Stainless steel conduit: A solution for any harsh environment

Sponsored by: Electri-Flex Company

Flexible stainless steel conduit is a safe and long-lasting way to protect electrical wiring and devices from damage in even the harshest environments. Depending on the intended application, it can be the ideal material as it is corrosion resistant, has a high crush strength and is a suitable for extreme temperature exposure.

Flexible stainless steel conduit is a safe and long-lasting way to protect electrical wiring and devices from damage in even the harshest environments.

Advantage of stainless steel conduit

Electrical conduit can be made from many materials including some plain carbon steel, hot-dipped galvanized (HDG) steel, aluminum and stainless steel. Even with all of these options, stainless steel alloys are the best choice in material for applications that require high strength and corrosion resistance.

In terms of corrosion resistance, stainless steel is the best material for a wide range of chemical exposure. The material is resistant to chemical attack from a variety of substances, salt water and other environments that can quickly compromise plain carbon steel conduit. This makes stainless steel suitable for challenging environments, such as at ports, food processing plants, chemical plants and other potentially corrosive environments. Overall, it offers a longer life and less susceptibility to chemicals from a wider range of sources than plain carbon steel.

Figure 1: Coil of jacketed, flexible stainless steel conduit. Source: Electri-Flex

Aluminum also offers corrosion-resistant properties, however, stainless steel is much stronger than aluminum. It has higher crush resistance, meaning cables contained in the conduit are less likely to be damaged from occasional impact. While plain carbon steel offers crush resistance, its susceptibility to corrosion can weaken the crush resistance over time. Stainless steel will remain strong for years after it is installed.

Besides these major advantages, stainless steel alloys are often harder, meaning they are less likely to be eroded or worn by abrasive environments. This is particularly important in places where sand, dirt and other particulates repeatedly rub against the conduit.

Sponsored by:

electri-flex

liquatite®

Produced by:

GlobalSpec

This material also has higher fatigue resistance than aluminum alloys. Fatigue is a physical failure where repeated, cyclic stresses below the yield strength of the material will eventually cause it to break. For example, a length of conduit placed near a rail line will be repeatedly stressed in a cyclic manner. With enough cycles — even at seemingly low stresses — an aluminum conduit will fail while stainless steel can hold up in reliability to fatigue failures.

Industries relying on stainless steel

Harsh environments or environments that require a high degree of cleanliness especially benefit from the use of stainless steel conduit. While many industries have such demanding conditions, there are a number of real-world applications where these conduits can benefit particularly stringent situations.

Food and beverage manufacturing

In the food and beverage manufacturing industry, conduit can be exposed to numerous chemicals. Even the food products that are consumed every day, such as orange juice, vinegar and baking soda, can cause materials to corrode under repeated exposure. Not only do manufacturers have to worry about the corrosion of the conduit, but they also have to worry about corrosion flaking off and potentially contaminating the edible product. An overhead conduit above an assembly line may be continuously exposed to a corrosive environment.

Besides the exposure to food products, most food processing equipment is maintained through Clean-In-Place (CIP) or Steam-In-Place (SIP) procedures. In these, cleaners or high pressure steam are forced through the equipment for sterilization and cleaning purposes. The cleaners and the high temperatures and pressures can accelerate corrosion. Conduit that runs near or in these systems will be subject to this type of corrosion, making stainless steel conduit a better choice for these industries.

The chromium in the stainless steel drastically reduces the effects of corrosion, and thus it is measurably safer around food and beverage production lines. Arguably the most crucial aspect of stainless steel is that it is resistant to bacterial growth, making it a more hygienic choice for these industries.

Wastewater treatment

Supplying electricity and maintaining sensors and control wires at wastewater treatment plants is challenging. The corrosive atmosphere, which includes salt spray or other organic contaminants, can significantly shorten the lifespan of conduit. This is further exacerbated by wastewater treatment plants that include outdoor sections of a facility, exposing conduit to extreme temperatures, precipitation and sunlight.

The use of stainless steel conduit at wastewater treatment facilities ensures long life, with a much lower maintenance cost and less frequent replacement, as compared to other conduit.

Marine and shipbuilding

Shipbuilding operations, drydocks, marinas, transportation and fishing docks, commercial piers and boardwalks, and other marine applications require watertight, corrosion-proof conduit to reliably deliver power to equipment across long distances.

Stainless steel is particularly suited for this harsh environment. The corrosion resistance prevents damage from moisture and salt water, while the high crush strength prevents damage from normal wear and tear from personnel and equipment. Notably, aluminum is another well-suited and popular option in marine and shipbuilding applications since it can also be corrosion resistant.

