HIGH-FLEX LV REELING CABLE · RTG / RMG / STS | 0.6/1 kV | 12 sizes | CSP rubber

FC-TCS-M-4 0.6/1 kV

Low-Voltage Port Reeling Cable 0.6/1 kV – 4 power cores, CSP rubber sheath. Complete technical data sheet: construction, dimensions, weights, current ratings, standards and installation guidance for 12 sizes.

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01 Application and Product Overview

FC-TCS-M-4 is a high-flex reeling cable for container terminals and heavy port equipment, rated 0.6/1 kV, with the configuration 4 power 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 chlorosulfonated polyethylene (CSP) rubber, resistant to weather, ozone and oil; power cores from 6 – 240 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

- Three-phase plus neutral and DC supplies where protective earth is provided separately
- 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
- Outdoor duty that calls for a rubber sheath with proven weather, ozone and oil resistance

Design

Four identical round power cores in concentric layers, without a dedicated protective conductor. Suited to three-phase systems with neutral, DC systems, or installations in which the protective earth is carried by the crane structure or a separate conductor.

12 sizes	0.6/1 kV	+90 °C	CSP rubber
Cross-section 6 – 240 mm²	Rated voltage U_0/U	Maximum conductor temperature	Sheath: CSP rubber

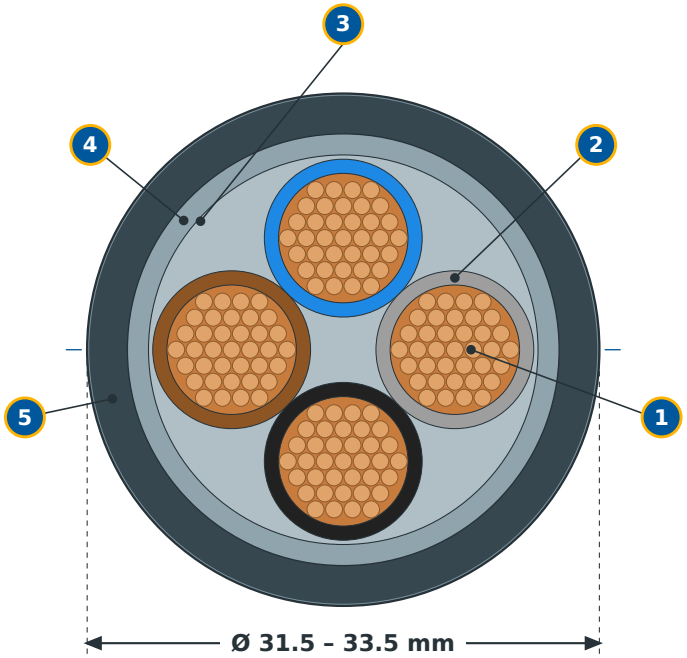
Key features

- Fine-wire class 5 copper conductors and a very short core lay length for repeated reeling
- 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
- Flame retardant to IEC 60332-1-2

02 Construction

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

FC-TCS-M-4
Sample size 4×50 · 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	Filler and binder tape	Halogen-free compound, polyester tape
4	Inner sheath	Halogen-free polymer compound
5	Outer sheath	Chlorosulfonated polyethylene (CSP) rubber, resistant to weather, ozone and oil

The drawing shows size 4×50. 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	Four power cores: blue, brown, black, grey
Stranding	Cores stranded in concentric layers with a short lay length; polyester binder tape
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 HFFR rubber or PUR version of the same construction.

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	−30 °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	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	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 (12 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
4×6	FC-LV112-001	3.3	17.0	18.1	144	460	480	3.30	54	0.858
4×10	FC-LV112-002	4.1	18.3	19.5	156	620	800	1.91	74	1.43
4×16	FC-LV112-003	5.2	19.9	21.1	168	850	1,280	1.21	99	2.29
4×25	FC-LV112-004	6.2	21.8	23.2	186	1,190	2,000	0.780	131	3.58
4×35	FC-LV112-005	7.8	26.5	28.0	224	1,710	2,800	0.554	162	5.00
4×50	FC-LV112-006	9.6	31.5	33.5	268	2,440	4,000	0.386	202	7.15
4×70	FC-LV112-007	11.1	37.5	40.0	320	3,460	5,600	0.272	250	10.01
4×95	FC-LV112-008	12.6	43.5	46.5	372	4,360	7,600	0.206	302	13.59
4×120	FC-LV112-009	14.8	47.5	50.5	404	5,500	9,600	0.161	350	17.16
4×150	FC-LV112-010	16.0	54.5	57.5	460	6,860	12,000	0.129	402	21.45
4×185	FC-LV112-011	17.7	59.0	62.5	500	8,580	14,800	0.106	459	26.45
4×240	FC-LV112-012	20.2	68.0	72.0	576	11,180	19,200	0.0801	540	34.32

