
**Information technology — Digitally
recorded media for information
interchange and storage — Information
Versatile Disk for Removable usage
(iVDR) cartridge**

*Technologies de l'information — Supports enregistrés numériquement
pour échange et stockage d'information — Disque versatile
d'information pour cartouche d'emploi amovible (iVDR)*

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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ISO/IEC 29171 was prepared by Technical Committee ISO/TC JTC 1, *Information technology*, Subcommittee SC 23, *Digitally Recorded Media for Information Interchange and Storage*.

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Introduction

The original iVDR specification was developed by the “iVDR Consortium”, (<http://www.ivdr.org>).

Hard disk drive technologies can be used in the cartridge. A major use of iVDR cartridges might be storage for digitally recorded audio and video content.

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Information technology — Digitally recorded media for information interchange and storage — Information Versatile Disk for Removable usage (iVDR) cartridge

1 Scope

This International Standard specifies the dimensional, mechanical and physical characteristics of an information Versatile Disk for Removable usage (iVDR) cartridge to enable mechanical interchangeability between data processing systems. Hard disk drive technologies can be used in the cartridge.

This International Standard specifies the environment in which iVDR cartridges are to be operated and stored, and specifies the dimensions and pin assignments of a connector employed by iVDR cartridges to enable data interchange.

Together with ISO/IEC 24739-3 and a standard for volume and file structure, this International Standard enables full data interchange between data processing systems.

Figure 1 shows an external view of an iVDR cartridge.



Figure 1 — External view of iVDR cartridge

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 60950-1, *Information technology equipment — Safety — Part 1: General requirements*

ISO/IEC 24739-3, *Information technology — AT Attachment with Packet Interface - 7 — Part 3: Serial Transport Protocols and Physical Interconnect (ATA/ATAPI-7 V3)*¹⁾

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

cartridge

housing that protects the inner storage mechanism and facilitates data interchange

3.2

clamp area

part of the cartridge to which the clamping force is applied by the clamping mechanism

3.3

eject area

part of the cartridge to which the ejection force is applied by the eject mechanism

3.4

gap

part of the housing that is used to lock the cartridge in place to prevent ejection

3.5

guide rail

part of the housing that facilitates proper cartridge loading and ejection

3.6

interface ID

identification of interface type such as ATA

3.7

insertion direction mark area

area on the cartridge that is used to apply markings which indicate the proper insertion of the cartridge into the receiving system

3.8

label area

area on the cartridge that is used to apply labels

3.9

load area

part of the cartridge to which the loading force is applied by the loading mechanism

3.10

locking system

mechanism that prevents ejection of the cartridge

3.11

plug connector

male type connector implemented on the cartridge

3.12

power ID

identification of operating voltage

1) Under preparation.

3.13**receiving system**

part of a data processing system of which the mechanism is designed to “receive” the cartridge

3.14**receptacle connector**

female type connector implemented on the receiving system

4 Conventions and notations**4.1 Representation of numbers**

A measured value is rounded off to the least significant digit of the corresponding specified value. For instance, it implies that a specified value of 1,26 with a positive tolerance of + 0,01 and a negative tolerance of - 0,02 allows a range of measured values from 1,235 to 1,275.

Numbers in decimal notations are represented by the digits 0 to 9.

Numbers in hexadecimal notation are represented by the hexadecimal digits 0 to 9 and A to F in parentheses.

The setting of bits is denoted by ZERO and ONE.

Numbers in binary notations and bit patterns are represented by strings of digits 0 and 1.

4.2 Names

The names of entities, e.g. specific sides, are given a capital initial, except for iVDR.

5 Acronyms

AT	Advanced Technology
ATA	Advanced Technology Attachment
GND	ground
ID	identification
IF	interface
PWR	power

6 Environment and safety

The conditions specified below refer to the environment where air immediately surrounding the iVDR cartridge has the following properties.

6.1 Testing environment

Unless stated otherwise, tests and measurements made on the iVDR cartridge to check conformance with this International Standard shall be carried out under the following conditions:

- Temperature: 20 °C ± 3 °C

- Relative humidity: 50 % $\pm$ 20 %
- Condition before testing: 24 h min.

The iVDR cartridge shall not be exposed to magnetic fields greater than 1,5 mT. No condensation on or in the iVDR cartridge shall occur.

6.2 Operating environment

The operating environment is the environment where air immediately surrounding the iVDR cartridge shall have the following properties:

- Temperature: 5 °C to 50 °C
- Relative humidity: 8 % to 90 %
- Wet bulb temperature: 29,4 °C max.
- Temperature gradient: 20 °C /h max.
- Atmospheric pressure: 714 hPa to 1 050 hPa
- Vibration: 9,8 m/s² max.
at 5 Hz to 500 Hz swept sine wave at 1,0 octave per minute.

The iVDR cartridge surface temperature in operating mode shall be below 55 °C.

No condensation on or in the iVDR cartridge shall occur. The iVDR cartridge shall not be exposed to magnetic fields greater than 1,5 mT. If an iVDR cartridge has been exposed during storage and/or transportation to a condition outside the above values, before use, the cartridge shall be conditioned in the operating environment for a time at least equal to the period during which it has been out of the operating environment, up to a maximum of 24 h.

The iVDR cartridge shall be operated under the following electrical conditions:

- Power supply voltage: +5,00 V $\pm$ 0,25 V
- Maximum peak to peak ripple noise: 100 mV
Frequency range of the ripple noise of power supply voltage is from 0 MHz to 1 MHz.
- Power supply current: 2 A max.

Maximum duration time of the incident peak current is 3 seconds.

6.3 Storage environment

The iVDR cartridge shall be stored under the following conditions:

- Temperature: -40 °C to 65 °C
- Relative humidity: 5 % to 95 %
- Wet bulb temperature: 40 °C max.
- Temperature gradient: 20 °C /h max.
- Atmospheric pressure: 282 hPa to 1 050 hPa

The iVDR cartridge shall not be exposed to magnetic fields greater than 1,5 mT. No condensation on or in the iVDR cartridge shall occur.

6.4 Safety

The iVDR cartridge assembly shall satisfy the requirements of IEC 60950-1 when used in the intended manner or in any foreseeable use in a receiving system.

6.5 Flammability

The iVDR cartridge assembly shall be constructed such that, if ignited it does not continue to burn in a still carbon dioxide atmosphere.

6.6 Transportation

Recommended limits for the environment to which an iVDR cartridge may be subjected during transportation, and the precautions to be taken to minimise the possibility of damage, are provided in Annex E.

7 Dimensional, mechanical, and physical characteristics of the iVDR cartridge

7.1 General description of the iVDR cartridge

The iVDR cartridge (see Figure 2) is a container of rectangular shape. It features guide rails on both sides to facilitate proper connector insertion. It has gaps for a locking system and has areas for a label and insertion direction mark. The label and insertion direction mark are optional.

Figure 2 shows a drawing of the iVDR cartridge in isometric form, with major features identified.

