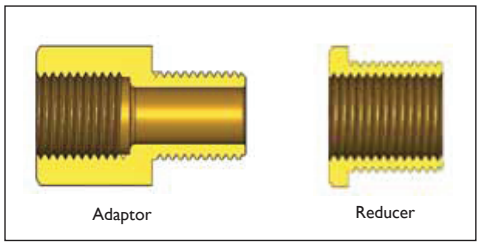
- To allow metric threaded Group I cable gland types, 653/Universal, 653/T and 623 to be used in size up spigot entries.

Ordering Example

Adaptor Flange Type/Size e.g. 483/A

Technical Data

- Flameproof EExd I. Ex I M2
- Baseefa Certificate No. Baseefa 02 ATEX 0173U.
- Suitable for use in Mines.



Group 1 Adaptors and Reducers
M476
ATEX Mining
Flameproof and Increased Safety

Adaptor

Reducer

ADAPTOR AND REDUCER SELECTION TABLE

Female Thread		Male Thread: Metric								Male Thread: NPT							
		M16	M20	M25	M32	M40	M50	M63	M75	½"	¾"	1"	1¼"	1½"	2"	2½"	3"
Metric	M16																
	M20																
	M25																
	M32																
	M40																
	M50																
	M63																
	M75																
NPT	½"																
	¾"																
	1"																
	1¼"																
	1½"																
	2"																
	2½"																
	3"																

General Information
All Metric entry threads are 1.5mm pitch as standard.

Materials & Finishes
Hawke adaptors/reducers are manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Adaptor Ordering Example
476/Male Thread Size/Female Thread Size.

e.g. 476//M25/M20.

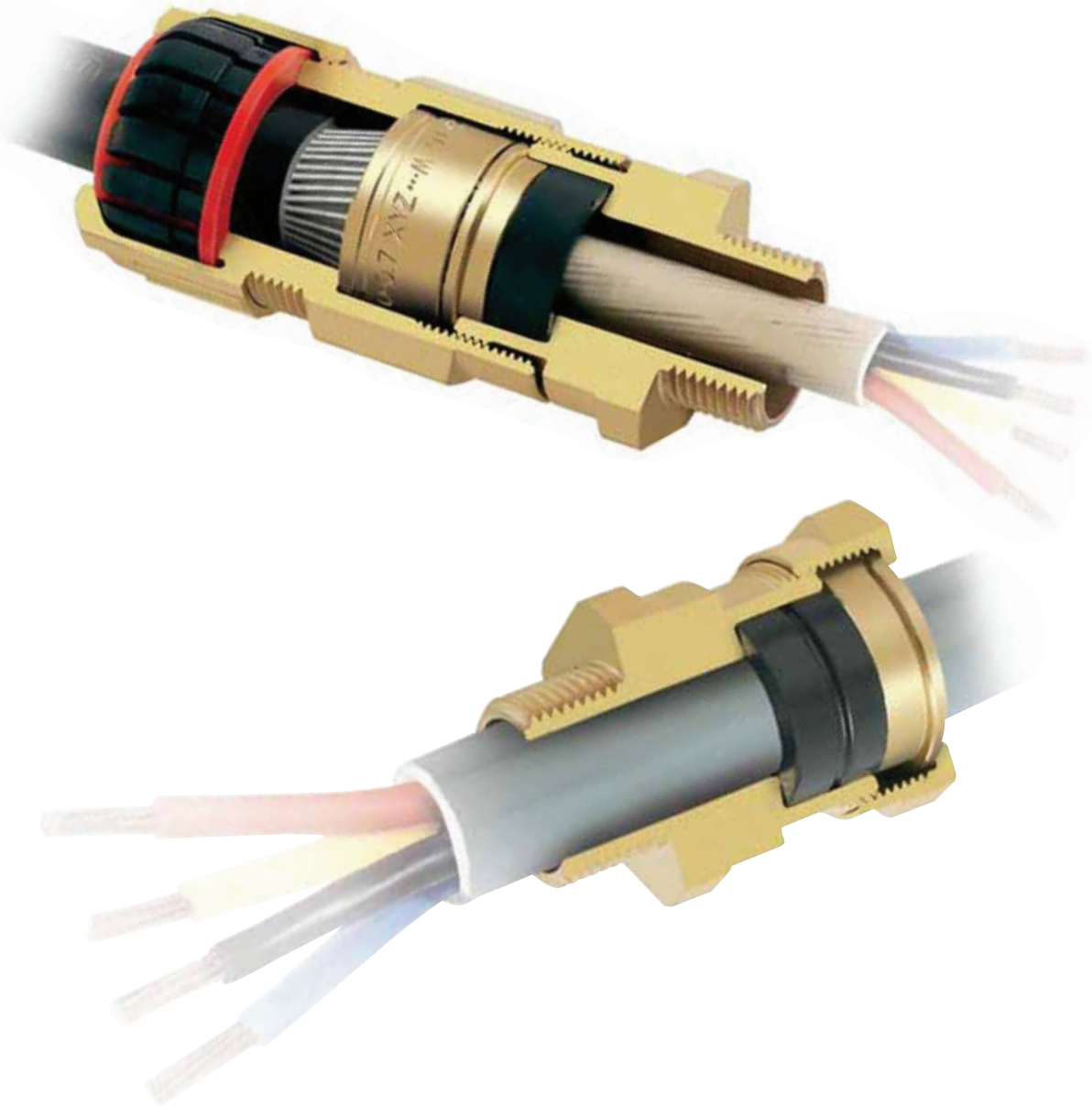
Reducer Ordering Example
M476/1/Male Thread Size/Female Thread Size.

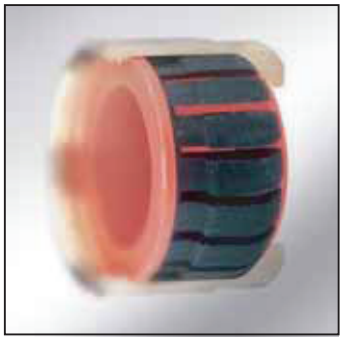
e.g. 476/1/M25/¾" NPT.

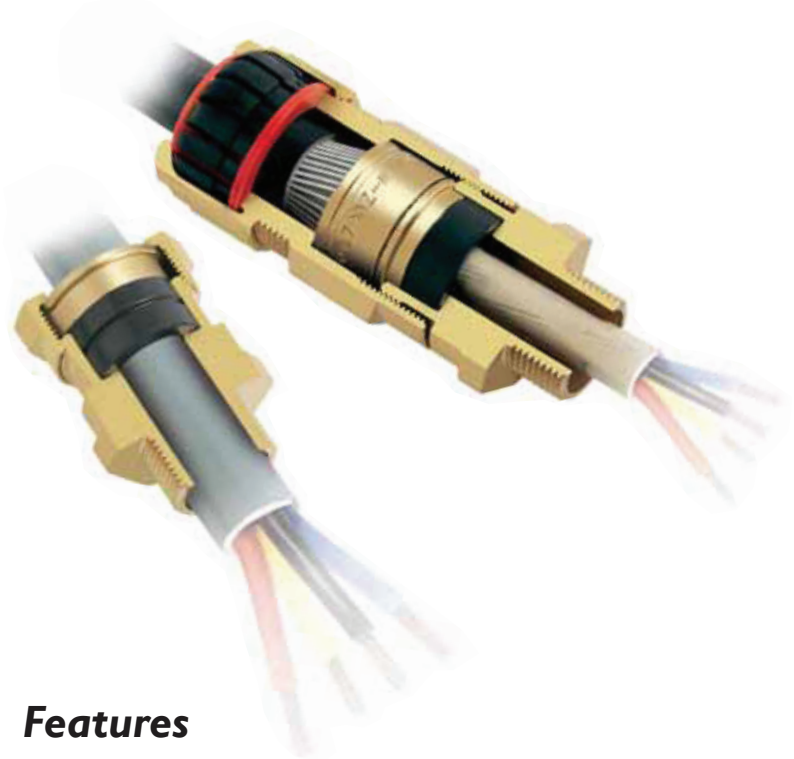
Application/Features
- Provides a means of connection between the equipment and cable glands with dissimilar thread sizes or types.

Technical Data
- Flameproof and Increased Safety Exde I. Ex I M2 IP66.
- Certificate No. SIRA 06 ATEX 1240U.
- Suitable for use in Mines.
- Construction and test standards EN 50014, EN 50018 and EN 50019.

Industrial Cable Glands





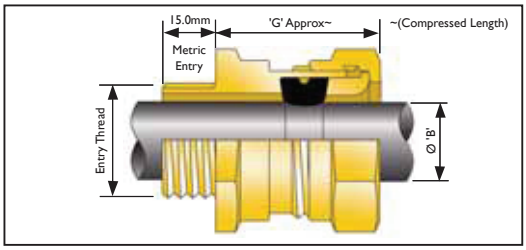


Features

- **Unique Rear Sealing System**
  This arrangement offers IP66, IP67, IP68 (30 metres for 7 days), NEMA 4X and Deluge (DTS01) Ingress Protection. The seal is manufactured from a silicone material, has LSFZH properties, is ozone and oil resistant and is suitable for use at both high and low temperatures.
  The Rear Sealing System covers the entire range of cable diameters without the need for special seals and the cable acceptance range is stamped on the backnut for ease of inspection. The backnut can be hand tightened, with only one further spanner turn required to ensure IP66, IP67, IP68 and NEMA 4X.

- **The Original Reversible Armour Clamp**
  The original RAC clamping system was invented by Hawke over 10 years ago and is a well established proven performer in all conditions. Simply by reversing the clamping ring, the cable gland can adjust to accomodate all types of cable armour or braid. Unlike many of our competitors the correct clamping orientation is marked clearly with a 'W', 'Z' or 'X' and backed up by the presence of a groove in the component. Hawke's RAC clamping system is also fully inspectable when positioned on the cable.

- **Inspectable Deluge Seal**
  Hawke's inspectable deluge seal offers IP66 and IP67 sealing and is certified as 'deluge proof' by ITS in accordance with DTS01. Indeed Hawke's deluge seal is so good that it exceeds the expectations of the offshore industry by not only preventing ingress into the equipment, but also into the cable gland, which could potentially corrode the cable armour.



Cable Gland Type 121

CE

Industrial

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details				'G'	Hexagon Dimensions	
			Outer Sheath 'B'						
			Standard Seal		Alternative Seal (S)				
	Metric	NPT* Std./ Option	Min.	Max.	Min.	Max.		Across Flats	Across Corners
2K	M16	-	3.0	8.0	-	-	27	19.0	21.2
Os	M20[2]	½"	3.0	8.0	-	-	32.8	24.0	27.7
O	M20[2]	½"	7.5	11.9	-	-	32.8	24.0	27.7
A	M20	¾"/½"	11.0	14.3	8.5	13.4	32.8	30.0	34.6
B	M25	1"/¾"	13.0	20.2	9.5	15.4	33.8	36.0	41.6
C	M32	1¼"/1"	19.0	26.5	15.5	21.2	35.2	46.0	53.1
C2	M40	1½"/1¼"	25.0	32.5	22.0	28.0	36.5	55.0	63.5
D	M50	2"/1½"	31.5	44.4/42.3[1]	27.5	34.8	47.9	65.0	75.1
E	M63	2½"/2"	42.5	56.3/54.3[1]	39.0	46.5	46.2	80.0	92.4
F	M75	3"/2½"	54.5	68.2/65.3[1]	48.5	58.3	48	95.0	109.6
G	M80	3½"	67.0	73.0	-	-	41	106.4	123.0
H	M90	3½"	67.0	77.6	-	-	41	115.0	132.8
J	M100	4"	75.0	91.6	-	-	41	127.0	146.7

[1] Smaller value is applicable when selecting reduced NPT entry option.
[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable outer sheath diameter is 10.9mm.

General Information

2K - F size metric entry threads are 1.5mm pitch as standard.
For G size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes 2K to F and 20mm for sizes G to J.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 307.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 121cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

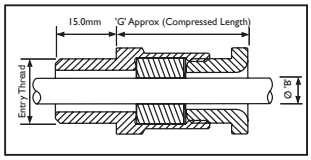
Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 121/C/M32
121/C/1¼" NPT

Cable Gland with Alternative Seal (S)

e.g. 121/C/M32/S
121/C/1¼" NPT/S



2K Size Cable Gland Design

Application

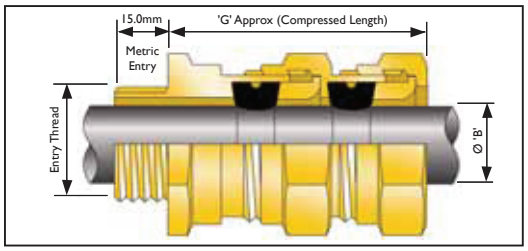
- Outdoor or Indoor use.
- For use with non-armoured elastomer and plastic insulated cables.
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a cable retention seal onto the cables outer sheath.

Technical Data

- Construction and test standards EN 50262. BS 6121 Part 1. Type A2.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529 and EN 60529.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +100°C as standard.



Cable Gland Type 123

CE

Industrial

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details				'G'	Hexagon Dimensions	
			Outer Sheath 'B'						
			Standard Seal		Alternative Seal (S)				
	Metric	NPT* Std./ Option	Min.	Max.	Min.	Max.		Across Flats	Across Corners
Os	M20[2]	½"	3.0	8.0	-	-	52.3	24.0	27.7
O	M20[2]	½"	7.5	11.9	-	-	52.3	24.0	27.7
A	M20	¾"/½"	11.0	14.3	8.5	13.4	51.5	30.0	34.6
B	M25	1"/¾"	13.0	20.2	9.5	15.4	54.7	36.0	41.6
C	M32	1¼"/1"	19.0	26.5	15.5	21.2	55.9	46.0	53.1
C2	M40	1½"/1¼"	25.0	32.5	22.0	28.0	58.1	55.0	63.5
D	M50	2"/1½"	31.5	44.4/42.3[1]	27.5	34.8	74.3	65.0	75.1
E	M63	2½"/2"	42.5	56.3/54.3[1]	39.0	46.5	73.2	80.0	92.4
F	M75	3"/2½"	54.5	68.2/65.3[1]	48.5	58.3	75	95.0	109.6
G	M80	3½"	67.0	73.0	-	-	68	106.4	123.0
H	M90	3½"	67.0	77.6	-	-	68	115.0	132.8
J	M100	4"	75.0	91.6	-	-	68	127.0	146.7

[1] Smaller value is applicable when selecting reduced NPT entry option.
[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable outer sheath diameter is 10.9mm.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For G size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F and 20mm for sizes G to J.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 306.

