

Information and Products for use in Washdown Settings



Thomas&Betts

Washdown Settings



Washdown settings demand the highest performance electrical components for power distribution to equipment, devices, switchcraft, appliances and lighting systems. Washdown procedures demand connections capable of exceeding direct blasts of water up to 250 psi without failing either by becoming infiltrated with water or by becoming disengaged during the water blast. Additionally, it is of vital importance that all connections used in washdown areas are resistant to corrosion or rust due to any residual or standing water remaining even after blowdown operations. Water and corrosion from water are two of the greatest threats to safe and reliable connections in food and beverage manufacturing. The estimated cost of corrosion to the food processing industry alone exceeds \$2.1 billion annually, not including labor and downtime involved in equipment failure. Stainless steel is widely used in this industry because of food quality requirements and its excellent corrosion resistant properties. There are, however, many other materials and designs that are equally suitable for washdown settings found in beverage production, food machinery, cutlery and utensils, commercial and restaurant equipment and other appliances. Thomas & Betts electrical products are designed, manufactured and tested to function fully in a broad range of NEMA requirements, giving you multiple time- and cost-saving options and materials to address your specific application.

In your production processes, it is necessary to first determine either the NEMA or Ingress Protection (IP) rating for your washdown setting. NEMA and IP ratings for electrical components are a means of classifying the degrees of protection from dust, water and impact afforded by electrical equipment and enclosures. NEMA ratings include degrees of protection against mechanical damage of equipment, risk of explosions, or conditions such as moisture, corrosive vapors, fungus, or vermin. Using numerals one through thirteen, the NEMA Standard for Enclosures for Electrical Equipment tests for environmental conditions such as corrosion, rust, icing, oil, and coolants, along with adherence to other trade standards. An IP rating, developed by CENELEC, includes some of the same characteristics but is not identical to the NEMA rating.

The IP designation consists of the letters "IP" followed by two numerals. The first digit indicates the degree of protection provided by the enclosure with respect to persons and solid foreign objects entering the enclosure. The second digit indicates the degree of protection against water.



The cleaning and sanitizing of food plant equipment is essential for providing a safe food supply.

Some questions to consider in your determination of the appropriate connectors:

- 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?
- Which pin and sleeve plugs and receptacles work best for washdown and blowdown applications?
- Are there alternative materials that offer a budget-conscious solution without sacrificing quality or safety?

The charts on the next two pages provide a brief explanation of most common NEMA or IP classifications for the range of washdown areas in food and beverage processing plants. Additionally, some selected T&B products are highlighted that provide excellent solutions for your maintenance and new construction near washdown locations in your plant.

Washdown Settings



Understanding NEMA Ratings

Correctly specifying the proper performance required for your application is essential to ensuring the longevity of the installation and the total cost of ownership.

Comparison of Specific Applications of Enclosures for Indoor Nonhazardous Locations (from NEMA 250-2003, Table 1)

INDOOR <i>Provides a Degree of Protection Against the Following Environmental Conditions</i>	Type of Enclosure – INDOOR									
	1*	2*	4	4X	5	6	6P	12	12K	13
<i>Incidental contact with the enclosed equipment</i>	X	X	X	X	X	X	X	X	X	X
<i>Falling dirt</i>	X	X	X	X	X	X	X	X	X	X
<i>Falling liquids and light splashing</i>	-	X	X	X	X	X	X	X	X	X
<i>Circulating dust, lint, fibers and flyings**</i>	-	-	X	X	-	X	X	X	X	X
<i>Settling airborne dust, lint, fibers and flyings**</i>	-	-	X	X	X	X	X	X	X	X
<i>Hosed down and splashing water</i>	-	-	X	X	-	X	X	-	-	-
<i>Oil and coolant seepage</i>	-	-	-	-	-	-	-	X	X	X
<i>Oil or coolant spraying and splashing</i>	-	-	-	-	-	-	-	-	-	X
<i>Corrosive agents</i>	-	-	-	X	-	-	X	-	-	-
<i>Occasional temporary submersion</i>	-	-	-	-	-	X	X	-	-	-
<i>Occasional prolonged submersion</i>	-	-	-	-	-	-	X	-	-	-

* These enclosures may be ventilated.

