

Enclosures Overview and Selection

Enclosures are an essential part of industrial, municipal, and practically any application involving electrical, control and automation systems. Learn about the many types of enclosures, their specific features and how to select the best enclosure for your application.

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What is an Electrical Enclosure?

An electrical enclosure is a purpose-built cabinet designed to house electrical and electronic devices, providing the required protection to keep operators/personnel safe from electrical shock hazards and devices protected from hazardous environments as well as accidental damage.

Today's enclosures are built to provide a lifetime of service when the correct enclosure is used to meet the specific needs for a service or application. A properly selected and installed enclosure in an industrial environment not only maintains a better appearance over time, it also does a better job protecting personnel and the components installed inside it. To ensure the best enclosure is selected, the designer must understand the many important considerations for industrial installations.

The following sections include some well-recognized guidelines that help ensure proper enclosure selection. Determining these variables as accurately as possible guarantees safety and years of reliable service.

Determine Required Protection Ratings

Your enclosure's primary function is to protect the equipment inside it from the surrounding environment. Therefore, if you need an enclosure, then you need to understand the environment where the enclosure will be located and select the appropriate level of protection.

The primary method of standardized enclosure protection classification used in North America is the NEMA rating system, established by the National Electrical Manufacturers Association (NEMA). In the rest of the world, Ingress Protection (IP) codes based on International Electrotechnical Commission (IEC) standards are the prevailing classification system, though these ratings are sometimes used in North America. Therefore, in order to properly select an enclosure for an application, we must know what environmental hazards the enclosure must protect against and what NEMA rating or IP code provides the desired level of protection.

Neither NEMA nor IEC actually tests products; they establish the performance criteria for enclosures intended for specific environments. Their standards describe each type of enclosure in general and in functional terms, and specifically omit construction details. In other words, they specify what an enclosure must do, not how to manufacture it.

NEMA Ratings

NEMA performance criteria and test methods are used by Underwriters Laboratories (UL) and the Canadian Standards Association (CSA) as guidelines for investigation and listing of electrical enclosures. The tested enclosures are then authorized to carry a label endorsed by UL or CSA to prove it has passed the required tests and meets the applicable UL or CSA standard.

The table below provides descriptions of typical NEMA ratings along with the level of protection they provide. Use this table to determine the level of protection required in your specific environment and surroundings. Keep in mind that it is just as important not to over-specify the protection level of your enclosure as it is to under-specify, as increasing the protection level typically increases the cost of the enclosure.

Enclosure NEMA Ratings	
Rating	Protection Description
NEMA 1	Provides minimal protection. Basically, these enclosures protect personnel from electrical hazard and are used for applications where sealing out dust, oil, and water is not required.
NEMA 2	Used primarily for indoor use and provide a degree of protection against limited amounts of falling water (not under pressure) and dirt.
NEMA 3	Intended for outdoor use and provide a degree of protection against windblown dust, rain, sleet, and external ice formation.
NEMA 3R	Typically used in outdoor applications for wiring and junction boxes and provide protection against falling rain, sleet, snow, and external ice formation. When used indoors they protect against dripping water.
NEMA 3RX	Basically the same as NEMA 3R enclosures, but they provide an additional level of protection against corrosion.
NEMA 3S	Intended for outdoor use and provide a degree of protection against windblown dust, rain, sleet, and to provide for operation of external mechanisms when ice laden.
NEMA 4	Used for applications where occasional wash-downs take place or where machine tool cutter coolant is used. They also protect in applications where a pressurized stream of water is used.
NEMA 4X	Used in harsh environments where corrosive materials and caustic cleaners are used. Applications include food, such as meat/poultry processing facilities, where total wash-down with disinfectants occur repeatedly, and petrochemical facilities, including offshore petroleum sites.
NEMA 5	Intended for indoor use to provide a degree of protection against settling airborne dust, falling dirt, and dripping non-corrosive liquids.
NEMA 6	Intended for indoor/outdoor use and to provide a degree of protection against water entry during occasional, temporary submersion at a limited depth.
NEMA 6P	Intended for indoor/outdoor use and to provide a degree of protection against the entry of water during prolonged submersion at a limited depth.
NEMA 12	Intended for indoor use to provide a degree of protection against drips, falling dirt, dripping non-corrosive liquids, and circulating dust, lint, and fibers.
NEMA 12K	Enclosures with knock-outs intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping non-corrosive liquids other than at knock-outs.
NEMA 13	Intended for indoor use and provide a degree of protection against dust, spraying of water, oil, and non-corrosive coolant.