Accessories including locknuts, sealing washers, ser rated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 123 cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 123/C/M32
123/C/1¼" NPT

Cable Gland with Alternative Seal (S)

e.g. 123/C/M32/S
123/C/1¼" NPT/S

Application

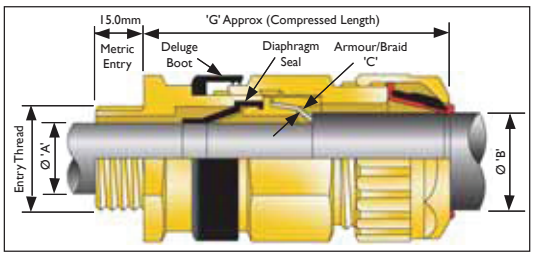
- Outdoor or Indoor use.
- For use with non-armoured elastomer and plastic insulated cables.
- May be used on cables incorporating inner and outer cable sheaths.
- See technical section of catalogue for installation rules and regulations.

Features

- Provides a cable retention seal onto the cables outer sheath at two independent sealing points.

Technical Data

- Construction and test standards EN 50262. BS 6121 Part 1. Type A2.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529 and EN 60529.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +100°C as standard.



Cable Gland Type 153/Universal

CE

Industrial

153/Universal Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details						'G'	Hexagon Dimensions	
			Inner Sheath 'A'		Outer Sheath 'B'		'C' Armour/Braid				
	Metric	NPT* Std./ Option	Min.	Max.	Min.	Max.	Orientation 1	Orientation 2		Across Flats	Across Corners
Os	M20[2]	½"	3.0	8.1	5.5	12.0	0.9/1.25	0/0.7	64.4	24.0	27.7
O	M20[2]	½"	6.5	11.9	9.5	16.0	0.9/1.25	0/0.7	64.4	24.0	27.7
A	M20	¾"/½"	8.4	14.3	12.5	20.5	0.9/1.25	0/0.7	65.4	30.0	34.6
B	M25	1"/¾"	11.1	20.2	16.9	26.0	1.25/1.6	0/0.7	71	36.0	41.6
C	M32	1¼"/1"	17.6	26.5	22.0	33.0	1.6/2.0	0/0.7	76	46.0	53.1
C2	M40	1½"/1¼"	23.1	32.5	28.0	41.0	1.6/2.0	0/0.7	78.1	55.0	63.5
D	M50	2"/1½"	28.9	44.4/42.3[1]	36.0	52.6	1.8/2.5	0/1.0	93.1	65.0	75.1
E	M63	2½"/2"	39.9	56.3/54.3[1]	46.0	65.3	1.8/2.5	0/1.0	99	80.0	92.4
F	M75	3"/2½"	50.5	68.2/65.3[1]	57.0	78.0	1.8/2.5	0/1.0	101.9	95.0	109.6

Larger cable glands available in 501/453 design style.

G	M80	3½"	67.0	73.0	75.0	89.5	#	#	90.6	106.4	123.0
H	M90	3½"	67.0	77.6	75.0	89.5	#	#	90.6	115.0	132.8
J	M100	4"	75.0	91.6	88.0	104.5	#	#	90.6	127.0	146.7

[1] Smaller value is applicable when selecting reduced NPT entry option.

[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 10.9mm.

Dedicated armour clamping rings are fitted. Please specify armour type and size when ordering.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For G size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F and 20mm for sizes G to J.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 372 for sizes Os to F.
Assembly instruction data sheet No. A.I. 303 for sizes G to J.

Alternative Reversible Armour Clamping Rings (RAC)

SELECTION TABLE		
Size Ref.	Steel Wire Armour/Braid/Tape	
	Orientation 1	Orientation 2
O/Os	0.8 - 1.0	0.4 - 0.8
A	0.8 - 1.0	0.4 - 0.8
B	0.9 - 1.25	0.5 - 0.9
C	1.2 - 1.6	0.6 - 1.2
C2	1.2 - 1.6	0.6 - 1.2
D	1.45 - 1.8	1.0 - 1.45
E	1.45 - 1.8	1.0 - 1.45
F	1.45 - 1.8	1.0 - 1.45

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 153/Universal cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 153/UNIV/C/M32
153/UNIV/C/1¼" NPT

Cable Gland with Alternative Clamping Ring (AR)

e.g. 153/UNIV/C/M32/AR
153/UNIV/C/1¼" NPT/AR

Application

- Outdoor or Indoor use.
- For use with single wire armoured 'W', wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables.

For particular use with :-
Cables that exhibit "Cold Flow" characteristics.

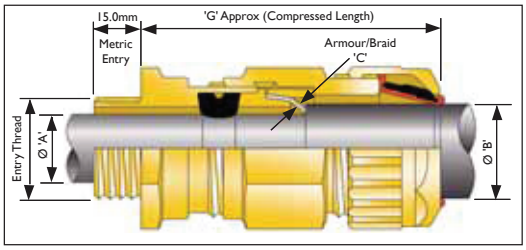
- See technical section of catalogue for installation rules and regulations.

Features

- Provides armour clamping using one clamping arrangement for all armour/braid types.
- Provides a diaphragm seal on the cables inner sheath which will not damage cable that has "Cold Flow" characteristics.
- Provides an outer deluge seal to prevent moisture ingress to the cable armour/braid.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Construction and test standards
EN 50262.
BS 6121 Part 1 type E1W, E1X and E1Z.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529 & EN 60529.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +80°C as standard.



Cable Gland Type 153/RAC

Industrial

153/RAC Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details								'G'	Hexagon Dimensions	
			Inner Sheath 'A'				Outer Sheath 'B'		'C' Armour/Braid				
			Standard Seal		Alternative Seal (S)								
	Metric	NPT* Std./ Option	Min.	Max.	Min.	Max.	Min.	Max.	Orientation 1	Orientation 2		Across Flats	Across Corners
Os	M20[2]	½"	3.0	8.0	-	-	5.5	12.0	0.9/1.25	0/0.7	65.1	24.0	27.7
O	M20[2]	½"	6.5	11.9	-	-	9.5	16.0	0.9/1.25	0/0.7	65.1	24.0	27.7
A	M20	¾"/½"	10.0	14.3	8.5	13.4	12.5	20.5	0.9/1.25	0/0.7	66.1	30.0	34.6
B	M25	1"/¾"	12.5	20.2	9.5	15.4	16.9	26.0	1.25/1.6	0/0.7	71.4	36.0	41.6
C	M32	1¼"/1"	19.0	26.5	14.5	21.2	22.0	33.0	1.6/2.0	0/0.7	75.2	46.0	53.1
C2	M40	1½"/1¼"	25.0	32.5	22.0	28.0	28.0	41.0	1.6/2.0	0/0.7	77.1	55.0	63.5
D	M50	2"/1½"	31.5	44.4/42.3[1]	27.5	34.8	36.0	52.6	1.8/2.5	0/1.0	90.3	65.0	75.1
E	M63	2½"/2"	42.5	56.3/54.3[1]	39.0	46.5	46.0	65.3	1.8/2.5	0/1.0	96.7	80.0	92.4
F	M75	3"/2½"	54.5	68.2/65.3[1]	48.5	58.3	57.0	78.0	1.8/2.5	0/1.0	96	95.0	109.6
Larger cable glands available in 501/453 design style.													
G	M80	3½"	67.0	73.0	-	-	75.0	89.5	#	#	95.6	106.4	123.0
H	M90	3½"	67.0	77.6	-	-	75.0	89.5	#	#	95.6	115.0	132.8
J	M100	4"	75.0	91.6	-	-	88.0	104.5	#	#	95.6	127.0	146.7

[1] Smaller value is applicable when selecting reduced NPT entry option.
[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 10.9mm.
[4] Deluge protection option available.
Dedicated armour clamping rings are fitted. Please specify armour type and size when ordering.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For G size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F and 20mm for sizes G to J.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 302 for sizes Os to F.
Assembly instruction data sheet No. A.I. 329 for sizes G to J.

Alternative Reversible Armour Clamping Rings (RAC)

SELECTION TABLE		
Size Ref.	Steel Wire Armour/Braid/Tape	
	Orientation 1	Orientation 2
O/Os	0.8 - 1.0	0.4 - 0.8
A	0.8 - 1.0	0.4 - 0.8
B	0.9 - 1.25	0.5 - 0.9
C	1.2 - 1.6	0.6 - 1.2
C2	1.2 - 1.6	0.6 - 1.2
D	1.45 - 1.8	1.0 - 1.45
E	1.45 - 1.8	1.0 - 1.45
F	1.45 - 1.8	1.0 - 1.45

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 153/RAC cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 153/RAC/C/M32
153/RAC/C/1¼" NPT

Cable Gland with Alternative Seal (S)

e.g. 153/RAC/C/M32/S
153/RAC/C/1¼" NPT/S

Cable Gland with Alternative Clamping Ring (AR)

e.g. 153/RAC/C/M32/AR
153/RAC/C/1¼" NPT/AR

Application

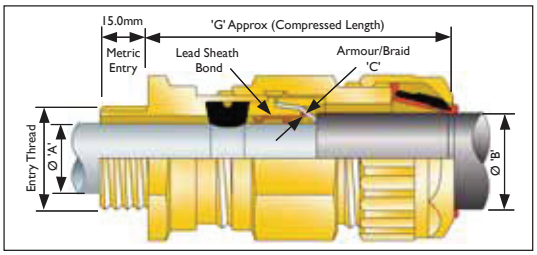
- Outdoor or Indoor use.
- For use with single wire armoured 'W', wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables.
- See technical section of catalogue for installation rules and regulations.

Features

- Provides armour clamping using one clamping arrangement for all armour/ braid types.
- Provides a seal on the cables inner sheath.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Construction and test standards EN 50262. BS 6121 Part 1. Type E1W, E1X and E1Z.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN 60529 and NEMA 4X.
- DTS01 deluge protection certified by ITS.
- Operating temperature range -60°C to +80°C as standard.



Cable Gland Type 153/RAC/L

For Lead Sheath Cables

CE

Industrial

153/RAC/L Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details								'G'	Hexagon Dimensions	
			Inner Lead Sheath 'A'				Outer Sheath 'B'		'C' Armour/Braid				
			Standard (L) Seal+Bond		Alternative (K) Seal+Bond								
	Metric	NPT* Std./ Option	Min.	Max.	Min.	Max.	Min.	Max.	Orientation 1	Orientation 2		Across Flats	Across Corners
O	M20[2]	½"	7.5	8.5	-	-	9.5	16.0	0.9/1.25	0/0.7	65.1	24.0	27.7
A	M20	¾"/½"	-	-	8.5	10.8	12.5	20.5	0.9/1.25	0/0.7	66.1	30.0	34.6
B	M25	1"/¾"	13.0	16.7	11.0	15.4	16.9	26.0	1.25/1.6	0/0.7	71.4	36.0	41.6
C	M32	1¼"/1"	19.0	22.5	15.5	21.2	22.0	33.0	1.6/2.0	0/0.7	75.2	46.0	53.1
C2	M40	1½"/1¼"	25.0	28.5	22.0	28.0	28.0	41.0	1.6/2.0	0/0.7	77.1	55.0	63.5
D	M50	2"/1½"	31.5	40.3	27.5	34.8	36.0	52.6	1.8/2.5	0/1.0	90.3	65.0	75.1
E	M63	2½"/2"	42.0	52.0	39.0	46.5	46.0	65.3	1.8/2.5	0/1.0	96.7	80.0	92.4
F	M75	3"/2½"	54.5	63.8	51.0	58.3	57.0	78.0	1.8/2.5	0/1.0	96	95.0	109.6

Larger cable glands available in 153/L design style.

G	M80	3½"	67.0	68.5	-	-	75.0	89.5	#	#	95.6	106.4	123.0
H	M90	3½"	67.0	73.1	-	-	75.0	89.5	#	#	95.6	115.0	132.8
J	M100	4"	75.0	87.1	-	-	88.0	104.5	#	#	95.6	127.0	146.7

[2] Size O is available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 10.9mm.

[4]Deluge protection option available.

Dedicated armour clamping rings are fitted. Please specify armour type and size when ordering.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For G size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F and 20mm for sizes G to J.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 302 +336 for sizes Os to F.
Assembly instruction data sheet No. A.I. 329 + 336 for sizes G to J.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available.
See pages 53 - 57.

Materials & Finishes

The 153/RAC/L cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Alternative Reversible Armour Clamping Rings (RAC)

SELECTION TABLE		
Size Ref.	Steel Wire Armour/Braid/Tape	
	Orientation 1	Orientation 2
O/Os	0.8 - 1.0	0.4 - 0.8
A	0.8 - 1.0	0.4 - 0.8
B	0.9 - 1.25	0.5 - 0.9
C	1.2 - 1.6	0.6 - 1.2
C2	1.2 - 1.6	0.6 - 1.2
D	1.45 - 1.8	1.0 - 1.45
E	1.45 - 1.8	1.0 - 1.45
F	1.45 - 1.8	1.0 - 1.45

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread/ Standard Inner Seal + Bond

e.g. 153/RAC/C/M32/L
153/RAC/C/1¼" NPT/L

Cable Gland with Alternative Inner Seal + Bond

e.g. 153/RAC/C/M32/K
153/RAC/C/1¼" NPT/K

Cable Gland with Alternative Clamping Ring (AR)

e.g. 153/RAC/C/M32/L/AR
153/RAC/C/1¼" NPT/L/AR

Application

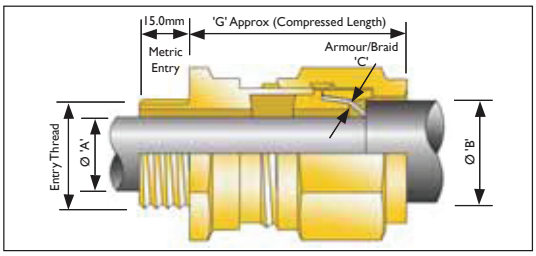
- Outdoor or Indoor use.
- For use with single wire armoured 'W', wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables with a lead inner sheath.
- See technical section of catalogue for installation rules and regulations.

Features

- Provides armour clamping using one clamping arrangement for all armour/braid types.
- Provides a seal and an electrical bond on the cables lead inner sheath.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Construction and test standards EN 50262. BS 6121 Part 1. Type E2W, E2X and E2Z.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN 60529 and NEMA 4X.
- Operating temperature range -60°C to +80°C as standard.



Cable Gland Type 150/RAC

Industrial

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details				'G'	Hexagon Dimensions	
	Metric	NPT* Std./ Option	Inner Sheath 'A'	Outer Sheath 'B'	'C' Armour/Braid			Across Flats	Across Corners
			Max.	Max.	Orientation 1	Orientation 2			
O	M20[2]	½"	11.9	16.0	0.9/1.25	0/0.7	47.5	24.0	27.7
A	M20	¾"/½"	14.3	20.5	0.9/1.25	0/0.7	47.5	30.0	34.6
B	M25	1"/¾"	20.2	26.0	1.25/1.6	0/0.7	50.8	36.0	41.6
C	M32	1¼"/1"	26.5	33.0	1.6/2.0	0/0.7	54.9	46.0	53.1
C2	M40	1½"/1¼"	32.5	41.0	1.6/2.0	0/0.7	64.4	55.0	63.5
D	M50	2"/1½"	44.4/42.3[1]	52.6	1.8/2.5	0/1.0	68.5	65.0	75.1
E	M63	2½"/2"	56.3/54.3[1]	65.3	1.8/2.5	0/1.0	70.1	80.0	92.4
F	M75	3"/2½"	68.2/65.3[1]	78.0	1.8/2.5	0/1.0	72.3	95.0	109.6

[1] Smaller value is applicable when selecting reduced NPT entry option.
[2] Size O is available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 10.9mm.

