HUBBELL-WIEGMANN

NEMA ENCLOSURES BASICS

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ENCLOSURE BASICS

An electrical enclosure serves to protect the electrical components inside the enclosure from the external environment that the enclosure is located in and to protect contact with the electrical components inside the enclosure by humans, animals, etc. Following are basic steps to take in determining what enclosure to specify depending on the application an enclosure will be used for and the environment an enclosure will be located in or near.

Determine the environment the enclosure will be used in to specify the NEMA Type rating needed for the application;

The below chart notes the different NEMA Type ratings. Wiegmann offers enclosures in the Type1, 3, 3R, 12, 4 and 4X ratings. Some select metal enclosures also have IP ratings, as do a majority of the non-metallic enclosures. Project or product spec may specify what the enclosure rating must be. The first thing that must be known – what rating is required for the enclosure.

ENCLOSURE TYPES NON-HAZARDOUS LOCATIONS			
TYPE DESIGNATION	**NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA STANDARD 250) AND ELECTRICAL AND ELECTRONIC MFG. ASSOCIATIONS OF CANADA (EEMAC)**	**UNDERWRITERS LABORATORIES INC. (UL 50 AND UL 508)**	**CANADIAN STADARDS ASSOCIATION (STANDARD C22.2 NO. 94)**
1	Enclosures are intended for indoor use primarily to provide a degree of protection against contact with the enclosed equipment or locations where unusual service conditions do not exist.	Indoor use primarily to provide protection against contact with the enclosed equipment and against a limited amount of falling dirt.	General purpose enclosure. Protects against accidental contact with live parts.
2	Enclosures are intended for indoor use primarily to provide a degree of protection against limited amounts of falling water and dirt.	Indoor use to provide a degree of protection against limited amounts of falling water and dirt.	Indoor use to provide a degree or protection against dripping and light splashing or non-corrosive liquids and falling dirt.
3	Enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, and sleet; undamaged by the formation of ice on the enclosure.	Outdoor use to provide a degree of protection against windblown dust and windblown rain; undamaged by the formation of ice on the enclosure.	Indoor or outdoor use; provides a degree of protection against rain, snow, and windblown dust; undamaged by the external formation of ice on the enclosure.
3R	Enclosures are intended for outdoor use primarily to provide a degree of protection against falling rain and sleet; undamaged by the formation of ice on the enclosure.	Outdoor use to provide a degree of protection against falling rain; undamaged by the formation of ice on the enclosure.	Indoor or outdoor use; provides a degree of protection against rain and snow; undamaged by the external formation of ice o the enclosure.
4	Enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure.	Either indoor or outdoor use to provide a degree of protection against falling rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure.	Indoor or outdoor use; provides a degree of protection against rain, snow, windblown dust, splashing and hose-directed water; undamaged by the external formation of ice on the enclosure.
4X	Enclosures are intended for outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure.	Either indoor or outdoor use to provide a degree of protection against falling rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure; resists corrosion.	Indoor or outdoor use; provides a degree of protection against rain, snow, windblown dust, splashing and hose-directed water; undamaged by the external formation of ice on the enclosure; resists corrosion.
6	Enclosures are intended for use indoors or outdoors where occasional submersion is encountered.	Indoor or outdoor use to provide a degree of protection against entry of water during temporary submersion at a limited depth; undamaged by the formation of ice o the enclosure.	Indoor or outdoor use; provides a degree of protection against the entry of water during temporary submersion at a limited depth; undamaged by the external formation of ice on the enclosure; resists corrosion.
12	Enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping non-corrosive liquids.	Indoor use to provide a degree of protection against dust, dirt, fiber flyings, dripping water, and external condensation of non-corrosive liquids.	Indoor use; provides a degree of protection against circulation dust, lint, fibers, and flyings; dripping and light splashing of non-corrosive liquids; not provided with knockouts.
13	Enclosures are intended for indoor use primarily to provide a degree of protection against dust, spraying of water, oil, and non-corrosive coolant.	Indoor use to provide a degree of protection against lint, dust seepage, external condensation and spraying of water, oil, and non-corrosive liquids.	Indoor use; provides a degree of protection against circulating dust, lint, fibers, and flyings; seepage and spraying of non-corrosive liquids, including oils and coolants.

