HIGH-FLEX MV REELING CABLE · PORT CRANES | 1.8/3 kV | CSP rubber | Article FC-MV11-010

# (N)TSCGEWÖU 3×240+3G50+2×12FO 1.8/3 kV

Medium-Voltage Port Reeling Cable 1.8/3 kV – 3 screened power cores + 3 split PE conductors + two 12-fibre single-mode optical elements, CSP rubber sheath. Complete technical data sheet of this single model: cross-section drawing, dimensions, weight, current ratings, reel design data, standards and ordering information.

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## 01 Application and Product Overview

**(N)TSCGEWÖU 3×240+3G50+2×12FO** is a CSP rubber-sheathed high-flex medium-voltage reeling cable rated 1.8/3 kV for ship-to-shore cranes, rail-mounted gantry cranes and shore connections. The configuration is 3 screened power cores + 3 split PE conductors + two 12-fibre single-mode optical elements. Each power core of 240 mm² has a class 5 copper conductor, semi-conductive layers, EPR insulation 2.0 mm thick and its own tinned-copper braid screen. The outer diameter is 79.0 – 84.0 mm, the weight about 12,820 kg/km, the rated current 497 A at 30 °C and the minimum bending radius 1,050 mm.

### Typical applications

- Medium-voltage supply of ship-to-shore (STS) cranes and rail-mounted gantry cranes through motor-driven cable reels
- Shore connections and mobile equipment powered from the terminal MV network
- Stackers, reclaimers, ship loaders and open-cast mining machines travelling on rails with a cable reel
- Outdoor operation with seawater spray, salt mist, UV radiation and ozone
- MV-supplied automated cranes that need redundant or separate fibre channels

### Design

Three screened power cores and three split PE conductors with two 12-fibre single-mode (G.652.D) optical elements (24 fibres in total), allowing separate or redundant data channels in the same reel as the MV supply.

| 79.0 – 84.0 mm | 12,820 kg/km | 497 A | 1,050 mm |
|---|---|---|---|
| Outer diameter | Approx. weight | Rated current, 30 °C | Min. bending radius |

### 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)
- CSP rubber sheath with proven weather, ozone and oil resistance
- Single-mode G.652.D optical fibres (12 per element) in a compression-resistant buffer tube
- Flame retardant to IEC 60332-1-2

## Type designation

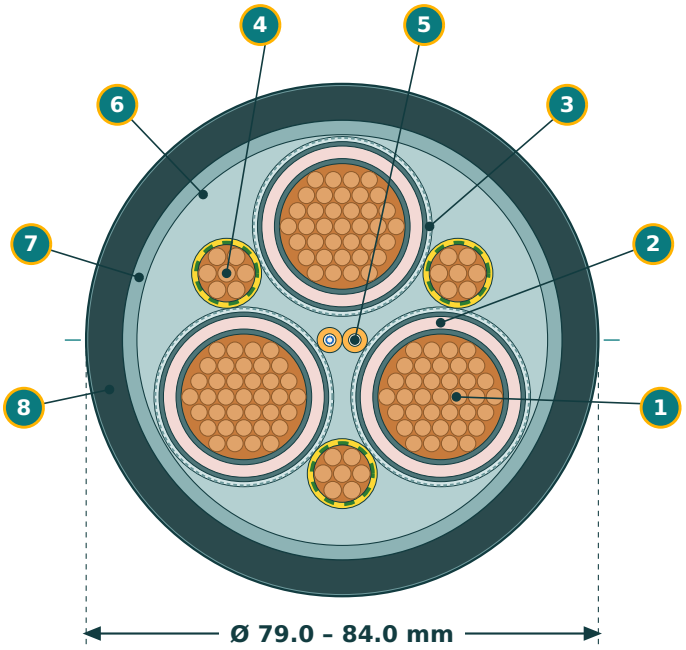
(N)TSCGEWÖU (also typed NTSCGEWOEU) is the German VDE-style type designation used in the trade for screened medium-voltage reeling and trailing cables with rubber insulation and split protective conductors for cranes and mobile equipment. The designation identifies the cable class and is used so that engineers can find and compare the product. Construction, dimensions and data in this datasheet are FeiChun's own.

