



FIBER CONNECTOR TYPES



Connector Types

There are many types of connectors in circulation. Previously, the most popular connector was the ST type, a bayonet connector, that has shown to be unstable. These connectors can not get certified anymore. If you come across a ST connector in a local area network, and if the installation is no longer stable, the connector may very well be the reason for the instability.

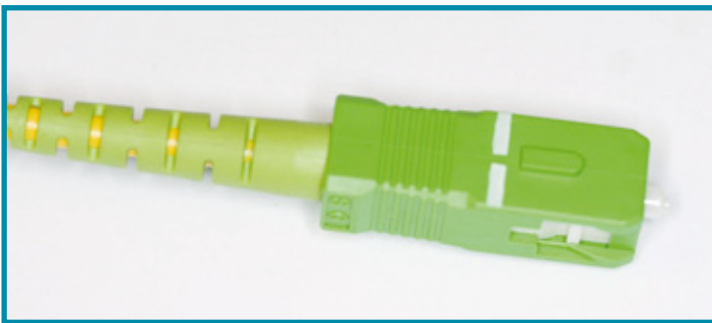
Figure 1



ST connector

The SC connector is very popular because it can be produced at a low price and because it actually works. The only disadvantage of this connector is the size.

Figure 2

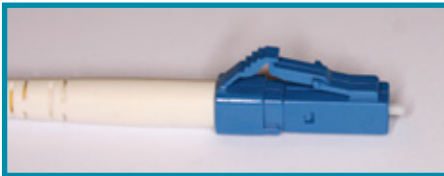


SC connector



The successor to the SC and ST types is the LC ,or Lucent, connector. It is so small, that if there is room for one Rj-45 connector, there will be room for two LC connectors, at the same place. Besides that, it is simple and stable, and it is produced by many manufacturers. The LC connector is available in multi mode (beige), single mode (blue) and furthermore, in a non-reflective design (green). The use of this connector type is becoming more and more widespread. But again, the biggest advantage of the LC is the small size. In a 43H rack there is room for 1920 LC connectors. There are some problems, though, with the outgoing patchcables, due to the many connectors.

Figure 3



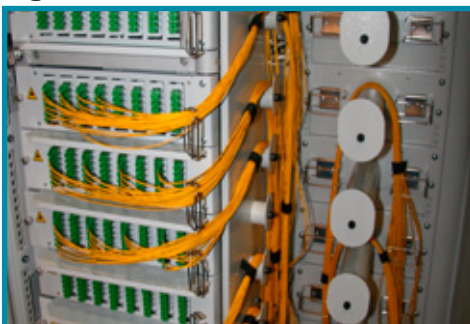
LC connector

Figure 4



Rack shown with LC connectors. Notice the patch cables on their way to the active equipment

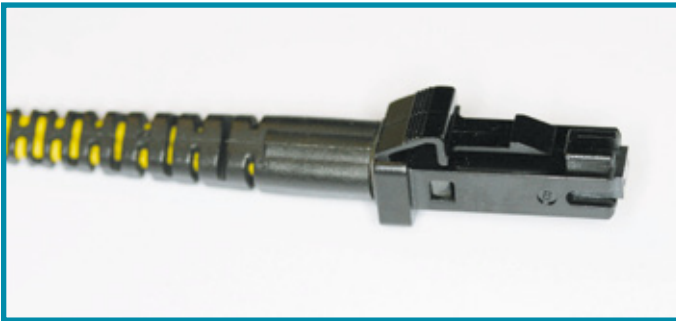
Figure 5



The passive section

The MT-Rj connector was, for some time, predicted to be the FTTD (Fiber To The Desk) connector, having two fibers and being just as small as a Rj45 connector. But now it is not so popular anymore.

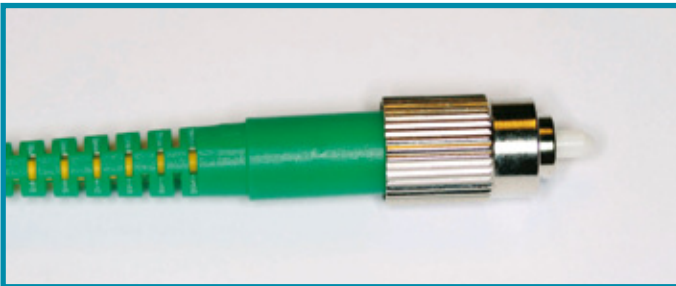
Figure 6



MT-Rj connector

The connector shown on figure 7, the FC-PC connector, was earlier on regarded as one of the best connectors, but now going out of use.