IP Ratings

IP ratings refer specifically to ingress of water (liquids) and solid objects, in other words, Ingress Protection, hence "IP". IP and NEMA ratings are not related and there is no conversion between the two.

The rating's numerical portion provides a reference to the type of ingress protection the device provides. The first number refers to the ingress limits for solids while the second number refers to ingress limits for liquids. The letter "K" added after the number reference refers to special testing with high-pressure water jets, originally developed for road vehicles and later adopted by food, beverage, pharmaceuticals, medical and other industries that required frequent high-temperature and high-pressure wash-downs to ensure sanitary conditions.

Just as mentioned with NEMA ratings, keep in mind that it is just as important not to over-specify the protection level of your enclosure as it is to under-specify, as increasing the protection level typically increases the cost of the enclosure.

Use the tables below as reference for IP ratings:

IP Ratings for Solids		
Rating	Protects From	Protection Description
0	No Protection	No protection from ingress of objects
1	Objects larger than 50mm	No ingress of objects larger than 50mm (i.e., hands but not fingers)
2	Objects larger than 12.5mm	No ingress of objects larger than 12.5mm (i.e., fingers or similar)
3	Objects larger than 2.5mm	No ingress of objects larger than 2.5mm (i.e., screwdriver or similar)
4	Objects larger than 1mm	No ingress of objects larger than 50mm (i.e., wires, large bugs, or similar)
5	Limited dust ingress protection	No ingress of most dust particles, but not complete ingress
6	Full dust Ingress Protection	No ingress of dust (dust tight), Surpasses previous protection limits

IP Ratings for Liquids		
Rating	Protects From	Protection Description
0	No Protection	No protection from ingress of liquids
1	Straight water drops	No vertical water dripping ingress (i.e., 1mm rainfall/minute)
2	Water dripping at 15° angle	No water drop ingress at 15° angle (i.e., 3mm rainfall/minute)
3	Water dripping at 60° angle	No water drop ingress at 60° angle (i.e., water spray nozzle)
4	Water splash, all directions	No water splash ingress from any angle
5	Water Jets	No ingress from a 4.4 PSI (0.3 Bar) water jet at 3m distance from any angle
6	Powerful water jets	No ingress from a 14.5 PSI (1 Bar) water jet at 3m distance from any angle
6K	High power water jets	No ingress from a 145 PSI (10 Bar) water jet at 3m distance from any angle
7	Up to 1m water immersion	No ingress from immersion of lowest part up to 1000mm below water surface
8	Over 1m water immersion	No ingress from immersion of lowest part up to 3m below water surface
9K	High pressure and temperature water jets	No ingress up to 1,100 to 1,450 PSI (80 to 100 Bar) close range water jet pressure with water up to 176° F (80° C). Surpasses previous protection limits.

