RELI SLEEVE™
(A Reliable Group of Companies)

An ISO 9001 : 2015 certified Company
An ISO 14001 : 2015 certified Company
An ISO 45001 : 2018 certified Company
A Govt. Recognized Export House Company
A PED Certified Company

HEAT SHRINK SLEEVE

RELI SLEEVE Provides you the best range of heat shrink repair sleeves (wrap around sleeves with effective & timely delivery

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ABOUT HEAT SHRINK SLEEVE

A heat-shrink sleeve is a corrosion protective coating for pipelines in the form of a wraparound or tubular sleeve that is field applied.

Heat-shrinkable sleeves are the most widely used technology in the world today for field-girth weld corrosion protection because they're easy to install, provide excellent protection, and are cost-effective.

A heat-shrink sleeve is also known as a heat-shrinkable sleeve or a shrink sleeve.

Heat shrink means just that—when heat is applied to the sleeve, it shrinks in size and conforms to the surface it surrounds. A heat-shrink sleeve starts out with a thick extruded polyolefin sheet (polyethylene or polypropylene) that is formulated to be cross-linkable.

Heat-shrink sleeves have an adhesive that sticks the sleeve to the material and the factory-applied mainline coating, and also acts as a corrosion protective layer. The backing provides mechanical protection against abrasion and soil stress forces after the pipeline is buried. Heat wrap tape may used in addition for pipe bends, or as an alternative method for wrapping the whole pipe.

Heat Shrink tubing is a type of extruded plastic tube that reduces in size when heated to a pre-determined shrink ratio to fit a specific application. A sleeve should be selected in a size larger than required to cover both the wire and components it is to be used with, before being shrunk to fit. Once fitted, the sleeve provides long lasting durability. Materials and Types Heat shrink is available in various different materials, colours, sizes and shrink ratios to suit the application required. Some are available with an adhesive lining that helps to bond the tubing with the cables and components. Polyolefin is the most common material as it is highly durable and can withstand high temperatures without a restricted shelf life. They are also manufactured from PVC, fluoropolymer, neoprene and elastomeric materials. The material is often cross linked to assist with the tubing shrinking back to its original dimensions.The pre-determined shrink ratio, for example, 2:1 or 3:1, is the measurement of how small the sleeve goes in comparison to its expanded size. When the number is higher in the shrink ratio the greater the shrinkage. It allows a precise, secure fit that does not come off easily. Applications Heat shrink tubing is versatile and easy to use therefore it can be applied in an assortment of applications, the most common uses being: Electrical insulation – covering joints and repairs Strain relief – relieving pressure from the cable Wire bundling – in harness building and cable organisation Environmental and mechanical protection – preventing damage from abrasion, moisture, dust and chemicals Identification – the wide range of colours the tubing is manufactured in allows it to be used for colour coding and component ID Installation When selecting the right size tubing, you should consider the maximum and minimum diameter of what you are covering. Use this information to check against the recovered diameter (the diameter after shrinking) and expanded diameter (the pre-shrinkage diameter) of the sleeve. You can cut most tubing to a suitable length using standard scissors. The unshrunk tubing can be slid over the area or objects it is to cover. Then with a hand held heat gun or heat shrink oven, the sleeve is shrunk tightly. To prevent uneven shrinkage or overheating, check the recommended heating temperature beforehand.

USES :-

When steel pipelines are built, they commonly consist of 10-12 meter long sections of steel pipe that had a protective coating applied in the factory. The factory leaves an uncoated area at each end of the pipe, called a cutback, so that when welding the pipe sections together, the coating is not damaged. Heat-shrinkable sleeves are then applied onto the cutback at the field weld, or field joint, during the construction of a pipeline.

Heat-shrink sleeves have a very wide range of applications. The ease of use makes heat-shrink sleeves a convenient option. In addition, heat-shrink sleeves have the well-known advantages associated with plastics materials—good insulation and chemical resistance, toughness, flexibility and excellent colorability.

Properly specified and applied heat-shrink sleeves can provide corrosion and mechanical protection that is equal to or superior to the mainline coating, be it a tape, epoxy or multi-layer polyolefin. It resists impact, abrasion and ultraviolet light as well as cathodic disbondment and dielectric breakdown.

