HIGH-FLEX LV REELING CABLE · RTG / RMG / STS | 0.6/1 kV | 10 sizes | HFFR rubber

# FC-THF-M 0.6/1 kV

Low-Voltage Port Reeling Cable 0.6/1 kV – 3 power cores + 3 split PE conductors + 2 control cores, halogen-free elastomer (HFFR rubber) sheath. Complete technical data sheet: construction, dimensions, weights, current ratings, standards and installation guidance for 10 sizes.

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## 01 Application and Product Overview

FC-THF-M is a high-flex reeling cable for container terminals and heavy port equipment, rated 0.6/1 kV, with the configuration 3 power cores + 3 split PE conductors + 2 control cores. It has fine-wire class 5 copper conductors, halogen-free EPR/HEPR rubber insulation, a halogen-free inner sheath and an outer sheath of halogen-free cross-linked elastomer (HFFR rubber), flame-retardant, low smoke, resistant to weather and ozone; power cores from 25 – 300 mm². Short-lay stranding makes it suitable for continuous winding on and off a cable reel under tensile and torsional load. The construction is derived from the FC-TPU-M D2X11Y platform with a rubber sheath.

### Typical applications

- Cranes whose cable reel must feed the drive power together with a few control or monitoring signals through one cable
- Rubber-tyred gantry (RTG), rail-mounted gantry (RMG) and electrified RTG cranes fed through spring-driven or motor-driven cable reels
- Ship-to-shore (STS) crane auxiliary drives, automated stacking cranes, ship unloaders and bulk-handling machines in terminals
- Outdoor quayside and yard operation with exposure to seawater spray, salt mist, UV radiation and ozone
- Reeling operation at travel speeds up to 60 m/min with repeated tensile and torsional loads
- Areas that require cables free of halogen acid gases when burned

### Design

Combined power and control design. Three power cores, three split protective-earth (PE) conductors in the interstices and two control cores share one cable, so a single reel channel carries power, protective earth and a small number of control or monitoring signals such as an earth-continuity loop, a brake release or a limit switch.

| 10 sizes | 0.6/1 kV | +90 °C | Halogen-free |
|---|---|---|---|
| Cross-section 25 – 300 mm² | Rated voltage $U_0/U$ | Maximum conductor temperature | Sheath: HFFR rubber |

### Key features

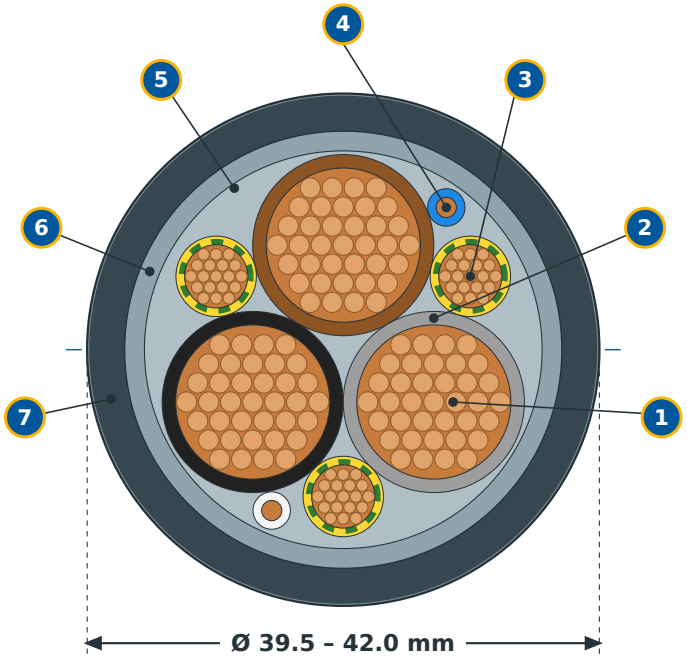
- Fine-wire class 5 copper conductors and a very short core lay length for repeated reeling
- Three split PE conductors in the interstices keep the cross-section round and balanced
- Designed for 20 N/mm² continuous tensile load (on the total copper cross-section of the power cores)
- Halogen-free insulation and sheaths; no halogen acid gases when burned (IEC 60754-1/-2)
- Low smoke density to IEC 61034-2
- Flame retardant to IEC 60332-1-2

