CAT 6 CABLES

Alfiya Fazil

Category 6 cable (Cat 6 cable)

- A Category 6 cable (Cat 6 cable) is a type of twisted pair cable standard used specifically in gigabit (Gb) Ethernet-based computer networks.
- In 2002, it was jointly defined and specified by the Electronics Industries Association and Telecommunication Industries Association (EIA/TIA).
- The Cat 6 cable is fully backward compatible with previous versions, such as the Category 5/5e and Category 3 cabling standards.

Twisted Pair Cable

Twisted pair cabling is a form of wiring in which two conductors are wound together for the purposes of cancelling out electromagnetic interference (EMI) from external sources and crosstalk from neighbouring wires.

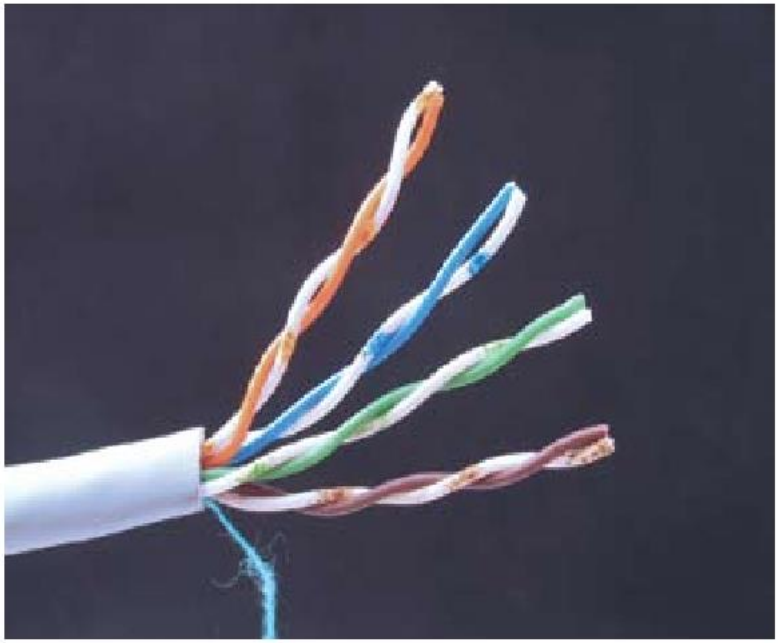
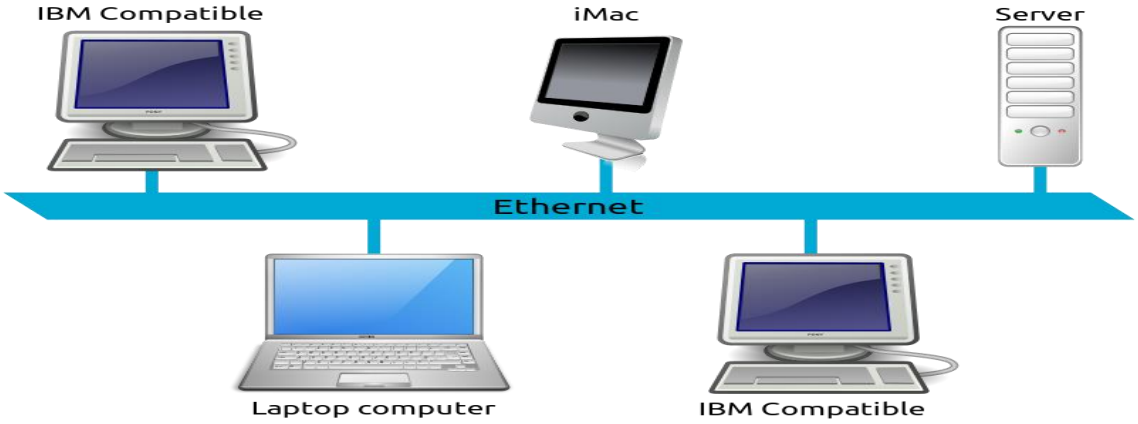


Image of exposed twisted copper pairs

ETHERNET

Ethernet is a family of computer networking technologies for Local Area Networks (LANs) and Metropolitan Area Networks (MANs). It was commercially introduced in 1980 and first standardized in 1983 as IEEE 802.3, and has since been refined to support higher bit rates and longer link distances.