As described above, the heat-shrinkable sleeves have an adhesive that sticks the sleeve to the cutback and the factory applied mainline coating and also acts as a corrosion protective layer. The backing provides mechanical protection against abrasion and soil stress forces after the pipeline is buried.

Heat wrap tape may used in addition for pipe bends, or as an alternative method for wrapping the whole pipe.

Key Product Benefits

Heat Shrink Tubing

- Protection from harsh environments
- Chemical resistant
- Color differentiation
- Displacement of glass, tape or glue
- Flexibility
- UV resistant
- Waterproof
- Flame retardant
- Lower applied cost
- Reduce operating time

Composition & Manufacture

Polyolefin Backing

Heat-shrinkable means just that, heat them up and they shrink, or more correctly, they recover in length. A heat-shrinkable sleeve starts out with a thick extruded polyolefin sheet (polyethylene or polypropylene) that is formulated to be cross-linkable. After extruding the thick sheet, it is taken to the "beam" where it is passed under a unit that subjects the sheet to electron irradiation. The irradiation process cross-links the polyolefin. This improves the molecular structure such that the polyolefin will work as part of a heat-shrinkable sleeve and provide the required level of mechanical protection while in-service. It makes the polyolefin perform more like a tough, heat-resistant, elastic material or rubber, rather than like a plastic material.

After cross-linking, the sheet is stretched by feeding it into a machine that heats it up, stretches it and cools it down. Because the sheet has been cross-linked, after stretching, it will want to recover to its original length when re-heated.

In recent years, many manufacturers had already developed their technologies of extruding and expansion of polyolefin backing. In the past, the production process of backing was done by extruding, cross-linking and expansion. However, in order to increase the production efficiency, some of manufacturers expand the backing during extruding, and then send the backing to e-beam for the cross-linking process.

Adhesives and Functions

An adhesives is then applied to the sheet and various manufacturers use proprietary techniques depending on the type,viscocity and melting temperature of the adhesive. The adhesive is the key to ultimate performance of the installed system, which is why different adhesive types will be specified depending on the pipeline operating conditions.

The adhesive has many functions; it adheres the installed sleeve to the steel at the coating cutback and mainline coating, it resists shear forces imparted by soil pressure after the pipeline is buried and provides long term corrosion protection to the steel. The choice of which adhesive to use is based on the pipeline design and operating conditions. As an example, for small diameter flow lines operating at ambient temperatures, a soft mastic-based adhesive may be chosen, while on large diameter pipelines operating at higher temperatures, a hard, semi-crystalline **hot melt adhesive** is used. The adhesive needs to be chosen based on its corrosion protection properties, adhesion strength, and resistance to shear forces imparted by pipe movement and the effects of soil pressures.

The coated sheet is then cut into individual sleeves suitable for application on a pipeline .As mentioned before, the sheet is stretched and wants to recover when heated, so a sealing strip or "closure" is applied during sleeve installation so that the sleeve will stay in place during and after recovery.

Epoxy Primer

A final component is an optional epoxy primer. Primers for heat-shrinkable sleeves work in the same manner as an FBE primer does when it is specified on 3-layer polyolefin pipeline coatings and is typically applied between 150 µm and 300 µm thick. Usually, the primer of heat shrinkable sleeve is two components non-solvent Epoxy, one is primer base and the other is curing agent.

Main Standards and certificates

- DVGW,
- ISO 21809-3,
- EN 12068,
- DIN 30678,
- NACE SP 0303,
- Shell standard

Heat Shrink Wrap Around Sleeve is a cross linked polyolefin 'tube' which is folded around the cable/pipe, zipped up with a stainless steel channel and then heat shrunk.
It is also called as (Cable Repair Sleeve.)

