INTERNATIONAL STANDARD

IEC 60297-3-101

First edition
2004-08

Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series –

Part 3-101: Subracks and associated plug-in units

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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MECHANICAL STRUCTURES FOR ELECTRONIC EQUIPMENT – DIMENSIONS OF MECHANICAL STRUCTURES OF THE 482,6 mm (19 in) SERIES –

Part 3-101: Subracks and associated plug-in units

FOREWORD

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International Standard IEC 60297-3-101 has been prepared by subcommittee 48D: Mechanical structures for electronic equipment, of IEC technical committee 48: Electro-mechanical components and mechanical structures for electronic equipment.

This standard cancels and replaces IEC 60297-3, IEC 60297-4, IEC 60297-5-100, IEC 60297-5-102, IEC 60297-5-103, IEC 60297-5-107.

The text of this standard is based on following documents:

FDIS	Report on voting
48D/299/FDIS	48D/306/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The IEC 60297-3 series consists of the following parts, under the general title *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series*

Part 3-101: Subracks and associated plug-in units

Part 3-102: Injector/extractor handle

Part 3-103: Keying and alignment pin

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual edition of this standard may be issued at a later date.

INTRODUCTION

The “Dimensions of mechanical structures of the 482,6 mm (19 in) standards are defined in IEC 60297. To the original IEC 60297-3:1988 publication was added Amendment 1:1995. The additional requirements were published in IEC 60297-4:1995 with Amendment 1:1999.

The extended requirements were published in the IEC 60297-5-1XX series (2001). Responding to market requirements and for more clarity it became necessary to merge and technically enhance these standard “parts” into 3 “new” standards for subracks and associated plug-in units. This “merged” standard series now defined as IEC 60297-3-101, IEC 60297-3-102 and IEC 60297-3-103 explains its relationship to the previous “fragmented” IEC 60297-X standards, see Figure 1.

The nomenclature of these new standards has been revised. The relationship to IEC 60297-1 (Part 1: Panels and Racks) has been maintained. The relationship to IEC 60297-2 (Part 2: Cabinets and pitches of rack structures) has been maintained. The relationship to IEC 61587-1 (Part 1: Climatic, mechanical tests and safety aspects for cabinets, racks, subracks and chassis) and IEC TS 61587-3 (Part 3: Electromagnetic shielding performance tests for cabinets, racks and subracks) has been added.

The IEC 60297-3-101 standard defines the interfaces of the basic 482,6 mm (19 in) subrack and associated plug-in units.

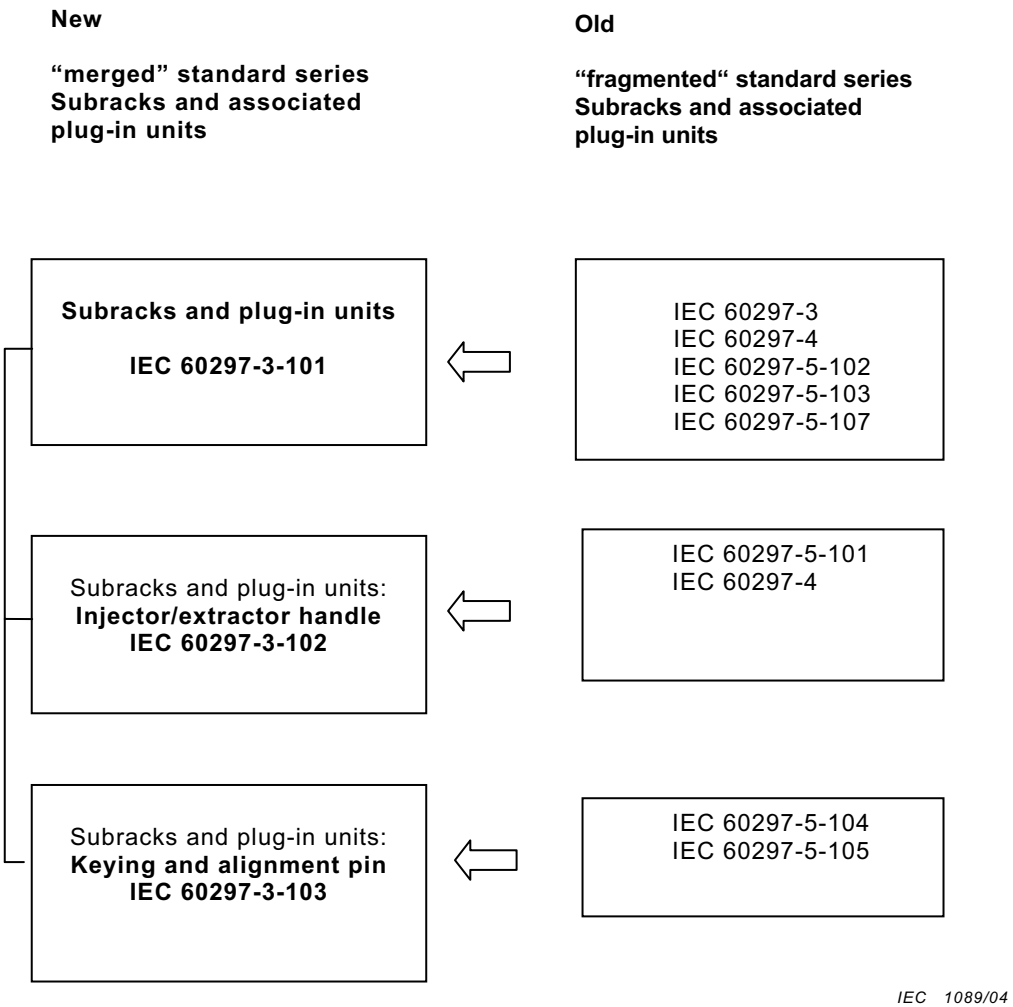


Figure 1 – Relationship between the new IEC 60297-3 series and the old IEC 60297 series

MECHANICAL STRUCTURES FOR ELECTRONIC EQUIPMENT – DIMENSIONS OF MECHANICAL STRUCTURES OF THE 482,6 mm (19 in) SERIES –

Part 3-101: Subracks and associated plug-in units

1 Scope and object

This part of IEC 60297 covers the basic dimensional relationship of a modular range of subracks and associated plug-in units in compliance with the IEC 60297 series.

The purpose of this standard is to specify dimensions which will ensure dimensional interchangeability of subracks and associated plug-in units. Connector related dimensions are limited to “inspection dimensions” only.

For mechanical and climatic tests refer to IEC 61587-1.

For electromagnetic shielding performance tests, refer to IEC 61587-3.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60249-2-1, *Base materials for printed circuits – Part 2: Specifications. Specification No. 1: Phenolic cellulose paper copper-clad laminated sheet, high electrical quality*

IEC 60297-1:1986, *Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 1: Panels and racks*

IEC 60297-2:1982, *Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 2: Cabinets and pitches of rack structures*

IEC 60603-2:1995, *Connectors for frequencies below 3 MHz for use with printed boards – Part 2: Detail specification for two-part connectors with assessed quality, for printed boards, for basic grid of 2,54 mm (0,1 in) with common mounting features*

IEC 60917-1:1998, *Modular order for the development of mechanical structures for electronic equipment practices – Part 1: Generic standard*

IEC 61076-4-101:2001, *Connectors for electronic equipment – Part 4-101: Printed board connectors with assessed quality – Detail specification for two-part connector modules, having a basic grid of 2,0 mm for printed boards and backplanes in accordance with IEC 60917*

IEC 61076-4-113:2002, *Connectors for electronic equipment – Printed board connectors – Part 4-113: Detail specification for two-part connectors having 5 rows with a grid of 2,54 mm for printed boards and backplanes in bus applications*

IEC 61587-1:1999, *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 – Part 1: Climatic, mechanical tests and safety aspects for cabinets, racks, subracks and chassis*

