

**STATE OF NEW JERSEY
DEPARTMENT OF TRANSPORTATION
TRENTON, NEW JERSEY 08625**

**METRIC SPECIFICATIONS FOR A 483 MILLIMETER RACK BASE MOUNT (HEATER/AC)
(ENVIRONMENTAL FIELD TERMINAL CABINET)**

N. J. Specification No. EBM-FTC-2

Effective Date: July 1, 2001

New Jersey Department of Transportation Specifications for a rack mount enclosure that is used to house various electronic and electrical components requiring environmental protection which are mounted in a 483 millimeter EIA (Electronic Industries Association) rack.

The purpose of these specifications is to describe the minimum acceptable design and construction requirements for this field terminal cabinet.

GENERAL - I

- 1-1 The cabinet shall be a NEMA 3R enclosure constructed of a minimum of 3 millimeters thick 50-52-H32 aluminum alloy. The outside dimensions shall be 610 millimeters W by 1 676 millimeters H by 762 millimeters D. A double door (front and rear) arrangement shall be utilized .
- 1-2 The inside available space dimensions of the cabinet shall be at least 508 by 1 365 by 667 millimeters.
- 1-3 An EIA (Electronic Industries Association) 483 millimeter rack shall be installed inside the cabinet. The rack shall be finished with Universal Rack Hole Spacing. The rack shall be made of heavy duty 2.66 millimeter type 304 stainless steel. The mounting holes shall be tapped with standard M 5 threads spaced in accordance with EIA RS-310-C. Mounting holes shall be included on both sides of the cabinet. The rack shall be 508 by 1 403 by 527 millimeters.
- 1-4 All bolts, nuts, washers, screws (size M4 or larger), hinges and hinge pins shall be stainless steel, unless otherwise specified.
- 1-5 All surfaces of the cabinet shall be clean, free of holes or blemishes, smooth without burrs and with exterior corners rounded. The cabinet shall not be painted.
- 1-6 All cabinet doors shall incorporate hinges and hinge pins utilizing stainless steel. Fastening of hinges to doors and cabinets shall be made using stainless steel pop-rivets or stainless steel nuts and bolts. Welding of hinges to cabinets and doors shall not be permitted.
- 1-7 The cabinet doors shall be equipped with a switch which will provide a contact closure indicating that the cabinet door is opened.
- 1-8 A fluorescent fixture supplied with a lens or shield and a 15 watt Type T-12 lamp and rapid start, high power factor cold weather ballast shall be supplied and installed in the

top front and rear of the cabinet. A switch shall be installed on the inside of the cabinet doors to manually disable the lamps.

- 1-9 Both cabinet doors shall be supplied with CCL 2-NJIVHS locks. One key shall be supplied with each lock. The keys shall be removable in the locked position only.
- 1-10 The cabinet shall be supplied with a slide out shelf/drawer storage unit.
- 1-11 The cabinet pad mounting pattern shall be a 381 by 635 millimeter grid consisting of oval bolt mountings of 50.80 by 25.40 millimeters.
- 1-12 The environment inside the rack shall be maintained within 0 °C to +40 °C, assuming that the ambient outside temperature is within the range of -25 °C to +60 °C.
- 1-13 All cabinet terminals, outlets, circuit boards, and other components shall be labeled using silk screening or a similar permanent process.

SURGE PROTECTOR - II

- 2-1 A 120 volt AC single phase surge protector shall be installed as a precautionary measure against possible damage resulting from voltage surges on all incoming power lines. The 120 volt AC single phase surge protector shall incorporate a series choke at a maximum clamp voltage of 340 volts at 20 kiloamps with a 5 nanosecond response. In addition, the surge protector shall have the capability of removing high energy surges and block high speed transients.
- 2-2 The surge protector shall comply with the following specifications:
 - A. Peak Current: 20 000 amps (8X20 µs waveshape)
 - B. Occurrences: 20 times at peak current
 - C. Minimum Series Inductance: 200 microhenries
 - D. Continuous Series Current: 10 amps
 - E. Temperature Range: -40 °C to +85 °C
- 2-3 All surge suppression devices shall be readily accessible for ease of replacement and not mounted behind any panel or enclosure.
- 2-4 A radio interference filter, shall be connected as to completely filter controller and auxiliary equipment, and shall have a minimum rating of 50 amps.

