

June 2023

Category 7 and 7A / Class F and F_A Cabling Concerns

Introduction

Category 7/Class F and Category 7A/Class F_A refer to cabling performance standards recognized primarily in Europe but see very limited adoption globally. While these systems advertise “better” performance versus Category 6A or lower systems, this “better” performance really offers no advantages in system performance while coming with significant problems. The purpose of this document is to discuss the advertised performance versus the tradeoffs.

Category 7 and 7A / Class F and F_A Overview

The Category 7 and 7A / Class F and F_A standards refer to performance levels as recognized by ISO/IEC 11801. Category 7 and 7A standards reference performance levels of the components (jacks and cable) while the Class F / F_A refers to the performance of the link or channel (when all of the components are used together). Specific IEC standards can refer to the connector designs themselves. A comparison between the standards is shown in [Table 1](#).

Table 1: Comparison Between the Different Categories

TIA ISO	Category 6 Class E	Category 6A Class E _A	Category 7 Class F	Category 7A Class F _A	Category 8 Class 8.1
Construction	UTP or Shielded	UTP or Shielded	Shielded (S/FTP only)	Shielded (S/FTP only)	STP
Connector Type	IEC 60603-7 (RJ45)	IEC 60603-7 (RJ45)	IEC 61076-3-104 or 61076-3-110 (Non-RJ45)	IEC 61076-3-104 or 61076-3-110 (Non-RJ45)	IEC 60603-7 (RJ45)
Specified Bandwidth	250 MHz	500 MHz	600 MHz	1000 MHz	2000 MHz
Specified Channel Length	100m	100m	100m	100m	30m
Cable Wire Gauge	23/24 AWG	23 AWG	22/23 AWG	22 AWG	22/23 AWG
PoE Support	Yes	Optimal	Optimal	Optimal	Optimal
Gigabit Ethernet	100 m	100m	100m	100m	100m
2.5 & 5GBASE-T	Low Risk	No Risk	No Risk	No Risk	No Risk
10GBASE-T Ethernet	Limited distances per TSB-155-A	100m	100m	100m	100m
25/40GBASE-T	Not Supported	Not Supported	Not Supported	Not Supported	30m

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Two key differences to highlight between traditional cable performance levels like Category 6 and 6A versus Category 7 and 7A are:

- **Shielding requirements:** Category 6 and 6A can be unshielded or shielded, whereas Category 7 and 7A are required to be shielded using an S/FTP construction
- **Connector requirements:** Category 6 and 6A use the ubiquitous IEC 60603-7 (RJ45) connector, whereas Category 7 and 7A use the uncommon IEC 61076-3-104 or 61076-3-110 connectors which are not compatible with RJ45 ports; these are highlighted in [Figure 1](#)