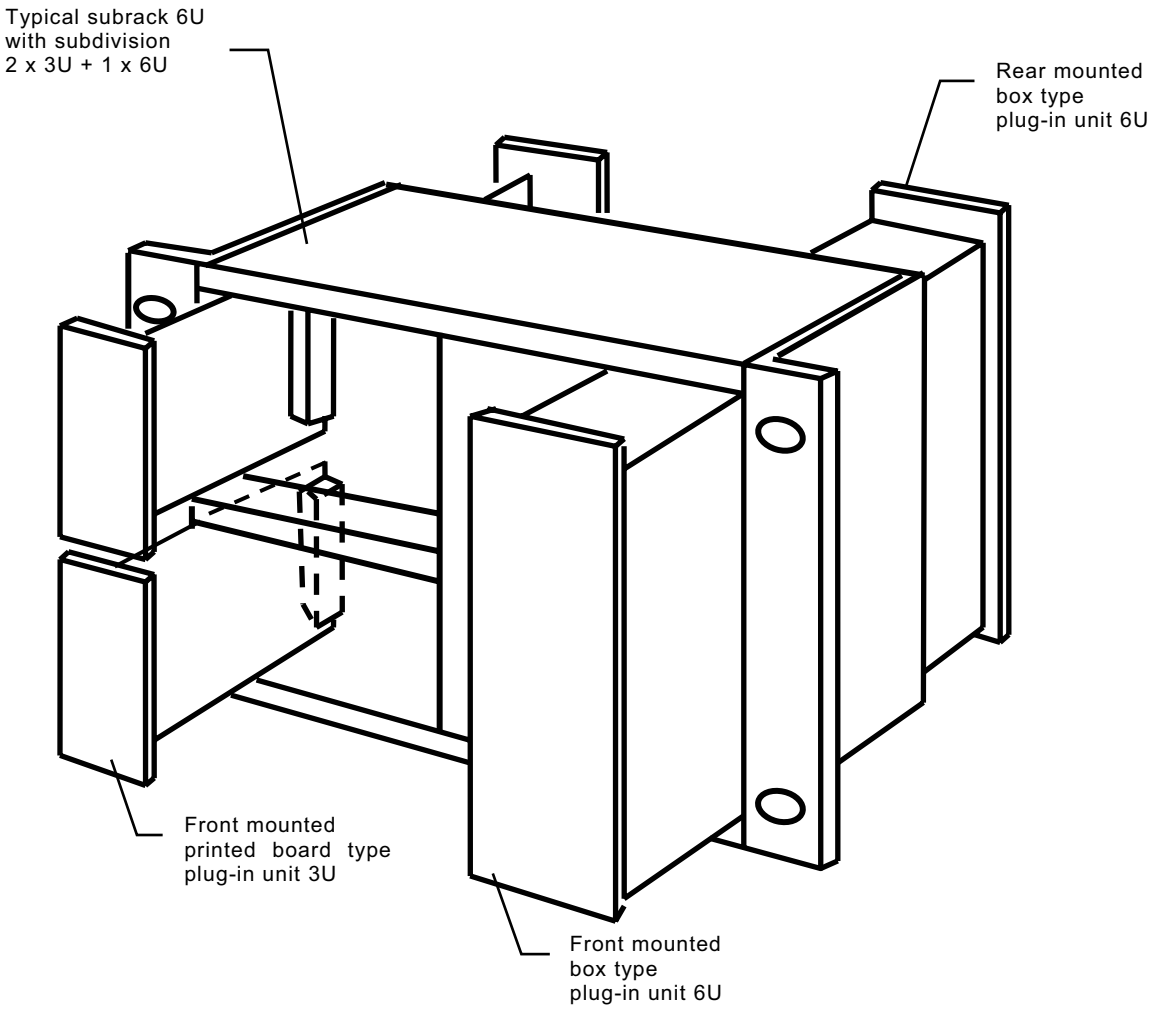
IEC 61587-3:1999, *Mechanical structures for electronic equipment – Tests for IEC 60917 and IEC 60297 – Part 3: Electromagnetic shielding performance tests for cabinets, racks and subracks*

3 Terms and definitions

For the purposes of this part of IEC 60297, the terms and definitions given in IEC 60917-1 apply.

4 Arrangement overview

The arrangement overview shown in Figure 2 illustrates a typical 6U subrack with subdivisions and rear mounted plug-in units.



Abbreviation: 1U = 44,45 mm (see Table 3).

Optional features: Subrack and plug-in units electromagnetic shielding provisions (see Clause 10).
Plug-in units electrostatic discharge provisions (see Clause 11).

Figure 2 – Arrangement overview

5 Subrack dimensions, front mounting area

The front mounting area of a subrack defines the aperture dimensions for plug-in units, the guide rail positions, the mounting dimensions to the cabinet and the depth dimensions with the relevant connectors, as shown in Figures 3 to 5.

Dimensions in millimetres

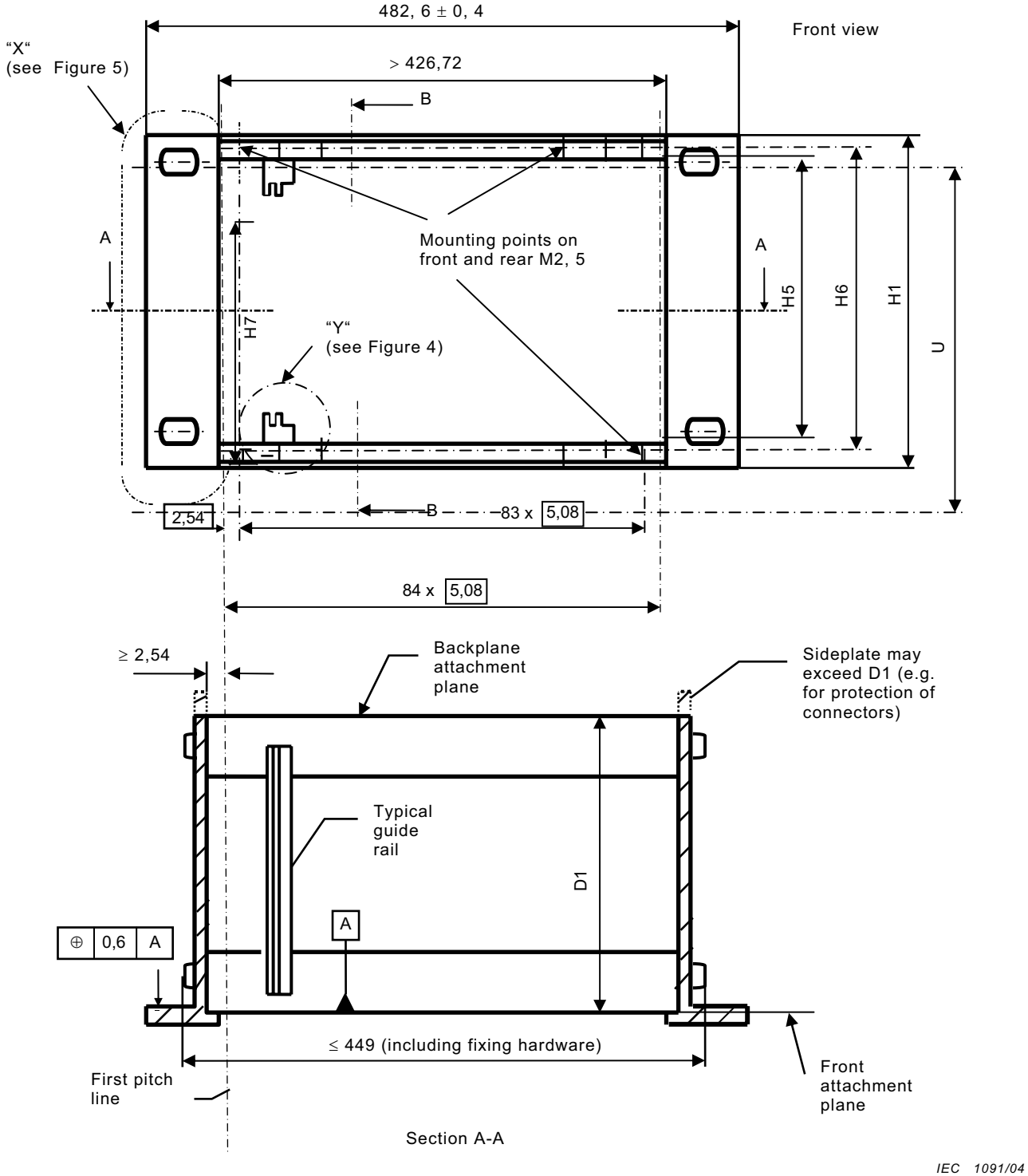
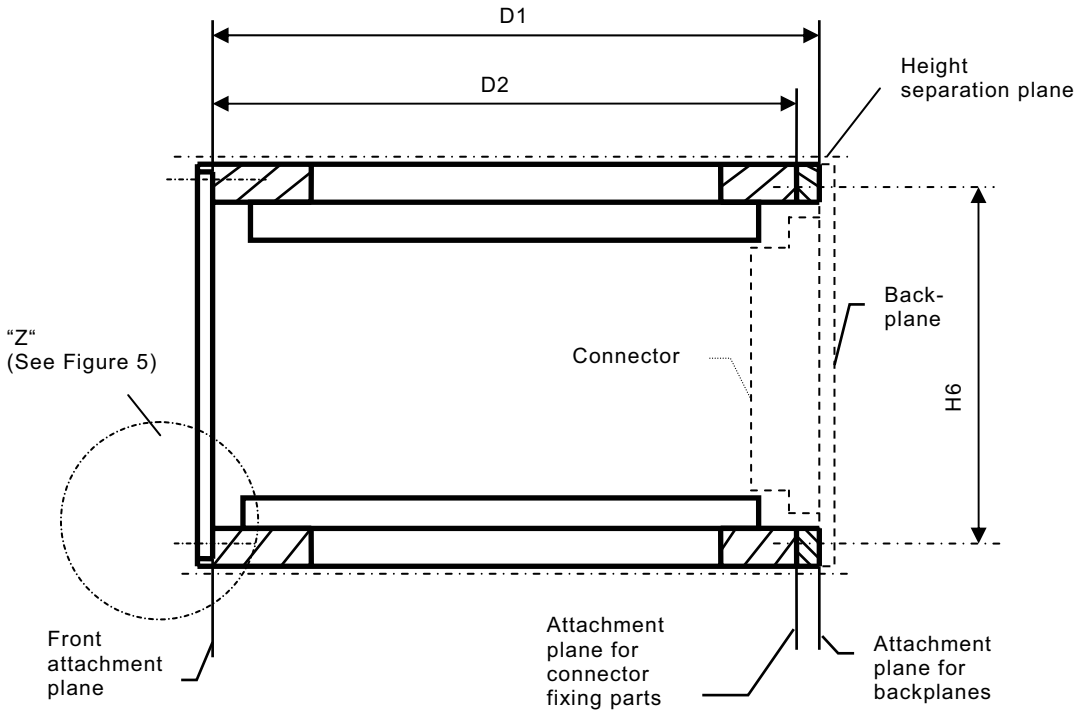
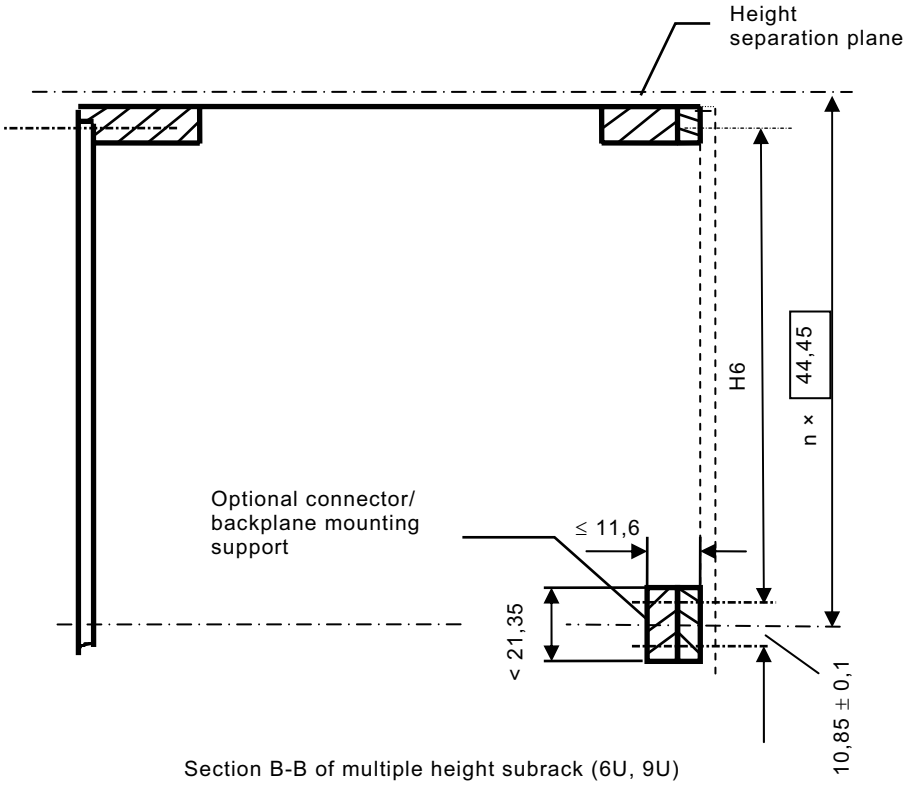