Determine Enclosure Size

When considering the size required for an enclosure, it is easy to assume that if the enclosure is big enough to fit all your equipment and devices, then the enclosure will work. In addition to the size of the internal components, there is much more to consider when sizing an enclosure. Examples of things to consider are:

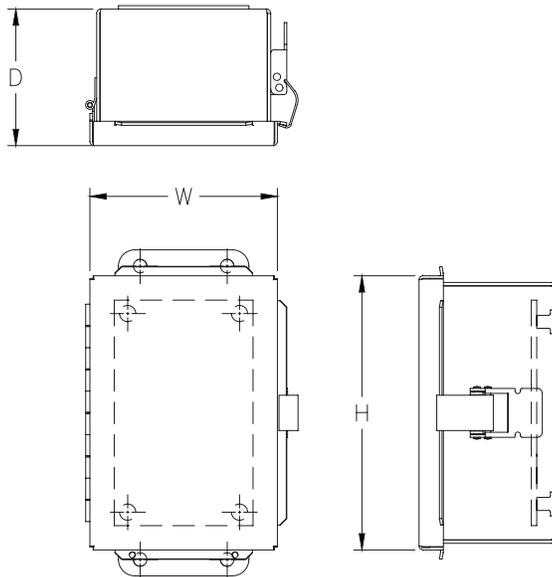
- Size of components and devices
- Manufacturers' recommended space tolerances for all devices
- Heat dissipation for heat generated by components and devices
- Adequate space for wires, cables and wiring ducts and conduits
- Adequate space for subpanels, mounts and DIN rails, as these will typically add depth requirements
- Space required to properly fit HMIs or any device installed on the enclosure door/cover
- Venting requirements
- Thermal management requirements

To determine the size of your enclosure:

1. Create a design showing how the equipment and components inside the enclosure will be laid out. Make sure you don't leave anything out (wire duct, terminal blocks, space for routing wires, etc.) and remember to allow space for subpanel mounting holes, cable entry, protrusions for externally-mounted items like HMIs or air conditioners, and any possible future additions. Remember to place the components and devices with enough spacing between them to prevent overheating, and allow enough space if the device needs to be adjusted. The manufacturer for each device should list any space requirements or tolerances in their manuals or specifications.
2. Remember to allow space for heat dissipation. If you have estimated component sizes or heat generation, it's always better to oversize the enclosure when you have the available space. For additional information on thermal management requirements, refer to the thermal management section later in this document.
3. Estimate the height and width for your enclosure from your design. If you are planning to use a subpanel, remember that the subpanel will be slightly smaller than the enclosure.
4. Determine the required enclosure depth. Remember that the subpanel mounting takes up a small portion of the depth. Also, any pushbuttons, operator interfaces, indicators, meters, etc., that you plan to mount on the enclosure door will occupy some enclosure depth. Be sure to account for every component and any wiring that will be included with this enclosure.

IMPORTANT: Enclosure descriptions typically include specifications of the enclosure's size. These are typically nominal sizes, not actual dimensions. Their correlation to actual dimensions may vary depending on the manufacturer and the style of the enclosure. Even if the dimensions in the description are actual dimensions, you don't know what those dimensions actually mean - the depth dimension may be overall depth, the depth of the enclosure tub (not including the door), the depth from the subpanel to the inside of the door, etc. **ALWAYS REVIEW THE ENGINEERING DRAWING FOR DIMENSIONAL DATA WHEN SELECTING AN ENCLOSURE. NEVER SELECT AN ENCLOSURE SOLELY FROM THE DIMENSIONS IN THE DESCRIPTION.**

Also keep in mind that the design may go through multiple iterations as you work through the selection process, as there may be many different sizes and configurations (number of doors, mounting, etc.) that suit your application.



Determine Security Requirements

Depending on the operation/application, the enclosure may require additional protection against unauthorized access to internal components. An enclosure might require this protection if it contains sensitive control equipment that must only be adjusted by authorized personnel or if it's accessible in an area where you want to ensure no one has direct access to the enclosure contents. To help provide this added protection, enclosure manufacturers offer a wide variety of security devices. For low-risk installations, a screw cover, lift-off cover, or single door with clamps may be sufficient. In higher risk installations, an enclosure with keylocking and/or padlocking capabilities may be needed.



