Choosing a Battery Enclosure

The following is a discussion on selecting and protecting the correct battery enclosure.

WHAT IS A BATTERY ENCLOSURE?

A battery enclosure is a box designed to protect batteries from potential weather and battery mishaps. They can be designed for indoor or outdoor use, and may include room for electronics. Specific designs allow for pole, wall, or ground mounted systems.

WHY DO I NEED A BATTERY ENCLOSURE?

Battery enclosures are essential components of off-grid solar systems for a number of reasons including: physical protection from outside elements including people and weather patterns, maintaining consistent temperatures, and meeting the requirements of the National Electric Manufacturer's Association (NEMA).

WHICH TYPE IS RIGHT FOR ME?

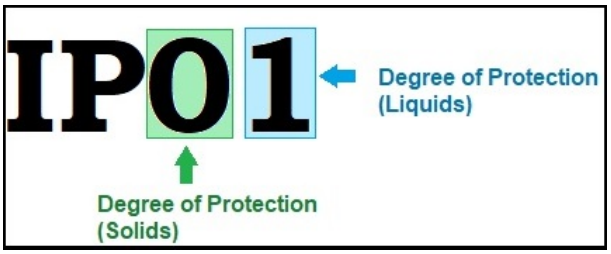
The specific type of battery enclosure design is different given the application and requirements of the project. The features and functions differ depending on the location and needs of the system. In general, all battery enclosures should be vented. This includes VRLA batteries, as hydrogen gas could potentially build up in a fault condition (e.g. controller failure). Passive venting should be adequate and active venting, like a fan, should only be required in rare cases. NEMA provides a rating scheme for consumers to easily decipher the correct number associated with his/her needs.

RATING SCHEMES

Two common methods of measuring the quality of protection offered by battery enclosures are the Ingress Protection Rating and the NEMA rating. IP and NEMA ratings are similar yet different; the NEMA code of protection can be said to be equivalent to the IP rating, but the same does not hold true for the IP rating.

INGRESS PROTECTION RATING

The IP rating is a standard evaluation of battery enclosures common in Europe. The given value contains 2-3 numbers to depict the level of protection from solid foreign objects and water.



NEMA RATING

The NEMA rating on the other hand is commonly used in North America. It considers the IP rating as well as other specifiers such as corrosion and construction details. The scale ranges from 1-13 with 7-10 being designed for Hazardous Locations and 1-6, 11-13 designed for Non-Hazardous Locations. These are types of NEMA enclosure ratings, and their various forms of protection in outdoor nonhazardous locations. All SunWize enclosures are designed to NEMA3R, which provides a high degree of protection from the elements in rugged and exposed outdoor locations.

Table 2
[From NEMA 250-2003]
Comparison of Specific Applications of Enclosures for Outdoor Nonhazardous Locations

Provides a Degree of Protection Against the Following Conditions	Type of Enclosure									
	3	3X	3R*	3RX*	3S	3SX	4	4X	6	6P
Access to hazardous parts	X	X	X	X	X	X	X	X	X	X
Ingress of water (Rain, snow, and sleet **)	X	X	X	X	X	X	X	X	X	X
Sleet ***	...	...	...	...	X	X	...	...	...	...
Ingress of solid foreign objects (Windblown dust, lint, fibers, and flyings)	X	X	...	...	X	X	X	X	X	X
Ingress of water (Hosedown)	...	...	...	...	...	...	X	X	X	X
Corrosive agents	...	X	...	X	...	X	...	X	...	X
Ingress of water (Occasional temporary submersion)	...	...	...	...	...	...	...	...	X	X
Ingress of water (Occasional prolonged submersion)	...	...	...	...	...	...	...	...	...	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.

INDOOR ENCLOSURES

Indoor enclosures may not have complex designs. Due to the simple features required of an indoor enclosure, it may only be composed of a battery rack with panels attached to it. In most cases, the indoor enclosure only needs to prevent things from falling onto the battery, so typically a Nema 1 rating is fine. The enclosure may need to be externally vented depending on the building requirements that house the battery. In most industrial applications, if the batteries are installed in a dedicated space, a separate enclosure is not required.

OUTDOOR ENCLOSURES

Outdoor enclosures should be rated Nema 3R to prevent water intrusion into the enclosure. Filters and screens can be added to prevent dust and insect intrusion. Powder-coated enclosures fabricated from aluminum can help prevent corrosion, further lengthening the battery's lifespan. Nema 4X enclosures should only be used in extremely corrosive environments. Although breather vents can be added to the Nema 4X enclosures to allow venting and still maintain the Nema 4X rating, they are restrictive and may not allow the gas to flow as freely.

SIDE OF POLE ENCLOSURES

Smaller battery enclosures can be mounted on a pole or a wall. Usually up to 300-400 lbs, larger enclosures are placed on the ground, slab, or foundation. Practical limitations usually prevent too many batteries or too much weight from being installed on the pole or wall. Larger ground mount enclosures usually do not have any limits.

CONCLUSION

Battery enclosures come in all shapes, sizes, materials, and ratings; choosing the best one that works for the application and requirements is a simple, yet crucial process. For more information on finding the perfect enclosure for your business needs, give SunWize a call or click on the button below to view enclosures online!