MINING REELING CONTROL CABLE · MOBILE MACHINERY | 0.6/1 kV | 4 sizes | CPE rubber

FC-MCR-R-C 19G 0.6/1 kV

Mining Reeling Control Cable 0.6/1 kV – 19-core reeling control cable with overall tinned-copper braid screen, CPE rubber sheath. Complete technical data sheet: construction, dimensions, weights, current ratings, standards and installation guidance for 4 sizes.

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01 Application and Product Overview

FC-MCR-R-C 19G is a 19-core reeling control cable with overall tinned-copper braid screen rated 0.6/1 kV for cable reels on drill rigs, LHD machines, shuttle cars and mobile mining plant. It has fine-wire class 5 copper cores with halogen-free EPR/HEPR rubber insulation, an inner sheath and an outer sheath of chlorinated polyethylene (CPE) rubber, resistant to weather, ozone and oil. Core cross-sections: 0.75 – 2.5 mm².

Design

19 cores in concentric layers with a short lay length and polyester binder tape. Black cores carry white numbers; the green-yellow protective core lies in the outer layer. The cores are bound with halogen-free filler and covered by an inner sheath before the outer sheath is applied. A tinned-copper braid screen (≥ 85 % coverage) between the inner and outer sheath limits electromagnetic coupling between the control cores and nearby power cables. With 19 cores this cable replaces several smaller control cables on a single reel channel.

Typical applications

- Control, signal and measuring circuits of drill rigs, LHD machines, shuttle cars and mobile crushers supplied through a cable reel
- Spring-driven and motor-driven cable reels on mining machines, cable handlers and conveyor take-up systems
- Operation with repeated winding, unwinding and bending within the permitted bending radius
- Wet, muddy, oily and abrasive environments typical of underground headings and open pits
- Circuits that need protection against electromagnetic interference: the overall tinned-copper braid screen limits coupling between control cores and nearby power cables
- Open-pit and surface duty that calls for a rubber sheath with proven weather, ozone and oil resistance

4 sizes	0.6/1 kV	+90 °C	CPE rubber
Cross-section 0.75 – 2.5 mm²	Rated voltage U_0/U	Maximum conductor temperature	Sheath: CPE rubber

Key features

- Fine-wire class 5 copper cores with insulation thickness to 0.6/1 kV for reliable operation on a reel
- Cores laid in concentric layers with a short lay length and polyester binder tape
- Number-printed black cores; green-yellow protective core in the outer layer (G types)
- CPE rubber sheath with proven weather, ozone and oil resistance
- Overall tinned-copper braid screen (≥ 85 % coverage) for EMC
- Flame retardant to IEC 60332-1-2

Service notes for mining duty

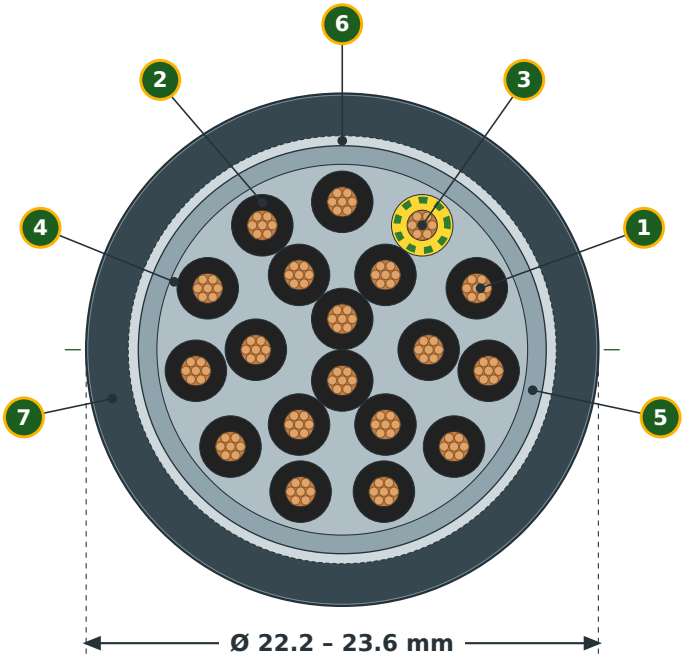
- Route control cables on the reel in a separate channel from MV or unscreened power cables, or use the screened version.
- Strip the outer sheath only as far as required for termination and seal the cable entry against water.

