# Cord Connector Material Selection Guide for Harsh Environments

REMKE
CONNECTING POSSIBILITIES

For those companies operating in harsh environments – like food processors – special attention must be paid to the potential impact of the environment on electrical connections. To insure integrity of the electrical connection and to guard against premature failure, food processors must insist upon connectors made from specific materials and should seek out connector manufacturers that can support a variety of materials in standard and custom configurations. Remke Industries, of Wheeling IL, is a connector manufacturer who has supported both standard and custom products for over 40 years.

Cord connectors and cable grips (also known as cable glands) provide the means for passing cord or cable into an enclosure, through a bulkhead or into a control device such as a switch or panel. These types of connectors prevent cable pull-out or premature fatigue because they secure the cable where it enters the enclosure – or where it terminates into a hardwired application. Cord connectors can be manufactured out of several different types of material. Aluminum, steel and nylon are often used for these type of connectors but for food processing applications those materials do not offer the needed level of corrosion resistance. Materials of construction that are best suited for use in food processing facilities include stainless steel, Valox® and nickel-plated aluminum. Remke Industries offers its line of Tuff-Seal™ cord & cable grips in a wide range of sizes in all three materials – and can create custom connectors in those materials for even the smallest of quantities. The following descriptions of stainless steel, Valox and nickel-plated aluminum are provided to help you in selecting which material might be best suited to your particular needs.

- **Stainless Steel**
  - Offers exceptional tensile strength which provides the highest levels of durability in severely corrosive environments filled with acids, chemicals or chlorine-bearing agents.
  - Durable, low-maintenance materials with excellent fatigue and impact resistance
  - Operating temperatures of -60°F to +1000°F
  - Resists rust and most other forms of corrosion
  - Cleanable and hygienic due to smooth & minimally porous surface
  - Retains its strength even in high temperatures
- **Valox**
  - Provides superior corrosion-resistance and is suitable for use in FDA mandated washdown environments

- Non-hydroscopic which means it won't absorb moisture
- Health-care grades meet FDA specifications for food contact
- Excellent chemical and high-heat resistance
- Operating temperatures of -40°F to +284°F
- Impact-resistant material

- **Nickel-Plated Aluminum**
  - Non-toxic nature makes it specifically suitable for all types of food handling equipment where corrosion & wear-resistance is required
  - Prevents rusting by moisture & high humidity
  - Resists corrosion by many alkalis and weak acids
  - Operating temperatures of -40°F to +500°F
  - A lightweight, low-cost alternative to stainless steel

With the extensive use of automated equipment and machinery in food processing facilities, top concerns must be placed on the integrity of sensor and control component connectors. Remke's line of Tuff-Link™ molded connectors (also know as quick-disconnects or industrial interconnects) is available in a variety of materials for both the overmolding/cable and hardware like coupling nuts. Materials used for molding both cable and connectors include specialized thermoplastic elastomers (TPE), polyurethanes (PUR) and silicone. Remke Industries offers its line of Tuff-Link connectors in all of these materials which are described below.

- **TPE**
  - Excellent resistance to oils, fats, fruits, juices, vegetables, dairy products, tomatoes, wine and vinegar
  - Durable with excellent abrasion resistance
  - Excellent for use in submerged water or in applications with constant bending and flexing
  - Operating temperatures of -60°F to +275°F
  - Excellent resistance to food industry chemicals like chlorinated alkaline cleaners, detergents, sanitizers or lubricants

- **PUR**
  - Excellent resistance to oils, fats, fruits, juices, vegetables, dairy products, tomatoes, wine and vinegar
  - Good for use in cold temperature & freezer applications
  - Excellent abrasion resistance for high abuse areas
  - Operating temperatures of -40°F to +176°F
  - Good resistance to food industry soils and chemicals
  - 1200 PSI washdown rated
- **Silicone**
  - Best used in high temperature applications or where there are extreme temperature changes
  - Resistant to high molecular oils, fats from vegetables & animals, diluted acids, and lye
  - Excellent for use in cold temperature & freezer applications
  - Operating temperatures of -58°F to +356°F
  - Good abrasion resistance
  - The hardware on molded connectors – such as coupling nuts, shells, couplers and adapters – can also be manufactured in a variety of materials to meet the environmental concerns of food processors. Remke offers the following materials of construction:
- **Stainless Steel**
  - Offers exceptional tensile strength which provides the highest levels of durability in severely corrosive environments filled with acids, chemicals or chlorine-bearing agents.
  - Durable, low-maintenance materials with excellent fatigue and impact resistance
  - Operating temperatures of -60°F to +1000°F
  - Resists rust and most other forms of corrosion
  - Cleanable and hygienic due to smooth & minimally porous surface
  - Retains its strength even in high temperatures
- **PEEK Polymers**
  - Conforms to FDA requirements and may be safely used for food contact

- Outperforms metals in many aggressive environments and is a cost-effective alternative to stainless steel
- Excellent resistance to a wide range of chemicals including common solvents, acids, bases and salts
- Scratch-resistant with outstanding wear resistance
- Ideally suited for continuous use in high temperatures up to +482°F
- Can be used in steam or high water pressure applications

- **Non-Metallic (e.g. Delrin®)**
  - FDA approved for use in the food industry
  - Lightweight with high fatigue endurance
  - High tensile strength & toughness for excellent durability and impact resistance
  - Very low moisture absorption
  - Operating temperatures of -40°F to +290°F
  - Resistant to a wide range of chemicals including hydrocarbons, fuels, solvents and neutral chemicals

- **Nickel-Plated Brass**
  - Nickel-plating improves appearance, hardness and long-term wear preventing pitting and corrosion
  - Rated for up to 150 PSI
  - Resistant to salt water, weak acids & alkalis, alcohol, esters, ketones, ether, mineral-animal and vegetable oil
  - Brass is rustproof
  - Provides superior protection against corrosion
  - Operating temperatures -40°F to +212°F

Material descriptions are often accompanied by an IP RATING. These ratings are defined by International Standard IEC that classifies the level of protection that enclosures of electrical equipment have against intrusions of foreign bodies and water. There are four IP Ratings that are most crucial to the food processing industry

- IP 65, IP 66, IP 67, IP 68. These four IP Ratings can be found in all of the materials that Remke uses in the manufacture of its products.
- IP 65 totally protected against dust (dust-tight) and protected against low-pressure jets of water from any direction from a nozzle
- IP 66 totally protected against dust (dust-tight) and protected against high-pressure (powerful) jets of water from any direction
- IP 67 totally protected against dust (dust-tight) and protected against the effects of temporary immersion in water between 15cm and 1m
- IP 68 totally protected against dust (dust-tight) and protected against long periods of immersion in water under pressure OR complete & continuous immersion in water (water-tight)

Valox is a registered trademark of GE Plastics Delrin is a registered trademark of DuPont