

EIA/ECA-310-E

EIA STANDARD

Cabinets, Racks, Panels, and Associated Equipment

EIA/ECA-310-E (Revision of EIA-310-D)

December 2005



Electronic Components Industry Association

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(Formulated under the auspices of the Consumer Electronics Association (CEA) R6 Mobile Electronics Committee for the Electronic Industries Alliance).

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FOREWORD

This Revision of the standard was developed under the auspices of the Consumer Electronics Association (CEA) R6 Mobile Electronics Committee for the Electronic Industries Alliance (EIA).

EIA-310-E supersedes EIA-310-D.

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CABINETS, RACKS, PANELS, AND ASSOCIATED EQUIPMENT

1 Scope

EIA-310-E is intended to provide overall design requirements for Cabinets, Panels, Racks and Subracks. When specifications are developed from EIA-310-E, agreements for that unit shall be made between the supplier and user.

2 Definitions

Cabinet—A freestanding and self-supporting enclosure for housing electrical and/or electronic equipment. It is usually fitted with doors and/or side panels, which may or may not be removable.

Hard Metric—The use of preferred metric dimensions, without regard to the inch system.

Mounting Flange—The surface of a Cabinet or Rack on which panels and subracks are mounted.

Panels—Flat, rectangular structural members used for the external surface of equipment. Panels are designed to be mounted on the mounting flanges of Cabinets or Racks. They are generally used for mounting controls, data presentation, apparatus or equipment.

Rack—An open structure for mounting electrical or electronic equipment.

Soft Metric—The exact conversion of inch dimensions to metric, usually resulting in odd metric numbers. (for example, 0.250 in. = 6.35 mm.)

Subrack—A structural unit for housing printed boards with components inserted, and plug-in units.

Suite of Racks or Cabinets—A row of racks or cabinets placed side by side.

3 Overview of EIA-310-E

3.1 Soft Metric Conversion of EIA-STD-310-C

EIA-310-E Section 4 is the soft metric conversion of superseded EIA-310-C to conform with U.S. Public Law 100-418.

3.2 2.25 Millimeter Practices for Cabinets and Racks

EIA-310-E Section 5 is an adaptation of IEC-917 recommendations for Cabinets, Racks and Panels. It is compatible with the IEC 25 millimeter practices.

Type A is the preferred Cabinet and Rack Standard with no restrictions placed on overall width, height or depth. Key interfaces control the dimensions. (See 5.3.1.1.)

Type B is similar to Type A, with restrictions on overall width, height, and depth. This type should be used when equipment is in an environment that must comply with IEC 917: Modular Order. (See 5.3.1.2.)

Type C is similar to Type B except it permits extended doors, panels, tops and other protrusions such as handles. (See 5.3.1.3.)

Racks are open cabinets, which in general conform to Type A cabinets. (See 5.3.2)

3.3 Panels and Subracks

EIA-310-E Section 6 may be applied in all fields of electronics conforming to the IEC 25 millimeter practices. The purpose of Section 6 is to ensure the mechanical interchangeability of panels and subracks with cabinets and racks.

EIA-310-E

4 Soft Metric Conversion of EIA-STD-310-C (Formerly Titled EIA-STD-310-C)

This section of EIA-310-E establishes those dimensions which are soft metric conversions of superseded EIA-310-C, and these dimensions are in millimeters. These dimensions are critical in ensuring compatibility between Cabinets or Racks and Panels, and the equipment or apparatus installed thereon. The figures contained in EIA-310-E shall not be construed to be standards for construction details.

4.1 Classification

EIA-310-C identified three cabinet or rack openings to accommodate each of three standard panel widths 482.6 mm, 609.6 mm and 762.0 mm. The preferred panel width is 482.6 mm.

4.2 Terms for Cabinets and Racks

“n”—“n” is equal to the number of modular units to be used in determining various dimensions. It is generally used with the value “U.”

“U”—The modular unit “U” on which panel heights are based is equal to 44.45 millimeters.

4.3 Cabinets and Racks

4.3.1 Cabinet

A cabinet shall be standard when it conforms to the dimensional requirements shown in Figure 1 and Figure 3.

4.3.2 Rack

A rack shall be standard when it conforms to the dimensional requirements shown in Figure 2 and Figure 3.

