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Edition 1.0 2015-09

INTERNATIONAL STANDARD

colour inside

Universal serial bus interfaces for data and power – Part 2-2: Micro-USB Cables and Connectors Specification, Revision 1.01

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UNIVERSAL SERIAL BUS INTERFACES FOR DATA AND POWER –

Part 2-2: Micro-USB Cables and Connectors Specification, Revision 1.01

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The text of this standard is based on the following documents:

CDV	Report on voting
100/2332/CDV	100/2435/RVC

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IEC 62680-1-1, *Universal Serial Bus interfaces for data and power – Part 1-1: Common components – USB Battery Charging Specification, Revision 1.2*

IEC 62680-2-1, *Universal Serial Bus interfaces for data and power – Part 2-1: Universal Serial Bus Specification, Revision 2.0*

IEC 62680-2-2, *Universal Serial Bus interfaces for data and power – Part 2-2: USB Micro-USB Cables and Connectors Specification, Revision 1.01*

IEC 62680-2-3, *Universal Serial Bus interfaces for data and power – Part 2-3: Universal Serial Bus Cables and Connectors Class Document Revision 2.0*

This part of the IEC 62680 series consists of several distinct parts:

- the main body of the text, which consists of the original specification and all ECN and Errata developed by the USB-IF.

CONTENTS

FOREWORD 2
INTRODUCTION 4
1 Introduction 10
1.1 General 10
1.2 Objective of the Specification 10
1.3 Intended Audience/Scope 10
1.4 Related Documents 10
2 Acronyms and Terms 10
3 Significant Features 11
3.1 USB 2.0 Specification Compliance 11
3.2 On-The-Go Device 12
3.3 Connectors 12
3.4 Compliant Cable Assemblies 12
3.5 Plug Overmolds 12
4 Cables and Connectors 13
4.1 Introduction 13
4.2 Micro-Connector Mating 13
4.3 Color Coding 13
4.4 Device, Cable and Adapter Delays 14
4.5 Compliant Usage of Connectors and Cables 15
4.5.1 Cables 15
4.5.2 Overmolds 15
4.5.3 Mechanical Interfaces) 15
4.5.4 Surface mount standard version drawings 15
4.5.5 DIP-type and Midmount-type receptacles 15
4.5.6 Connector Keying 15
4.5.7 Right Angle Plugs 15
4.5.8 Adapters 16
4.6 Drawings 17
5 Electrical Compliance Requirements 35
5.1 Data Rates Beyond USB 2.0 (480 Mb/s -->) 36
5.2 Low Level Contact Resistance 36
5.3 Contact Current Rating 36
5.3.1 Signal Contacts Only (2, 3, and 4) 36
5.3.2 With Power Applied Contacts (1 and 5) 36
6 Mechanical Compliance Requirements 36
6.1 Operating Temperature Range 36
6.1.1 Option I 36
6.1.2 Option II 36
6.2 Insertion Force 36
6.3 Extraction Force 36
6.4 Plating 37
6.4.1 Option I 37
6.4.2 Option II 37
6.5 Solderability 37

6.6 Peel Strength (Reference Only) 37
6.7 Wrenching Strength (Reference Only) 37
6.8 Lead Co-Planarity 37
6.9 RoHS Compliance 37
6.10 Shell & Latch Materials 38

Figure 4-1 – Micro-A to Micro-B Cable 17
Figure 4-2 – Standard-A to Micro-B Cable 18
Figure 4-3 – Micro-A to Captive Cable 19
Figure 4-4 – Micro-A Plug Overmold, Straight 20
Figure 4-5 – Micro-B Plug Overmold, Straight 21
Figure 4-6 – Micro-A Plug Interface 22
Figure 4-7 – Micro-B Plug Interface 23
Figure 4-8 – Micro-A/B Plug Interface (Cut-section) 24
Figure 4-9 – Micro-AB receptacle interface 25
Figure 4-10 – Micro-B receptacle interface 26
Figure 4-11 – Micro-AB Receptacle Design 27
Figure 4-12 – Micro-B Receptacle Design 28
Figure 4-13 – Micro-A Plug Blockage 29
Figure 4-14 – Micro-B Plug Blockage 30
Figure 4-15 – Micro-A Plug, Side Right Angle 31
Figure 4-16 – Micro-A Plug, Down Right Angle 32
Figure 4-17 – Micro-B Plug, Side Right Angle 33
Figure 4-18 – Micro-B Plug, Down Right Angle 34
Figure 4-19 – Adapter, Standard-A receptacle to Micro-A plug 35
Figure 4-9 – Micro-AB receptacle interface 40
Figure 4-10 – Micro-B receptacle interface 41

Table 4-1 – Plugs Accepted By Receptacles 13
Table 4-2 – Micro-A Plug Pin Assignments 13
Table 4-3 – Color Coding for Plugs and Receptacles 14
Table 4-4 – Maximum Delay for Micro-Connector and Cable 14
Table 4-5 – Maximum Delay for Standard Connector Cable 14

Note: All Engineering Change Notice's (ECN) and Errata documents as of September 01, 2012 that pertain to this core specification follow the last page of the specification starting on page 39.

Universal Serial Bus
Micro-USB Cables and Connectors
Specification

Revision 1.01
April 4, 2007

Revision History

Revision	Issue Date	Comment
0.6	1/30/2006	Revisions to all sections
0.7	3/24/2006	Added revised Micro-USB drawings to Rev.0.8
0.8	4/19/2006	Editorial changes and additions by Jan Fahllund (Nokia)
0.8b	4/26/2006	Corrections to the 0.8 version (based by comments from contributors)
0.9	6/7/2006	Corrections based on comments from the 0.8b version
1.0RC	8/2/2006	Added lubricant recommendation, LLRC delta change specified
1.01RC	11/10/2006	Editorial changes and addition based on Oct-06 USB-IF CCWG meeting.
1.02RC	12/10/2006	Shell material thickness tolerances changed so that material can be 0.25 mm or 0.3 mm; edited three pictures (Figure 4-10, 4-11 and 4-12).
1.03RC	12/11/2006	Two pictures edited (Figure 4-8 and 4-9). In fig 4-8 max height to be 2.8 mm MAX. In fig 4-9 R0.25 mm MAX to be R0.30 mm MAX.
1.0RC3	12/19/2006	For BoD approval
1.0	1/12/2007	Approved
1.0	1/22/2007	Cosmetic edits for publication
1.01	4/4/2007	Editorial corrections and additions to contributor list. Reinserted shell and plug material requirements as section 6.10, Clarified wording on Plating Recommendations.

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UNIVERSAL SERIAL BUS INTERFACES FOR DATA AND POWER –

Part 2-2: Micro-USB Cables and Connectors Specification, Revision 1.01

1 Introduction

1.1 General

USB has become a popular interface for exchanging data between cell phone and portable devices. Many of these devices have become so small it is impossible to use standard USB components as defined in the USB 2.0 specification. In addition the durability requirements of the Cell Phone and Portable Devices market exceed the specifications of the current interconnects. Since Cell Phones and other small Portable Devices are the largest market potential for USB, this specification is addressing this very large market while meeting all the requirements for electrical performance within the USB 2.0 specification.

1.2 Objective of the Specification

The purpose of this document is to define the requirements and features of a Micro-USB connector that will meet the current and future needs of the Cell Phone and Portable Devices markets, while conforming to the USB 2.0 specification for performance, physical size and shape of the Micro-USB interconnect.

This is not a stand-alone document. Any aspects of USB that are not specifically changed by this specification are governed by the USB 2.0 Specification and USB On-The-Go Supplement.

1.3 Intended Audience/Scope

Cell phone and Portable Devices have become so thin that the current Mini-USB does not fit well within the constraints of future designs. Additional requirements for a more rugged connector that will have durability past 10 000 cycles and still meet the USB 2.0 specification for mechanical and electrical performance was also a consideration. The Mini-USB could not be modified and remain backward compatible to the existing connector as defined in the USB OTG specification.

1.4 Related Documents

USB 2.0

USB OTG Supplement

2 Acronyms and Terms

This chapter lists and defines terms and abbreviations used throughout this specification.

A-Device A device with a Type-A plug inserted into its receptacle. The A-device supplies power to VBUS and is host at the start of a session. If the A-device is On-The-Go, it may relinquish the role of host to an On-The-Go B-device under certain conditions,

Application	A generic term referring to any software that is running on a device that can control the behavior or actions of the USB port(s) on a device.
B-Device	A device with a Type-B plug inserted into its receptacle. The B-device is a peripheral at the start of a session. If the B-device is OTG, it may be granted the role of host from an OTG A-device.
DIP-type	A connector with contact and shield solder tails that are soldered through the printed circuit board.
FS	Full Speed (max 12 Mb/s)
Higher than HS	(480 Mb/s ---> 5 Gb/s)
HS	High Speed (max 480 Mb/s)
Host	A physical entity that is attached to a USB cable and is acting in the role of the USB host as defined in the USB Specification, Revision 2.0. This entity initiates all data transactions and provides periodic Start of Frames.
HNP	Host Negotiation Protocol
ID	Identification. Denotes the pin on the Micro connectors that is used to differentiate a Micro-A plug from a Micro-B plug.
LS	Low Speed (max 1,5 Mb/s)
Midmount-type	A connector that is mounted in a cut-out in the printed circuit board between the top and bottom surfaces.
OTG	On-The-Go
OTG device	A device with the host and peripheral capabilities
Peripheral	A physical entity that is attached to a USB cable and is currently operating as a “device” as defined in the USB Specification, Revision 2.0. The Peripheral responds to low level bus requests from the Host.
PCB	Printed circuit board
USB	Universal Serial Bus
USB-IF	USB Implementers Forum

3 Significant Features

This section identifies the significant features of the Micro-USB specification. The purpose of this section is not to present all the technical details associated with each major feature, but rather to highlight its existence. Where appropriate, this section references other parts of the document where further details can be found.

3.1 USB 2.0 Specification Compliance

Any device with Micro-USB features is first and foremost a USB peripheral that is compliant with the USB 2.0 specification.

3.2 On-The-Go Device

Any OTG Micro-USB device shall conform to the OTG requirements as set forth in the On-The-Go Supplement to the USB 2.0 Specification.

3.3 Connectors

The USB 2.0 specification defines the following connectors:

- Standard-A plug and receptacle,
- Standard-B plug and receptacle, and
- Mini-B plug and receptacle.

The Micro-USB specification defines the following additional connectors:

- Micro-B plug and receptacle
- Micro-AB receptacle
- Micro-A plug.

The Micro-AB receptacle is only allowed on OTG products. All other uses of the Micro-AB receptacle are prohibited. The Micro-AB receptacle accepts either a Micro-A plug or a Micro-B plug.

It is recommended that the Micro-AB continue to support HNP as requested and support full functionality as a peripheral when a Micro-B plug is inserted.

3.4 Compliant Cable Assemblies

The USB 2.0 specification defines the following cables:

- Standard-A plug to Standard–B plug,
- Standard-A plug to Mini-B plug, and
- Captive cable with Standard-A plug.

The Micro-USB specification defines the following additional cables:

- Micro-A plug to Micro-B plug,
- Micro-A plug to Standard-A receptacle
- Micro-B plug to Standard-A plug, and
- Hardwired Captive cable with Micro-A plug. (Hardwired Captive cable is a cable, connected internally to a device, which is not designed to be removed by the end user of that device.)

No other types of cables are allowed by either the USB specification, or by the OTG supplement. Cables are not allowed to have receptacles on either end unless they meet the mechanical and electrical requirements of adapters defined in this document.

3.5 Plug Overmolds

The Micro-USB specification constrains the size and the shape of the overmolds for the Micro-A and Micro-B plugs.

The Micro-A plug’s overmold has a rectangular shape, and the Micro-B plug’s overmold is rectangular with chamfers. This allows easy recognition and differentiation of the two plugs by the consumer. See pictures Figure 4-4 and Figure 4-5.

4 Cables and Connectors

4.1 Introduction

This chapter provides the mechanical and electrical specifications for the cables, connectors and cable assemblies used to interconnect devices as well as constraints on the design of the overmolds for the Micro-A and Micro-B plugs.

4.2 Micro-Connector Mating

The following table summarizes the plugs accepted by each of the receptacles.

Table 4-1 – Plugs Accepted By Receptacles

Receptacle	Plugs Accepted
Standard-A	Standard-A
Standard-B	Standard-B
Mini-B	Mini-B
Micro-B	Micro-B
Micro-AB	Micro-A or Micro-B

The usage and wiring assignments of the five pins in the Micro-A plug are defined in the following table.

Table 4-2 – Micro-A Plug Pin Assignments

Contact Number	Signal Name	Typical Wiring Assignment
1	VBUS	Red
2	D-	White
3	D+	Green
4	ID	<Ra_PLUG_ID
5	GND	Black
Shell	Shield	Drain Wire

The ID pin on a Micro-A plug shall be connected to the GND pin. The ID pin on a Micro-B plug is not connected or is connected to ground by a resistance of greater than Rb_PLUG_ID (100 kΩ MIN). An On-The-Go device is required to be able to detect whether a Micro-A or Micro-B plug is inserted by determining if the ID pin resistance to ground is less than Ra_PLUG_ID (10 Ω MAX) or if the resistance to ground is greater than Rb_PLUG_ID . Any ID resistance less than Ra_PLUG_ID shall be treated as ID = FALSE and any resistance greater than Rb_PLUG_ID shall be treated as ID = TRUE.

4.3 Color Coding

The following colors are mandated for the plastic inside the Micro-USB connectors defined in this specification.

Table 4-3 – Color Coding for Plugs and Receptacles

Connector	Color
Micro-A plug	White
Micro-B receptacle	Black
Micro-B plug	Black
Micro-AB receptacle	Gray

4.4 Device, Cable and Adapter Delays

In Figure 7-11 of the USB 2.0 specification, four test planes are defined along the transmission path from the host transceivers to the peripheral transceivers. These test planes (TP) are as follows:

- TP1: pins of host transceiver chip
- TP2: contact points of host Standard-A receptacle
- TP3: contact points of peripheral Standard-B or Micro-B receptacle
- TP4: pins of peripheral transceiver chip

The maximum total delays are as follows:

- On-The-Go device – TP1 to TP2: 1 ns
- Adapter: 1 ns
- Any cable with a Micro-A or Micro-B plug: 10 ns

The maximum delays for the two worst cases of connection are shown in the following tables.

