

## Rationale for use of Contechs Poly/chem Shrink for drop hardening over traditional rubber grommets

For most engineers the principal reason for using rubber grommets or shrink tubing are the exacting requirements for moisture protection that are required in heavy rainfall areas or Coastal environs. Whilst the rubber grommets do keep Moisture out when the connector is tight, it does not prevent the connector body from corroding, the Poly/chem shrink by encapsulating prevents moisture ingress and prevents the connector from corroding.

We wish to state that although Contechs Poly/Chem shrink does prevent moisture ingress, it is not the primary objective. The primary objective is to prevent the loosening of connectors by Temperature cycling, Wind and Vibration, Security of system from customer interference and to increase the life span of the external drop. The use of Traditional rubber grommets does not do this

For historical purposes we should firstly re-visit Hardline connections. In the 1980's this was the major cause of service calls in the industry. The application of shrink tubing over hardline connectors was then introduced. The purpose of encapsulating the connector was twofold, Firstly to hold the connector from loosening and secondly to prevent moisture ingress. In practice it is normal to use two 9" wrenches to apply 100 to 120 inch pounds of torque on the hardline connector. The shrink tube is applied and the combination of proper tightening and the shrink tubing has successfully prevented the connectors from loosening and is now common practice. Hardline connections are no longer a major problem

We then look at the F connector which creates the largest number of service calls and resulting customer dissatisfaction. Why is this?; number one is the inherent craft sensitivity with the connectorization process. When we look at the evolution of the drop connector over the past 20 years, we have evolved from the Crimp fitting, to Raychem E Z F, to the multitude of compression fittings available today. What has been the results of these changes. 20 years ago repeat service calls were in the magnitude of 20 to 25% and it was normal to visit each customer every 1 to 2 years. Today the average in the industry is that repeat service calls are in the range of 12 to 20% and we still visit each customer every 1 to 3 years. The connector manufacturers have also developed F connectors that are supposedly waterproof but do not address the craft sensitivity of connectorization and loosening effect. Without the encapsulating effect of the Poly/Chem shrink the connector will loosen over time.

It is clear from the above analysis that the only people happy with the situation are the connector manufacturers. They sell sufficient connectors each year to cover 40% of the market. A radical rethink is necessary.

When you look at the SCTE test for "F" connectors (see attached loosening Torque evaluation) it clearly shows that after completion of the test all connectors on average lose 65% of their holding force. When you add in wind and vibration, on top of temperature cycling it is easy to understand why connectors come loose. With the use of Contechs Poly/chem shrink, we fully encapsulate the Port, connector and cable interfaces and, in the same way as hardline connectors, prevent the connectors from loosening.

We have a Comcast system in Florida that was using the product 12 years ago. They will take off the shrink tubing and find a tight connection, like new connector and a copper stinger.

To put a cost factor on the above we maintain that a properly installed connector with a Poly/Chem shrink encapsulating it will last at least 10 years. A connector with a rubber grommet in front will have to be changed/tightened at least 3 times during this period, resulting in 3 service calls at \$100 per call.

The cost of the Poly/chem shrink at the initial visit is approx \$1 per customer or 10 cents per customer per year for a 10 year period. The cost of the repeat service calls for loose connectors is \$300 for same 10 year period or \$30 per customer.

Finally with the new HOT Drop Initiative, it is more important than ever to prevent connectors from loosening. If you intend to stop calls for disconnects within the year, now would be a good time to start, bearing in mind that it takes approx 3 years to visit all customers.