# 02 Construction

**FEICHUN · CROSS-SECTION A-A · 1.8/3 kV**

**(N)TSCGEWÖU 3×240+3G50+2×12FO**

Article FC-MV11-010 · Rev 0 · Illustrative, not to scale




| No. | Component | Material |
|---|---|---|
| 1 | Conductor | Bare annealed fine-wire copper, class 5 to IEC 60228 (tinned on request) |
| 2 | Semi-conductive layers and insulation | Inner and outer semi-conductive compound with EPR insulation, extruded in one pass |
| 3 | Core screen | Tinned-copper wire braid, coverage ≥ 80 % |
| 4 | Split PE conductor | Class 5 copper, green-yellow insulation, laid in the interstices between the power cores |
| 5 | Optical element | 12 single-mode G.652.D fibres per element in a compression-resistant loose tube |
| 6 | Filler and binder tape | Halogen-free compound, polyester tape |
| 7 | Inner sheath | Halogen-free polymer compound |
| 8 | Outer sheath | Chlorosulfonated polyethylene (CSP) rubber, resistant to weather, ozone and oil |

**Figure 1.** Cross-section of (N)TSCGEWÖU 3×240+3G50+2×12FO 1.8/3 kV. The drawing is generated from the geometry of this exact size; elements are shown to scale relative to each other and do not overlap.

## Construction details

| | |
|---|---|
| **Conductor** | Bare annealed fine-wire copper; tinned on request, class 5 to DIN EN 60228 / IEC 60228 / VDE 0295 |
| **Insulation** | Halogen-free EPR/HEPR rubber to IEC 60502-2, maximum conductor temperature 90 °C |
| **Core screen** | Semi-conductive layers extruded together with the EPR insulation; tinned-copper wire braid screen, coverage ≥ 80 % |
| **Core identification** | Power cores brown, black, grey to DIN VDE 0298-300 |
| **Protective conductor** | Three PE conductors (3G), green-yellow, 50 mm² each, laid in the interstices between the power cores |
| **Optical element** | Two elements, each of 12 single-mode G.652.D fibres in a loose tube with compression-resistant buffer, located at the cable core |
| **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** | Chlorosulfonated polyethylene (CSP) rubber, resistant to weather, ozone and oil |

## Sheath material

The chlorosulfonated polyethylene (CSP) rubber sheath is a proven reeling-cable material for open-air cranes: excellent resistance to weather, ozone and mineral oil, good mechanical robustness and low-temperature flexibility to −30 °C in motion. CSP contains halogen; where halogen-free cables are specified, select the PUR version of the same construction.

## 03 Electrical, Thermal and Mechanical Characteristics

### Electrical data

| | |
|---|---|
| **Rated voltage $U_0/U$** | 1.8/3 kV AC |
| **Test voltage** | 4.5 kV AC, 5 min |
| **Maximum operating voltage, DC** | 2.7/5.4 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** | −30 °C to +90 °C |
| **Minimum bending radius** | 6 × D fixed; 12.5 × D on a cable reel |
| **Maximum tensile load** | 20 N/mm² continuous, on the total copper cross-section of the power cores |
| **Maximum torsional load** | To be agreed with FeiChun for the specific reel design |
| **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** | No (CSP rubber sheath) |
| **UV and ozone resistance** | Resistant |
| **Mineral oil resistance** | Resistant, IEC 60811-404 |

