

CHENGDU HONELINKS INNOVATION TECHNOLOGY CO.,LTD.

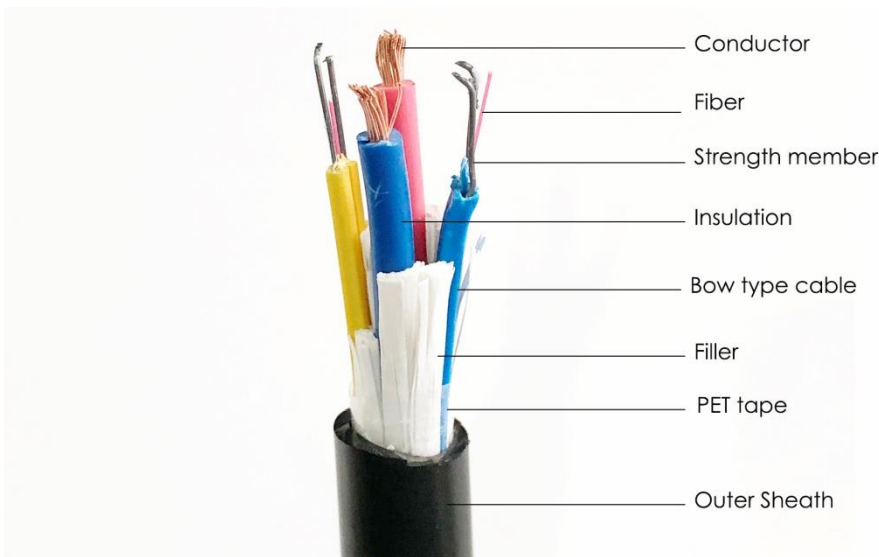
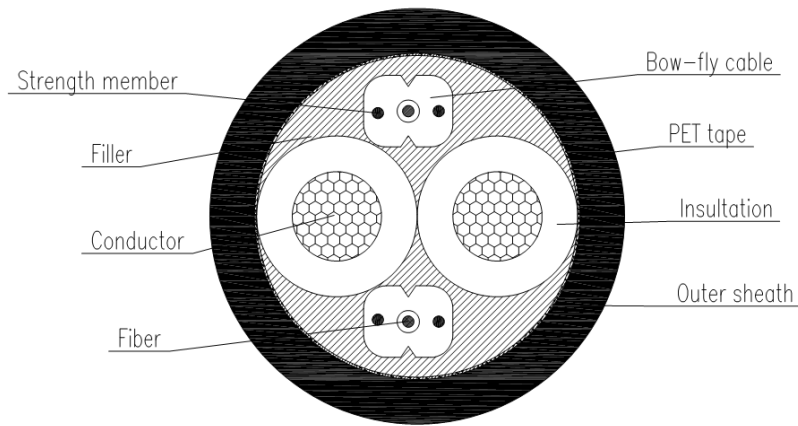
**GDVV 2G.657A2(Bow-type)+2×1.5mm<sup>2</sup> Hybrid Cable  
Specification**



CHENGDU PUTIAN TELECOMMUNICATIONS CABLE CO.LTD.

Working temperature range	-40℃~80℃
Min. installation temperature	-20℃
Storage and transport temperature range	-40℃~60℃
Applications	Indoor & Outdoor
Service life	≥15 years
Reference standards	YD/T1997,ITU 657,YD/T 1173,GB/T 7424.2, YD/T 2289.3, IEC 61034, IEC 60754, IEC 60332-1, GB/T 2951, IEC 60754 <a href="#">EN 50305</a> GB/T 2951
Remark	Other requirements not mentioned should fulfill the reference standards above.