General Information

O - F size metric entry threads are 1.5mm pitch as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 325.

Alternative Reversible Armour Clamping Rings (RAC)

SELECTION TABLE		
Size Ref.	Steel Wire Armour/Braid/Tape	
	Orientation 1	Orientation 2
O/Os	0.8 - 1.0	0.4 - 0.8
A	0.8 - 1.0	0.4 - 0.8
B	0.9 - 1.25	0.5 - 0.9
C	1.2 - 1.6	0.6 - 1.2
C2	1.2 - 1.6	0.6 - 1.2
D	1.45 - 1.8	1.0 - 1.45
E	1.45 - 1.8	1.0 - 1.45
F	1.45 - 1.8	1.0 - 1.45

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 150/RAC cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 150/RAC/C/M32
150/RAC/C/1¼" NPT

Cable Gland with Alternative Clamping Ring (AR)

e.g. 150/RAC/C/M32/AR
150/RAC/C/1¼" NPT/AR

Application

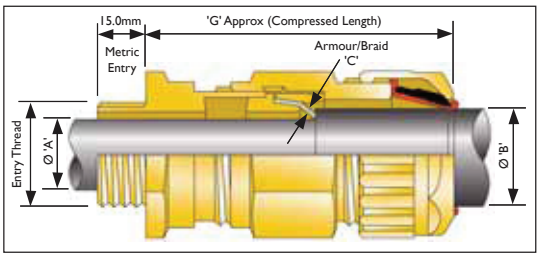
- Outdoor or Indoor use.
- For use with single wire armoured 'W', wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables.
- See technical section of catalogue for installation rules and regulations.

Features

- Provides armour clamping using one clamping arrangement for all armour/braid types.

Technical Data

- Construction and test standards BS 6121 Part 1.
Type BW, BX and BZ.



Cable Gland Type 151/RAC

CE

Industrial

151/RAC Cable Gland

CABLE GLAND SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details					'G'	Hexagon Dimensions	
			Inner Sheath 'A'	Outer Sheath 'B'		'C' Armour/Braid				
	Metric	NPT* Std./ Option	Max.	Min.	Max.	Orientation 1	Orientation 2		Across Flats	Across Corners
Os	M20[2]	½"	8.0	5.5	12.0	0.9/1.25	0/0.7	65.1	24.0	27.7
O	M20[2]	½"	11.9	9.5	16.0	0.9/1.25	0/0.7	65.1	24.0	27.7
A	M20	¾"/½"	14.3	12.5	20.5	0.9/1.25	0/0.7	66.1	30.0	34.6
B	M25	1"/¾"	20.2	16.9	26.0	1.25/1.6	0/0.7	71.4	36.0	41.6
C	M32	1¼"/1"	26.5	22.0	33.0	1.6/2.0	0/0.7	75.2	46.0	53.1
C2	M40	1½"/1¼"	32.5	28.0	41.0	1.6/2.0	0/0.7	77.1	55.0	63.5
D	M50	2"/1½"	44.4/42.3[1]	36.0	52.6	1.8/2.5	0/1.0	90.3	65.0	75.1
E	M63	2½"/2"	56.3/54.3[1]	46.0	65.3	1.8/2.5	0/1.0	96.7	80.0	92.4
F	M75	3"/2½"	68.2/65.3[1]	57.0	78.0	1.8/2.5	0/1.0	96.0	95.0	109.6

Larger cable glands available in 151 design.

G	M80	3½"	72.0	75.0	89.5	#	#	95.6	106.4	123.0
H	M90	3½"	80.0	75.0	89.5	#	#	95.6	115.0	132.8
J	M100	4"	90.0	88.0	104.5	#	#	95.6	127.0	146.7

[1] Smaller value is applicable when selecting reduced NPT entry option.
[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 10.9mm.
[4] Deluge protection option available.
Dedicated armour clamping rings are fitted. Please specify armour type and size when ordering.

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For G size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F and 20mm for sizes G to J.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 308 for sizes Os to F.
Assembly instruction data sheet No. A.I. 314 for sizes G to J.

Alternative Reversible Armour Clamping Rings (RAC)

SELECTION TABLE		
Size Ref.	Steel Wire Armour/Braid/Tape	
	Orientation 1	Orientation 2
O/Os	0.8 - 1.0	0.4 - 0.8
A	0.8 - 1.0	0.4 - 0.8
B	0.9 - 1.25	0.5 - 0.9
C	1.2 - 1.6	0.6 - 1.2
C2	1.2 - 1.6	0.6 - 1.2
D	1.45 - 1.8	1.0 - 1.45
E	1.45 - 1.8	1.0 - 1.45
F	1.45 - 1.8	1.0 - 1.45

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 151/RAC cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Thread

e.g. 151/RAC/C/M32
151/RAC/C/1¼" NPT

Cable Gland with Alternative Clamping Ring (AR)

e.g. 151/RAC/C/M32/AR
151/RAC/C/1¼" NPT/AR

Application

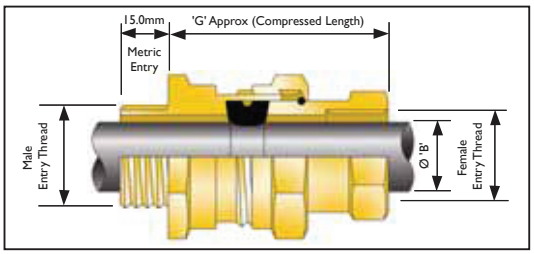
- Outdoor or Indoor use.
- For use with single wire armoured 'W', wire braided 'X' and steel tape armoured 'Z', elastomer and plastic insulated cables.
- See technical section of catalogue for installation rules and regulations.

Features

- Provides armour clamping using one clamping arrangement for all armour/braid types.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer sheath.

Technical Data

- Construction and test standards EN 50262. BS 6121 Part 1. Type CW, CX and CZ.
- IP66 ingress protection to IEC 60529 and EN 60529.
- Operating temperature range -60°C to +80°C as standard.



Cable Gland Type 114

CE

Industrial

CABLE GLAND SELECTION TABLE

Size Ref.	Male Entry Thread Size		Female Entry Thread Size		Cable Acceptance Details Outer Sheath 'B'				'G'	Hexagon Dimensions	
					Standard Seal		Alternative Seal (S)				
	Metric	NPT* Std./ Option	Metric	NPT #	Min.	Max.	Min.	Max.		Across Flats	Across Corners
A	M20	¾"/½"	M20	-	11.0	14.3	8.5	13.4	63.9	30.0	34.6
B	M25	1"/¾"	M25	-	13.0	20.2	9.5	15.4	52.8	36.0	41.6
C	M32	1¼"/1"	M32	-	19.0	26.5	15.5	21.2	69.5	46.0	53.1
C2	M40	1½"/1¼"	M40	-	25.0	32.5	22.0	28.0	72.3	55.0	63.5
D	M50	2"/1½"	M50	-	31.5	44.4/42.3[1]	27.5	34.8	92.8	65.0	75.1
E	M63	2½"/2"	M63	-	42.5	56.3/54.3[1]	39.0	46.5	93.2	80.0	92.4
F	M75	3"/2½"	M75	-	54.5	68.2/65.3[1]	48.5	58.3	94.9	95.0	109.6

[1] Smaller value is applicable when selecting reduced NPT entry option.
NPT female thread sizes equivalent to those shown in the table for the male thread size are available. Hexagon dimensions as shown may alter.

General Information

A - F size metric entry threads are 1.5mm pitch as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes A to F.
All dimensions in millimetres (except* where dimensions are in inches).
Assembly instruction data sheet No. A.I. 310.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 114 cable gland is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland Ordering Examples

Cable Gland Type/Size/Male Thread/Female Thread

e.g. 114/C/M32/M32
114/C/1¼" NPT/M32

Cable Gland with Alternative Seal (S)

e.g. 114/C/M32/M32/S
114/C/1¼" NPT/M32/S

Application

- Outdoor or Indoor use.
- For use with non-armoured elastomer and plastic insulated cables installed in conduit.
- See technical section of the catalogue for installation rules and regulations.

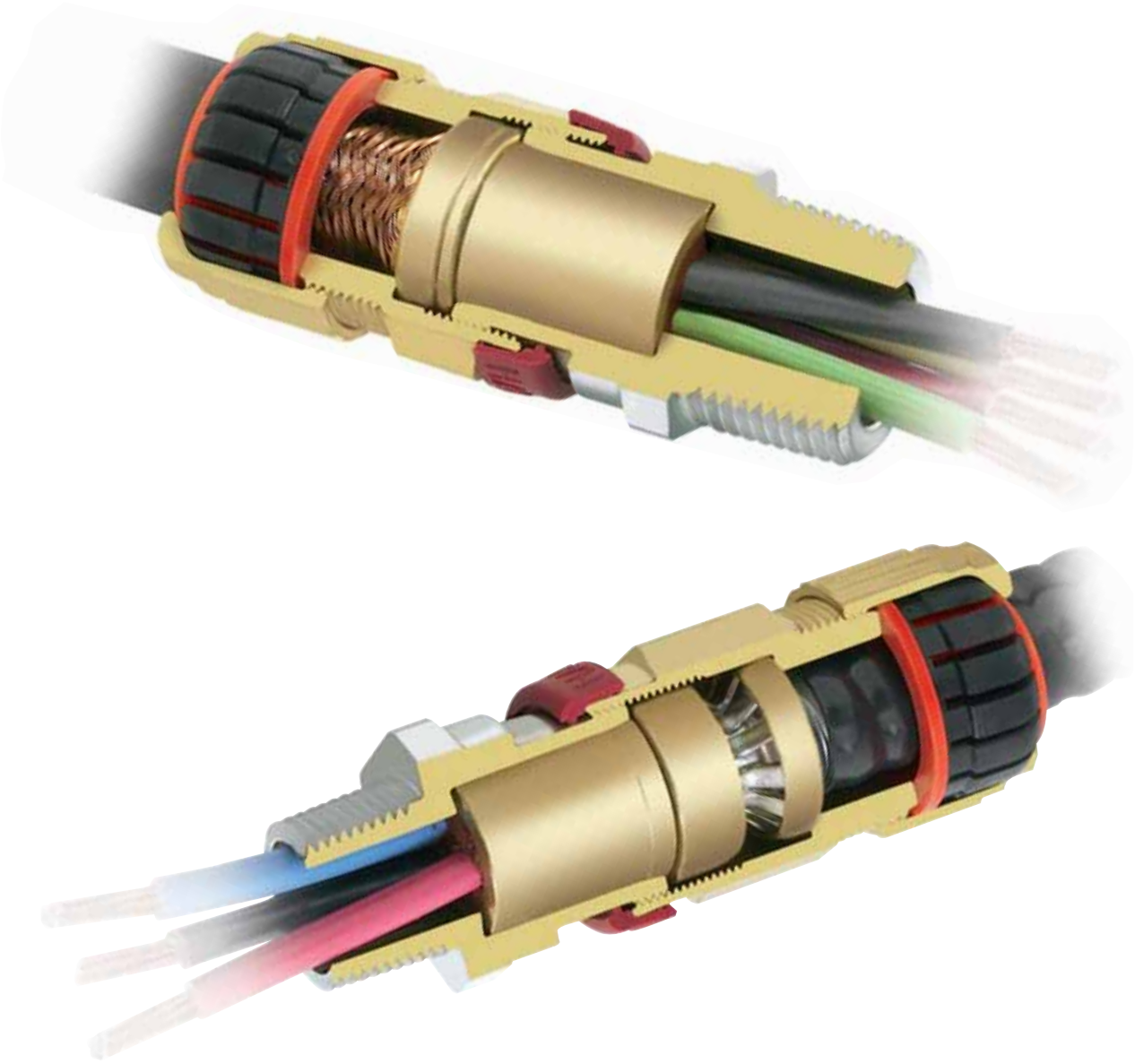
Features

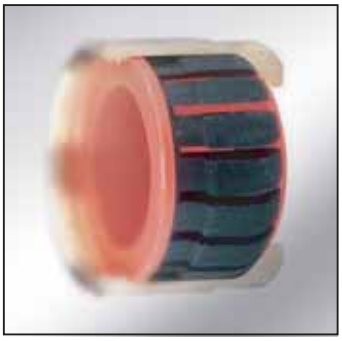
- Provides a cable retention seal onto the cables outer sheath.
- Provides female running coupler for cable gland or conduit entry.

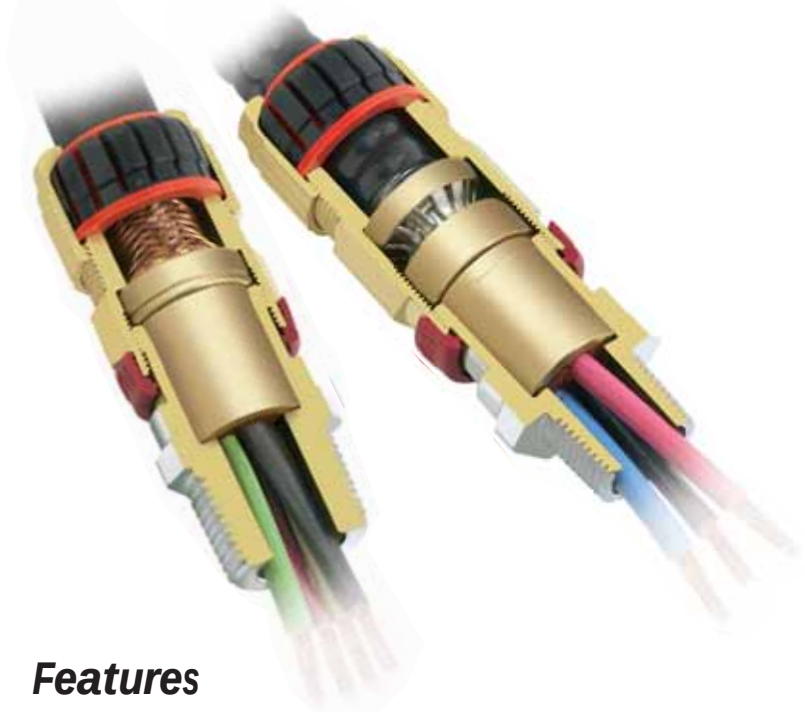
Technical Data

- Construction and test standards EN 50262.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529 and EN 60529.
- Operating temperature range -60°C to +100°C as standard.