POWER DISTRIBUTION ASSEMBLY - III

- 3-1 Three copper ground bars with brass terminal bolts capable of handling #10 wire and having a minimum of 12 terminal connecting points shall be provided and labeled AC neutral, chassis and logic ground.
- 3-2 AC-, chassis and logic ground shall be isolated from each other throughout the assembly, including any auxiliary subpanels. AC- and logic ground bars shall be mounted on insulators.
- 3-3 An additional fourth copper ground bar mounted on insulators shall also be provided on the lower portion of the power panel, having a minimum of 24 terminals, electrically connected to AC neutral for field wiring.
- 3-4 Spacing between ground bars on the power panel shall not be less than 38 millimeters apart.
- 3-5 All subpanel power cables shall terminate directly to the power panel.
- 3-6 Terminal block for incoming power shall be dual terminal block rated at 50 amps and shall have a minimum barrier height of 19 millimeters and utilize M5 x 8 screws.
- 3-7 Power Distribution

A. The power distribution shall include the following:

- 1. Duplex NEMA 5-15R Receptacle
- 2. Duplex NEMA 5-15R Equipment GFI Receptacle
- 3. 1 Pole 50 amperes minimum, 120 volts AC Main Circuit Breaker
- 4. 6 Pole Ganged, 15 amperes, 120 volts AC Signal Bus Circuit Breaker
- 5. Mercury Contactor - rated minimum 60 amperes, 120 volts AC
- 6. Terminal blocks as required

B. Breaker Rating Label

Rating of breakers shall be shown on the face of breaker or handle. Breaker function shall be labeled below the breakers on the front panel.

C. Ground Fault Receptacle

The first receptacle in the circuit shall have ground-fault circuit interruption as defined in the National Electrical Code.

D. Conductors

All conductors from the power distribution shall be connected to the terminal block on the common side, except for the AC power conductor between the service terminal block and main circuit breaker. All internal conductors terminating at the blocks shall be connected to the other side of the blocks.

E. Ganged Circuit Breakers

Ganged Circuit Breakers shall be certified by the circuit breaker manufacturer that their circuit breakers shall gang trip.

FIELD CABINET CONSTRUCTION - IV

4-1 Basic Design

The housing shall be rainproof with the top of the enclosure crowned to prevent standing water.

4-2 Welding

All exterior seams for enclosure and doors shall be continuously welded and shall be smooth. All edges shall be filed to a radius of 0.78 millimeter minimum. Exterior cabinet welds shall be done by gas Tungsten arc TIG process only. ER5356 aluminum alloy bare welding electrodes conforming to AWS A5.10 requirements shall be used for welding on aluminum. Procedures, welders and welding operators shall conform to the requirements and practices in AWS B3.0 and C5.6 for aluminum. Internal cabinet welds shall be done by either gas metal arc MIG or gas tungsten arc TIG Process.

4-3 Door Frames

The enclosure door frames shall be double fanged out on all four sides and shall have strikers to hold tension on and form a firm seal between the door gasketing and the frame. The dimension between the door edge and the enclosure external surface when the door is closed and locked shall be 3.9 ± 2 millimeters.

4-4 Gasketing

Gasketing shall be provided on all door openings and shall be dust-tight. Gaskets shall be 6 millimeters minimum thickness closed cell neoprene and shall be permanently bonded to the metal. The mating surface of the gasketing shall be covered with a silicone lubricant to prevent sticking to the mating metal surface. A Gasket Top Channel shall be provided to support the top gasket on the door to prevent gasket gravitational fatigue.

4-5 Rack Cage Supports

Cage bottom support mounting angles shall be provided on either side, level with the bottom edge of the door opening, for horizontal support and bolt attachment. In addition, side cage supports shall be provided for the upper cage bolt attachments. Spacer brackets between the side cage supports and the cage shall be a minimum thickness of either 4.775 millimeter aluminum or 2.667 millimeter steel.

4-6 Door Handles

The latching handles shall have provision for padlocking in the closed position. Each handle shall be 19 millimeters minimum diameter stainless steel with a minimum 13 millimeter shank. The padlocking attachment shall be placed at 100 millimeters from

the handle shank center to clear the lock and key. An additional 100 millimeters minimum gripping length shall be provided.

4-7 Latching Mechanism

The latching mechanism shall be a three-point draw roller type. The pushrods shall be turned edgewise at the outward supports and have a cross section of 6 millimeters thick by 19 millimeters wide, minimum.