Key Points About Heat-Shrink-Repair-Sleeves:

- Designed for restoring damaged membranes and cable insulation and leak-proof protection/insulation of contact connections
- Modern alternative to heat shrink sleeves and tubes
- Fivefold and fourfold shrinkage ratio
- Sleeves have the form of a plate with rails on the edges for sliding metal lock
- Thermo-indicating paint is applied to the outer surface of the sleeve, while heating it changes color from green to black
- Resistant to UV rays and all weather conditions
- Hot melt layer on the inner surface of the sleeve, provides adhesion to all materials and guarantees a complete sealing of the damaged section
- Unlike heat-shrinkable tubes and sleeves, repair sleeves can be mounted on any place of the cable, without cutting or disassembly of contact connections
- Size and manufacturer logo marked on each sleeve with permanent paint
- Quick and easy installation without disconnecting lines
- Sleeves and metal locks can be cut into segments of desired length at the installation site
- Due to special structure, hot melt adhesive retains its elasticity even at low temperatures
- While shrinkage steel lock maintains flexibility and follows the shape of the contact connection.

SCOPE :

This specification covers pre-cut heat shrinkable wrap-around sleeves to be used for corrosion prevention of field welded steel pipe joints, and repair of mainline coating damages. These sleeves consist of a thick-walled material fabricated from an irradiated cross-linked polyolefin, pre-coated with a specially formulated mastic sealant. The mastic metal surfaces, and properly prepared polymer or thermoset mainline coatings. The Closure Seal provided with the heat-shrinkable sleeve is to secure the overlap/underlap areas of the sleeve together, which forms the wrap-around sleeve into a tube configuration, and prevents the sleeve ends from pulling apart during the shrinking process.

Features

Shut down of system not required for repair.

Hot melt adhesive provides complete environmental sealing and insulation.

High resistance to UV rays, chemicals, corrosion, fungus, etc.

Temperature sensitive paint changes color when heat shrinking process is complete.

Maximum length available upto 2500 mm.
Provides permanent waterproof barrier & environmental seal.
High resistance to UV rays, chemicals, corrosion, fungus, etc.
Significant protection advantages over insulating tape.
Reduces total labor and installation cost.

APPLICABLE DOCUMENTS:

a. ASTM International (ASTM) D-149, "Dielectric Breakdown Voltage and Dielectric Strength
b. Electrical Insulating Materials at Commercial Power Frequencies.
c. ASTM International (ASTM) D-257, "DC Resistance or Conductance of Insulating Materials.
d. ASTM International (ASTM) D-624, "Tear Resistance of Vulcanized Rubber."
e. ASTM International (ASTM) D-638, "Tensile Properties of Plastics."
f. ASTM International (ASTM) D-1000, "Pressure Sensitive Adhesive Coated Tapes used for Electrical Insulations.
g. ASTM International (ASTM) D-1002, "Strength Properties of Adhesives in Shear by Tension Loading (Metal-to-Metal)."
h. ASTM International (ASTM) D-2671, "Heat-Shrinkable Tubing"
i. ASTM International (ASTM) E-96, "Water Vapor Transmission of Materials in Sheet Form."
j. ASTM International (ASTM) G-6, "Abrasion Resistance of Pipeline Coatings."
k. ASTM International (ASTM) G-8, "Cathodic Disbonding of Pipeline Coatings."
l. ASTM International (ASTM) G-11, "Effects of Outdoor Weathering on Pipeline Coatings."
m. ASTM International (ASTM) G-13, "Impact Resistance of Pipeline Coatings. (Limestone Drop Test).
n. ASTM International (ASTM) G-14, "Pipeline Coatings (Falling Weight Test)."
o. ASTM International (ASTM) G-17, "Penetration Resistance of Pipeline Coatings. (Blunt Rod).
p. ASTM International (ASTM) G-21, "Determining Resistance of Synthetic Polymeric Materials to Fungi."
q. ASTM International (ASTM) G-22, "Determining Resistance of Plastics to Bacteria."
r. United States Department of Transportation (DOT), Code of Federal Regulations, Title 49, Part 192, "Transportation of Natural and Other Gas by Pipelines Minimum Safety Standards."