### Sheath material comparison

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

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

## 04 Technical Data of (N)TSCGEWÖU 3×240+3G50+2×12FO 1.8/3 kV

| | | | |
|---|---|---|---|
| **Type designation** | **(N)TSCGEWÖU 3×240+3G50+2×12FO** | **FeiChun article no.** | FC-MV11-010 |
| **Power cores** | 3 × 240 mm² | **Protective conductor** | 3 × 50 mm² (split PE, 3G) |
| **Optical elements** | 2 × 12 fibres, single-mode G.652.D | **Rated voltage $U_0/U$** | 1.8/3 kV AC |
| **Test voltage** | 4.5 kV AC, 5 min | **Conductor** | Class 5 fine-wire copper, Ø max 20.2 mm |
| **Insulation** | EPR / HEPR, 2.0 mm nominal | **Inner sheath** | ≈ 2.3 mm nominal |
| **Outer sheath** | CSP rubber, ≈ 5.8 mm nominal | **Outer diameter** | 79.0 – 84.0 mm |
| **Weight, approx.** | 12,820 kg/km | **Copper weight** | 8,390 kg/km |
| **$R_{20}$ max** | 0.0801 Ω/km | **$R_{90}$ (calculated)** | 0.102 Ω/km |
| **Rated current** | 497 A (free air, 30 °C) | **$I_k$ (1 s, 90 → 250 °C)** | 34.32 kA |
| **Min. bending radius, reeling** | 1,050 mm (12.5 × D) | **Max. pull force** | 14,400 N |
| **Min. reel core Ø** | 2,100 mm (2 × bending radius) | **Max. travelling speed** | 60 m/min on a reel |

Diameters, dimensions and weights are nominal design values and vary within manufacturing tolerances; confirm critical dimensions before dimensioning reels, guides or festoon systems. Current ratings are design values to DIN VDE 0298-4 for flexible cables in free air at 30 °C ambient. Pull force = 20 N/mm² × total copper cross-section of the power cores. Other sizes and configurations are produced to order.

### Calculated electrical data

| Quantity | Value | Basis |
|---|---|---|
| **Conductor resistance at 90 °C** | 0.102 Ω/km | $R_{90} = R_{20} \times (1 + 0.00393 \times 70)$ |
| **Voltage drop at rated current** | 8.8 V per 100 m | Three-phase, resistive, cos φ = 1, conductor at 90 °C |
| **Conductor loss at rated current** | 75.7 W/m | All 3 load-carrying cores at 90 °C |
| **Length for 3 % voltage drop, 3 kV** | 1,023 m | At the rated current, 3-phase, resistive |

### Current-carrying capacity by ambient temperature and number of layers on the reel

| Layers on reel / ambient °C | 20 | 25 | 30 | 35 | 40 | 45 | 50 |
|---|---|---|---|---|---|---|---|
| **1 layer (×0.80)** | 429 | 414 | 398 | 382 | 362 | 346 | 326 |
| **2 layers (×0.61)** | 327 | 315 | 303 | 291 | 276 | 264 | 249 |
| **3 layers (×0.49)** | 263 | 253 | 244 | 234 | 222 | 212 | 200 |
| **4 layers (×0.41)** | 220 | 212 | 204 | 196 | 185 | 177 | 167 |

Permissible current = table current × layer factor × ambient temperature factor (conductor 90 °C). Factors: 20 °C: 1.08, 25 °C: 1.04, 30 °C: 1.00, 35 °C: 0.96, 40 °C: 0.91, 45 °C: 0.87, 50 °C: 0.82.

### Short-circuit current rating of the power cores

| Duration t (s) | 0.1 | 0.2 | 0.5 | 1 | 2 | 3 | 5 |
|---|---|---|---|---|---|---|---|
| **$I_k$ (kA)** | 108.53 | 76.74 | 48.54 | 34.32 | 24.27 | 19.81 | 15.35 |

$I_k = 0.143$ kA/mm² × 240 mm² for 1 s (conductor 90 °C → 250 °C); for another duration t: $I_{k,t} = I_{k,1s} / \sqrt{t}$ (0.1 s ≤ t ≤ 5 s).

## 05 Reeling Performance and Reel Design Data

For (N)TSCGEWÖU 3×240+3G50+2×12FO the minimum reel core diameter is 2,100 mm and the cable weighs 1,282.0 kg per 100 m. The table gives the indicative length that fits on standard reel sizes when the reel is wound with this cable at the minimum core diameter and 90 % fill; use it for a first reel selection, not as a substitute for the reel manufacturer’s calculation.

