

Information and Products for use in Harsh Chemical Environments



Thomas & Betts



Washdown with harsh chemicals, bacteria concerns, demanding USDA and FDA requirements, and continuous manufacturing conditions require electrical maintenance products that exceed expectations.

With electrical products from Thomas & Betts, you can improve your food or beverage operation by:

- reliably extending equipment uptime
- more flexible process planning
- decreasing inventory of maintenance parts
- reducing wasteful maintenance schedules
- improving energy consumption and cycle times



Many chemicals are frequently used in the processing of red meats. Some chemicals will not damage metal equipment or most painted surfaces when used as directed, while others may require stainless steel materials for safe use.

T&B offers a full line of time-tested, rugged and highly engineered electrical components specifically designed to be used with cleaning chemicals in washdown applications in the food and beverage industry. These products include liquidtight fittings in a variety of materials, lighting fixtures with specific coatings for chemical resistance, and pin and sleeve plugs and receptacles for maximum performance in the harshest chemical environments. All T&B products are designed and engineered with features that can help you improve your Total Cost of Ownership (TCO).

For maintenance-free solutions in washdown or dry environments, specify Thomas & Betts electrical products.

In your production processes, there are a multitude of issues to examine in establishing which products to specify for harsh environments. Here are some considerations:

- Which caustic chemicals are necessary for the application?
- What materials are resistant to the chemicals needed?
- What liquidtight fitting material works best for your location?
- Are there special considerations for PVC coated metallics?
- Which PVC coated product meets the performance needs?
- What coating for lighting can withstand harsh chemicals?
- What coating works best on lighting globes?
- Which pin and sleeve plugs and receptacles work best for washdown and blowdown applications?

The following pages offer an outline of chemical considerations for caustic chemical washdown settings and a brief explanation of applicable products compatible with food and beverage processing plants.



Phosphoric acid is used to remove milk stone from dairy processing pipes and equipment and to remove mineral deposits. This USDA-approved chemical requires stainless steel materials for optimum performance.

The Environment

Chemicals and cleaners commonly used in the food and beverage market



Type of Cleaner	Chemicals	Purpose of Cleaner
Acid Cleaners – High Foaming	Phosphoric Acid	High-foaming, non-fuming acid cleaner for scale removal and brightening of aluminum, galvanized metal, and stainless steel equipment. Will not damage metal equipment or most painted surfaces when used as directed. Contains no harsh hydrochloric, sulfuric components.
Acid Peroxygen Sanitizers	Hydrogen Peroxide, Acetic Acid (ethanoic acid, vinegar acid), Peroxyacetic Acid (and acetyl hydroperoxide)	A concentrated, no rinse, non-foaming acidic peroxygen sanitizer. Contains no chlorine. Safer for the environment while being less harmful to equipment. Quickly kills a broad spectrum of micro-organisms. Effective over a wide range of pH. USDA applicable.
Chlorine Sanitizers	Sodium Dichloro-s-Triazinetrione Dihydrate, Sodium Dichlorocyanurate Dihydrate, Monosodium Phosphate, Anhydrous Sodium Sulfate, Sulfuric Acid Disodium Salt	For use in preparing no-rinse sanitizer solutions in food processing plants. Readily soluble in cold water. Leaves no film on surfaces. Can also be used to sanitize hatching eggs in the poultry industry. USDA applicable, EPA registered.
Denaturants	Nonylphenoxy Poly (ethylenoxy) ethanol	This product is formulated to denature condemned carcasses and meat or meat products in red meat processing plants. Thus denatured, the meat can be disposed of as tannage. This product will impart a green color as well as a strong citronella odor to meat.
Food and Dairy Products – Heavy Duty Low Foam Cleaner	Sodium Hydroxide, Sodium Carbonate	Used for C.I.P. cleaning operations. Contains strong alkalis to remove soil that is encountered in processing lines. Hard water tolerant and free-rinsing. Safe for use in all food processing facilities. USDA applicable.
Dairy – Milk Stone Remover	Phosphoric Acid	Used for removal of milk stone from dairy processing pipes and equipment. Removes mineral deposits. Harmless to stainless steel equipment. Low foaming for proper flow through pipes. For manual and circulation-type cleaning operations. USDA applicable.
Poultry Floor Cleaner	Sodium Metasilicate, Trisodium Orthophosphate, Sodium Carbonate, Sodium Chloride, Nonylphenoxy poly Ethanol	Used for heavy duty cleaning in poultry plants. General cleaner. Removes blood, grease and waste deposits. Use manually or with mechanical floor scrubber. USDA applicable.
Floor Cleaner	Diethylene Glycol Monomethylether, Sodium Dodecylbenzene Sulfonate, Sodium Silicate	Used to remove dirt, food, grease, fats and soap scum. Can be used on concrete, masonry, brick, stone, and ceramic tile. Has moderate foam to promote free rinsing with no residue. USDA applicable.

