

# STANDARDS AND INFORMATION DOCUMENTS

## Call for comment on DRAFT REVISED AES standard for interconnections - Data connector in an XLR connector shell

This document was developed by a writing group of the Audio Engineering Society Standards Committee (AESSC) and has been prepared for comment according to AES policies and procedures. It has been brought to the attention of International Electrotechnical Commission Technical Committee 100. Existing international standards relating to the subject of this document were used and referenced throughout its development.

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# **AES standard for interconnections - Data connector in an XLR connector shell**

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## **Abstract**

Commonly used modular connectors are widely used, but are fragile in demanding installations, where a broken connection can affect the application critically. This is not important in many applications, such as structured data cabling for use with computer networks, or simple interconnect cabling and patching using Category 5 (or better) data cable. However, in professional audio applications, a broken connection can affect the application critically. A standard ruggedized fitting will promote system security in these applications. This document specifies a ruggedized data connector that is compatible with 8-position 8-contact (8P8C) modular connectors, commonly (though inaccurately) called RJ-45 connectors, with regard to mechanical aspects for proper mating and locking.

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**Audio Engineering Society Inc., 697 Third Avenue, Suite 405, New York, NY 10017, US.**

**[www.aes.org/standards](http://www.aes.org/standards)   [standards@aes.org](mailto:standards@aes.org)**

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**Foreword**

This foreword is not part of AES63-2012, *AES standard for interconnections - Data connector in an XLR connector shell*.

The standard was developed under project AES-X130 by the SC-05-02 working group on Audio Connectors. It was motivated by the understanding that the development of digital audio has necessarily expanding to include cables and connectors common in conventional computer applications. However, many audio professionals operate in more rugged conditions than the office environments familiar to IT installers; and so they need appropriately rugged connections.

The members of the writing group that developed this document in draft are: W. Bachman, J. Brown, M. Natter, R. Rayburn, J. Woodgate, M. Yonge.

R. Rayburn  
Chair, working group SC-05-02  
2012-05-18

**Foreword to second edition, 2024**

This revision adds an informative Annex on connector usage.

Members of the task group that contributed to this revision in draft are: J. Berryman, R. Cabot, K. Fause, R. Hess, R. J. Kenny, A. Kuzub, J. Meyer, F. Morgenstern, D. Prince, P. Treleaven, A. Walker, B. Whitlock, J. Woodgate.

Fred Morgenstern  
Chair, working group SC-05-02  
2024-02-02

**Note on normative language**

In AES standards documents, sentences containing the word “shall” are requirements for compliance with the document. Sentences containing the verb “should” are strong suggestions (recommendations). Sentences giving permission use the verb “may”. Sentences expressing a possibility use the verb “can”.

# AES standard for interconnections - Data connector in an XLR connector shell

## Introduction

There is a growing market for a number of audio applications that use data-connecting cabling and hardware the same as that being used for structured wiring in IT infrastructures, for example in Ethernet networks. As a result the use of ubiquitous “Category 5” data cables and the related modular connectors is becoming more and more popular.

Commonly used modular connectors are widely available but are fragile in demanding installations. A standard ruggedized fitting will promote system security in these applications.

The AES has a particular interest in professional audio installations which need physically secure data connections for high signal integrity.

This standard will help system integrators, designers, installers and users of data for professional audio and associated media in choosing a connector system which is already approved for its ruggedness and reliability in just these application areas. Based on the dimensions of the convenient XLR connectors the space requirements are comparable and the required panel cutouts in equipment are even compatible. The identical locking mechanism facilitates handling.

The standard will also greatly simplify equipment and cable compatibility.

## 0 Preamble

### 0.1 Patents

Attention is drawn to the possibility that some of the elements of this AES standard may be the subject of patent rights other than those identified herein. AES shall not be held responsible for identifying any or all such patent rights.

### 0.2 Documentation conventions

Following ISO convention, decimal points are conventionally shown as commas (,) unless an alternative, such as a period (.), is expressly stated here, with justification.