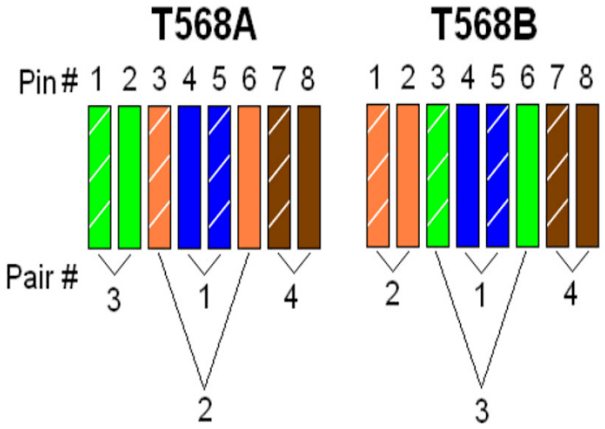
Over time, Ethernet has largely replaced competing wired LAN technologies such as token ring, FDDI, and ARCNET.



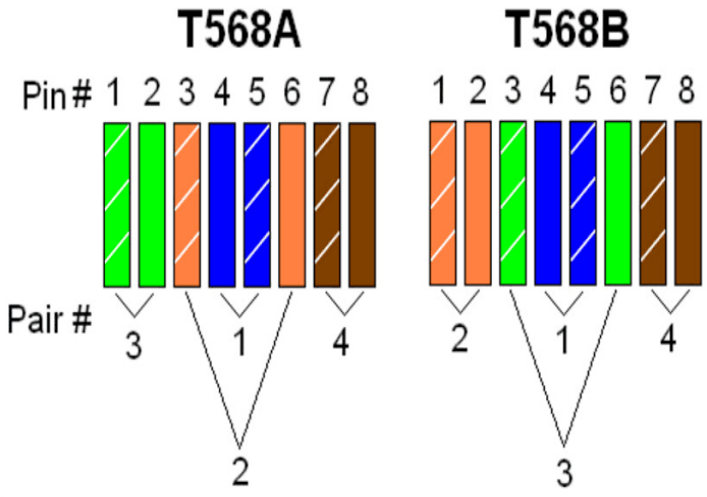
- EIA/TIA Wiring Standards are standards for commercial and telecommunications wiring developed by the Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA).
- These standards are also supported by the American National Standards Institute (ANSI).
- The EIA\TIA wiring standards actually consist of a group of standards covering different aspects of premise cabling and other wiring practices.

TIA/EIA 568A and TIA/EIA 568B Standards

- TIA/EIA developed the TIA/EIA 568A and TIA/EIA 568B Standards for Unshielded Twisted Pair wiring.
- TIA/EIA 568A and TIA/EIA 568B Standards determine the order of the wires placed in the Rj45 connector.
- Functionally, there is no difference between both standards, only difference is that the position of Green and Orange wires are switched.




TIA/EIA 568A Wiring
1 Green-White
2 Green
3 Orange-White
4 Blue
5 Blue-White
6 Orange
7 Brown-White
8 Brown
TIA/EIA 568B Wiring
1 Orange-White
2 Orange
3 Green-White
4 Blue
5 Blue-White
6 Green
7 Brown-White
8 Brown


T568A
T568B
Pin # 1 2 3 4 5 6 7 8
1 2 3 4 5 6 7 8
Pair #
3
1
4
2
2
1
4
3

Rj45 connector

- A registered jack (RJ) is a standardized physical network interface for connecting telecommunications or data equipment.
- The most common twisted pair connector is an eight position eight contact (8P8C) modular plug and jack commonly referred to as an RJ45 connector.