PERFORMANCE REQUIREMENTS

The sleeves meets the requirements as below :

PROPERTY	VALUE	TEST METHOD
SLEEVE BACKING		
Tensile Strength	2,200 psi min.	ASTM D-638
Elongation	500% min.	ASTM D-638
Heat Shock Penetration Resistance	No dripping, flowing or cracking 0.02 inch max.	ASTM D-2671 ASTM G-17
Tear Strength	500 lb./inch min.	ASTM D-624
MASTIC SEALANT		
Shear	45 psi min	ASTM D-1002
FINISHED SLEEVE		
Adhesive Peel	30PLI min.	ASTM D-1000 (Method B w/Jaw Sep. Speed 4"/min.
Impact Resistance	50 inch/lbs. min. (70 inch/lbs. min.)	ASTM G-14
Limestone Drop Test	50 drops min.	ASTM G-13 (35 lbs.)
Abrasion Resistance	No Holidays	ASTM G-6
Outdoor Weathering	No deterioration of performance	ASTM G-11
Low Temperature Flexibility	Below-15C	ASTM D-2671 (Proc. C, 1-inch Mandrel)
Cathodic Disbondment	<=10mm	ASTM G-8 (30 days)
Fungi Resistance	Rating <= 1	ASTM G-21
Bacterial Resistance	No growth 21 days	ASTM G-22
Water Vapor Transmission	.05 gr/24 hrs/100m^{2}max	ASTM E-96 (Method B)
Dielectric Withstand	20,000 volts	ASTM D-149
Insulation Resistance	1012 ohmXcm min.	ASTM D-257
Thickness Backing	.030 inch min.	ASTM D-2671 (Recovered)
Thickness Mastic – Wraparound	.045 inch	ASTM D-2671 (As Supplied)

HEAT SHRINK SLEEVE–HEAT SHRINKING TECHNIQUE

Before starting the heat shrink sleeve application, become familiar with the following;

- Wear heat resistant gloves whenever working with the propane torch and hot surfaces.
- Use two (2) people and two (2) torches for outside diameters larger than 18 inches.
- The propane torch flame should be kept at least 6 inches away from the heat shrink sleeve and at an angle to the surface. Holding the propane torch at an angle allows the flame to bounce off the heat shrink sleeve and

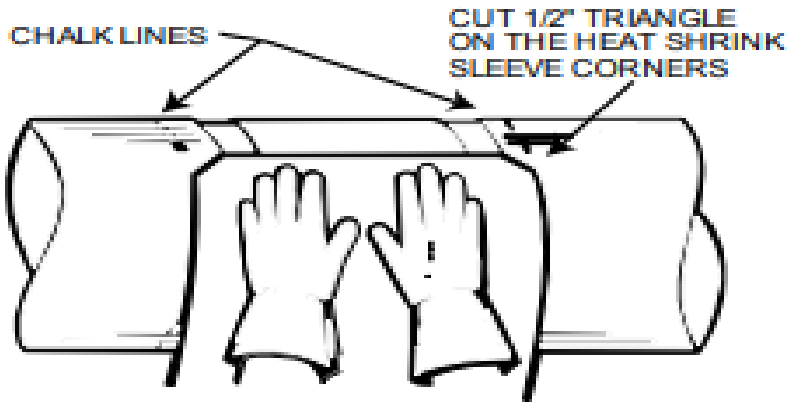
decreases the local intensity of the heat. If the flame is held too close to the surface, the heat shrink sleeve will burn and may tear around the burned areas.

- Use your body as a shield to protect the flame from the wind. Keep the propane torch at an angle to the sleeve and pointed in the direction the wind is blowing to maintain a fairly even flame. Do Not increase the size of the flame, this could overheat and burn the heat shrink sleeve.
- Keep the propane torch in constant motion. Do Not burn any surfaces.