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02 Construction

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

FC-MCR-R-C
Sample size 19G1 C · 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	Protective (PE) core	Class 5 copper, green-yellow insulation
4	Filler and binder tape	Halogen-free compound, polyester tape
5	Inner sheath	Halogen-free polymer compound
6	Overall screen	Tinned-copper wire braid, coverage ≥ 85 %
7	Outer sheath	Chlorinated polyethylene (CPE) rubber, resistant to weather, ozone and oil

The drawing shows size 19G1 C. 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	Black cores with white numbers; green-yellow protective core in the outer layer
Stranding	Cores stranded in concentric layers with a short lay length; polyester binder tape
Overall screen	Tinned-copper wire braid, coverage ≥ 85 %, between inner and outer sheath
Inner sheath	Halogen-free polymer compound, extruded tightly over the stranded cores
Outer sheath	Chlorinated polyethylene (CPE) rubber, resistant to weather, ozone and oil

Sheath material

The chlorinated polyethylene (CPE) rubber sheath offers good resistance to weather, ozone and mineral oil with good mechanical robustness and flexibility to −30 °C in motion, at a favourable cost level. CPE 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	0.6/1 kV AC
Test voltage	3.5 kV AC, 5 min
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

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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	Fixed: 4 × D (D ≥ 8 mm), 3 × D (D < 8 mm); moving or reeling: 6 × D (D ≤ 12 mm), 8 × D (D ≤ 20 mm), 10 × D (D > 20 mm)
Maximum tensile load	15 N/mm² continuous, on the total copper cross-section of the power cores
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 (CPE rubber sheath)
UV and ozone resistance	Resistant
Mineral oil resistance	Resistant, IEC 60811-404

04 Dimensions, Weights and Rated Data – 0.6/1 kV (4 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	Current per core A	I_k (1 s) kA
19G0.75 C	FC-MC209-001	1.2	21.1	22.4	224	570	214	26.0	7	0.107
19G1 C	FC-MC209-002	1.4	22.2	23.6	236	650	285	19.5	9	0.143
19G1.5 C	FC-MC209-003	1.7	24.0	25.5	256	800	430	13.3	11	0.214
19G2.5 C	FC-MC209-004	2.2	27.0	29.0	290	1,090	710	7.98	15	0.357

Current-carrying capacity: rated design values to DIN VDE 0298-4 for flexible cables, free air, 30 °C ambient; values per core include the derating factor for the number of cores; for other ambient temperatures, grouping or layered winding on a reel, apply the factors below. Pull force = 15 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).

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
19G0.75 C	22.4	224	448	204	57.0
19G1 C	23.6	236	472	251	65.0
19G1.5 C	25.5	256	512	344	80.0
19G2.5 C	29.0	290	580	530	109.0

Reel design guidance

- Minimum reel core diameter = 2 × minimum bending radius = 2 × minimum bending radius (outer diameter D).
- 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.

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06 Selection Guide and Sizing Aid

FC-MCR-R-C 19G covers 4 sizes. The smallest, 19G0.75 C, has an outer diameter of up to 22.4 mm and weighs about 570 kg/km; the largest, 19G2.5 C, has an outer diameter of up to 29.0 mm and weighs about 1,090 kg/km, 1.9 times as much. Across the range the rated current per core rises from 7 A to 15 A at 30 °C, and the minimum bending radius from 224 mm to 290 mm.

Example 1. A circuit carries 8 A per core at an ambient temperature of 40 °C. Required table current = 8 / 0.91 = 9 A per core. The smallest suitable size is 19G1 C with 9 A per core.

Example 2. A circuit carries 10 A per core at an ambient temperature of 35 °C. Required table current = 10 / 0.96 = 11 A per core. The smallest suitable size is 19G1.5 C with 11 A per core.

Type designation cores × mm²	Total copper mm²	Cable weight kg/100 m	Winding capacity m	Free-hanging length m (vertical)
19G0.75 C	14.25	57.0	8,150	38
19G1 C	19	65.0	7,300	44
19G1.5 C	28.5	80.0	6,205	54
19G2.5 C	47.5	109.0	4,875	66

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. Free-hanging length = permissible pull ÷ (weight × 9.81); it is the length at which the cable’s own weight reaches the rated pull, without any safety factor for hoisting.

07 Engineering Profile by Size

Each size of FC-MCR-R-C 19G with the values that matter when sizing a circuit: dimensions, weight, copper share, heat and voltage drop at rated current, and the permissible pull. Voltage drop is for 100 m of cable at rated current with conductors at 90 °C (single-phase AC or DC round trip).

Choose 19G0.75 C when the load is near 7 A: the conductor resistance is 26.00 Ω/km, the overall size is Ø 22.4 mm and the weight 570 kg/km. The minimum reel core is 448 mm and the 1 s short-circuit rating 0.11 kA. Handling 19G0.75 C: 57.0 kg per 100 m, bending radius 224 mm; two people can lift a 20 m piece of about 11.4 kg.

19G1 C: Ø 23.6 mm; bend radius 236 mm; weight 650 kg/km. Voltage drop at rated current (9 A) is 44.8 V per 100 m, loss 4.0 W/m, and the cable can support 44 m of its own length vertically at the rated pull of 285 N. A 500 m length of 19G1 C weighs about 325 kg; with a 472 mm minimum core the drum must be sized for that load.