Figure 3 – Subrack dimensions, front mounting area – Part 1

Dimensions in millimetres



Section B–B of single height subrack (3U)

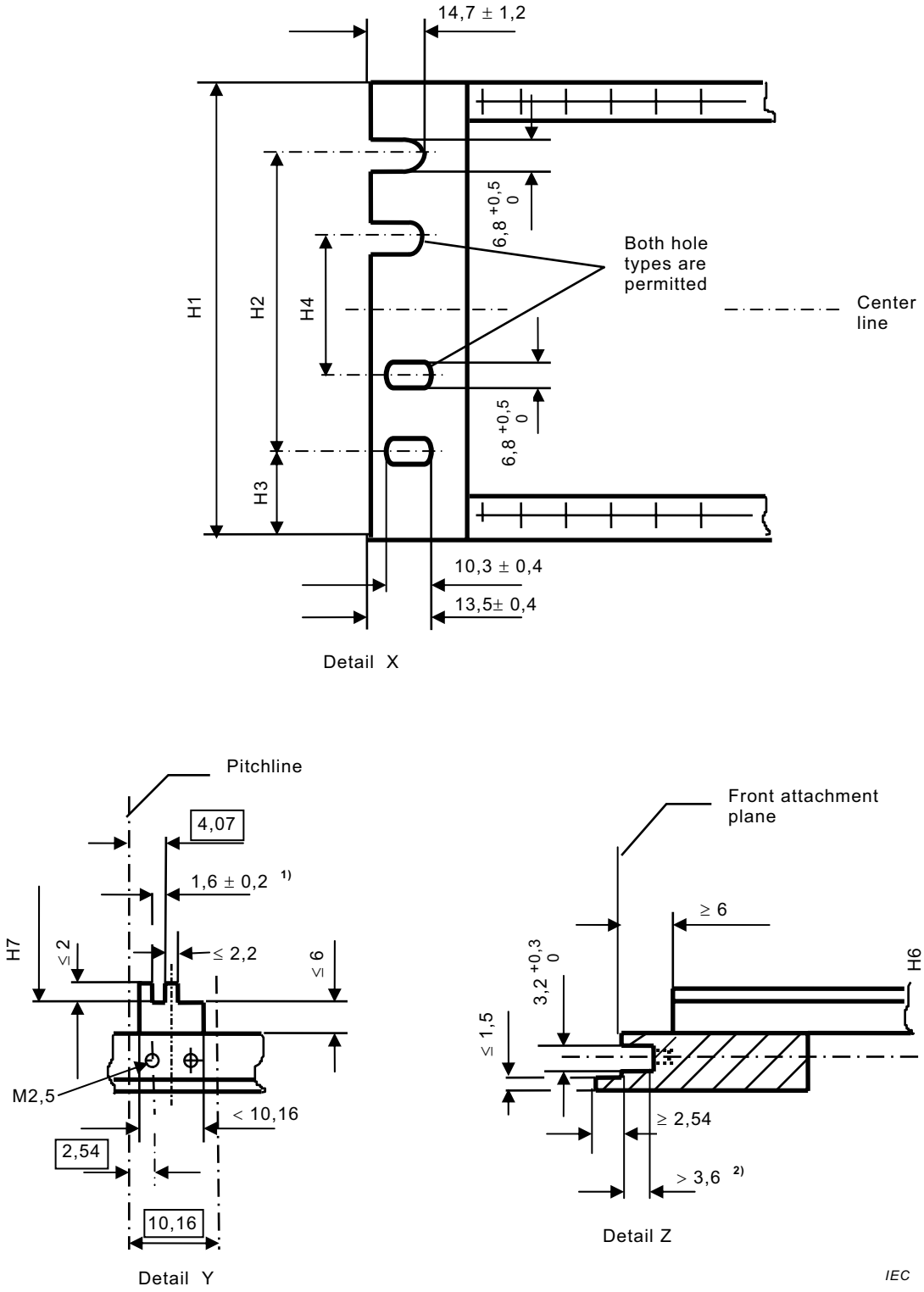


Section B-B of multiple height subrack (6U, 9U)

IEC 1092/04

Figure 4 – Subrack dimensions, front mounting area – Part 2

Dimensions in millimetres



1) For board thickness 1,6 in accordance to IEC 60249-2. The dimension 4,07 is the reference for the position of the right hand side of the printed board. Thicker boards can only expand to the left hand side. The guide rail shall be made of electrically insulating material.