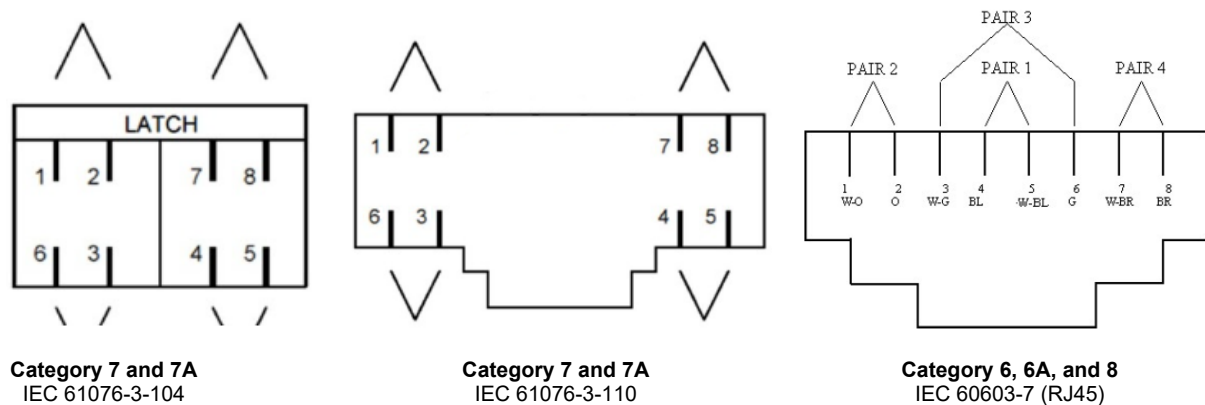


Figure 1: Comparison of Category 7 and 7A versus Category 6 and 6A Connectors

Status of 25 and 40GBASE-T

Often the topic of future proofing to new standards is given as a justification for installing Category 7 or 7A cabling components. 25GBASE-T and 40GBASE-T are standards that were published in 2016 as part of the 802.3bq task force. Some highlights of these standards:

- Maximum channel reach of 30 meters (24-meter link, 6 meters of patch cords)
- Require shielded cabling (can be any type of shielding)
- Require a Category 8 infrastructure
- Focus on data center use cases due to short reach

At the time of publication of this document, Panduit is unaware of equipment or a roadmap for equipment that will operate at 25 or 40GBASE-T. However, this does not imply that these standards will never be deployed.

Future Proofing Concerns with Category 7 and 7A / Class F and F_A

When looking for a cabling system with long life potential, [Table 1](#) shows:

- Category 7 and 7A **offer the same** 1000BASE-T performance as Category 6 and 6A
- Category 7 and 7A **offer the same** 2.5 and 5GBASE-T performance as Category 6A
- Category 7 and 7A **offer the same** 10GBASE-T performance as Category 6A
- Category 7 and 7A **offer the same** Power over Ethernet performance as Category 6A
- Category 7 and 7A **cannot support** 25 and 40GBASE-T; Category 8 would be required

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Hence, a Category 7 and 7A system offer the same performance as a Category 6A system with no future proofing benefits. While the status of 25 and 40GBASE-T is unknown, a Category 7 and 7A / Class F and Class F_A infrastructure could not support it. [Figure 2](#) shows that the Category 7 and 7A standards have insufficient bandwidth to support 25 and 40GBASE-T; [Figure 3](#) shows that a Category 7 or 7A system can reach up to 100 meters, which is 70 meters too long for 25 and 40GBASE-T.

