# Crypto Mining Modular Data Centers

What should you look for on these modular data centers (MDCs)? Does UL Solutions List (Certify) MDCs?

by UL Solutions

**Q** We are seeing a lot of crypto currency miners coming to our jurisdiction setting up operations using modular data centers. They are shipping containers filled with distribution equipment and servers. Very few of them seem to be Listed (Certified) as an assembly. What should we look for on these modular data centers (MDCs)? Does UL Solutions List (Certify) MDCs?

**A** Article 646 Modular Data Centers of the National Electrical Code® (NEC®) covers MDCs. NEC 646.4 requires all MDCs to be Listed (Certified) and labeled and comply with 646.3(M) and 646.5 through 646.9 or comply with this article. The Certification (Listing) process includes an evaluation of the equipment, installed wiring, lighting and working space. Any field-installed wiring, including supply circuits and data circuits, must comply with the appropriate *NEC* article.

MDCs – also referred to as containerized data centers – are usually shipping-type containers that incorporate power distribution equipment to power racks of crypto-mining servers. These servers run 24 hours a day and generate tremendous amounts of heat. It is critically important that these MDCs are equipped with HVAC systems to cool the containers to prevent a fire.

UL Solutions does Certify (List) MDCs under the product category Modular Data Centers (PQVA) for compliance with UL Subject 2755, Outline of Investigation for Modular Data Centers. The guide information and Certifications (Listings) can be located on UL Product iQ® at www.ul.com/piq; enter PQVA at the search field. Searching UL Product iQ is complimentary, however, full search capability requires registration. If the MDC is already installed in the field, UL Solutions can also perform field evaluations on MDCs. For a quote or more information on UL Solutions field evaluations, contact UL Solutions Customer Service at 877-854-3577, #4 or www.ul.com/field.

The PQVA category covers modular data centers rated 600 V or less and intended to be installed in accordance with the *NEC*. They are self-contained assemblies of information technology equipment (ITE) installed within prefabricated enclosures that may also include integral support equipment such as power distribution units, HVAC equipment, standby power, illumination and other equipment required for operating the ITE. In some cases, the support equipment may be housed in a separate enclosure, and Certified (Listed) as part of the MDC system. PQVA also covers accessory power modules intended for use with modular data centers.

MDCs comprise an enclosure, all equipment and components located within an enclosure and all components mounted to the walls of an enclosure. They may allow autho-

rized personnel to enter an enclosure to service, maintain and upgrade the ITE and associated support equipment. MDCs are not intended to be occupied by personnel or used as office space.

MDCs are investigated as complete equipment including subassemblies, power distribution, cabling, cooling system components, lighting and the like installed within the enclosure. Emergency egress by maintenance personnel and working space around equipment are also considered during a UL Solutions evaluation. MDCs are not investigated as an ITE room as described in ANSI/NFPA 75, Fire Protection of Information Technology Equipment, and Article 645 of the NEC®.

When provided, fire protection and detection equipment has been investigated for compliance with the appropriate codes and standards applying to these installations such as

ANSI/NFPA 72, National Fire Alarm and Signaling Code; ANSI/NFPA 12, Carbon Dioxide Extinguishing Systems; ANSI/NFPA 12A, Halon 1301 Fire Extinguishing Systems; and ANSI/NFPA 2001, Clean Agent Fire Extinguishing Systems.

MDCs are preconfigured and, except as permitted below, are preassembled at the manufacturing location. They are shipped and installed intact, requiring only electrical, network and cooling system hookups when external cooling equipment is used at the installation site.

An MDC can be shipped from the factory unassembled or disassembled to the degree necessary to facilitate shipment. In some cases, subassemblies may be shipped separately for final assembly at the installation site. In these cases, the following apply:

1. All parts are furnished or specified by the manufacturer.
2. The specific location of the assemblies in the MDC and their methods of installation are predetermined by the manufacturer and are not dependent upon installation personnel.
3. Electrical connections for field-installed components within a cabinet are done through plugs and receptacles, or other means in compliance with the NEC.
4. The manufacturer provides detailed step-by-step installation instructions or a detailed installation practice.
5. An assembly manufacturer's company name or logo and a part number (P/N) or other type designation appear on all parts and subassemblies.

An MDC may be constructed with empty space or bays or empty shelf or rack space for installing ITE that is not specifically defined by, or under the control of, the MDC manufacturer. The generic type of ITE – together with its installation, connection and maximum ratings – is defined by the MDC manufacturer who includes this information in the system drawings and schematics. Maximum permissible weight loads of the auxiliary ITE are predetermined by the MDC manufacturer and included in the installation instructions and system diagrams for an MDC. Each MDC will have a marking on or near the main nameplate stating the following or its equivalent: ATTENTION! This MDC is provided with space for the installation of auxiliary IT equipment that is not evaluated as part of the MDC certification. Refer to [drawing/document number] for a complete list of equipment that is included as part of the certification of this MDC. Unevaluated equipment is subject to inspection and approval by local authorities having jurisdiction.

Field-installed accessories for Certified (Listed) equipment must include suitable markings and/or instructions detailing proper installation or assembly of the accessory with either a specific or generic Certified (Listed) equipment specified in the markings or instructions.

Unless otherwise identified, MDCs are intended for fixed and indoor installation. MDCs intended for outdoor use are marked Outdoor Use, Raintight or Rainproof, or are provided with a NEMA environmental class rating.

Installation of MDCs are subject to approval by the Authority Having Jurisdiction (AHJ). AHJs should also be consulted if installation requires structural loading considerations.

Information concerning field-wiring connections, mounting location, site preparation, installation clearances, etc., is marked on the MDC or provided in detailed installation instructions accompanying each MDC.

Working space within an MDC is evaluated as part of the equipment investigation. Access and working space around electrical equipment accessible from outside of the MDC, e.g., outward-facing panelboard or field-wiring compartment, is intended to comply with the applicable requirements in *NEC* 110.26 after the installation of one or more MDCs at a site.

The installation and arrangement of one or more MDCs at a site should not interfere with exits provided in the MDC.

MDCs often require special installation, such as a separate transformer, special grounding methods, motor-generator equipment, external chillers, etc. If required, these features are covered in the manufacturer's installation instructions.

MDC systems consisting of the main MDC enclosure housing the ITE and one or more additional enclosures for power, cooling, etc., are investigated as a system and are identified as such in the individual Certifications (Listings). The relationship and interconnections between the parts of the system are clearly identified in the manufacturer's installation instructions. Interconnecting power, signaling and communications wire and cable not investigated as part of an MDC system is intended to be installed in accordance with the applicable provisions of the *NEC*. All accessory equipment is marked with a reference to and the identification of the equipment with which it is intended to be used.

Accessory power modules intended for use with modular data centers that are not part of a specific MDC system are identified as such in the individual Certifications (Listings).