Table 4-4 – Maximum Delay for Micro-Connector and Cable

Location	Delay Time
USB 2.0 Compliant Host – TP1 to TP2	3 ns
Standard-A receptacle to Micro-A plug adapter	1 ns
Micro-A plug to Micro-B plug cable	10 ns
USB 2.0 Compliant B-device – TP3-TP4	1 ns
Total	15 ns

Table 4-5 – Maximum Delay for Standard Connector Cable

Location	Delay Time
On-The-Go Compliant Device – TP1 to TP2	1 ns
Micro-A plug to Standard-A receptacle adapter	1 ns
Standard-A plug to Standard-B plug cable	26 ns
USB 2.0 Compliant B-device – TP3 to TP4	1 ns
Total	29 ns

4.5 Compliant Usage of Connectors and Cables

Cable assemblies and connectors not described below or not allowed by other amendments to the USB specification are not compliant with the USB specification and may not be labeled as such.

4.5.1 Cables

The cables allowed by the Micro-USB specification are shown in Figure 4-1, Figure 4-2, and Figure 4-3. Cables must have a propagation delay of 10 ns or less, have a physical length of no more than 2.0 meters, and meet all other requirements of a USB cable.

4.5.2 Overmolds

The size and shape of the Micro-A and Micro-B plug overmolds must conform to the constraints shown in Figure 4-4 and Figure 4-5 .

4.5.3 Mechanical Interfaces)

The mechanical interface dimensions for the Micro-A and Micro-B plugs are shown in Figure 4-6, Figure 4-7 and Figure 4-7. Mechanical interface dimensions for Micro-AB and Micro-B receptacles are shown in Figure 4-9 and Figure 4-10.

4.5.4 Surface mount standard version drawings

By following these instructions, receptacles from different manufacturers can be used interchangeably on the same printed circuit board (PCB). In the case of the ”surface mount standard version”, the dimensions of the contact tail and shield tail must comply with figures 4-11 and 4-12.

NOTE PCB-layout drawings are included for reference only.

Figure 4-11 and Figure 4-12 shows designs for the Micro-AB and Micro-B receptacles respectively.

4.5.5 DIP-type and Midmount-type receptacles

DIP-type (contact and shield tails soldered through PCB) and Midmount-type (connector that is mounted in a cut-out in the printed circuit board between the top and bottom surfaces) receptacle connectors are not defined in this standards document. These mounting styles are allowed under the standard as long as all intermating conditions are met. Mechanical dimensions and mechanical durability values may vary from the Surface mount standard connector but must comply with all minimum values.

4.5.6 Connector Keying

This Micro connector series has been designed so as to prevent the Micro-A and Micro-B plugs from being incorrectly inserted into a receptacle. The amount of metal blocking various possible incorrect insertions is shown in Figure 4-13 and Figure 4-14, and is always greater than 0.35 mm.

4.5.7 Right Angle Plugs

The overmolds for right / down angle plugs are required to comply with the same shape constraints that apply to straight plugs. Reference drawings for right / down angle plugs are shown in Figure 4-15, Figure 4-16, Figure 4-17 and Figure 4-18.

4.5.8 Adapters

Requirements:

- The propagation delay of the adapter shall be less than 1 ns.
- The physical length shall not exceed 150 mm.
- The resistance of the adapter through VBUS and GND, including contacts, shall not exceed 70 mΩ.

4.5.8.1 Standard-A receptacle to Micro-A plug

This adapter is used to connect a cable with a Standard-A plug to an On-The-Go device that has a Micro-AB receptacle. A reference drawing for this adapter is shown in Figure 4-19 (Figure 4-18).

4.6 Drawings

This section contains the mechanical drawings that are referenced in the previous section.