QUICK VIEW OF ETHERNET CABLES

Category	Shielding	Max Transmission Speed (at 100 meters)	Max Bandwidth
Cat 3	Unshielded	10 Mbps	16 MHz
Cat 5	Unshielded	10/100 Mbps	100 MHz
Cat 5e	Unshielded	1,000 Mbps / 1 Gbps	100 MHz
Cat 6	Shielded or Unshielded	1,000 Mbps / 1 Gbps	250 MHz
Cat 6a	Shielded	10,000 Mbps / 10 Gbps	500 MHz
Cat 7	Shielded	10,000 Mbps / 10 Gbps	600 MHz
Cat 7a	Shielded	10,000 Mbps/10 Gbps	1,000Mhz

CAT6 Vs CAT 6a Cables

	Cat6	Cat6a
Speed	10 Gbps	10 Gbps
Distance	33-55 meters (up to 100 meters at slower speeds)	100 meters
Frequency	Up to 250 MHz	Up to 500 MHz
Shielded	Yes and Unshielded	Yes
Backward compatible	Yes	Yes

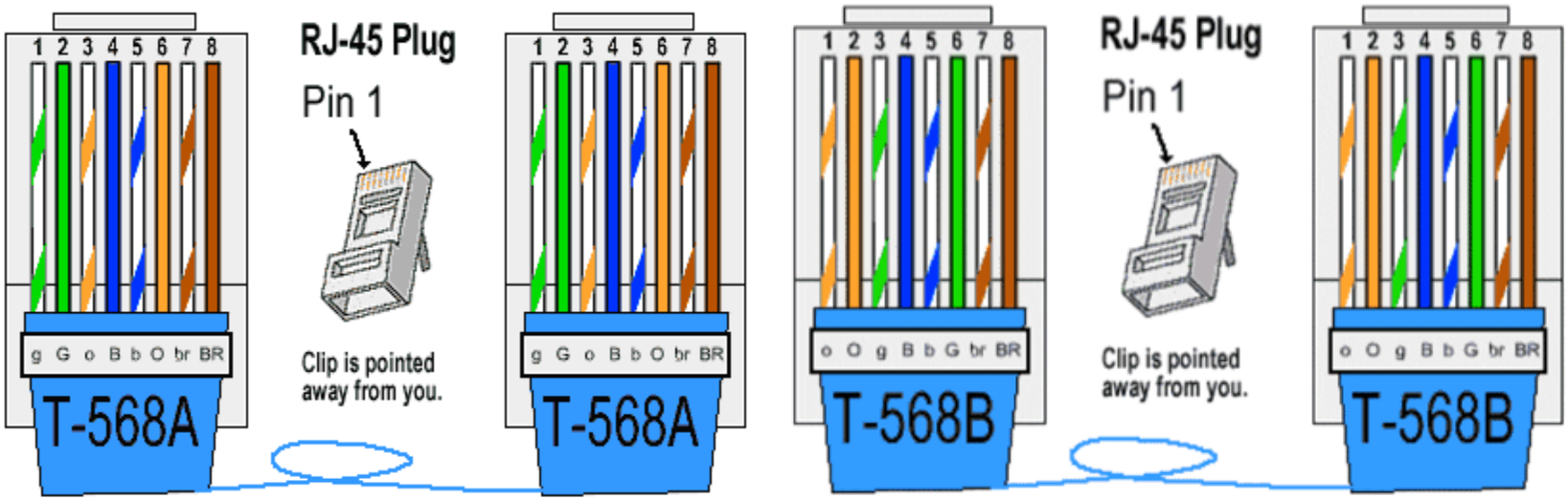
MAKING ETHERNET CABLES (USING A CRIMPING TOOL)

There are two kinds of Ethernet cables you can make, **Straight Through** and **Crossover**.