Harsh Chemicals Used



Chemical Resistance Performance Rating

- A Best
- B Better
- C Good
- D Poor

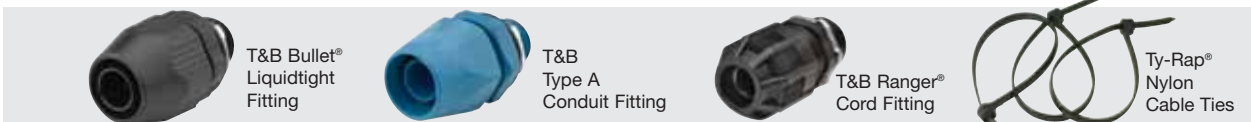
	Overall Chemical Resistance	Phosphoric Acid (Crude)	Phosphoric Acid (>40%)	Sodium Hydroxide (50%)	Sodium Chloride	Sodium Carbonate	Sodium Metasilicate	Diethylene Glycol	Sodium Silicate	Hydrogen Peroxide (30%)	Acetic Acid (20%)	Sulfuric Acid (10-75%)	Citric Acid	Fruit Juice	Chlorine, Anhydrous Liquid	Chlorine Water	Clorox
316 Stainless	A	B	D	B	B	A	A	A	B	B	B	D	A	A	C	C	A
304 Stainless	A	D	D	B	B	A	A	A	A	B	B	D	B	A	C	C	A
Aluminum	B	C	C	D	C	D	D	B	A	A	B	D	C	A	D	D	A
Brass	D	N/A	D	D	D	B	N/A	N/A	D	N/A	D	N/A	D	D	D	D	N/A
Cast Iron	D	D	D	D	D	B	A	A	B	B	D	D	D	D	D	N/A	D
Nylon	B	B	B	A	A	B	N/A	A	A	D	D	D	A	A	D	C	A
PVC	A	B	B	A	A	A	A	C	A	A	D	A	B	A	D	A	A
PVC Coated	A	B	B	A	A	A	A	C	A	A	D	A	B	A	D	A	A
Kynar	A	A	B	A	A	A	N/A	A	A	A	A	A	A	A	A	B	A
Polycarbonate	B	A	A	D	A	A	N/A	B	N/A	A	A	B	A	N/A	C	N/A	N/A

The information in this chart has been supplied to Thomas & Betts by other reputable sources and is to be used ONLY as a guide in selecting equipment for appropriate chemical compatibility. Thomas & Betts does not warrant that the information in this chart is accurate or complete or that any material is suitable for any purpose. Before permanent installation, test the equipment with the chemicals and under the specific conditions of your application. Ratings of chemical behavior listed in this chart apply to a 48-hour exposure period. Thomas & Betts has no knowledge of possible effects beyond this period.

Materials Comparison



Food and beverage processing plants consume over 370,000 tons of stainless steel each year. You can achieve savings up to 33% through careful selection of appropriate materials for your specific application.





304 grade stainless steel can be equally as protective as 316 grade and offers cost savings up to 33% in common applications. While 316 grade stainless steel offers higher resistance to certain types of corrosion, a

cost/benefit evaluation of both 304 and 316 stainless steel may provide substantial savings in your maintenance and repair costs in harsh environments.