1 Cross section



## 2 Type

GDVV 2G.657A2(bow-type)+2×1.5mm<sup>2</sup>

Table 1. Cable dimensions

Item			Unit	Item
bow-type optical cable	Cable dimension			2.1(±0.1)*1.6(±0.1)
Sub-power cable unit	Conductor		/	30/0.25
	Insulation	Material	/	PVC
		Nominal insulation thickness	mm	0.7
		Min. insulation thickness	mm	0.53
		Insulation diameter	mm	3.1 ±0.3
Outer sheath		Material	/	PVC
		Nominal insulation thickness	mm	1.0
		Min. insulation thickness	mm	0.8
		Finished diameter	mm	9.0±0.3
Reference weight			Kg/km	118
Rated voltage			V	300/500
Minimum bending radius			mm	90

### 3.1 Insulation

Color scheme: Red(186U), Blue(3005U) Chromatic aberration  $\Delta E$ :  $\leq 4.0$

Nominal thickness of insulation: 0.7mm

Min. thickness of insulation: 0.53mm

Insulation diameter: 3.1 ±0.3mm

### 3.1.2 Tensile strength and elongation at break

Test method: GB/T 2951.11

Tensile strength before aging:  $\geq 12.5$  N/mm<sup>2</sup>

Elongation before aging:  $\geq 125\%$ .

Aging condition: 80°C±2°C, 168h.

Tensile strength after aging:  $\geq 12.5$  N/mm<sup>2</sup>

Tensile strength variation:  $\leq \pm 20\%$

Elongation at rupture after aging:  $\geq 125\%$ .

Elongation variation:  $\leq \pm 2\%$

### 3.1.3 Cold bend test for OD $\leq 12.5$ mm

Test method: GB/T 2951.14

Conditions: -20°C±2°C, 4h.

Result: no crack

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## 3.2 Requirements of the bow-type optical cable

### 3.2.1 Fiber

Fiber requirements meet standard ITU-T G.657

### 3.2.2 Sheath of the simplex bow-type optical cable

Material: LSZH

Hardness:  $96 \pm 3$  Shore A    Test method: GB/T2411

Color: yellow (Pantone 136C), blue (PANTONE 3005C) Chromatic aberration  $\Delta E$ :  $\leq 4.0$

### 3.2.3 Mechanical performance

Test method: GB/T 2951.11

Tensile strength before aging:  $\geq 10.0$  Mpa

Elongation before aging:  $\geq 125\%$

Aging condition:  $100^{\circ}\text{C} \pm 2^{\circ}\text{C}$  for 168h

Tensile strength variation:  $\leq \pm 30\%$

Elongation at rupture after aging:  $\geq 125\%$ .

Elongation variation:  $\leq \pm 30\%$

### 3.2.4 Strength member

Material: Steel wire coated with glue. Steel wire requirements meet standard GB/T 24202-2009

Dimension (Body/Coating): 0.43mm/0.48mm ( $\pm 0.02$ mm)

Count: 2 pcs

### 3.2.5 Pulling force for the steel wire from sheath

Test method: EN 50305

Condition:

Length of sheath under test: 25mm

Diameter of the hole on test fixture for steel wire: 0.6mm

Requirements:

1. The pulling force for the steel wire from sheath shall be no less than 30N;

### 3.2.6 Separability of cable

Test method: JB/T 10696.7-2007

Condition:

Cable length under test: 500mm

Separation length: 200mm

Sample amount: 5pcs

Requirements:

1. the tensile force for separation should be more than 5N, and max should be less than 15N.

2. After separation, the fiber should be revealed completely.

3. The sheath around steel wire should be kept intact and without crackle.

### 3.2.7 Tensile performance

Test method: GB/T 7424.2 E1

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Conditions:

Length of the cable under tension:  $\geq 50\text{m}$

Load duration: 1min.

Diameter of test pulleys: 250mm

Velocity of transfer device: 100mm/min

Long term tensile force: 75N for 10min, Short term tensile force: 150N for 1min

Requirements:

1. With the long term tensile force, the fiber additional attenuation absolute value should be  $\leq 0.05\text{dB}$  at 1550nm and the fiber stress-strain  $\leq 0.2\%$ ;
2. With the short term tensile force, the fiber stress-strain should be  $\leq 0.4\%$ ;
3. After releasing the load, fiber additional attenuation absolute value should be  $\leq 0.05\text{dB}$  at 1550nm and no change in fiber strain;
4. There shall be no damage to the cable elements under visual inspection.