Figure 7



FC-PC connector



Within the world of tele communications the E-2000 is being widely used. It is a high-quality type of connector and among other qualities, it is good at handling the high power in analog tv installations. E-2000 is born with a protection cap, shielding against the very dangerous laser light.

Figure 10



E-2000

Pre-polished Connectors

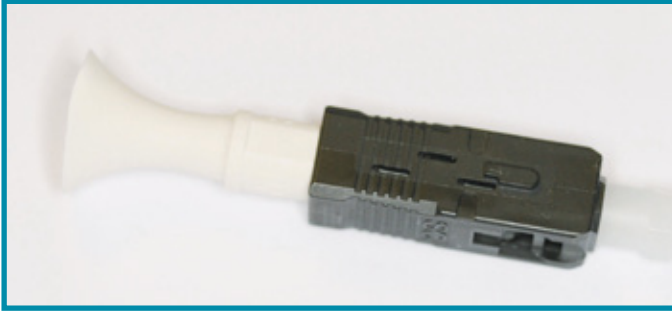
There are many plug types and many connection methods to choose from. If you want to make a small number of terminations only, you may use pre-polished connectors, that is, connectors ready to use. You do not have to polish with figure-eight-shaped movements, as done in “the old days”.

Figure 11



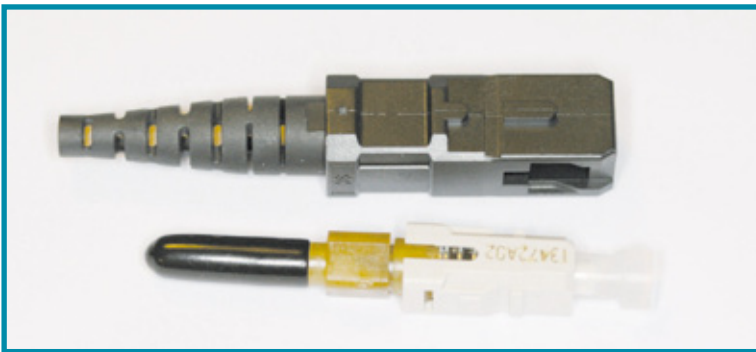
*Pre-polished connector
from Belden*

Figure 12



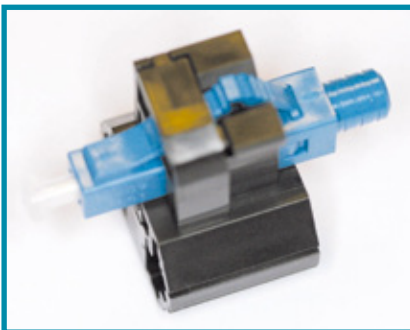
Pre-polished connector from 3M

Figure 13



Pre-polished connector from LK

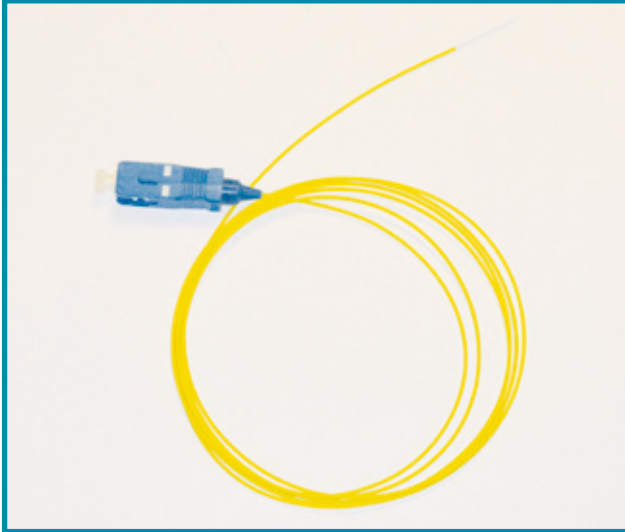
Figure 14



Pre-polished connector from Fujikara

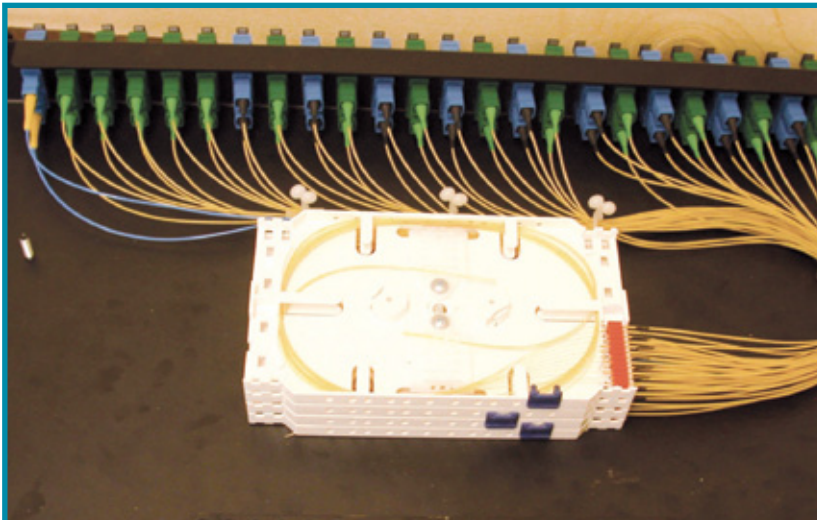


Figure 15



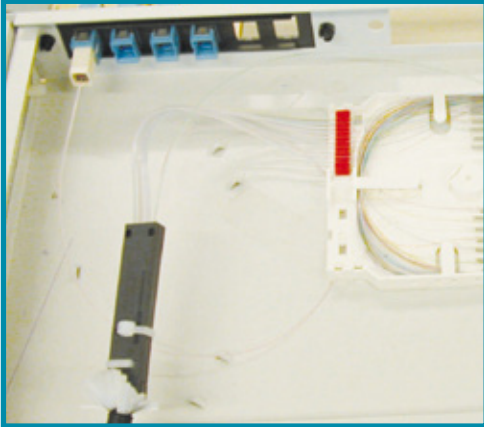
This is a pigtail, that is, a connector with 1 meter of fiber attached. All and ready, needs only a cleaning. Must be spliced, though, by means of a splicer. Definitely the cheapest solution, but the investment is big.

Figure 16



Patch cable, terminated by a splicing cassette.

Figure 17



Patch cable with break out kit

According to calculations, you must make appr. 500 connections before it pays to buy a fusion splicer. In other words, if you work with fiber over a couple of years, it may be a good investment to buy a splicer.