When the enclosure requires added security, a lock or lockable latch can provide the means to latch and lock an enclosure door securely. Every enclosure manufacturer provides various types and styles of locking devices designed to fit and work efficiently with their enclosures. Here's a few examples of locks and keylocks. Refer to the manufacturer's online catalog to find the options available for your specific enclosure.

Other types of latch locking systems are the electrical interlock system and the defeater. These types of locking systems are available from a few manufacturers and are usually made for specific enclosure models.



The electrical interlock is designed to prevent the door handle from being turned, ensuring no one can access the enclosure when it is activated. This allows designers to wire the lock to only open when some specific actions are taken, ensuring the enclosure cannot be accessed until it is completely safe for the operator or authorized personnel to do so. These interlocks are usually designed to fit handles for specific enclosures.

A defeater is basically an electrical interlock that operates with a keyed momentary contact switch. When the key is turned, the interlock is disabled, which causes the latch to unlock, allowing access to the enclosure contents.



Determine Enclosure Type

Enclosures are designed in a range of shapes and sizes to serve various applications. When deciding what enclosure type would be best for your application, it is important to know and understand all the variables that will affect this enclosure. Here is a list of most of the common variables affecting what enclosure type to select:

- Where will the enclosure be located?
- What type of service will it provide?
- Will it be wall mounted, floor mounted, freestanding?

Knowing the information above, now you can browse through the list of enclosure types and determine which enclosure will be the best fit for your installation. The following is a list of enclosure types along with a brief description of each to help you determine the best type to use:

- **Wall-Mount Enclosures:** General purpose, surface-mounted enclosures used for a wide variety of applications with broad range of sizes, ratings, and features.
- **Floor-Mount and Freestanding Enclosures:** Commonly used for larger applications involving motor starters, drives, contactors, and PLCs as well as a wide variety of other electrical and electronic equipment.
- **Junction Boxes:** Designed for use as surface-mounted junction boxes, service boxes, switch boxes and cutout boxes. Many NEMA 1 and NEMA 3R junction boxes include pre-punched knockouts for easier cable entry.
- **Pushbutton Enclosures:** Pushbutton enclosures with standard openings to fit 30.5mm or 22.5mm mount pushbuttons, switches and pilot lights in standard arrangements. Also available in blank cover models that allow customer to determine the configuration. Available in various NEMA ratings for dirt, dust, oil and water protection.
- **Disconnect Enclosures:** Used to house disconnects from many manufacturers, these enclosures offer NEMA 4, 4X, 12 or 4/12 protection in wall-mount, floor mount and free-standing versions.
- **Consoles and Consolets:** Typically used to house electrical and electronic controls and/or instruments. Sloped surface models can be used to mount pushbuttons, pilot lights, meters, switches and other devices. Heavy duty construction protects contents from dirt, dust, oil and water.

- Freestanding Consoles
- Console Tops
- Writing Desks
- Operator Consoles
- Pushbutton Consolets
- Pedestals and Bases



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- **Wireways and Fittings:** Designed to protect wiring.
- **Sloped Top Enclosures:** Designed for wash-down environments the sloped top and the angled door flanges to eliminate horizontal surfaces to prevent the accumulation of water. So are the carbon steel models.
- **Windowed and Clear Covered Enclosures:** Enclosures with a window or clear cover allow a view inside the enclosure without opening the door and exposing the internal components.
- **Dual Access Enclosures:** Designed to protect electrical and electronic controls, components, and instruments in typical industrial environments with dust, dirt, oil and dripping water. Dual access enclosures are designed to provide additional access from the rear side of the enclosure if necessary.
- **Flush-Mount Enclosures:** Wall-mount enclosures with an external frame that allows it to be recessed in wall. These enclosures are typically used in applications where external space is limited or in high traffic areas.



Enclosure Construction Materials

Today's electrical enclosures have become more advanced, with sealing systems, security accessories, and more. One of the areas where enclosures have evolved is in the construction materials. Today we have metallic and non-metallic enclosures that provide many benefits, ranging from easy and quick installation to resistance to highly corrosive conditions.