** These fibers and flyings are nonhazardous materials and are not considered Class III type ignitable fibers or combustible flyings. For Class III type ignitable fibers or combustible flyings, see the National Electrical Code, Article 500.

Comparison of Specific Applications of Enclosures for Outdoor Nonhazardous Locations (from NEMA 250-2003, Table 2)

OUTDOOR <i>Provides a Degree of Protection Against the Following Environmental Conditions</i>	Type of Enclosure – OUTDOOR						
	3	3R*	3S	4	4X	6	6P
<i>Incidental contact with the enclosed equipment</i>	X	X	X	X	X	X	X
<i>Rain, snow and sleet**</i>	X	X	X	X	X	X	X
<i>Sleet***</i>	-	-	X	-	-	-	-
<i>Windblown dust, lint, fibers and flyings</i>	X	-	X	X	X	X	X
<i>Hosedown operations</i>	-	-	-	X	X	X	X
<i>Corrosive agents</i>	-	-	-	-	X	-	X
<i>Occasional temporary submersion</i>	-	-	-	-	-	X	X
<i>Occasional prolonged submersion</i>	-	-	-	-	-	-	X

* These enclosures may be ventilated.

** External operating mechanisms are not required to be operable when the enclosure is ice covered.

*** External operating mechanisms are operable when the enclosure is ice covered.

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High productivity depends upon failure-proof components that are capable of handling large and varied production tasks.



Washdown Settings



Understanding IP Ratings

Correctly specifying the proper performance required for your application is essential to ensuring the longevity of the installation and the total cost of ownership (TCO).

Degrees of Protection Provided by Enclosures - IP Ratings

European Committee for Electrotechnical Standardization (CENELEC)

DEGREE OF PROTECTION (First Number in Code)			DEGREE OF PROTECTION (First Number in Code)		
	Brief Description	Definition		Brief Description	Definition
0	Non protected	-	0	Non protected	-
1	Protected against solid foreign objects of 50mm diameter and greater.	The object probe, sphere of 50mm diameter, shall not fully penetrate. ¹	1	Protected against vertically falling water drops.	Vertically falling drops shall have no harmful effects.
2	Protected against solid foreign objects of 12.5mm diameter and greater.	The object probe, sphere of 12.5mm diameter, shall not fully penetrate. ¹	2	Protected against vertically falling water drops when enclosure is tilted up to 15°.	Vertically falling drops have no harmful effects when the enclosure is tilted at any angle up to 15° on either side of the vertical.
3	Protected against solid foreign objects of 2.5mm diameter and greater.	The object probe, sphere of 2.5mm diameter, shall not penetrate at all. ¹	3	Protected against spraying water.	Water sprayed at an angle up to 60° on either side of the vertical shall have no harmful effect.
4	Protected against solid foreign objects of 1mm diameter and greater.	The object probe, sphere of 1mm diameter, shall not penetrate at all. ¹	4	Protected against splashing water.	Water splashed against the enclosure from any direction shall have no harmful effects.
5	Dust-protected	Ingress of dust is not totally prevented, but dust shall not penetrate in a quantity to interfere with satisfactory operation of the apparatus or the impair safety.	5	Protected against water jets.	Water projected in jets against the enclosure from any direction shall have no harmful effects.
6	Dust-tight	No ingress of dust.	6	Protected against powerful water jets.	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects.
			7	Protected against the effects of temporary immersion in water.	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed 1 meter in water under standardized conditions of pressure and time.
			8	Protected against the effects of continuous immersion in water.	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is continuously immersed in water under conditions which shall be agreed between manufacturer and the user, but are more severe than for number 7.



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¹ The full diameter of the object shall not pass through an opening of the enclosure

Washdown Settings



DuraGard® – The Ultimate in Safety and Performance

Severe environments and high pressure washdown applications require durable, waterproof and safe connections. DuraGard® connectors offer exceptional safety standards for truly waterproof connectors. While many watertight specifications cover mated connections only, DuraGard® connectors are designed to be watertight mated or unmated 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. Specify DuraGard® pin and sleeve connectors for maximum safety durability and performance.



