

Don't Take Outdoor Enclosure Integrity for Granted.

What are the key criteria to consider when designing and installing an outdoor enclosure for sensitive electronic equipment, battery and UPS applications?

The primary function of an outdoor enclosure is to maintain a uniform environment that protects the sensitive equipment housed inside it. But the enclosure's integrity cannot be taken for granted. Its performance and durability is just as important as the equipment it houses. There are a number of things that must be considered when placing an enclosure in an outdoor environment. And without the proper degree of protection from external elements, you can find yourself with more site downtime and less revenue-generating uptime.

Start with the standards

There are established and proven governing standards that provide guidance and uniformity in determining proper outdoor enclosure performance, and these should be the place to start. These standards also encompass such concerns as corrosion resistance, marking and labeling, and shipping vibration, among others.

Among these standards are IEC 61969-2-1, IEC 61969-2-2, ETSI / EN 301 169-2, IEC 61587-1,-2,-3, IEC 61969-3, IEC 61587-1, IEC 60950 / IEC61010, Bellcore GR-487-CORE (Generic Requirements for Electronic Equipment Cabinets) and Bellcore GR-63-CORE (NEBS-Network Equipment-Building System, Generic Equipment Building Requirements), all of which are used primarily for mechanical, seismic, shielding and integrity related enclosure concerns.

Not to be overlooked is UL 50 (Enclosures for Electrical Equipment), which addresses primarily the sealing and structural integrity of the enclosure.

Environmental considerations - An important consideration is the intended location of the enclosure in relation to other contributing factors in the immediate vicinity. Consider, for example, the difference between a roof-mounted enclosure in direct summer sunlight and one located on the usually cooler north side of a building. The difference in solar gain could account for a few hundred watts of additional or lost heat to be accounted for.

Typical equipment housed in an enclosures include Cisco routers/hubs, Servers, Base Transceiver Station (BTS), Base Band Unit, E-911 Location Measurement Unit (LMU), wireless backhaul, fixed microwave transceivers, and power and battery support. Listed below are the notable features that are relevant to enclosure configurations.

Temperature Range - Many of the older electronic, radio and microwave transceivers are specified to operate from 0 to 40 C, while more modern BTS transceivers will typically operate from -40 to 65 C. This means that the enclosure manufacturers must provide thermal analysis and design services to ensure the wireless equipment stays within its prescribed operating range. Additionally, the enclosure manufacturer must offer a wider range of thermal management systems to support the tighter operating window of older transceivers. This should include direct air cooling, heat exchangers, air conditioners (with integrated heaters), and thermoelectric coolers (with integrated heaters).

Temperature Transition – A little known fact about electronic equipment is that both older and new products are very sensitive to quick changes in temperature and humidity. Although older equipment may have been rated to operate within 0 to +40 C and newer models are rated from -40 to 65 C, they operate best when the temperature changes do not exceed 10 C per hour within the outdoor chamber. Many of the cooling systems built by Cannon Technologies for equipment operators strive to keep the electronics in +20 to +30 C range, and limit the temperature changes to 10 C per hour.

Indoor and Hardened Equipment – Many OEM's offer indoor and hardened versions of their electronic equipment and hardened equipment always commands a premium over indoor equipment because it is designed to accommodate severe temperature and humidity environments. Historically,

hardened equipment was usually deployed in unmanaged outdoor enclosures. However, the deployment of indoor equipment in thermally managed outdoor enclosures is a viable and cost effective alternative for the operator. Some manufacturers may require testing and validation of their equipment in the enclosure before they warranty their equipment in that environment.

Cable Entry – Most enclosures typically have cable entry at the side or bottom of the enclosure. Wireless operators for example prefer antenna cables entering near the top of the enclosure, as well as backhaul cables exiting through the side or bottom of the enclosure. “Cable raceways” organize and distribute antenna cables entering near the top to different sections of the enclosure.

Operational cost - As wireless operators continue to build out their infrastructure to support ever-increasing bandwidth requirements, one commonly overlooked aspect that has a significant impact on operational cost is enclosures and cabinets needed to house electronics.

Outdoor equipment enclosures enable operators to save substantial time, labor, space, capital and operational expense as compared to prefabricated buildings and shelters, while meeting their exact needs for equipment mounting, thermal management, cable and fiber cable management, power and battery backup. Similar to buildings and shelters, enclosures support multiple chambers, protect equipment in a wide variety of environmental zones, and can be mounted on roofs, plinths and concrete pads.



Image #1 Caption: Example of outdoor enclosure with thermal management system and cable access via base ducting being installed by Cannon Technologies.



Image #2 Caption: Enclosure installation at base of London Olympic Stadium providing security and thermal management to sensitive electronic CCTV equipment.

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LTE Transceivers connect to a GPS antenna to triangulate the location of any inbound E121 calls. The antenna cable for GPS antennas require an upper rectangular opening and knock-out to exit the enclosure. To simplify installation, wireless enclosures need some rectangular knock-outs in addition to the conventional round knockouts found in enclosures.

Partitioned Chambers – Since mobile network towers can be shared among several operators, the chamber of a wireless enclosure may be physically partitioned so multiple operators can house their equipment in their own compartment (without access to the adjacent compartments). A wireless operator may lease excess chamber space within the enclosure to another wireless operator.