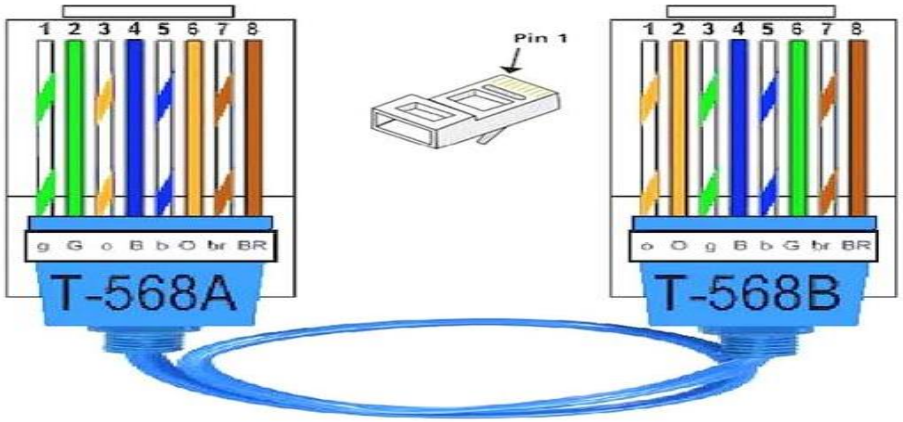
STRAIGHT THROUGH Ethernet cables are the standard cable used for almost all purposes, and are often called "patch cables".

CROSSOVER CABLES - The purpose of a Crossover Ethernet cable is to directly connect one computer to another computer (or device) without going through a router, switch or hub.