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
4×6	18.1	144	288	213	46.0	43	33	26	22
4×10	19.5	156	312	356	62.0	59	45	36	30
4×16	21.1	168	336	570	85.0	79	60	49	41
4×25	23.2	186	372	890	119.0	105	80	64	54
4×35	28.0	224	448	1,240	171.0	130	99	79	66
4×50	33.5	268	536	1,780	244.0	162	123	99	83
4×70	40.0	320	640	2,490	346.0	200	152	122	102
4×95	46.5	372	744	3,380	436.0	242	184	148	124
4×120	50.5	404	808	4,270	550.0	280	214	172	144
4×150	57.5	460	920	5,330	686.0	322	245	197	165
4×185	62.5	500	1,000	6,580	858.0	367	280	225	188
4×240	72.0	576	1,152	8,530	1,118.0	432	329	265	221

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-TCS-M-4 covers 12 sizes. The smallest, 4×6, has an outer diameter of up to 18.1 mm and weighs about 460 kg/km; the largest, 4×240, has an outer diameter of up to 72.0 mm and weighs about 11,180 kg/km, 24.3 times as much. Across the range the rated current in free air rises from 54 A to 540 A at 30 °C, and the minimum bending radius from 144 mm to 576 mm.

Example 1. A drive draws 83 A continuously, the cable is wound in 2 layers on the reel and the ambient temperature is 40 °C. Required table current = 83 / (0.61 × 0.91) = 150 A. The smallest suitable size is 4×35 with 162 A.

Example 2. A drive draws 247 A continuously, the cable is wound in 1 layer on the reel and the ambient temperature is 35 °C. Required table current = 247 / (0.80 × 0.96) = 322 A. The smallest suitable size is 4×120 with 350 A.

Type designation cores × mm²	Apparent power at 400 V kVA (1 layer)	Apparent power at 690 V kVA (1 layer)	Winding capacity m
4×6	29.9	51.6	13,205
4×10	41.0	70.8	11,340
4×16	54.9	94.7	9,570
4×25	72.6	125.2	7,745
4×35	89.8	154.9	5,185
4×50	112.0	193.1	3,585
4×70	138.6	239.0	2,535

Type designation cores × mm²	Apparent power at 400 V kVA (1 layer)	Apparent power at 690 V kVA (1 layer)	Winding capacity m
4×95	167.4	288.7	1,690
4×120	194.0	334.6	1,390
4×150	222.8	384.3	1,040
4×185	254.4	438.8	950
4×240	299.3	516.3	595

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 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
- Bending, tensile and reeling torsion tests (type test)
- Flame propagation (IEC 60332-1-2)

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-TCS-M-4 [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-TCS-M-4	FeiChun series and sheath system
Core configuration	4×50	Number of cores with × (no PE core) or G (with PE core) and cross-section in mm²
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-TCS-M-4 4×50 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-4 0.6/1 kV – 4 power cores, PUR
- FC-TCS-M 0.6/1 kV – 3 power cores + 3 split PE conductors + 2 control cores, CSP rubber
- FC-TPU-MA D2X11Y-4 0.6/1 kV – 4 power cores, PUR low-temp
- FC-TCS-M-N 0.6/1 kV – 3 power cores + 3 split PE conductors, CSP rubber
- FC-TRB-M-4 0.6/1 kV – 4 power cores, CPE rubber
- FC-TCS-M-P 0.6/1 kV – 3 power cores + 3 split PE conductors + 2 pilot cores 2×2.5 mm², CSP rubber
- FC-CFX-M (N)SHTÖU-4 0.6/1 kV – 4 power cores, PCP rubber
- FC-TCS-M-NS 0.6/1 kV – 3 power cores + 3 split PE conductors + overall screen, CSP rubber

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

Frequently asked questions

What is FC-TCS-M-4 used for?
Typical applications include three-phase plus neutral and DC supplies where protective earth is provided separately.

What are the outer diameter and minimum bending radius of 4×50?
The outer diameter is 31.5 to 33.5 mm and the minimum bending radius in moving or reeling operation is 268 mm (8 × D).

What minimum reel core diameter is needed for 4×50?
At least 536 mm, which is twice the minimum bending radius of 268 mm. A larger core diameter extends cable life.

What current rating applies to 4×50 on a cable reel?
The rated current in free air at 30 °C ambient is 202 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?
No. The CSP rubber sheath contains halogen. If halogen-free cables are required, select the HFFR rubber or PUR version of the same construction.

Which cross-sections are available?
FC-TCS-M-4: 6, 10, 16, 25, 35, 50, 70, 95, 120, 150, 185, 240 mm². Other sizes and special designs can be produced to order.

11 Trademark Notice and Intellectual Property

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