## 02 Construction

**FEICHUN · CROSS-SECTION A-A · 0.6/1 kV**

**FC-THF-M**

Sample size 3×95+3G16+2×1.5 · Rev 0 · Illustrative, not to scale




| No. | Component | Material |
|---|---|---|
| 1 | Conductor | Bare annealed fine-wire copper, class 5 to IEC 60228 |
| 2 | Insulation | Halogen-free EPR/HEPR rubber |
| 3 | Split PE conductor | Class 5 copper, green-yellow insulation, laid in the interstices between the power cores |
| 4 | Control cores | Class 5 copper, blue and white insulation |
| 5 | Filler and binder tape | Halogen-free compound, polyester tape |
| 6 | Inner sheath | Halogen-free polymer compound |
| 7 | Outer sheath | Halogen-free cross-linked elastomer (HFFR rubber), flame-retardant, low smoke, resistant to weather and ozone |

The drawing shows size 3×95+3G16+2×1.5. Other sizes have the same construction with scaled dimensions.

### Construction details

| | |
|---|---|
| **Conductor** | Bare annealed fine-wire copper, class 5 to DIN EN 60228 / IEC 60228 / VDE 0295 |
| **Insulation** | Halogen-free EPR/HEPR rubber to IEC 60502-1, maximum conductor temperature 90 °C |
| **Core identification** | Power cores brown, black, grey to DIN VDE 0298-300 |
| **Protective conductor** | Three PE conductors (3G), green-yellow, 16 mm² each, laid in the interstices between the power cores |
| **Control cores** | Two control cores 2 × 1.5 mm² (blue, white) laid in the free space between the power cores |
| **Stranding** | Power cores, split PE conductors and control or optical elements are stranded together with a very short lay length |
| **Inner sheath** | Halogen-free polymer compound, extruded tightly over the stranded cores |
| **Outer sheath** | Halogen-free cross-linked elastomer (HFFR rubber), flame-retardant, low smoke, resistant to weather and ozone |

### Sheath material

The halogen-free, flame-retardant cross-linked elastomer (HFFR rubber) sheath combines the elasticity of a rubber reeling cable with low smoke density (IEC 61034-2) and no halogen acid gas when burned (IEC 60754-1/-2). It is the preferred choice for cable reels in tunnels, enclosed bulk-handling buildings, ship holds and other areas where people must be protected from corrosive smoke. Moving use down to −25 °C.

## 03 Electrical, Thermal and Mechanical Characteristics

### Electrical data

| | |
|---|---|
| **Rated voltage $U_0/U$** | 0.6/1 kV AC |
| **Test voltage** | 2.5 kV AC (power cores); 2 kV AC (control cores) |
| **Maximum operating voltage, DC** | 0.9/1.8 kV |
| **Current-carrying capacity** | To DIN VDE 0298-4 at 30 °C ambient; the table gives rated design values |
| **Conductor resistance** | Maximum at 20 °C, class 5 to IEC 60228 |

### Thermal and mechanical data

| | |
|---|---|
| **Maximum conductor temperature** | +90 °C |
| **Maximum temperature at short circuit** | +250 °C |
| **Ambient temperature, fixed installation** | −40 °C to +90 °C |
| **Ambient temperature, in motion** | −25 °C to +90 °C |
| **Minimum bending radius** | 4 × D fixed; 8 × D on a cable reel (DIN VDE 0298-3) |
| **Maximum tensile load** | 20 N/mm² continuous, on the total copper cross-section of the power cores |
| **Maximum torsional load** | ±50 °/m |
| **Maximum travelling speed** | 60 m/min on a cable reel; higher speeds on request |
| **Flame propagation** | IEC 60332-1-2 / DIN EN 60332-1-2 |
| **Halogen-free** | Yes (insulation, inner and outer sheath); IEC 60754-1/-2 |
| **UV and ozone resistance** | Resistant |
| **Mineral oil resistance** | Resistant, IEC 60811-404 |