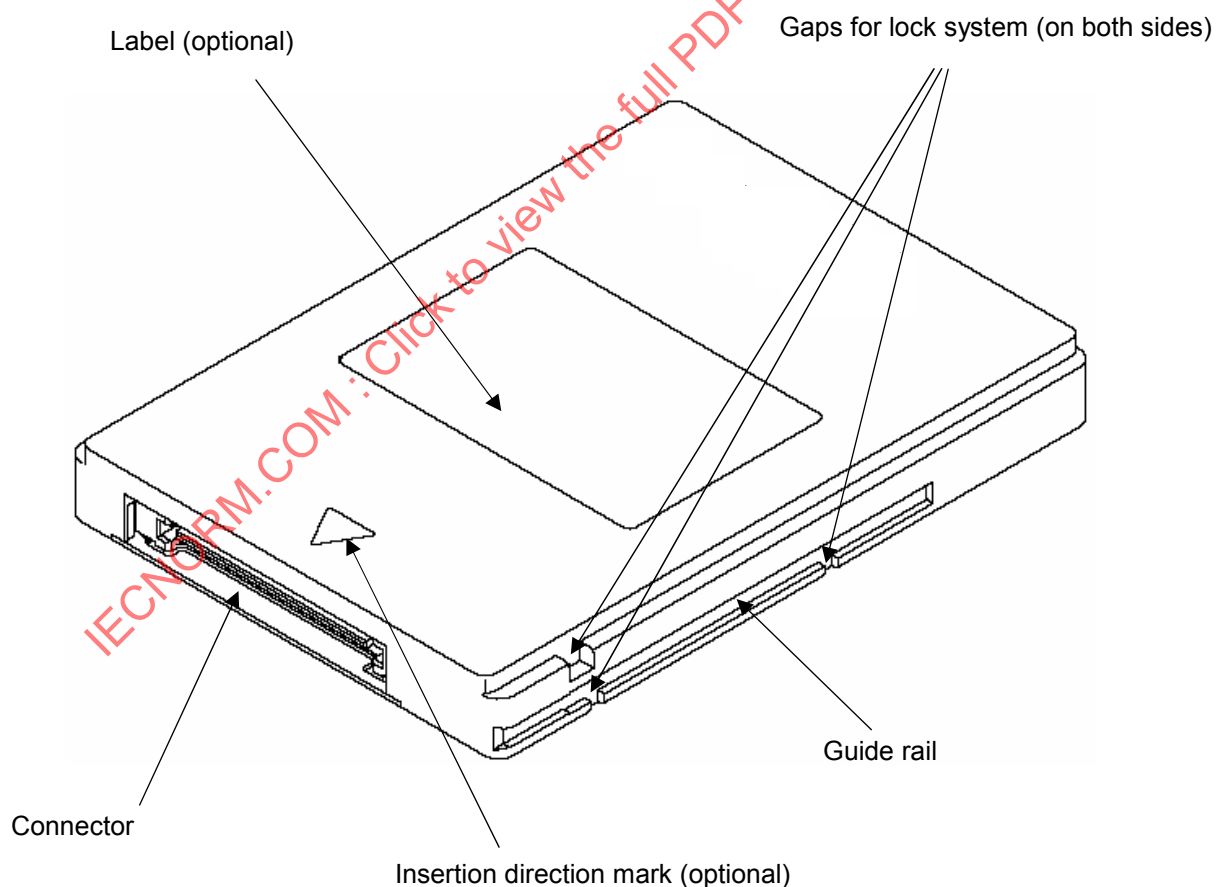


Figure 2 — iVDR cartridge outline

7.2 Outer dimensions

Figure 3 shows an outline drawing of the iVDR cartridge. A more detailed drawing can be found in Figure 4.

The total length of the iVDR shall be

$$l_1 = 110,0 \text{ mm} \begin{matrix} +0,0 \text{ mm} \\ -0,3 \text{ mm} \end{matrix}$$

The total width shall be

$$l_2 = 80,0 \text{ mm} \begin{matrix} +0,0 \text{ mm} \\ -0,3 \text{ mm} \end{matrix}$$

The total thickness shall be

$$l_3 = 12,7 \text{ mm} \begin{matrix} +0,0 \text{ mm} \\ -0,3 \text{ mm} \end{matrix}$$

The total thickness shall not cause the cartridge thickness l_3 to exceed the value specified above even though label and/or insertion direction mark are optional.

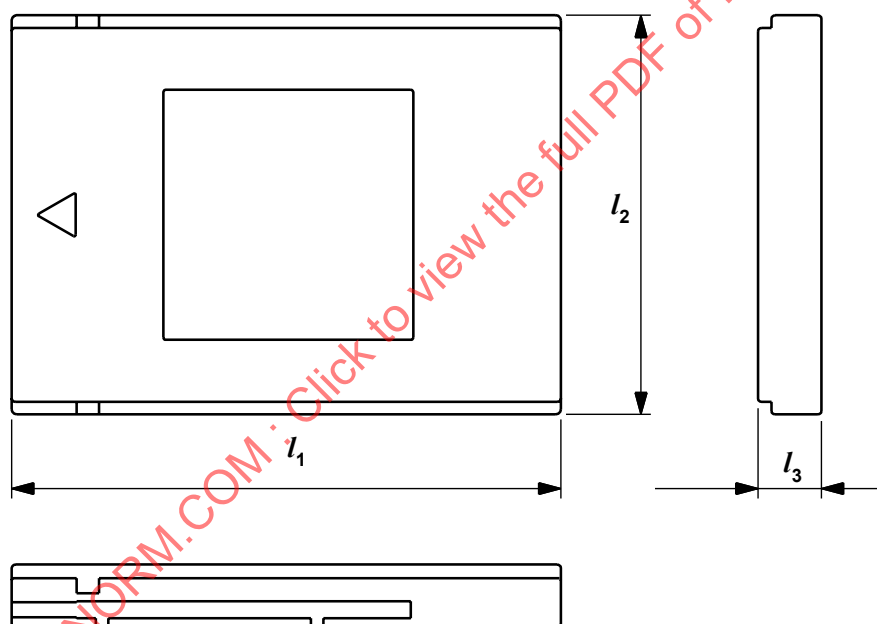


Figure 3 — Outline drawing of the iVDR cartridge

7.3 Mass

The maximum mass of the iVDR cartridge shall be 0,25 kg.