### 3.2.8 Crush

Test method: GB/T 7424.2 E3

Condition:

Long term crush force: 500N for 1min;

Short term crush force: 1000N for 1min;

Length between test locations: 500 mm

Test times: 3

Requirements:

1. With the long term crush force, fiber additional attenuation absolute value should be  $\leq 0.05\text{dB}$  at 1550nm;
2. With the short term crush force, fiber additional attenuation absolute value should be no more than 0.4dB at 1550nm;
3. After releasing the load, fiber additional attenuation absolute value should be  $\leq 0.05\text{dB}$  at 1550nm;
4. There shall be no damage to the cable elements under visual inspection.

*Note, the force is applied on the flat sides for flat cables.*

### 3.2.9 Repeated bend

Test method: GB/T 7424.2 E6

Condition:

Mass of the weight: 20N

Bending Radius: 10H (H is height of finished optical cable)

Number of cycles: 300 times

Requirements:

1. Fiber additional attenuation should be no more than 0.4dB at 1550nm after test;
2. There shall be no damage to the cable elements under visual inspection.

### 3.2.10 Torsion

Test method: GB/T 7424.2 E7

Condition:

Tension load to be applied: 20N

Test length: **125H (200mm)**

Angle range for cable to be twist:  $\pm 180^\circ$

Number of cycles: 20

Requirements:

1. Fiber additional attenuation should be no more than 0.4dB at 1550nm after test;
2. There shall be no damage to the cable elements under visual inspection.

### 3.2.11 kink

Test method: GB/T 7424.2 E10

Condition:

Min. loop diameter: **20mm**

Requirements: no kink

### 3.3 Wrapping

Material: PET tape.

Thickness:  $\geq 0.025\text{mm}$ .

Overlapping:  $\geq 25\%$

### 3.4 Outer sheath

Test method: GB/T 2951.11

Material: PVC

Color scheme: Black

Table 1. Outer sheath requirements

Item			Requirement
Outer-sheath material			PVC
Tensile strength and elongation at break	Tensile strength before aging(Mpa)		$\geq 12.5$
		Elongation variation absolute value,%	$\geq 125$
	Aging condition	$80^\circ\text{C}(\pm 2) \times 168\text{ hrs}$	
	Aged mechanical performance		
		Tensile strength variation absolute value,%	$\leq 20$
		Elongation variation absolute value,%	$\leq 20$

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#### 4 Marking

##### 4.1 The surface markings should include following contents:

SINOHONE GDVV 2G.657A2(Bow-type)+2×1.5mm<sup>2</sup> 300/500V HYBRID CABLE IEC 60332-1

Month/Day/Year XXXXXX m

##### 4.2 Durability

Test method: IEC 60794-1-2 E2B

Requirement: The surface marking words should be clear enough to identify after rubbing 5 times with a piece of cotton wool or cloth soaked in water.

##### 4.3 Legibility

All markings shall be clear and natty, have no overprint and lack of printing. The colors of the identification threads shall be easy to recognize or easily made recognizable.

#### 5 Optical transmission requirements of hybrid cable Test method: GB/T 15972.40 2008

Table 3. Transmission requirements

Item	Detail	Requirements
Attenuation coefficient	Maximum from 1310 nm to 1625 nm	0.4 dB/km
	Maximum at 1383 nm±3 nm	0.4 dB/km
	Maximum at 1550 nm	0.3 dB/km
Cable cut-off wavelength		≤1260nm

#### 6 Electrical characteristics of hybrid cable

##### 6.1Conductor DC resistance

Test method: GB/T 3048.4

Max.13.3Ω/km@20℃

##### 6.2 Voltage test

Test method: GB/T 3048.8

Conditions: 2.0kV AC, 1min.

Result: no breakdown.

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## 7 Mechanical and physical characteristics of hybrid cable

### 7.1 Tensile strength

Test method: GB/T 7424.2 E1

Conditions:

Length of the cable under tension:  $\geq 50\text{m}$

Load duration: 5min.