### Sheath material comparison

| Property | PUR | PUR low-temp | CSP rubber | CPE rubber | PCP rubber | HFFR rubber |
|---|---|---|---|---|---|---|
| **Abrasion resistance** | Excellent | Excellent | Good | Good | Very good | **Good** |
| **Cut and tear resistance** | Excellent | Excellent | Good | Good | Very good | **Good** |
| **Mineral oil resistance** | Very good | Very good | Very good | Very good | Very good | **Good** |
| **Weather, UV and ozone resistance** | Very good | Very good | Excellent | Very good | Excellent | **Very good** |
| **Cold flexibility (moving)** | −30 °C | −40 °C | −30 °C | −30 °C | −25 °C | **−25 °C** |
| **Halogen-free (IEC 60754-1/-2)** | Yes | Yes | No | No | No | **Yes** |

The column of the sheath used in this cable is highlighted. Ratings are qualitative; ask FeiChun for test data on a specific requirement.

## 04 Dimensions, Weights and Rated Data – 0.6/1 kV (10 sizes)

| Type designation cores × mm² | FeiChun article no. | Conductor Ø max mm | Outer Ø min mm | Outer Ø max mm | Min. bend radius mm | Weight approx. kg/km | Max. pull force N | $R_{20}$ max Ω/km | Rated current A | $I_k$ (1 s) kA |
|---|---|---|---|---|---|---|---|---|---|---|
| **3×25+3G6+2×1** | FC-LV191-001 | 6.2 | 22.6 | 23.9 | 192 | 1,170 | 1,500 | 0.780 | 131 | 3.58 |
| **3×35+3G6+2×1.5** | FC-LV191-002 | 7.8 | 26.5 | 28.0 | 224 | 1,590 | 2,100 | 0.554 | 162 | 5.00 |
| **3×50+3G10+2×1.5** | FC-LV191-003 | 9.6 | 30.0 | 32.0 | 256 | 2,240 | 3,000 | 0.386 | 202 | 7.15 |
| **3×70+3G16+2×1.5** | FC-LV191-004 | 11.1 | 35.0 | 37.0 | 296 | 3,160 | 4,200 | 0.272 | 250 | 10.01 |
| **3×95+3G16+2×1.5** | FC-LV191-005 | 12.6 | 39.5 | 42.0 | 336 | 3,800 | 5,700 | 0.206 | 302 | 13.59 |
| **3×120+3G25+2×1.5** | FC-LV191-006 | 14.8 | 44.0 | 46.5 | 372 | 4,950 | 7,200 | 0.161 | 350 | 17.16 |
| **3×150+3G25+2×1.5** | FC-LV191-007 | 16.0 | 49.0 | 52.0 | 416 | 5,940 | 9,000 | 0.129 | 402 | 21.45 |
| **3×185+3G35+2×1.5** | FC-LV191-008 | 17.7 | 53.0 | 56.5 | 452 | 7,510 | 11,100 | 0.106 | 459 | 26.45 |
| **3×240+3G50+2×1.5** | FC-LV191-009 | 20.2 | 61.0 | 65.0 | 520 | 9,880 | 14,400 | 0.0801 | 540 | 34.32 |
| **3×300+3G50+2×1.5** | FC-LV191-010 | 22.4 | 67.0 | 71.5 | 572 | 11,890 | 18,000 | 0.0641 | 621 | 42.90 |

Current-carrying capacity: rated design values to DIN VDE 0298-4 for flexible cables, free air, 30 °C ambient; for other ambient temperatures, grouping or layered winding on a reel, apply the factors below. Pull force = 20 N/mm² × total copper cross-section of the power cores. Diameters, dimensions and weights are nominal design values and vary within manufacturing tolerances; confirm critical dimensions before dimensioning reels, guides or festoon systems. Other sizes and configurations are produced to order.

### Ambient temperature factors (conductor 90 °C)

| °C | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
|---|---|---|---|---|---|---|---|
| Factor | 1.08 | 1.04 | 1.00 | 0.96 | 0.91 | 0.87 | 0.82 |

### Short-circuit current rating

$I_k$ = 0.143 kA/mm² × cross-section of the power core (conductor 90 °C → 250 °C). For another short-circuit duration t: $I_{k,t} = I_{k,1s} / \sqrt{t}$ (0.1 s ≤ t ≤ 5 s).