7.4 Detailed mechanical specifications

7.4.1 Dimensions

The cartridge is represented schematically by Figure 4. The dimensions of the iVDR cartridge shall be as listed below.

$$l_{50} = 2,5 \text{ mm} \pm 0,1 \text{ mm}$$

$$l_{51} = 10,0 \text{ mm} \begin{matrix} +0,0 \text{ mm} \\ -0,3 \text{ mm} \end{matrix}$$

$$l_{52} = 48,2 \text{ mm} \pm 0,1 \text{ mm}$$

$$l_{53} = 11,025 \text{ mm} \pm 0,100 \text{ mm}$$

$$l_{54} = 1,2 \text{ mm} \begin{matrix} +0,1 \text{ mm} \\ -0,7 \text{ mm} \end{matrix}$$

$$l_{55} = 7,55 \text{ mm} \begin{matrix} +0,70 \text{ mm} \\ -0,10 \text{ mm} \end{matrix}$$

$$l_{56} = 1,2 \text{ mm} \pm 0,1 \text{ mm}$$

$$l_{57} = 60,00 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{58} = 2,5 \text{ mm} \pm 0,1 \text{ mm}$$

$$l_{59} = 17,00 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{60} = 2,5 \text{ mm} \pm 0,1 \text{ mm}$$

$$l_{61} = 13,00 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{62} = 4,5 \text{ mm} \pm 0,1 \text{ mm}$$

$$l_{63} = 3,0 \text{ mm} \pm 0,1 \text{ mm}$$

$$l_{64} = 5,0 \text{ mm} \pm 0,1 \text{ mm}$$

$$l_{65} = 3,0 \text{ mm} \pm 0,1 \text{ mm}$$

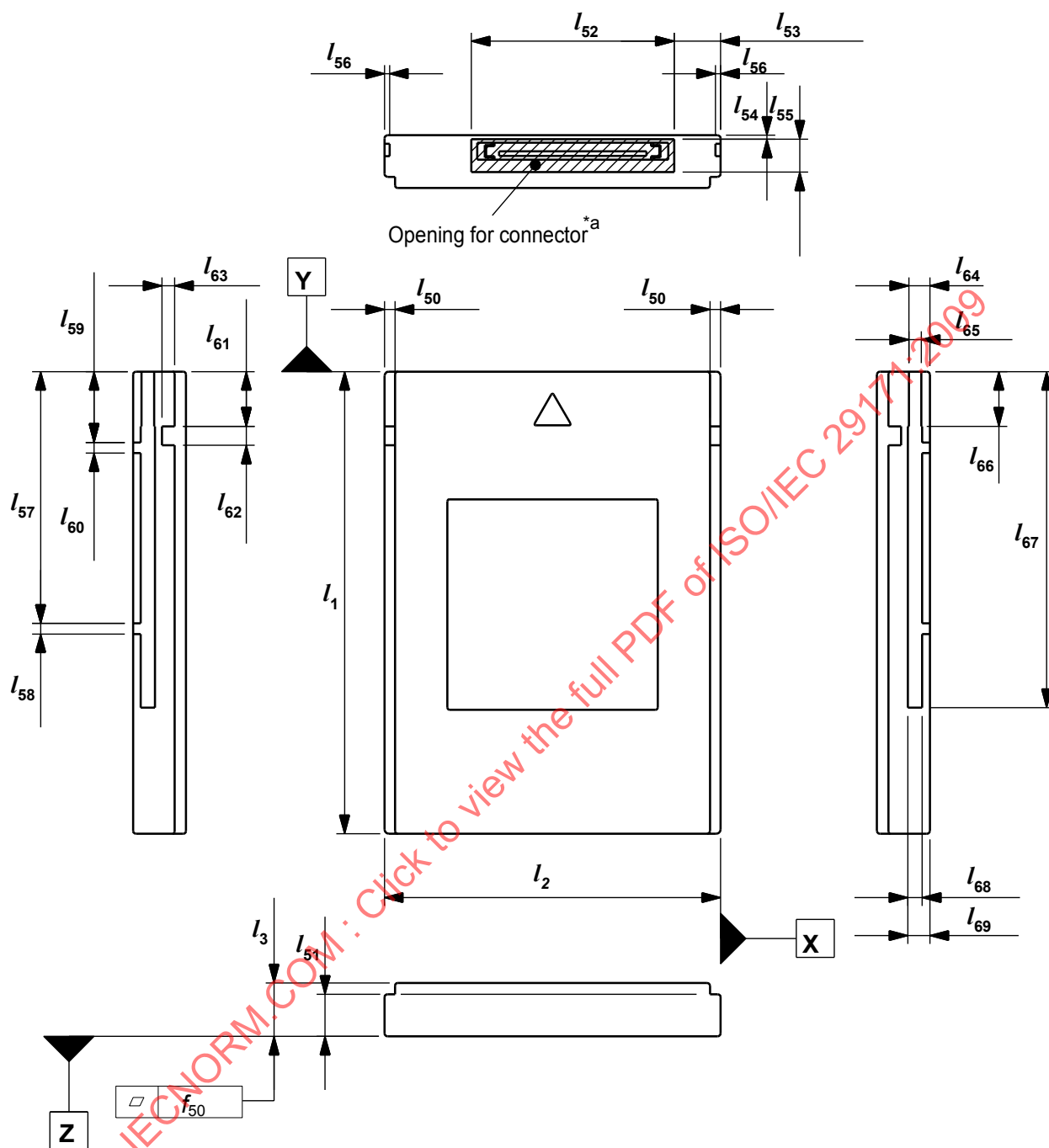
$$l_{66} = 13,00 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{67} = 80,0 \text{ mm} \pm 0,5 \text{ mm}$$

$$l_{68} = 3,4 \text{ mm} \pm 0,1 \text{ mm}$$

$$l_{69} = 5,2 \text{ mm} \pm 0,1 \text{ mm}$$

$$f_{50} = 0,3 \text{ mm}$$



*a See Figure 10 in 7.4.6 for the exact position of the iVDR connector

Figure 4 — Overall dimensions of the iVDR cartridge

Figure 5 shows the datum plane of the iVDR cartridge.

The datum plane Z is determined by the supporting areas A, B and C or A, B and D. The datum plane Z is defined by either one of the planes ABC or ABD whose remaining supporting area D or C is inward of the plane itself.

The flatness of the supporting areas comprised from A to D shall be 0,15 mm or less. The dimensions of the supporting areas shall be as follows.