Rail and mass transit

Mass transit hubs and stations, railways, bridges and tunnels have heavy electrical demands. Depending on the specific application, they may require lighting, climate control or power to run mobile equipment, sensors, security equipment and many other devices. Consider a commuter light rail station: it may have lighting and security cameras, electronic signs for informing passengers about train delays, sensors for locking out rail blocks to prevent collisions, and many other devices.

Just like in marine applications, many of these hubs are outdoors, meaning they face the summer sunshine, rain and potentially even salt exposure from snow and ice removal. This constant thermal and chemical exposure requires conduit to be watertight and resistant to corrosion.

Electri-Flex advantage

Electri-Flex has been developing and manufacturing Liquatite® flexible conduit for 70 years. They provide industry-leading flexible conduit for numerous applications, serving many industrial, commercial and manufacturing facilities.

They have five stainless steel conduit families in their catalog, each serving a distinct purpose.

Type LAFG-SS

Geared toward the food and beverage industry, the LAFG-SS type is a UL listed, jacketed, flexible 316L stainless steel conduit.

Figure 2: Type LAFG-SS. Source: Electri-Flex

The jacket is made from an FDA-approved, antimicrobial flexible polyvinyl chloride (PVC) that is designed to withstand splashes and spills from oils and mild acids. This product meets FDA CFR21 and NSF 51/61 standards.

Type LA-SS

Type LA-SS is a UL listed, jacketed 316L stainless steel conduit designed for outdoor use. The flexible jacket is resistant to oil and mild acid exposure and is also resistant to deterioration from sunlight (UV) light. This conduit was designed to serve in corrosive environments and outdoor locations for defense, shipbuilding, wastewater treatment and other such industries.

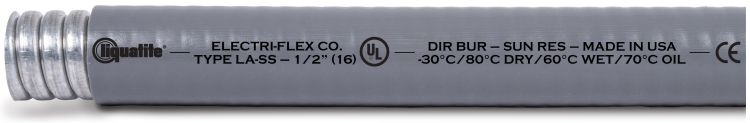

Figure 3:Type LA-SS. Source: Electri-Flex

Type ZHLA-SS

ZHLA-SS conduit is a UL listed, halogen-free product that is designed for use in defense, oil and gas, mining and similar industries. It uses a Halogen-Free Flame Retardant jacket material that has passed numerous ASTM tests for flame spread and smoke production, and also meets toxicity requirements per Bombardier SMP800-C. For refineries, mines and other places where there is an ever-present risk of fire, ZHLA-SS can limit the spread of fire and avoid the introduction of hazardous gasses.

Figure 4: Type ZHLA-SS. Source: Electri-Flex

Type ATLA-SS

The type ATLA-SS conduit is UL listed, made from 316L stainless steel, and is coated with a specially designed jacket to protect the conduit from a wider range of temperatures. The jacket is rated -55°C to 105°C Dry, 60°C Wet, 70°C Oil, making it suitable for outdoor environments all over the planet.

Figure 5: Type ATLA-SS. Source: Electri-Flex

Type ATX-SS

This conduit line is a non-UL, 316L stainless steel product, jacketed with a thermoplastic rubber. The thermoplastic rubber allows the conduit to withstand temperature extremes of -60° C to 150° C and 165° C intermittently, but is also flame-retardant and halogen-free, meeting UL94-HB.

Figure 6: Type ATX-SS. Source: Electri-Flex

Electri-Flex

With 70 years of experience in the conduit manufacturing industry, Liquatite® by Electri-Flex can help improve the safety, quality and lifespan of virtually any industrial, marine or manufacturing operation. By choosing flexible stainless steel conduit, wiring will be protected for many years to come. To learn more about how these conduit options can benefit any application on the market, contact the experts at Electri-Flex.

ELECTRI-FLEX COMPANY

222 W. Central Ave.
Roselle, IL 60172
(630) 529-2920

GLOBALSPEC

257 Fuller Road
Suite NFE 1100
Albany, NY 12203
Tel: (518) 880-0200

ABOUT ELECTRI-FLEX COMPANY

Electri-Flex has nearly 70 years of success manufacturing the highest quality flexible liquidtight conduit in the Industry. Founded in 1955, Electri-flex has perfected the design and manufacture of its line of nearly 50 flexible electrical conduits. A true innovator in the liquidtight conduit industry. Making the best product doesn't create success without sales, service and marketing programs that meet the needs of our customers. Our partners can expect outstanding service from fast shipments on in-stock items, as well as developing a conduit for unique applications. Our team of salesmen, customer service agents and application engineers can assist at every stage of the buying process.