HIGH-FLEX MV REELING CABLE · PORT CRANES | 3.6/6 kV | CSP rubber | Article FC-MV22-010

(N)TSCGEWÖU 3×240+3G50+12FO

3.6/6 kV

Medium-Voltage Port Reeling Cable 3.6/6 kV – 3 screened power cores + 3 split PE conductors + 12-fibre single-mode optical element, 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+12FO is a CSP rubber-sheathed high-flex medium-voltage reeling cable rated 3.6/6 kV for ship-to-shore cranes, rail-mounted gantry cranes and shore connections. The configuration is 3 screened power cores + 3 split PE conductors + 12-fibre single-mode optical element. Each power core of 240 mm² has a class 5 copper conductor, semi-conductive layers, EPR insulation 2.5 mm thick and its own tinned-copper braid screen. The outer diameter is 78.0 – 83.0 mm, the weight about 12,760 kg/km, the rated current 497 A at 30 °C and the minimum bending radius 1,038 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 cranes that need a fibre-optic data link through the same reel

Design

Three screened power cores and three split PE conductors with a central 12-fibre single-mode (G.652.D) optical element. The fibres are placed close to the neutral axis to limit bending strain, and give a data link in the same reel as the MV supply.

78.0 – 83.0 mm	12,760 kg/km	497 A	1,038 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

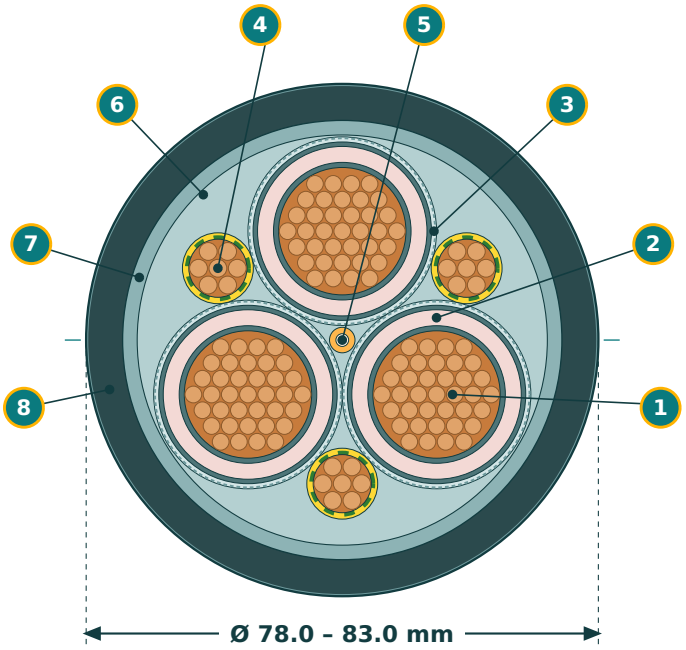
(N)TSCGEWÖU (also typed NTSCGEWOEU) is the German VDE-style type designation used in the trade for screened medium-voltage reeling and trailing cables with rubber insulation and split protective conductors for cranes and mobile equipment. The designation identifies the cable class and is used so that 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 · 3.6/6 kV

(N)TSCGEWÖU 3×240+3G50+12FO

Article FC-MV22-010 · 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+12FO 3.6/6 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	One element 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	3.6/6 kV AC
Test voltage	9 kV AC, 5 min
Maximum operating voltage, DC	5.4/10.8 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	−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+12FO 3.6/6 kV