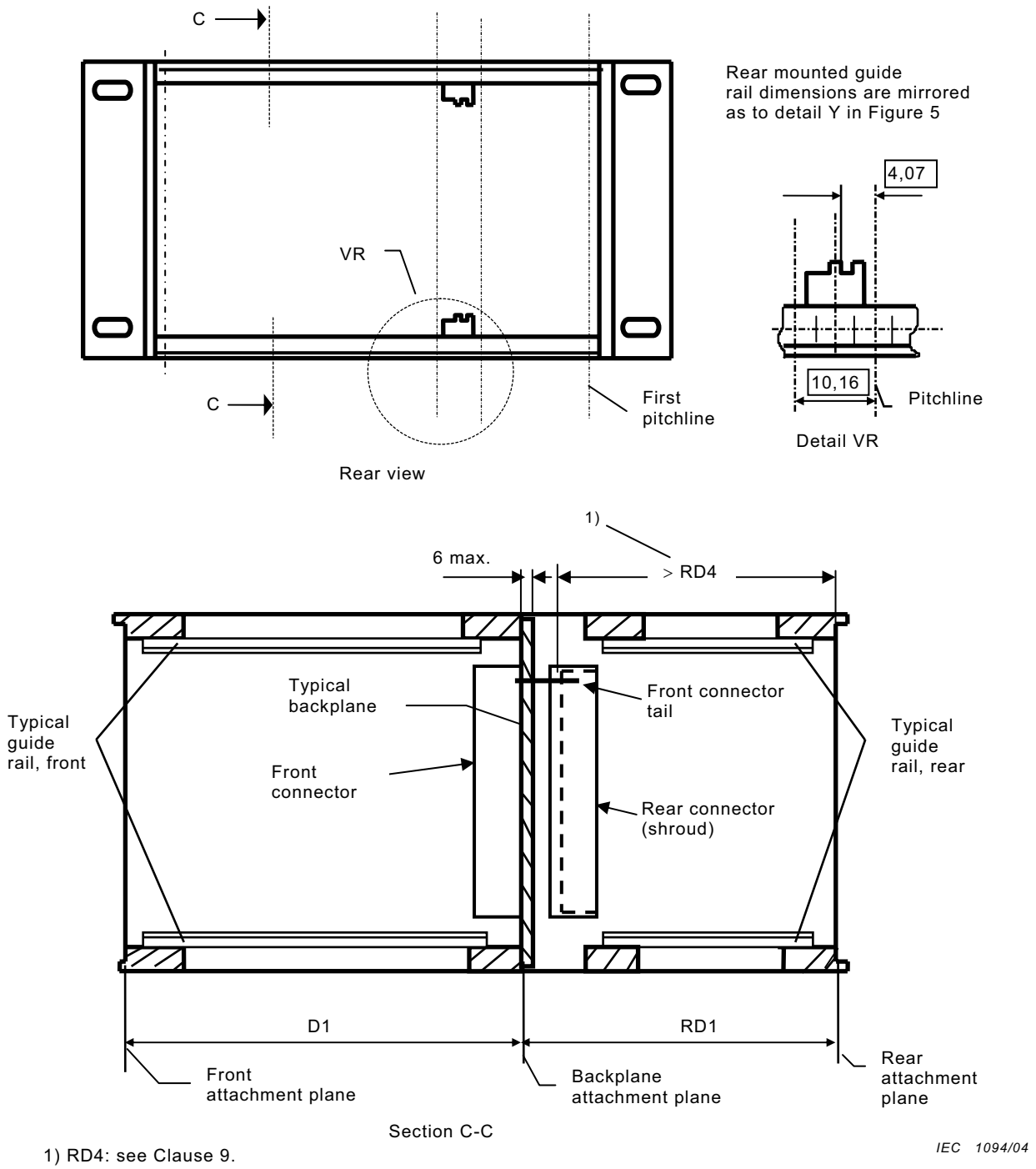
2) See Clause 7, detail “V” for thread dimensions.

Figure 5 – Subrack dimensions, front mounting area – Part 3

6 Subrack dimensions, rear mounting area

The rear mounting area of a subrack defines the aperture dimensions for rear plug-in units, the guide rail positions and the depth dimensions with the relevant connectors (see Table 1 and Figure 6).

Dimensions in millimetres



1) RD4: see Clause 9.

Figure 6 – Subrack dimensions, rear mounting area

Table 1 – RD1 dimensions

Dimensions in millimetres

Printed board depth reference (D3)	60	80	100	120	140	160	220	280
Subrack Type A [1)] RD1 ± 0, 25	82,48	102,48	122,48	142,48	162,48	182,48	242,48	302,48
Subrack Type B [2)] RD1 ± 0, 25	80	100	120	140	160	180	240	300
RD1: Depth inspection dimensions using connectors [1)] IEC 60603-2 and 61076-4-113. [2)] IEC 61076-4-101.								

7 Printed board type plug-in units, front mounted

The dimensions of front panels, printed boards and fixing parts will insure the compatibility of front mounted plug-in units into subracks (see Figures 7 to 9).