Stainless Steel T&B Hub is designed and manufactured with exacting tolerances and features to assist in ordinary maintenance and repair of raceway systems. **316 Grade Stainless Steel only.**

- Unique sealing ring and groove.
- Sharper and deeper teeth on locknut and body.
- Hexagonal/Splined body and locknut design for fast, easy installation with wrench or hammer and screwdriver.
- Precision machined tapered threads designed to create watertight union.
- T&B uniquely colored insulated throat molded from special high temperature and caustic-rated 105°C (221°F) rated thermoplastic.



Stainless Steel Superstrut® Framing Channel is manufactured to exacting tolerances for optimum performance and long-lasting installations. Perfect for caustic washdown settings where channel is necessary for rugged equipment mounting.

- 10' and 20' lengths in 12 and 14 gauge stainless steel.
- **Supplied in type 304 stainless steel. Type 316 stainless steel available upon request.**
- Threaded rods and an assortment of accessories are also available in stainless steel to complement the framing channel installation.
- Available in solid, half-slot, slotted and punched hole configurations for standard 1-5/8" channel design.



Stainless Steel T&B TCF Series Tray/Cord Fitting is the cost-efficient choice for increased safety when terminating portable cord and tray cable in hazardous locations, providing efficient strain relief for cables entering enclosures and raceways, and for cords used on portable equipment.

- Tapered neoprene bushing and O-ring seal out moisture and dirt.
- Chuck grip provides high mechanical pullout performance and exceeds applicable requirements.
- Hand-tightens — no tools required.
- **316 stainless steel construction.**
- **304 stainless steel construction available upon request.**



Stainless Steel Star Teck™ cable fittings are designed to accommodate a broad range of cables, thereby minimizing the possibility of mismatched cables and fittings in the field.

To order a 316 stainless steel fitting, add the suffix "SS" to the catalogue number (example ST050-464SS). Only available for 1/2 thru 1 inch hub sizes. Will handle outer jacket diameters from 0.525 to 1.375 inch.



Stainless Steel Cable Tray offers good yield strength and high creep strength at high ambient temperatures.

The stainless steel cable tray is roll-formed from AISI Type 316 stainless steel which is not magnetic and possesses high strength when cold rolled or formed.

Type 316 includes molybdenum to increase high temperature strength and improve corrosion resistance to chloride and sulfuric acid. Carbon content is reduced to facilitate welding.



Stainless Steel QuikLok™. The 2" deep U-profile is ideally suited for light- to medium-duty commercial and industrial applications where load capacity is required.

The higher 4" profile securely contains bulky cables, reducing the risk of cables falling out of heavily loaded trays. Available in AISI Type 304. AISI 316 available upon request.

Choose the QuikLok™ fast connection profile for installations requiring long runs of straight cable tray lengths.



Stainless Steel is a perfect solution for long-lasting installations in contact with corrosive media. 304 grade stainless steel is the most versatile and most widely used stainless steel, available in a wider range of products,



forms and finishes than any other. It has excellent forming and welding characteristics and performs in a wide range of atmospheric environments.

Stainless Steel Pipe Straps support and securely fasten rigid, IMC and EMT conduit. One- and two-hole stainless steel straps are ideal for industrial applications in food and beverage manufacturing plants.

- Higher degree of corrosion resistance than traditional zinc plated or hot-dipped galvanized straps.
- One- and two-hole straps for EMT sizes 1/2" through 2".
- One- and two-hole straps for rigid and IMC sizes 1/2" through 4".
- **304 stainless steel.**



Stainless Steel T&B Liquidtight Flexible Metal Conduit Fitting is designed to stand up to demanding, wet or corrosive environments, and anywhere high performance is a requirement.

- Safe-Edge™ ground cone design accepts variations in raceway convolutions and provides a positive bond.
- Continuous sealing ring completely surrounds the conduit to ensure a liquidtight seal.
- **304 stainless steel** for long life and exceptional appearance.
- T&B's blue insulated throat molded from special high temperature and caustic-rated 105°C (221°F) rated thermoplastic.
- **Selected straight fittings available in 316 stainless steel.**



Stainless Steel Ty-Rap® Cable Ties feature a low profile design with an internal locking roller and spring-tension head that ensures a secure fit.