EIA-310-E

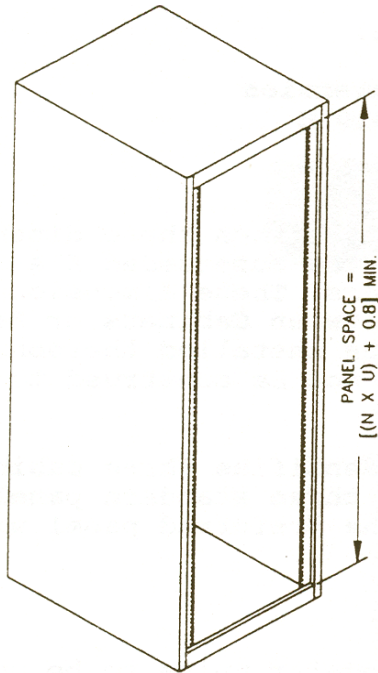


Figure 1 Cabinet Panel Dimension

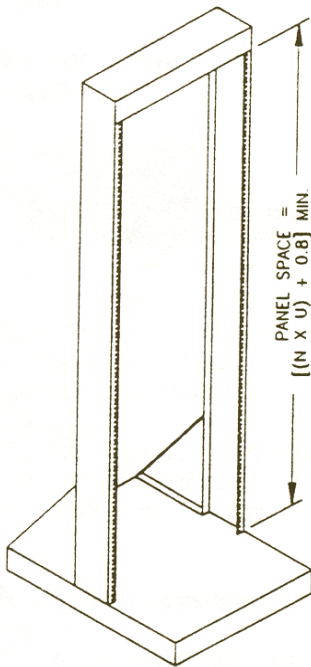
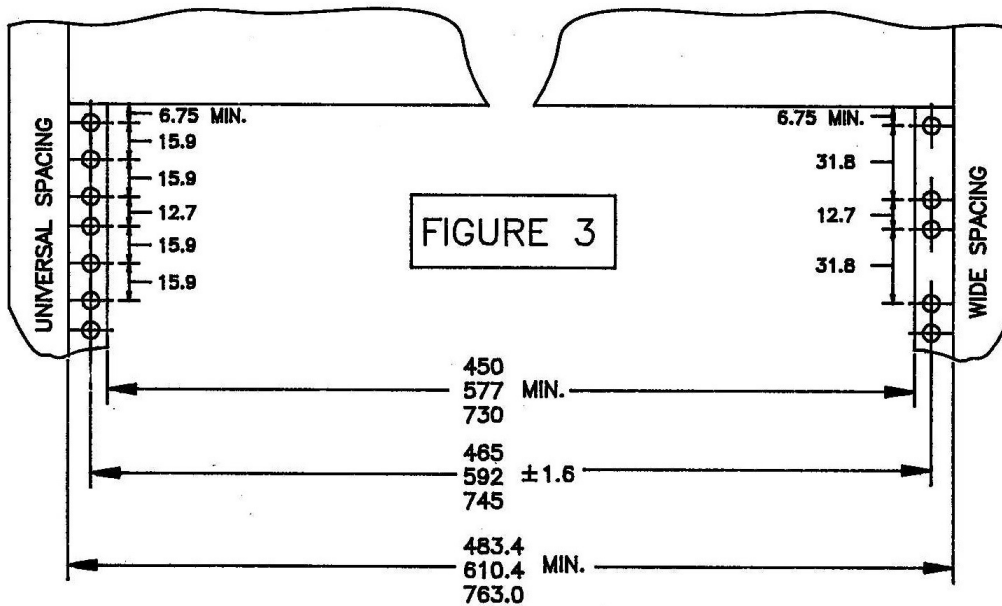


Figure 2 Rack Panel Dimension



- NOTES: 1. ALL UNTOLERANCED DIMENSIONS TO BE BASIC IN TRUE POSITION.
 HOLES TO BE WITHIN 0.8 AT MAX. MATERIAL CONDITION.
2. MOUNTING PROVISIONS:
- A. HOLES SHALL BE 7.1 ± 0.1 DIAMETER.
 - B. THREAD SYSTEM SHALL BE 10-32 CLASS UNF-2B,
 12-24 CLASS UNC-2B, M5X.8-6H OR M6X1-6H THREAD.
 (SEE FED. STD. H28)
 - C. OTHER FASTENING SYSTEMS SHALL BE AGREED UPON BETWEEN
 SUPPLIER AND USER.