Type designation	**(N)TSCGEWÖU 3×240+3G50+12FO**	**FeiChun article no.**	FC-MV22-010
Power cores	3 × 240 mm²	**Protective conductor**	3 × 50 mm² (split PE, 3G)
Optical elements	1 × 12 fibres, single-mode G.652.D	**Rated voltage U_0/U**	3.6/6 kV AC
Test voltage	9 kV AC, 5 min	**Conductor**	Class 5 fine-wire copper, Ø max 20.2 mm
Insulation	EPR / HEPR, 2.5 mm nominal	**Inner sheath**	≈ 2.3 mm nominal
Outer sheath	CSP rubber, ≈ 5.7 mm nominal	**Outer diameter**	78.0 – 83.0 mm
Weight, approx.	12,760 kg/km	**Copper weight**	8,410 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	1,038 mm (12.5 × D)	**Max. pull force**	14,400 N
Min. reel core Ø	2,076 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, 6 kV	2,047 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+12FO the minimum reel core diameter is 2,076 mm and the cable weighs 1,276.0 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	2,076	too small	–
Ø 2,000 × 1,000 mm	2,076	too small	–
Ø 2,500 × 1,000 mm	2,076	150	1,914
Ø 3,000 × 1,200 mm	2,076	495	6,316
Ø 3,500 × 1,500 mm	2,076	1,115	14,227

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 3.6/6 kV CSP rubber is offered in 11 sizes from 16 to 300 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+12FO	FC-MV22-001	47.5	2,590	91	594
3×25+3G6+12FO	FC-MV22-002	50.5	3,110	121	632
3×35+3G6+12FO	FC-MV22-003	53.0	3,590	149	662
3×50+3G10+12FO	FC-MV22-004	56.5	4,360	186	706
3×70+3G16+12FO	FC-MV22-005	60.5	5,380	230	756
3×95+3G16+12FO	FC-MV22-006	65.0	6,390	278	812
3×120+3G25+12FO	FC-MV22-007	68.5	7,610	322	856
3×150+3G25+12FO	FC-MV22-008	72.5	8,770	370	906
3×185+3G35+12FO	FC-MV22-009	76.5	10,320	422	956
3×240+3G50+12FO	**FC-MV22-010**	**83.0**	**12,760**	**497**	**1,038**
3×300+3G50+12FO	FC-MV22-011	88.5	14,970	571	1,106

Example. (N)TSCGEWÖU 3×240+3G50+12FO wound in two layers on the reel at 40 °C ambient may carry 497 × 0.61 × 0.91 = 276 A continuously. At 6,000 V this is an apparent power of about 2,868.3 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): 9 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+12FO 3.6/6 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+12FO	Number × cross-section (mm²) of the screened power cores, split PE conductors (G) and pilot or optical elements
Rated voltage	3.6/6 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-MV22-010	Quote this number in enquiries and orders

Order example: (N)TSCGEWÖU 3×240+3G50+12FO 3.6/6 kV CSP rubber – 500 m on one steel reel (FeiChun article FC-MV22-010). 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 3.6/6 kV CSP rubber – 3 screened power cores + 3 split PE conductors
- (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
- (N)TSCGEWÖU 3×240+3G50+2×2.5 3.6/6 kV CSP rubber – 3 screened power cores + 3 split PE conductors + 2 pilot cores 2×2.5 mm²
- (N)TSCGEWÖU 3×240+3G50+12FO 3.6/6 kV PUR – 3 screened power cores + 3 split PE conductors + 12-fibre single-mode optical element
- (N)TSCGEWÖU 3×240+3G50+12FO 3.6/6 kV low-temp PUR – 3 screened power cores + 3 split PE conductors + 12-fibre single-mode optical element
- (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

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+12FO used for?
(N)TSCGEWÖU 3×240+3G50+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+12FO 3.6/6 kV?
The outer diameter is 78.0 – 83.0 mm and the weight is about 12,760 kg/km, of which copper is 8,410 kg/km. These are nominal design values and vary within manufacturing tolerances.

What is the minimum bending radius of (N)TSCGEWÖU 3×240+3G50+12FO?
The minimum bending radius in moving or reeling operation is 1,038 mm (12.5 × D).

What reel core diameter does (N)TSCGEWÖU 3×240+3G50+12FO need?
At least 2,076 mm, which is twice the minimum bending radius. On a reel with 2,500 mm flange diameter and 1,000 mm traverse width, about 150 m of cable fit at that core diameter (indicative).

What current can (N)TSCGEWÖU 3×240+3G50+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+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 3.6/6 kV CSP rubber is offered in 16, 25, 35, 50, 70, 95, 120, 150, 185, 240, 300 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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