$$l_{70} = 60 \text{ mm}$$

$$l_{71} = 10 \text{ mm}$$

$$l_{72} = 77 \text{ mm}$$

$$l_{73} = 25 \text{ mm}$$

$$d_{50} = 8 \text{ mm}$$

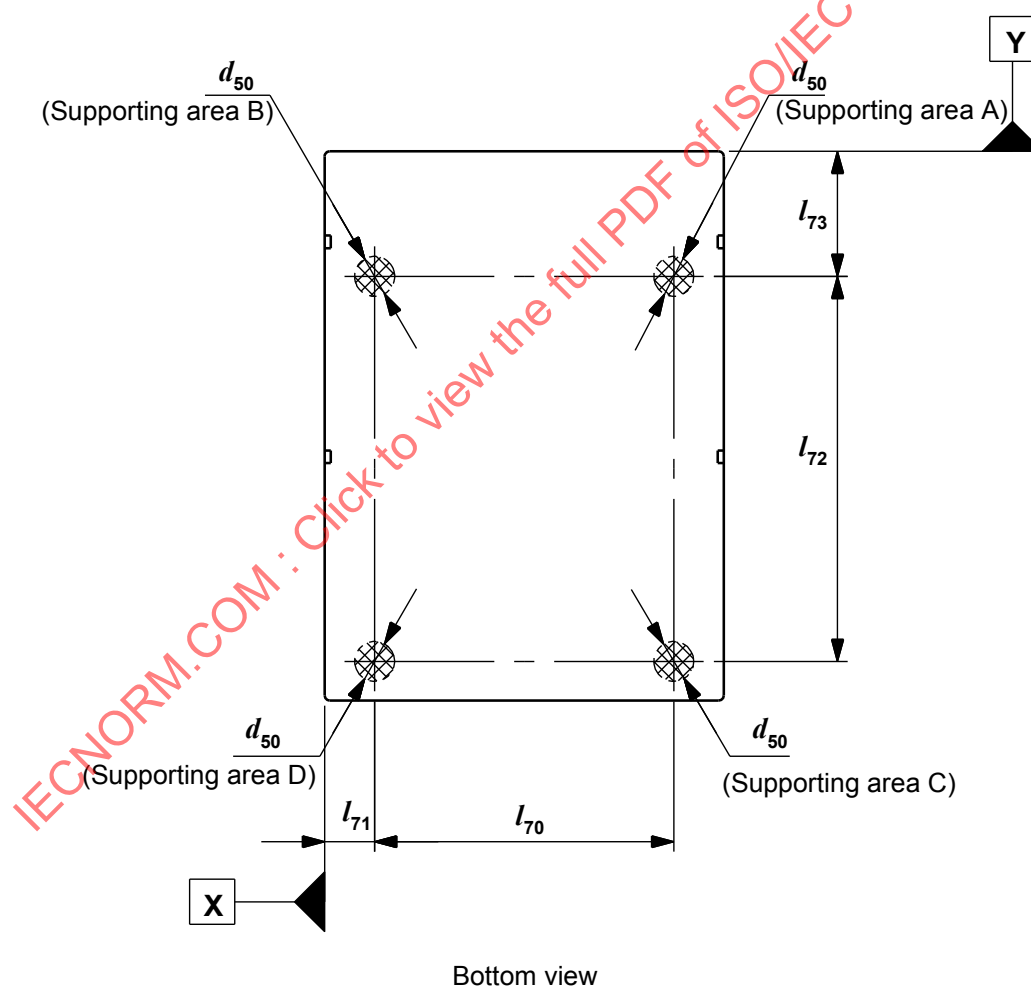


Figure 5 — Supporting areas at the bottom part of the iVDR cartridge

7.4.2 Guide rail

Figure 6 shows a diagram of the guide rails.

The guide rails are placed on both sides and are used for loading and ejecting.

They also aid in properly inserting the cartridge connector.

The radius of the rail edge guide shall be

$r_{50} = 0,3 \text{ mm max.}$ (8 places)

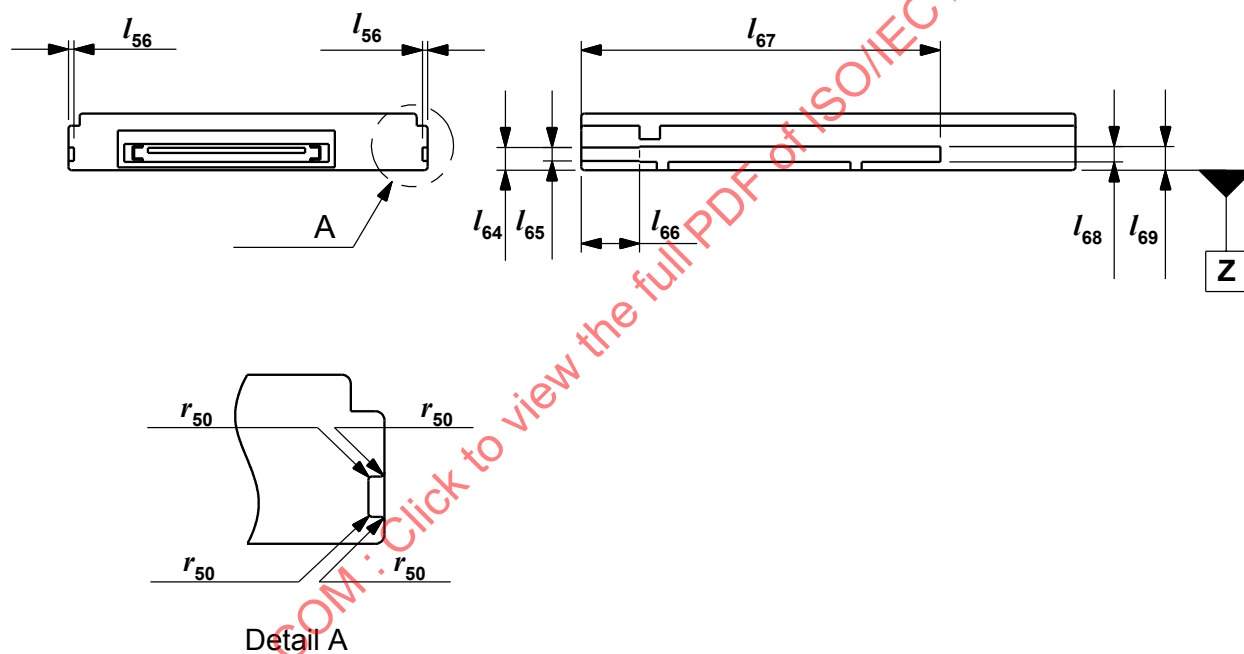


Figure 6 — Guide rails of the iVDR cartridge

7.4.3 Gaps for locking system

Figure 7 shows the gaps for the locking system. These gaps shall be used for locking the iVDR cartridge in place to prevent users from ejecting a cartridge in operation.