Figure 3 Cabinet and Rack Dimensions

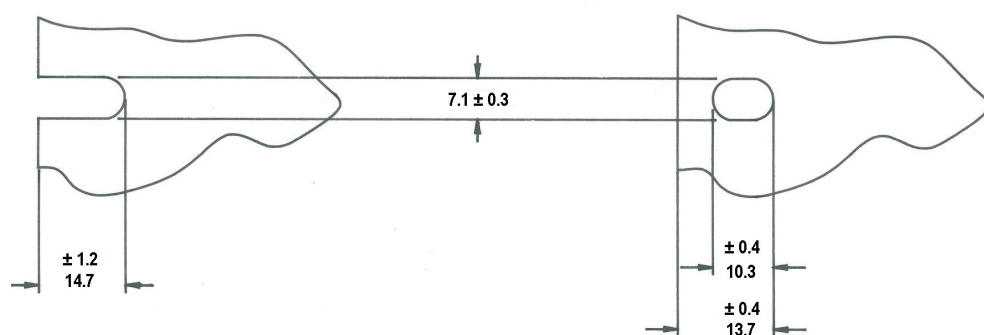
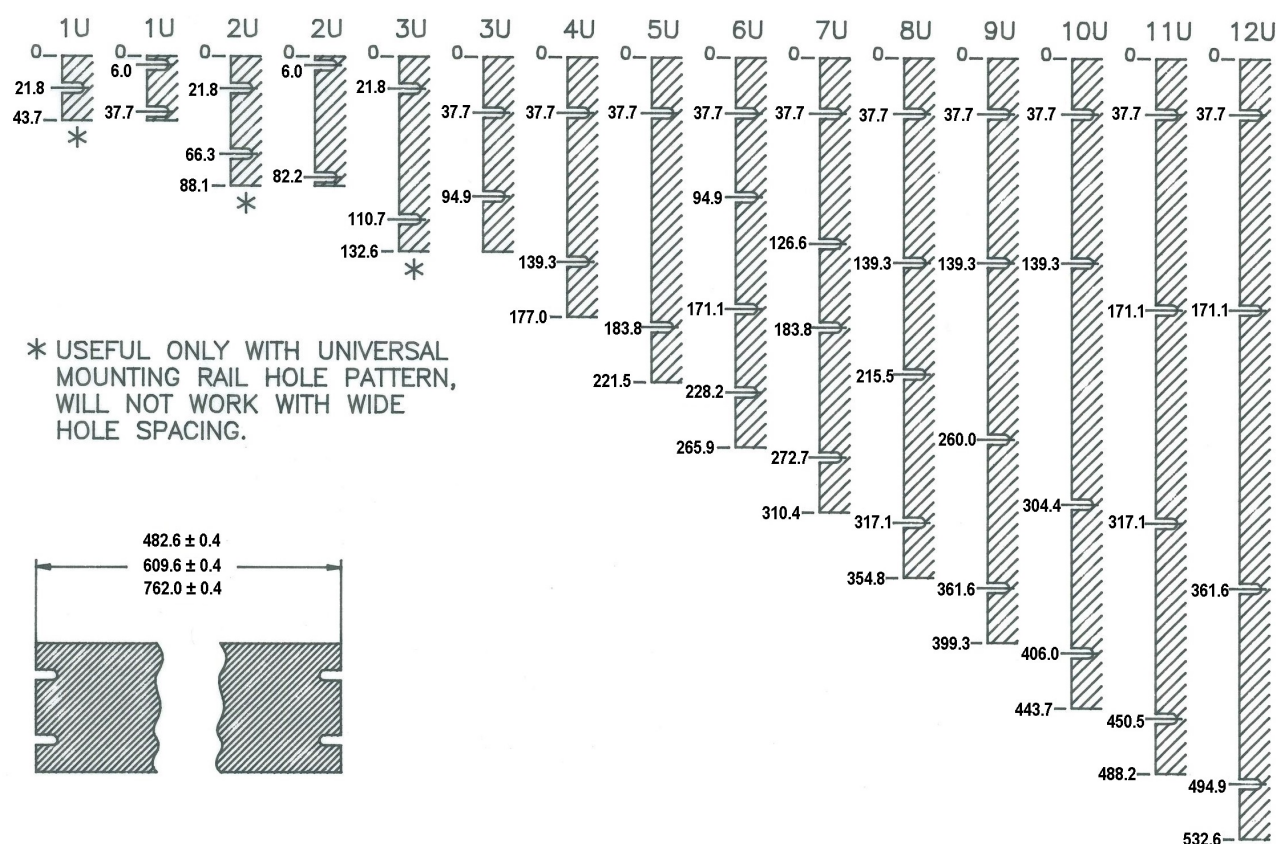
4.4 Mounting flanges

Mounting flanges shall be standard when they conform to the dimensional requirements shown in Figure 3. Either the universal or the wide spacing shall be used on both flanges.

4.5 Panels

Panels shall be standard when they conform with the dimensional requirements shown in Figure 4. The preferred thread system is M5.

PANELS



NOTES

1. PANEL THICKNESS AND NUMBER OF SLOTS MAY VARY WITH DESIGN REQUIREMENTS.
2. UNTOLERANCED DIMENSIONS TO BE ± 0.4 AT MAX. MATERIAL CONDITION.
3. BOTH OPEN SLOTS AND CLOSED SLOTS AS SHOWN ABOVE ARE STANDARD.
4. PANEL HEIGHT = $(n \times U) - 0.8$

Figure 4 Rack Dimensions

5 25 Millimeter Practices for Cabinets and Racks

This section establishes those dimensions that are hard metric. These dimensions are critical in ensuring compatibility between Cabinets or Racks and Panels or Subracks, and the equipment or apparatus installed thereon. Figure 5 is an example of a cabinet with various configurations installed.

5.1 References

- IEC 916 Mechanical structures for electronic equipment, Terminology.
- IEC 917 Modular Order for the development of Mechanical structures for electronic equipment practices.
- IEC 917-0 Guide for the users of IEC 917

5.2 Terms for Cabinets and Racks

"i"—"i" is equal to any integer value.

"n"—"n" is equal to the number of modular units to be used in determining various dimensions. It is generally used with the value "SU."

"SU"—System unit "SU" is equal to 25 millimeters.