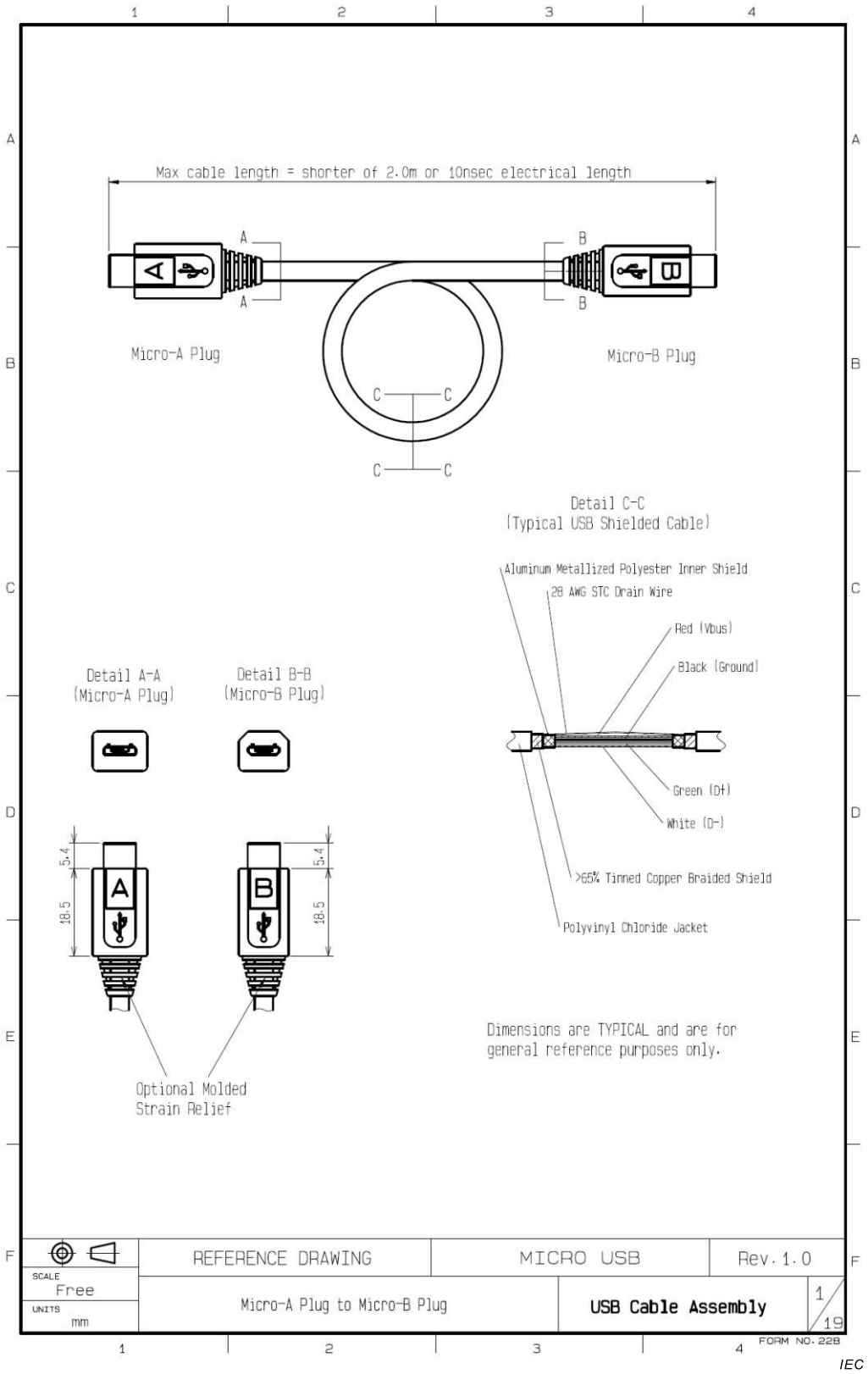


Figure 4-1 – Micro-A to Micro-B Cable

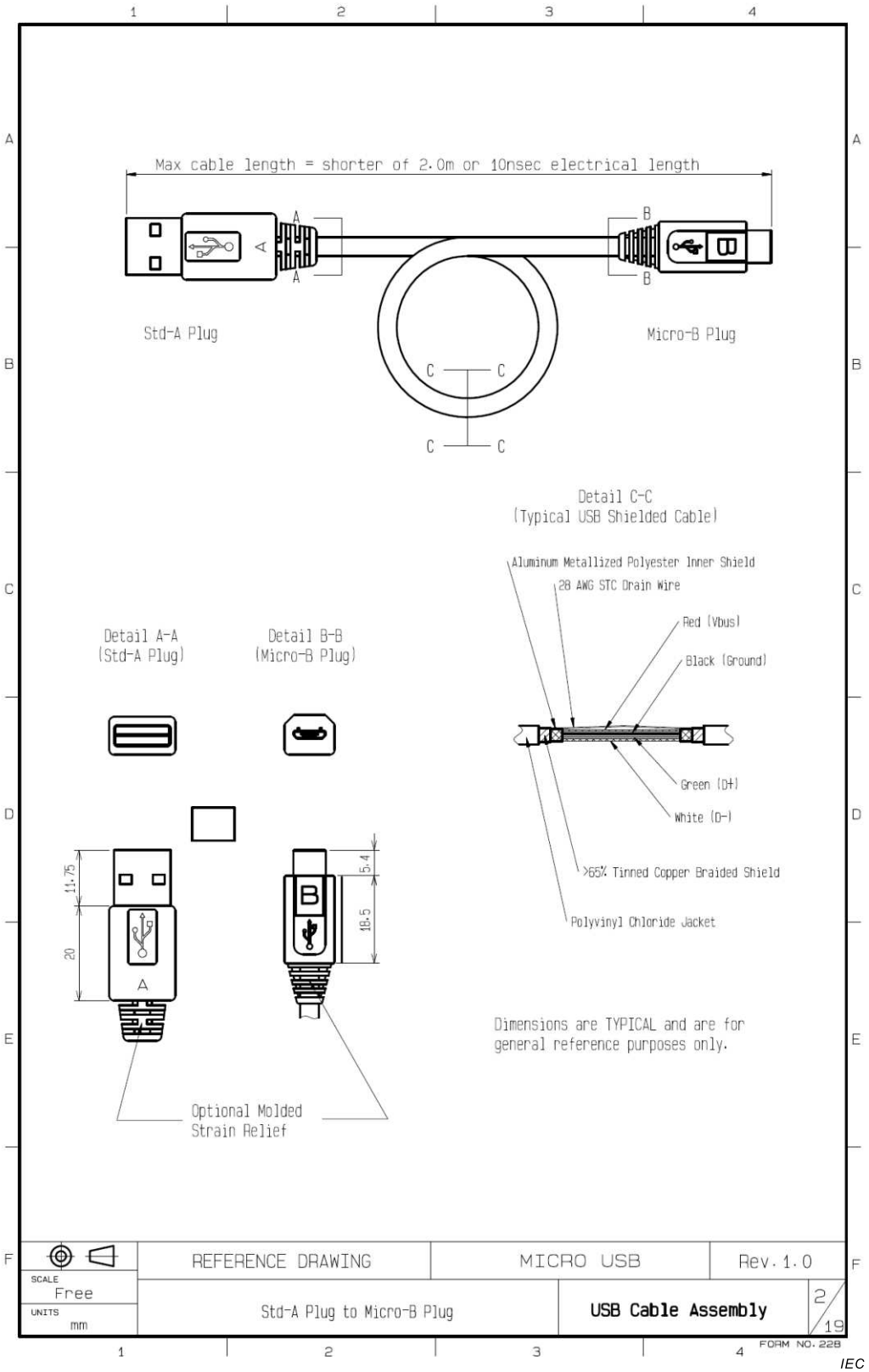


Figure 4-2 – Standard-A to Micro-B Cable

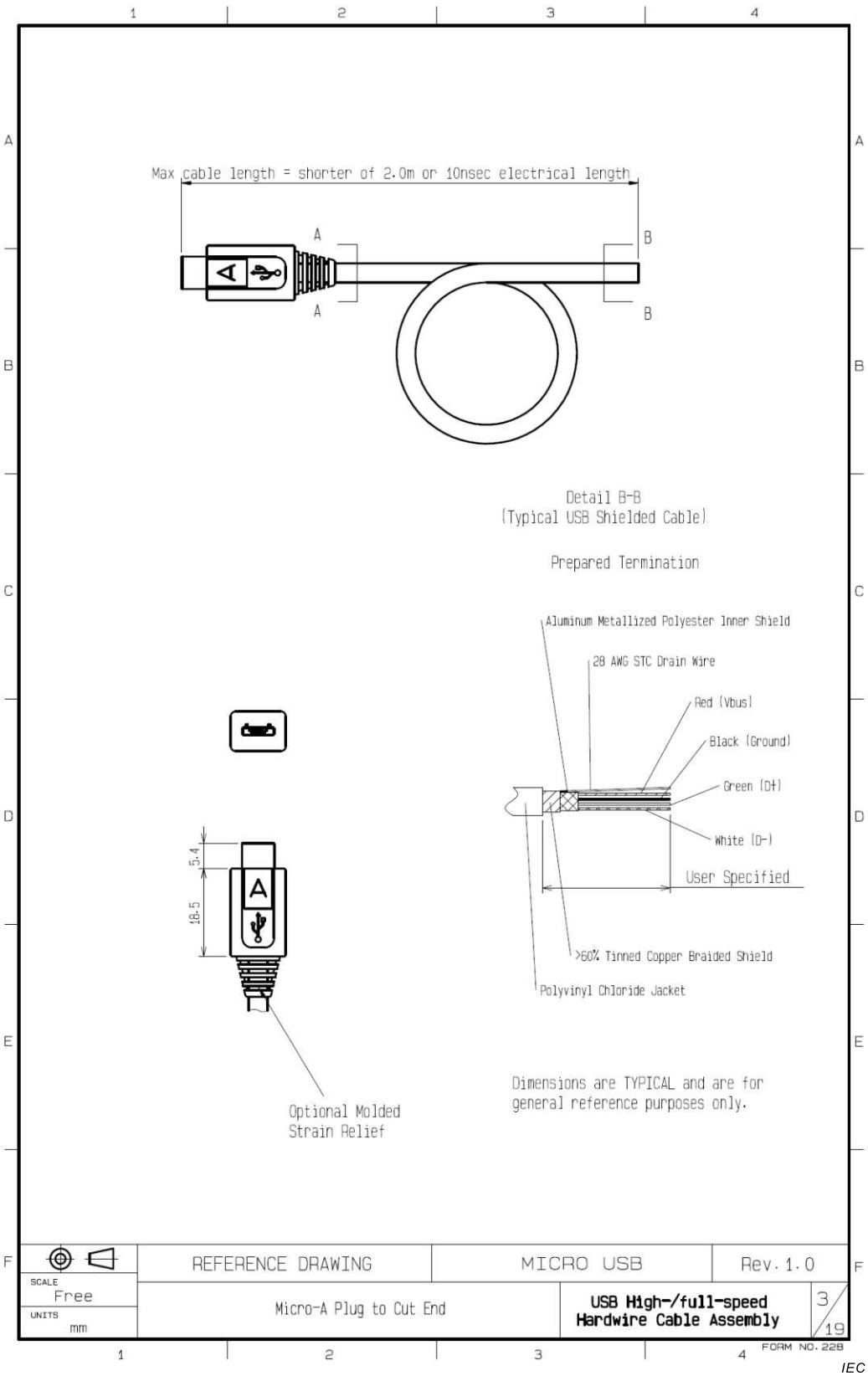


Figure 4-3 – Micro-A to Captive Cable

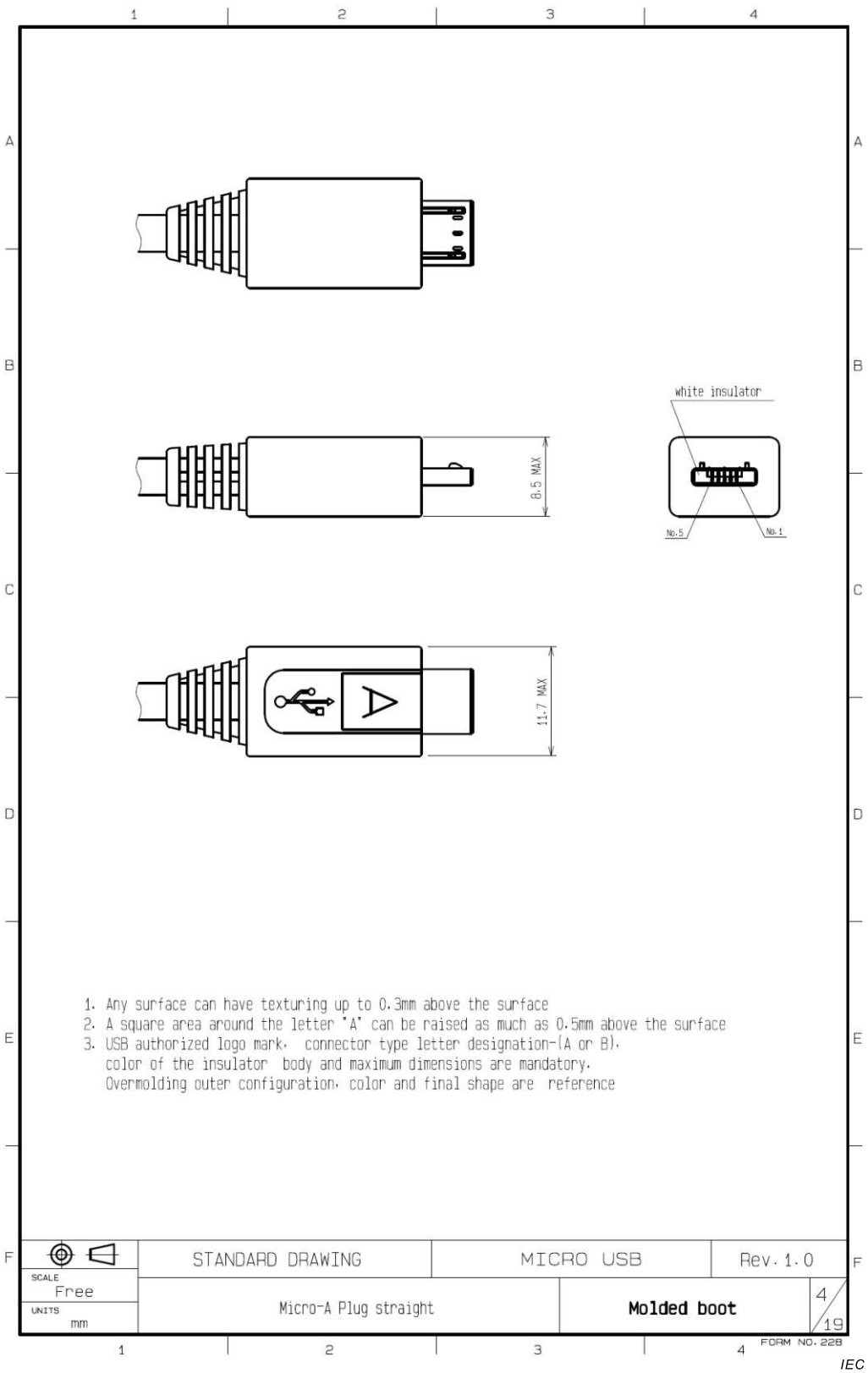


Figure 4-4 – Micro-A Plug Overmold, Straight