Dimensions in millimetres

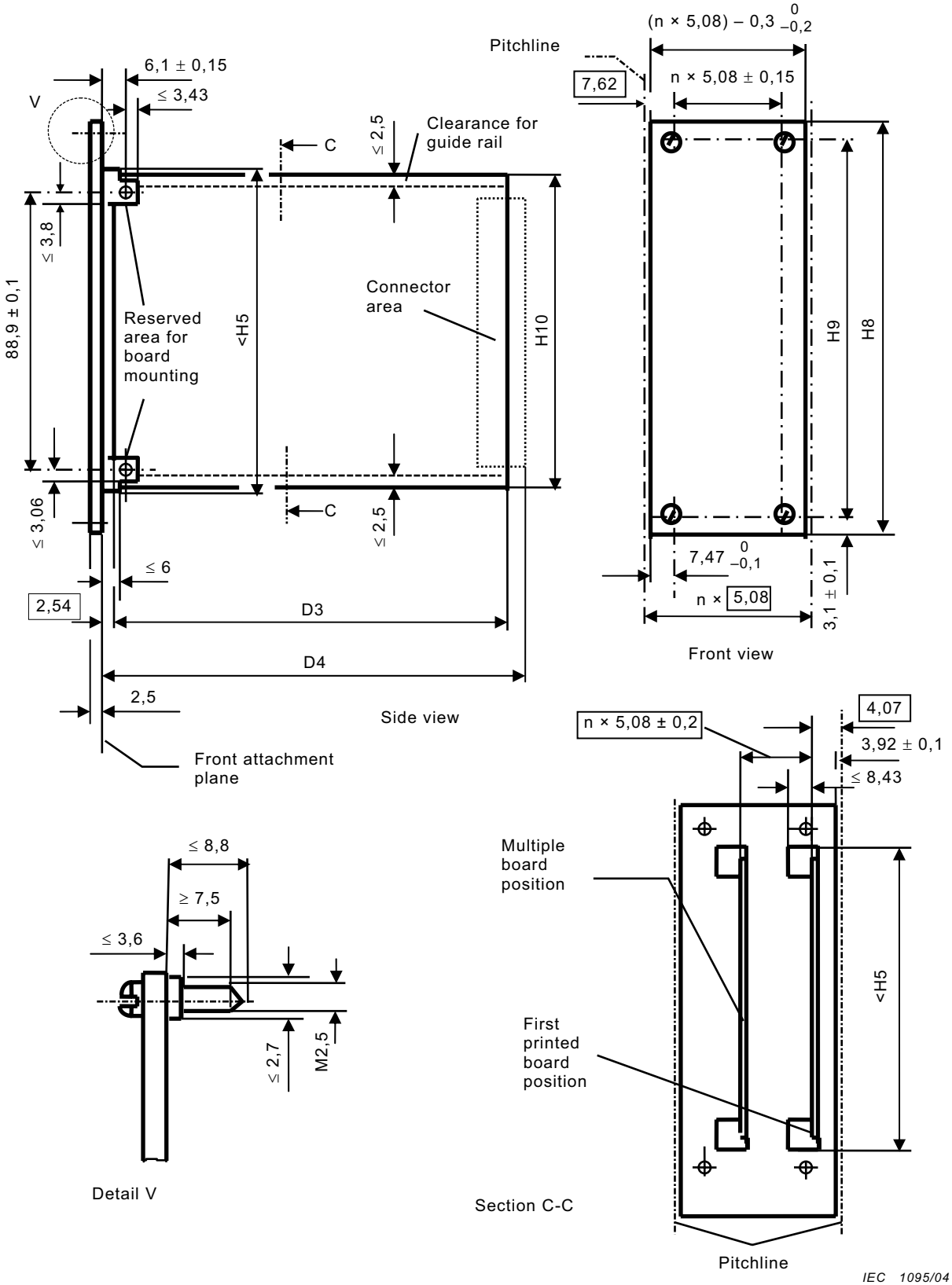


Figure 7 – Printed board type plug-in unit, 3U

Dimensions in millimetres

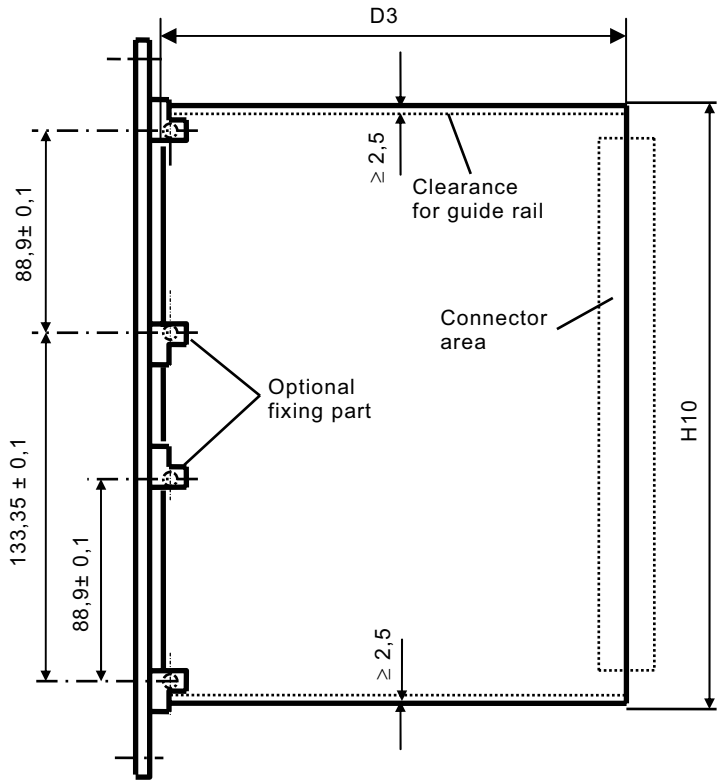


Figure 8 – Printed board type plug-in unit, 6U

Dimensions in millimetres

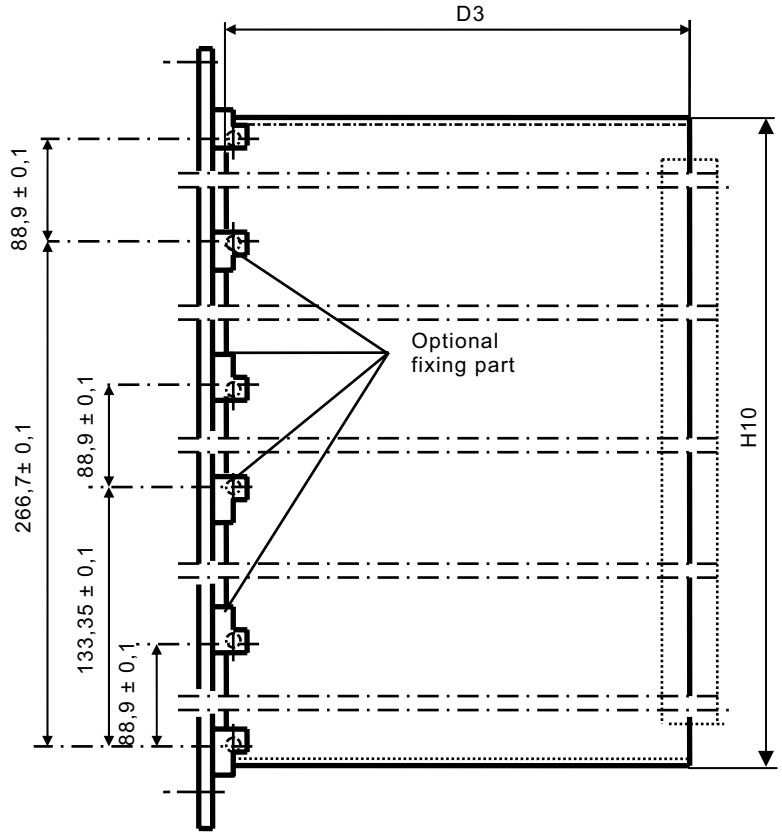


Figure 9 – Printed board type plug-in unit, 9U

8 Box type plug-in units, front mounted

The box type plug-in units have the specific geometry to fit into the same guide rails as the printed board type plug-in units. The inside aperture dimensions are suitable for the same printed board dimensions as they fit into subracks (see Figures 10 to 12).