5.2.1 Depths

- D_x = Control dimension (Basic)
- D_o = Cabinet or rack depth
- D_1 = Usable aperture depth

5.2.2 Heights

- H_x = Control dimension (Basic)
- H_o = Cabinet or rack height
- H_1 = Aperture height for mounting subracks and panels

5.2.3 Mounting Pitches

- mp_1 = Vertical Pitch for mounting panels and subracks = 25 millimeters

5.2.4 Widths

- W_x = Control dimension (Basic)
- W_o = Cabinet or rack width
- W_1 = Panel opening width
- W_2 = Usable aperture between mounting flanges
- W_3 = Mounting hole distance for subrack and panel mounting

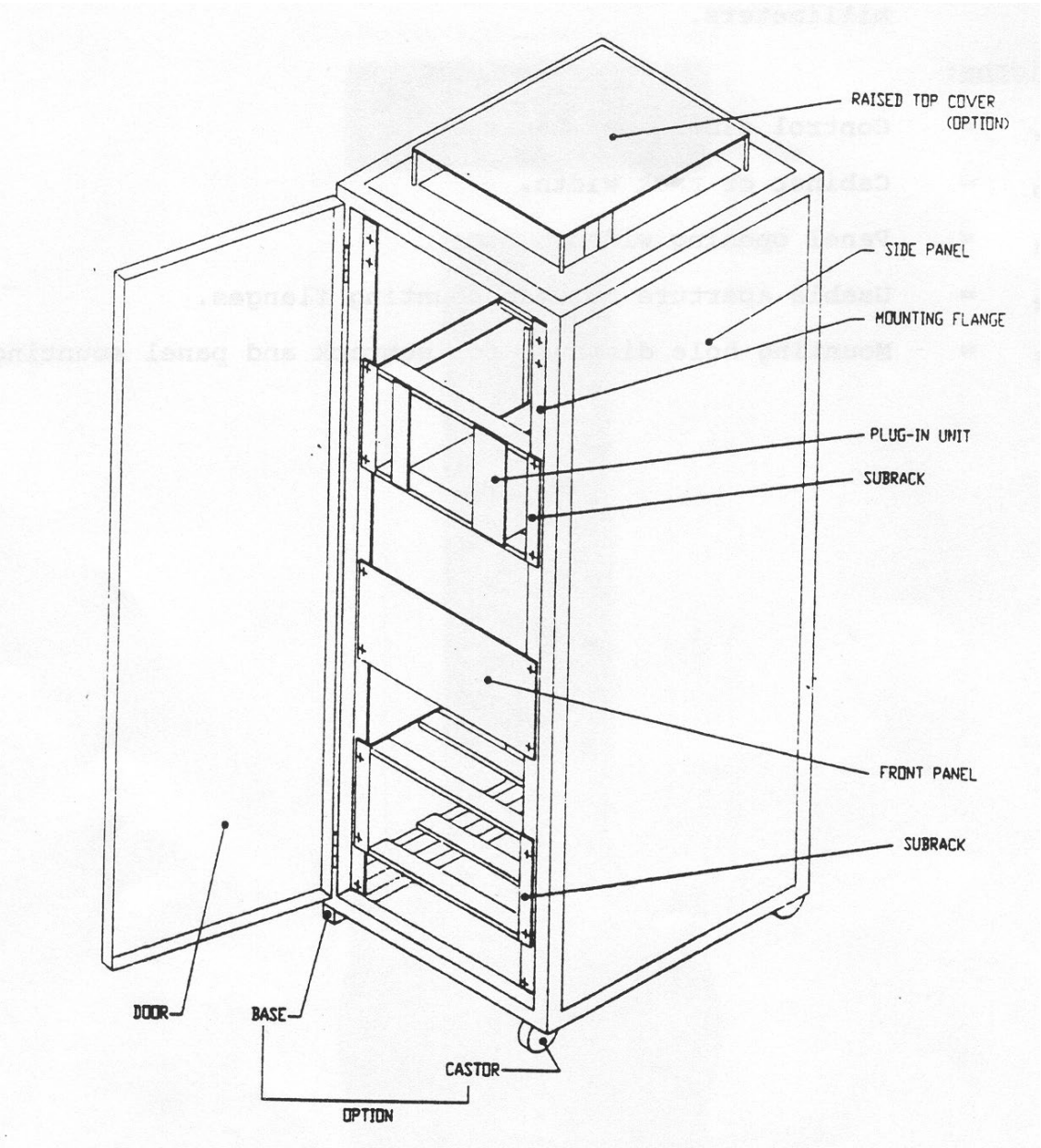


Figure 5 Example of a Cabinet with Subracks, Plug-In Units, Front Panels, and Attachments Installed

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5.3 Cabinets and Racks

5.3.1 Cabinets

5.3.1.1 Cabinet Type A

Type A cabinets (See Figure 6) have no restrictions placed on overall width, height or depth. Internal height and width dimensions shall comply with the IEC 25 millimeter practice.