Figure 18



Toolkit from LK

You must always use connectors if a need for reconnecting might arise later on. There are many types of connectors on the market, but they can all be divided into three main categories.

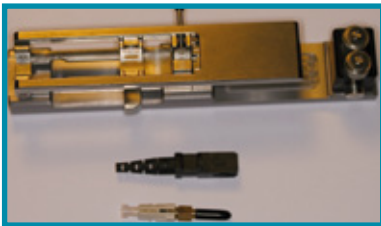
The first category consists of connectors, which have to be mounted and polished. Even so, these connectors are almost no longer in use, they are the most well known. An example of this category is the Hot Melt connector from 3M. This is where you will be sitting with your polishing paper, polishing the fiber with figure-eight shaped movements. In this way, you do not get the best connector.



The second category of connectors includes connectors, pre-polished by manufacturer. Tyco, Belden and LK are examples of manufacturers offering pre-polished connectors. In addition, you will need a small assembly kit for the mounting of these connectors.

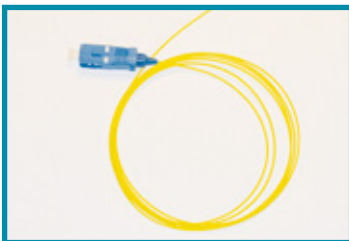
The third and last category is the pig tail choice. A pig tail is a mounted connector with a piece of fiber attached (the pig tail).

Figure 19



Pre-polished connector, with tool kit, from LK

Figure 20



Pig tail

When the mounting method has been chosen, you must decide on a connector type, and there is a huge selection to choose from.

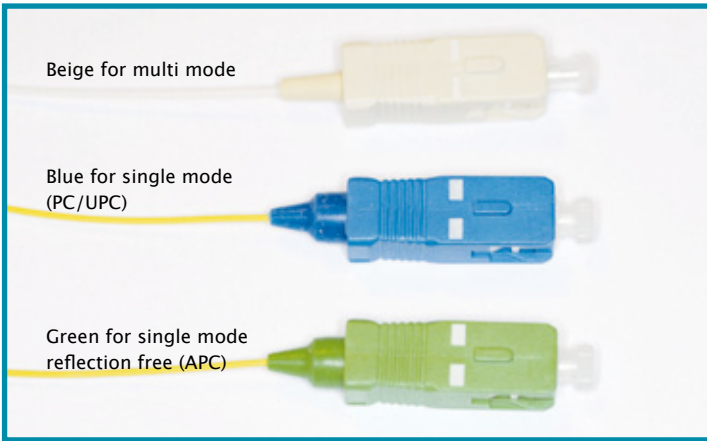
The most widespread of the old types is the SC type (square connectors). The new type gaining ground is the LC (Lucent connector), that only takes up half the space.