Dimensions in millimetres

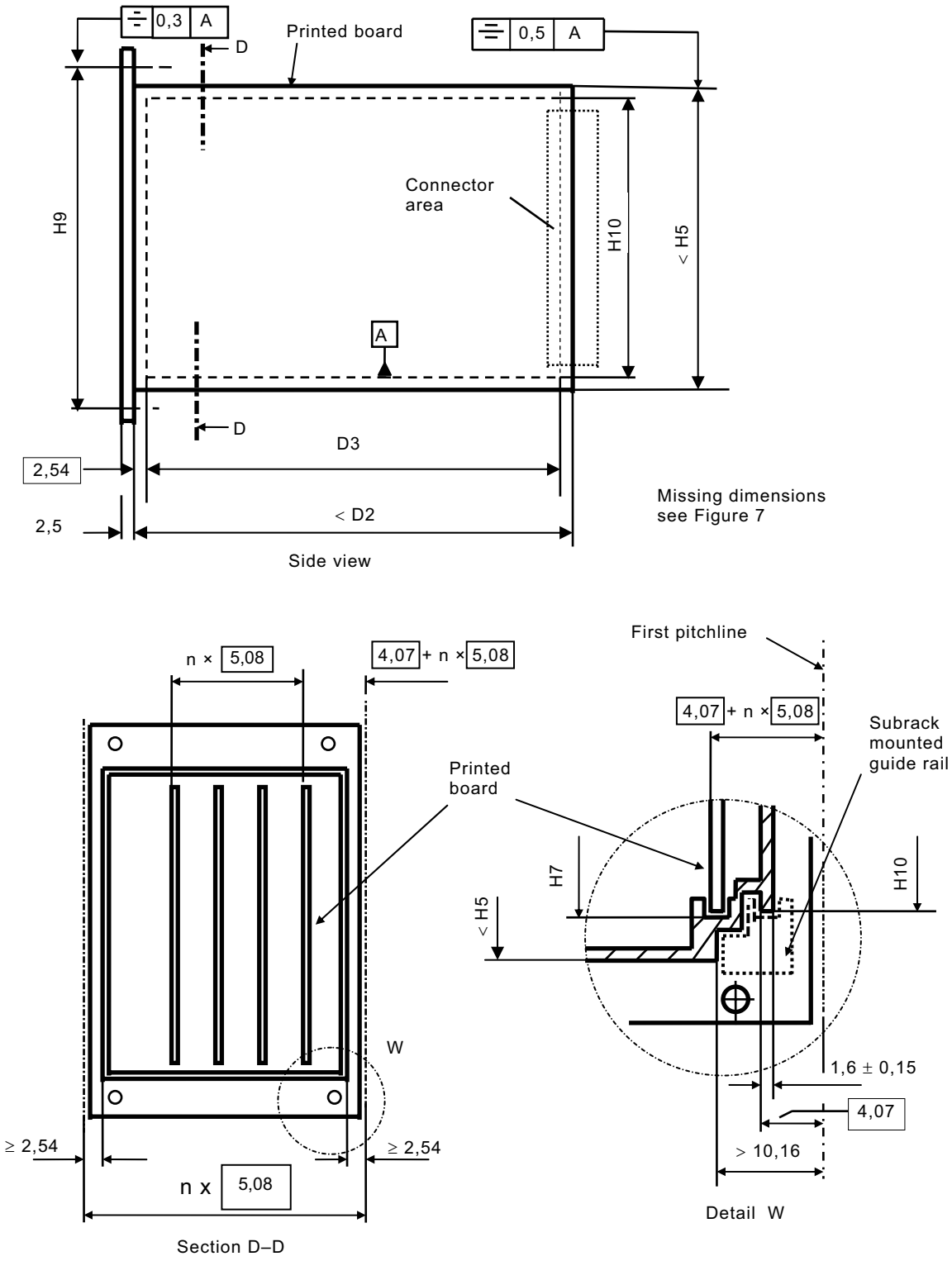


Figure 10 – Box type plug-in unit, 3U

Dimensions in millimetres

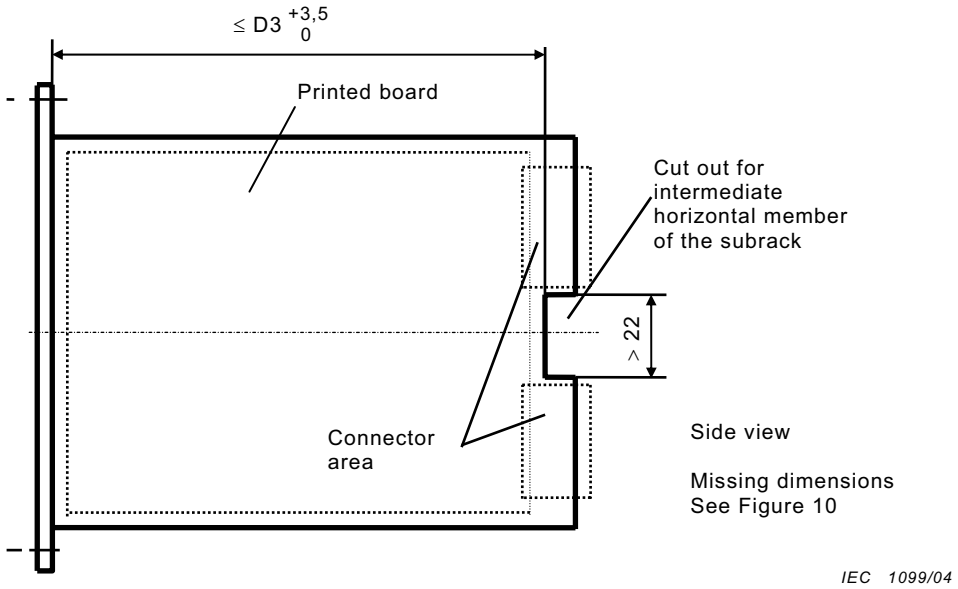


Figure 11 – Box type plug-in unit, 6U

Dimensions in millimetres

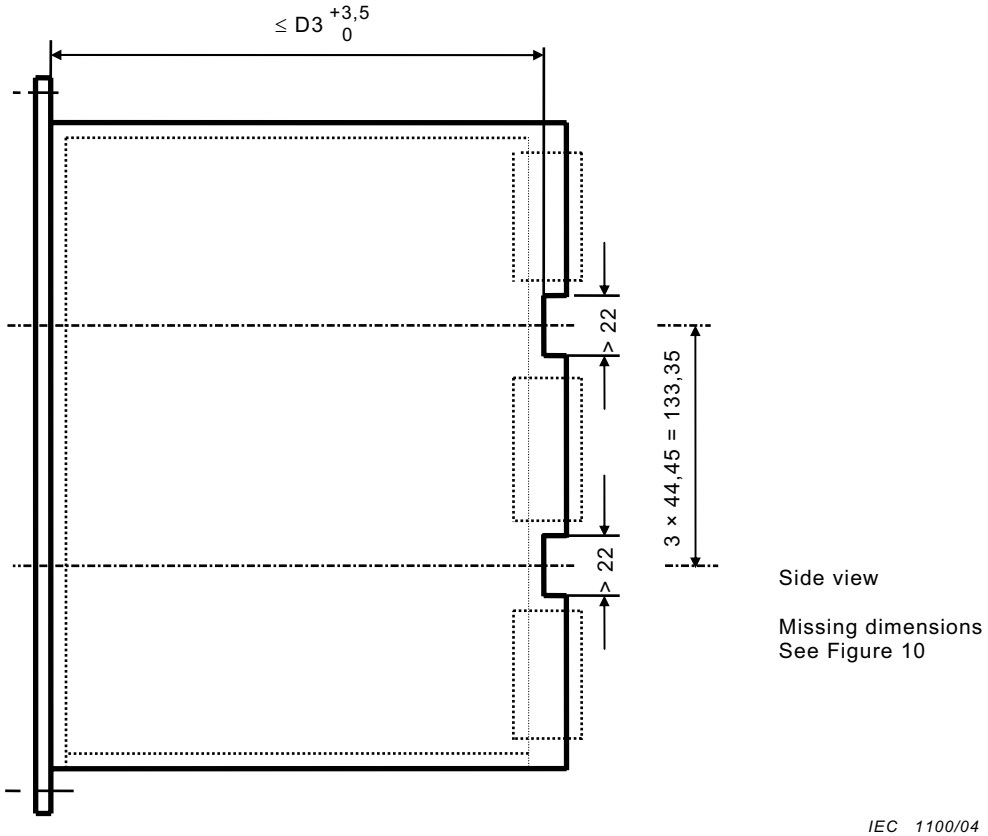


Figure 12 – Box type plug-in unit, 9U

9 Printed board type plug-in units, rear mounted

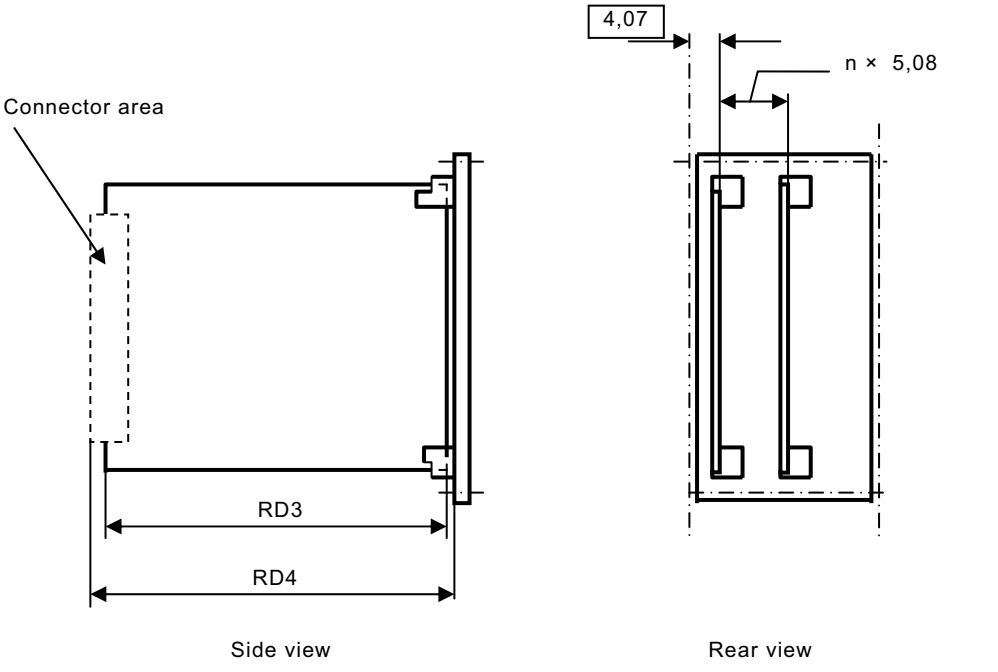
The rear mounted printed board type plug-in units are mirrored to the front mounted plug-in units. The depth dimensions are suitable for the relevant connectors (see Table 2 and Figure 13).

Table 2 – Depth dimensions RD3, RD4

Dimensions in millimetres

RD3 –0,3/+0	60	80	100	120	140	160
RD4 ± 0,4 IEC 61076-4-101	71,74	91,74	111,74	131,74	151,74	171,74
RD4 ± 0,4 IEC 60603-2	69,88	89,88	109,88	129,88	149,88	169,88
RD4 ± 0,4 IEC 61076-4-113	72,38	92,38	112,38	132,38	152,38	172,38
NOTE RD4 dependent on connector type (for IEC 60603-2 and IEC 61076-4-113 inverse types used).						

Dimensions in millimetres



Missing dimensions, see Figure 7.