To assist in deciding what material might be best for your application, the following list provides information on the most common materials available today, along with their description and benefits:

- **Carbon Steel:** Also commonly referred to as LowCarbon Steel or Mild Steel, these enclosures are very common in many industries and are the most cost-effective choice for metallic enclosures used for indoor applications. These enclosures are not resistant to corrosion so to protect against deterioration, manufacturers treat all carbon steel enclosures with a protective paint covering, consisting of an initial layer of primer, followed by a layer of high-quality powder paint coating that provides a more efficient scratch-resistant finish. Finishes range from smooth to textured. The most common paint colors are ANSI 61 gray and RAL 7035 light gray. However, this doesn't mean that the surface will resist a scratch from a strong accidental collision with another object. In the event the enclosure becomes scratched, the scratch must be repaired immediately with touch up paint to ensure the unit maintains corrosion protection.
- **304 Stainless Steel:** This type of stainless steel is an alloy that contains an iron base with approximately 18% to 20% chromium. This alloy provides corrosion resistance from corrosive solvents, alkalis, and some acids, making them ideal for applications requiring wash-downs with caustic cleaners. 304 Stainless steel enclosures can be used for indoor or outdoor applications.
- **316 Stainless Steel:** This type of stainless steel is an alloy containing molybdenum, which provides an even better resistance to corrosion than 304 stainless steel. This alloy provides increased resistance to sea water, chlorine sulfates, bromides, other acids and high temperatures. This added resistance makes 316 stainless steel enclosures ideal for pharmaceutical, food and beverage, marine applications, and inside/outside applications.
- **316L Stainless Steel:** This stainless steel alloy has a lower carbon content than 316 types, which makes it more resistant to decay resulting from welding on the enclosure or exposure to temperatures over 425 °C. The lower carbon content increases resistance to very high temperature and highly corrosive applications. It is commonly used for marine and construction applications because of its durability.

- **Aluminum:** Aluminum enclosures are lighter and more economical than other metallic enclosures and are ideal for industrial applications for solar, telecommunications, traffic control, and water and wastewater applications. In addition, these enclosures work well in harsh conditions and high-heat environments, and are lightweight.
- **Fiberglass Reinforced Polyester:** These non-metallic enclosures are commonly described as fiberglass or FRP enclosures. These lightweight enclosures are usually easy to install and modify when drilling is required. However, make sure that if modifications are made, all openings are properly sealed to maintain the NEMA rating of the enclosure. These enclosures are considered strong enough to resist normal impacts and can resist corrosive environments, and installations near high-temperature conditions. Some fiberglass enclosure models are designed to be temporarily submerged in water while maintaining the required protection.
- **Polycarbonate:** These non-metallic enclosures are made from thermoplastic polymers. The advantages of polycarbonate enclosures include a higher degree of impact resistance than other non-metallic enclosures, UV resistance, ease of installation and modification since holes and cutouts are cleaner, and no requirement for sanding or finishing. They resist weather conditions better, are available with clear covers or windows for viewing contents without opening, and are ideal for housing instrumentation, controls, and sensitive equipment.
- **PVC:** These non-metallic enclosures are very cost-efficient, have a high degree of impact resistance, are UV resistant, non-conductive, are easier to install and to modify because holes and cutouts are cleaner, and require no sanding or finishing. They are available with clear covers or windows for viewing contents without opening, and are ideal for housing small junction circuits, cabling, and applications requiring watertight and dust-tight seals.
- **Thermoplastic ABS:** Commonly known as ABS enclosures, these enclosures have a high degree of impact, heat and corrosion resistance, are non-conductive, and are ideal for FDA controlled food and beverage (natural beige or black ABS), pharmaceutical and medical applications. These enclosures are also ideal for use for wireless equipment such as WiFi, Bluetooth, and radio frequency technologies, as well as communications panels. ABS enclosures are easy to install and modify because holes and cutouts are cleaner and require no sanding or finishing. They are available with clear covers or windows for viewing contents without opening, and when taken out of service they are fully recyclable.