Straight through cable



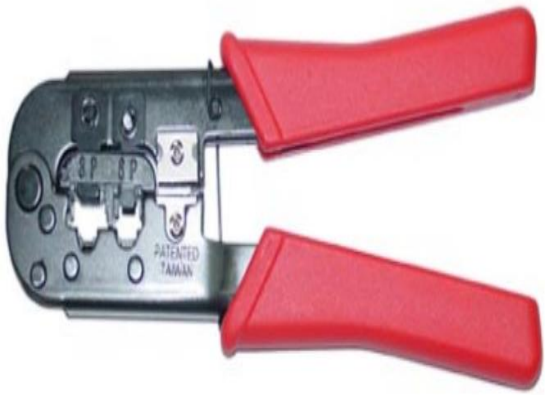
Cross over cable



MATERIALS REQUIRED FOR MAKING ETHERNET CABLES

Category 6 cable

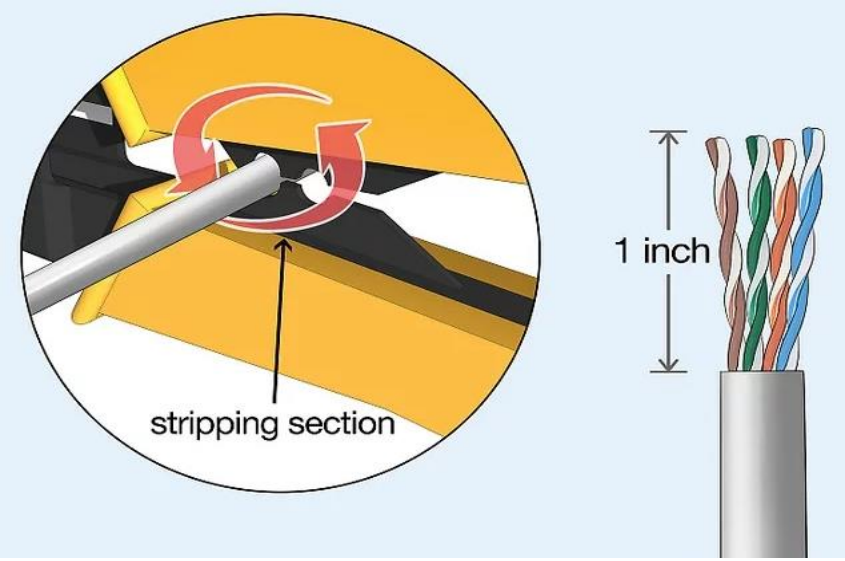
RJ-45 Crimpable Connectors for CAT-6



RJ-45 Crimping tool

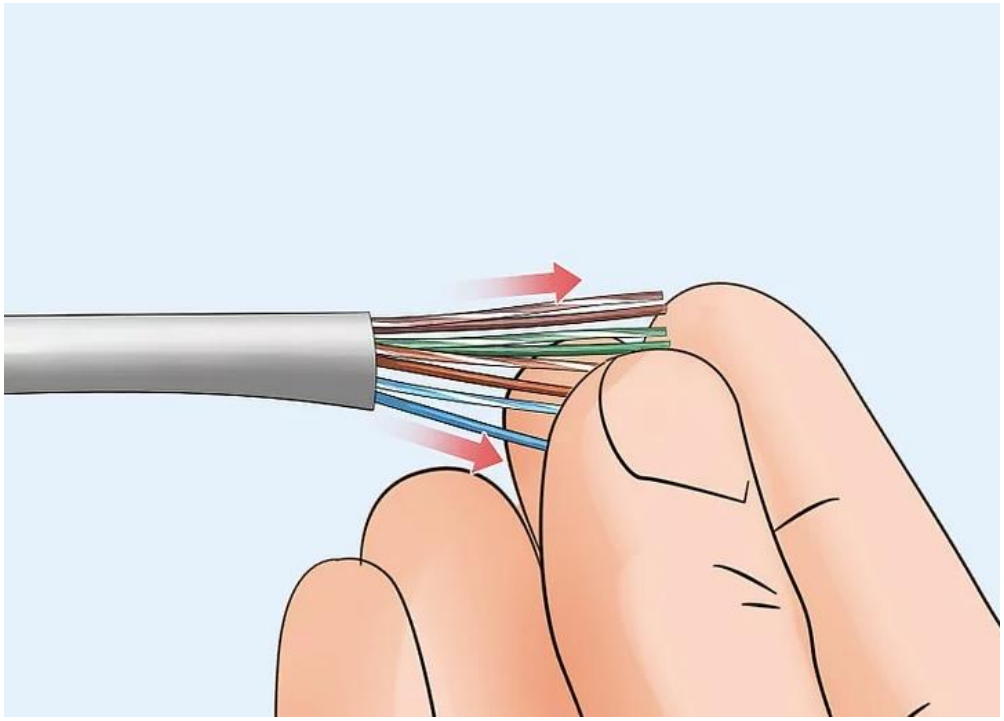
STEP 1 :- Strip the cable back 1 inch (25 mm) from the end.

- ✓ Insert the cable into the stripper section of the tool and squeeze it tight.
- ✓ Rotate the crimping tool around the cable in a smooth and even motion to create a clean cut.
- ✓ Keep the tool clamped and pull away towards the end of the wire to remove the sheathing.