North American Series Cable Glands/Connectors







Features

- **Unique Rear Sealing System**

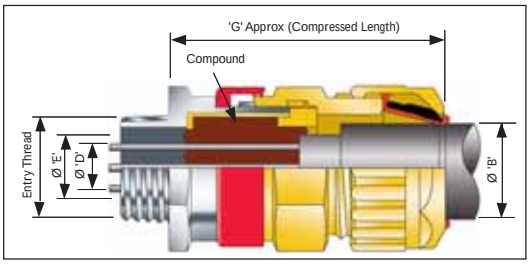
  This arrangement offers IP66, IP67, IP68 (30 metres for 7 days), NEMA 4X and Deluge (DTS01) Ingress Protection. The seal is manufactured from a silicone material, has LSFZH properties, is ozone and oil resistant and is suitable for use at both high and low temperatures.
  The Rear Sealing System covers the entire range of cable diameters without the need for special seals and the cable acceptance range is stamped on the backnut for ease of inspection. The backnut can be hand tightened, with only one further spanner turn required to ensure IP66, IP67, IP68 and NEMA 4X.

- **Armour Grounding Device**

  This device provides 360° armour grounding which is fully inspectable.
  The grounding device is unique in that it remains in contact with the metal cable jacket when the cable gland/connector is disassembled for inspection.

- **Inspectable Deluge Seal**

  Hawke's inspectable deluge seal offers IP66 and IP67 sealing and is certified as 'deluge proof' by ITS in accordance with DTS01. Indeed Hawke's deluge seal is so good that it exceeds the expectations of the offshore industry by not only preventing ingress into the equipment, but also into the cable gland/connector, which could potentially corrode the cable armour. The deluge seal is coloured red for hazardous location products and black for industrial general purpose products.



Cable Gland/Connector Type 710

c UL us
Explosion Proof

710 Cable Gland/Connector

CABLE GLAND/CONNECTOR SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details					'G'	Hexagon Dimensions	
			Inner Jacket/Cores			Outer Jacket 'B'				
	NPT Std./ Option	Metric *	'D' Max. Over Cores	'E' Max. Inner Jacket	Max. No. Of Cores	Min.	Max.		Across Flats	Across Corners
Os	½"	M20[2]	0.35"	0.39"	6	0.22"	0.47"	2.81"	0.94"	1.09"
O	½"	M20[2]	0.35"	0.39"	6	0.37"	0.63"	2.81"	0.94"	1.09"
A	½"/¾"	M20	0.43"	0.64"	10	0.49"	0.81"	2.84"	1.18"	1.36"
B	¾"/1"	M25	0.64"	0.93"	21	0.66"	1.02"	2.95"	1.42"	1.64"
C	1"/1¼"	M32	0.86"	1.23"	42	0.87"	1.30"	3.11"	1.81"	2.09"
C2	1¼"/1½"	M40	1.04"	1.59"	60	1.10"	1.61"	3.26"	2.17"	2.50"
D	2"/1½"	M50	1.46"	1.96"	80	1.42"	2.07"	3.36"	2.56"	2.96"
E	2½"/2"	M63	1.88"	2.55"	100	1.81"	2.57"	3.56"	3.15"	3.64"
F	3"/2½"	M75	2.32"	2.98"	120	2.24"	3.07"	3.76"	3.74"	4.31"

'H' size cable gland/connector available.
Contact Hawke International for further details.

H	3½"	M90	2.79"	3.12"	-	3.07"	3.52"	3.54"	4.18"	4.84"

[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 0.43".

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For H size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F and 20mm for size H.
All dimensions in inches (except* where dimensions are in millimetres).
Two part sealing compound and assembly instructions are supplied with the cable gland.
Assembly instruction data sheet No. A.I. 316 for sizes Os to F.
Assembly instruction data sheet No. A.I. 337 for size H.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 710 cable gland/connector is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland/Connector Ordering Examples

Cable Gland/Connector Type/Size/Thread

e.g. 710/C/1" NPT

Application

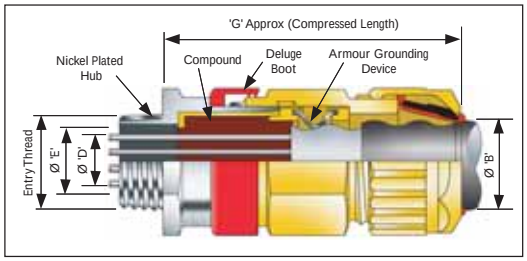
- Outdoor or Indoor use.
- For use with non-armoured cable, as permitted by the NEC.
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a barrier seal between the individual insulated conductors within the cable and prevents entry of the products of an explosion into the cable.
- Assembly of the cable gland/connector compresses and distributes the compound evenly to effect a barrier seal at the point of entry into the enclosure.
- Provides an outer deluge seal to prevent moisture ingress to the cable armour and enclosure.
  Deluge seal is coloured red to indicate Hazardous Locations product.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer jacket.

Technical Data

- UL Listed for use in Class1, Division 2, Gas Groups A, B, C and D.
- UL Listed for use in Class1, Zone 2, Gas Groups IIA, IIB and IIC.
- UL listed AExd IIC and AExe II Class 1, Zone 2.
- Construction and test standards c UL us UL Listed hazardous locations in USA and Canada. E84940.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN60529 and NEMA 4X.
- DTS01 deluge tested by ITS.
- Operating temperature range -50°C to +60°C as standard.
- Alternative Certification Options Available.
  - Marine Approval.
  - ABS Marine Approval.



Cable Gland/Connector Type 711 Class 1 Division 1

c UL us
Explosion Proof

711 Cable Gland/Connector

CABLE GLAND/CONNECTOR SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details						'G'	Hexagon Dimensions	
			Inner Jacket/Cores				Outer Jacket 'B'				
	NPT Std./ Option	Metric *	'D' Max. Over Cores	Armour Jacket 'E' Min.	Armour Jacket 'E' Max.	Max. No. Of Cores	Min.	Max.		Across Flats	Across Corners
A	½"/¾"	M20	0.43"	0.41"	0.64"	10	0.49"	0.81"	2.74"	1.18"	1.36"
B	¾"/1"	M25	0.64"	0.49"	0.93"	21	0.66"	1.02"	2.95"	1.42"	1.64"
C	1"/1¼"	M32	0.86"	0.85"	1.23"	42	0.87"	1.30"	3.04"	1.81"	2.09"
C2	1¼"/1½"	M40	1.04"	1.17"	1.59"	60	1.10"	1.61"	3.09"	2.17"	2.50"
D	2"/1½"	M50	1.46"	1.37"	1.96"	80	1.42"	2.07"	3.37"	2.56"	2.96"
E	2½"/2"	M63	1.88"	1.76"	2.55"	100	1.81"	2.57"	3.65"	3.15"	3.64"
F	3"/2½"	M75	2.32"	2.29"	2.98"	120	2.24"	3.07"	3.73"	3.74"	4.31"

'H' size cable gland/connector available.
Contact Hawke International for further details.

H	3½"	M90	2.79"	2.93"	3.47"	120	3.07"	3.52"	4.33"	4.18"	4.84"

General Information

A - F size metric entry threads are 1.5mm pitch as standard.
For H size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes A to F and 20mm for size H.
All dimensions in inches (except* where dimensions are in millimetres).
Two part sealing compound and assembly instructions are supplied with the cable gland.
Assembly instruction data sheet No. A.I. 317 for sizes Os to F.
Assembly instruction data sheet No. A.I. 338 for size H.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 711 cable gland/connector is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland/Connector Ordering Examples

Cable Gland/Connector Type/Size/Thread

e.g. 711/C/1" NPT

Application

- Outdoor or Indoor use.
- For use with continuous corrugated aluminium, Metal Clad (MCHL) cable.
- See technical section of the catalogue for installation rules and regulations.

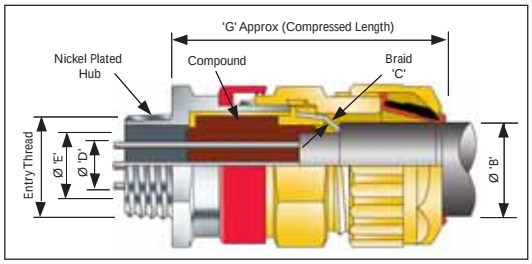
Features

- Provides 360° armour grounding which is fully inspectable.
- Grounding Device remains in contact with cable when disassembled for inspection.
- Provides a barrier seal between the individual insulated cores within the cable and prevents entry of the products of an explosion into the cable.
- Assembly of the cable gland/connector compresses and distributes the compound evenly to create a barrier seal at the point of entry into the enclosure.
- Provides an outer deluge seal to prevent moisture ingress to the cable armour and enclosure. Deluge seal is coloured red to indicate Hazardous Location product.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer jacket.

Technical Data

- UL Listed for use in Class1, Division 1, Gas Groups A, B, C and D.
- UL Listed for use in Class1, Zone 1, Gas Groups IIA, IIB and IIC.
- UL Listed AExd IIC and AExe II Class 1, Zone 1.
- Construction and test standards c UL us UL Listed hazardous locations in USA and Canada. E84940
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN60529 and NEMA 4X.
- DTS01 deluge tested by ITS.
- Operating temperature range -50°C to +60°C as standard.
- Alternative Certification Options available.
  - Marine Approval.
  - ABS Marine Approval.

For Class 1, Division 2 MC cable applications, the 713 cable gland/connector is available. Details and sizes are the same as the 711.



Cable Gland/Connector Type 753

MARINE c UL us

Explosion Proof

753 Cable Gland/Connector

CABLE GLAND/CONNECTOR SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details						'G'	Hexagon Dimensions	
			Inner Jacket/ Cores			Outer Jacket 'B'		'C'			
	NPT Std./ Option	Metric *	'D' Max. Over Cores	'E' Max. Inner Jacket	Max. No. Of Cores	Min.	Max.	Braid		Across Flats	Across Corners
Os	½"	M20[2]	0.35"	0.46"	6	0.22"	0.47"	0.008"/0.013"	2.80"	0.94"	1.09"
O	½"	M20[2]	0.35"	0.46"	6	0.37"	0.63"	0.008"/0.013"	2.80"	0.94"	1.09"
A	½"/¾"	M20	0.43"	0.49"	10	0.49"	0.81"	0.008"/0.013"	2.83"	1.18"	1.36"
B	¾"/1"	M25	0.64"	0.72"	21	0.66"	1.02"	0.008"/0.013"	2.94"	1.42"	1.64"
C	1"/1¼"	M32	0.86"	0.97"	42	0.87"	1.30"	0.008"/0.013"	3.10"	1.81"	2.09"
C2	1¼"/1½"	M40	1.04"	1.16"	60	1.10"	1.61"	0.008"/0.013"	3.26"	2.17"	2.50"
D	2"/1½"	M50	1.46"	1.64"	80	1.42"	2.07"	0.008"/0.013"	3.35"	2.56"	2.96"
E	2½"/2"	M63	1.88"	2.11"	100	1.81"	2.57"	0.008"/0.013"	3.56"	3.15"	3.64"
F	3"/2½"	M75	2.32"	2.61"/2.57"[1]	120	2.24"	3.07"	0.008"/0.013"	3.76"	3.74"	4.31"

'H' size cable gland/connector available.
Contact Hawke International for further details.

H	3½"	M90	2.79"	3.05"	-	3.07"	3.52"	0.008"/0.013"	3.54"	4.18"	4.84"

[1] Smaller value is applicable when selecting reduced NPT entry option.
[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 0.43".

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For H size glands and above, a 2mm pitch is supplied as standard. (1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F and 20mm for size H.
All dimensions in inches (except* where dimensions are in millimetres).
Two part sealing compound and assembly instructions are supplied with the cable gland.
Assembly instruction data sheet No. A.I. 318 for sizes Os to F.
Assembly instruction data sheet No. A.I. 339 for size H.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 753 cable gland/connector is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland/Connector Ordering Examples

Cable Gland/Connector Type/Size/Thread

e.g. 753/C/1" NPT

Application

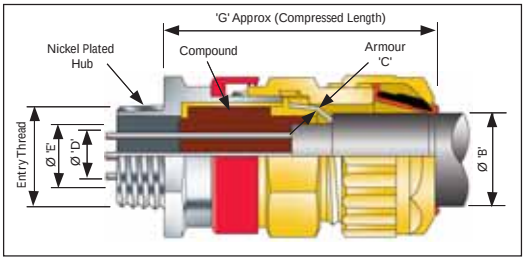
- Outdoor or Indoor use.
- For use with braid armoured marine shipboard jacketed or non-jacketed cable.
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a barrier seal between the individual insulated conductors within the cable and prevents entry of the products of an explosion into the cable.
- Assembly of the cable gland/connector compresses and distributes the compound evenly to effect a barrier seal at the point of entry into the enclosure.
- Provides an outer deluge seal to prevent moisture ingress to the cable armour and enclosure. Deluge seal is coloured red to indicate Hazardous Location product.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer jacket.

Technical Data

- UL Listed for use in Class1, Division 1, Gas Groups A, B, C and D.
- UL Listed for use in Class1, Zone 1 and Zone 2, Gas Groups IIA, IIB and IIC.
- UL Listed AExd IIC and AExe II Class 1, Zone 1.
- Construction and test standards
  MARINE c UL us UL Listed hazardous locations in USA and Canada. E84941.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN60529 and NEMA 4X.
- DTS01 deluge tested by ITS.
- Operating temperature range -50°C to +60°C as standard.
- Alternative Certification Options available.
  - Marine Approval.
  - ABS Marine Approval.



Cable Gland/Connector Type 755

c UL us
Explosion Proof

CABLE GLAND/CONNECTOR SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details								'G'	Hexagon Dimensions	
			Inner Jacket/ Cores			Outer Jacket 'B'		'C'					
	NPT Std./ Option	Metric *	'D' Max. Over Cores	'E' Max. Inner Jacket	Max. No. Of Cores	Min.	Max.	Steel Wire Armour	Braid	Tape		Across Flats	Across Corners
Os	½"	M20 [2]	0.35"	0.46"	6	0.22"	0.47"	0.036"/0.049"	0.008"/0.013"	0.008"/0.031"	2.80"	0.94"	1.09"
O	½"	M20 [2]	0.35"	0.46"	6	0.37"	0.63"	0.036"/0.049"	0.008"/0.013"	0.008"/0.031"	2.80"	0.94"	1.09"
A	½"/¾"	M20	0.43"	0.49"	10	0.49"	0.81"	0.036"/0.049"	0.008"/0.013"	0.008"/0.031"	2.83"	1.18"	1.36"
B	¾"/1"	M25	0.64"	0.72"	21	0.66"	1.02"	0.049"/0.062"	0.008"/0.013"	0.008"/0.039"	2.94"	1.42"	1.64"
C	1"/1¼"	M32	0.86"	0.97"	42	0.87"	1.30"	0.062"/0.078"	0.008"/0.013"	0.008"/0.055"	3.10"	1.81"	2.09"
C2	1¼"/1½"	M40	1.04"	1.16"	60	1.10"	1.61"	0.062"/0.078"	0.008"/0.013"	0.008"/0.070"	3.26"	2.17"	2.50"
D	2"/1½"	M50	1.46"	1.64"	80	1.42"	2.07"	0.078"/0.098"	0.008"/0.013"	0.008"/0.070"	3.35"	2.56"	2.96"
E	2½"/2"	M63	1.88"	2.11"	100	1.81"	2.57"	0.098"	0.008"/0.013"	0.008"/0.070"	3.56"	3.15"	3.64"
F	3"/2½"	M75	2.32"	2.61"/2.57" [1]	120	2.24"	3.07"	0.098"	0.008"/0.013"	0.008"/0.070"	3.76"	3.74"	4.31"

[1] Smaller value is applicable when selecting reduced NPT entry option.
[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 0.43".

