Generator Set Outdoor Enclosures

Genset Enclosures: More Than Buildings

There's increasing pressure on every designer to squeeze more usable space out of a building in the design phase as well as those already in place and undergoing renovation. That often puts gensets in an awkward position. In new buildings, architects vie for genset space for other uses. In renovation projects, the power upgrade also means that additional standby power is needed. This typically means the larger gensets and switchgear won't fit in the original space.

That's led to the development of outside enclosures for gensets. Designers are finding that moving gensets outside requires more than pouring a slab and putting steel sided housing over the structure. It involves many factors that affect genset operation, including local codes for safety, sound, sight and air quality.

Cashman Power Solutions has addressed site, sound and code requirements for thousands of genset installations.

The following criteria must be considered with all genset enclosures:

Space and System Requirements

The enclosure should offer as much or more space as required by the genset in a building. AutoCAD drawings available from Cashman Power show equipment layouts and door swings. At a minimum, the enclosure should have 4' free space on three sides and 10' free space at the radiator outlet end. The enclosure should offer expandable construction, withstand excessive winds, allow full service access to genset, including the ability to lift the enclosure off the installation.

When selecting a site for the enclosure, consider cfm air requirements for the genset(s) as well as how exhaust fumes may travel. Pay particular attention to building ventilation inlet locations as nothing empties a building faster than diesel fumes being sucked into the building. Enclosure security is another concern. The enclosure must be lockable as well as tamper and vandal resistant.

Fuel Storage, Cooling, Monitoring, And Maintenance

Fuel tanks are typically built into the base of an outdoor enclosed generator set. They are all available with local or remote level monitoring as needed and specified. Inlet and Return fittings should be separated by baffling so fuel circulates within the tank allowing returned hot fuel to cool before being pulled back into the engine. While all our tanks are dual wall, some code changes have occurred requiring more than a double wall UL142 listed tanks. Several jurisdictions now require UL2085 tanks if larger than 239 gallons, which are dual wall with a concrete-like material poured into the interstitial area. These tanks have specific requirements they must meet relative to ballistic- and impact-resistance as well as being one-hour fire rated. They are substantially heavier and more expensive than UL142 tanks, so this must be factored into the mounting pad design. In some cases, exemptions have been granted if the equipment is installed by a 8" CMU block screen walled enclosure. These requirements should be carefully reviewed with the local fire and building AHJ.

Lastly, Cashman Power offers permanent fuel maintenance systems for large storage tanks where the fuel will likely be stored in excess of two (2) years. Alternately, we provide fuel cleaning service.

Sound Attenuation

Controlling noise emissions is the greatest challenge for enclosure designers. Tougher local codes are cracking down on high sound levels. Several methods can be employed to minimize sound transmission. Cashman Power offers sound attenuation packages able to reduce noise levels to virtually any need. However, several factors should be considered:

1. Genset location and surroundings – enclosure sound ratings are provided as "free-field". Location of the equipment near reflective building materials such as glass or concrete will reflect the noise and increase the levels in some directions.
2. Genset location relative to property line. Most customers are not concerned with noise levels for a piece of equipment which only runs in the absence of utility. However, their neighbors are very concerned and most municipalities have codes regarding equipment noise levels at the property line. Gensets should be located as

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far from the property line as possible and noise ratings based on the code requirement at the specific distance to the property line. In other words, a specification should state, as an example, "noise levels shall not exceed 70dB(A) at property line 45 feet away." They should also note surroundings as noted in item 1 above.

3. Most sound attenuated enclosures attain their noise levels by baffling the intake air and baffling and directing the outlet air upward. This often leads to higher noise levels directly above the machine. Ideally, the genset would be located where there are no windows above it to avoid disturbing occupants.

A Critical Note about Radiator Outlet Air

If there is one area we struggle with here in the desert southwest, it is generators located outside with insufficient space allowed for radiator outlet air to be rejected from the generator. If walls are built too closely around the generator set, the radiator outlet air will be recirculated back into the genset causing overheating and shutdown. Under space requirements, we listed a minimum of 10 feet of clearance at the radiator outlet end of the generator set to ensure proper hot air rejection. Sometimes, depending upon prevailing winds, size of generator, and wall heights this may not even be enough. However, Cashman Power offers a simple, space saving, and cost-effective solution to this problem. We have long added 90˚ scoops on the front of overheating generator sets to eliminate this problem. The scoop typically extends 1.5 times the width of the enclosure from the front of the enclosure i.e.,: an enclosure that's 4 feet wide would require a 6 foot scoop. The excellent news here is the front of that scoop can then be located tight against the wall – therefore providing a net reduction in deck space required for the generator set. If you have a space constraint, be safe and specify a turnscoop on the radiator outlet to prevent costly change orders.

Appearance

Because enclosures often are in the public eye, they should blend in with the surrounding environment. The enclosure should look clean, neat and be maintenance free. For example, Cashman Power's enclosures are built with 12- or 14-gauge coated steel and painted with 2 coats of enamel or powder coated for years of excellent appearance and life.

Code Requirements

Various city, state and federal codes affect genset enclosure. Enclosures may be considered temporary to permanent buildings, depending on your zoning code. Consider sound, sight, and earthquake tolerance requirements. Food and health codes may also impact enclosure location and design.