

# Cat6/6A Network Cables Are Evolving and Becoming Larger - How Can Existing Connectors Fit?

Cat6/6A cable is not just for office network wiring. In challenging factory environments, broadcast studios, laboratories and even outdoors, Cat6/6A cable is being run to bring high-speed networking where it's needed. Cable runs to wireless relay stations can be long and endure harsh conditions, but they are critical to keeping facilities connected. All these environments require specialized cable with increased insulation, gel filling for weatherproofing, ground bonding, and thicker conductors for better performance. For techs who have spent a lot of time installing office networks, terminating these rugged and high-performance cables is a lot more challenging.

## Cat6/6A is Performance, Not Size

A major stumbling point in high-speed network installation is the incompatibility of Cat6/6A connectors and Cat6/6A cable. As demands on network performance increase, cable manufacturers adjust their product to handle increased speeds. The TIA-568 specification calls for cabling electrical characteristics but leaves the physical construction to the manufacturer. This leaves "standard" RJ45 connectors unable to accommodate newer and enhanced cables, even though they are "Cat6/6A" connectors, designed for the high-speed electrical characteristics.

Four aspects of the cable can cause problems when terminating:

- Cable OD
- Conductor OD
- Conductor shielding
- Ground bonding
- Connector Capacity

Cable outside diameter can prevent the intact cable from even entering the connector. Inexperienced -- or desperate -- techs will sometimes run the insulated inner conductors into the RJ45 connector, bypassing any form of strain relief provided by it. While this might work temporarily on a lab bench, it is a disaster waiting to happen in the field, especially in inaccessible locations. Even if the cable is supposedly immobilized, at some point someone is going to be pulling on it.

## Conductor OD and Electrical Connections

Punch-down connections inside most common RJ45s expect an AWG 23 wire size. For performance up to 10 Gigabit, some companies are using larger conductors, which don't seat properly when punched down, and could be

damaged, work free, or damage the punch-down terminal, especially when installed with a tool frame and die type system which delivers significant force. Slicing of the larger wire could lead to later breakage, and damage to the terminal could reduce its holding ability as the sides are spread apart. Stranded wires bring additional challenges for termination, though they provide more flexibility for installations with bends and flexing.

## Conductor Insulation Blocks Wire Insertion

The insulation surrounding individual conductors in the cable and frequently conductor size increases as well result in larger wires which do not fit through holes in the connector leading to the punch-down terminals. A simple problem which tempts yet another awkward fix: running bare wires through to the terminals, with substantial risk of contacting other wires inside. Even if the wires can be inserted into the connector, standard 8-across arrangement becomes problematic with the larger wire ODs.

## Ground Bonding Complicates Assembly

Grounding connectors can be either foil-braid-based or braid-based, and either kind needs to make a bonding connection at one end of the cable during crimping. Cable outer diameter issues and, of course, non-grounded connectors will stand in the way of completing this connection, essential to many high-speed data operations.

## Further Advances Mean More Challenges

As the move to Cat6/6A shows, reducing crosstalk and ensuring good performance at ever increasing data rates means that cables will continue to grow in size to accommodate larger conductors, insulation, spacers, pair twisting and other methods of improving cable characteristics. The challenges involved in fitting the prepared cable to the terminating connector will continue to plague the technician -- unless the connector evolves along with the cable. While some characteristics of RJ45 are well-defined, there is room for innovation.

## Planning for Success

The technician, as the final link in the process, must verify that he or she is ready to meet the physical requirements of higher-performance and weatherproof cabling with

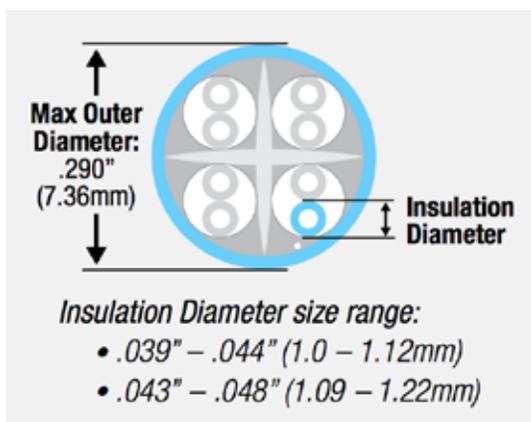
appropriate termination devices. RJ45 connectors designed to easily accommodate the cabling are available. The key to success is obtaining information about the cable, which can be challenging. Cable OD is almost universally available, but often only bare wire AWG specs are available for the internal components. Insulation thickness is often seen as proprietary information, for example. A few manufacturers such as Vertical Cable, Wavenet, and Ice Cable do provide excellent data sheets for their products, making the selection of appropriate termination much easier.

## Classic Technology, Reinvented

The ezEX-RJ45® termination system from Platinum has taken the standard RJ45 termination and considered all the challenges that evolving cable presents. The connector is part of the network characteristics, and so must ensure that quality cabling carries the signal over to the terminating device. The RJ45 connector is almost universal, and so the way that it is implemented had to be changed. Rather than compromise the cable itself, flattening it or otherwise affecting its electrical characteristics, Platinum took each problem that larger, higher performance cable brings, and found a way to make it fit and perform in a legacy connector style, the RJ45.

## Doing the Numbers

One example of this new connector's innovation: since the eight contacts are defined with 0.040 inch centers, evenly spaced, there is not much room for insulation increases. Current 23 AWG wire itself takes 0.0226 inches, and wire sizes are increasing. As space runs out, the distortion in the wire arrangement inside the shell can cause disconnects on some or all contacts, or the assembly will not meet certification requirements even if it does connect. Platinum simply placed the wires in a four-on-four staggered arrangement, leaving room for conductor growth in Cat6/6A and beyond, in an elegant fashion.



## Factory-Quality Assembly with a Hand Tool

The ezEX-RJ45 connector comes with a system, a hand tool and die set which handle everything once the wires are in place. Since the wires enter through generous pass throughs

in an orderly fashion, there is no need for inspecting and taming the wires as they float above the contacts – each is inserted into the two rows of four wires, firmly in place before the connector is assembled. The tool, with a reversible and replaceable die which allows ambidextrous operation, holds the connector in place while it terminates and cuts the wires and crimps the strain relief in place. Simple and repeatable operation, with no bars and liners, gives confidence in each and every connector, no matter what cable parameters are involved.

## Connectors Designed for Evolving Cable

ezEX44™ connectors handle 0.039-0.044 inch conductors and ezEX48™ handle 0.043-0.048 inch conductors. The right tool for each job, implementing the unique Platinum Tools design but with "just right" spacing, makes assembly easy and use reliable. With cable specs in hand, the right ezEX-RJ45® connectors can be ordered and on hand for the job, rated to 10 Gigabit to work hand in hand with high-performance cable.

## Looking Forward

While Platinum Tools connector products save time and money, they are a new generation of forward-thinking products, designed to work with the latest network installations running reliably at high speeds. Platinum Tools considers applications, not just connections, and helps installers prepare for reliable PoE-based systems such as security cameras, and the need for all parts of the cabling system to test as ready for 10 Gigabit performance during signoff. Rather than placing generic parts on high-quality cable, using ezEX-RJ45® connectors gives end-to-end quality going forward.

## Ordering Information

100061C	EXO Crimp Frame + EXO-EX Die set for ezEX-RJ45™ Connectors
100062C	EXO Crimp Frame + EZ-RJ45 Die for EZ-RJ45 Connectors
202044J	ezEX-RJ45™ Connectors. 100pc Jar for .039 - .044"
202048J	ezEX-RJ45™ Connectors. 100 pc Jar for .043 - .048"