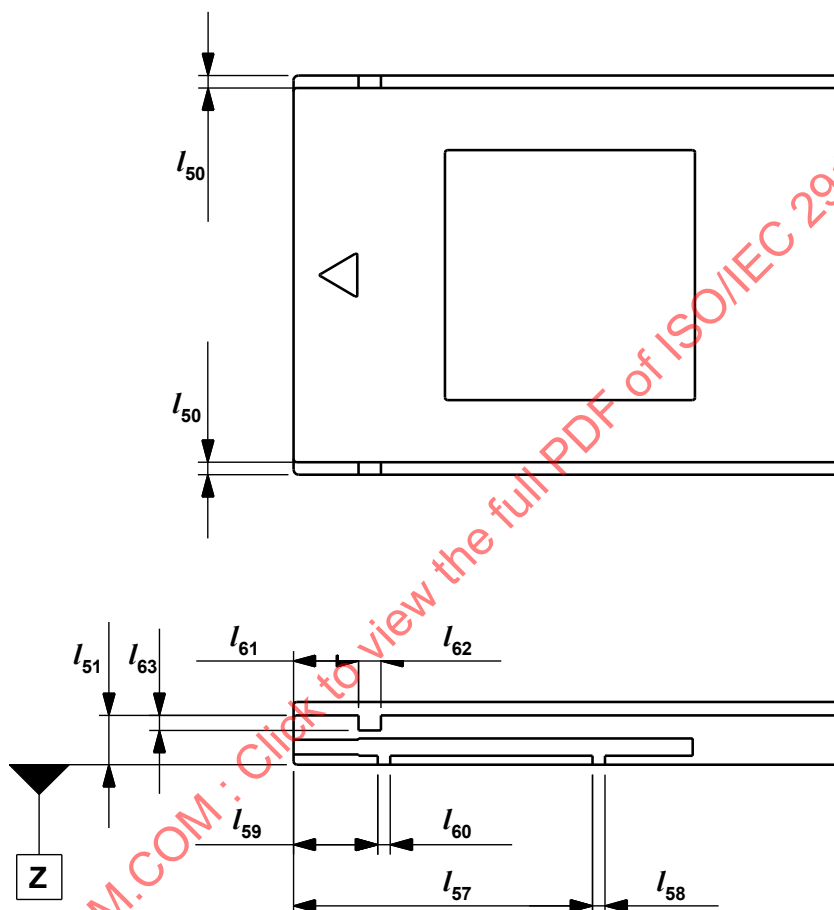


Figure 7 — Gaps for locking system

7.4.4 Load area and eject area

Figure 8 shows a diagram of the load and the eject area.

The receiving system shall use these areas for loading and ejection of the cartridge as listed below.

$$l_{74} = 5,0 \text{ mm} \pm 0,5 \text{ mm}$$

$$l_{75} = 10,0 \text{ mm} \pm 0,5 \text{ mm}$$

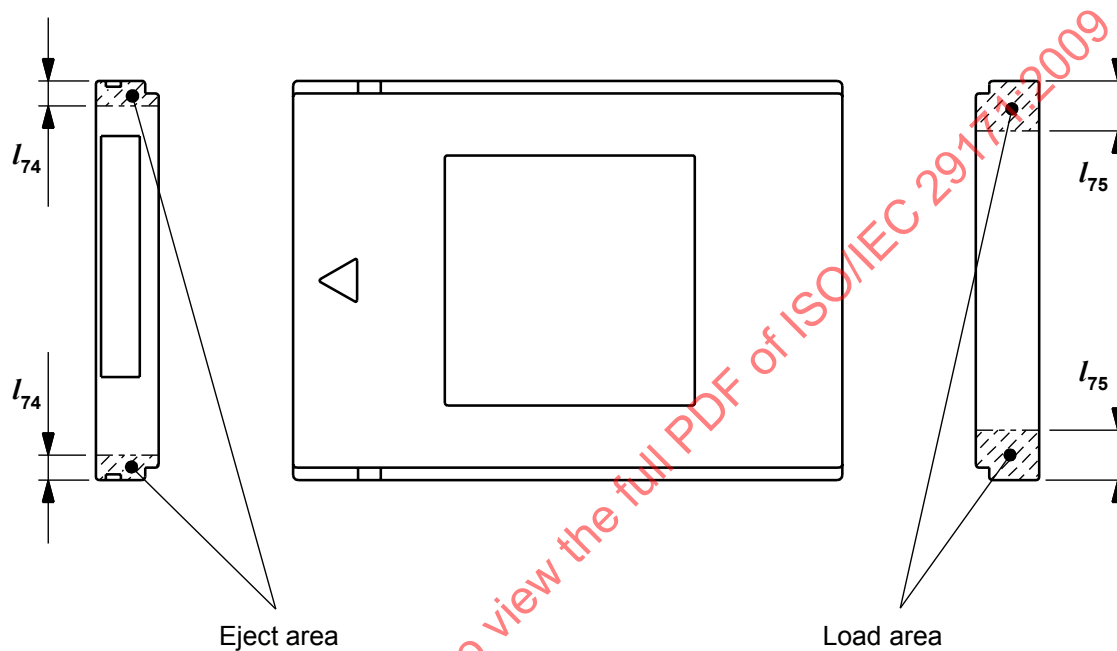


Figure 8 — Load area and eject area

7.4.5 Clamp area

Figure 9 shows a drawing of the clamp area.

This area is used for clamping the iVDR cartridge by the receiving system. It shall be free of any obstructions to clamping function. The receiving system shall only use this designated area for clamping.

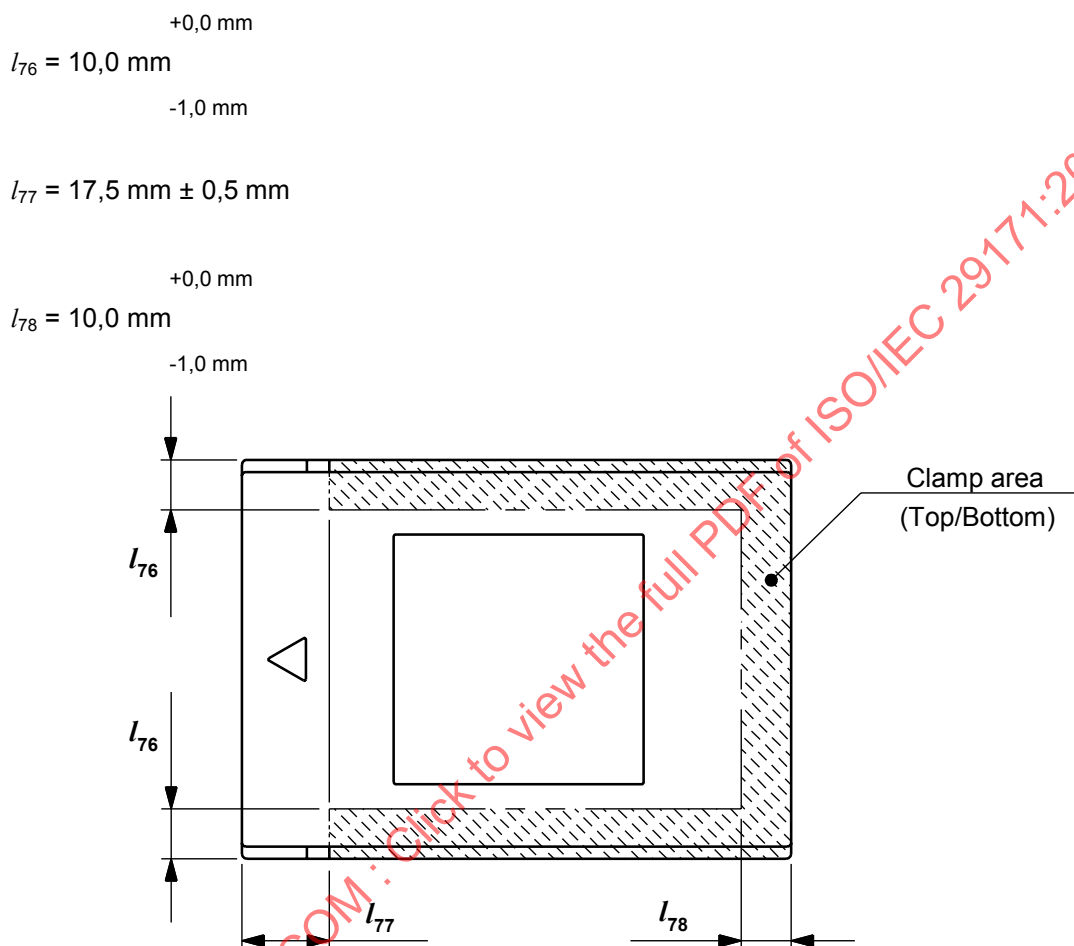


Figure 9 — Clamp area

7.4.6 Connector position

Figure 10 shows the position of the iVDR plug connector. In Figure 10, length l_{84} is the distance between the center line of iVDR cartridge and the center line of iVDR connector. The plug connector specifications are described in Section 8. The dimensions of the connector position shall be as follows.