5.3.1.1.1 Dimensions (in Millimeters)

5.3.1.1.1.1 Internal Height

$$H_1 \geq (n \times SU) + 2$$

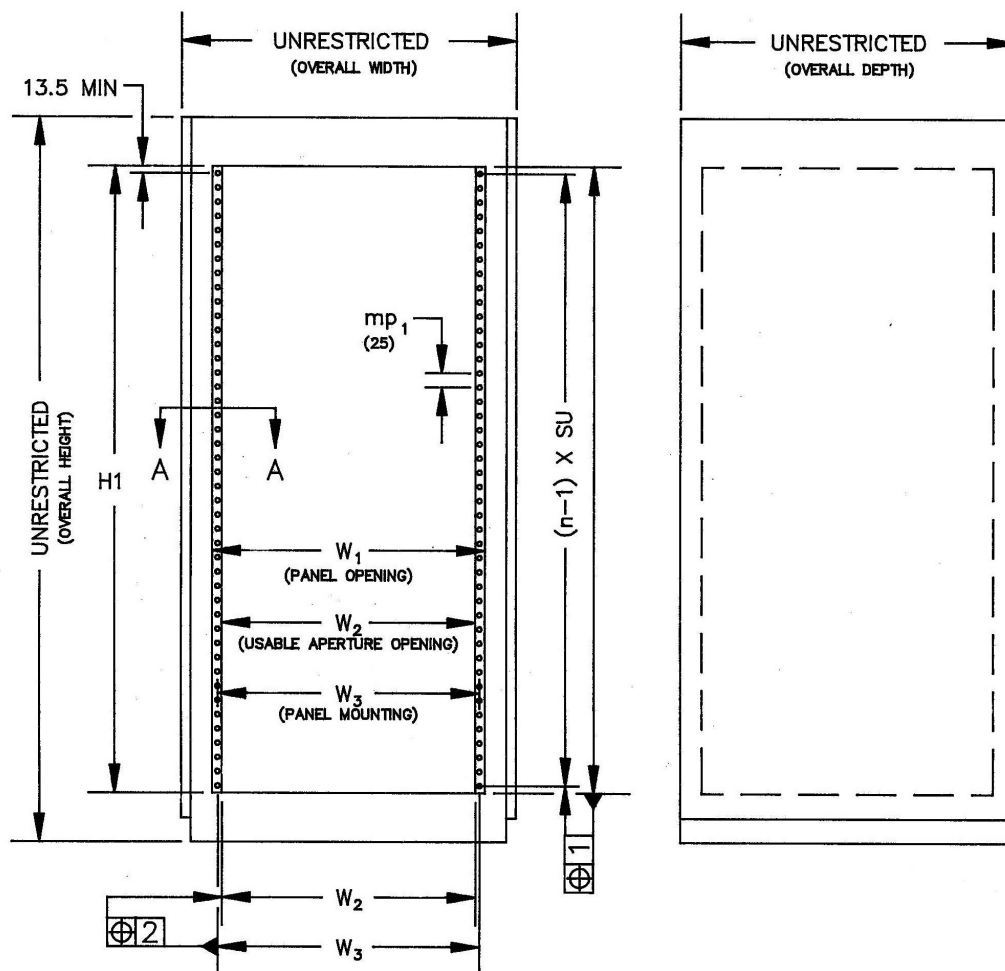
5.3.1.1.1.2 Internal width

W_x = Control Dimension. (The preferred value is 450. Other control dimensions shall be in increments of 25.)

$$W_1 = (W_x + 35) \pm 2$$

$$W_2 \geq W_x$$

$$W_3 = (W_x + 15) \pm 2$$



DOOR, SIDE PANEL & MOUNTING FLANGE OPTIONS

- A. SIDE PANELS CAN BE BUSTLE TYPE OR FLUSH.
- B. DOORS CAN BE FACE MOUNTED OR FLUSH.
- C. MOUNTING FLANGES CAN BE FIXED OR ADJUSTABLE FRONT TO REAR SEE SECTION A-A.

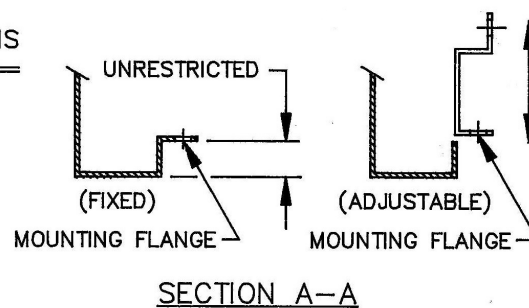


Figure 6 Type A Cabinet—Shown with Bustle Type Side Panels. External Overall Dimensions are Unrestricted. Doors Omitted for Clarity. (Options Below)

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5.3.1.2 Cabinet Type B

Type B Cabinets (See Figure 7) shall have within their outside dimensions all protrusions (e.g., adjustable feet, handles, permanently fitted lifting aids, etc.)

5.3.1.2.1 Height Dimensions

The height dimension, H_o , includes covers, feet or castors etc.

$$H_x = n \times SU.$$

H_1 = Usable aperture height for mounting panels or sub racks in the cabinet or rack, $H_1 \geq H_x + 2$. Aperture height dimensions may be increased. Multiples of 25 shall be used.

$$H_o = H_x + (i \times SU) + 0/-5.$$

For typical applications, the use of $i = 6$ is preferred.

If more space is required for base, castors, etc., $i = 10$ is preferred but other integer values may also be used.

If less space is required, then $i = 4$ is preferred but other integer values may also be used.

5.3.1.2.2 Width Dimensions

The width dimensions, W_o , include any covers and their mounting parts.