Shrouded pins and sleeves are protected from damage and inadvertent access. Locking housing screw collars provide for a reliable, long lasting connection, with electrical contacts separate.

The DuraGard® Performance Difference

Not just “watertight”; waterproof for washdown duty

- Specifically designed for wet environments with our unique sealing system. Unit is watertight mated or unmated.
- Eliminates need for costly “weather boots” or “adapters”.
- Compact Size.
- “Lockout Ready” plugs have padlock access hole in front.



Safe and Reliable Power Connections: Pin and Sleeve, Voltage Polarized

- **Long Life:** Round, Self Cleaning, Constant Pressure Pin and Sleeve Contacts of Solid CDA 360 brass for long reliable electrical life.
- **More Power, Operates Cooler:** Large circular electrical contact area allows more current flow with lower temperature rise.
- **Ground Pin Keyed for Voltage Polarization** (O-ring seal)

Easy To Wire

- **“No twistoff” Locking Plugs:** Integral Threaded Screw Collars and Compression type Bushings make wiring a snap.

- **Fast Assembly and Wiring:** “Drop-In” rear loaded interiors use no assembly screws, versus 3 to 5 or more with other connectors. 30/50A connectors also use unique EZ Tite® external gland lock screw, also.

Durable, Tough and Flame Safety Rated Housings

- DuraV® housing material specially selected for hot or cold washdown applications.
- Flame safe UL94-V0 rated housings.
- Superior performance in corrosive environments.
- High visibility yellow housings.



Non-watertight plug failure due to water getting into wiring chamber.

DuraGard® plugs, connectors, receptacles and interlocks are supplied in 20A - 50A versions; 2P3W and 3P4W; 600 VAC.



Systems designed for high-pressure washdown offer advantages from choosing components from different suppliers. T&B offers several systems uniquely designed to exceed nominal performance ratings for

washdown environments and, at the same time, provide unique safety features and savings through lower overall installation costs.



SPECIFICATION

The BULLET® Nonmetallic Fitting (submersible rated) provides a reliable liquidtight seal that combines high pullout resistance and ease of installation. Installations can be 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 provide space savings.
- Captive sealing "O" ring features predetermined compression to provide a reliable seal at enclosure.
- **T&B system offers submersible ratings of NEMA 6P** when installed with T&B XtraFlex® conduit (shown upper left).

Hazlux® Fluorescent Lighting Fixtures are suitable for high pressure washdown areas. As a totally sealed fixture design, **they are tested at 1500 PSI over 60 minutes at 5' and 10' distances.** The lights operate in a corrosion resistant nonmetallic housing with an extruded aluminum interior assembly. A clear, impact resistant, acrylic lens provides safe, bright illumination in your washdown location.



- All external hardware is stainless steel or nonmetallic.
- Silicone gasket permanently mounted in end cap.
- Many 2, 4 and 8 foot models with multi-lamp T8 or T12 designs.

DuraGard® connectors are designed to be watertight 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.



SPECIFICATION

SPECIFICATION

- 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.**



Water can even seep into PVC coated conduit runs while being discharged under the pressure of plant cleaning equipment. T&B recommends that installers specify Form 8 Conduit bodies rather than Form 7 in washdown areas

that may receive large amounts of potential liquids under pressure. Covers should be installed to face the splash area.



T&B Form 8 Conduit Bodies provide pull outlets, 90° bends, splices, taps, and mounting outlets for your electrical raceway system. Form 8 bodies are designed for heavier conductors and have a larger cubic inch capacity than Form 7 bodies. The covers utilize stainless steel screws that tap directly into the wall of the conduit body, providing higher resistance to water in splash areas.

- Sand cast class 30 gray iron alloy bodies, sand cast gray iron alloy covers and Neoprene gaskets.
- Meet all UL test requirements for wet locations.
- T&B Form 8 bodies and covers are interchangeable with Form 8 bodies and covers from other manufacturers.
- **T&B recommends specifying Form 8 for better performance.**



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



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



The T&B Stainless Steel I.D. Tagging system includes a complete range of individual letters, numbers, and symbols. Slip them over carriers or strips and attach to your cable or hose with a variety of Thomas & Betts Stainless Steel Cable Ties.