Figure 13 – Printed board type plug-in units, rear mounting dimensions

10 Subrack and plug-in units with electromagnetic shielding provisions

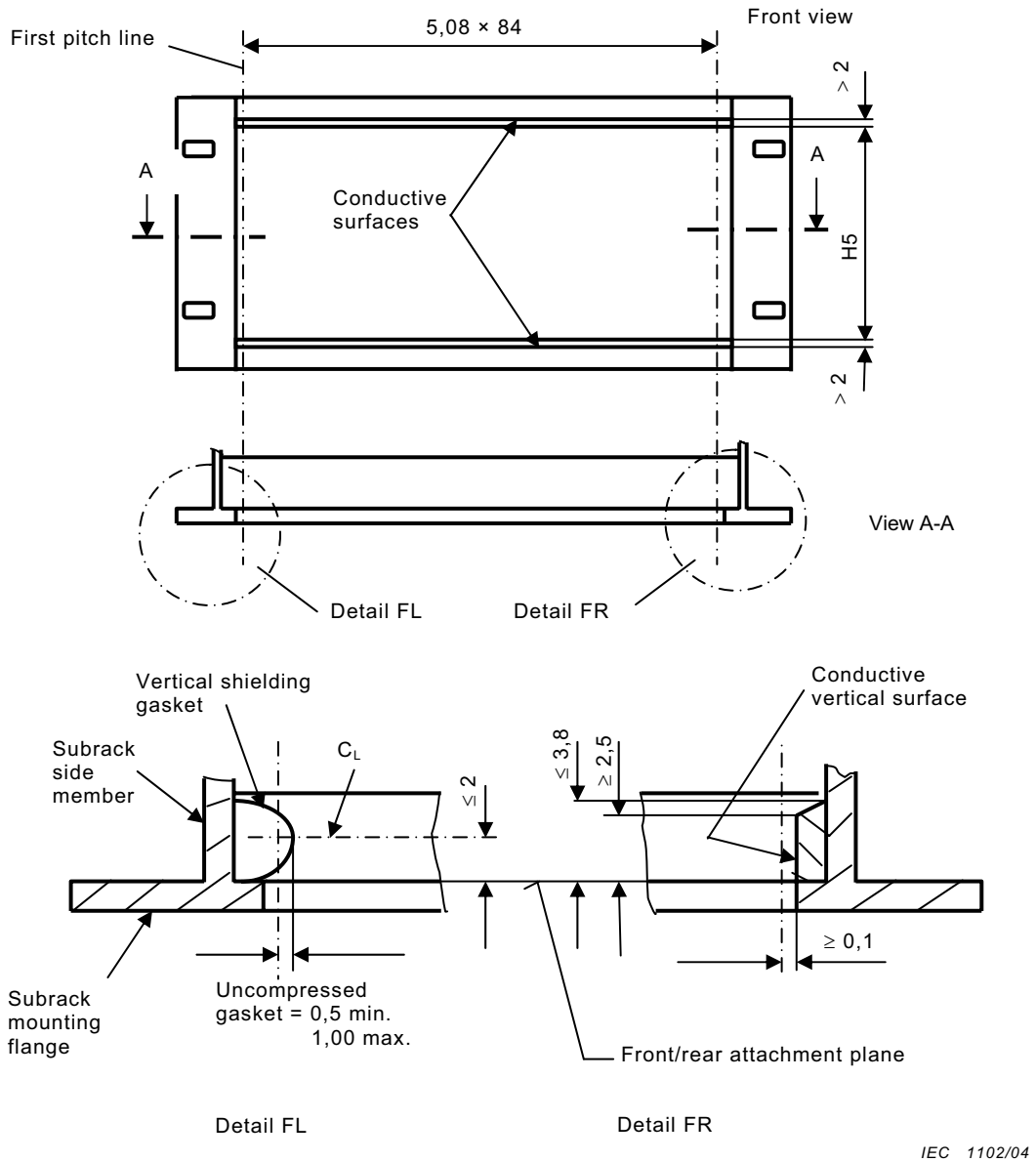
10.1 General

The dimensional specifications of electromagnetic shielding provisions for subracks and associated plug-in units are restricted to the subrack and plug-in unit interfaces. The basic dimensions are in accordance with Clauses 5, 6, 7 and 8 of this part of IEC 60297. Only the extended dimensions of the shielding interfaces are the subject of this Clause. Materials of the shielding interfaces should be chosen for adequate contact properties.

10.2 Subrack shielding interface dimensions

For subrack shielding interface dimensions, see Figure 14. For corresponding plug-in unit dimensions, see 10.3.

Dimensions in millimetres



NOTE Front/rear of the subrack is of mirror image.

Figure 14 – Subrack shielding interface dimensions

10.3 Plug-in unit and filler panels with electromagnetic shielding provisions

The basic dimensions are in accordance with Clauses 7 and 8 of this part of IEC 60297. Only the extended dimensions of the shielding interface are shown. See Figure 15.

Dimensions in millimetres

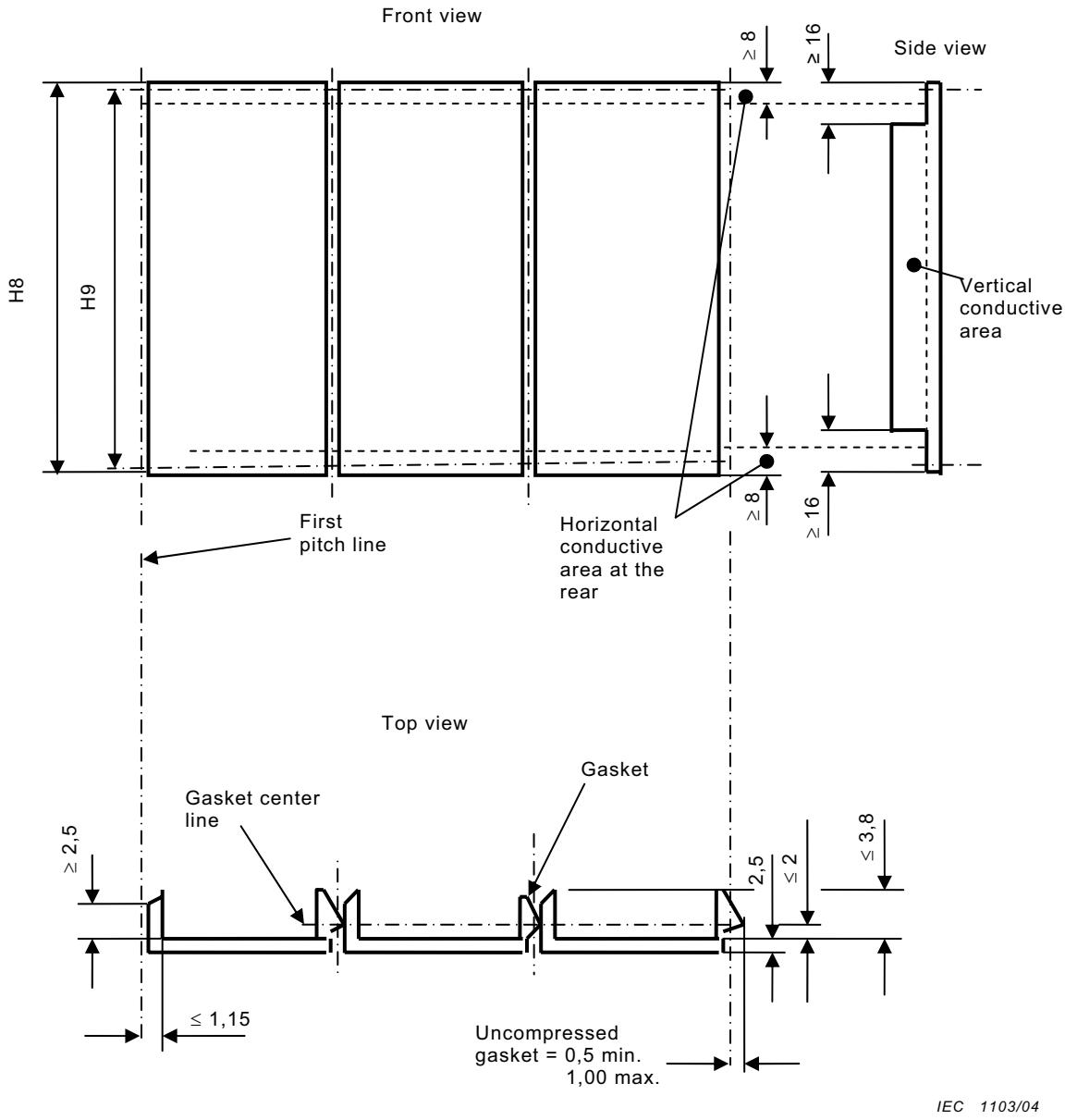


Figure 15 – Plug-in unit and filler panels shielding interface dimensions

11 Plug-in units electrostatic discharge provisions

11.1 General

This Clause specifies the interface dimensions for an electrostatic discharge (ESD) contact implemented in the guide rail and the corresponding conductive strip on the plug-in unit printed board (see Figures 16 and 17).

The conductive strips on the printed board are shown for two application requirements: with permanent connection along with the depth dimension of the board or with interruption before the board is fully engaged in the connector.

11.2 ESD contact interface dimensions

The ESD contact shall be connected to the subrack horizontal member and spring load fixed within the determined guide rail area. The ESD contact shall be able to connect the inserted board on both sides.