W_x = Control Dimension. (The preferred value is 450. Other control dimensions shall be in increments of 25.)

$$W_1 = (W_x + 35) \pm 2.$$

$$W_2 \geq W_x$$

$$W_3 = (W_x + 15) \pm 2.$$

$$W_o = (W_x + 50) + (i \times 50) + 0/-5$$

NOTE—If additional equipment at the ends of a suite of cabinets or racks is required, the associated overall dimensions shall be specified as a multiple of the mounting pitch = 25. The resulting total width of the suite should be agreed to in final design.

5.3.1.2.3 Depth Dimensions

The depth dimension, D_o , applies to cabinets and racks and includes all protrusions (e.g., doors, handles and covers). In this way flush installations are created -when cabinets and racks of same depths are arranged in a suite.

$$D_x = i \times SU.$$

$$D_o = D_x + 0/-5$$

$$D_1 \leq D_x$$

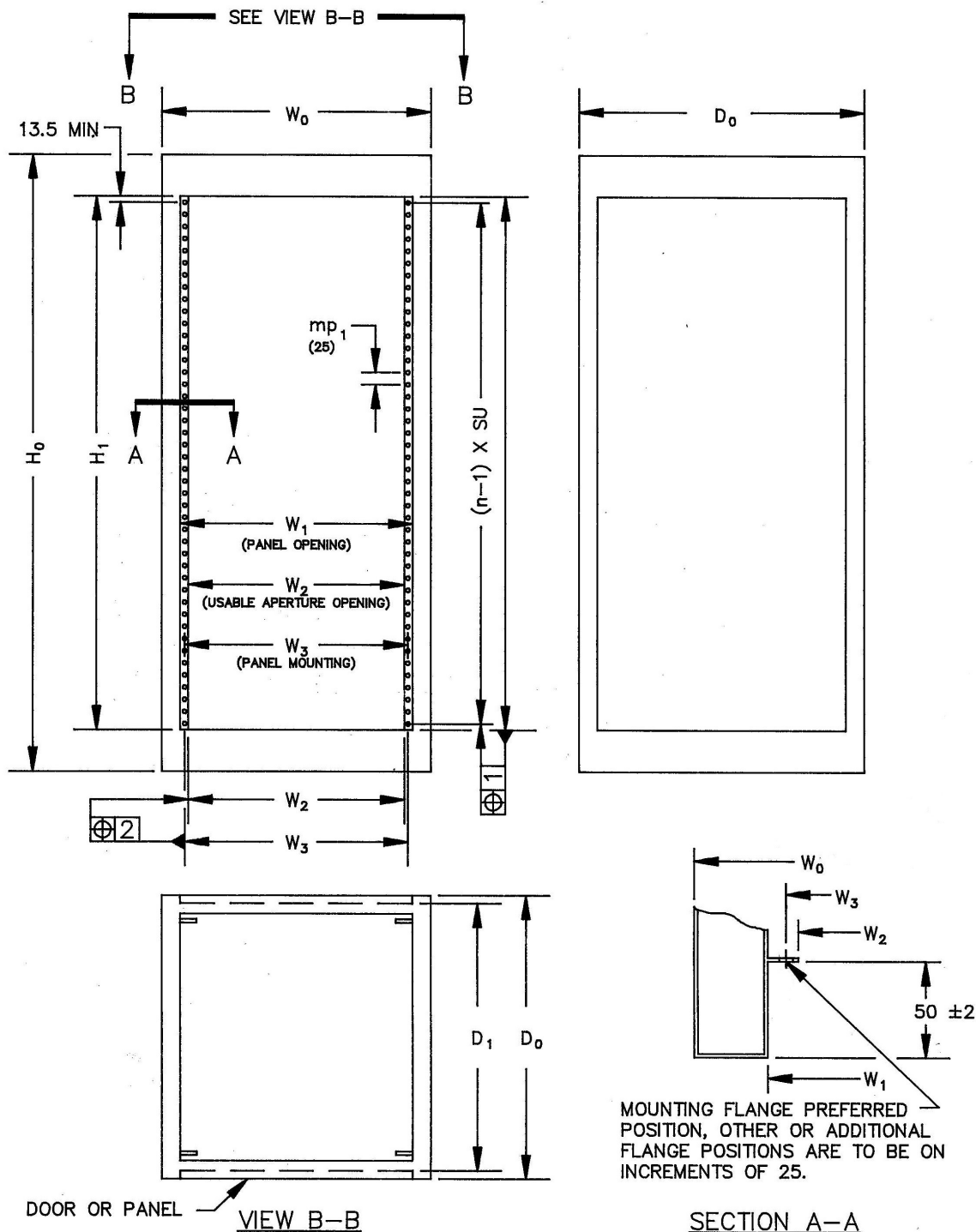


Figure 7 Type B Cabinet—External & Internal Dimensions are Restricted

5.3.1.3 Cabinet Type C

Type C cabinets (See Figure 8) differ from Type B cabinets by permitting protrusions beyond the dimensions defined in Paragraph 4.1.3.1 for Height and Paragraph 4.1.3.3 for Depth. Protrusions include; covers, doors, hinge pieces, handles, and permanent lifting aids. The Width dimensions shall be in accordance with Paragraph 4.1.3.2.