Diameter of test pulleys:  $\geq 30D$  (D is diameter of finished optical cable)

Velocity of transfer device: 100mm/min

Long term tensile force: 300N, Short term tensile force: 600N

Requirements:

1. With the long term tensile force, the fiber additional attenuation absolute value should be  $\leq 0.05\text{dB}$  at 1550nm and the fiber stress-strain  $\leq 0.2\%$ ;
2. With the short term tensile force, the fiber stress-strain should be  $\leq 0.4\%$ ;
3. After releasing the load, fiber additional attenuation absolute value should be  $\leq 0.05\text{dB}$  at 1550nm;
4. There shall be no damage to the cable elements under visual inspection.

### 7.2 Crush

Test method: GB/T 7424.2 E3

Condition: long term crush force: 1000N for 10min, short term crush force: 2000N for 1 min

Requirements:

1. With the long term crush force, fiber additional attenuation absolute value should be  $\leq 0.1\text{dB}$  at 1550nm;
2. With the short term crush force, fiber additional attenuation absolute value should be no more than 0.4dB at 1550nm;
3. After releasing the load, fiber additional attenuation absolute value should be  $\leq 0.05\text{dB}$  at 1550nm;
4. There shall be no damage to the cable elements under visual inspection.

### 7.3 Repeated bend

Test method: GB/T 7424.2 E6

Condition:

Mass of the weight: 150N

Bending Radius: 10D (D is diameter of finished optical cable)

Number of cycles: 25 times

Requirements:

1. Fiber additional attenuation should be no more than 0.4dB at 1550nm;
2. There shall be no damage to the cable elements under visual inspection.

### 7.4 Torsion

Test method: GB/T 7424.2 E7

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Condition:

Tension load to be applied: 150N

Test length: 1m

Angle range for cable to be twist:  $\pm 180^\circ$

Number of cycles: 10

Requirements:

1. Fiber additional attenuation should be no more than 0.4dB at 1550nm;
2. There shall be no damage to the cable elements under visual inspection.

## 7.5 Minimum bending radius

Minimum operation bending radius : 10D (D is diameter of finished optical cable)

## 8 Environment Requirements of hybrid cable

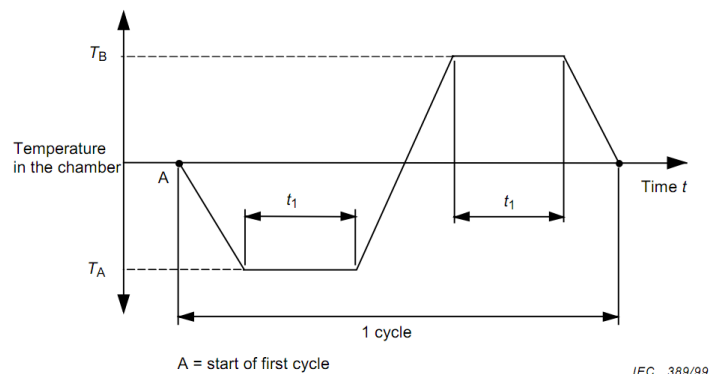
### 8.1 Temperature cycling

Test method: GB/T 7424.2 F1

Condition:

Cable sample length:  $\geq 1\text{km}$

Temperature cycle diagram:



Temperature range:  $T_A$ :  $-40^\circ\text{C}$ ;  $T_B$ :  $60^\circ\text{C}$

Duration of temperature plateau  $t_1$ : 8h

Rate of temperature changing:  $1^\circ\text{C}/\text{min}$

Number of cycles: 2

Requirements:

1. Fiber additional attenuation should be no more than 0.4dB/km at 1550nm;
2. There shall be no damage to the cable elements under visual inspection.

### 8.2 Cable bending at low temperature

Bending test at low temperature

Test method: GB/T 2951

Aging condition:  $-20^\circ\text{C} \pm 2^\circ\text{C}$  for 4h.

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Diameter of the mandrel: 5D((D is diameter of finished optical cable) )

Number of turns: 6

Requirement: no crack

### 8.3 Flammability

#### *Flame resistant*

No	Item	Unit	Technology index
	Flame propagation test	-	IEC 60332-1