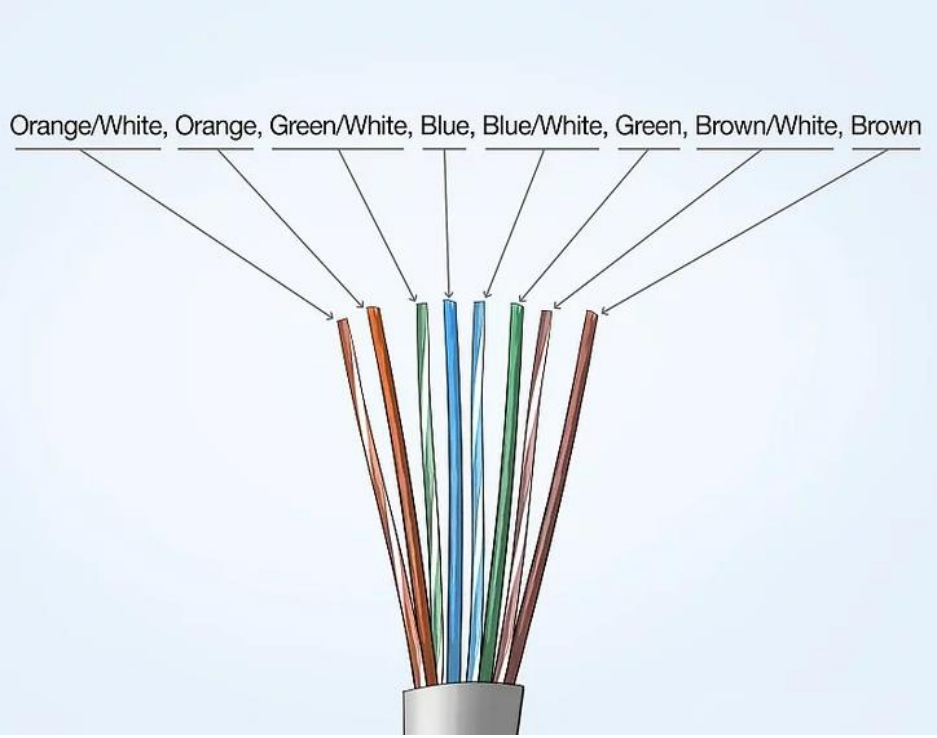
STEP 2 :- Untwist and straighten the wires inside the cable.

- ✓ Separate the twisted wires inside the cable.
- ✓ Straighten them out so they’re easier to sort into the right order.



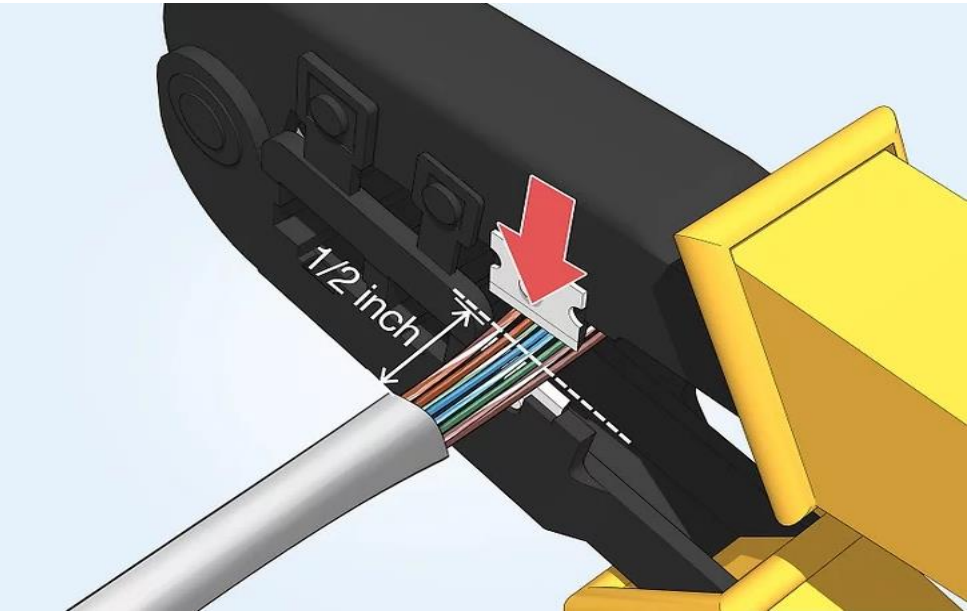
STEP 3 :- Arrange the wires into the right order.

- ✓ Use your fingers to put the wires in the correct order so they can be properly crimped.