5.3.1.4 Mounting Provisions

Mounting provisions to secure panels and subracks to the cabinets and panels shall be selected from the following:

- a) Mounting holes shall be 7.0 ± 0.1 millimeters in diameter.
- b) Thread systems shall be either M5 or M6. The preferred size is M5.
- c) Other fastening systems shall be agreed upon between supplier and user.

5.3.2 Racks

A rack is a freestanding or fixed structure, without doors or covers for mounting electrical or electronic equipment. The aperture dimensions of racks are the same as those for Type A cabinets. (See Figure 6 and 4.1.1.)

6 Panels and Subracks

This section applies to all fields of electronics in which devices and systems conform to the IEC 25 millimeter practices. The purpose of this section is to ensure the mechanical interchangeability of panels and sub racks with cabinets and racks.

6.1 Terms for Panels and Subracks

"n"—"n" is equal to the number of modular units to be used in determining various dimensions. It is generally used with the value "SU".

"SU"—System unit, "SU" is equal to 25 millimeters.

6.1.1 Heights

Hp = Panel or subrack height

6.2 Width

Wp = Panel or subrack width

Wx = Control Dimension. The preferred value is 450. Other control dimensions shall be in increments of 25.

TYPE C CABINET:
 EXTERNAL & INTERNAL DIMENSIONS ARE RESTRICTED
 CABINET PANELS OR DOORS EXCEED D_0 AND/OR H_0

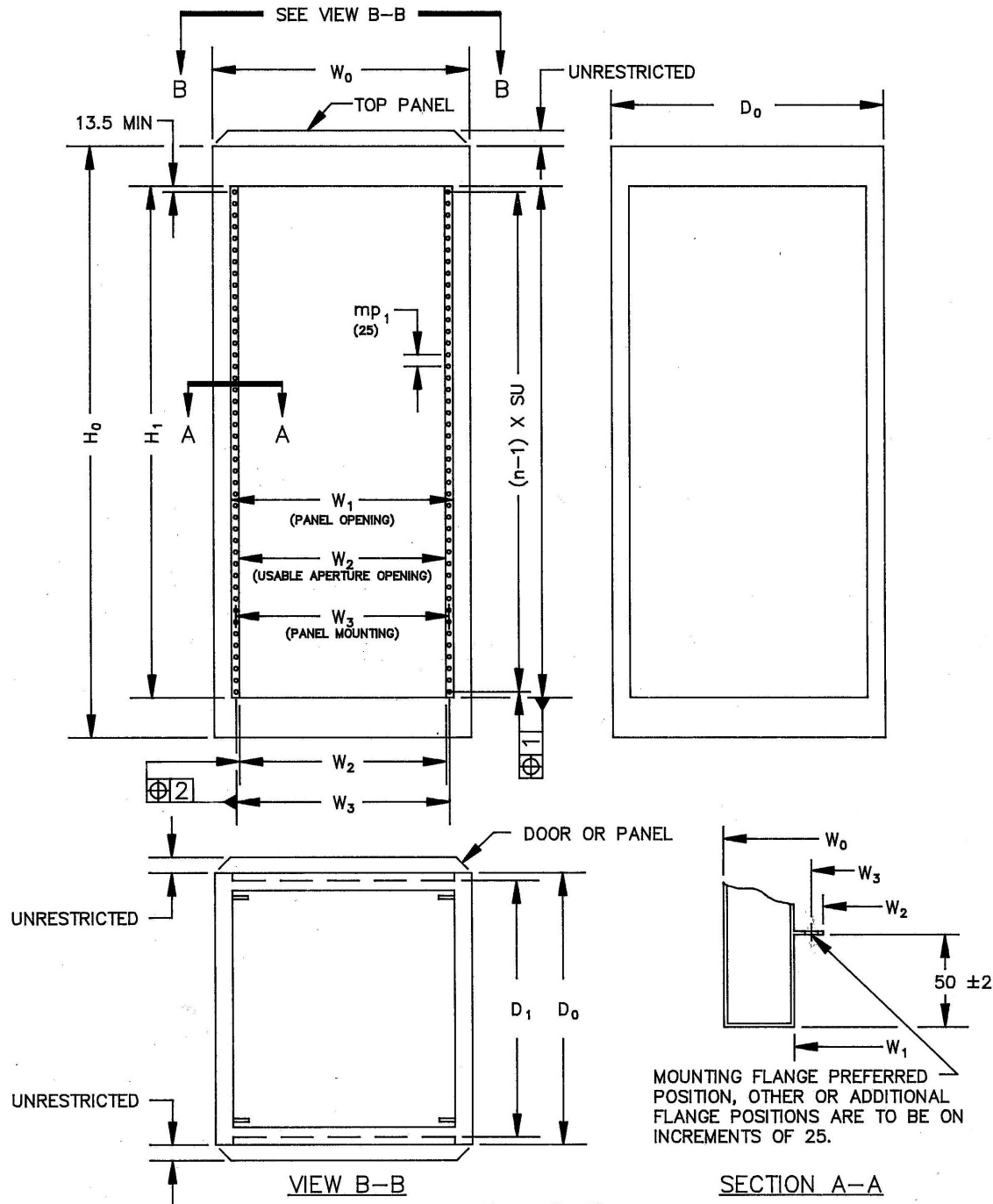
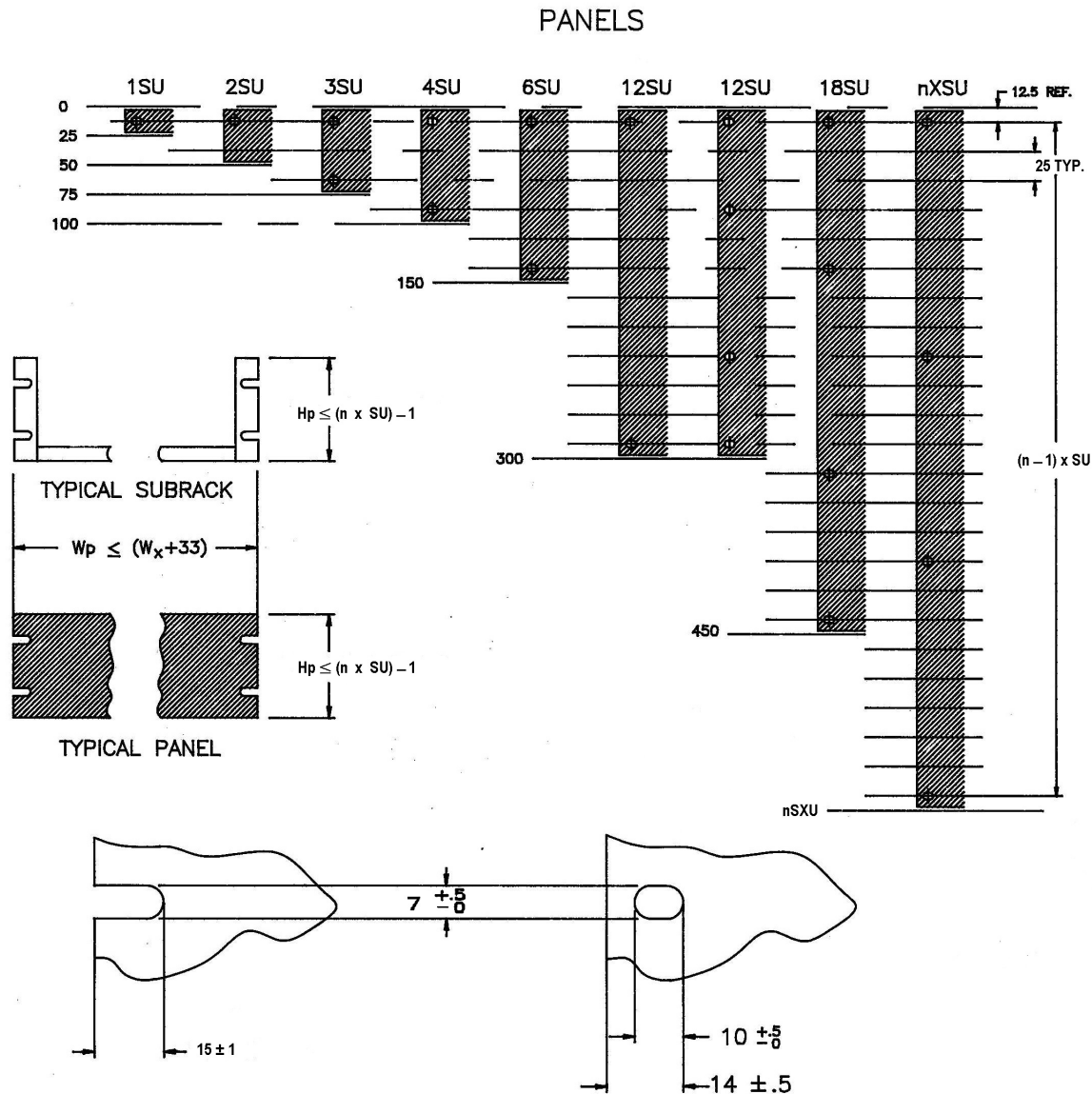


Figure 8 Type C Cabinet—External & Internal Dimensions are Restricted Cabinet Panels or Doors Exceed D_0 and/or H_0

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6.3 Panels and Subracks

Panels and subracks designed to conform to the dimensional requirements shown in Figure 9 shall be considered standard.



NOTES

1. PANEL THICKNESS AND NUMBER OF SLOTS MAY VARY WITH DESIGN REQUIREMENTS.
2. UNTOLERANCED DIMENSIONS TO BE ± 0.4 AT MAX. MATERIAL CONDITION.
3. BOTH OPEN SLOTS AND CLOSED SLOTS AS SHOWN ABOVE ARE STANDARD.
4. OTHER PANEL WIDTHS & HEIGHTS MAY BE USED WITH ADDITIONS OR SUBTRACTIONS OF DIMENSIONS SHOWN IN MULTIPLES OF 25.

Figure 9 Panel & Subrack Dimensional Requirements

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