- Spring feature provides extra snug fit in applications where bundle tightness is critical.
- Internal locking roller (average slip, within the locking mechanism at 100 lb load is 55% lower than conventional ball lock design).
- Rounded edges and smooth surfaces for fast, safe installation
- Buckle length is 38% less and height is 24% less than the conventional ball locking design.
- **Available in 316 and 304 stainless steel.**



Polycarbonate and Nylon are rated highly among materials available for resistance to a variety of harsh chemicals. Nylon 6 cast products are tough and offer high tensile strength. Nylon fibers have great elasticity, high

lustre and are resistant to abrasion and chemicals like acids. Polycarbonates are extremely impact resistant, with excellent UV and heat performance.



SPECIFICATION

The **BULLET® Nonmetallic Fitting** provides a reliable liquidtight seal that combines high pullout resistance and ease of installation. Installations are performed quickly and easily because BULLET® liquidtight fittings can be installed without disassembly. BULLET® nonmetallic fittings are resistant to numerous caustics and solvents.

- Rugged low-profile nonmetallic body and gland construction provides space savings.
- Captive sealing "O" ring features predetermined compression to provide a reliable seal at enclosure.
- NEMA 6P listing for temporary and cold submersion.
- **Specify the raceway system to be NEMA 6P listed for submersion.**



The **Ranger® Series Nonmetallic Liquidtight Cord Connector** takes twice the cable range of most ordinary strain relief connectors. T&B's Ranger Connectors allow you to reduce your inventory and save time, with one connector that can do the work of two. The sturdy nylon material adds corrosion resistance to your installation.

- Extended range with superior strain relief.
- Reduced overall size, fits into tighter spaces.
- Gland nut designed to restrict cable bending.
- Cord Range: Straight – 0.125" to 0.950" 90° – 0.125" to 0.750"
- Hub Size Range: Straight – 1/2" to 1" 90° – 1/2" to 3/4"



Iberville® Nonmetallic Connectors

- Liquidtight and strain relief.
- Corrosion resistant polyamide (nylon).
- Vibration proof.
- No twisted cords.
- Indoor or outdoor use. Quick installation.
- Working temperatures: -30°C (-22°F) to 100°C (212°F) and up to 150°C (302°F) for short periods of time.
- Resistant to salt water, weak acids, weak alkalis, alcohol, acetone, ether, benzene, gas, mineral oil, animal and vegetable oils.



High-strength, chemically resistant thermoplastic is useful for the toughest conditions and long-lasting performance. For particularly harsh and corrosive settings, our PVC and PVC-coated conduit and connectors are the best choice for

both indoor and outdoor applications. The PVC coating protects exposed surfaces for long-lasting, reliable connections.

PVC



Liquidtight Flexible Nonmetallic Liquidtight Type A Conduit Connectors provide a liquidtight, dust tight connection between flexible, nonmetallic conduit and an enclosure.

- Serrated design provides high mechanical pullout strength.
- Unique component parts (body/gland) design insures positive seal between conduit and connector.
- Tapered thread hub and sealing 'O' ring provide a liquidtight/ dust tight seal to a box or an enclosure.
- High strength, chemical resistant, non-burning, non-dripping thermoplastic construction.

PVC



XtraFlex® Liquidtight Flexible Conduit insures fast, easy installations and long-lasting, high performance in a variety of environments. Constructed of PVC, available in black and gray.

- Fast installation – even in tight, cramped spaces.
- Smooth outer jacket – approved for outdoor use, sunlight resistant and oil resistant. Smooth inner diameter allows easy wire pulling.
- Tested to CSA and UL requirements.
- Marked at one-foot intervals for fast, easy measuring.
- Temperature Range: Black -18°C to +105°C (-2°F to +221°F)

Gray -18°C to +80°C (-2°F to +176°F)

SPECIFICATION

- Specify the raceway system to be NEMA 6P listed for submersion.

PVC



Liquatite® Flexible Conduit – Nonmetallic. This non-metallic liquidtight conduit is ideally suited for continuous flexing situations. It is often specified in "Power Track" or cable carrier installations and on industrial robots. It does not contain a metal core which could fatigue from repeated flexing or vibration.



