HAWKE International

WE NEED TO TALK ABOUT

COLD FLOW

The Problem With The 'Cold Flow Standard'

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COLD FLOW AND THE STANDARDS

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COLD FLOW AND THE STANDARDS

We need to talk about Cold Flow

In the world of Hazardous Area cables and cable gland termination, few terms are used so often without understanding as the term “cold flow.” To understand this further, let’s look at what “cold flow” really is:

Cold flow, or creep as it is referred to in material science is the tendency of any solid material to move or deform over a period of time under the influence of mechanical stresses. Although temperature and various other environmental factors impact cold flow, materials such as plastics and rubbers will begin to creep at room temperature.

All solid objects are deformable!

The cold flow of a cable is influenced by the ambient temperature, the applied force and time. In hazardous areas, where cables are often subject to ambient temperatures of 40 deg or greater for prolonged periods of time, the only impact a cable gland manufacturer can have to help negate the impact of cold flow is to reduce the load stresses on the cable itself.

COLD FLOW AND THE STANDARDS

The Cold Flow standards

Manufacturers often claim compliance with "The cold-flow standard" however there is no specific cold-flow standard.
The cold-flow note referenced in Clause 10.2 of EN / IEC 60079-14 – "Electrical installations, design, selection and erection" are also referenced many times in relation to this.

Let's look at that in more detail.
The guidance document IEC60079-14:2014 states that:

> **Cable glands and/or cables shall be selected to reduce the effects of "coldflow characteristics" of the cable**
>
> **NOTE 1:**
> **Cables employ materials which could exhibit "coldflow" characteristics.**
>
> Coldflow in cables can be described as the movement of the cable sheath under the compressive forces created by the displacement of seals in cable glands where the compressive force applied by the seal is greater than the resistance of the cable sheath to deformation. Coldflow could give rise to a reduction in the insulation resistance of the cable, which could remove the protection concept. Low smoke and/or fire resistant cables usually exhibit significant cold flow characteristics.

“Force caused by tightening can cause cold flow and create a possible path for gas or flame propagation in the event of an explosion.”

COLD FLOW AND THE STANDARDS

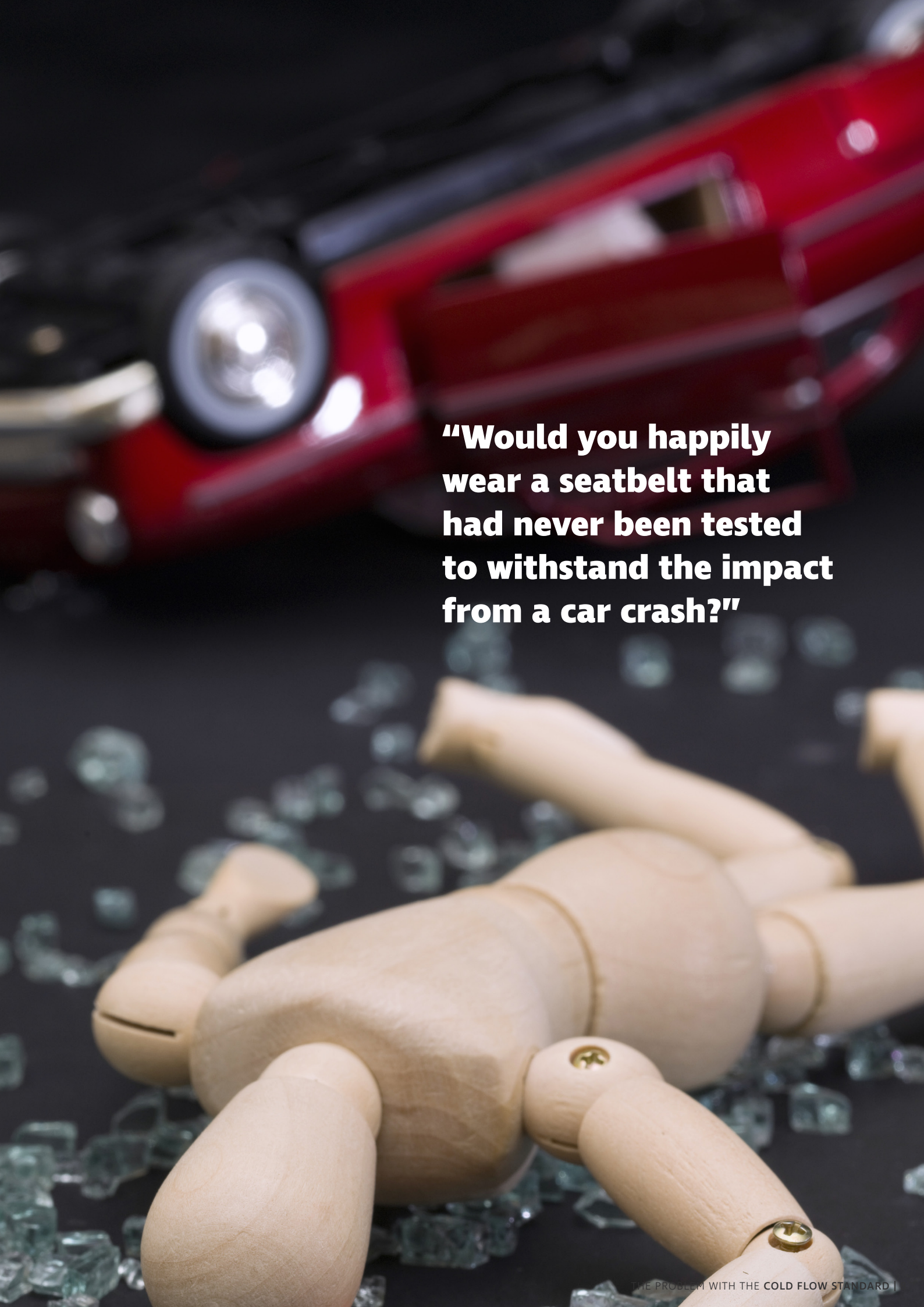
Clearly any gland using compression or displacement seals should be avoided?