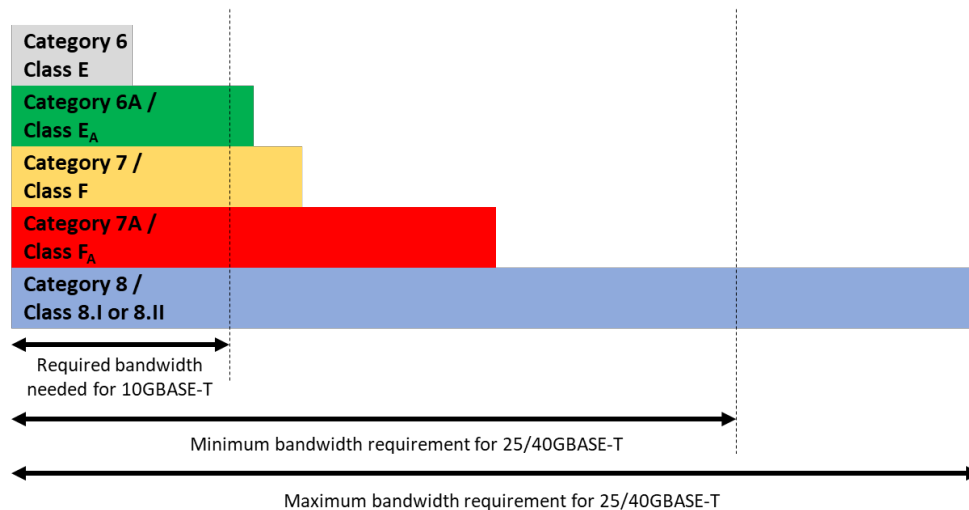


Figure 2: Category 7 and 7A have Insufficient Bandwidth for 25 and 40GBASE-T

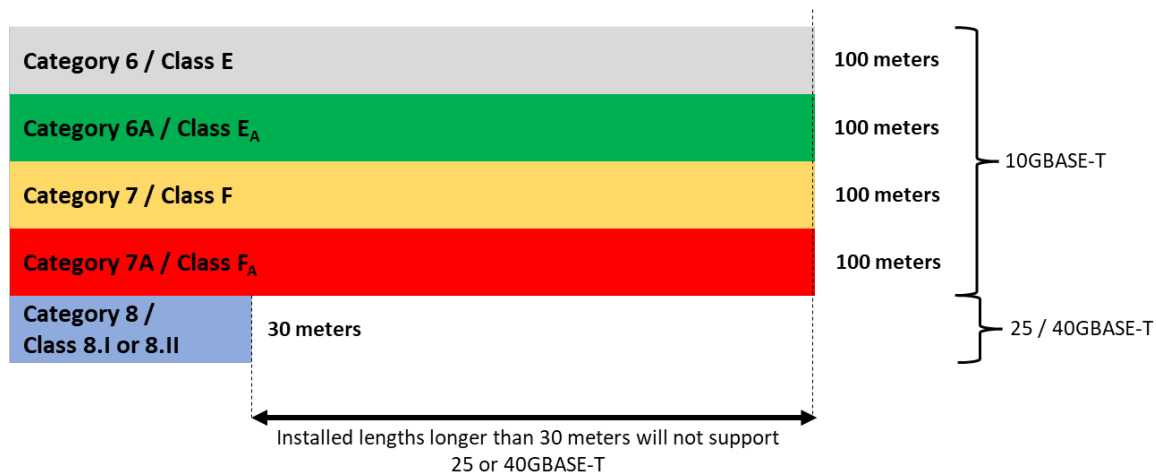


Figure 3: Category 7 and 7A are Specified to 100 meters, while 25 and 40GBASE-T have a maximum reach of 30 meters

Problems with Category 7 and 7A Cabling

The latest global estimates show that Category 7 and 7A systems comprise less than 1% of global cable revenue. In comparison, Category 6 is about 45% of global cable revenue and Category 6A is 40% of global cable revenue. Hence, Category 7 and 7A are uncommon.

Category 7 and 7A / Class F and F_A Cabling Concerns

Additional problems and concerns with Category 7 and 7A cabling are:

- Small market size means limited vendors and product availability, particularly in markets where shielded products are not common
- The IEC 61076-3-104 and 61076-3-110 connectors are effectively proprietary vendor solutions due to the lack of an ecosystem around these connectors
- TIA does not recognize Category 7 or 7A performance levels so adoption in markets like North America, Latin America, and much of Asia Pacific is likely to further decrease
- Category 7 and 7A offer no future proofing for 25 and 40GBASE-T
- Compatibility issues with equipment that would require RJ45s would require hybrid patch cords to interface from the Category 7 or 7A connectors to the equipment. This is additional inventory a customer would need to maintain on site.
- Hybrid patch cords would reduce the Category 7 or 7A performance level back to the level of the RJ45 plug (likely Category 6 or 6A).
- Installing a Category 7 or 7A cable with Category 6A shielded connectors (as is sometimes done) is equal to installing a shielded Category 6A system

As can be seen, Category 7 and 7A / Class F and F_A offer no performance benefits, with significant obstacles and concerns for deployment.

Panduit Recommendation

Panduit recommends the installation of a Category 6A / Class E_A system to support data rates of up to 10GBASE-T and have optimal Power over Ethernet performance. If there is a preference for the shielded nature of Category 7 or 7A, then Panduit would recommend the installation of a shielded Category 6A / Class E_A system. Category 6A utilizes the ubiquitous RJ45 interface and it is widely available from a large ecosystem of vendors.

Category 6A / Class E_A systems offer the same application performance as Category 7 or 7A / Class F or F_A with none of the downsides of these systems.