To support the phased equipment loading of an enclosure, the mounting scheme for thermal systems is externally mounted on the front and/or back doors. Field upgrades of thermal systems, which will be required when a new compartment is leased out, are accomplished by exchanging doors. Quick-release hinges allow fast and efficient changes to the thermal management systems that can typically be accomplished without having to remove the cabinet or electronic equipment from service. This exchange can be accomplished in minutes by a standard craft person.

Security - Security is a critical concern for any wireless operator, especially as larger quantities of smaller micro-sites are deployed in suburban and urban neighborhoods. Unauthorized access to equipment can quickly lead to network downtime. Enclosures and cabinets should have numerous features that provide uncompromising security.

Door hinges on all access doors must be stainless steel for strength and angled to ensure attack from LPS tools are mitigated. Unlike stainless chamfer black hinges, exterior hinges (i.e. piano hinges) can be easily knocked off the enclosure, thus allowing the removal of the door and access to the enclosure interior as well.

All exterior doors must be locked with a multi-point latching mechanism to ensure that all door corners and edges are secured. The latching mechanism must be captive, such that the latch effectively bonds the door to the cabinet when locked.

Any penetration of the enclosure wall by firearms can compromise the enclosed electronics. As an example, the Telcordia GR-487-CORE standard specifies that enclosures must be capable of withstanding a point blank 12-gauge shotgun blast without penetration of the cabinet wall by any pellets.

Intrusion alarms must provide signaling of unauthorized or unscheduled door movement (i.e. open/close) to a centralized alarm monitoring center. Alarms must work with all main chamber doors, as well as the side chamber.

Vertical Stacking Equipment – Narrower enclosures should offer vertical stacking features. Vertical stacking of equipment adds capacity to an existing enclosure footprint, which is typically located roadside where pedestrian access is restricted. When enclosures provided stacked equipment, a key consideration is still meeting the thermal requirements to ensure air inlet and exhaust points are not restricted.



Image #3 Caption: Example of vertical stack equipment compartment

Customisation

Cannon Technologies product platforms for outdoor electronics and electrical equipment are designed to meet the necessary global standard requirements. The standard platforms provide about 80

percent of the design, which leaves about 20 percent for customisation. "We tell the engineer, 'We have 80 percent of what you want already, so you don't have to start from a clean sheet.

A lot of customisation includes the front door and front access for aesthetics and there might be some particular materials that a customer may request in a certain thickness or a particular plastic-a type of shielding or something else that you don't have but that you need to adapt your platform to. Or there may be some unique spec such as the CE mark required for sales to European markets, that the enclosure needs to meet.

Cannon offers design capabilities such as SolidWorks, a CAD application for 3-D, and Web-enabled engineering. Web-enabled engineering is designed around the need for a very quick turnaround for collaborative design among key design engineers in a new project. It allows them to communicate through a secure Web site where changes or updates to the design are posted.

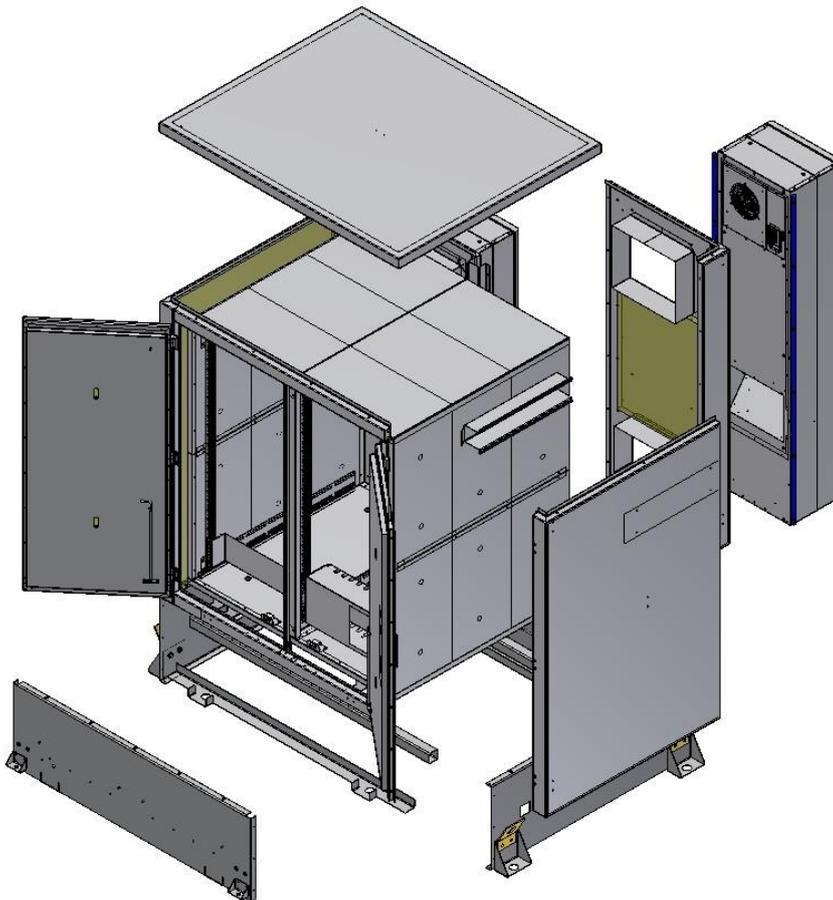


Image #4 Caption: Example of Cannon SolidWorks 3D Model

Please contact us with details next Outdoor cabinet project and we will provide you with a solution that meets your exacting requirements.