| Reel flange Ø × traverse width | Min. core Ø mm | Indicative capacity m | Cable weight on reel kg |
|---|---|---|---|
| **Ø 1,600 × 800 mm** | 2,100 | too small | – |
| **Ø 2,000 × 1,000 mm** | 2,100 | too small | – |
| **Ø 2,500 × 1,000 mm** | 2,100 | 140 | 1,795 |
| **Ø 3,000 × 1,200 mm** | 2,100 | 500 | 6,410 |
| **Ø 3,500 × 1,500 mm** | 2,100 | 1,065 | 13,653 |

### Reel design guidance

- Minimum reel core diameter = 2 × minimum bending radius = 25 × 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 Sizes in this Series and Selection Aid

(N)TSCGEWÖU 1.8/3 kV CSP rubber is offered in 10 sizes from 16 to 240 mm². Each size has its own datasheet; the size of this document is highlighted. The next smaller or larger size can be opened directly from the table.

| Type designation | Article no. | Outer Ø max mm | Weight kg/km | Current A | Bend radius mm |
|---|---|---|---|---|---|
| 3×16+3G4+2×12FO | FC-MV11-001 | 49.0 | 2,660 | 91 | 612 |
| 3×25+3G6+2×12FO | FC-MV11-002 | 52.0 | 3,190 | 121 | 650 |
| 3×35+3G6+2×12FO | FC-MV11-003 | 54.5 | 3,670 | 149 | 682 |
| 3×50+3G10+2×12FO | FC-MV11-004 | 58.5 | 4,460 | 186 | 732 |
| 3×70+3G16+2×12FO | FC-MV11-005 | 62.0 | 5,460 | 230 | 776 |
| 3×95+3G16+2×12FO | FC-MV11-006 | 66.5 | 6,490 | 278 | 832 |
| 3×120+3G25+2×12FO | FC-MV11-007 | 70.0 | 7,720 | 322 | 876 |
| 3×150+3G25+2×12FO | FC-MV11-008 | 74.0 | 8,860 | 370 | 924 |
| 3×185+3G35+2×12FO | FC-MV11-009 | 78.0 | 10,420 | 422 | 976 |
| **3×240+3G50+2×12FO** | **FC-MV11-010** | **84.0** | **12,820** | **497** | **1,050** |

**Example.** (N)TSCGEWÖU 3×240+3G50+2×12FO wound in two layers on the reel at 40 °C ambient may carry 497 × 0.61 × 0.91 = 276 A continuously. At 3,000 V this is an apparent power of about 1,434.1 kVA (S = √3 × U × I).

## 07 Standards and Testing

| Standard | Scope |
|---|---|
| **DIN EN 60228 / IEC 60228 / VDE 0295** | Conductors, class 5 |
| **IEC 60502-2** | Power cables with extruded insulation, 6 kV to 30 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 0250-813** | Reference construction of MV reeling cables |
| **IEC 60811-404** | Mineral oil immersion test |
| **DIN VDE 0292** | Type designation of cables (designation practice) |

### Routine and type tests

- AC voltage test on every reel length (routine test): 4.5 kV AC, 5 min
- Partial-discharge test of the MV power cores to IEC 60502-2
- Conductor resistance and checks of dimensions, insulation thickness and sheath thickness
- Continuity of conductors and protective earth
- Bending, tensile and reeling torsion tests (type test)
- Flame propagation (IEC 60332-1-2)
- Optical attenuation test of every fibre after cabling

**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, Delivery and Ordering

### Installation guidance

- Use a spring-driven or motor-driven cable reel with a core diameter of at least twice the minimum bending radius (25 × 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 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.
- Use terminations and joints that are approved for individually screened cores; do not cut back the semi-conductive layers unless instructed by the accessory manufacturer.