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
Thread length is 15mm for sizes Os to F.
All dimensions in inches (except* where dimensions are in millimetres).
Two part sealing compound and assembly instructions are supplied with the cable gland.
Assembly instruction data sheet No. A.I. 319.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 753 cable gland/connector is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland/Connector Ordering Examples

Cable Gland/Connector Type/Size/Thread

e.g. 755/C/1" NPT

- Alternative Certification Options available.
- Marine Approval.
- ABS Marine Approval.

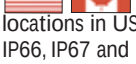
Application

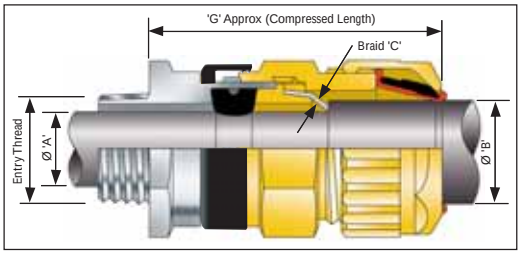
- Outdoor or Indoor use.
- For use with armoured jacketed cable, as permitted by the NEC.
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides a barrier seal between the individual insulated conductors within the cable and prevents entry of the products of an explosion into the cable.
- Assembly of the cable gland/connector compresses and distributes the compound evenly to effect a barrier seal at the point of entry into the enclosure.
- Provides an outer deluge seal to prevent moisture ingress to the cable armour and enclosure. Deluge seal is coloured red to indicate Hazardous Location product.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer jacket.

Technical Data

- UL Listed for use in Class1, Division 2, Gas Groups A, B, C and D.
- UL Listed for use in Class1, Zone 2, Gas Groups IIA, IIB and IIC.
- UL Listed AExd IIC and AExe II Class 1, Zone 2.
- Construction and test standards  c UL us UL Listed hazardous locations in USA and Canada. E84940.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN60529 and NEMA 4X.
- DTS01 deluge tested by ITS.
- Operating temperature range -50°C to +60°C as standard.



Cable Gland/Connector Type 153/X

c UL us

General Purpose

153/X Cable Gland/Connector

CABLE GLAND/CONNECTOR SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details							'G'	Hexagon Dimensions	
			Inner Jacket 'A'				Outer Jacket 'B'		'C'			
			Standard Seal		Alternative Seal (S)							
	NPT Std./ Option	Metric *	Min.	Max.	Min.	Max.	Min.	Max.	Braid		Across Flats	Across Corners
Os	½"	M20[2]	0.12"	0.31"	-	-	0.22"	0.47"	0.008"/0.013"	2.56"	0.94"	1.09"
O	½"	M20[2]	0.30"	0.46"	-	-	0.37"	0.63"	0.008"/0.013"	2.56"	0.94"	1.09"
A	½"/¾"	M20	0.44"	0.56"	0.34"	0.52"	0.49"	0.81"	0.008"/0.013"	2.60"	1.18"	1.36"
B	¾"/1"	M25	0.52"	0.79"	0.38"	0.60"	0.66"	1.02"	0.008"/0.013"	2.81"	1.42"	1.64"
C	1"/1¼"	M32	0.75"	1.04"	0.61"	0.83"	0.87"	1.30"	0.008"/0.013"	2.96"	1.81"	2.09"
C2	1¼"/1½"	M40	0.99"	1.27"	0.87"	1.10"	1.10"	1.61"	0.008"/0.013"	3.04"	2.17"	2.50"
D	2"/1½"	M50	1.24"	1.74"/1.67"[1]	1.09"	1.37"	1.42"	2.07"	0.008"/0.013"	3.54"	2.56"	2.96"
E	2½"/2"	M63	1.68"	2.21"/2.14"[1]	1.54"	1.83"	1.81"	2.57"	0.008"/0.013"	3.81"	3.15"	3.64"
F	3"/2½"	M75	2.15"	2.68"/2.57"[1]	1.91"	2.29"	2.24"	3.07"	0.008"/0.013"	3.78"	3.74"	4.31"

'H' size cable gland/connector available.
Contact Hawke International for further details.

H	3½"	M90	2.64"	3.06"	-	-	2.96"	3.52"	0.008"/0.013"	4.8"	4.53"	5.23"

[1] Smaller value is applicable when selecting reduced NPT entry option.

[2] Sizes Os and O are available with an M16 thread size. For O size with M16 thread, the maximum cable inner sheath diameter is 0.43".

General Information

Os - F size metric entry threads are 1.5mm pitch as standard.
For H size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes Os to F and 20mm for size H.
All dimensions in inches (except* where dimensions are in millimetres).
Assembly instruction data sheet No. A.I. 341.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 153/X cable gland/connector is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland/Connector Ordering Examples

Cable Gland/Connector Type/Size/Thread

e.g. 153/CX/M32
153/CX/1" NPT

Cable Gland/Connector with Alternative Seal (S)

e.g. 153/CX/M32/S
153/CX/1" NPT/S

Application

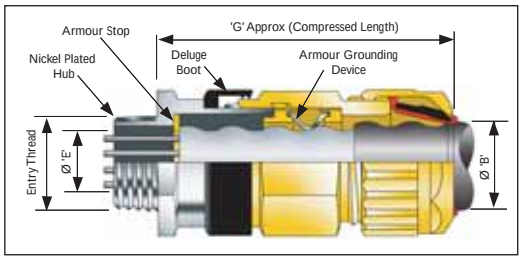
- Outdoor or Indoor use.
- For use with armoured marine shipboard jacketed or non-jacketed cable.
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides armour clamping for marine shipboard cable.
- Provide a seal on the cables inner jacket.
- Provides an outer deluge seal to prevent moisture ingress to the cable armour and enclosure.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer jacket.

Technical Data

- Construction and test standards c UL us UL Listed wet locations. E218332.
- IP66, IP67 and IP68 (30 metres for 7 days) ingress protection to IEC 60529, EN60529 and NEMA 4X.
- DTS01 deluge tested by ITS.
- Operating temperature range -50°C to +60°C as standard.
- Alternative Certification Options available.
  - Marine Approval.
  - ABS Marine Approval.



Cable Gland/Connector Type 701

c UL us

General Purpose

CABLE GLAND/CONNECTOR SELECTION TABLE

Size Ref.	Entry Thread Size		Cable Acceptance Details				'G'	Hexagon Dimensions	
			Armour Jacket 'E'		Outer Jacket 'B'				
	NPT Std./ Option	Metric *	Min.	Max.	Min.	Max.		Across Flats	Across Corners
A	½"/¾"	M20	0.41"	0.64"	0.49"	0.81"	2.74"	1.18"	1.36"
B	¾"/1"	M25	0.49"	0.93"	0.66"	1.02"	2.95"	1.42"	1.64"
C	1"/1¼"	M32	0.85"	1.23"	0.87"	1.30"	3.04"	1.81"	2.09"
C2	1¼"/1½"	M40	1.17"	1.59"	1.10"	1.61"	3.09"	2.17"	2.50"
D	2"/1½"	M50	1.37"	1.96"	1.42"	2.07"	3.37"	2.56"	2.96"
E	2½"/2"	M63	1.76"	2.55"	1.81"	2.57"	3.65"	3.15"	3.64"
F	3"/2½"	M75	2.29"	2.98"	2.24"	3.07"	3.73"	3.74"	4.31"

'H' size cable gland/connector available.
Contact Hawke International for further details.

H	3½"	M90	2.93"	3.47"	3.07"	3.52"	4.33"	4.18"	4.84"

General Information

A - F size metric entry threads are 1.5mm pitch as standard.
For H size glands and above, a 2mm pitch is supplied as standard.
(1.5mm pitch with 15mm length of thread can be supplied) please specify when ordering.
Thread length is 15mm for sizes A to F and 20mm for size H.
All dimensions in inches (except* where dimensions are in millimetres).
Assembly instruction data sheet No. A.I. 315 for sizes Os to F.
Assembly instruction data sheet No. A.I. 342 for size H.

Accessories including locknuts, sealing washers, serrated washers, earth tags, shrouds, adaptors and reducers available. See pages 53 - 57.

Materials & Finishes

The 701 cable gland/connector is manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Cable Gland/Connector Ordering Examples

Cable Gland/Connector Type/Size/Thread

e.g. 701/C/1" NPT

Application

- Outdoor or Indoor use.
- For use with continuous corrugated aluminium and interlocked steel Metal Clad, MCHL and Teck type cables.
- See technical section of the catalogue for installation rules and regulations.

Features

- Provides 360° armour grounding which is fully inspectable.
- Grounding Device remains in contact with cable when disassembled for inspection.
- Provides an outer deluge seal to prevent moisture ingress to the cable armour and enclosure.
- Provides a cable retention and low smoke and fume, zero halogen seal onto the cables outer jacket.

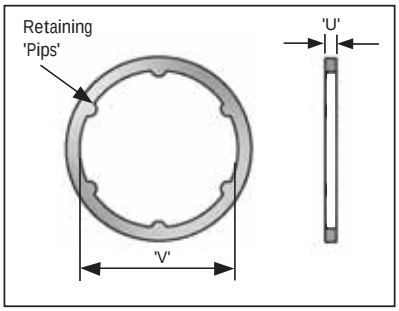
Technical Data

- Construction and test standards c UL us UL Listed wet locations. E165706.
- IP66 and IP67 ingress protection to IEC 60529, EN60529 and NEMA 4X.
- DTS01 deluge tested by ITS.
- Operating temperature range -50°C to +60°C as standard.
- Alternative Certification Options available .
  - Marine Approval.
  - ABS Marine Approval.

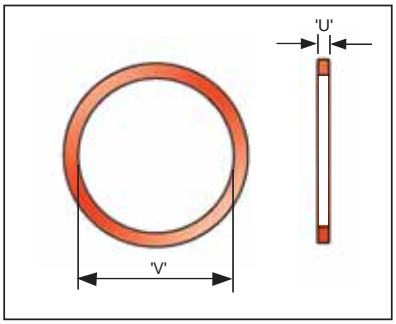
Accessories

Cable Gland Accessories

Nylon Sealing Washer



Red Fibre Washer



SEALING WASHER SELECTION TABLE		
Metric Cable Gland Size 'V'	NPT * Cable Gland Size 'V'	'U'
M20	½"	1.5
M20	¾"	1.5
M25	1"	1.5
M32	1¼"	1.5
M40	1½"	1.5
M50	2"	1.5
M63	2½"	1.5
M75	3"	1.5
M80	3½"	1.5
M90	3½"	1.5
M100	4"	1.5

General Information

All dimensions in millimetres (except* where dimensions are in inches).
Washers for M80, M90 and M100 sizes are only available in Red Fibre.

Application

- For use on cable gland entry threads.

Features

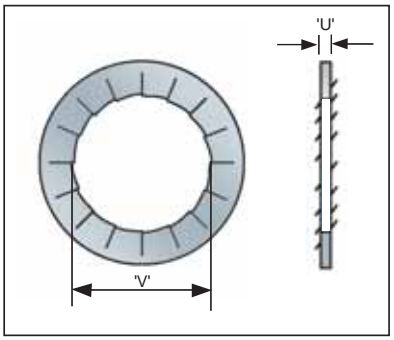
- To maintain ingress protection rating at the enclosure.
- Retaining 'Pips' make washer captive on metric cable gland entry thread.

Ordering Examples

Sealing Washer Type/Size/ Thread

e.g. Nylon Washer/M25
Fibre Washer/M25

Serrated Washer



SERRATED WASHER SELECTION TABLE		
Metric Cable Gland Size 'V'	NPT * Cable Gland Size 'V'	'U'
M20	½"	1.5
M20	¾"	1.5
M25	1"	1.5
M32	1¼"	1.5
M40	1½"	1.5
M50	2"	1.5
M63	2½"	1.5
M75	3"	1.5

General Information

All dimensions in millimetres (except* where dimensions are in inches).

Application

- For use on cable gland entry threads.

Features

- To dampen vibrations of the cable gland/ equipment assembly which may loosen the cable gland or locknut.

Materials & Finishes

Hawke serrated washers are manufactured in stainless steel (standard).

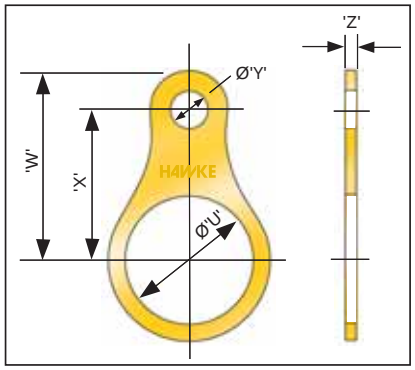
Ordering Examples

Serrated Washer/Size/Thread

e.g. Serrated Washer/M25
Serrated Washer/1" NPT

Cable Gland Accessories

Earth Tags



EARTH TAG SELECTION TABLE				
Metric Cable Gland Size 'U'	'Y'	'W'	'X'	'Z'
M20	7.0	39.6	33.1	1.6
M25	10.5	45.5	36.5	1.6
M32	12.2	52.0	40.9	1.6
M40	13.6	59.6	44.2	1.6
M50	13.5	78.9	58.1	1.6
M63	13.5	87.6	66.8	1.6
M75	13.5	93.7	72.9	1.6
M80	14.0	128.0	104.0	3.0
M90	14.0	128.0	104.0	3.0
M100	14.0	128.0	104.0	3.0

Features

Provides an earth bond attachment for a cable gland.

Materials & Finishes

Hawke earth tags are manufactured in brass (standard).
Stainless Steel locknuts are available, but dimensions may differ slightly to those stated in the selection table. Please contact Hawke for details.

Ordering Example

Earth Tag /Size/Thread

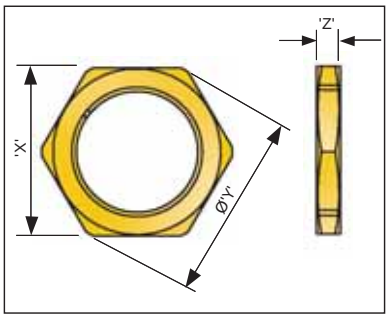
e.g. Earth Tag/M25

Alternative Shape may be supplied dependant upon size.