### Derating on a cable reel (DIN VDE 0298-4)

1 layer: 0.80 · 2 layers: 0.61 · 3 layers: 0.49 · 4 layers: 0.41. Permissible current = table current × layer factor × temperature factor.

## 05 Reeling Performance and Reel Design Data

The values below support the dimensioning of the cable reel: minimum reel core diameter, copper weight for earthing and loop-resistance calculations, cable weight, and the rated current for the number of layers wound on the reel.

| Type designation cores × mm² | Outer Ø max mm | Min. bend radius on reel, mm | Min. reel core Ø mm | Copper weight kg/km | Cable weight kg/100 m | Current, 1 layer A | 2 layers A | 3 layers A | 4 layers A |
|---|---|---|---|---|---|---|---|---|---|
| 3×25+3G6+2×1 | 23.9 | 192 | 384 | 840 | 117.0 | 105 | 80 | 64 | 54 |
| 3×35+3G6+2×1.5 | 28.0 | 224 | 448 | 1,120 | 159.0 | 130 | 99 | 79 | 66 |
| 3×50+3G10+2×1.5 | 32.0 | 256 | 512 | 1,630 | 224.0 | 162 | 123 | 99 | 83 |
| 3×70+3G16+2×1.5 | 37.0 | 296 | 592 | 2,320 | 316.0 | 200 | 152 | 122 | 102 |
| 3×95+3G16+2×1.5 | 42.0 | 336 | 672 | 2,990 | 380.0 | 242 | 184 | 148 | 124 |
| 3×120+3G25+2×1.5 | 46.5 | 372 | 744 | 3,890 | 495.0 | 280 | 214 | 172 | 144 |
| 3×150+3G25+2×1.5 | 52.0 | 416 | 832 | 4,690 | 594.0 | 322 | 245 | 197 | 165 |
| 3×185+3G35+2×1.5 | 56.5 | 452 | 904 | 5,890 | 751.0 | 367 | 280 | 225 | 188 |
| 3×240+3G50+2×1.5 | 65.0 | 520 | 1,040 | 7,760 | 988.0 | 432 | 329 | 265 | 221 |
| 3×300+3G50+2×1.5 | 71.5 | 572 | 1,144 | 9,360 | 1,189.0 | 497 | 379 | 304 | 255 |

### Reel design guidance

- Minimum reel core diameter = 2 × minimum bending radius = 16 × D (outer diameter D).
- Spring reels suit short travel and low tensile load; motor-driven reels with torque control keep the cable under constant, low tension.
- Fit a guide or level-wind that keeps the cable parallel to the reel axis to prevent crossing turns.
- Rated current falls with the number of layers on the reel because heat is not dissipated; see the layer factors below.

## 06 Selection Guide and Sizing Aid

FC-THF-M covers 10 sizes. The smallest, 3×25+3G6+2×1, has an outer diameter of up to 23.9 mm and weighs about 1,170 kg/km; the largest, 3×300+3G50+2×1.5, has an outer diameter of up to 71.5 mm and weighs about 11,890 kg/km, 10.2 times as much. Across the range the rated current in free air rises from 131 A to 621 A at 30 °C, and the minimum bending radius from 192 mm to 572 mm.

**Example 1.** A drive draws 128 A continuously, the cable is wound in 2 layers on the reel and the ambient temperature is 40 °C. Required table current = 128 / (0.61 × 0.91) = 231 A. The smallest suitable size is 3×70+3G16+2×1.5 with 250 A.