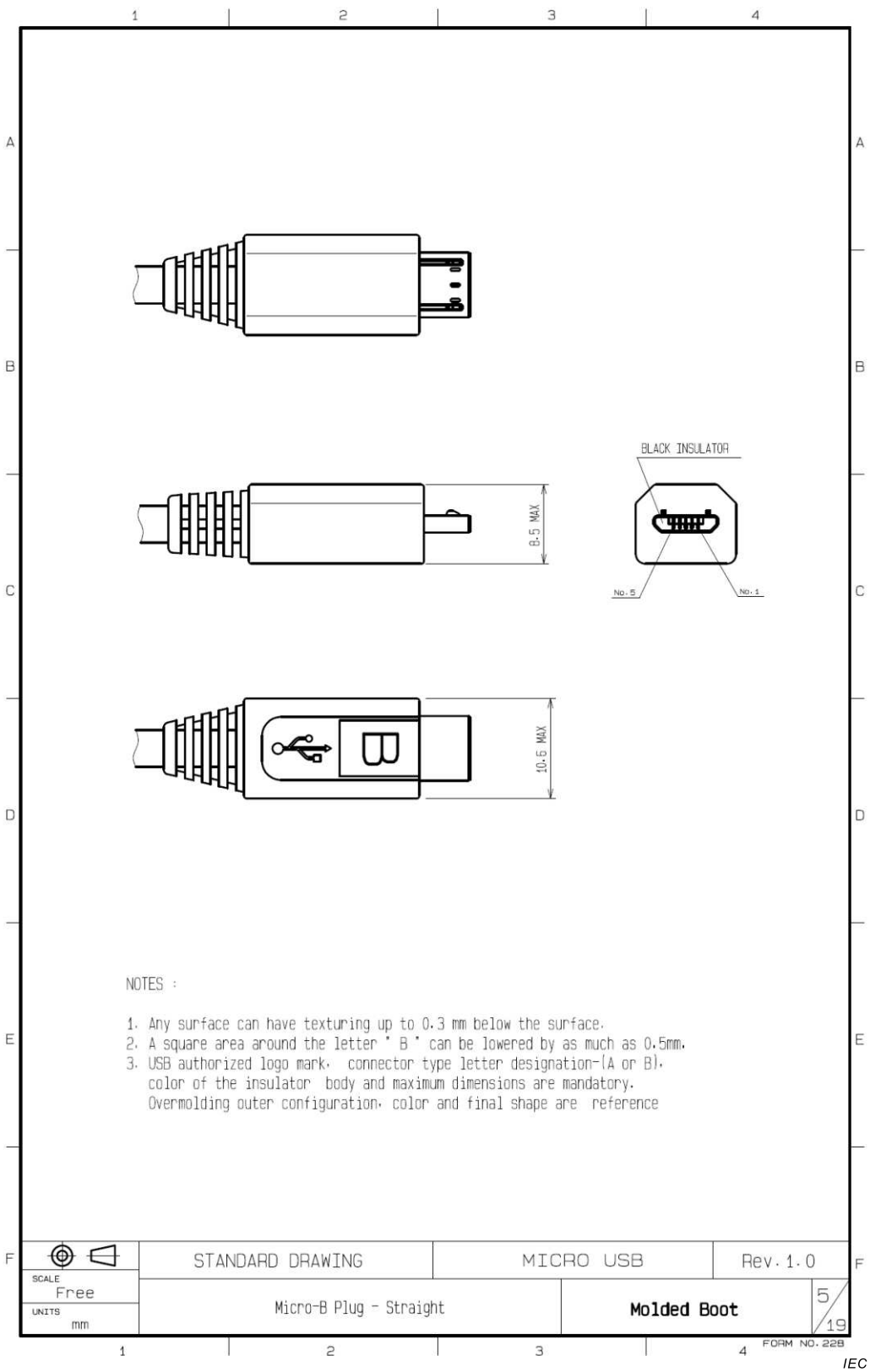


Figure 4-5 – Micro-B Plug Overmold, Straight

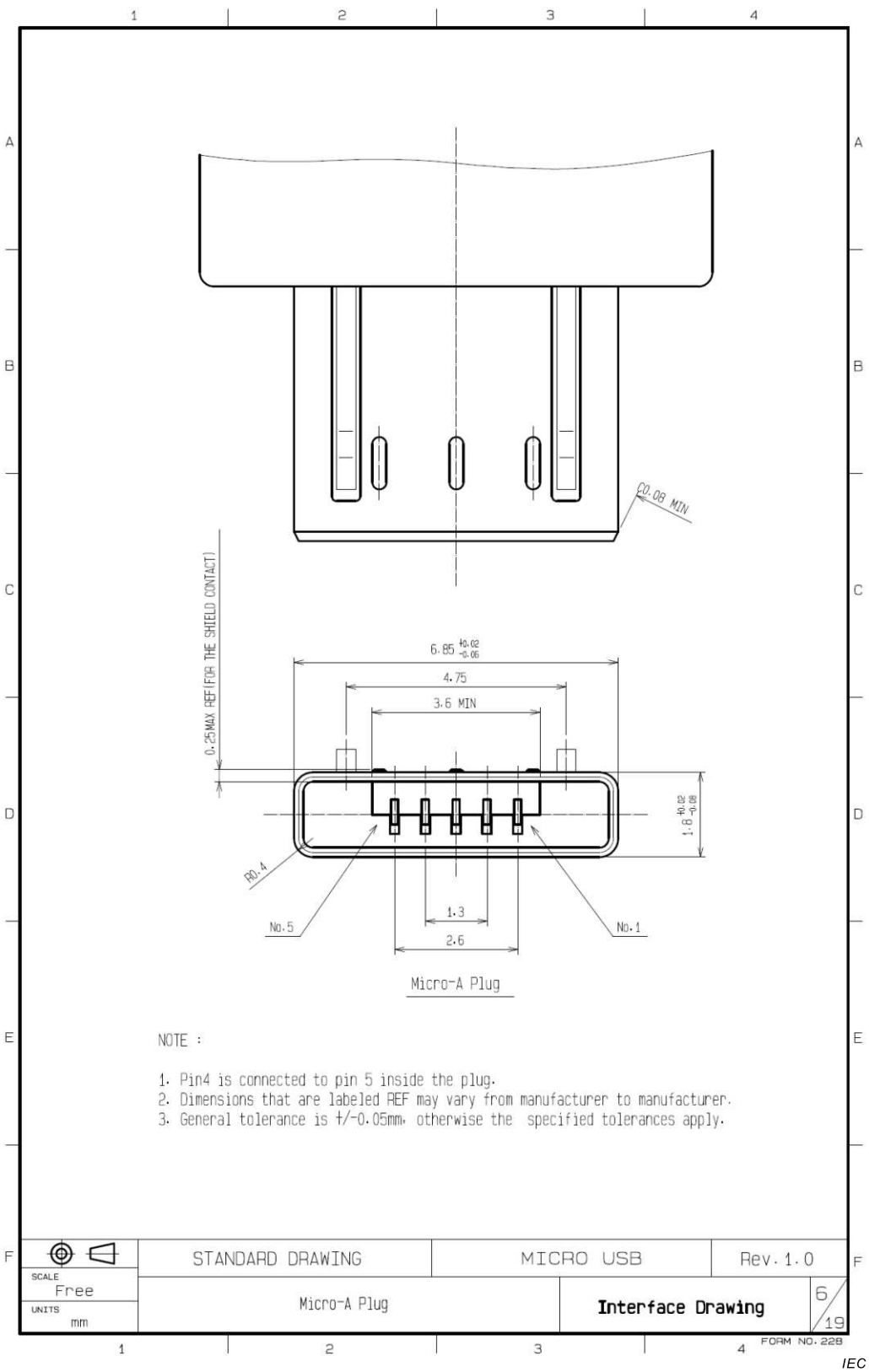


Figure 4-6 – Micro-A Plug Interface

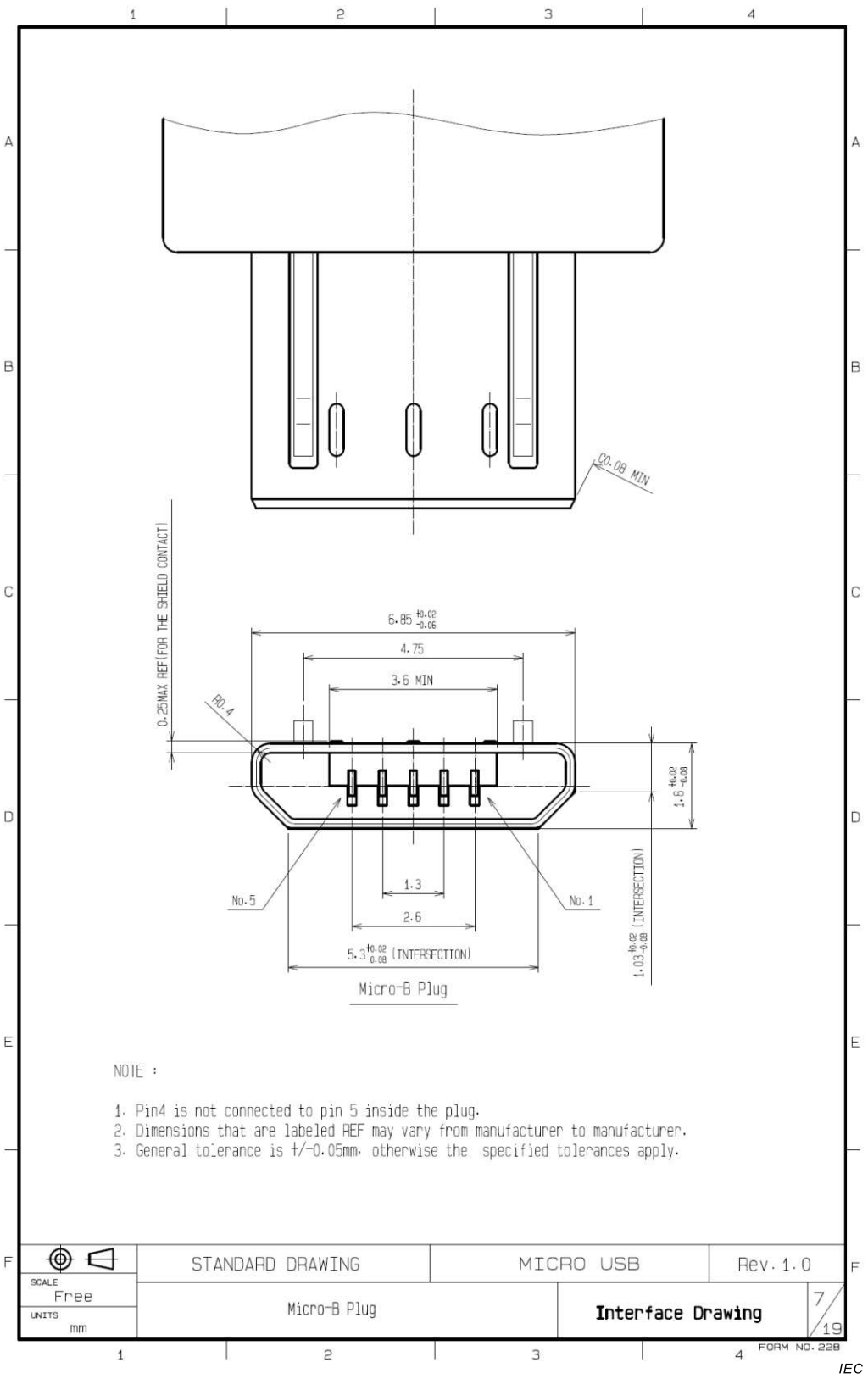


Figure 4-7 – Micro-B Plug Interface

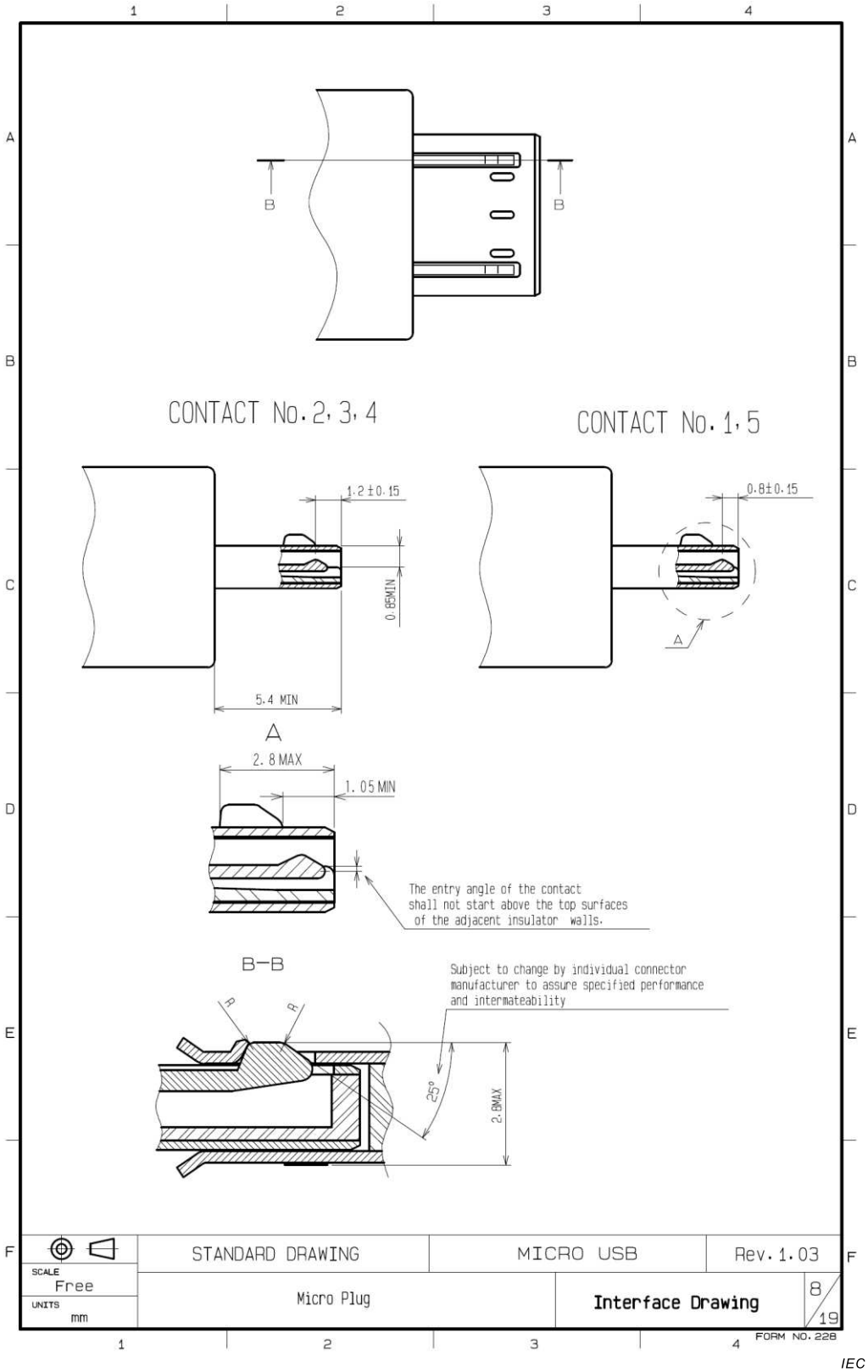


Figure 4-8 – Micro-A/B Plug Interface (Cut-section)