General Information

All dimensions in millimetres.

Heavy Duty Locknuts



LOCKNUT SELECTION TABLE							
Metric x 1.5mm Pitch				NPT			
Metric Cable Gland	Across Flats 'X'	Across Corners 'Y'	'Z'	NPT * Cable Gland	Across Flats 'X'	Across Corners 'Y'	'Z'
M16	19.0	21.9	3.2	-	-	-	-
M20	24.0	26.9	4.0	½"	30.0	33.6	4.7
M20	24.0	26.9	4.0	¾"	30.0	33.6	4.7
M25	30.0	33.6	4.0	1"	36.0	40.3	6.4
M32	46.0	53.1	4.0	1¼"	46.0	53.1	6.4
M40	46.0	53.1	4.8	1½"	55.0	61.6	6.4
M50	65.0	72.8	4.7	2"	65.0	72.8	6.4
M63	80.0	89.6	6.4	2½"	80.0	89.6	6.4
M75	95.0	107.0	6.4	3"	95.0	107.0	6.4
M80	106.4	119.2	10.0	3½"	127.0	143.0	9.0
M90	106.4	119.2	10.0	3½"	127.0	143.0	9.0
M100	127.0	142.2	10.0	4"	139.7	158.0	9.0

Features

Secures a cable gland in position at the equipment.

Materials & Finishes

Hawke heavy duty locknuts are manufactured in brass (standard).
Stainless Steel locknuts are available, but dimensions may differ slightly to those stated in the selection table. Please contact Hawke for details.

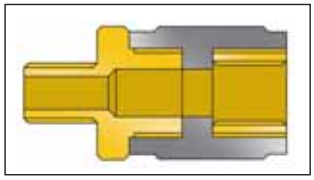
Ordering Example

Locknut /Size/Thread

e.g. Locknut/M25

General Information

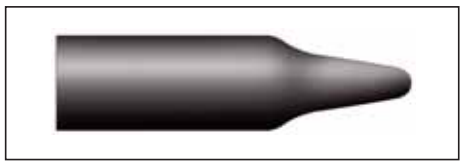
All dimensions in millimetres (except* where dimensions are in inches).



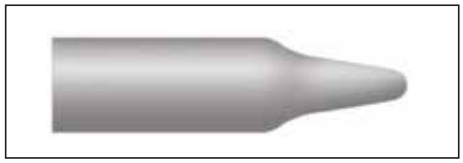
Cable Gland Accessories

Flameproof, Increased Safety and Industrial

PVC Shrouds



PCP Shrouds



SHROUD SELECTION TABLE
Size Ref. #
O/Os
A
B
C
C2
D
E
F
G
H
J

Application

- Outdoor or Indoor use.
- For fitting over cable glands when additional environmental and corrosion protection is required.

Materials & Finishes

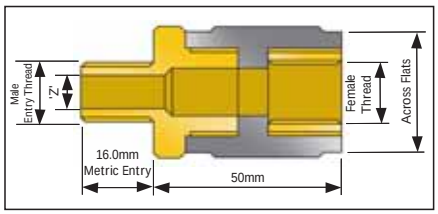
Hawke shrouds are supplied in black (standard).

Ordering Examples

Shroud Type/Size

e.g. PVC Shroud/C
PCP Shroud/C

Insulated Adaptor Type 478



General Information

All dimensions in millimetres.

Materials & Finishes

Insulated portion manufactured from glass filled nylon.
Female insert and entry component are manufactured in brass (standard).

INSULATED ADAPTOR SELECTION TABLE					
Size Ref.	Male Thread	Female Thread	'Z' Bore	Hexagon Dimensions	
	Metric	Metric		Across Flats	Across Corners
A	M20	M20	14.3	35.0	40.0
B	M25	M25	19.3	41.0	47.0
C	M32	M32	25.8	49.0	54.0
C2	M40	M40	33.0	55.0	63.5
D	M50	M50	43.0	70.0	80.5
E	M63	M63	54.0	80.0	92.4
F	M75	M75	67.0	90.0	103.5

Ordering Example

Insulated Adaptor/Size/Male Thread/Female Thread
e.g. 478/1/C/M32/M32

Application

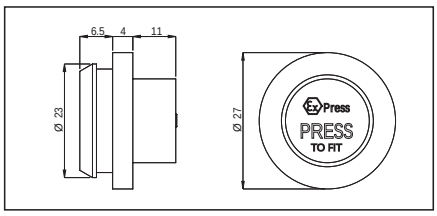
- Outdoor or Indoor use.
- Provides electrical insulation between a cable gland or a conduit fitting and an electrical enclosure. e.g. to provide a means of isolating armour/braid on signal/instrument cable.

Technical Data

478 Certification and Approval

- Certificate No. SIRA 06 ATEX 1240U.
- Exd IIC.
- Suitable for use in Zone 1 and Zone 2.
- Suitable for use in Gas Groups IIA, IIB and IIC.

Press Stopping Plug



General Information

All dimensions in millimetres.

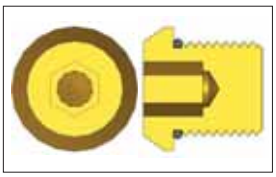
PUSH-IN PLUG APPLICATION DATA		
Clearance Hole	Gland Plate Thickness	Min/Max Clearance Hole Ø
M20	2mm-3mm	20mm-20.7mm

Materials & Finishes

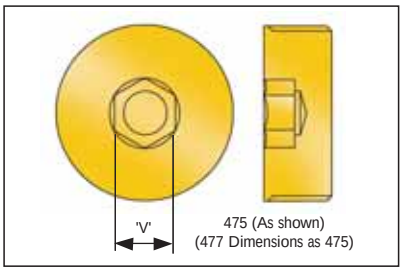
Hawke push-in stopping plugs are supplied in Black Silicone (standard).

Technical Data

- Increased Safety EExe. Ⓔx II 2 GD EExe II.
- Ⓔx Press Plug Baseefa Certificate No. Baseefa 04 ATEX 0168U.
- Suitable for use in Zone 1, Zone 2, Zone 21 & Zone 22.
- Construction and test standards EN 50014, EN 50019 and EN 50281-1-1. IEC 60079-0 and IEC 60079-7.
- Meets IP66 ingress protection for S Series and EZE Series Enclosures.
- DTS01 deluge protection witnessed by EECS.
- Operating temperature range -40°C to +80°C.



Type 475 and 477 Flameproof



477 AND 475 STOPPING PLUGS		
Thread Size		Hex. Key
Metric x 1.5p	NPT *	Across Flats Size 'V'
M20	¾"/½"	10.0
M25	1"/¾"	10.0
M32	1¼"/1"	10.0
M40	1½"/1¼"	19.0
M50	2"/1½"	19.0
M63	2½"/2"	19.0
M75	3"/2½"	19.0

General Information

All dimensions in millimetres (except* where dimensions are in inches).
The 475 - EExd (removable from outside the enclosure).
The 477 - EExd (removable from inside the enclosure).

Materials & Finishes

475 and 477 Stopping plugs are manufactured in brass (standard).

Features

- To close unused cable gland entries and maintain the flameproof integrity of the equipment.

Technical Data

- Flameproof EExd IIC Ex II 2 GD IP66.
- Certificate No. SIRA 06 ATEX 1240U.

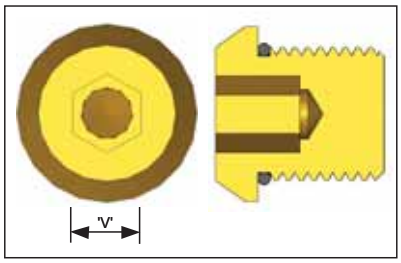
Stopping Plugs Ordering Example

Stopping Plug Type/Size/Thread

e.g. 477/M32

Cable Gland Accessories

Type 387 Flameproof and Increased Safety



387 STOPPING PLUGS	
Thread Size	Hex. Key
Metric x 1.5p	Across Flats Size 'V'
M16	10.0
M20	10.0
M25	10.0
M32	10.0
M40	19.0
M50	19.0
M63	19.0
M75	19.0

General Information

Ingress Protection

To meet with IP66 and IP67, the stopping plugs must be fitted perpendicular to the equipment face in a suitably sized threaded or plain hole and the equipment face must be smooth. Plain holes must be no larger than 0.7mm above the major diameter of the stopping plug thread and the plug must be held in place with a locknut. An serrated washer may also be fitted.

Features

- To close unused cable gland entries and maintain the increased safety integrity of the equipment

Technical Data

- Increased Safety EExde II Ex II 2 GD IP66.
- Certificate No. SIRA 06 ATEX 1240U.

Materials & Finishes

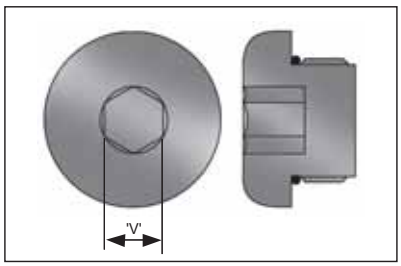
387 Stopping plugs are manufactured in brass (standard).

Stopping Plugs Ordering Example

Stopping Plug Type/Size/Thread

e.g. 387/M32

Type 375 Increased Safety



375 STOPPING PLUGS	
Thread	Hex. Key
Metric x 1.5p	Across Flats Size 'V'
M20	10.1
M25	10.1

General Information

Ingress Protection

To meet with IP66 and IP67, the stopping plugs must be fitted perpendicular to the equipment face in a suitably sized threaded or plain hole and the equipment face must be smooth. Plain holes must be no larger than 0.7mm above the major diameter of the stopping plug thread and the plug must be held in place with a locknut. An optional serrated washer may also be fitted.

Features

- To close unused cable gland entries and maintain the increased safety integrity of the equipment

Technical Data

- Increased Safety EExe II Ex II 2 GD IP66.
- Baseefa Certificate No. BAS 01 ATEX 2104U.

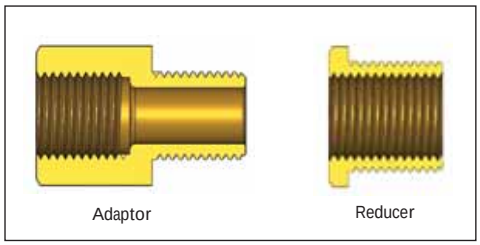
Materials & Finishes

375 Stopping plugs are manufactured in Black Nylon (standard).

Stopping Plugs Ordering Example

Stopping Plug Type/Size/Thread

e.g. 375/M20



Adaptors and Reducers
Type 476

ATEX

Flameproof and Increased Safety

Adaptor

Reducer

ADAPTOR AND REDUCER SELECTION TABLE

Male Thread

Female Thread		Metric								NPT							
		M16	M20	M25	M32	M40	M50	M63	M75	½"	¾"	1"	1¼"	1½"	2"	2½"	3"
Metric	M16																
	M20																
	M25																
	M32																
	M40																
	M50																
	M63																
	M75																
NPT	½"																
	¾"																
	1"																
	1¼"																
	1½"																
	2"																
	2½"																
	3"																

General Information

All Metric entry threads are 1.5mm pitch as standard.

Materials & Finishes

Hawke adaptors/reducers are manufactured in brass (standard), nickel plated brass, 316 stainless steel or aluminium.
Brass NPT entries are nickel plated as standard.

Adaptor Ordering Example

476/Male Thread Size/Female Thread Size.

e.g. 476//M25/M20.

Reducer Ordering Example

476/1/Male Thread Size/Female Thread Size.

e.g. 476/1/M25/¾" NPT.

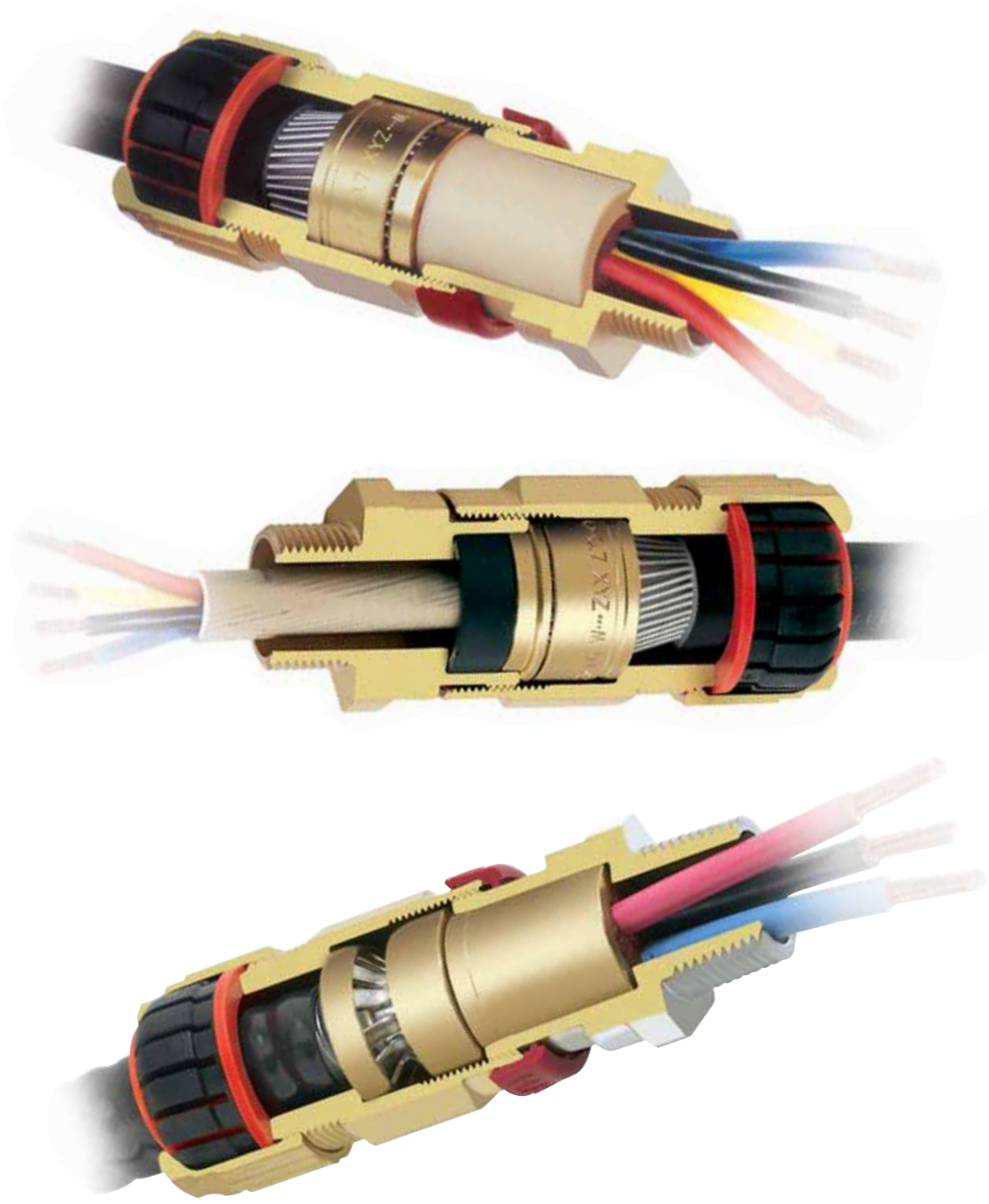
Application/Features

- Provides a means of connection between the equipment and cable glands with dissimilar thread sizes or types.