**Example 2.** A drive draws 284 A continuously, the cable is wound in 1 layer on the reel and the ambient temperature is 35 °C. Required table current = 284 / (0.80 × 0.96) = 370 A. The smallest suitable size is 3×150+3G25+2×1.5 with 402 A.

| Type designation cores × mm² | Apparent power at 400 V kVA (1 layer) | Apparent power at 690 V kVA (1 layer) | Winding capacity m |
|---|---|---|---|
| 3×25+3G6+2×1 | 72.6 | 125.2 | 7,325 |
| 3×35+3G6+2×1.5 | 89.8 | 154.9 | 5,185 |
| 3×50+3G10+2×1.5 | 112.0 | 193.1 | 4,085 |
| 3×70+3G16+2×1.5 | 138.6 | 239.0 | 2,895 |
| 3×95+3G16+2×1.5 | 167.4 | 288.7 | 2,120 |

| Type designation cores × mm² | Apparent power at 400 V kVA (1 layer) | Apparent power at 690 V kVA (1 layer) | Winding capacity m |
|---|---|---|---|
| 3×120+3G25+2×1.5 | 194.0 | 334.6 | 1,690 |
| 3×150+3G25+2×1.5 | 222.8 | 384.3 | 1,430 |
| 3×185+3G35+2×1.5 | 254.4 | 438.8 | 1,140 |
| 3×240+3G50+2×1.5 | 299.3 | 516.3 | 820 |
| 3×300+3G50+2×1.5 | 344.2 | 593.7 | 590 |

Apparent power S = √3 × U × I × 0.80 (one layer on the reel, 30 °C). Winding capacity is an indicative value for a reel with 2,500 mm flange diameter, 1,000 mm traverse width, core diameter equal to the minimum reel core diameter and 90 % fill; it is not a substitute for the reel manufacturer's calculation.

## 07 Standards and Testing

| Standard | Scope |
|---|---|
| **DIN EN 60228 / IEC 60228 / VDE 0295** | Conductors, class 5 |
| **IEC 60502-1** | Insulation compound, power cables up to 1 kV |
| **DIN VDE 0298-3** | Application of cables – bending radii and tensile loads |
| **DIN VDE 0298-4** | Application of cables – current-carrying capacity |
| **DIN EN 60332-1-2 / IEC 60332-1-2** | Flame propagation, single cable |
| **DIN VDE 0298-300** | Core identification |
| **DIN VDE 0250-814** | Design reference for flexible reeling and trailing cables (NSHTÖU type) |
| **IEC 60754-1 / -2** | Halogen acid gas emission when burned |
| **IEC 61034-2** | Smoke density when burned |
| **IEC 60811-404** | Mineral oil immersion test |

### Routine and type tests

- AC voltage test on every reel length (routine test): 2.5 kV AC (power cores); 2 kV AC (control cores)
- Conductor resistance and checks of dimensions, insulation thickness and sheath thickness
- Continuity of conductors and protective earth and control cores
- Bending, tensile and reeling torsion tests (type test)
- Flame propagation (IEC 60332-1-2) and confirmation of halogen-free materials

**Test documentation:** every delivery is accompanied by a test certificate from FeiChun's own laboratory. Third-party witnessed tests can be arranged at the buyer's cost.

## 08 Installation, Marking and Delivery

### Installation guidance

- Use a spring-driven or motor-driven cable reel with a core diameter of at least twice the minimum bending radius (16 × D).
- Unwind from the shipping reel tangentially; never pull the cable over the flange of the drum, and avoid loops and kinks.
- Keep torsion within the permitted limit (±50 °/m) and tensile load within the value in the table.
- Guide the cable so that it is not run over by vehicles or crushed; inspect the sheath regularly.
- Connect all parts of the split PE conductor at both ends of the cable.
- Suitable for wet conditions; consult FeiChun for continuous immersion.

### Sheath marking

FEICHUN FC-THF-M [cross-section] 0.6/1 kV [year] [serial no.] [metre mark]

### Packing and delivery

| | |
|---|---|
| **Reel** | Steel or fumigated wooden reels; cable ends sealed with heat-shrink caps |
| **Delivery length** | As ordered, in one continuous length without joints |
| **Lead time** | 2–3 weeks after technical approval |
| **Warranty** | 1 year, covering failures not caused by human factors |
| **Reel label** | Type, cross-section, length, gross/net weight, batch no., reel no. |

### Ordering information

| Field | Example | Meaning |
|---|---|---|
| **Series code** | FC-THF-M | FeiChun series and sheath system |
| **Core configuration** | 3×95+3G16+2×1.5 | Number × cross-section (mm²) of the power cores, split PE conductors (G) and control or optical elements |
| **Rated voltage** | 0.6/1 kV | $U_0$/U, AC |
| **Length and packing** | 500 m, steel reel | Delivery length in one piece; reel type on request |

**Order example: FC-THF-M 3×95+3G16+2×1.5 0.6/1 kV** – 500 m on one steel reel. When requesting a quotation, state the cable type, configuration, cross-section, voltage, length per piece, required standards and installation conditions.