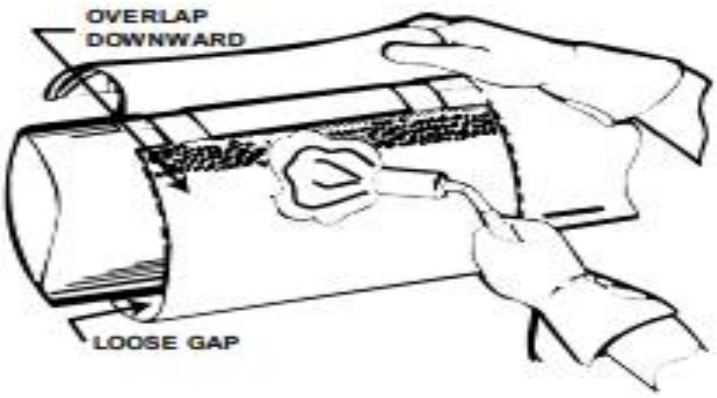
HEAT SHRINK SLEEVE – APPLICATION

Apply the heat shrink sleeve in the following manner;

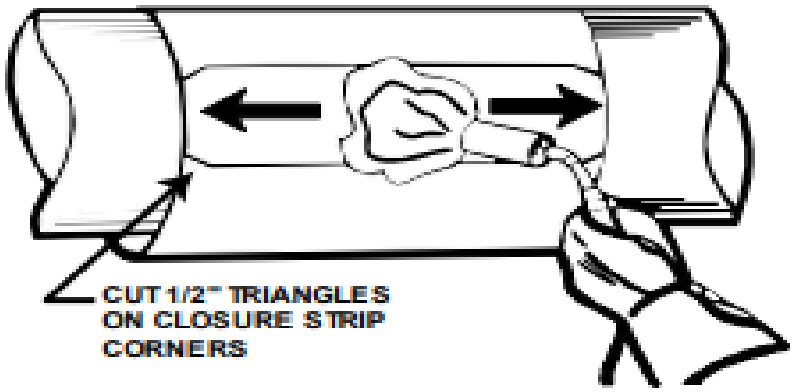
- Roughen the surface of the insulation jacket or conduit / containment coating and metal surface with sandpaper in the areas when the heat shrink sleeve will cover,
- Wipe the field joint area clean and dry with a clean cloth. Use solvent or detergent if needed.
- Measure the width of the field joint area and the heat shrink sleeve. Use chalk to mark guidelines on the insulation jacket or conduit / containment pipe for the edges of the heat shrink sleeve. The heat shrink sleeve should be centered on the field joint area with a minimum 4 inch overlap on each end onto the insulation jacket or conduit / containment pipe coating.
- Preheat the field joint area. **Do Not** burn any surfaces.
- For insulated and jacketed systems **Do Not** preheat the insulation, only preheat the insulation jacket. Preheat the jacket to 120O F to 130O F.
- For coated conduit / containment systems preheat the coating and bare conduit / containment to 140O F to 150O F.
- Remove the first 6-10 inches of backing material from the heat shrink sleeve
- Hold the heat shrink sleeve up. Press the top edge of the heat shrink sleeve just below the top of the field joint and centered between the chalk lines.
- Heat the top 2 inches of the heat shrink sleeve with the propane torch until it becomes soft and adheres to the insulation and insulation jacket or conduit / containment pipe coating.



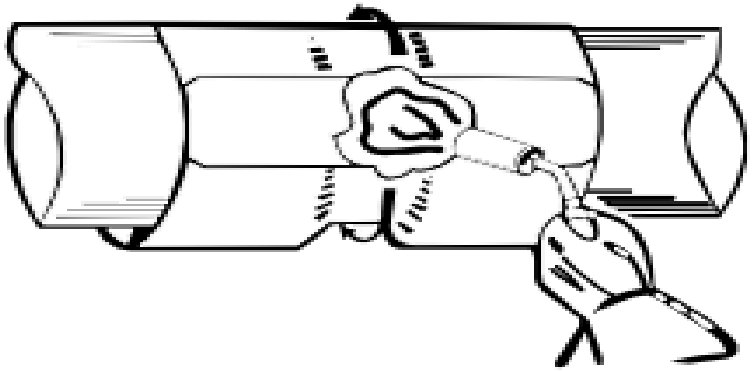
- Wrap the heat shrink sleeve around the field joint area so the lower portion forms a loose gap that hangs about 1 inch from the bottom of the insulation jacket or conduit / containment pipe. This gives the heat shrink sleeve room to shrink properly. If the heat shrink sleeve is wrapped snugly, without a gap, it may pull apart or tear during heating.
- Stay within the chalk guidelines. Reheat the top 2 inches of the heat shrink sleeve before overlapping. Be sure to overlap downward.