### Sheath marking

FEICHUN (N)TSCGEWÖU 3×240+3G50+2×12FO 1.8/3 kV CSP rubber [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** | At least 3 years against manufacturing defects |
| **Reel label** | Type, cross-section, length, gross/net weight, batch no., reel no. |

### Ordering information

| Field | Example | Meaning |
|---|---|---|
| **Type designation** | (N)TSCGEWÖU | Cable type as used in the trade |
| **Core configuration** | 3×240+3G50+2×12FO | Number × cross-section (mm²) of the screened power cores, split PE conductors (G) and pilot or optical elements |
| **Rated voltage** | 1.8/3 kV | $U_0$/U, AC |
| **Sheath** | CSP rubber | Chlorosulfonated polyethylene (CSP) rubber, resistant to weather, ozone and oil |
| **Length and packing** | 500 m, steel reel | Delivery length in one piece; reel type on request |
| **FeiChun article no.** | FC-MV11-010 | Quote this number in enquiries and orders |

**Order example: (N)TSCGEWÖU 3×240+3G50+2×12FO 1.8/3 kV CSP rubber** – 500 m on one steel reel (FeiChun article FC-MV11-010). 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.

## 10 Related Datasheets and FAQ

Cables of the same class with a different sheath, configuration or voltage and the closest cross-section. All datasheets are PDF files.

- (N)TSCGEWÖU 3×240+3G50 1.8/3 kV CSP rubber – 3 screened power cores + 3 split PE conductors
- (N)TSCGEWÖU 3×240+3G50+12FO 1.8/3 kV CSP rubber – 3 screened power cores + 3 split PE conductors + 12-fibre single-mode optical element
- (N)TSCGEWÖU 3×240+3G50+2×2.5 1.8/3 kV CSP rubber – 3 screened power cores + 3 split PE conductors + 2 pilot cores 2×2.5 mm²
- (N)TSCGEWÖU 3×240+3G50+2×12FO 1.8/3 kV PUR – 3 screened power cores + 3 split PE conductors + two 12-fibre single-mode optical elements
- (N)TSCGEWÖU 3×240+3G50+2×12FO 1.8/3 kV low-temp PUR – 3 screened power cores + 3 split PE conductors + two 12-fibre single-mode optical elements
- (N)TSCGEWÖU 3×240+3G50+2×12FO 3.6/6 kV CSP rubber – 3 screened power cores + 3 split PE conductors + two 12-fibre single-mode optical elements

Overview of all datasheets in this family: Medium-Voltage Port Reeling Cables 1.8/3 – 18/30 kV

### Frequently asked questions

**What is (N)TSCGEWÖU 3×240+3G50+2×12FO used for?**
(N)TSCGEWÖU 3×240+3G50+2×12FO is intended for medium-voltage supply of ship-to-shore (STS) cranes and rail-mounted gantry cranes through motor-driven cable reels.

**What are the dimensions and weight of (N)TSCGEWÖU 3×240+3G50+2×12FO 1.8/3 kV?**
The outer diameter is 79.0 – 84.0 mm and the weight is about 12,820 kg/km, of which copper is 8,390 kg/km. These are nominal design values and vary within manufacturing tolerances.

**What is the minimum bending radius of (N)TSCGEWÖU 3×240+3G50+2×12FO?**
The minimum bending radius in moving or reeling operation is 1,050 mm (12.5 × D).

**What reel core diameter does (N)TSCGEWÖU 3×240+3G50+2×12FO need?**
At least 2,100 mm, which is twice the minimum bending radius. On a reel with 2,500 mm flange diameter and 1,000 mm traverse width, about 140 m of cable fit at that core diameter (indicative).

**What current can (N)TSCGEWÖU 3×240+3G50+2×12FO carry on a cable reel?**
The rated current in free air at 30 °C is 497 A. With one layer on the reel the permissible current is 398 A, with two layers 303 A, with three layers 244 A and with four layers 204 A (DIN VDE 0298-4 layer factors, 30 °C ambient).

**Is (N)TSCGEWÖU 3×240+3G50+2×12FO halogen-free?**
No. The CSP rubber sheath contains halogen. For a halogen-free cable select the PUR version of the same construction.

**Which other sizes of this type are available?**
(N)TSCGEWÖU 1.8/3 kV CSP rubber is offered in 16, 25, 35, 50, 70, 95, 120, 150, 185, 240 mm². Each size has its own datasheet, linked in section 06.

## 11 Notices and Intellectual Property

(N)TSCGEWÖU is a type designation used in the cable trade to name a class of cable; it is used here for identification and comparison only. The designation does not imply approval of the product by a third party unless a certificate is named in section 09.

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