Important Note: While stainless steels, aluminum, and non-metallic materials are all considered "corrosion resistant," all of them have compatibility limitations. Always check to ensure that the material you select has adequate resistance to whatever corrosive agents or other environmental exposures that you expect your enclosure to be exposed to.

Determine Thermal Management Needs

If the enclosure is inside a building or office, and has minor controls or devices inside it, it will probably not require any thermal management. However, many industrial enclosures housing critical devices and components must be able to dissipate the heat generated by the components inside of it, either alone or by adding a cooling device. Additional cooling may be achieved by upsizing your enclosure to increase the surface area through which heat is transferred to the atmosphere.

If additional cooling is required, remember that the heat dissipation method you select must be compatible with the enclosure's NEMA rating. For some applications, a simple louver plate will provide adequate heat dissipation. A fan kit and louver combination would be the next most economical ventilation option. For small enclosures, a vortex cooler using compressed air can be considered. A sealed enclosure may require a heat exchanger or an air conditioner controlling the internal temperature without introducing outside air and its contaminants.

An enclosure may also require heating where environmental conditions are conducive to condensation and/or ice formation inside the enclosure. In most cases, enclosure heating is not used to keep internal components warm. In fact, most electric and electronic components perform better at colder temperatures. The exception is when an enclosure is installed outside in an area where ambient temperatures dip well below freezing. In these situations, heating is required to keep internal temperatures within the operating range of electrical components.

More typically, heating is needed to reduce moisture and related corrosion. The goal of enclosure heating is to keep the relative humidity inside the enclosure below 65%. A consistent temperature inside a control enclosure helps guarantee optimal operating conditions and prevent condensation. In some applications, an enclosure may need to be cooled during the day and heated at night.

Because thermal management selection for an enclosure includes many possibilities and variables to consider, this document does not include everything you need to know to design or select the proper solution. If you need help determining what type of thermal management system to use, refer to our "How to Select and Size Enclosure Thermal Management Systems" white paper, which provides detailed information on system design and selection. To see this white paper, go to: <http://go2adc.com/thermal-mgmt>



Determine Required Enclosure Accessories

Suppliers like AutomationDirect offer a wide range of accessories for enclosures that help make more efficient installations and provide any feature necessary for your project. The following is a list of many accessories available through AutomationDirect:

- **Subpanels, Swing-out Panels, and Dead Front Panels:** These panels provide a surface to install components in different areas of the enclosure without compromising NEMA ratings and make it helpful to complete installations. 
- **Adjustable Depth Mounting Kits, Support Kits, and Central Panel Support:** These kits are made for specific enclosure makes and models. Mounting kits provide a way to mount accessories (i.e., swing-out panels, DIN rails, rack angles, mounting channels and grid straps) at various depths. Support kits provide support for panels housing heavy components. Central panel supports adapt single-wide subpanels, swing-out panels or rack mount frames for mounting in double-door enclosures. 
- **Barriers:** Barrier kits for specific enclosures provide partial separation between power and control sections within one cabinet. Barrier kits are available in various sizes and materials. 
- **DIN Rails:** Provide a mounting surface for DIN mounted snap-on devices in enclosures. DIN rail is available in various lengths and pre-packaged quantities. Available kits include short pre-cut slotted rails with mounting hardware. 
- **Rack Mounting:** Rack mounting accessories allow installation of rack-style equipment in an enclosure. Rack mounts sell separately in various sizes for certain enclosure brands and styles. 
- **Terminal Block Strips, Brackets, and Straps:** Provide a strong, versatile means for mounting terminal blocks in specific enclosures. 
- **Alternative Mounting:**
 - ◆ **Floor Stand kits:** Kits used to set a wall-mount style enclosure on the floor or to elevate a freestanding enclosure. 
 - ◆ **Mounting Feet:** Mounting feet kits provide an easy way to securely mount an enclosure on a surface. 
 - ◆ **Pole Mounting Kits:** Pole mounting kits provide an easy way to mount enclosures to various pole sizes. 
 - ◆ **Casters:** Casters can be installed on enclosures to provide enclosure mobility. 
 - ◆ **Flush Covers:** Flush covers for specific enclosures provide a cover for junction boxes and are designed for flush mount installation requirements. 