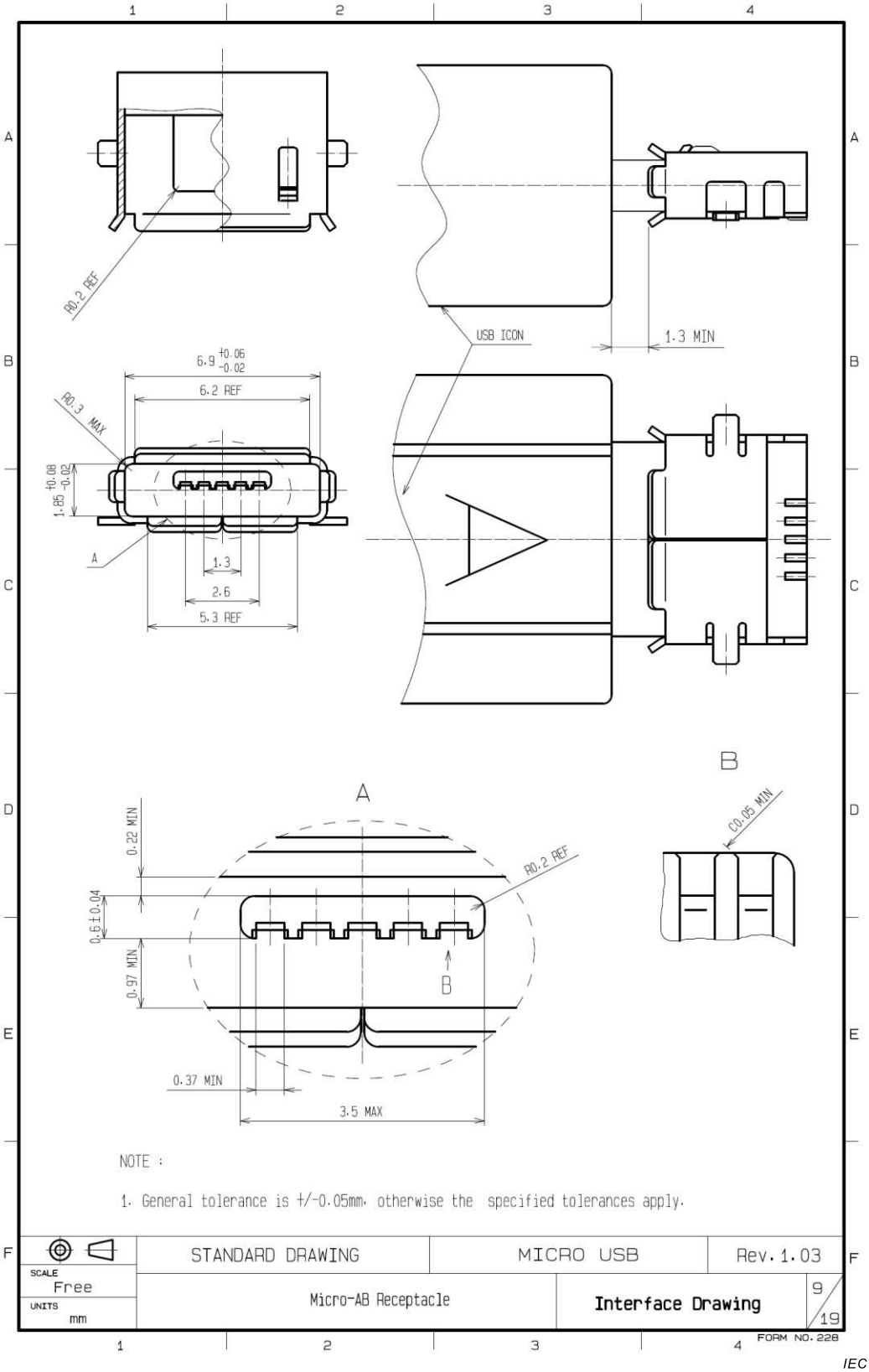


Figure 4-9 – Micro-AB receptacle interface

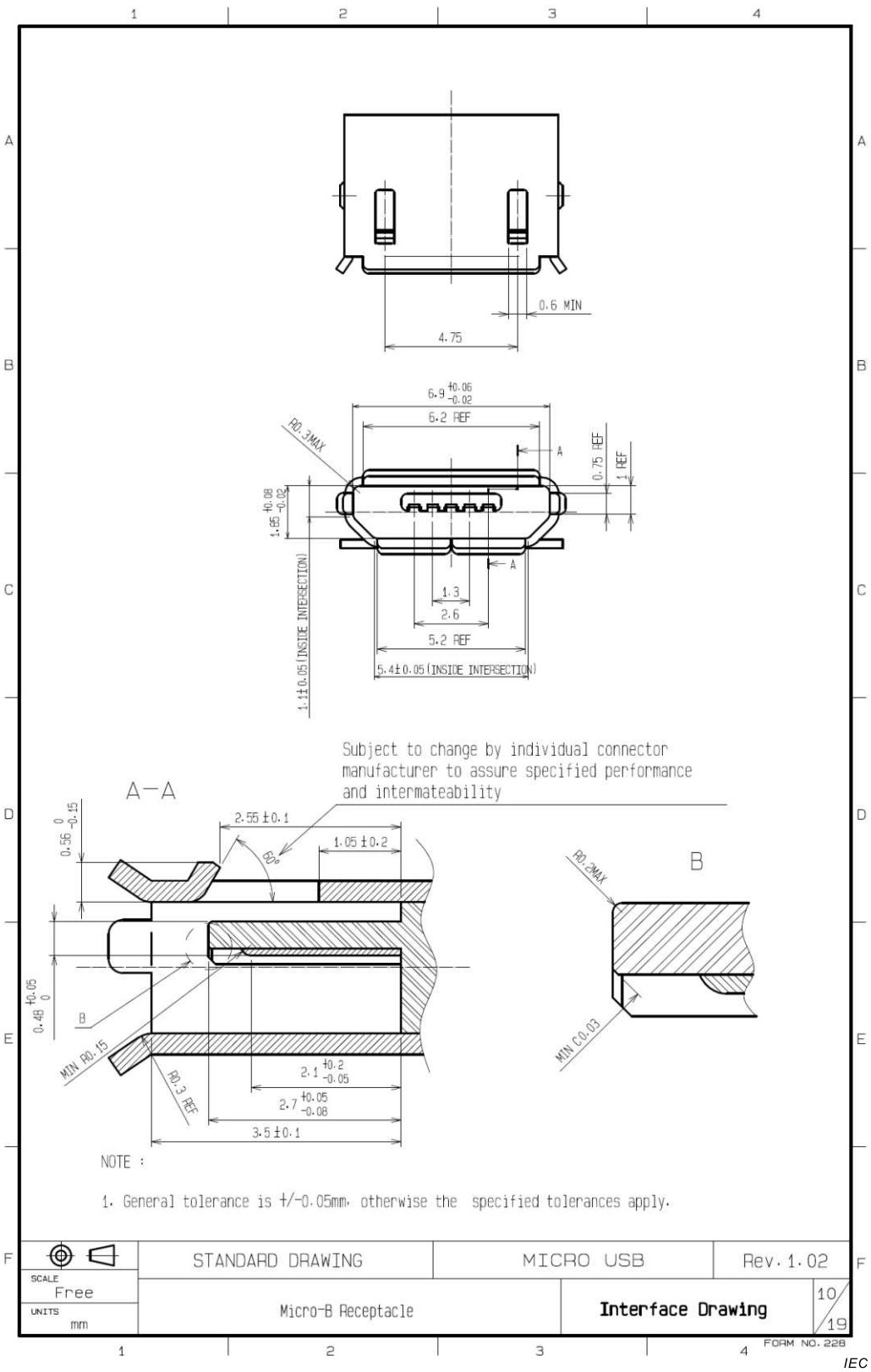


Figure 4-10 – Micro-B receptacle interface

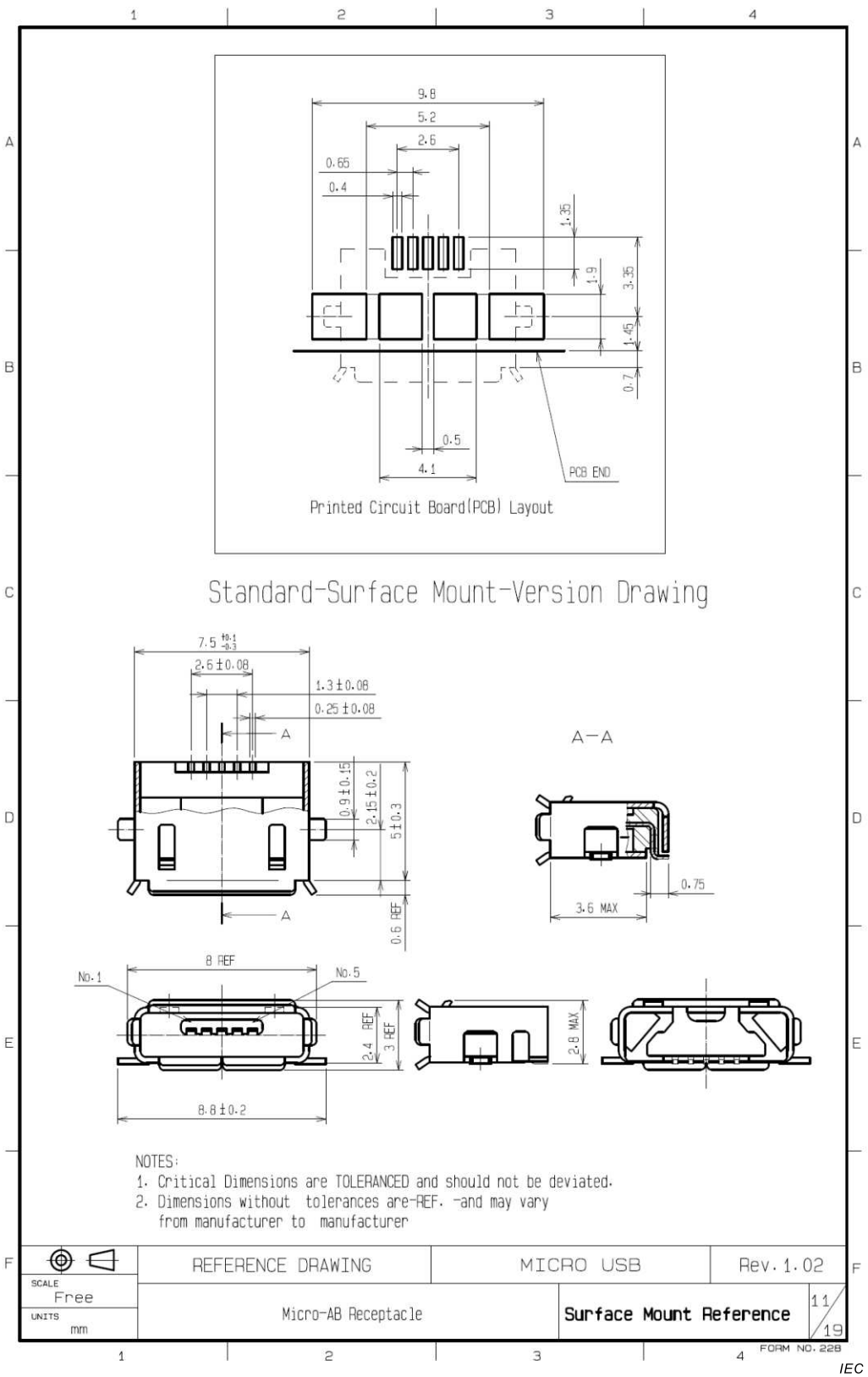


Figure 4-11 – Micro-AB Receptacle Design

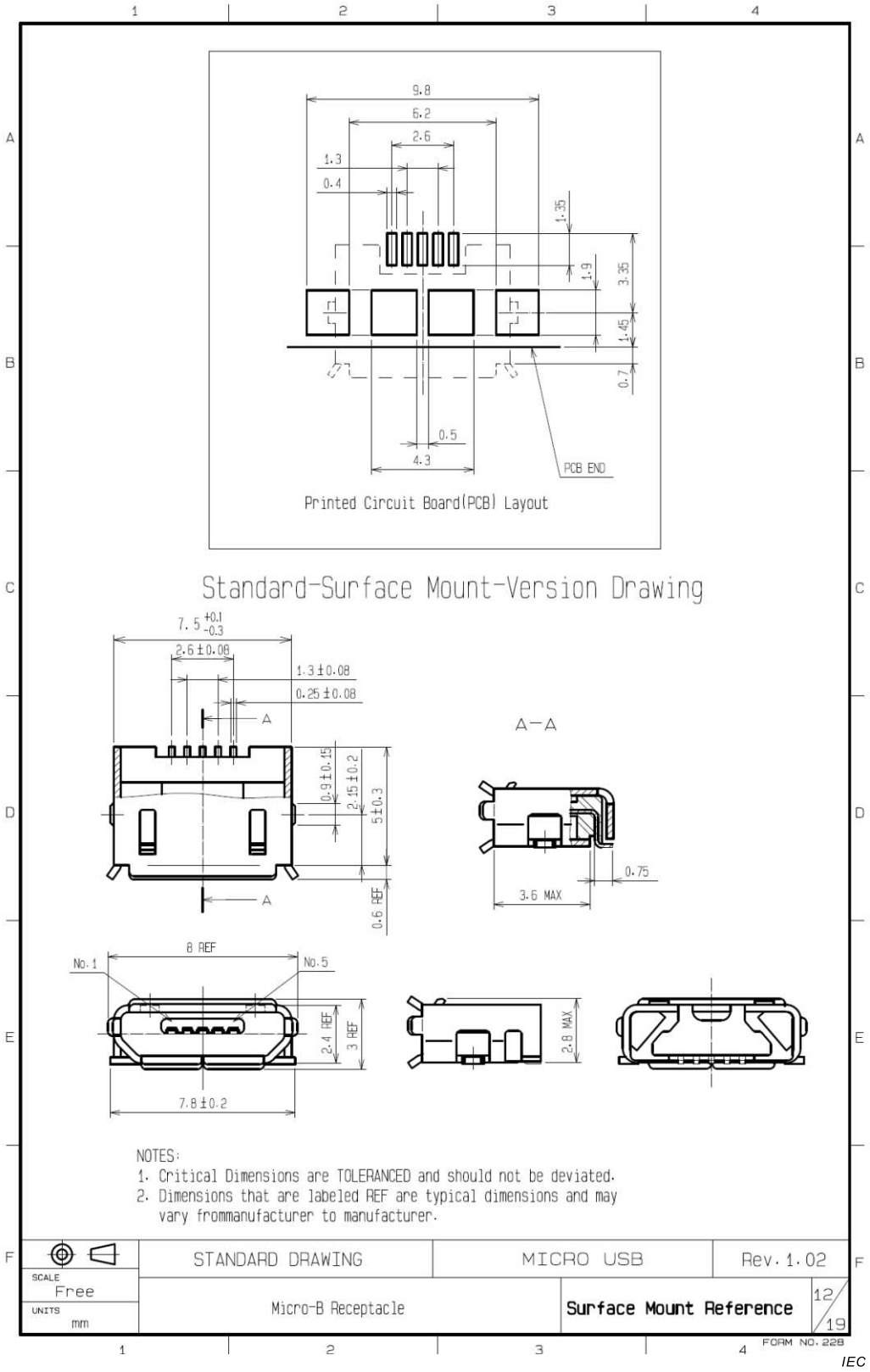


Figure 4-12 – Micro-B Receptacle Design

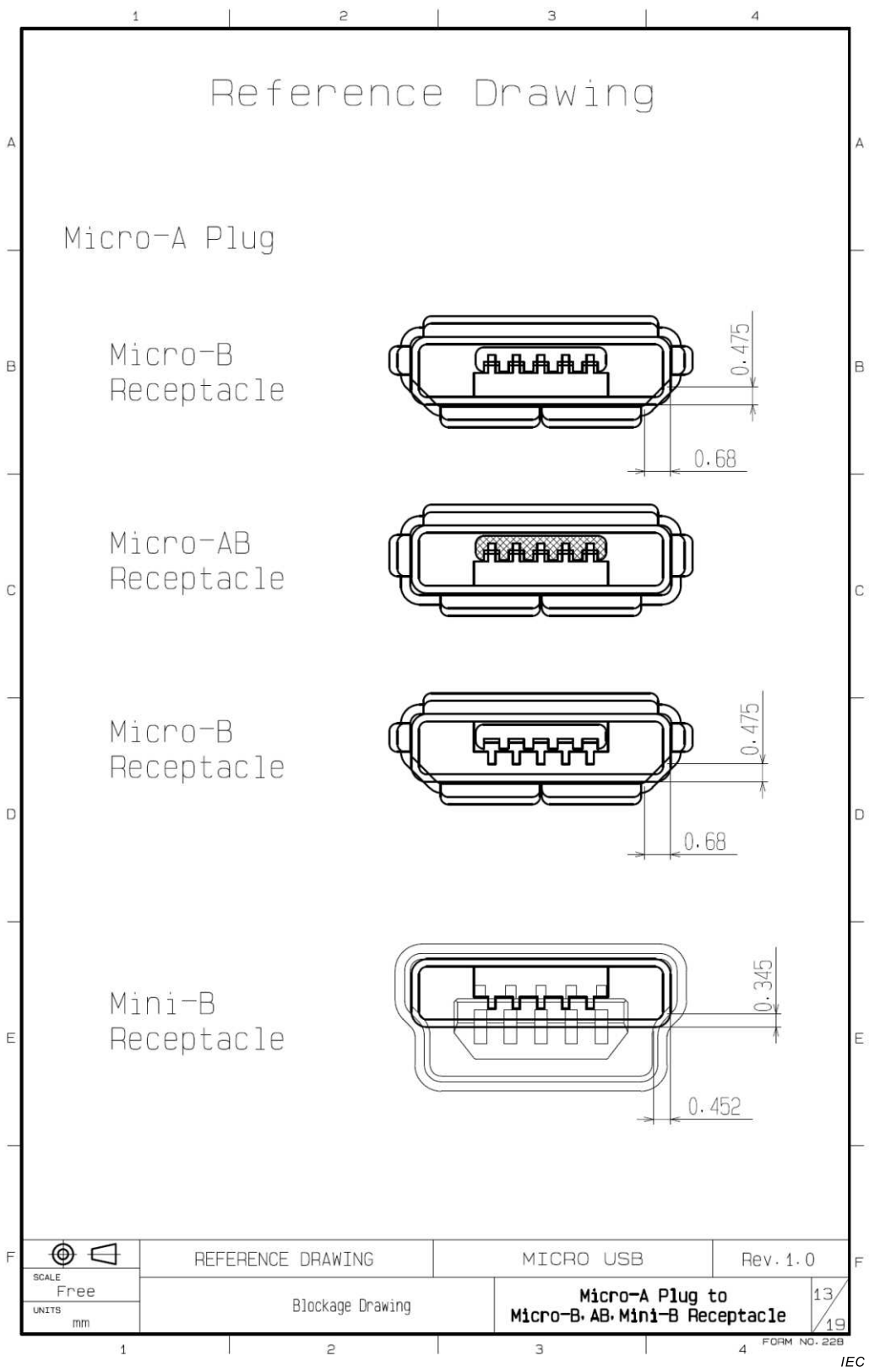


Figure 4-13 – Micro-A Plug Blockage

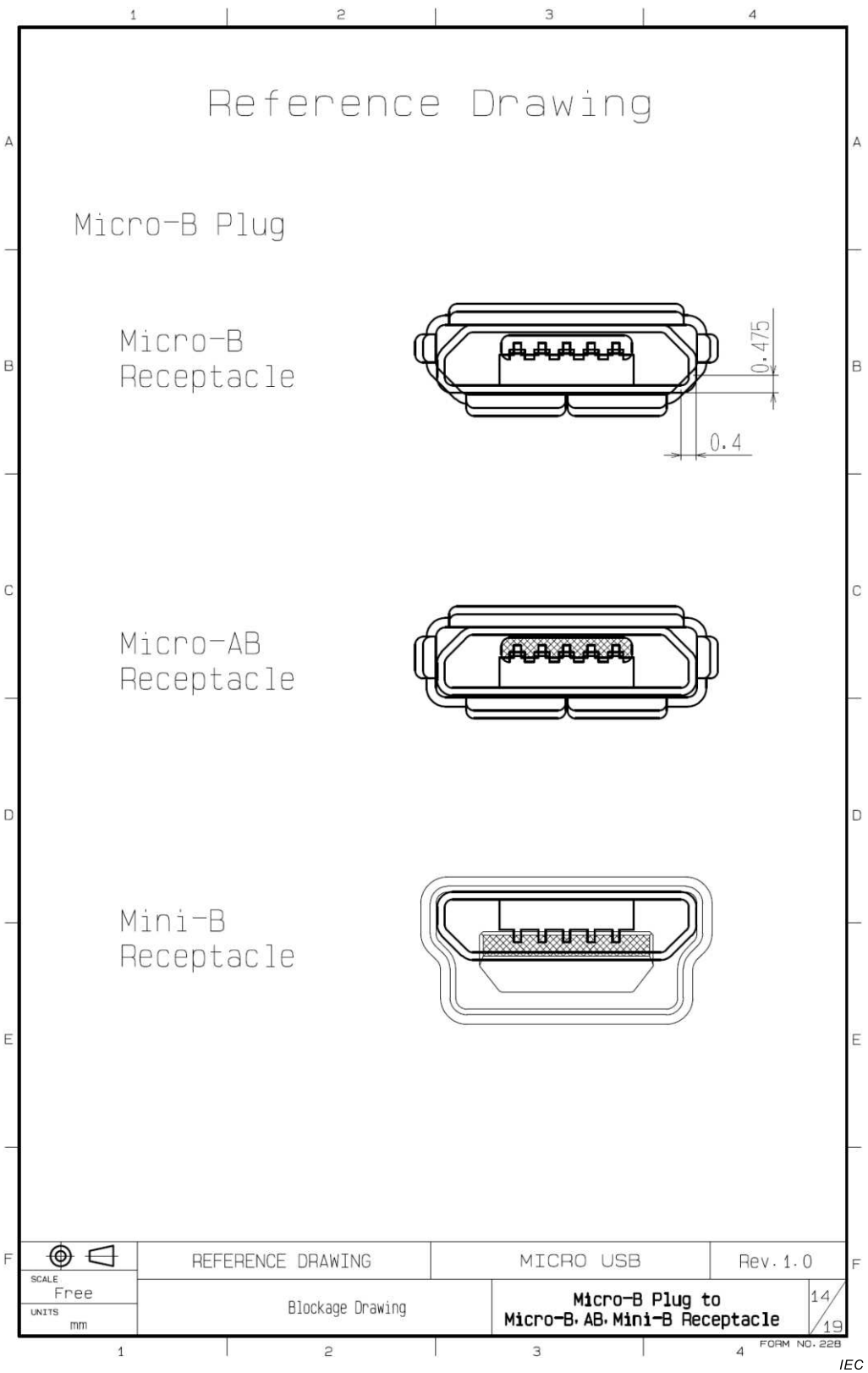


Figure 4-14 – Micro-B Plug Blockage

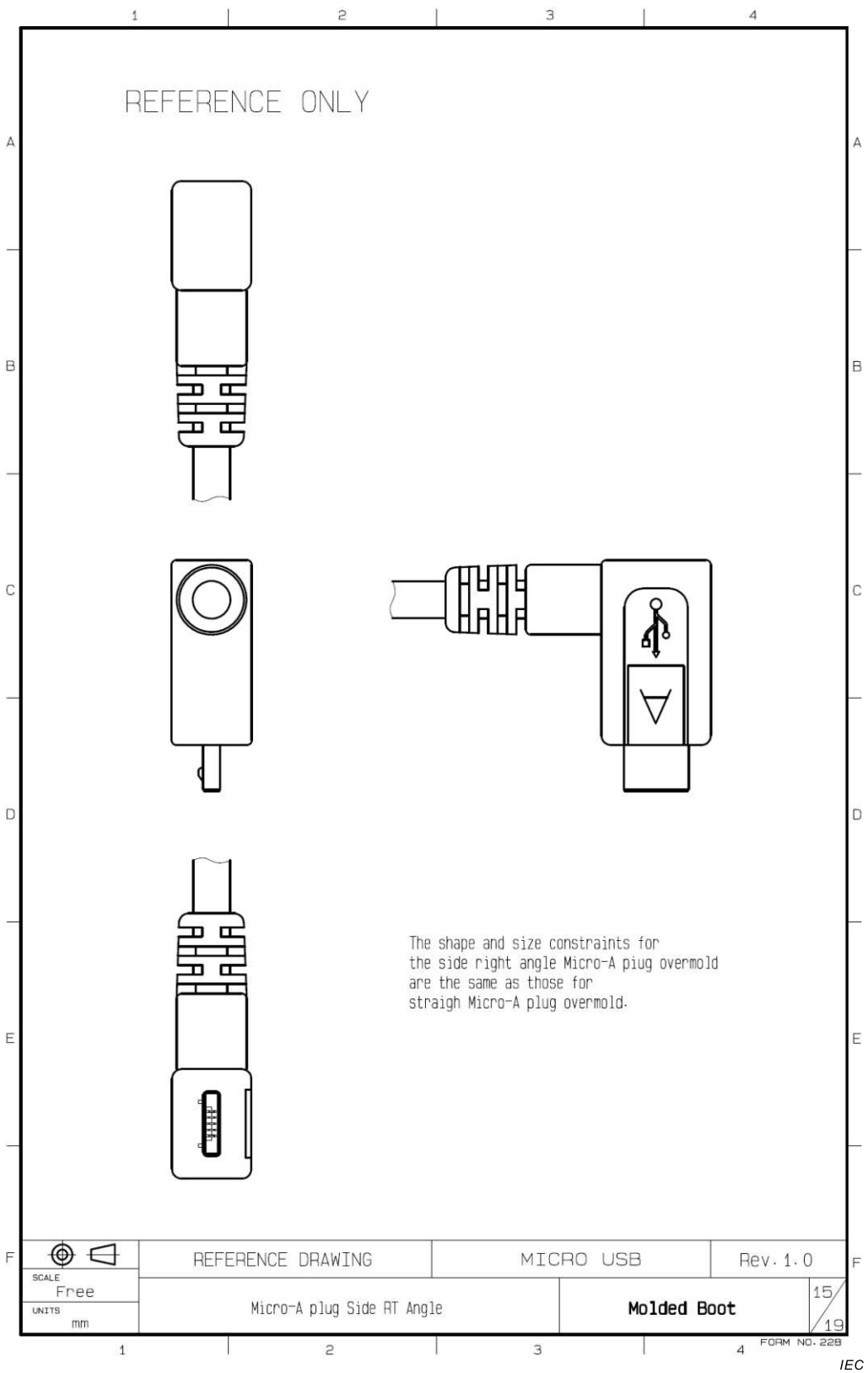


Figure 4-15 – Micro-A Plug, Side Right Angle

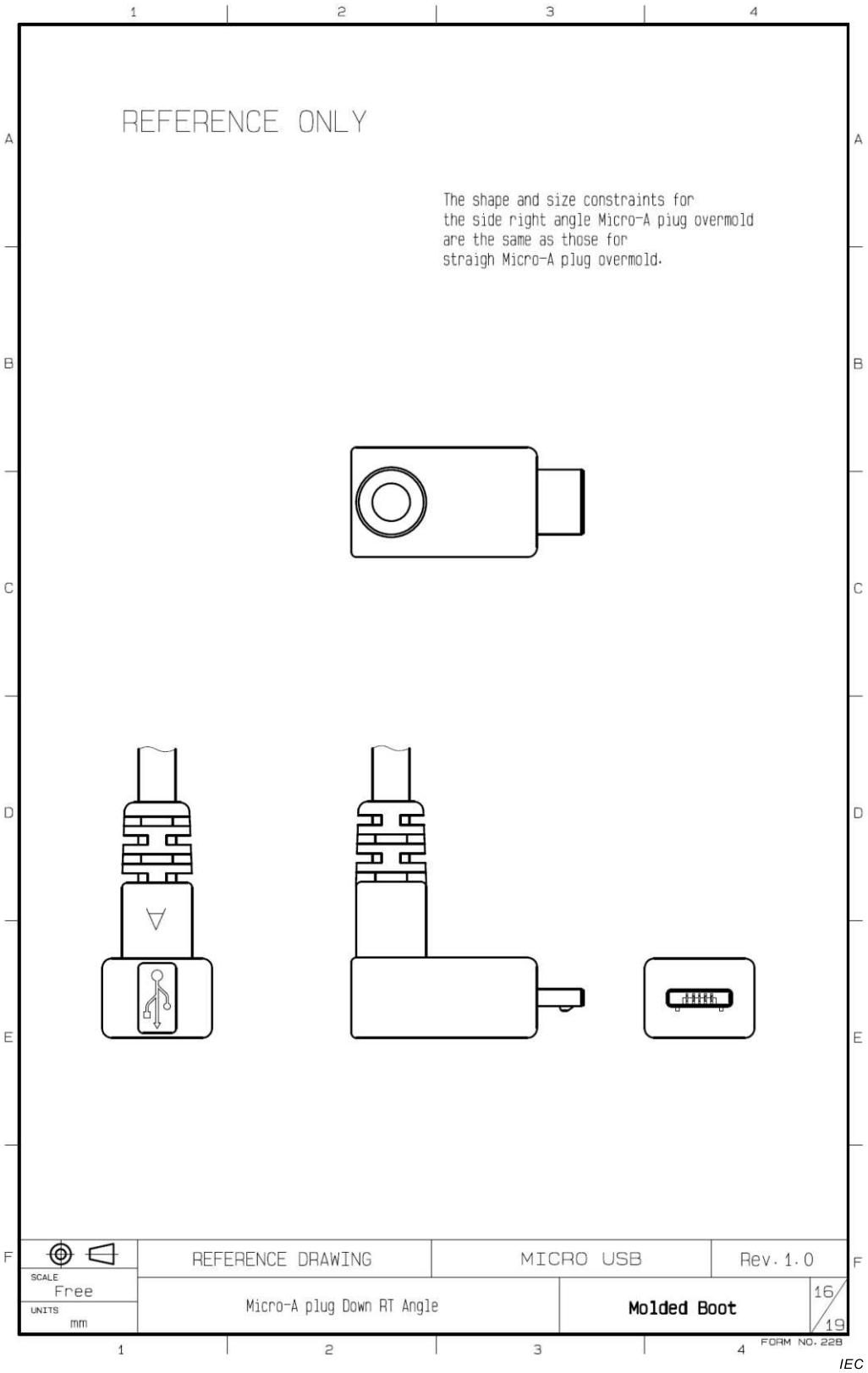


Figure 4-16 – Micro-A Plug, Down Right Angle

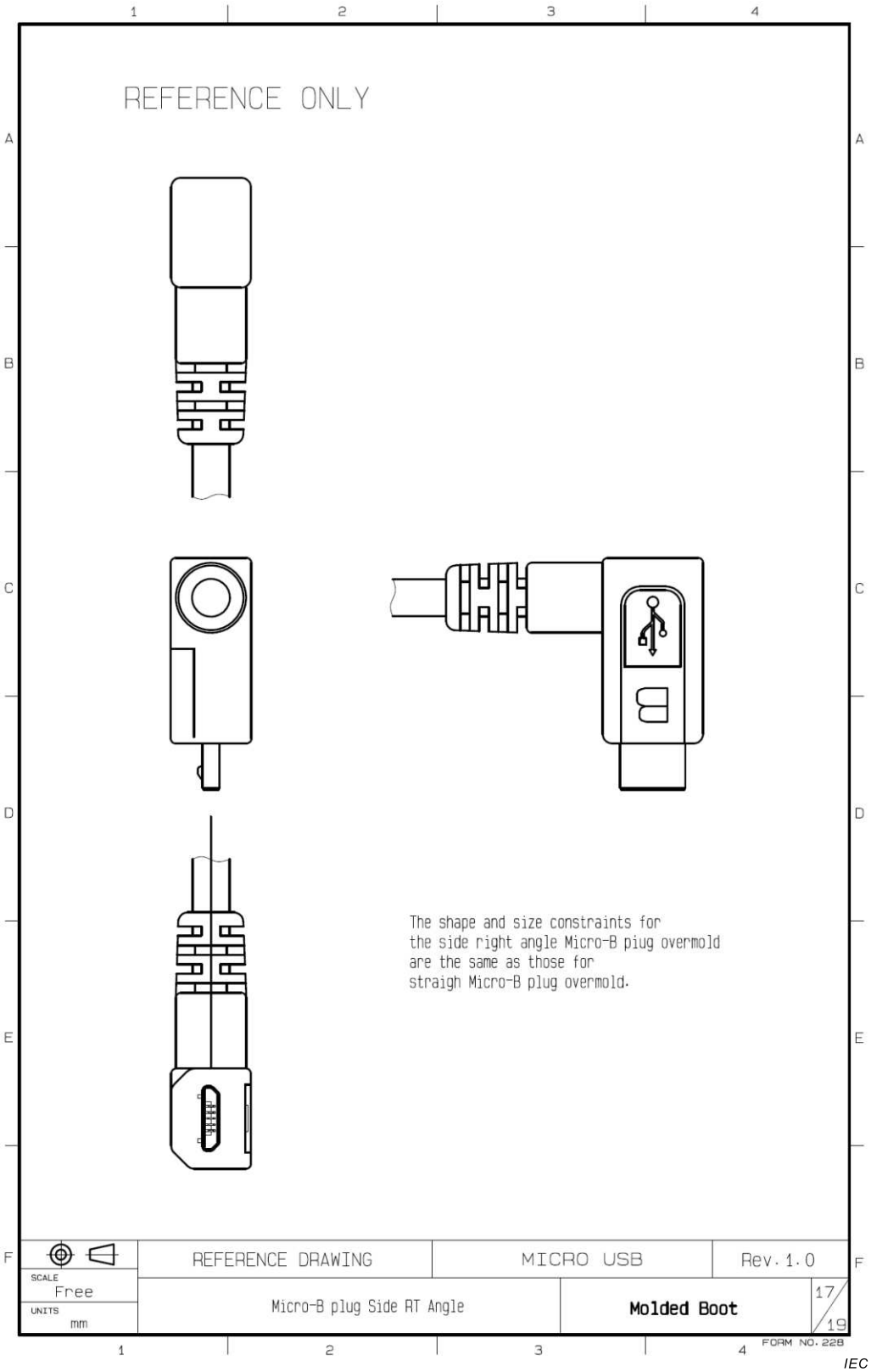


Figure 4-17 – Micro-B Plug, Side Right Angle

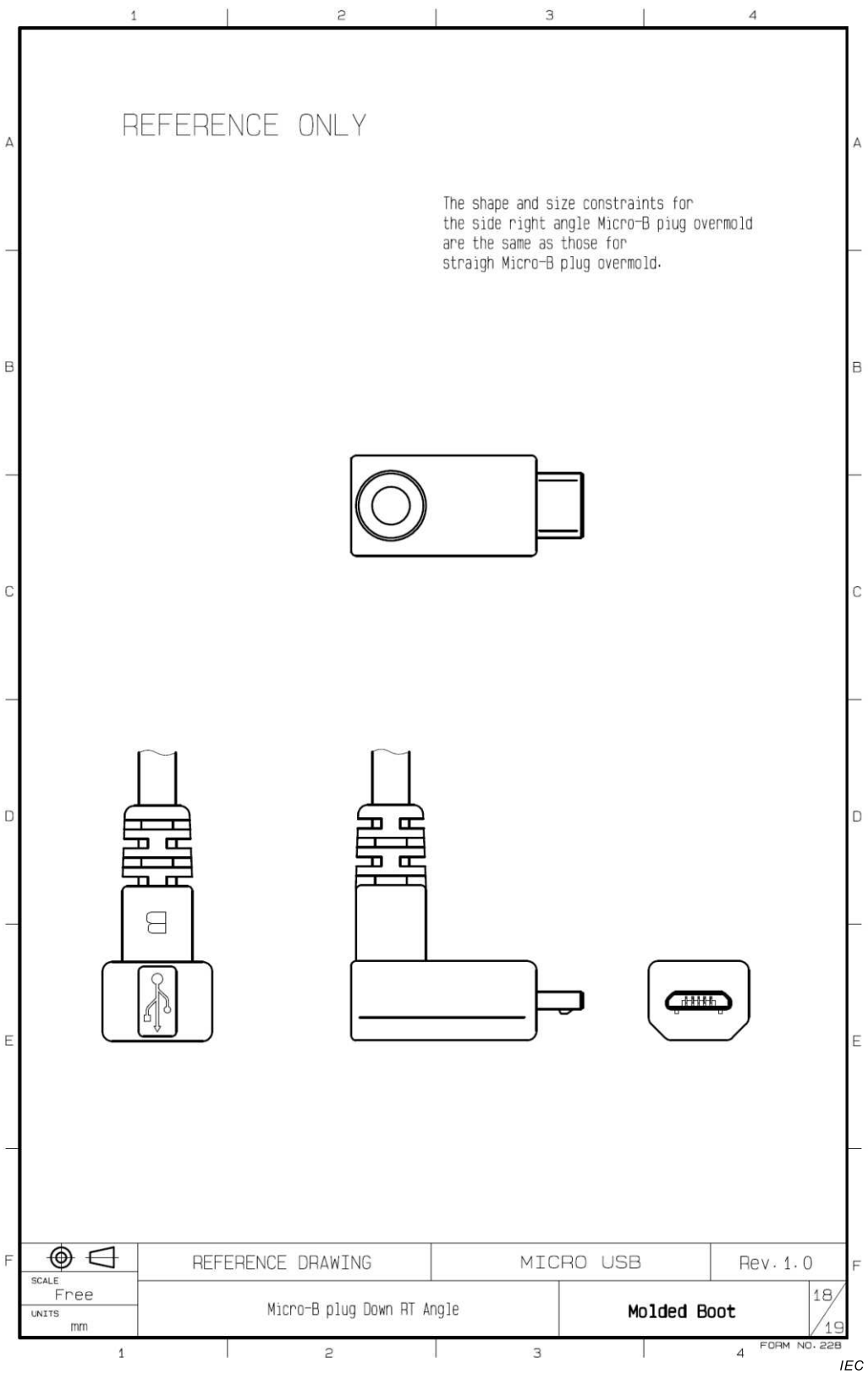


Figure 4-18 – Micro-B Plug, Down Right Angle

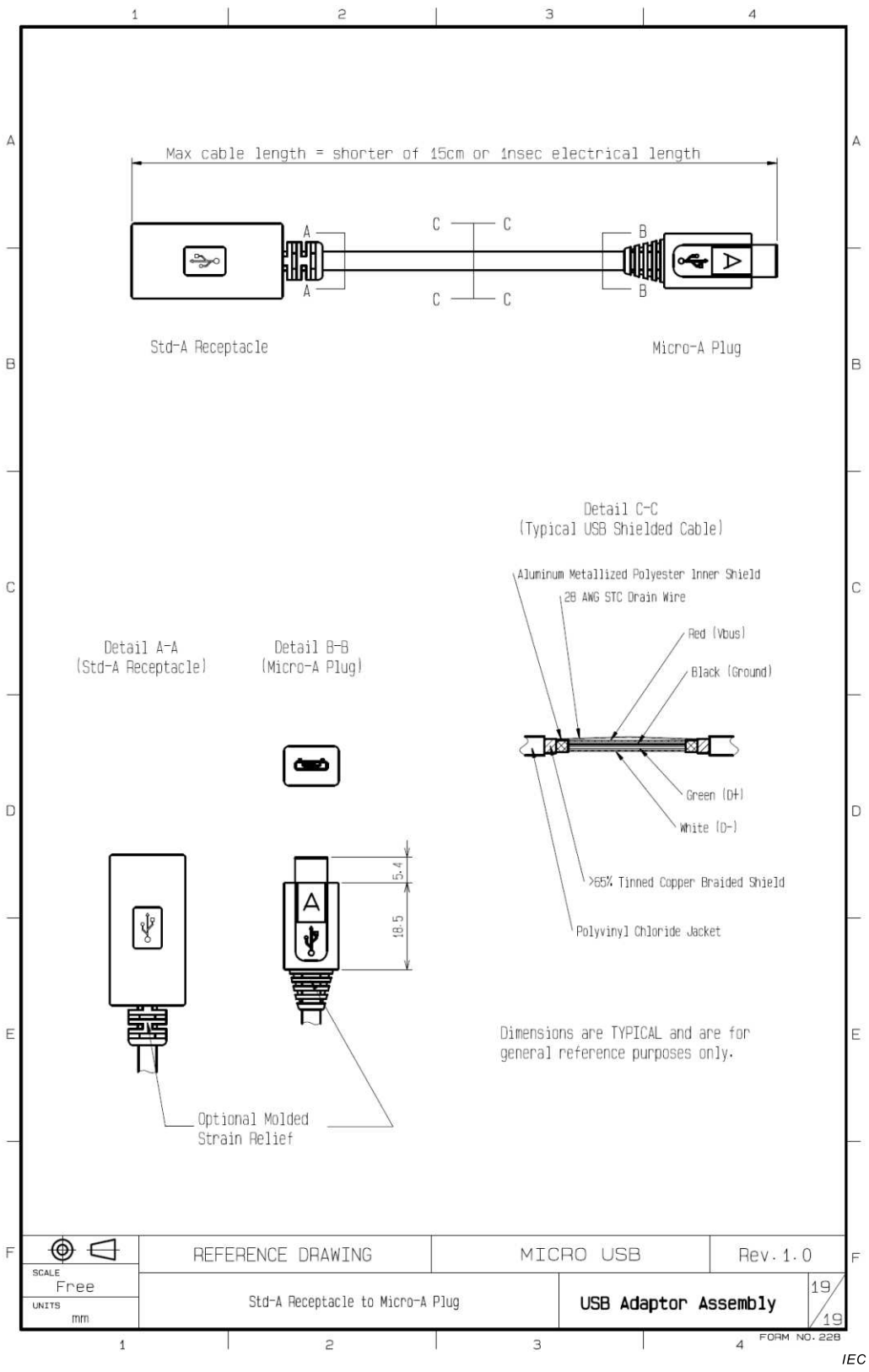


Figure 4-19 – Adapter, Standard-A receptacle to Micro-A plug

5 Electrical Compliance Requirements

Electrical requirements are unchanged from the USB 2.0 specification (Chapter 6; Table 6-7) and the On-The-Go Supplement to the USB 2.0 Specification, unless otherwise specified here.

5.1 Data Rates Beyond USB 2.0 (480 Mb/s -->)

This section will be amended as requirements for higher data rates (beyond the current USB 2.0 specification) become available.

5.2 Low Level Contact Resistance

30 mΩ (Max) initial when measured at 20 mV (Max) open circuit at 100 mA. Maximum change (delta) of +**10 mΩ** after 10 000 insertion/extraction cycles at a maximum rate of 500 cycles per hour. (When manually operated, mating speed should be below 200 cycles per hour.)

5.3 Contact Current Rating

5.3.1 Signal Contacts Only (2, 3, and 4)

1 A minimum when measured at an ambient temperature of 25 degrees Celsius. With power applied to the contacts, the delta temperature must not exceed +30 degrees Celsius at any point in the USB connector under test.

5.3.2 With Power Applied Contacts (1 and 5)

1.8 A for contacts 1 and 5 and at the same time 0.5 A for contacts 2, 3 & 4, minimum when measured at an ambient temperature of 25 degrees Celsius. With power applied to the contacts, the delta temperature must not exceed +30 degrees Celsius at any point in the USB connector under test.

6 Mechanical Compliance Requirements