4-8 Door Lock Operation

When the door is closed and latched, the door shall be locked. The locks and handles shall be on the left side of the front door and right side of the rear door. The lock and lock support shall be rigidly mounted on the door. In the locked position, the bolt throw shall extend a minimum of 6.4 ± 0.8 millimeters into the latch cam area. A seal shall be provided to prevent dust or water entry through the lock opening. The locks shall be CCL 2-NJIVHS type, or equal. One key shall be supplied with each lock. The keys shall be removable in the locked position only.

4-9 Front Door

The front door shall not be louvered.

AIR CONDITIONER - V

5-1 The air conditioner shall be a minimum of 1 759 watts.

5-2 The unit shall mount to the side of the Field Terminal Cabinet and shall not exceed the dimensions of 508 by 1 016 by 279 millimeters. In addition, the unit must not exceed the depth of the cabinet.

5-3 A closed loop cooling system shall be utilized which keeps the ambient air outside the enclosure. The unit shall include a hot gas by-pass valve to regulate cooling and prevent evaporator coil freezing during periods of low heat load and low ambient air temperature.

5-4 The air conditioner shall be controlled by a thermostat which is designed to operate the cooling system only when required. The thermostat shall be adjustable in the range of +20 °C to +60 °C to activate cooling. Unit turn-off shall be 5 °C lower than the turn-on temperature.

5-5 The unit shall be equipped with a solid state electronic noise suppresser to minimize EMI/RFI interference.

5-6 A contact closure shall be provided to indicate a high temperature alarm. The sensor shall be adjustable in the range of +20 °C to +60 °C.

5-7 The cabinet shall be equipped with a separate circuit breaker for the air conditioner service.

HEATER - VI

- 6-1 A 400 watt strip heater shall be mounted on the cabinet side wall opposite to the one utilized for the air conditioner.
- 6-2 The heater shall be controlled by a thermostat which is designed to operate the heating system only when required. The thermostat shall be adjustable in the range of -10 °C to +5 °C to activate heating. Unit turn-off shall be 5 °C higher than the turn-on temperature.
- 6-3 A contact closure shall be provided to indicate a low temperature alarm. The sensor shall be adjustable in the range of +5 °C to -15 °C.

INSTRUCTIONS AND GUARANTEES - VII**7-1 Wiring Diagrams**

One reproducible blackline Diazo mylar (0.1 millimeter thick) A1 size (594 by 841 millimeters) and two prints of the schematic wiring diagram for the cabinet wiring shall be supplied with each cabinet. The diagrams shall be nonproprietary. They shall identify all circuits in such a manner as to be readily interpreted. The diagrams shall be placed in a heavy duty side opening clear plastic pouch and attached to the front cabinet door. The pouch shall be of such design and material that it provides adequate storage and access to the wiring diagram and manual.

7-2 Cabinet Manuals

Two cabinet manuals shall be provided in the pouch together with the wiring diagram sets. The pouch shall be of size and strength to easily hold the documents and keys without tearing.

- 7-3 No changes or substitutions in these requirements will be acceptable unless authorized in writing. Inquiries regarding this specification shall be addressed to the Manager, Office of ITS Engineering, New Jersey Department of Transportation, P.O. Box 613, 1035 Parkway Avenue, Trenton, New Jersey 08625.
- 7-4 The complete control and auxiliary equipment shall carry a two-year guarantee from the date of acceptance against any imperfections in workmanship or materials. Any tests or repairs made by a manufacturer or representative shall be documented on the New Jersey Department of Transportation "Equipment Failure Analysis and Report Form" and returned with units when warranty repaired. The Department will attach a copy of this form to all returned equipment. This documentation shall include an explanation of the exact repairs made and identification of parts replaced by part number and circuit number. All warranty repairs must be made within thirty days upon receiving equipment.
- 7-5 The company agrees upon the request of the Manager, Office of ITS Engineering to deliver to the Office, a sample of the equipment to be supplied in compliance with these

specifications for inspection and test before acceptance. After completion of the test, the sample shall be returned.

- 7-6 The company shall furnish any and all equipment which they deem necessary for safe and reliable field operation of the equipment.
- 7-7 All equipment furnished under this specification must be current production equipment and of recent manufacturer, similar models of which are field operational. Untried or prototype units shall not be considered for acceptance.
- 7-8 All major components shall be identified with a metal plate containing the serial number with a bar code identification.