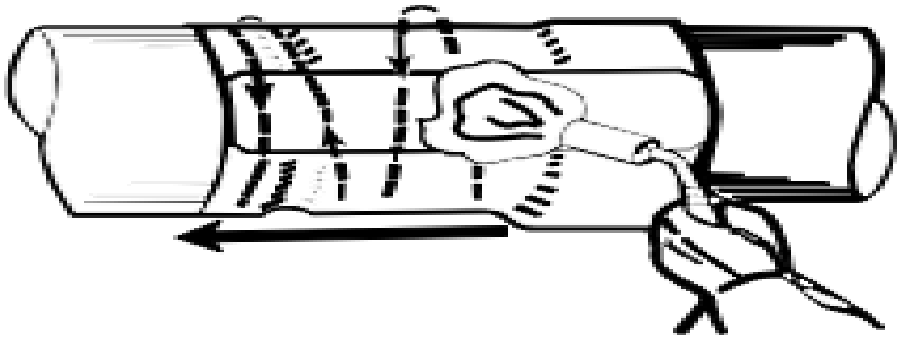
- Cut a ½ inch triangle from each corner of the closure strip to prevent the corners from peeling up after application.
- Peel the backing strip off the closure strip and preheat the closure strip for approximately 5 seconds until it becomes soft.
- Attach the closure strip directly over the seam of the heat shrink sleeve. Overlap and press down firmly. Do not try to smooth the closure strip at this time.



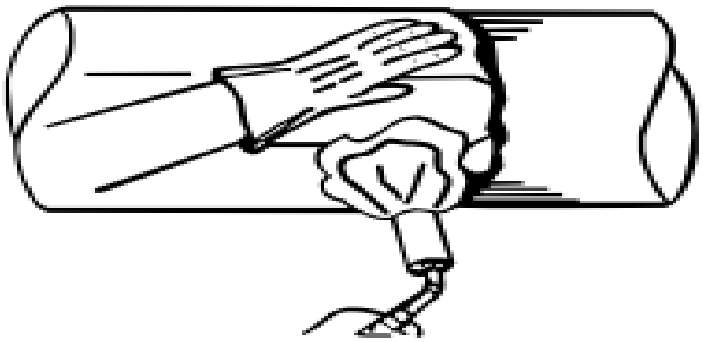
- Heat the center section of the heat shrink sleeve all the way around until it shrinks.



- When the center of the heat shrink sleeve has shrunk, begin to move the propane torch with an up and down spiral motion around the shrink sleeve toward the left edge.



- When the left side has shrunk, heat the right side with the same up-and-down spiral motion.
- Reduce the flame slightly and shrink the edges of the heat shrink sleeve onto the insulation jacket or conduit / containment pipe. Black adhesive escaping at the edges of the heat shrink sleeve indicates a good bond and shrinkage.
- Heat the closure strip until it sticks to the heat shrink sleeve. Use a wooden wallpaper roller to apply pressure to the closure strip. Sufficient heat and pressure is required to completely fuse the closure strip to the heat shrink sleeve seam.
- If the heat shrink sleeve edge rises up, reheat and press down firmly.
- While the heat shrink sleeve is still hot and soft, use a hand roller to gently roll the sleeve surface and push any trapped air up and out of the sleeve. Reheat, if necessary.



- FINAL INSPECTION After installation, visually inspect the heat shrink sleeve to verify it has been properly installed and is completely sealed onto the insulation jacket or conduit / containment pipe coating.
- There should be a visible indication of mastic extruding out from under the heat shrink sleeve along the circumferential seams of the heat shrink sleeve. There should be no bubbles or air pockets under the heat shrink sleeve.
- Re-heat and re-shrink the heat shrink sleeve if there are any signs the heat shrink sleeve is not completely sealed to the insulation jacket or conduit / containment pipe coating.