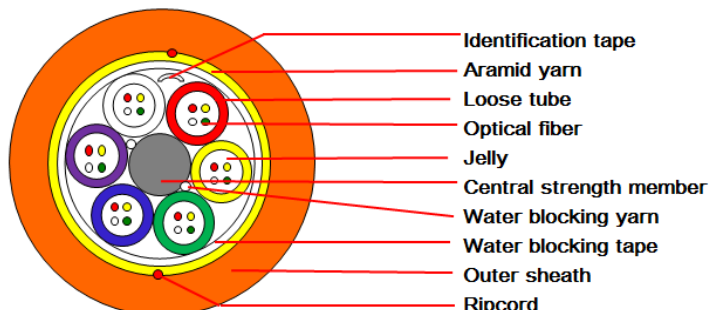


# GYFY

## 1. Cable cross-section



**BOROPTİK MÜHENDİSLİK**  
AR-GE İMALAT VE TİCARET A.Ş.  
Çayırbaşı Mahallesi Acıgöl OSB  
1.Cad. 3.Sok. No: 1 Acıgöl/NEVŞEHİR  
Acıgöl T.C. - 190 045 3906

## 2. Cable Specification

### 2.1 Introduction

Loose tube construction, tubes jelly filled, elements (tubes and filler rods) and water blocking yarns laid up around non-metallic central strength member, polyester yarns used to bind the cable core, water blocking tape, then aramid yarn as strength member, dry core, then PE outer sheath(orange RAL2008).

### 2.2 Color codes

Color codes conform to the following table

24F

| ORDER NO | FIBER TUBE COLOR | ORDER NO | FIBER COLORS |
|----------|------------------|----------|--------------|
| 1        | RED              | 1        | RED          |
| 2        | YELLOW           | 2        | YELLOW       |
| 3        | GREEN            | 3        | GREEN        |
| 4        | BLUE             | 4        | NATURAL      |
| 5        | VIOLET           |          |              |
| 6        | WHITE            |          |              |

48F

| ORDER NO | FIBER TUBE COLOR | ORDER NO | FIBER COLORS |
|----------|------------------|----------|--------------|
|          |                  |          |              |



## HENG TONG OPTIC-ELECTRIC CO., LTD.

|   |        |   |         |
|---|--------|---|---------|
| 1 | RED    | 1 | RED     |
| 2 | YELLOW | 2 | YELLOW  |
| 3 | GREEN  | 3 | GREEN   |
| 4 | BLUE   | 4 | BLUE    |
| 5 | VIOLET | 5 | VIOLET  |
| 6 | WHITE  | 6 | BROWN   |
|   |        | 7 | BLACK   |
|   |        | 8 | NATURAL |

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Acıgöl T.C. 180 045 3906~~

96F

| ORDER<br>NO | FIBER TUBE<br>COLOR | ORDER<br>NO | FIBER<br>COLORS |
|-------------|---------------------|-------------|-----------------|
| 1           | RED                 | 1           | RED             |
| 2           | YELLOW              | 2           | YELLOW          |
| 3           | GREEN               | 3           | GREEN           |
| 4           | BLUE                | 4           | BLUE            |
| 5           | VIOLET              | 5           | VIOLET          |
| 6           | BROWN               | 6           | BROWN           |
| 7           | BLACK               | 7           | BLACK           |
| 8           | ORANGE              | 8           | ORANGE          |
|             |                     | 9           | PINK            |
|             |                     | 10          | GRAY            |
|             |                     | 11          | TURQUOISE       |
|             |                     | 12          | NATURAL         |

144F

| ORDER<br>NO | FIBER TUBE<br>COLOR | ORDER<br>NO | FIBER<br>COLORS |
|-------------|---------------------|-------------|-----------------|
|-------------|---------------------|-------------|-----------------|



## HENG TONG OPTIC-ELECTRIC CO., LTD.

|    |           |    |           |
|----|-----------|----|-----------|
| 1  | RED       | 1  | RED       |
| 2  | YELLOW    | 2  | YELLOW    |
| 3  | GREEN     | 3  | GREEN     |
| 4  | BLUE      | 4  | BLUE      |
| 5  | VIOLET    | 5  | VIOLET    |
| 6  | BROWN     | 6  | BROWN     |
| 7  | BLACK     | 7  | BLACK     |
| 8  | ORANGE    | 8  | ORANGE    |
| 9  | PINK      | 9  | PINK      |
| 10 | GRAY      | 10 | GRAY      |
| 11 | TURQUOISE | 11 | TURQUOISE |
| 12 | WHITE     | 12 | NATURAL   |