All dimensional values are indicated in mm.

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**1 Scope**

The scope of this standard is to specify a ruggedized data connector that is compatible with 8-way modular connectors, also called RJ-45 connectors. Basic physical properties and mechanical dimensions are specified in order to enable proper mating and locking and to ensure reliable electrical contact in the locked position. No further requirements are specified with respect to electrical and other mechanical properties.

**2 Normative references**

The following standards contain provisions which, through reference in this text, constitute provisions of this document. At the time of publication, the editions indicated were valid.

IEC 60603-7-1 Ed.3 (2011) *Connectors for electronic equipment – Part 7-1: Detail specification for 8-way, shielded free and fixed connectors with common mating features, with assessed quality*, International Electrotechnical Commission, Geneva, Switzerland.

IEC 61076-2-103 (2004) *Connectors for electronic equipment – Part 2-103: Circular connectors – Detail specification for a range of multipole connectors (type 'XLR')*, International Electrotechnical Commission, Geneva, Switzerland.

**3 Definitions and abbreviations****3.1****XLR shell**

Housing of XLR-type connector adapted to incorporate the 8-way modular connector.

**3.2****Modular connector**

8-way connector specified in IEC 60603-7-1. Sometimes known as “RJ-45”

**4 Mechanical interface****4.1 General mating information**

The dimensions of the fixed chassis connector shall be such that mating and latching operation is guaranteed with a ruggedized modular plug in an XLR shell, or with a standard modular plug (free connector). In the case of a modular plug within XLR shell the integral latching means of the modular plug shall be permanently deactivated or be released when the XLR connector is being separated from the chassis connector.

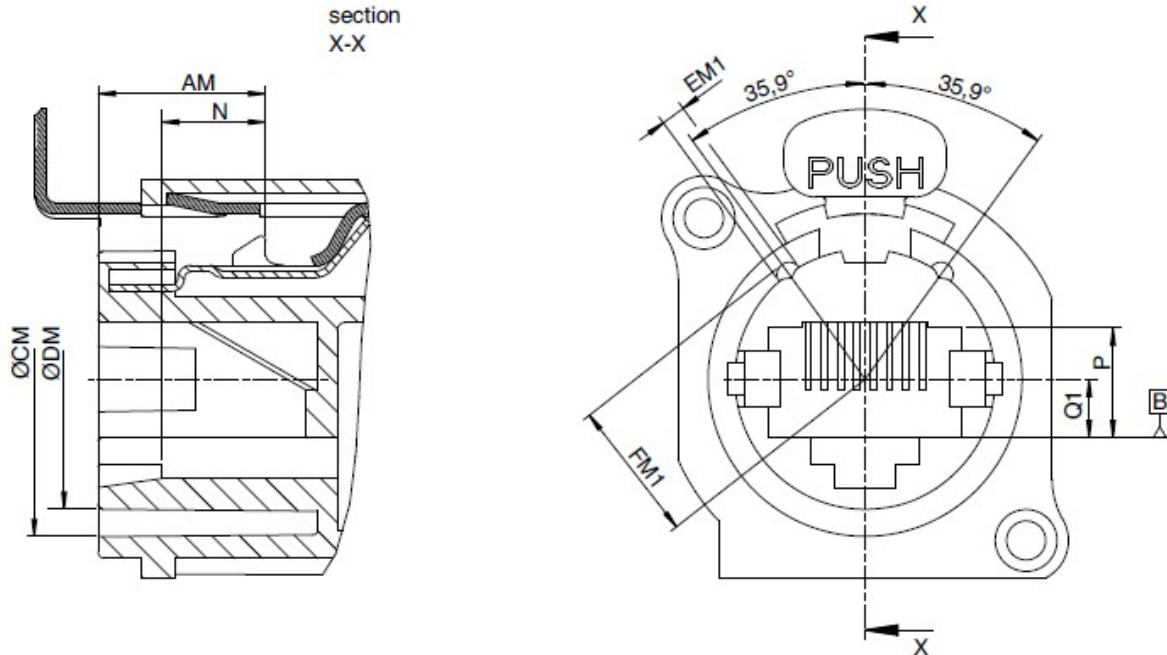
The shape of the connectors may deviate from those given in the following drawings as long as the specified dimensions are not influenced.