$$l_{84} = 4,8 \text{ mm} \pm 0,3 \text{ mm}$$

$$l_{85} = 4,9 \text{ mm} \pm 0,5 \text{ mm}$$

$$l_{86} = 2,5 \text{ mm} \pm 0,5 \text{ mm}$$

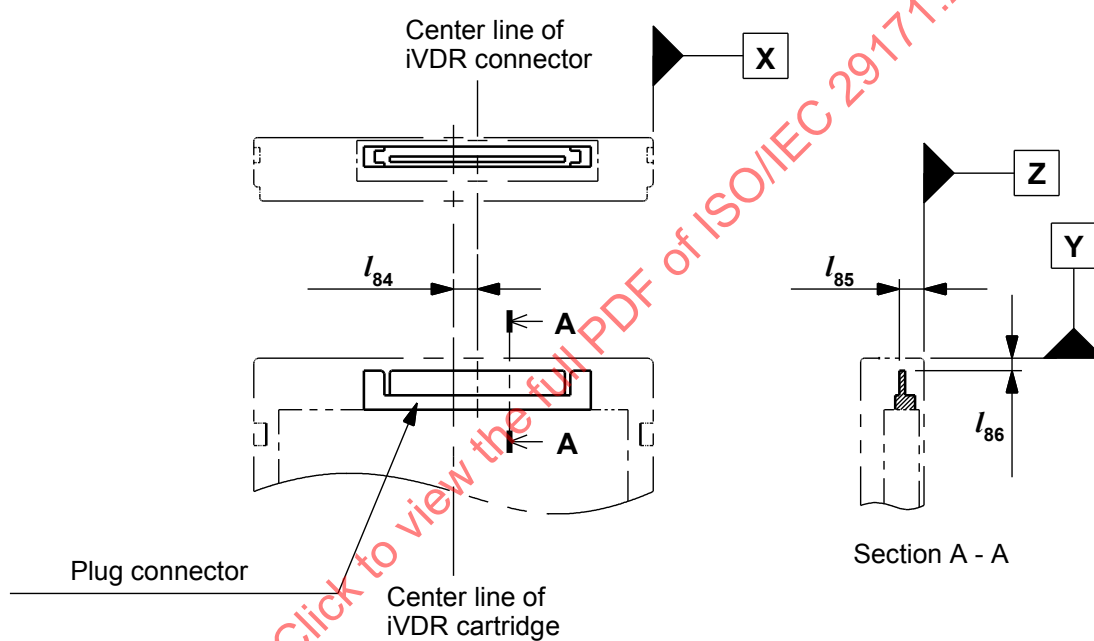


Figure 10 — Position of iVDR connector

8 iVDR cartridge plug connector description

8.1 General specification

The connector mounted on the iVDR cartridge is named “plug connector” in this specification.

Figure 11 shows outline of the iVDR cartridge plug connector.

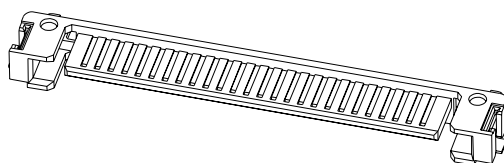


Figure 11 — Outline of iVDR cartridge plug connector

8.2 Configuration specification

Figure 12 shows a drawing of the iVDR cartridge plug connector. The asymmetrical shape of the connector assures proper mating with its counterpart. The connector dimensions shall be as listed below:

$$l_4 = 46,43 \text{ mm}$$

$$l_5 = 41,13 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_6 = 0,30 \text{ mm} \pm 0,05 \text{ mm} \text{ (2 places)}$$

$$l_7 = 4,00 \text{ mm} \pm 0,08 \text{ mm}$$

$$l_8 = 0,30 \text{ mm} \pm 0,05 \text{ mm} \text{ (4 places)}$$

$$l_9 = 1,10 \text{ mm}$$

$$l_{10} = 34,99 \text{ mm} \pm 0,08 \text{ mm}$$

$$l_{11} = 31,75 \text{ mm}$$

$$l_{12} = 4,90 \text{ mm} \pm 0,08 \text{ mm}$$

$$l_{13} = 1,27 \text{ mm}$$

$$l_{14} = 0,84 \text{ mm} \pm 0,08 \text{ mm}$$

$$l_{15} = 1,97 \text{ mm} \pm 0,02 \text{ mm}$$

$$l_{16} = 2,40 \text{ mm} \pm 0,08 \text{ mm}$$

$$l_{17} = 1,90 \text{ mm} \pm 0,08 \text{ mm}$$

$$l_{18} = 0,30 \text{ mm} \pm 0,05 \text{ mm}$$

$$l_{19} = 1,23 \text{ mm} \pm 0,05 \text{ mm}$$

$$l_{20} = 4,40 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{21} = 0,52 \text{ mm} \pm 0,20 \text{ mm}$$