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Acıgöl T.C. : 045 3906~~

288F

| ORDER<br>NO | FIBER TUBE<br>COLOR | ORDER<br>NO | FIBER<br>COLORS |
|-------------|---------------------|-------------|-----------------|
| Inner 1     | RED                 | 1           | RED             |
| 2           | YELLOW              | 2           | YELLOW          |
| 3           | GREEN               | 3           | GREEN           |
| 4           | BLUE                | 4           | BLUE            |
| 5           | VIOLET              | 5           | VIOLET          |
| 6           | BROWN               | 6           | BROWN           |
| 7           | BLACK               | 7           | BLACK           |
| 8           | ORANGE              | 8           | ORANGE          |
| 9           | WHITE               | 9           | PINK            |
| Outer 1     | RED                 | 10          | GRAY            |

|    |                         |    |           |
|----|-------------------------|----|-----------|
| 2  | YELLOW                  | 11 | TURQUOISE |
| 3  | GREEN                   | 12 | NATURAL   |
| 4  | BLUE                    |    |           |
| 5  | VIOLET                  |    |           |
| 6  | BROWN                   |    |           |
| 7  | BLACK                   |    |           |
| 8  | ORANGE                  |    |           |
| 9  | PINK                    |    |           |
| 10 | GRAY                    |    |           |
| 11 | TURQUOISE               |    |           |
| 12 | WHITE                   |    |           |
| 13 | RED with black strip    |    |           |
| 14 | YELLOW with black strip |    |           |
| 15 | GREEN with black strip  |    |           |

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### 2.3 Cable structure and parameter

| SN | Item                            | Unit  | Value   |      |         |         |         |
|----|---------------------------------|-------|---------|------|---------|---------|---------|
| 1  | No. of fibers                   | count | 24      | 48   | 96      | 144     | 288     |
| 2  | No. of fibers per tube          | count | 4       | 8    | 12      | 12      | 12      |
| 3  | No. of elements                 | count | 6       | 6    | 8       | 12      | 9+15    |
| 4  | CSM diameter                    | mm    | 2.2     | 2.2  | 2.2/3.4 | 2.8/5.8 | 2.8/3.8 |
| 5  | Tube diameter(Nominal)          | mm    | 1.9     |      |         |         | 1.9/2.0 |
| 6  | Outer sheath thickness(Nominal) | mm    | 1.2±0.1 |      |         |         |         |
| 7  | Aramid Yarn Content             | gt/mt | 0.64    | 0.64 | 4       | 2.5     | 1.9     |



|    |                                   |         |       |     |       |      |      |
|----|-----------------------------------|---------|-------|-----|-------|------|------|
| 8  | Cable outer diameter( $\pm 5\%$ ) | mm      | 9.1   | 9.1 | 10.5  | 12.8 | 15.2 |
| 8  | Cable weight( $\pm 10\%$ )        | kg/km   | 64    | 65  | 89    | 132  | 189  |
| 9  | Short term tension                | N       | 1500  |     | 2500  |      |      |
| 10 | Ultimate tensile strength         | N       | >2000 |     | >4000 |      |      |
| 11 | Short term crush                  | N/100mm | 2000  |     |       |      |      |

### 3. Characteristic of Optical Cable

#### 3.1 Min. bending radius for installation

Static: 10 x cable diameter

Dynamic: 20 x cable diameter

#### 3.2 Application temperature range

Operation:  $-40^{\circ}\text{C} \sim +80^{\circ}\text{C}$

Installation:  $-5^{\circ}\text{C} \sim +70^{\circ}\text{C}$

Storage/transportation:  $-40^{\circ}\text{C} \sim +80^{\circ}\text{C}$

#### 3.3 Main mechanical & environmental performance test

| Item                                 | Test Method                                                                          | Acceptance Condition                                                                                                                 |
|--------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Tensile Strength<br>IEC 60794-1-2-E1 | - Load: Short term tension<br>- Length of cable: about 100m<br>- Load time: 1min     | - Fiber strain $\leq 0.33\%$<br>- No fiber break and no sheath damage.                                                               |
| Crush Test<br>IEC 60794-1-2-E3       | - Load: Short term crush<br>- Load time: 10min<br>- Load: 4000N<br>- Load time: 1min | - Loss change $\leq 0.05\text{dB}@1550\text{nm}$<br>- No fiber break and no sheath damage.<br>- No fiber break and no sheath damage. |
| Impact Test<br>IEC 60794-1-2-E4      | - Points of impact: 3<br>- Times of per point: 1                                     | - Loss change $\leq 0.05\text{dB}@1550\text{nm}$<br>- No fiber break and no sheath damage.                                           |