Technical Data

- Flameproof and Increased Safety EExde IIC.
  Ⓔx II 2 GD IP66.
- Certificate No. SIRA 06 ATEX 1240U.
- Suitable for use in Zone 1, Zone 2, Zone 21 and Zone 22.
- Suitable for use in Gas Groups IIA, IIB and IIC.
- Construction and test standards
  EN 50014, EN 50018, EN 50019 and
  EN 50281-1-1.
  IEC 60079-0, IEC 60079-1 and IEC 60079-7.

Technical Data



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 etc. 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 a mixture: -

- Of flammable substances in the form of gases, vapours, mists, dusts or fibres
- With air
- Under atmospheric conditions
- In 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 CENELEC and 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 follows: -

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 / year but less than 1,000 hours / 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 / 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 mixture with air.

For further information on the classification of hazardous areas, see: -

- **IEC 60079-10** - Electrical Apparatus for Explosive Gas Atmospheres, Classification of Hazardous Areas
- **IEC 61241-3** - Electrical apparatus for use in the presence of combustible dust Part 3: Classification of areas where combustible dusts are, or may be, present
- **BS EN 50281-3** - Classification of areas where dusts are, or may be, present
- **Institute of Petroleum** - Model Code of Safe Practice in the Petroleum Industry, Part 15: Area Classification Code for installations handling flammable fluids, IP 15

3.2 Classification Society

A Classification Society may also enforce requirements for the design and installation 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 installation 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

Apparatus for use in Zone 0

- Intrinsic safety 'ia'

Apparatus for use in Zone 1

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

Apparatus for use in Zone 2

- Electrical apparatus permitted for use in Zone 0 or Zone 1 or
- Electrical apparatus designed specifically for Zone 2 (for example 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.

Apparatus for use in Zones 20, 21 and 22

- Refer to IEC 61241-14 Electrical apparatus protected by enclosures - Selection, installation and maintenance.

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 temperature of any gas or vapour that may be present.

Temperature class of electrical apparatus	Maximun 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.

For further information regarding data for flammable gases and vapours, see PD IEC 60079-20.

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

CENELEC	IEC
BS EN 60079-0 - General Requirements	IEC 60079-0 - General Requirements
EN 50015 - Oil Immersion 'o'	IEC 60079-6 - Oil Immersion 'o'
BS EN 60079-2 - Pressurisation 'p'	IEC 60079-2 - Pressurisation 'p'
BS EN 60079-5 - Powder Filling 'q'	IEC 60079-5 - Powder Filling 'q'
BS EN 60079-1 - Flameproof Enclosure 'd'	IEC 60079-1 - Flameproof Enclosure 'd'
BS EN 60079-7 - Increased Safety 'e'	IEC 60079-7 - Increased Safety 'e'
BS EN 60079-11 - Intrinsic Safety 'i'	IEC 60079-11 - Intrinsic Safety 'i'
BS EN 60079-15 - Electrical Apparatus type 'n'	IEC 60079-15 - Electrical Apparatus type 'n'
BS EN 60079-18 - Encapsulation 'm'	IEC 60079-18 - Encapsulation 'm'

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 60079-14** - Electrical installations in hazardous areas (other than mines)
- **IEC 61892-7** - Mobile and fixed offshore units - Electrical installation, Part 7: Hazardous areas
- **IEC 61241-1-1 and IEC 61241-1-2** - Electrical apparatus in the presence of combustible dust.
- **EN 60079-14** - Electrical installations in hazardous areas (other than mines)
- **IEC 61241-14** - Electrical apparatus for use in the presence of combustible dust

3.9 Inspection Standards and Codes

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

IEC 60079-17	- Inspection and maintenance of electrical installations in hazardous areas (other than mines)
IEC 61241-17	- Electrical apparatus for use in the presence of combustible dust atmosphere - Part 17: Inspection and maintenance

4.0 ATEX 94/9/EC Directive

ATEX is the term used when referring to the European Unions (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 harmonised 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 M1 - equipment intended for mining use and is required to remain functional in the presence of an explosive atmosphere.

Category M2 - equipment intended for mining use but is intended to be de-energised in the event of an explosive atmosphere.

Category 1G - non-mining equipment for use in Zone 0.

Category 2G - non-mining equipment for use in Zone 1.

Category 3G - non-mining equipment for use in Zone 2.

Category 1D - non-mining equipment for use in Zone 20.

Category 2D - non-mining equipment for use in Zone 21.

Category 2D - 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 below in accordance with Section II, Article 7 of the Directive.

5.0 Wiring Systems

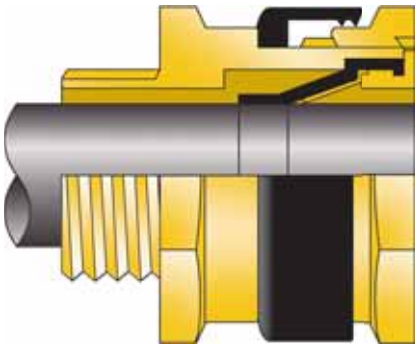
Cable systems and accessories should be installed in positions that prevent them from being subject to mechanical damage, corrosion, chemical attack, heat and other detrimental environmental conditions. Selection of the wiring system and cable type must consider these influences and where exposure to 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.

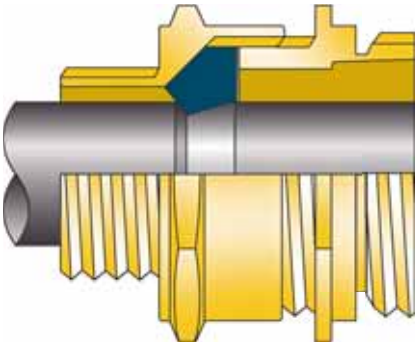
5.1 CENELEC and IEC Wiring Methods

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/Universal 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 / displacement seals.

The IEC and CENELEC installation standards, IEC 60079-14 and BS EN 60079-14 address "cold flow" in Clause 9.1.4.

5.2 **Extract from BS EN 60079-14 / IEC 60079-14**
Installations in hazardous areas

9.1.4 Connections

The connection of cables and conduits to the electrical apparatus shall be made in acordance with the requirements of the relevant type of protection.

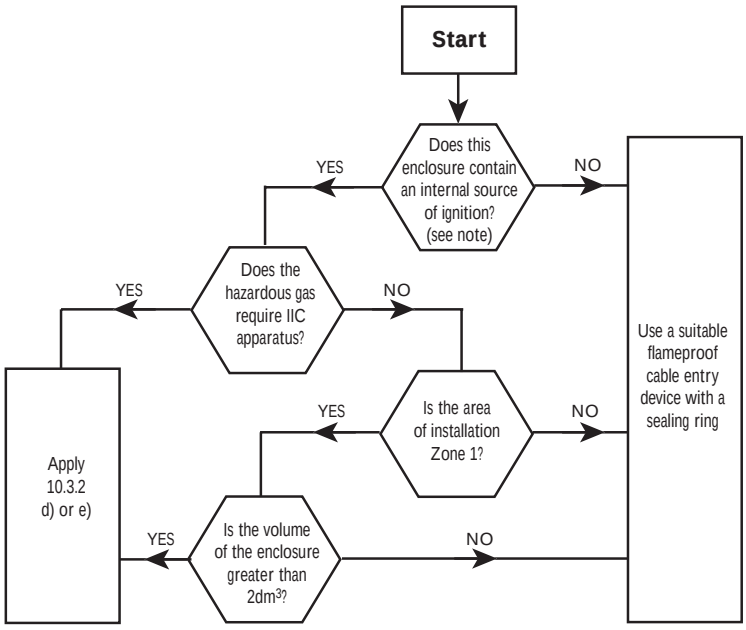
Notes:

1 Certain types of cable employ materials which can exhibit significant "cold flow" characteristics which could have adverse effects on the protection of the apparatus. Where such cable is to be used, a suitable cable entry device should be employed, for example cable entry devices not employing compression seals which act upon the part(s) of the cable having "cold flow" characteristics. “Low smoke” and/or fire resistant cables usually exhibit “cold flow” characteristics.

2 "Cold flow" can be more fully described as "thermoplastic materials which flow when subjected to pressure of ambient temperature".

Figure 1 - Selection chart for cable entry devices into flameproof enclosures for cables complying with item b) of 10.4.2

It is important to read notes and 10.4.2 before selecting appropriate cable gland for flameproof applications from Figure 1 below



NOTE - 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.

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 appropriate apparatus standard, that the cable entry device is appropriate to the type of cable employed, maintains the respective method of protection and is in accordance with clause 9.

Where cables enter into flameproof apparatus via flameproof bushings through the wall of the enclosure which are part of the apparatus (indirect entry), the parts of the bushings outside the flameproof enclosure will be protected in accordance with one of the types of protection listed in IEC 60079-0. Normally the exposed part of the bushings will be within a terminal compartment which will either be another flameproof enclosure or will be protected by protection type '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 11.3.

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

10.4.2 Selection

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

a) cable entry device in compliance with IEC 60079-1 and the particular type of cable intended for use with that device;

b) thermoplastic, thermosetting or elastomeric cable which is substantially compact and circular, has extruded bedding and the fillers, if any, are non-hygroscopic, may utilize flameproof cable entry devices, incorporating a sealing ring selected in accordance with figure1;

c) mineral insulated cable with or without plastic outer covering with appropriate flameproof cable entry device;

d) flameproof sealing device (for example a stopper box or sealing chamber) specified in the apparatus documentation or having component approval and employing cable entry devices appropriate to the cables used. The sealing devices such as stopper boxes or sealing chambers shall incorporate compound or other appropriate seals which permit stopping around indivudual cores. Sealing devices shall be fitted at the point of entry of cables to the apparatus;

e) flameproof cable entry devices incorporating compound filled seals around the individual cores or other equivalent sealing arrangements;

f) other means which maintain the integrity of the flameproof enclosure.

NOTE - Where a factory-made termination of the encapsulated type is used, no attempt should be made to interfere with the connection to the apparatus or to replace the cable.

Hazardous Area Information

11.3 Wiring Systems

11.3.1 General

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

11.3.2 Cable Entry Devices

The connection of cables to increased safety apparatus shall be effected by means of cable entry devices appropriate to the type of cable used. They shall maintain protection type 'e' and shall incorporate a suitable sealing component to achieve IP54 degree of protection of the terminal enclosure and meet the mechanical impact strength requirements of IEC 60079-0

NOTES

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

2 In order to meet the minimum requirement ot 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 device and the entry plate or enclosure providing the axis of

ACKNOWLEDGEMENT
Extracts from BS EN 60079-14 : 2003 reproduced with the permission of BSI under licence no. PD/1998 1818 and 1920. Complete editions of the standards can be obtained by post from BSI Customer Services, 389 Cjhiswick high Road, London. W4 4AL

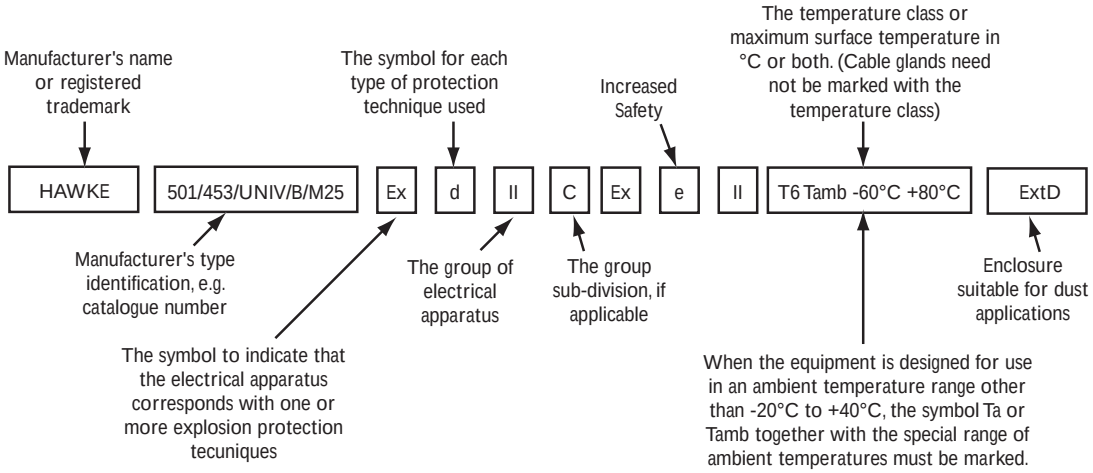
Wiring Methods for Type of Protection 'e' - Increased Safety:

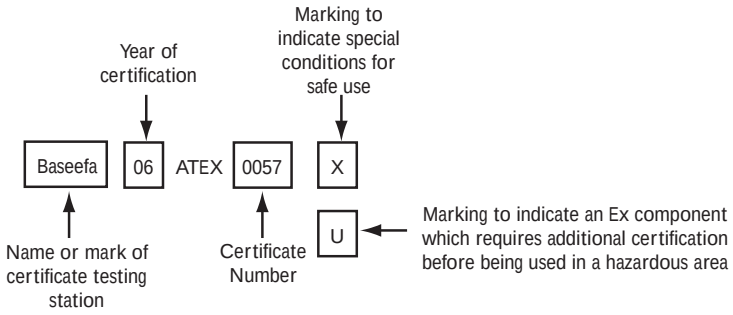
The cable entry device, e.g. cable gland, must comply with all the requirements referred to in the appropriate Standard, be appropriate to the cable type. and maintain the type 'e' integrity of the equipment.

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, earthtag, serrated washer and locknut accessories shown in the catalogue.