It is important to remember the colour codes.

- Beige is used for multi mode installations.
- Blue is used for single mode installations.
- Green is used as code for single mode installations, without reflections, which means that the signal does not tolerate reflections. Commonly used in analog tv installations.

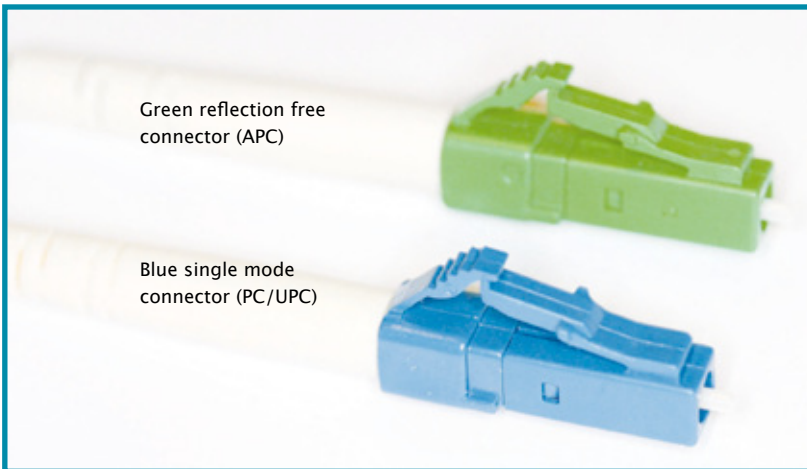
It is important never to mix differently coloured connectors.

Figure 21



3 types of SC connectors

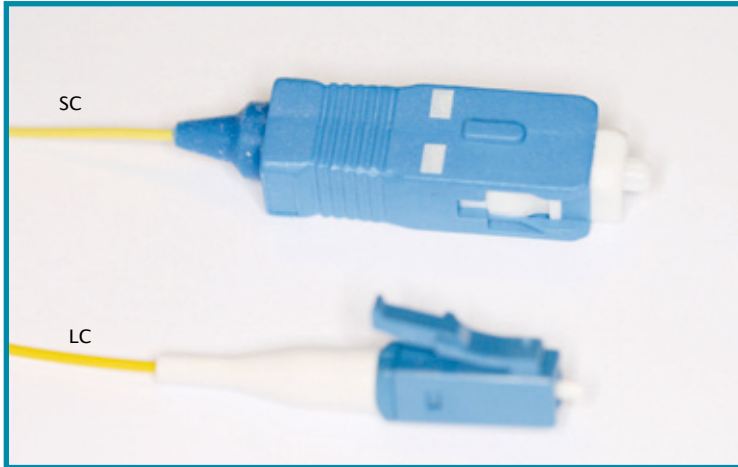
Figure 22



2 types of LC connectors



Figure 23



*LC and SC
connector*

LC is half size

A local area network can be carried out as a FTTD (Fiber To The Desk) installation. The fiber is lead to a wall outlet, and from the outlet it is taken further on to an optical fiber network card. Another way of doing it, is to mount a media converter and then take the signal to the pc, through a copper cable.

A practical example of dimensioning

In the next chapter we shall look at the dimensioning of a small fiber installation. At first we shall deal with the different elements of the installation, and what it takes to get the installation to work. Next, we will investigate results, obtainable if the installation is properly carried out.

Let us say our task is to connect two racks in a factory installation, and, let us say there is a distance of 200m between the two racks. If we do a multi mode installation, the maximum speed will be 1Gbit and if we do a single mode, the maximum speed will be 40Gbit. That means, we will have to make two calculations, one for a single mode installation and one for multi mode. Verizon have been testing the first 100Gbit installations in their backbone system for some time (december 2007).

You must remember, that whether you make a calculation or a dimensioning, it is about the fiber – and the fiber only. We do not concern ourselves with cables, installation methods, etc. But of course, these matters must be dealt with before the projekt is carried out in the real world. Both fields of work are equally important, if one of them fails, the installation will not work.

Which items must be taken into consideration?

- ▶ Attenuation in the fiber
- ▶ Attenuation in connectors
- ▶ Attenuation in splicings
- ▶ Surplus for repairs
- ▶ The wavelength in question
- ▶ Reserves, if necessary
- ▶ Light, emitted by transmitter
- ▶ Receiver sensitivity
- ▶ Choice of network standard
- ▶ Choice of media converter