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|                                         |                                                                                                               |                                                                                               |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
|                                         | - Impact energy: 3J                                                                                           |                                                                                               |
| Repeated Bending<br>IEC 60794-1-2-E6    | - Bending radius: 20 x OD<br>- No. of cycle: 25                                                               | - Loss change $\leq 0.05\text{dB}@1550\text{nm}$<br>- No fiber break and no sheath damage.    |
| Torsion<br>IEC 60794-1-2-E7             | - Length: 1m<br>- Twist angle: $\pm 180^\circ$<br>- No. of cycle: 3                                           | - Loss change $\leq 0.05\text{dB}@1550\text{nm}$<br>- No fiber break and no sheath damage.    |
| Cable bend<br>IEC 60794-1-2-E11         | - Diameter of mandrel: 15 x OD<br>- Number of turns: 5<br>- Number of cycles: 3                               | - Loss change $\leq 0.05\text{dB}@1550\text{nm}$<br>- No fiber break and no sheath damage.    |
| Temperature Cycling<br>IEC 60794-1-2-F1 | - Temperature: $-40^\circ\text{C} \sim +80^\circ\text{C}$<br>- Time of each step: 36h<br>- Number of cycle: 1 | - Loss change $\leq 10\%$<br>- No fiber break and no sheath damage.                           |
| Water Penetration<br>IEC 60794-1-2-F5B  | - Height of water: 1m<br>- Sample length: 1m<br>- Time: 48h                                                   | - No water leak from the cable core of the opposite end                                       |
| Kink Test<br>IEC 60794-1-2-E10          | - Bending radius: 20 x OD                                                                                     | - Loss change $\leq 0.05\text{dB/km}@1550\text{nm}$<br>- No fiber break and no sheath damage. |

#### 4. Characteristic of Optical Fiber

##### G652D fiber information

|                                                        |                                      |
|--------------------------------------------------------|--------------------------------------|
| Mode field diameter (1310nm):                          | $9.2\mu\text{m} \pm 0.4\mu\text{m}$  |
| Mode field diameter (1550nm):                          | $10.4\mu\text{m} \pm 0.5\mu\text{m}$ |
| Cladding diameter:                                     | $125\mu\text{m} \pm 0.7\mu\text{m}$  |
| Coating diameter:                                      | $245\mu\text{m} \pm 10\mu\text{m}$   |
| Core/cladding concentricity error:                     | $\leq 0.6\mu\text{m}$                |
| Cladding non-circularity:                              | $\leq 1.0\%$                         |
| Cut off wavelength of cabled fiber ( $\lambda_{cc}$ ): | $\leq 1260\text{nm}$                 |





Before Cabling(In Bare Fiber)

Attenuation at 1310nm:  $\leq 0.34\text{dB/km}$

Attenuation at 1550nm:  $\leq 0.21\text{dB/km}$

Attenuation at 1625nm:  $\leq 0.22\text{dB/km}$

After Cabling (In Fiber Cable)

Attenuation at 1310nm:  $\leq 0.36\text{dB/km}$

Attenuation at 1550nm:  $\leq 0.22\text{dB/km}$

Attenuation at 1625nm:  $\leq 0.24\text{dB/km}$

Bending loss at 1550nm (100 turns, 30mm radius):  $\leq 0.05\text{dB}$

Dispersion in the range 1288 to 1339nm:  $\leq 3.5\text{ps}/(\text{nm}\cdot\text{km})$

Dispersion at 1550nm:  $\leq 17\text{ps}/(\text{nm}\cdot\text{km})$

zero-Dispersion wavelength  $1300\text{nm}\sim 1322\text{nm}$

Dispersion slope at zero dispersion wavelength:  $\leq 0.092\text{ps}/(\text{nm}^2\cdot\text{km})$

Polarization mode dispersion (individual fiber):  $\leq 0.2\text{ps}/\sqrt{\text{km}}$

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