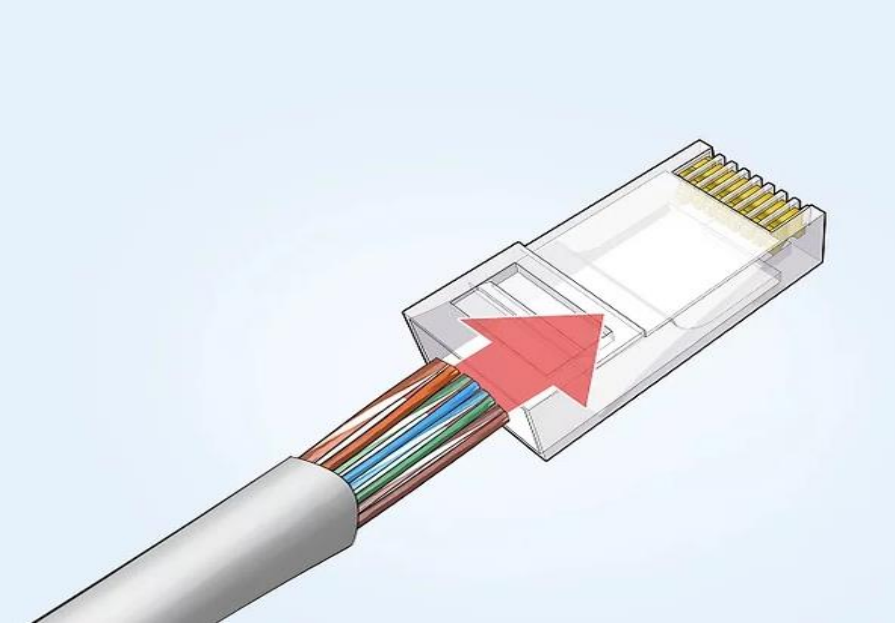
STEP 4 :- Cut the wires into an even line 1⁄2 inch (13 mm) from sheathing.

- ✓ Hold the wires with your thumb and index finger to keep them in order.
- ✓ Use the cutting section of the crimping tool to cut them into an even line.



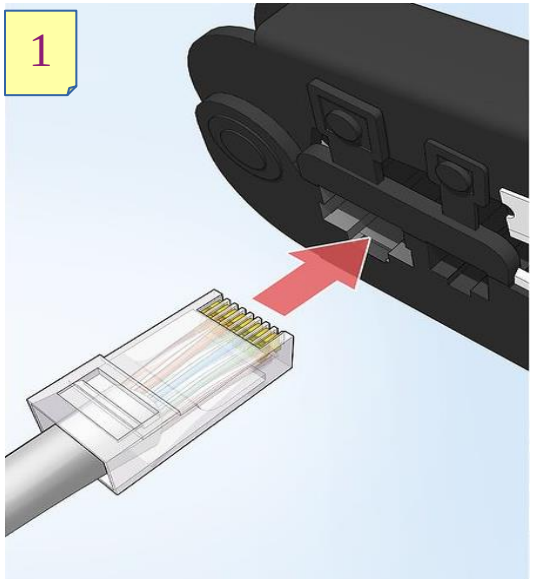
STEP 5 :- Insert the wires into the RJ-45 connector.

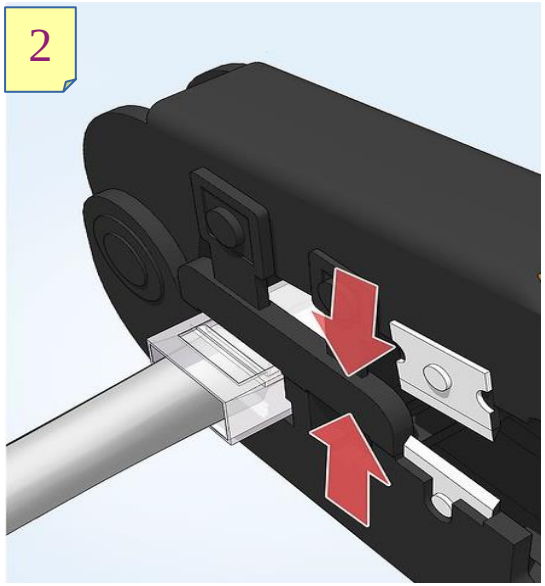
- ✓ Hold the RJ-45 connector so the clip is on the underside and the small metal pins are facing up.
- ✓ Insert the cable into the connector so that each of the small wires fits into the small grooves in the connector.