Dimensions in millimetres

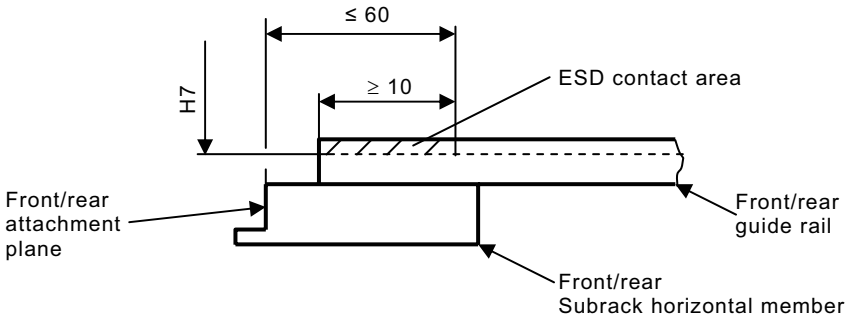


Figure 16 – ESD contact interface dimensions

Dimensions in millimetres

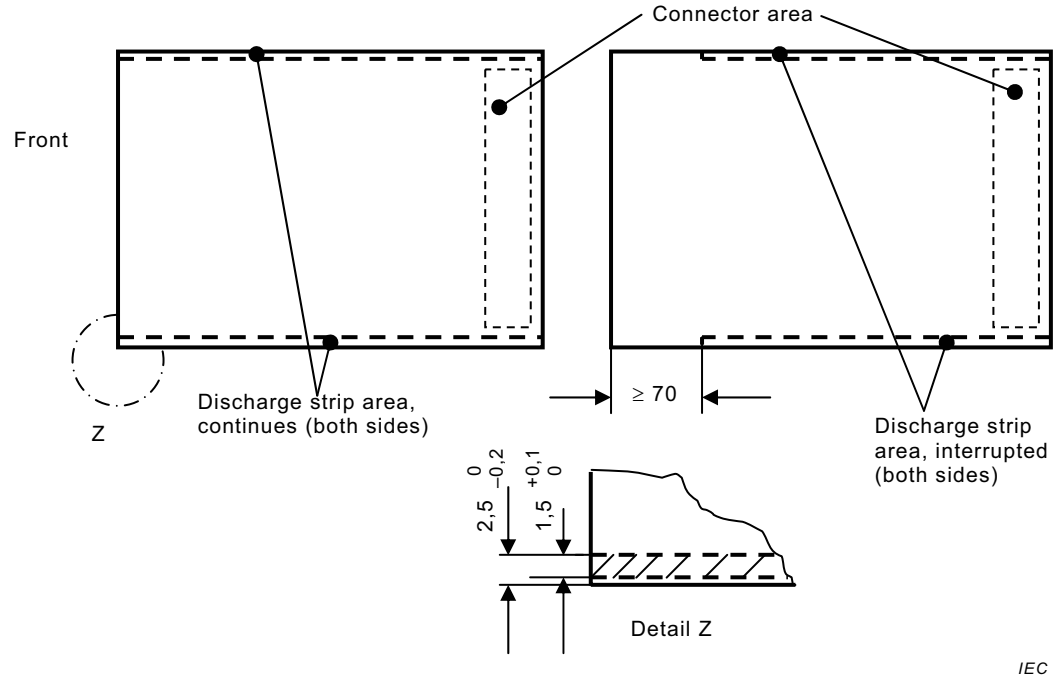


Figure 17 – ESD strip interface dimensions

Table 3 – Height dimensions

Dimensions in millimetres

Height units	2U	3U	4U	5U	6U	7U	8U	9U	10U	11U	12U
H1 ± 0,4	88,10	**132,55**	177,00	221,45	**265,90**	310,35	354,80	**399,25**	443,70	488,15	532,60
H2 ± 0,4	76,20	**57,15**	101,60	146,05	**190,50**	234,95	279,40	**323,85**	368,30	412,75	457,20
H3 ± 0,4	5,95	**37,70**	37,70	37,70	**37,70**	37,70	37,70	**37,70**	37,70	37,70	37,70
H4 ± 0,4	-	**-**	-	-	**76,20** [1)]	57,15	76,20	**120,65**	165,10	146,05	190,50
H5 ≥	67,55	**112,00**	156,45	200,90	**245,35**	289,80	334,25	**378,70**	423,15	467,60	512,05
H6 ± 0,2	78,05	**122,50**	166,95	211,40	**255,85**	300,30	344,75	**389,20**	433,65	478,10	522,55
H7 +0,5 –0	55,75	**100,20**	144,65	189,10	**233,55**	278,00	322,45	**366,90**	411,35	455,80	500,25
H8 ± 0,15	84,10	**128,55**	173,00	217,45	**261,90**	306,35	350,80	**395,25**	439,70	484,15	528,60
H9 ± 0,2	78,05	**122,50**	166,95	211,40	**255,85**	300,30	344,75	**389,20**	433,65	478,10	522,55
H10 +0 –0,3	55,55	**100,00**	144,45	188,90	**233,35**	277,80	322,25	**366,70**	411,15	455,60	500,05

[1)] Optional.

Preferred dimensions are in bold.

Table 4 – Depth dimensions

Dimensions in millimetres

D1 ± 0,5	75,6	95,60	115,60	135,60	155,60	**175,60**	**235,60**	295,60
D2 ± 0,5	72,24	92,24	112,24	132,24	152,24	**172,24**	**232,24**	292,24
D3 – 0,3	60	80,00	100,00	120	140	**160,00**	**220,00**	280,00
D4 ± 0,4 [1)]	69,93	89,93	109,93	129,93	149,93	**169,93**	**229,93**	289,93
D4 ± 0,4 [2)]	71,93	91,93	111,93	131,93	151,93	**171,93**	**231,93**	291,93
D4 ± 0,4 [3)]	71,74	91,74	111,74	131,74	151,74	**171,74**	**231,74**	291,74

[1)] Depth inspection dimension with connector see IEC 60603-2, Type B,C,D and IEC 61076-4-113.

[2)]Depth inspection dimension with connector see IEC 60603-2, Type F,G,H.

[3)] Depth inspection dimension with connector see IEC 61076-4-101.

Preferred dimensions are in bold.

12 Dimensions used in the figures

Height

U: Coordination height unit of 44,45 mm (1,75 in). See IEC 60297-1.

H1: Subrack heights (equal to dimension E of IEC 60297-1).

H2: Subrack to cabinet or rack mounting hole positions (equal to dimensions Y/Z of IEC 60297-1).

H3: Subrack to cabinet or rack mounting hole positions (equal to dimensions A of IEC 60297-1).

H4: Subrack to cabinet or rack mounting hole positions (equal to dimensions Y/Z of IEC 60297-1).

H5: Subrack vertical aperture opening for plug-in units.

H6: Mounting center distance for plug-in units, front panels, backplanes and connector supports.

H7: Plug-in unit and printed board guidance height.

H8: Plug-in unit front panel height.

H9: Vertical plug-in unit front panel or backplane onto subrack mounting dimensions.

H10: Printed Board height or plug-in unit into subrack guidance height.

Width

HP: The subrack aperture is theoretically divided into 84 Horizontal Pitches (HP) of 5,08 mm.

The subrack aperture may be divided into 168 half pitches of 2,54 mm.

The plug-in unit front panel width is divided into Nx 5,08 mm horizontal pitches.

The plug-in unit front panel width may be divided into Nx 2,54 mm half pitches.

The plug-in unit guide to guide position is divided into Nx 5,08 mm horizontal pitches.

The plug-in unit guide to guide position may be divided into Nx 2,54 mm half pitches.

Depth

D1: Subrack test dimension for front mounted plug-in units.

RD1: Subrack test dimension for rear mounted plug-in units.

D2: Is irrelevant and should be removed or (alternatively) D2 should be defined as "Optional backplane insulation space" only with no dimensions.

D3: Front mounted printed board recommended depth (may be increased or decreased according to connector choice).

RD3: Rear mounted printed board recommended depth (may be increased or decreased according to connector choice).

D4: Front plug-in unit test dimension, connector dependent.

RD4: Rear plug-in unit test dimension, connector dependent.

Standards Survey

The IEC would like to offer you the best quality standards possible. To make sure that we continue to meet your needs, your feedback is essential. Would you please take a minute to answer the questions overleaf and fax them to us at +41 22 919 03 00 or mail them to the address below. Thank you!

Customer Service Centre (CSC)

International Electrotechnical Commission
3, rue de Varembé
1211 Genève 20
Switzerland

or

Fax to: **IEC**/CSC at +41 22 919 03 00

Thank you for your contribution to the standards-making process.

Nicht frankieren
Ne pas affranchir

Non affrancare
No stamp required

A Prioritaire

RÉPONSE PAYÉE

SUISSE

Customer Service Centre (CSC)
International Electrotechnical Commission
3, rue de Varembé
1211 GENEVA 20
Switzerland

Q1 Please report on **ONE STANDARD** and **ONE STANDARD ONLY**. Enter the exact number of the standard: *(e.g. 60601-1-1)*

.....

Q2 Please tell us in what capacity(ies) you bought the standard *(tick all that apply).* I am the/a:

purchasing agent ❑
librarian ❑
researcher ❑
design engineer ❑
safety engineer ❑
testing engineer ❑
marketing specialist ❑
other.....

Q3 I work for/in/as a: *(tick all that apply)*

manufacturing ❑
consultant ❑
government ❑
test/certification facility ❑
public utility ❑
education ❑
military ❑
other.....

Q4 This standard will be used for: *(tick all that apply)*

general reference ❑
product research ❑
product design/development ❑
specifications ❑
tenders ❑
quality assessment ❑
certification ❑
technical documentation ❑
thesis ❑
manufacturing ❑
other.....

Q5 This standard meets my needs: *(tick one)*

not at all ❑
nearly ❑
fairly well ❑
exactly ❑

Q6 If you ticked NOT AT ALL in Question 5 the reason is: *(tick all that apply)*

standard is out of date ❑
standard is incomplete ❑
standard is too academic ❑
standard is too superficial ❑
title is misleading ❑
I made the wrong choice ❑
other .....

Q7 Please assess the standard in the following categories, using the numbers:
(1) unacceptable,
(2) below average,
(3) average,
(4) above average,
(5) exceptional,
(6) not applicable

timeliness.....
quality of writing.....
technical contents.....
logic of arrangement of contents .....
tables, charts, graphs, figures.....
other .....

Q8 I read/use the: *(tick one)*

French text only ❑
English text only ❑
both English and French texts ❑

Q9 Please share any comment on any aspect of the IEC that you would like us to know:

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