$$l_{22} = 0,52 \text{ mm} \pm 0,20 \text{ mm}$$

$$l_{23} = 0,2 \text{ mm}$$

$$l_{24} = 0,15 \text{ mm}$$

$$l_{25} = 0,1 \text{ mm}$$

$$l_{26} = 15,875 \text{ mm}$$

$$a_1 = 65^\circ$$

$$a_2 = 30^\circ$$

$$a_3 = 30^\circ$$

$$a_4 = 65^\circ$$

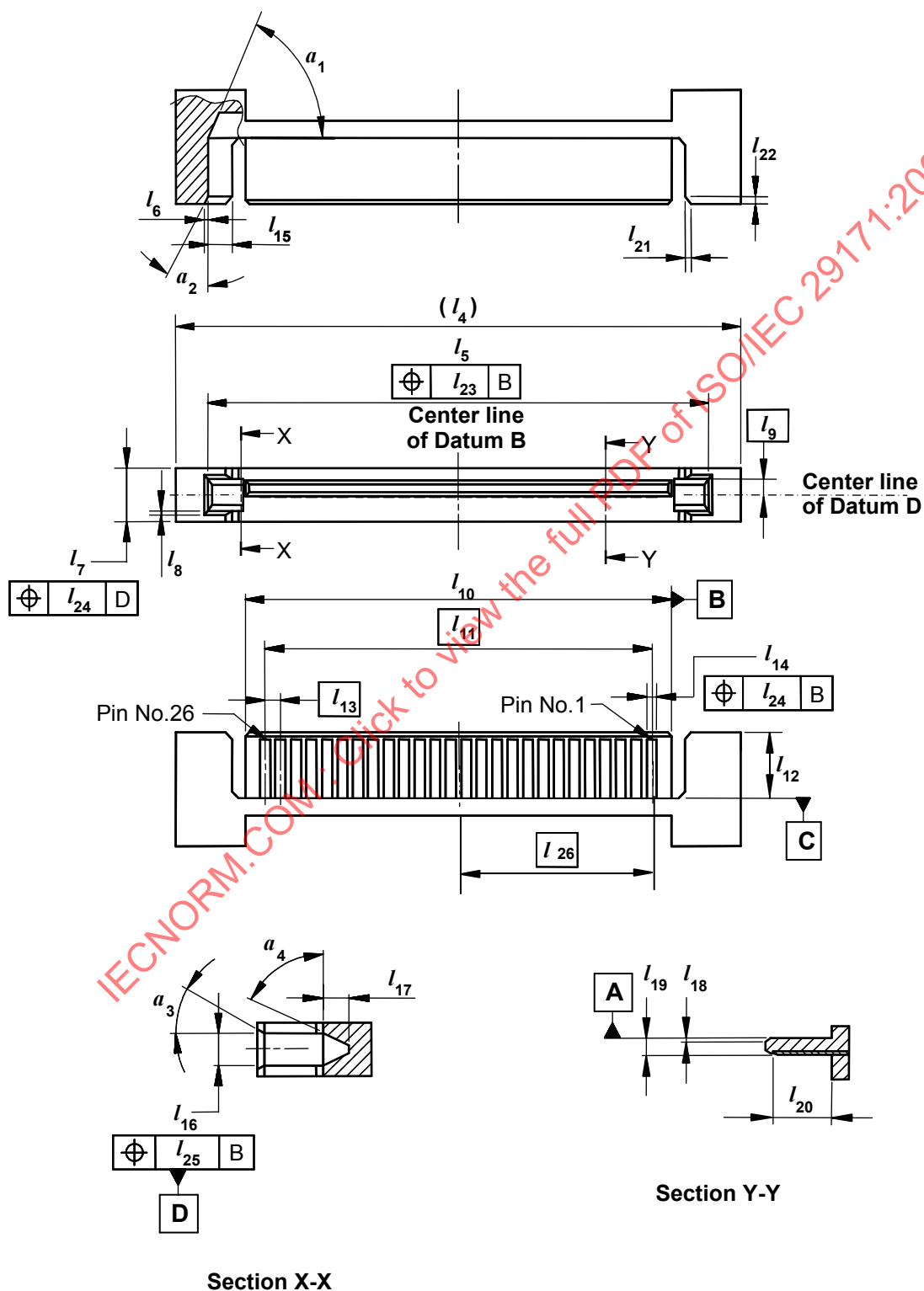


Figure 12 — iVDR cartridge plug connector

9 Signal assignment for connector

Figure 13 shows the diagram of the iVDR cartridge plug connector pin configuration. Table 1 shows the pin assignments.

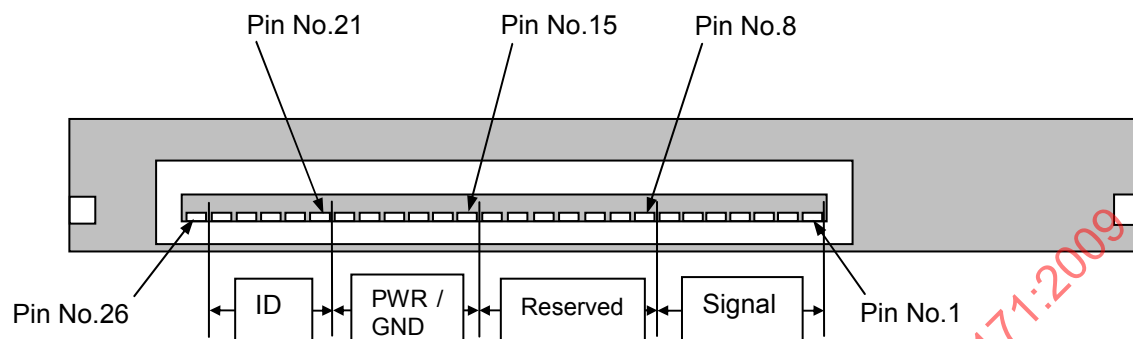


Figure 13 — Pin configuration of iVDR cartridge plug connector

- Signal part
This part consists of differential signals and ground. Signal format and characteristics are defined in ISO/IEC 24739-3.
- Reserved part
This part is reserved.
- PWR/GND part
The Settings of this part are shown in Table 2.
- ID part
The Settings of this part are shown in Table 3.

In Table 2 and Table 3, logical level “1” and “0” shall be designated as follows:

- Logic “1” (High Level) is achieved by opening the corresponding pin.
- Logic “0” (Low Level) is achieved by dropping the corresponding pin to GND.

The input voltage specification of this part is shown at Table 4. Description of receptacle connector can be found in Annex A.

Table 1 — Plug Connector Pin Assignment

No.	Name	Type	Description	Part
1	S1	GND	Ground	Signal
2	S2	A+	Differential signal	
3	S3	A-	Differential signal	
4	S4	GND	Ground	
5	S5	B-	Differential signal	
6	S6	B+	Differential signal	
7	S7	GND	Ground	
8	-	-	Reserved	Reserved
9	-	-	Reserved	
10	-	-	Reserved	
11	-	-	Reserved	
12	-	-	Reserved	
13	-	-	Reserved	
14	-	-	Reserved	
15	P1	GND	Ground	PWR /GND
16	P2	GND	Ground	
17	P3	GND	Ground	
18	P4	PWR	Power	
19	P5	PWR	Power	
20	P6	PWR	Power	
21	ID1	PWR-ID 0	Power ID 0	ID
22	ID2	PWR-ID 1	Power ID 1	
23	ID3	IF-ID 0	Interface ID 0	
24	ID4	IF-ID 1	Interface ID 1	
25	ID5	IF-ID 2	Interface ID 2	
26	-	-	Reserved	-

Table 2 — Power ID Assignment

PWR-ID 0	PWR-ID 1	Specification
1	1	Operating voltage of iVDR is +5 V.

Table 3 — Interface ID Assignment

IF-ID 0	IF-ID 1	IF-ID 2
0	1	1

Table 4 — Input Voltage of ID Part

Item	Specification
Input voltage	+6 V max.