STEP 6 :-Stick the connector into the crimping part of the tool and squeeze twice.

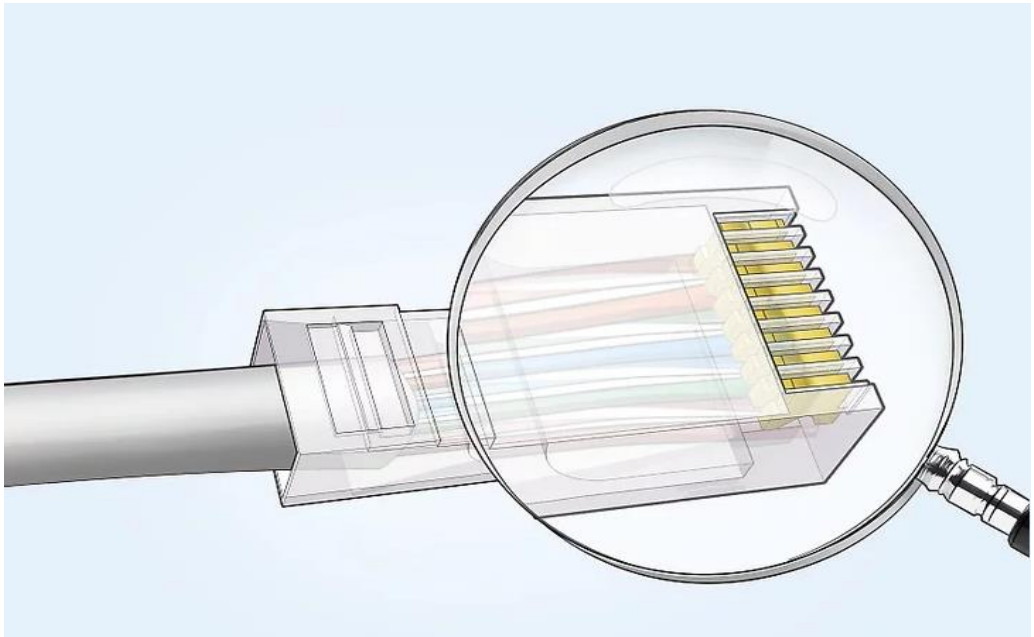
- ✓ Insert the connector in the crimping section of the tool until it can’t fit any further.
- ✓ Squeeze the handles to crimp the connector and secure the wires.
- ✓ Release the handles, then squeeze the tool again to make sure all of the pins are pushed down.





STEP 7 :- Remove the cable from the tool and check that all of the pins are down.

- ✓ Take the connector out of the tool and look at the pins to see that they're all pushed down in an even line.
- ✓ Lightly tug at the connector to make sure it's attached to the cable.



CAT6 CABLE TESTER

- Cat6 cable testers are an essential tool for quickly testing and troubleshooting the integrity of Ethernet cables.
- They can test multiple cable types, verifying if cables are correctly or incorrectly connected.
- They generally vary depending on price, performance and specific use.

How to Test an RJ45 Connection

STEP 1

Turn the testing unit on.

STEP 2

Plug the ends of your RJ45 terminated cable into the tester's two ports. It doesn't matter what order you do this in.

STEP 3

Two types of testers are available, **automatic** and **manual.**

In automatic test mode, simply push the button and let the unit do its work and while using a manual mode tester, simply hit the test button repeatedly to advance through all 8 wires.

STEP 4

Two separate bars of indicators are present. Watch these indicator lights as the test sequence is completed, wire-by-wire. If both the input and output indicators for each wire are,

Brightly lit - Optimum Connection

Dimly lit - Poor Connection

Not lit - No Connection

THANK YOU