How do compression or displacement type seals work?

The polymer sealing element found in most hazardous area cable glands will only form an effective seal on a cable when compressed or displaced through the action of tightening opposing components of a cable gland. This force applied to the seal either compresses or displaces the sealing face of the seal onto the cable inner sheath. In either case, the force applied in tightening the gland is transferred through this sealing element and on to the inner sheath of the cable.

This force can cause coldflow where the cable inner sheath may move away from the seal and create a possible path for gas or flame propagation in the event of an explosion.

This potentially hazardous situation may be multiplied by hundreds, even thousands of times across a hazardous area installation such as an offshore oil platform. The possible consequence's could be catastrophic.



“Would you happily wear a seatbelt that had never been tested to withstand the impact from a car crash?”

COLD FLOW AND THE STANDARDS

Surely the 3rd party testing required ensures this cannot cause cable damage?

This may startle many, but in the majority of instances (unless specified on the test certificate,) cable glands do not undergo certification testing complete with cables. Instead, metallic test mandrels are employed. What does this mean in real terms? This would be similar to testing a bullet proof vest with a paintball gun. The test is similar, but ultimately not the same: Would you feel comfortable wearing a bulletproof vest knowing it had never had to withstand the impact from a real bullet whilst under development and testing? Or a seatbelt that had never had to withstand the impact from a car crash?

The same can be said for the testing of glands on metallic cable substitutes: compression or displacement type seals will not cause any damage to a metallic mandrel acting as a substitute for a cable. Most will comfortably comply with the requirements of EN60079-0 and -1 when fitted on a test mandrel – but what about in the real world, when fitted to a real cable?

COLD FLOW AND THE STANDARDS

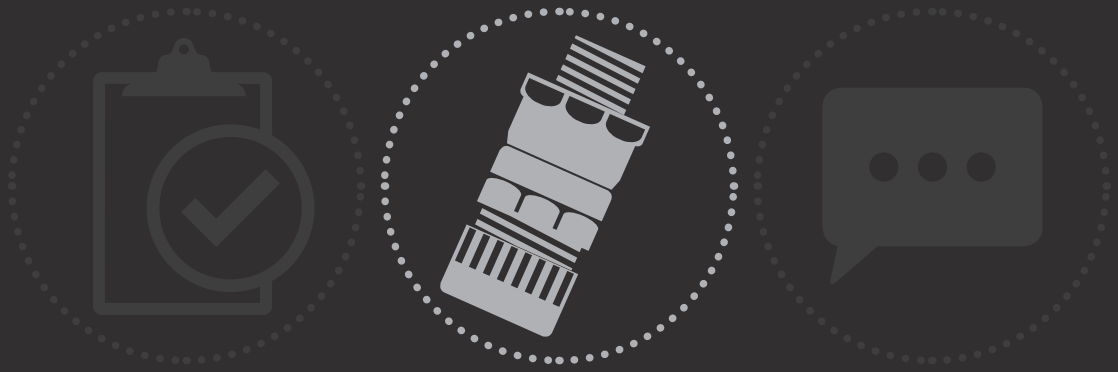
Independent test of compression and displacement seals

In independent 3rd party testing carried out to determine the comparable effects of a number of manufacturers explosion protected "flameproof" cable gland products on cables which exhibit cold flow characteristics, only one cable gland from a sample of 9 manufacturers was able to:

- Withstand an explosive pressure test
  (this is the basis of Exd protection)
- Did not cause significant damage to cable inner sheath
  (can cause conductors to be damaged or insulating properties to be changed)
- Did not cause the inner sheath to compress below the permitted range
  (in over 50% of cases the act of installing the gland compressed the cable inner sheath to a level that it was no longer certified for use in a hazardous area)
- Could be removed for inspection and maintenance
  (the ability to inspect the flameproof seal, in situ on the cable inner sheath)

Click here to request a full copy of the report

COLD FLOW AND CABLE GLANDS



- Passing the Tests
- Active vs. Passive Seals
- Inspection
- 501/453 Universal

COLD FLOW AND CABLE GLANDS

Which was the only cable gland to pass testing on cables?