The following requirements will take precedence over the requirements set forth in the USB 2.0 specification (Chapter 6; Table 6-8) and the On-The-Go Supplement to the USB 2.0 Specification.

6.1 Operating Temperature Range

6.1.1 Option I

–30 °C to +80 °C

6.1.2 Option II

–30 °C to +85 °C (and above)

6.2 Insertion Force

Recommendations:

- It is recommend to use a non-silicon based lubricant on the latching mechanism to reduce wear. If used the lubricant may not affect any other characteristics of the system.
- 35 Newton’s maximum at a maximum rate of 12.5 mm (0.492″) per minute.

6.3 Extraction Force

- 8N (MIN) after 10 000 insertion/extraction cycles (at a maximum rate of 12.5 mm (0.492") per minute).
- No burs or sharp edges are allowed on top of locking latches (hook surfaces which will rub against receptacle shield).
- It is recommend to use a non-silicon based lubricant on the latching mechanism to reduce wear. If used the lubricant may not affect any other characteristic of the system.

6.4 Plating

Recommendations:

- Contact plating should be done after stamping and forming
- Burrs should not be present on contact areas
- Contact area as smooth as possible before plating
- Use a sealing treatment to control plating porosity (contact area)

6.4.1 Option I

6.4.1.1 Receptacle

Contact area: (Min) 0.05 μm Au + (Min) 0.75 μm Ni-Pd on top of (Min) 2.0 μm Ni

Contact tail: (Min) 0.05 μm Au on top of (Min) 2.0 μm Ni

6.4.1.2 Plug

Contact area: (Min) 0.05 μm Au + (Min) 0.75 μm Ni-Pd on top of (Min) 2.0 μm Ni

6.4.2 Option II

6.4.2.1 Receptacle

Contact area: (Min) 0.75 μm Au on top of (Min) 2.0 μm Ni

Contact tail: (Min) 0.05 μm Au on top of (Min) 2.0 μm Ni

6.4.2.2 Plug

Contact area: (Min) 0.75 μm Au on top of (Min) 2.0 μm Ni

6.5 Solderability

Solder shall cover a minimum of 95 % of the surface being immersed, when soldered at temperature 255 °C ± 5 °C for in immersion duration 5 s. (component is to be lead-free component) Using Type R flux.

6.6 Peel Strength (Reference Only)

Minimum 150 N when soldered connector is pulled up from PCB in the vertical direction.

6.7 Wrenching Strength (Reference Only)

Perpendicular Force Test: This test shall be performed using virgin parts. Perpendicular forces (Fp) are applied to a plug when inserted at a distance (L) of 15 mm from the edge of the receptacle. Testing conditions & method should be agreed with all parties. These forces are to four direction (left, right, up, down). Compliant connectors will meet the following force thresholds with the following results:

– No plug or receptacle damage: 0 – 25 N.

– The plug can be damaged, but in such a way that the receptacle does not sustain damage: 25 – 50 N.

6.8 Lead Co-Planarity

Co-planarity of all SMT leads shall be within 0.08 mm range.

6.9 RoHS Compliance

Component is to be RoHS compliant. Lead Free plug and receptacle materials must conform to Directive 2002/95/EC of January 27, 2003 on Restriction of Hazardous Substances (RoHS).

6.10 Shell & Latch Materials

Shell and latch materials for both plug and receptacle shall be stainless steel or mechanically equivalent material.

NOTE All Engineering Change Notice's (ECN) and Errata documents as of September 01, 2012 that pertain to this core specification follow the last page of the specification starting on page 39.

USB ENGINEERING CHANGE NOTICE

Title: Clarification on the Chamfer on USB 2.0 Micro Connectors

Applies to: MicroUSB Specification to the USB 2.0 Specification,
Revision 1.01

Summary of ECN

Modify the USB2.0 micro receptacle definition so that the external chamfer metals are optional as they are in the USB3.0 micro specification.

Reasons for ECN

A number of the portable device manufacturers are asking for Micro-series receptacles that have the lead-in chamfer removed. This is primarily an Industrial Design concern as it improves the aesthetics of products.

Impact on Existing Peripherals and Systems:

No significant impact on the existing parts as they still conform to the specification. Even if the chamfer metals are removed, the guiding function and the insertion force stay the same because the inner side of the shell edge has taper.

Hardware Implications:

None.

Software Implications:

None.

Compliance Testing Implications:

The change does not affect the mechanical and electrical performance specified in the current USB2.0 compliance specification. The test items in the specification were all passed.

Specification Changes

Universal Serial Bus Micro-USB Cables and Connectors specification Revision 1.01

The ECR proposes to add a note “Chamfer metals are optional with no sharp edges.” to the Figure 4-9 Micro-AB receptacle interface on the page 24 and to the Figure 4-10 Micro-B receptacle interface on the page 25 as shown in the following pages.