PVC Coated



Interior urethane coating shown in sample cutaway

SPECIFICATION

SPECIFICATION

Ocal™ Blue PVC coated conduit and fittings represent a complete corrosion protection package for your entire conduit system. Ocal PVC coated conduit and fittings ensure corrosion protection that will extend the life of your electrical raceway system for many years of constant use.

- UL Listed with both the zinc coating and the PVC coating investigated and listed per UL 6.
- Full-undisturbed zinc coating under the PVC coating, fulfilling the requirement of NEMA RN-1 for undisturbed zinc coating.
- **Specify urethane coating on both inside and outside of fitting.**
- **Specify white color for easier visual inspection and to showcase a clean operation!**

Other corrosion-resistant materials are suitable for food processing plants. Aluminum is resistant to rust, oil and other liquids and may provide a cost-effective solution for your

routine maintenance schedule. Additionally, T&B utilizes custom coatings and highly engineered designs to ensure reliable connections in caustic washdown applications.

Polycarbonate (DuraV®)



SPECIFICATION

SPECIFICATION

DuraGard® connectors are designed to be watertight whether mated or unmated (1000 PSI rated), thus offering the ultimate waterproof connection. DuraGard connectors are also UL94-V0 flame rated for safety and utilize a durable, efficient pin and sleeve contact design that is voltage polarized to meet NEC210-7 and OSHA standards.

- Specifically designed for wet environments with a unique sealing system.
- Superior performance in corrosive environments.
- High visibility yellow housings.
- Eliminates need for costly "weather boots" or "adapters".
- **Specify that connectors are to be watertightmated and unmated.**
- **Specify that connectors be listed and may be disconnected while under load.**

Kynar Coating



Hazlux® enclosed and gasketed fixtures for adverse, wet and marine locations integrate a totally sealed fixture design. These lights feature cast aluminum parts and stainless steel inserts and are suitable for highly corrosive washdown areas. Meets NEMA 4X.

- Safety coated glass globe has a silicone coating to restrain glass particles in case of breakage; prevents glass from contaminating process areas.
- HazCote® Custom Corrosion Resistant Coating (Kynar) provides higher degree of corrosion protection for cast aluminum parts.
- All external hardware is stainless steel or nonmetallic.



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Aluminum



Liquidtight
Conduit
Fitting

Ranger® Cord
Fitting

Aluminum Liquidtight and Cord Connectors are designed to handle the unique connection demands of flexible cord and power cable applications. Use where exceptional mechanical strain relief is needed in addition to a dependable seal against dust, oil, and other liquids.

- Neoprene bushing to make liquidtight installations by applying pressure against the cable for the full length of the bushing.
- CSA certified watertight, and UL listed for liquidtight strain relief and as an outlet bushing.
- Capable of accepting a wide range of cords.



Weatherproof Boxes

Applications:

- Industrial grade FS device boxes and raintight covers protect wiring devices, switches, electronic components, and terminal blocks in dry, damp and wet locations.
- Spacious, accessible wiring chamber provides a convenient location to maintain or change a system, pull conductors and make splices.
- Junction for branch conduits.
- Aluminum boxes can be used with steel rigid conduit.

Features/Benefits:

- Copper-free* aluminum, stainless steel cover springs and hinge pins provide increased corrosion resistance.
- Boxes with securely fastened mounting plates and industrial designed covers combine to produce a rugged protective enclosure for devices on industrial and OEM applications.
- Clean cover edges provide good gasket sealing.
- Precision NPT threaded hubs allow trouble-free field installation for rigid or IMC conduit.
- Clear UL, CSA and cubic content markings speed approval by inspectors.
- Boxes – external hub design provides increased wiring room.

Standard Materials:

- C1FD and C1FS Boxes: Rugged sand cast aluminum (copper free*)
- C1FS Covers: Stamped aluminum
- Other Covers: Die cast aluminum alloy A360 (copper-free*)
- Cover hinge pins and springs: Stainless steel

* Less than 0.004% copper content