6.0 Apparatus Marking - IEC and CENELEC (Group II)

6.1 ATEX Marking (Glands)





6.2 ATEX Marking (Enclosures)

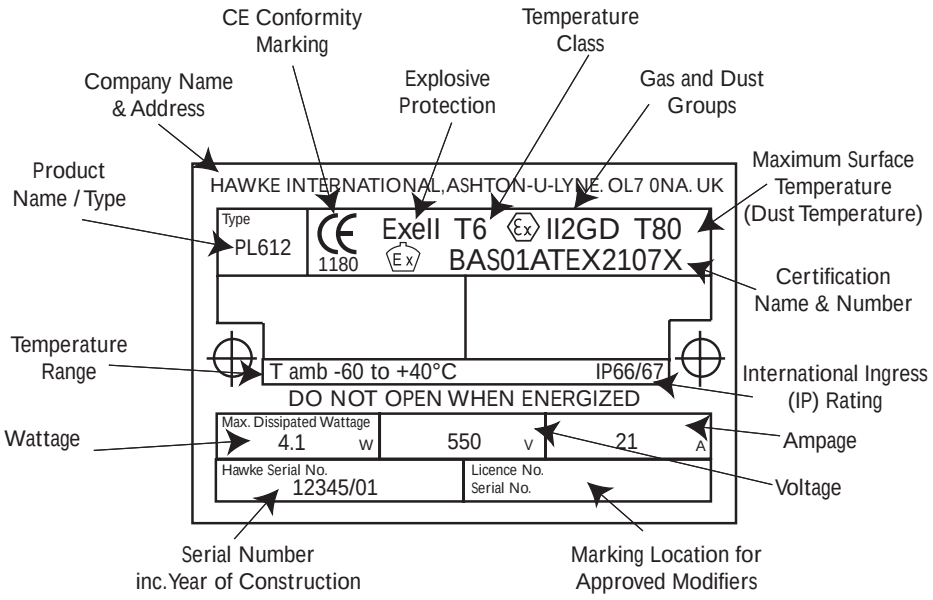
- The name and address of the manufacturer
- Type, serial number and the year in which the equipment was constructed
- The specific marking of explosion protection Ⓔx followed by the symbol of the equipment group and the category.

  'EN50 014 EN50 019 EN50 281' (optional), Ⓔx 'ExeII' Temperature Classification, CE 1180 Ⓔx, Gas and Dust Groups, Maximum Surface Temperature of the enclosure (T), 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

Example:



6.2 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.

Example: CE
1180

7.0 CE Marking CE

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

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 we have carried out independent third-party testing on the EMC shielding effectiveness of our 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.

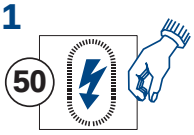
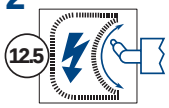
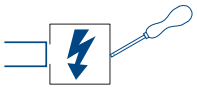
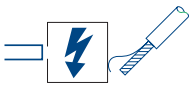
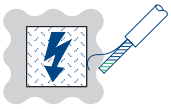
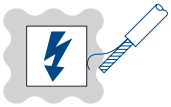
8.0 Certification / Listing / Approvals

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 2001 Limited 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.

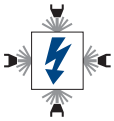
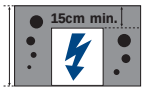
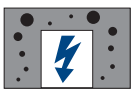
9.0 CENELEC and IEC Degree of Protection, IP Code

The standards EN 60529 and IEC 60529 describe a system for classifying the degrees of protection provided by the enclosures of electrial 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 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'.

Hazardous (classified) locations may be sub-divided as follows: -

In the United States of America, hazardous (classified) locations are sub-divided into three Zones or two Divisions, as follows: -

Class 1, Flammable Gases, Vapors or Liquids	Class 1, Flammable Gases, Vapors or Liquids
Division 1: Where ignitable concentrations of flammable gases, vapors or liquids can exist all of the time or some time under normal operating conditions.	**Zone 0:** Where ignitable concentrations of flammable gases, vapors or liquids can exist all of the time or for long periods at time under normal operation conditions. **Zone 1:** Where ignitable concentrations of flammable gases, vapors or liquids can exist some of the time under normal operating conditions.
Division 2: Where ignitable concentrations of flammable gases, vapors or liquids are not likely to exist under normal operating conditions	**Zone 2:** Where ignitable concentrations of flammable gases, vapors or liquids are not likely to exist under normal operating conditions.

Class 11, Combustible Dusts
Division 1: Where ignitable concentrations of flammable gases, vapors or liquids can exist all of the time or some time under normal operating
Division 2: Where ignitable concentrations of combustible dusts are not likely to exist under normal operating conditions

There is no Zone classification for dusts, fibres or flyings at present in the NEC

Class 111, Ignitable Fibres and Flyings
Division 1: Where ignitable concentrations of ignitable fibres and flyings can exist all of the time or some of the time under normal operating conditions
Division 2: Where ignitable concentrations of ignitable fibres and flyings are not likely to exist under normal operating conditions

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

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 RP 505	-	Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1 or Zone 2

11.2 Apparatus selection according to Class 1

Apparatus for use in Class 1, Division 1

- Explosion-proof
- Intrinsically safe
- Purged / pressurised (type X or Y)

Apparatus for use in Class 1, Division 2

- Any Class 1, Division 1 method
- Non-incendive
- Non-sparking device
- Purged / pressurised (type Z)
- Hermetically sealed
- Oil immersion

Apparatus for use in Class 1, Zone 0

- Intrinsic safety AEx ia
- Class I, Division 1 intrinsically safe

Apparatus for use in Class 1, 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 pressurised, AEx p
- Powder filling, AEx q
- Oil immersion, AEx o
- Encapsulation, AEx m

Apparatus for use in Class 1, Zone 2

- Any Class I, Zone 0 or 1 method
- Any Class I, Division 1 or 2 method
- Type of protection AEx n

Intrinsically safe equipment listed for use in Class I, Division 1, locations for the same gas or a permitted by Section 505-7(d) 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 505-7(d) 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 505-7(d) 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 vap

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

Temperature class of electrical apparatus	Maximun 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 vapors, 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 vapors are classified into categories A, B, C and D.

Gas / Vapor Group
A (typical gas - acetylene)
B (typical gas - hydrogen)
C (typical gas - ethylene)
D (typical gas - propane)

The grouping of Class II dusts are classified into categories E, F, and G.

Dust Group
E (typical atmospheres containing combustible metal dusts)
F (typical atmospheres containing coal dusts)
G (typical atmospheres containing 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 - S12.12	-	Non-incendive 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	-	Metal-Clad Cables and Cable-Sealing Fittings 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 2279	-	Electrical Equipment for use in Class I, Zone 0, 1 and 2 Hazardous (Classified) Locations.
ISA S12.0.01	-	Electrical Apparatus for use in Class I, Zone 0, 1 Hazardous (Classified) Locations, General Requirements.
ISA S12.22.01	-	Electrical Apparatus for use in Class I, Zone 1 and 2 Hazardous (Classified) Locations, Type of Protection - Flameproof 'd'
ISA S12.16.01	-	Electrical Apparatus for use in Class I, Zone 1 and 2 Hazardous (Classified) Locations, Type of Protection - 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 Installatin of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class 1, Division 1 and Division 2 Locations.
API RP 14FZ	-	Rcommended Practice for Design and Installation of Electrical systems for fixed and floating offshore petroleum facilities for Unclassified and Class 1, Zone 0, Zone 1 and Zone 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) Wiring Methods

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

Hawke Type 711 CableGland/ Connector

- Type MC cable, listed for use, with a gas / vapor tight continuous corrugated aluminum 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 he application, e.g. Hawke type 711 cable gland/connector.
- Type ITC cable, listed for use with a gas / vapor tight continuous aluminum 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

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

In Class I, 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 aluminum 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.

Hawke Type 711 Cable Gland/ Connector

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 State 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: -

Hawke Type 753 Cable Gland/ Connector

- 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, vapor-tight, and water-tight sheath of aluminum 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 armor 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

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.
- Armored marine shipboard cable with an overall impervious sheath over the armor, 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 / vapor tight continuous corrugated aluminum sheath and with an overall PVC or other suitable polymeric jacket.
- Threaded rigid copper-free aluminum 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.

HawkeType 710 Cable Gland/ Connector

Class 1, Division 2

- Wiring methods as recommended for use in Division 1.
- Type MC cable with a gas / vapour tight continuous corrugated aluminum sheath, an overall PVC or other suitable polymeric jacket, and grounding conductors in accordance with NEC 250-122.
- Non-armored 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 I 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.

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.

Class 1, Zone 1

- Type MC-HL metal clad cables as defined in UL 2225.
- Armored marine shipboard cable with an overall impervious sheath over the armor, 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 / vapor tight continuous corrugated aluminum sheath and with an overall PVC or other suitable polymeric jacket.
- Threaded rigid copper-free aluminum 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-armored 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.

Class 1, Zone 2

- Wiring methods as recommended for use in Zone 1.
- Type MC cable with a gas / vapor tight continuous corrugated aluminum sheath, an overall PVC or other suitable polymeric jacket, and grounding conductors in accordance with NEC 250-122.
- Non-armored 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.

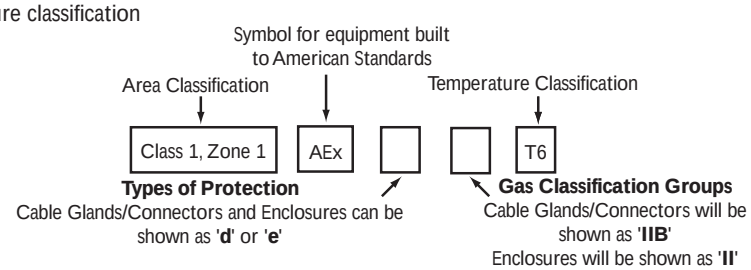
In unclassified and Zone 2 locations, when the metallic sheath is approved as a grounding conductor, the continuous metal sheath of the MC cable or the combined metallic sheath and grounding conductors may be used as the grounding conductor when used with termination fittings that are NRTL listed to 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 I, Zone 0 or Class I, Zone 1 or Class I, Zone 2.
- Applicable gas classification group(s)
- Temperature classification

Example:



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 of where appropriate.
- Division 1 or Division 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

Non-Hazardous Locations

NEMA Enclosure Type Number	Application
1	For indoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt.
2	For indoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt, and to provide a degree of protection against dripping and light splashing of liquids.
3	For either indoor or outdoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt, rain, sleet, snow, and windblown dust; and that will be undamaged by the external formation of ice on the enclosure.
3R	For either indoor or outdoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt, rain, sleet, and snow; and that will be undamaged by the external formation of ice on the enclosure.
3S	For either indoor or outdoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt, rain, sleet, snow, and windblown dust; and in which the external mechanism(s) remain operable when ice laden.
4	For either indoor or outdoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt, rain, sleet, snow, windblown dust, splashing water, and hose-directed water; and that will be undamaged by the external formation of ice on the enclosure.
4X	For either indoor or outdoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt, rain, sleet, snow, windblown dust, splashing water, hose-directed water, and corrosion; and that will be undamaged by the external formation of ice on the enclosure.
5	For either indoor or outdoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt; against settling airborne dust, lint, fibres, and flyings; and to provide a degree of protection against dripping and light splashing of liquids.
6	For either indoor or outdoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt; against 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
6P	For either indoor or outdoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt; against hose-directed water and the entry of water during prolonged submersion at a limited depth; 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 (personnel against incidental contact with the enclosed equipment) against falling dirt; against circulating dust, lint, fibres, and flyings; and against dripping and light
12K	Enclosures constructed (without knockouts) for indoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt; against circulating dust, lint, fibres, and flyings; and against dripping and light splashing of liquids.
13	For either indoor or outdoor use to provide a degree of protection (personnel against incidental contact with the enclosed equipment) against falling dirt; against circulating dust, lint fibres, and flyings; and against the spraying, splashing, and seepage of water, oil, and non-corrosive coolants.

Hazardous Locations

Enclosure Type Number	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.
9	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 below: -

NEMA Enclosure Type Number	IEC and CENELEC 60529
1	IP10
2	IP11
3	IP54
3R	IP14
3S	IP54
4 and 4X	IP56
5	IP52
6 and 6P	IP67

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

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
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

Abbreviations, Acronyms and Definitions (cont'd)

BASEEFA	British Approvals Service for Electrical Equipment in Flammable Atmospheres. They provide a range of testing and certification services primarily related to equipment and systems intended for use in potentially explosive atmospheres. BASEEFA is a constituent of EECS - a branch of the Health & Safety Executive, UK.
BASEEFA (2001) Ltd	They provide a range of testing and certification services primarily related to equipment and systems intended for use in potentially explosive atmospheres.
CEC	Canadian Electric Code. The CEC, Part 1, CSA Standard C22.1, is a safety standard for the installation and maintenance of electrical equipment.
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardization. CENELEC is a European Standards Organisation that publishes harmonised standards for the European market. CENELEC comprises the National Committees of the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.
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 they offer 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
EECS	Electrical Equipment Certification Service (UK). They provide a range of testing and certification services primarily related to equipment and systems intended for use in potentially explosive atmospheres. EECS has two divisions, the Mining Equipment Certification Services (MECS), and BASEEFA. The EECS is a branch of the Health & Safety Executive, UK.
Ex	A marking prefix for apparatus complying with one or more types of explosion protection techniques in accordance with CENELEC standards.

Abbreviations, Acronyms and Definitions (cont'd)

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	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 50 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	Instituto Nacional de Metrologia, Normalizacão Qualidade Industrial (Brazil)
Intrinsically Safe System	An assembly of interconnected items of apparatus which may comprise 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 standard levels of Ingress Protection provided by the apparatus.
ISA	The International Society for Measurement and Control (formerly Instrument Society of America)
ISO	International Organisations for Standardisation. A worldwide federation of national standard bodies from 130 countries. ISO's mission is to promote the development of standardisation to facilitate international exchange of goods service.
ITS	Intertek Testing Services

Abbreviations, Acronyms and Definitions (cont'd)

Marine Shipboard Cable	Impervious sheathed armoured or non-armoured cable constructed in accordance with UL 1309/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 334
MC-HL Cable	Metal-clad cable for hazardous locations as defined in UL 2225
NEC	National Electric Code ® (ANSI/NFPA 70)
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration, U.S. Department of Labor National Recognised Test Laboratories (NRTL's) recognised by OSHA include CSA, FMRC and UL. The NRTL determines that the specific products meet the relevant standards of safety as required by OSHA and that the products are safe for use in the U.S. workplace. For further information, refer to OSHA's web site at www.osha.gov
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 un-consumed mixture.
SCS	SIRA Certification Service (UK). They 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 340
UL	Underwriters Laboratories Inc ® (USA)
USCG	United States Coast Guard

NOTES

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Hawke Cable Glands Limited
Oxford Street West,
Ashton-under-Lyne,
Lancashire OL7 0NA. UK.
Sales: 0870 60 60 105
Tel: +44 (0) 161 308 3611
Fax: +44 (0) 161 308 5848
E-mail: sales@ehawke.com
www.ehawke.com

Hawke Cable Glands America L.C.
600 Kenrick, Suite C-10,
Houston, TX. 77060, USA
Tel: +1 (281) 445 7400
Wats: (800) 354 9189
Fax: +1 (281) 445 7404
E-mail: america@ehawke.com
www.ehawke.com

Hawke Asia-Pacific Pte Ltd
130 Joo Seng Road, #03-02
Olivine Building
Singapore 368357
Tel: 00 65 6282 2242
Fax: 00 65 6284 4244
E-mail: asia@ehawke.com
www.ehawke.com

HWK74 Feb '08