Annex A (normative)

iVDR cartridge receptacle connector

A.1 Configuration specification

Figure A.1 shows a diagram of the receptacle connector. Dimensions shall be as follows.

$$l_{200} = 36,79 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{201} = 31,75 \text{ mm}$$

$$l_{202} = 15,875 \text{ mm}$$

$$l_{203} = 1,27 \text{ mm}$$

$$l_{204} = 1,95 \text{ mm} \pm 0,05 \text{ mm}$$

$$l_{205} = 1,15 \text{ mm}$$

$$l_{206} = 0,40 \text{ mm} \pm 0,05 \text{ mm}$$

$$l_{207} = 35,29 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{208} = 40,43 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{209} = 38,65 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{210} = 0,50 \text{ mm} \pm 0,05 \text{ mm}$$

$$l_{211} = 7,4 \text{ mm min.}$$

$$l_{212} = 3,50 \text{ mm} \pm 0,08 \text{ mm}$$

$$l_{213} = 0,60 \text{ mm} \pm 0,08 \text{ mm}$$

$$l_{214} = 1,70 \text{ mm} \pm 0,08 \text{ mm}$$

$$l_{215} = 1,40 \text{ mm} \pm 0,10 \text{ mm}$$

$$l_{216} = 5,20 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{217} = 1,40 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{218} = 1,90 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{219} = 0,35 \text{ mm} \pm 0,15 \text{ mm}$$

$$l_{220} = 0,35 \text{ mm} \pm 0,15 \text{ mm}$$

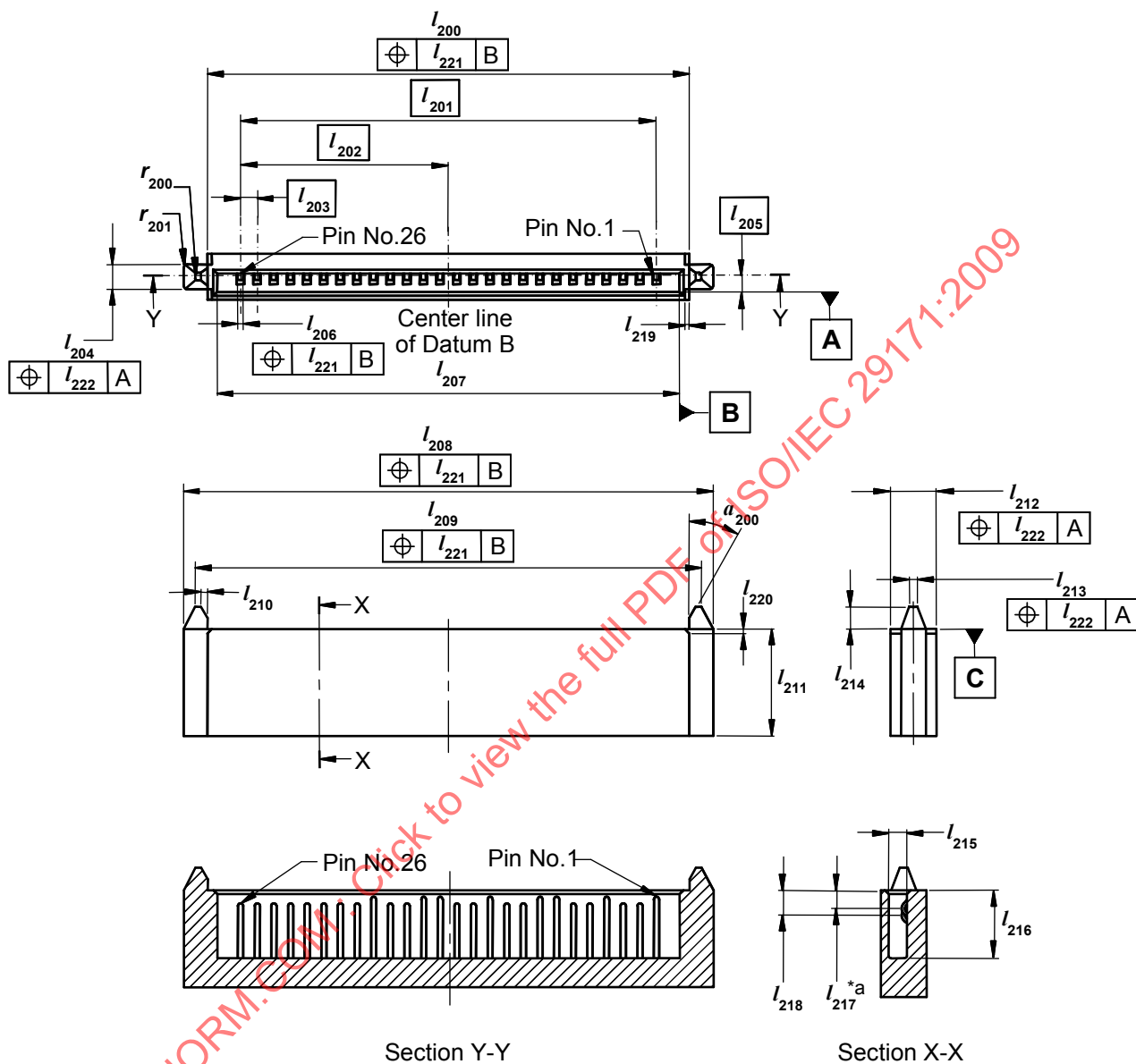
$$l_{221} = 0,2 \text{ mm}$$

$$l_{222} = 0,15 \text{ mm}$$

$$r_{200} = 0,2 \text{ mm} \pm 0,2 \text{ mm}$$

$$r_{201} = 0,3 \text{ mm} \pm 0,2 \text{ mm}$$

$$a_{200} = 30^\circ$$



*a Pins number of 1, 4, 7, 8, 11, 14, 15, 18 only

Figure A.1 — iVDR cartridge receptacle connector

Pin length of the iVDR cartridge receptacle connector has two lengths defined by Table A. 1 . Pins number 1, 4, 7, 8, 11, 14, 15, 18 have long pin length, other pins number have short pin length.

A.2 Signal assignment for connector

Table A.1 — Receptacle Connector Pin Assignment

No.	Name	Type	Description	Pin Length	Part
1	S1	GND	Ground	Long	Signal
2	S2	A+	Differential signal	Short	
3	S3	A-	Differential signal	Short	
4	S4	GND	Ground	Long	
5	S5	B-	Differential signal	Short	
6	S6	B+	Differential signal	Short	
7	S7	GND	Ground	Long	
8	-	-	Reserved	Long	Reserved
9	-	-	Reserved	Short	
10	-	-	Reserved	Short	
11	-	-	Reserved	Long	
12	-	-	Reserved	Short	
13	-	-	Reserved	Short	
14	-	-	Reserved	Long	
15	P1	GND	Ground	Long	PWR /GND
16	P2	GND	Ground	Short	
17	P3	GND	Ground	Short	
18	P4	PWR	Power	Long	
19	P5	PWR	Power	Short	
20	P6	PWR	Power	Short	
21	ID1	PWR-ID 0	Power ID 0	Short	ID
22	ID2	PWR-ID 1	Power ID 1	Short	
23	ID3	IF-ID 0	Interface ID 0	Short	
24	ID4	IF-ID 1	Interface ID 1	Short	
25	ID5	IF-ID 2	Interface ID 2	Short	
26	-	-	Reserved	Short	-

Annex B

(normative)

Insertion and extraction force of the connector

The insertion and extraction force between plug and receptacle connector are specified in Table B.1.

Table B.1 — Insertion and Extraction force of the connector

Item	Specification
Insertion force	0,48 N max. per connector pin
Extraction force	0,17 N min. per connector pin 0,39 N max. per connector pin

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