- **Accessibility:**
 - ◆ **Drip Shield Kits:** Drip shields provide additional protection to enclosure doors from dripping water and settling dust.
 - ◆ **Deep-Hinged Doors:** Universal deep-hinged doors with concealed hinges for specific enclosures offer a viewing window for clear visibility.
 - ◆ **Window Kits:** Window kits are available in various materials are compatible with NEMA 4, 4X, 12 and 13 enclosures. Kits are fully gasketed and include all necessary hardware for installation.
 - ◆ **Locks and Latches:** Provide enhanced security options not available as a standard feature.
- **Folding Shelves:** Folding shelves provide temporary support inside or outside an enclosure for equipment weighing 35 pounds or less and fold down when not in use.
- **Grounding:** Ground lugs and wire are often needed to provide proper grounding for enclosures.
- **Print Pockets:** Print pockets provide storage that can be used to hold documents (i.e., small manual, blueprint). A double-sided adhesive flange allows for easy installation anywhere inside or outside any enclosure.
- **Cable Entry/Cable Management:**
 - ◆ **Cable Entry Systems:** Provide safe cable entry into enclosures or electrical equipment, secure cables and provide strain relief while maintaining enclosure sealing requirements.
 - ◆ **Cable Glands:** Provide cable entry into enclosures or electrical equipment, securing cables or wires and providing strain relief while maintaining enclosure sealing requirements. Available in plastic and metallic.
 - ◆ **Gland Plates:** Gland plates are designed to provide easy cable entry into the enclosure while maintaining a NEMA 4 or 12 rating.
 - ◆ **Electrical Connectors:** Connectors and fittings provide transitions between components of wired or piped systems.
 - ◆ **Wire Duct and Accessories:** Used to route, protect and/or organize electrical cables and wires, typically within a control panel. Rigid and flexible duct in a variety of sizes and styles offer installation flexibility; spiral wire wrap and braided sleeving allow easy wire grouping and protection.



Closing Thoughts

Enclosure layout and selection is often an iterative process, with many draft versions leading to the final design. Always make sure you have covered all required needs and allowed for any future expected additions. Once you have completed your design, always make one last check to ensure that your design fits your enclosure before placing an order.

ALWAYS REMEMBER that even if the dimensions in the description are actual dimensions, you don't know what those dimensions actually mean - the depth dimension may be overall depth, the depth of the enclosure tub (not including the door), the depth from the subpanel to the inside of the door, etc. **ALWAYS REVIEW THE ENGINEERING DRAWING FOR DIMENSIONAL DATA WHEN SELECTING AN ENCLOSURE. NEVER SELECT AN ENCLOSURE SOLELY FROM THE DIMENSIONS IN THE DESCRIPTION.**

In most cases, you will find that there are many available enclosures that will meet your requirements. Keep in mind that manufacturers often have different specific features for otherwise identical enclosures that meet your requirements - thinner or thicker materials, different types of latches and hinges, different finishes, etc. These aspects may or may not be important to you, but you should familiarize yourself with the differences.

One last important variable that should be considered is the availability of the enclosure. Enclosure availability varies considerably between manufacturers and suppliers. If there is an immediate need for the enclosure, it is best to use a supplier that stocks most of their enclosures or has fast drop shipping available. Make sure to review and consider lead times when making your decision.