

Cold Sealing Solutions

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DSG-Canusa

As today's automobiles evolve, the need for comfort combined with fuel efficiency and very low noise has become paramount.

Although there have been significant advancements in vehicle design, the wiring harness has remained relatively untouched. The very slow evolution of such a valuable vehicle component is attributed to the vital function of supplying power to the automobile at a relatively low cost.

One area of concern is the harness feed through location, where preventing water migration into the vehicles interior continues to be a source of frustration for harness designers and engineers. Cable bundles often require waterproof sealing, as well as resistance against thermal, chemical and mechanical influences.

An automotive designer is tasked with selecting the correct water blocking system. They are challenged with choosing the most cost effective system, ensuring that the system provides the necessary protection 100% of the time and that the system is simple and easy to install.

The designer typically has the following options:

- Drip Loops
- Epoxy's/Silicones's
- Hot Melt Adhesive Profiles (with Heat Shrink Tubing)
- DSG-Canusa's Coldmelt Water Blocking System (using Mastics)

Drip Loops

Drip loops are the oldest and most widely used method in preventing vehicle water ingress via the wiring harness. They involve the addition of an extra 12-18 inches of cabling into the wiring harness just before it enters through the vehicles fire wall. The cables are bent to form a concave – U shaped loop. The premise behind drip loops is that when water beads onto the wiring harness it will flow down the cables and away from entering the inside of the vehicle.

Drip loops are been repeatedly redesigned in an effort to improve reliability, particularly in vehicles that are designed to perform in both on-highway, and off-road conditions.

The main areas of concerns with drip loops are performance and noise.

When water gets to the side of the drip loop closest to the vehicles interior it gains unimpeded access to the interior wire harness. If there are unsealed splices in the interior harness water will wick up the cables and into the splices and create corrosion and ultimately failure of components.

The extra lengths of cable increase the vehicles curb weight and ultimately the assembly labor cost as the excess wires are cumbersome to maneuver.

As the wiring harness is generally fed through a hollow grommet, the noise generated in the engine compartment and from the road travels uninhibited into the vehicles interior.

Epoxy and Silicones

The process of using epoxy or silicone improves upon drip loops as it eliminates the excess cables and allows for easier pulling of the harness during assembly. They ensure complete encapsulation of each individual cable in the wiring harness bundle and provide some noise suppression. These types of material are usually supplied and applied in the semi-liquid state, allowing for easy injection into a specially designed grommet.

The benefits of epoxy's and silicones are off-set by long curing times, EHS issues and the challenge of containing them during processing.

Silicones and epoxies creep over time, losing shape and volume. The hardening of these materials creates excess stress at the blocked area increasing the likelihood of cable insulation damage and ultimately water penetration.

There are also health concerns with the high odor and potential off-gassing on epoxies and silicones.

Hot Melt Adhesive Profiles (with Heat shrink Tubing)

This type of water blocking solution accommodates only a relatively small number (up to a maximum of 20) of cables in the wire bundle.

Despite this obvious limitation hot melt adhesive profiles were proven to be an adequate solution until additional issues were discovered during application.

Special care had to be taken to ensure that the cables were properly positioned into the pre-notched openings of the adhesive, and the subsequent heating of the adhesive to its melting point allowing for the complete encapsulation of each individual cable.

There is also an extreme high risk of short-circuits on larger bundle sizes due to the high heat required to melt the adhesive.

Some hot melt adhesive longitudinal water blocking designs utilize microwave heating, which can cause short circuits, particularly with twisted pairs.

DSG-Canusa's Water Blocking Solution using Mastics

Mastics are the most widely used water blocking solution in automotive applications. They are generally low cost, easily applied and provide the necessary strain relief, while ensuring 100% water proofing when correctly installed.

DSG-Canusa, a leading manufacturer of heat shrink products and application equipment, has developed an innovative system to block this method of water penetration.

DSG-Canusa's Deray® Coldmelt water blocking system employs a 2 part solution of a fast recovering heat shrink tubing and specially formulated mastic. By using a carefully designed shrink oven, Deray® ColdMelt effectively seals 100% of the time.

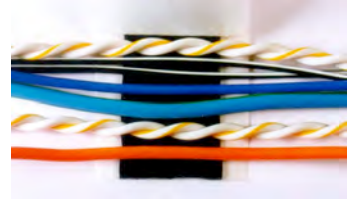
This very cost effective, OEM approved solution eliminates drip loops, adds harness design flexibility, allows for grommet standardization and reduces handling during vehicle assembly.

Deray® ColdMelt is extremely easy to install and accommodates cable bundles ranging in sizes from 10-150 wires. Offered in several expanded tube diameters from 17 to 50 mm, with adhesive strips in 50 and 70 mm lengths. It is ideal for any application where water leakage/moisture ingress is a potential problem.

Applying Coldmelt can be incorporated into the wire harness on-line assembly or off-line on a bench top as follows:

Application sequence for the Deray® ColdMelt water blocking system.

First embed the cables of the wiring harness into the mastic



Protect the adhesive with a low temperature shrink tube.



Use the Deray® Sealman to both shrink the outer tubing and to mechanically squeeze the mastic between the cables.



The outer heat shrink tubing:

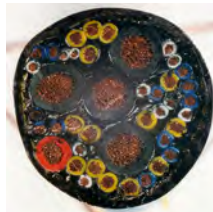
- Forms a protective outer layer.
- Continuously shrinks to maintain constant hoop strength.
- Protects Deray® Coldmelt strips from fluids and heat aging.
- Enables processing and clean handling.

The Deray® Coldmelt mastic strips:

- Provide inner sealing.
- Require low or no heat input.
- Are proven compatible with all wire types.
- Have excellent heat aging properties.
- Enable sealing of small and large bundles (10-150 wires).

DSG-Canusa's Water Blocking Solution:

- Eliminates handling damage and dampens noise.
- Uses low temperatures to prevent the burning of wires and to improve safety.
- Has a cylindrical shape that improves placement of grommet.
- Accommodates process flexibility.



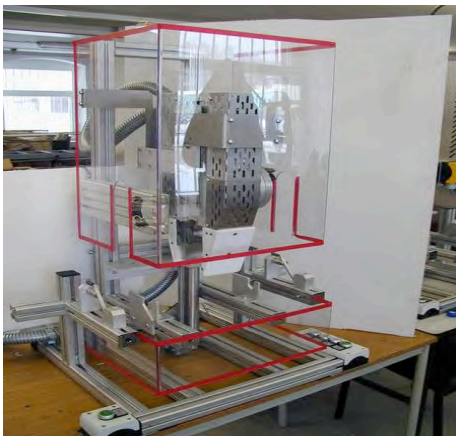
(Cross section of a Deray® Coldmelt sealed wire harness).

The Sealman

The Deray® Sealman application equipment is an integral part of the Deray® Coldmelt process. This process control application tool was designed to fit seamlessly into any harness manufacturing environment. The unit can be configured to work on a table top or on-line application with a configurable controller for custom settings.

The Deray® Sealman features:

- A 3 step process :
 - 1) Heating Cycle
 - 2) Pressing Cycle
 - 3) Re-heat Cycle
- Low heat processing, preventing wire damage and improving safety.
- A repeatable process, ensuring sealing efficiency.
- Three programmable settings for process flexibility.



(The table top Deray® Sealman)



(The on-line Deray® Sealman)

In today's competitive market it is vital to optimize the quality of your wire harness while ultimately minimizing the cost.

DSG-Canusa's Deray® Coldmelt system is the right solution for today's wire harness.

To learn more about Deray® Coldmelt and Deray® Sealman please visit www.dsgcanusa.com.