# Color Codes and Counting Directions for Fiber Optic Cables

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1. About Color Code Systems

Fibers, tubes and ribbons in fiber optic cables are marked with different colors and bar codes to facilitate identification. Hexatronic offers cables with color code systems according to all international and national standards and for all types of fiber optic cables. Custom specific color code systems are available on request. This document describes the most common color code standards for cable designs, namely:

- TIA/EIA-598 (Bellcore)
- S12
- Standard Type E
- FIN2012

All systems are characterized by using 12 different colors to identify fibers that are grouped together in a common bundle such as a tube, ribbon, yarn wrapped bundle or other types of bundle. In all charts in this document, all types of bundles are referred to as “tubes”. If more than 12 fibers or tubes are to be separated, the color sequence is normally repeated, but with ring marks or lines on the colored fibers and tubes. Some systems such as the S12 and Standard Type E use only a few tube colors and the tube is instead identified by its position in the cable.

To make the charts in this document easy to read, all unnecessary information is removed.

Counting direction

2. TIA/EIA-598 (Bellcore)

This color code, formerly referred as the “Bellcore”-standard, is the most recognized system worldwide.

Fiber color coding:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Orange</td>
<td>Green</td>
<td>Brown</td>
<td>Grey</td>
<td>White</td>
<td>Red</td>
<td>Black</td>
<td>Yellow</td>
<td>Violet</td>
<td>Pink</td>
<td>Turquoise</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Orange</td>
<td>Green</td>
<td>Brown</td>
<td>Grey</td>
<td>White</td>
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<td>Pink</td>
<td>Turquoise</td>
</tr>
</tbody>
</table>

If fiber 13-24 are used in a loose tube design, the color sequence is repeated for fiber 13-24, but fibers are ring marked. Fiber 20 is clear (uncolored) since ring marking will not be visible on black colored fibers.

Tube color coding:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>Orange</td>
<td>Green</td>
<td>Brown</td>
<td>Grey</td>
<td>White</td>
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<td>Black</td>
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<td>Pink</td>
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</tr>
</tbody>
</table>
3. S12
The S12 color code was introduced in 2012 by Skanova (Sweden) to be used for micro cables and nano cables. The standard is now widely used in Sweden and other countries.

Fiber color coding:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Red</td>
<td>Blue</td>
<td>White</td>
<td>Green</td>
<td>Yellow</td>
<td>Grey</td>
<td>Brown</td>
<td>Black</td>
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<td>Pink</td>
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</thead>
<tbody>
<tr>
<td></td>
<td>Red</td>
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<td>Pink</td>
</tr>
</tbody>
</table>

Note about fiber ribbon cables and the S12 system:
To identify ribbons in a fiber ribbon cable there are two allowed methods in the S12 system:

1. Marking with stripes on each ribbon in each slot
2. Making each ribbon unique in each slot by deviating from the color sequence in the table above. Each ribbon will have its own color sequence.

Method 1 is by far the most convenient since the ribbon is easily identified without the need to consult complicated color charts. Only 4 different colors are used for fibers in the ribbon and these are the same for every ribbon. It is also much easier to identify the ribbons in low light or monochrome lightning situations. Method 1 is therefore superior, but also requires that the cable manufacturer can make stripe markings on the ribbon that will not wear out and that will not affect the optical properties of the fibers. Since this process is difficult to master, method 2 was introduced by some manufacturers in 2013.

Hexatronic has a long experience in stripe marking of ribbons and with its unique production capabilities, stripe marking is the standard method to separate ribbons. This guideline will therefore only describe method 1. For more information about color codes in ribbon fiber cables, see the following sections.
4. Standard Type E
Standard color code system originally jointly defined by Televerket (Telia) and Ericsson in Sweden. The system is used worldwide but is gradually replaced by the S12 and TIA/EIA-598 systems in many regions.

Fiber color coding:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
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<th>4</th>
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<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Blue</td>
<td>White</td>
<td>Green</td>
<td>Yellow</td>
<td>Grey</td>
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<tr>
<th>13</th>
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<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Blue</td>
<td>White</td>
<td>Green</td>
<td>Yellow</td>
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<td>Brown</td>
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Tube color coding:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3-6</th>
<th>7</th>
<th>8-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Blue</td>
<td>White</td>
<td>Blue</td>
<td>White</td>
</tr>
</tbody>
</table>

The color sequence is repeated on additional tube layers and starts with 1 (red) on each layer.

Exceptions:
Tube identification in slotted core loose tube cables can alternatively be done by identifying the three line markings on the slotted core profile as shown in the figure below. Note that there is always only three line markings regardless the number of slots.
5. FIN2012
The FIN2012 is a color code standard used in Finland.

Fiber color coding:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
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<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue</td>
<td>White</td>
<td>Yellow</td>
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<td>Orange</td>
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<td>Turquoise</td>
<td>Clear</td>
<td>Violet</td>
<td>Pink</td>
<td>Red</td>
</tr>
</tbody>
</table>

Tube color coding (layer 1):

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<th>10</th>
<th>11</th>
<th>12</th>
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<td>Blue</td>
<td>White</td>
<td>Yellow</td>
<td>Green</td>
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<td>Orange</td>
<td>Brown</td>
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<td>Black</td>
<td>Violet</td>
<td>Pink</td>
<td>Red</td>
</tr>
</tbody>
</table>

Tube colors for cables with more than one layer according to FIN2012 will differ depending on cable design. Please contact Hexatronic for more information.
6. Fiber Ribbon Cables

This section describes the color codes for fiber ribbon cables according to both the S12 system, (method 1 with stripe markings) and Standard Type E.

**Slotted Core Profile, 4-fiber Ribbon**

- **Ribbon marking**
  - 1 line
  - 2 lines
  - 3 lines
  - 4 lines
- **Fiber color**
  - 4 green
  - 3 white
  - 2 blue
  - 1 red

**Slotted Core Profile, 8-fiber Ribbon, 8 to 192 Fibers**

- **Ribbon marking**
  - 1 line
  - 2 lines
  - 3 lines
  - 4 lines
- **Fiber color**
  - 8 green
  - 7 white
  - 6 blue
  - 5 red
  - 4 green
  - 3 white
  - 2 blue
  - 1 red

**Counting direction**

1. [Diagram of counting direction]
Color Codes and Counting Directions for Fiber Optic Cables

Slotted Core Profile, 8-fiber Ribbon, 288 to 640 Fibers

Fiber color inside the ribbon:
Red, Blue, White, Green, Red, Blue, White, Green

Counting direction
7. Submarine Cables (Loose Tube)

The fibers are color coded according to Standard Type E.

The fibers are grouped in bundles of 12 fibers. The groups are held together with yarn of different colors to be able to separate the bundles.

Color coding of the fibers (bundle with yarn)

Fiber 1 Red
Fiber 2 Blue
Fiber 3 White
Fiber 4 Green
Fiber 5 Yellow
Fiber 6 Grey
Fiber 7 Brown
Fiber 8 Black
Fiber 9 Orange
Fiber 10 Violet
Fiber 11 Pink
Fiber 12 Turquoise

Yarn color

Yarn 1 - Red (fibers 1-12)
Yarn 2 - Blue (fibers 13-24)
Yarn 3 - White (fibers 25-36)
Yarn 4 - Green (fibers 37-48)