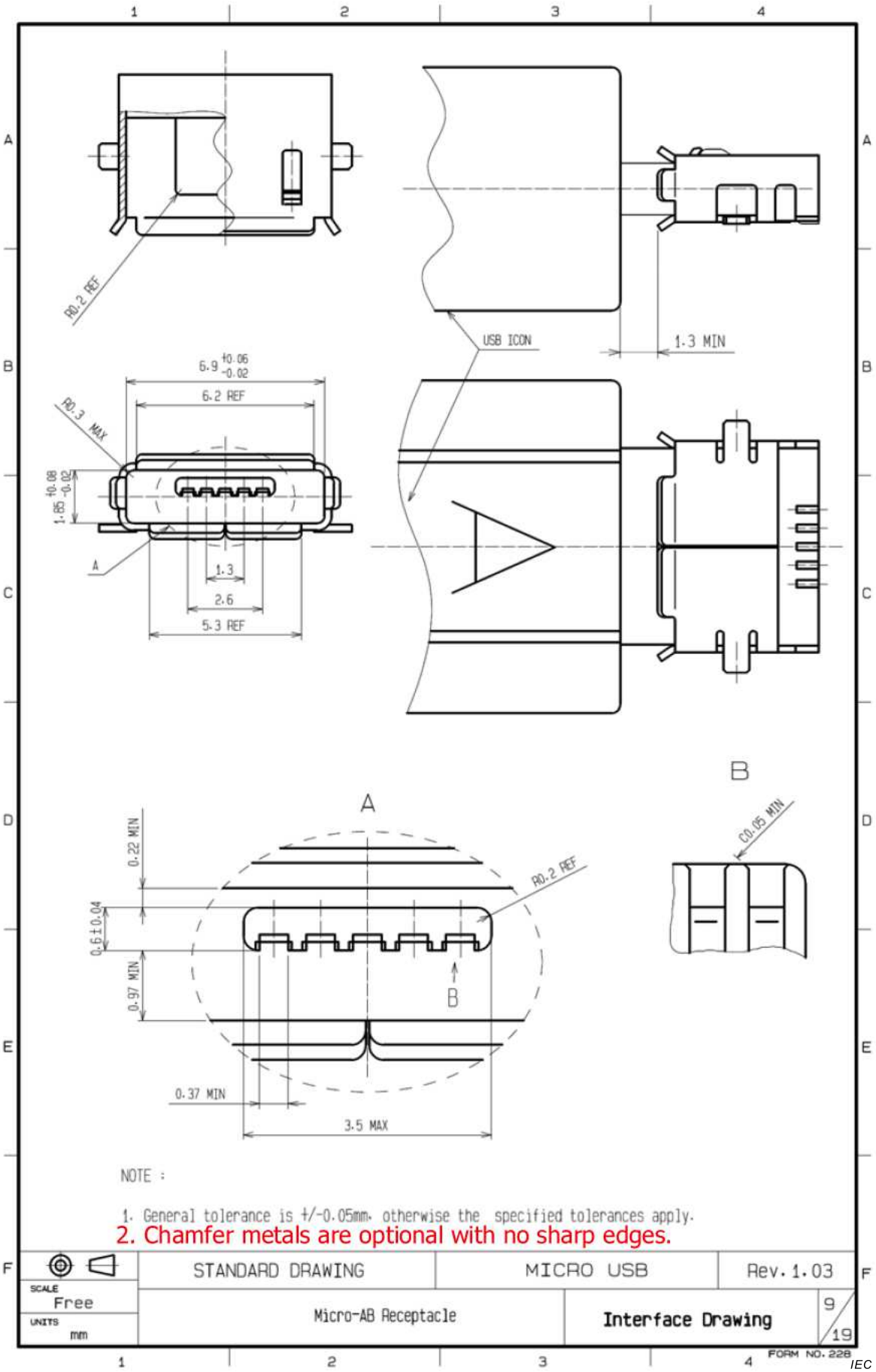


Figure 4-9 – Micro-AB receptacle interface

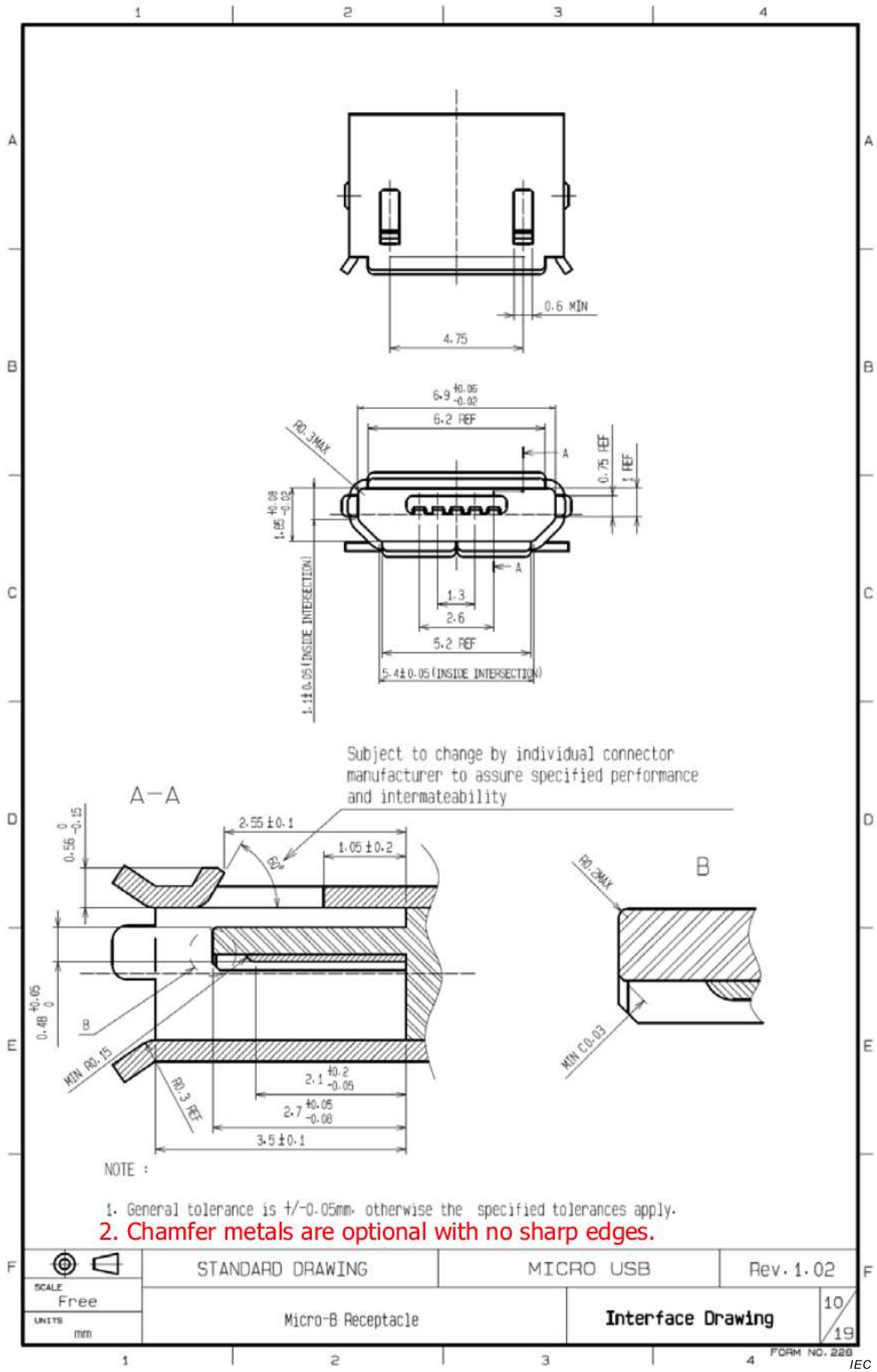


Figure 4-10 – Micro-B receptacle interface

USB ENGINEERING CHANGE NOTICE

Title: **MicroUSB Micro-B ID Pin Resistance and Tolerance stack-up between D+ and D-**

Applies to: **MicroUSB Specification to the USB 2.0 Specification, Revision 1.01**

Summary of ECN

Increase the minimum resistance to ground of the MicroB plug ID pin.

Reasons for ECN

The resistance change to the ID pin of the MicroUSB B plug is required for the identification of the battery charger. This change will give the battery charger the required margin and eliminate overlap in the battery charger specification. The tolerance stack-up between D+ and D- is required to ensure charging ID is properly sequenced.

Impact on Existing Peripherals and Systems:

This ECR increases the resistance to 1Mohm. Any cables that have a micro b plug with an ID resistance between 1Kohm and 1 Mohm will be affected.

Hardware Implications:

Cables and plugs that support the “floating” state according to the Micro-USB spec will not have to change, since they don’t have an actual resistor to ground on the ID pin that needs to be changed. The ID pin is simply floating, so this change (100 Kohm to 1 M Ω) will have no implications there.

Software Implications:

This will have no implications on software.

Compliance Testing Implications:

The testing threshold for the Rb_PLUG_ID parameter in the Micro-USB spec needs to be changed to support the 1 MΩ min instead of the 100 Kohm min.

Specification Changes

In Section 4.2 after Table 4-2 change:

The ID pin on a Micro-A plug shall be connected to the GND pin. The ID pin on a Micro-B plug is not connected or is connected to ground by a resistance of greater than Rb_PLUG_ID (100 kΩ MIN).

To:

The ID pin on a Micro-A plug shall be connected to the GND pin. The ID pin on a Micro-B plug is not connected or is connected to ground by a resistance of greater than Rb_PLUG_ID (1 MΩ MIN).

Additional Changes to be made to the specification:

Add a note to Figure 4-8 of the MicroUSB specification that the tolerance stack-up between D+ and D- cannot exceed a total of ±0,075 mm between the two pins.

After **Table 4-2** reference **Figure 4-8** and note that the point of contact for D+ and D- must mate within 0.15 mm maximum.

USB ENGINEERING CHANGE NOTICE

Title: **Quad type cable additional for Micro USB**

Applies to: **Universal Serial Bus Micro-USB Cables and Connectors Specification, Revision 1.01**

Summary of ECN

The current Micro-USB specification in Section 4.5.1 specifies “The cables allowed by the Micro-USB specification are shown in Figure 4-1, Figure 4-2, Figure 4-3. ..... and meet all other requirements of a USB cable” that a typical USB cable construction consist of non-twisted power pair, twisted signal pair, drain wire, aluminum shield, braiding and cable jacket. This ECN allows a Micro-USB cable to be constructed with the data and power lines twisted together and to not have a drain wire as is currently required in the Micro-USB specification Revision 1.01. Such a Micro-USB cable is referred to as a Quad Type Micro-USB cable.

Reasons for ECN

The benefits of this ECN are that a Quad Type Micro-USB cable can be produced that has a smaller diameter, is more flexible and has good bending performance. In addition, the cost of these cables will be less than standard Micro-USB cables, due the fact that these cables require reduced amount of material, less material for packaging due to smaller bundle shape, and reduced transportation costs.

Impact on Existing Peripherals and Systems:

This ECN meets all the electrical requirements for Micro-USB cables. So there is no impact on the existing peripherals and systems.

(Ref. XV-4687C ECN Proposal for Micro USB (080815).pdf)

(Ref. XV-4687C_Supplement Quad cable R1 (091202).pdf)

Hardware Implications:

There is no implication and impact.

Software Implications:

There is no implication and impact.

Compliance Testing Implications:

The Cable Assemblies Test must be updated to state that a Micro-USB cable that has data and power lines that are twisted together without a drain wire is an acceptable Micro-USB cable when visually verifying the cable construction.

Specification Changes

Universal Serial Bus Micro-USB Cables and Connectors specification Revision 1.01

From:
Section 4.5.1 Cables
The cables allowed by the Micro-USB specification are shown in Figure 4-1, Figure 4-2, and Figure 4-3. Cables must have a propagation delay of 10 ns or less, have a physical length of no more than 2.0 meters, and meet all other requirements of a USB cable.

To:
Section 4.5.1 Cables
The cables allowed by the Micro-USB specification are shown in Figure 4-1, Figure 4-2, and Figure 4-3. Cables must have a propagation delay of 10 ns or less, have a physical length of no more than 2.0 meters, and meet all other requirements of a USB cable. However, Micro-USB cables may be manufactured that have the data and power lines twisted together and without a drain wire. Such a Micro-USB cable is referred to as a Quad Type Micro-USB cable.

Note that in Fig4-1, Fig4-2 and Fig4-3 “Micro-USB cables can have their data and power lines twisted together without a drain wire”.

Universal Serial Bus Cables and Connectors Class Document Revision 2.0 Section 4.10.1.1.2 Cable Assemblies

4.10.1.1.2 Cable Assemblies

The cable construction for standard detachable USB cable assemblies is to be visually verified. Cable construction must contain a braided outer shield and a metallic inner shield. A drain wire of 28 AWG or braid shield must be in contact with both shields. Cables must contain two data-lines of 28 AWG, and a power pair of 28 AWG to 20AWG. Note that a cable with the data and power lines twisted together without a drain wire is allowed for Micro-USB series. Power pairs smaller than 28 AWG are prohibited. The laboratory conducting the compliance testing is required to visually verify the construction of the cable.

Section 4.10.9 Test Group ‘8’

Test Phase	Test			Measurement To Be Performed			Common Requirements
	Title	EIA 364 Test	Severity or Condition of Test	Title	EIA 364 Test	P1	
8.5	Visual Inspection			Cable Construction			Existence of braided shield attached to shell of connector Existence of 28 gauge drain wire in contact with shield and attached to shell of connector Power lines 28 gauge minimum Data lines 28 gauge twisted

Data and power lines twisted together without a drain wire is allowed for Micro-USB series

USB ENGINEERING CHANGE NOTICE

Title: **Maximum Un-mating force value definition to micro connector USB 2.0**

Applies to: **MicroUSB Specification to the USB 2.0 Specification, Revision 1.01**

Summary of ECN

As is common among connector specifications, currently there is no upper limit on the un-mating force of the Micro-series connectors. However, the variation in design of the passive latching feature has led to combinations with excessive extraction forces, resulting in customer dissatisfaction and the potential for device failures (broken cables or peeled off receptacles).

It is fairly critical to proper operation that the plug's latch feature be designed as described by the new reference dimensions. However, it was decided to leave these dimensions as reference only in order to avoid causing manufacturers with certified and working product to have to change their tooling even if it isn't designed exactly as described by the new reference dimensions.

Impact on Existing Peripherals and Systems:

Most of the current receptacle + plug combinations fulfill this new requirement already.

Hardware Implications:

None.

Software Implications:

None.

Compliance Testing Implications:

The un-mating force is already measured in compliance testing according to EIA 364-13 (testing standard and equipment exists).

Test should be made in test group 1, after test 1-1 and 1-2 (Max mating force and contact resistance tests) before durability cycle test; followed by other tests as is done now.

Specification Changes

Change 1.
In Section 6.3 Extraction Force (of MicroUSB Specification to the USB 2.0 Specification, Revision 1.01)

From:

– 8 N (MIN) after 10 000 insertion/extraction cycles (at a maximum rate of 12,5 mm (0,492") per minute).

– No burs or sharp edges are allowed on top of locking latches (hook surfaces which will rub against receptacle shield).

– It is recommend to use a non-silicon based lubricant on the latching mechanism to reduce wear. If used the lubricant may not affect any other characteristic of the system.

To:

– 8 N (MIN) and 25 N (MAX) before and after 10 000 insertion/extraction cycles (at a maximum rate of 12,5 mm (0,492") per minute).

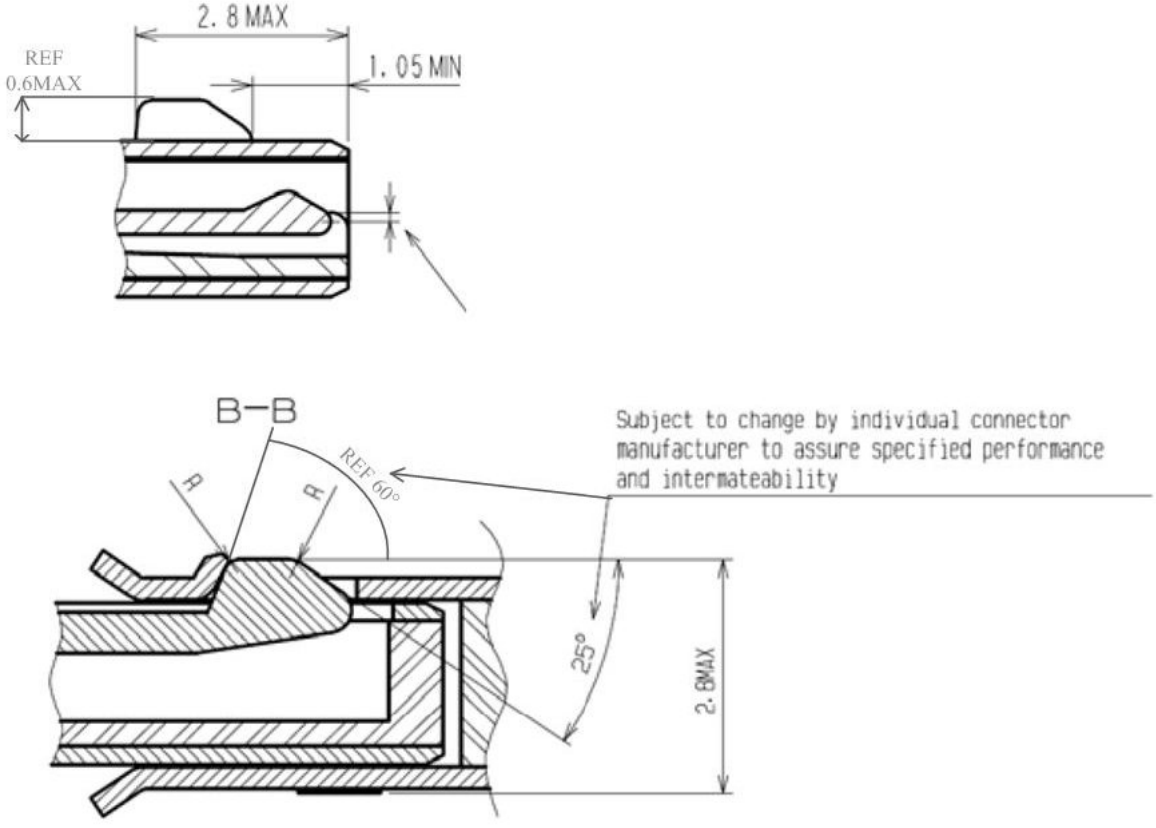
– No burs or sharp edges are allowed on top of locking latches (hook surfaces which will rub against receptacle shield).

– It is recommended to use a non-silicon based lubricant on the latching mechanism to reduce wear. If used the lubricant may not affect any other characteristic of the system.

Change 2. (Reference)

In Figure 4-8 Micro-A/B Plug Interface (of MicroUSB Specification to the USB 2.0 Specification, Revision 1.01)

Add REF latch height 0,6 mm MAX and REF latch angle 60° (same as receptacle side Ref angle)



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