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The below chart is a general cross reference between NEMA Type ratings and European IP ratings:

NEMA TO IEC – ENCLOSURE RATING CROSS-REFERENCE*								
NEMA TYPE	**IP23**	**IP30**	**IP32**	**IP55**	**IP64**	**IP65**	**IP66**	**IP67**
1	●							
2		●						
3					●			
3R			●					
4							●	
4X							●	
6								●
12				●				
13						●		

**Note: This cross-reference table is an approximation of NEMA and IEC classifications for reference only. Please consult the appropriate agency's requirements and test qualifications for complete information.*

Determine the product series within the needed rating requirement that will best meet the application needs.

There are multiple offerings that fall under each NEMA Type rating that Wiegmann offers. For example, in the Type 1 ratings there are 5 different product series that would meet the rating requirement. And within these series there may be multiple design offerings (i.e. painted carbon steel vs. raw galvanized steel, with knockouts or without knockouts, etc.). Other consideration examples would be does the application require an interior sub panel, (some Type 1 series accept optional sub panels, some do not) does the application require mounting feet or interior mounting holes (some application specifications state mounting means must be internal, or there is limited room around the installation site to have external mounting feet) is a door latch required or is screw mounting means required, etc. For large enclosures a typical consideration is should it be a free standing unit (not mounted to the floor) or a floor mount unit (one that has floor mount stands where the enclosure can be lag bolted to the floor).

Determine the size the enclosure needs to be per the offerings in the product series chosen.

Once the rating, product series and offering within the product series is known - the actual size of the enclosure needs to be determined. This is driven by many factors such as how much room is needed to mount the electrical components inside the enclosure, is there a max foot

print the enclosure has to be to fit into an installation site, is internal heat dissipation a concern, etc. Many times a project or product spec will call out the size needed.

Determine if the enclosure needed will be a standard product out of the Wiegmann standard product offering or will it need to be a modified standard or a special engineered to order enclosure.

At this point the required rating, the product series (that will also determine the material, painted or not painted, etc.) and the enclosure size will be known. That is when it can be determined if a standard Wiegmann product offering part number will meet the application needs. It always the most efficient route to use standard products due to the standard products are stocked or have very short lead times, and the price is lower for the customer due to the volume of the product manufactured. If a standard product will meet the need, you have determined the enclosure part number. If a modified standard or special engineered to order product is required, please refer to section F of this manual.

Determine if the enclosure will also need standard general accessories as part of the BOM.

Wiegmann offers many standard general accessories and a majority of enclosure applications require these type of accessories. The most common accessory is interior sub panels and those can be found in section D of this manual. If the enclosure type chosen accepts optional sub panels, the question of "is a sub panel needed for the enclosure" should always be asked. For the Wiegmann general accessory offering, refer to section E in this manual for non-metallic enclosure accessories and section G for all other general accessories.

Determine if the enclosure will need any environmental controls or products as part of the BOM.

In some applications, controlling the interior climate (temperature, humidity, etc.) are a must. For those instances, Wiegmann offers a full line of environmental products to maintain the interior environment of the enclosure. This could be thermostats, AC units, fans, heaters, etc. For sizing of the product needed to maintain climate control inside the enclosure, a sizing software program is offered by Wiegmann at www.hubbell.com/wiegmann and it is always the

method used by Wiegmann as opposed to attempting to manually calculate the requirement by hand. The data input into the software must be accurate to correctly calculate the product needed for the application based on heat load being put into the enclosure, the size and material of the enclosure being used and the ambient temperature the enclosure will be located in. Refer to section H of this manual for the environmental products that Wiegmann offers.

Sources of technical information.

The most used source of technical information for Wiegmann products can be found in the current edition of the Wiegmann Engineering Catalog. This is offered in both hard print and on the Wiegmann web site at www.hubbell.com/wiegmann Regional Managers, Specifications Sales and the internal Wiegmann Customer Service and Engineering departments are another great source of technical information.