The 501/453/UNIVERSAL gland manufactured by Hawke International is the only known independently tested gland proven to not cause damage to cables and to meet the Essential Health and Safety Requirements when fitted to an actual cable – not a solid metallic test mandrel.

Active vs. passive seal

Whilst various manufacturers attempt to utilise various methods to prevent the effects of cold flow, these all exert a significant force on the cable inner sheath which can ultimately degrade the cable insulation. The 501/453/UNIVERSAL patented design acts differently from any other seal as it applies a minimal force on the cable inner sheath. Using the elastic properties of the material, the diaphragm seal conforms to the maximum and minimum cable inner sheath diameters with minimal force, no seal displacement and no tightening onto the cable required.

This passive seal is constantly acting on the cable inner sheath, requiring no action to activate it unlike most conventional compressive displacement type seals. In the event of an explosion, the pressure acts upon the seal, forcing this onto the cable inner sheath and preventing further propagation.

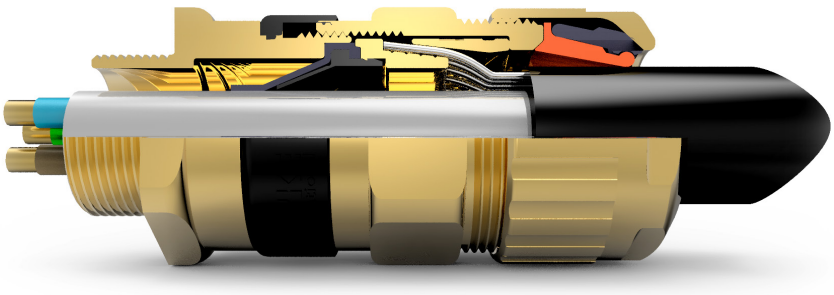
COLD FLOW AND CABLE GLANDS

Inspection

By their very nature, a compression or displacement seal requires compression to act upon the cable inner sheath. So, to inspect the seal, the seal must be uncompressed begging the question – was the seal ever working? How is it possible to be certain that with the gland fitted, the seal is actually forming a seal on the cable? And as the seal compresses the inner cable sheath, the effects of cold flow may reduce the sheath to below its certified limit, essentially invalidating any certification even before the gland is commissioned.

What this means?

All cables will suffer from creep to some extent – the amount is variable based on the materials employed in the cable construction as well as the ambient conditions. Whilst compression and displacement type seals are perfectly safe for many applications using standard cables, where soft bedded, low smoke and fire resistant cables are employed, as clearly stated in the standard, compression and displacement type seals should be avoided. The Hawke patented 501/453/UNIVERSAL, with its always on passive seal provides protection against gas migration and explosive gasses, without any cable damage.



501/453 UNIVERSAL

The **501/453/UNIVERSAL** also offers installation time up to 48% faster than competitors cable glands, a fully inspectable flameproof seal which unlike other designs, can be visually inspected in action on the cable, and an extremely wide cable acceptance range, meaning less glands required to cover all your cable glanding requirements.

Globally certified and stocked at over 100 locations worldwide, the 501/453/UNIVERSAL is universally accepted as the number one hazardous area cable gland choice.

MADE IN BRITAIN

International Approvals

GET IN TOUCH

- About Hawke International
- How to contact us

HAWKE INTERNATIONAL

Founded in 1955, Hawke International are known for their market leading cable gland business and also boast an extensive range of enclosures, hazardous area connectors, control stations and interconnect accessories. These market leading products, coupled with user-friendly online applications and constant product development have helped keep Hawke International at the forefront of the cable termination market for over 60 years.

Hawke International is one of seven Hubbell brands in the Hubbell Harsh & Hazardous division.

Experienced
With over 60 years experience protecting people and assets in the world's most demanding environments, Hawke is the obvious choice for reliability, quality and safety.

Worldwide
Our global network of distributors can support you wherever you're based and supply you with Hawke products.

Quality Driven
All Hawke products are designed to comply with ISO 9001 standards. Rigorous in-house and third party testing ensures that all our products exceed expectations.

Complete Solution
With an extensive range of Cable Glands, Enclosures, Connectors, Accessories, Control Stations and more Hawke International can provide you with a complete solution, no matter what your project is.

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