## 09 Certification and Quality

All cable is subject to FeiChun's quality control, with routine testing over 100 % of the delivered length. Certificates, type tests and third-party tests (for example partial discharge or compatibility with cable accessories) are provided per project requirement; copies of the records are available on request.

The CE, EAC and UKCA certificates listed in datasheet FC-TDS-TMP-2026-9238-EN apply to the FC-TPU-M D2X11Y product group. Confirm with FeiChun that the certificate scope covers this construction before quoting it in a tender.

## 10 Related Datasheets

Variants of this cable that differ in one attribute – sheath, configuration, optical fibres or voltage. All datasheets are in PDF format.

- FC-TPU-M D2X11Y 0.6/1 kV – 3 power cores + 3 split PE conductors + 2 control cores, PUR
- FC-THF-M-N 0.6/1 kV – 3 power cores + 3 split PE conductors, HFFR rubber
- FC-THF-M-KF6 0.6/1 kV – 3 power cores + 3 split PE conductors + 2 control cores + 6 single-mode fibres G.652.D, HFFR rubber
- FC-TPU-MA D2X11Y 0.6/1 kV – 3 power cores + 3 split PE conductors + 2 control cores, PUR low-temp
- FC-THF-M-P 0.6/1 kV – 3 power cores + 3 split PE conductors + 2 pilot cores 2×2.5 mm², HFFR rubber
- FC-THF-M-KF 0.6/1 kV – 3 power cores + 3 split PE conductors + 2 control cores + 12 single-mode fibres G.652.D, HFFR rubber
- FC-TCS-M 0.6/1 kV – 3 power cores + 3 split PE conductors + 2 control cores, CSP rubber
- FC-THF-M-NS 0.6/1 kV – 3 power cores + 3 split PE conductors + overall screen, HFFR rubber

Overview of all datasheets: Low-Voltage Port Reeling Cables 0.6/1 kV

### Frequently asked questions

**What is FC-THF-M used for?**
Typical applications include cranes whose cable reel must feed the drive power together with a few control or monitoring signals through one cable.

**What are the outer diameter and minimum bending radius of 3×95+3G16+2×1.5?**
The outer diameter is 39.5 to 42.0 mm and the minimum bending radius in moving or reeling operation is 336 mm (8 × D).

**What minimum reel core diameter is needed for 3×95+3G16+2×1.5?**
At least 672 mm, which is twice the minimum bending radius of 336 mm. A larger core diameter extends cable life.

**What current rating applies to 3×95+3G16+2×1.5 on a cable reel?**
The rated current in free air at 30 °C ambient is 302 A. Multiply it by 0.80 for one layer on the reel, 0.61 for two layers, 0.49 for three layers and 0.41 for four layers (DIN VDE 0298-4), and by the ambient temperature factor.

**Is this cable halogen-free?**
Yes. The insulation and all sheaths are halogen-free; see section 03 for flame-retardancy and temperature data.

**Which cross-sections are available?**
FC-THF-M: 25, 35, 50, 70, 95, 120, 150, 185, 240, 300 mm². Other sizes and special designs can be produced to order.

## 11 Trademark Notice and Intellectual Property

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## Technical and commercial contacts

**Anhui FeiChun Special Cable Co., Ltd.**
International Business Department
Park No. 1, Private Science and Technology Park, Hefei National Economic and Technological Development Zone, Hefei, Anhui, China
Technical support: Tech@feichuncables.com
Mining and heavy industry: mining@feichuncables.com
Zihao Yang, Global Sales Manager: zihao.yang@feichuncables.com
WhatsApp: +86 138 5512 3218
Web: www.feichuncables.com

## Document control

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