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## 4.2 Fixed connector

Based on the female chassis-mounted XLR connector, the dimensions shall be as shown in figure 1 and table 1.



**Figure 1 – Dimensions of fixed connector**

NOTE 1: Line B (identification letter in square) indicates corresponding reference plane of modular connector.

NOTE 2: Dimensions concerning the chassis cutout should preferably be compatible to those of XLR connectors (see IEC 61076-2-103).

NOTE 3: Vertical centre lines of modular connector and XLR shell coincide

**Table 1 – Dimensions of fixed connector**

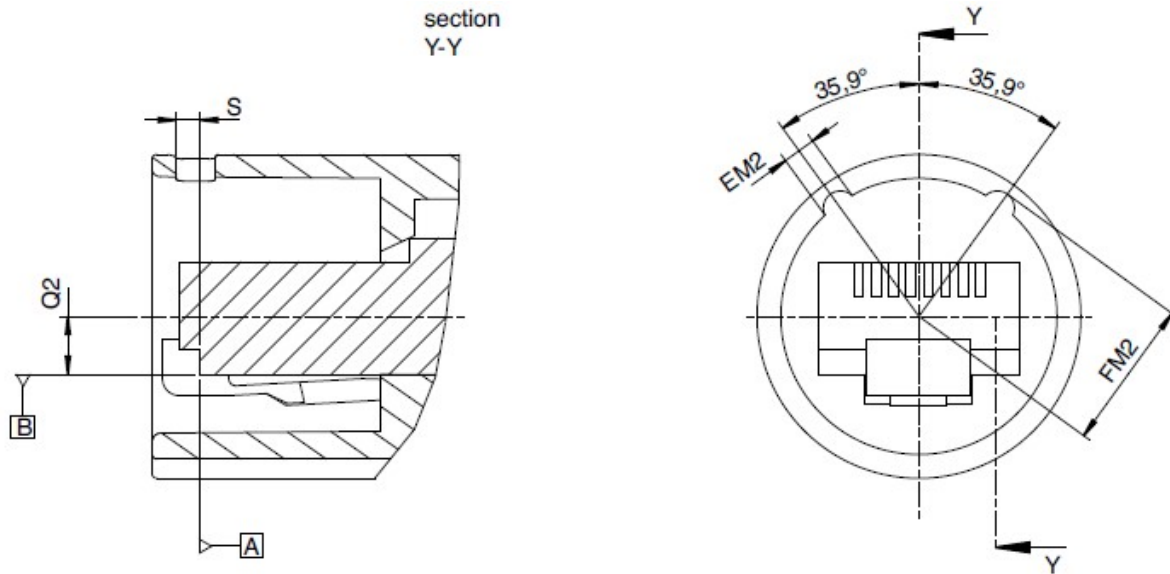
Reference	Max.	Min.	Remark
AM	11,0	10,8	Locking plane of XLR connector relative to surface plane of mating face
N	7,2	6,3	Locking plane of modular connector relative to locking plane of XLR
CM	19,4	19,1	Diameter
DM	16,2	15,9	Diameter
EM1	1,6	1,4	
FM1	8,7	8,6	
P	6,9	6,76	
Q1	3,6 nom.		Vertical distance of XLR axis from modular reference plane B

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## 4.3 Free connector

Based on the male cable-mounted XLR connector, the dimensions shall be as shown in figure 2.



**Figure 2 – Axial position of free modular connector with respect to XLR locking plane**

NOTE: Lines A and B (identification letters in squares) indicate corresponding reference planes of modular connector.

**Table 2 - Dimensions of free connector**

Reference	Max.	Min.	Remark
EM2	2,0	1,7	
FM2	9,0	8,8	
Q2	3,55	-	Vertical distance of XLR axis from modular reference plane B
S	1,35 nom.		Modular reference plane A relative to locking plane of XLR



**Annex A (Informative) - Notes on transmission performance**

Due to the applications the connector system is expected to be used in, and the growing data rates to be handled in general, it is recommended to specify a minimum transmission performance according to requirements as specified for transmission Class D or Category 5 (see D.4).

As a consequence, corresponding requirements for return loss, crosstalk (NEXT, ELFEXT) and other relevant transmission parameters should be specified up to a minimum bandwidth of 100 MHz (refer to D.2).

Transmission performance will depend on using cable and connectors with an appropriate specification, with Category 5e representing a practical minimum in most cases. At high data rates, Category 6 or better may be advisable.

**Annex B (Informative) - Notes on shield termination**

Depending on environmental and application-specific situations the use of unshielded (UTP) or shielded (FTP, STP) twisted-pair cables is preferred. The following information is relevant only when shielded cables are used.

In general, it is recommended to follow the corresponding requirements as outlined in AES48-2005 (reference D.5) and AES54-2-2008 (reference D.3), or to see reference D.11, whichever is more practical and helpful in the actual application.

The shell of the free modular connectors - not necessarily the shell of the ruggedized connector (XLR shell) - is defined to be the designated shield contact.

## Annex C (Informative) - Connector Usage

### C.1 Compatible connector types

Not all ruggedized RJ45-type (8P8C) systems comply with the dimensions and locking of the fixed and free connectors as specified in sections 4.2 and 4.3. Some historic ruggedized 8P8C systems were incompatible due to physical constraints, and some may be incompatible due to being designed for different markets and applications. For use in media applications, compliance with AES63 is strongly encouraged for new designs.

### C.2 Usage for AES50, AES67, and AES72

AES63 is an appropriate, commonly used connector (though not the required connector) for AES50, AES67, and AES72.

## Annex D - Bibliography

- D.1 ISO/IEC 8877 *Information technology – Telecommunications and information exchange between systems – Interface connector and contact assignment for ISDN Basic Access Interface located at reference points S and T*
- D.2 IEC 60603-7-3 *Connectors for electronic equipment – Part 7-3: Detail specification for 8-way, shielded, free and fixed connectors, for data transmission with frequencies up to 100 MHz*, International Electrotechnical Commission, Geneva, Switzerland.
- D.3 AES54-2 AES standard on interconnections - Grounding and EMC practices - Shields of balanced audio wiring within fixed and portable passive connector panels, jack fields, and passive microphone splitters
- D.4 TIA/EIA-568-D (2015) *Commercial building telecommunications cabling standards*, Telecommunications Industry Association/Electronic Industries Alliance, USA
- D.5 AES48 *AES standard on interconnections – Grounding and EMC practices – Shields of connectors in audio equipment containing active circuitry*
- D.6 AES3-4 *AES Standard for digital audio – Digital input-output interfacing – Serial-transmission format for two-channel linearly represented digital audio data - Part 4: Physical and electrical*, Annex C.4.2 (8-way modular connector)
- D.7 AES-2id *AES information document for digital audio engineering - Guidelines for the use of the AES3 interface*,
- D.8 AES47 *Digital audio in asynchronous transfer mode (ATM)*
- D.9 AES50 *AES standard for digital audio engineering – High-resolution multi-channel audio interconnection (HRMAI)*
- D.10 AES-R6 *AES project report – Guidelines for AES standard for digital audio engineering – High-resolution multi-channel audio interconnection (HRMAI), AES50*
- D.11 JAES Special Issue on Grounding and Shielding, *J. Audio Eng. Soc.*, June 1995, vol. 43 #6