For 19G1.5 C the design values are: Ø 25.5 mm, 800 kg/km, 430 N permissible pull, 11 A rated current. The copper accounts for 43% of the weight, and 4.1 W/m is dissipated at full load, so heat-sensitive reel layers should be derated as shown in section 04. Reel and handling: at 19G1.5 C the minimum reel core is 512 mm and the cable weighs 80.0 kg per 100 m, so a 500 m length weighs about 400 kg before the drum.

For 19G2.5 C the design values are: Ø 29.0 mm, 1,090 kg/km, 710 N permissible pull, 15 A rated current. The copper accounts for 49% of the weight, and 4.6 W/m is dissipated at full load, so heat-sensitive reel layers should be derated as shown in section 04. Per 100 m, 19G2.5 C contains 53.0 kg of copper and 56.0 kg of insulation, filler and sheath material, which sets the scrap value and the recycling split.

08 Configuration Guidance and Variant Comparison

Typical case: a cable handler whose control loom must survive repeated winding at 236 mm radius. For this case FC-MCR-R-C 19G is a fit in the 19G1 C size (Ø 23.6 mm).

CPE suits moderate-duty surface equipment and pumps; it contains halogen.

Rated 0.6/1 kV, the cable covers the common 400 V, 690 V and 1,000 V mining supplies.

In the drawn size 19G1 C the cores fill 52% of the circle inside the inner sheath, the inner sheath is 0.8 mm thick, the screen 0.45 mm and the outer sheath 1.9 mm, giving a total wall of 3.2 mm around a core bundle of Ø 16.6 mm.

FC-MCR-R-C 19G is one of 360 datasheets in the mining reeling control cable group and one of 953 in the library. The next smaller core count, FC-MCR-R-C 16G, has an outer Ø of 23.9 mm at 1 mm² against 23.6 mm here. The next larger core count, FC-MCR-R-C 24G, measures 24.6 mm and weighs 740 kg/km (this model: 650 kg/km).

Element inventory and core layout

Element inventory of the drawn size 19G1 C: 19 elements with 19.0 mm² of copper in total. The 19 cores are stranded in 3 concentric layers (layer 1: 2 cores; layer 2: 6 cores; layer 3: 11 cores), counted from the centre outwards, each layer with a short lay length and alternating lay direction. Keeping about 15 % of the cores as spare leaves 15 usable circuits plus the protective core; plan the core allocation before ordering because the number cannot be changed after manufacture.

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Element	Quantity	Cross-section	Ø over insulation mm	Copper mm²
Power / main core	18	1 mm²	2.7	18.0
Protective (PE) conductor	1	1 mm²	2.7	1.0

Termination data (indicative)

Type designation cores × mm²	Outer Ø or W × H mm	Cable gland thread	Lug / ferrule bolt	Strip length mm	Terminal row mm	Gland-to-bend straight mm
19G0.75 C	22.4	M40	ferrule	12	97	112
19G1 C	23.6	M40	ferrule	12	97	118
19G1.5 C	25.5	M40	ferrule	12	97	128
19G2.5 C	29.0	M40	ferrule	12	97	145

Gland, lug and terminal-row values are planning guides computed from the dimensions above; confirm them with the accessory manufacturer.

Comparison with related variants at size 19G1 C

Variant	Differs in	Outer Ø / H mm	Weight kg/km	Pull N	Current A
This datasheet FC-MCR-R-C 19G	–	23.6	650	285	9
FC-MCR-S-C 19G 0.6/1 kV	sheath	23.6 (+0%)	660 (+2%)	285 (+0%)	9 (+0%)
FC-MCR-A-C 19G 0.6/1 kV	sheath	23.6 (+0%)	610 (-6%)	285 (+0%)	9 (+0%)
FC-MCR-R-C 16G 0.6/1 kV	configuration	23.9 (+1%)	630 (-3%)	240 (-16%)	9 (+0%)
FC-MCR-R-C 24G 0.6/1 kV	configuration	24.6 (+4%)	740 (+14%)	360 (+26%)	8 (-11%)
FC-MCR-R 19G 0.6/1 kV	screen	22.7 (-4%)	560 (-14%)	285 (+0%)	9 (+0%)
FC-MCR-R-C-HT 19G 0.6/1 kV	tensile braid	25.0 (+6%)	720 (+11%)	2,630 (+823%)	9 (+0%)

Percentages show the change against this datasheet for the same cross-section; use them to judge what a change of sheath, voltage class, screen or tensile braid costs in size and weight.

09 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 0293-308	Core identification
IEC 60811-404	Mineral oil immersion test

Routine and type tests

- AC voltage test on every reel length (routine test): 3.5 kV AC, 5 min
- Conductor resistance and checks of dimensions, insulation thickness and sheath thickness
- Continuity of conductors and protective earth
- Bending, tensile 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.

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10 Installation, Marking and Delivery

Installation guidance

- Use a reel core diameter of at least twice the minimum bending radius; keep the cable free of loops and kinks while winding.
- Do not exceed the tensile load in the table; relieve the cable of tension at the reel hub and at the machine.
- Connect the protective core (G types) at both ends; terminate the screen 360° where fitted.
- Inspect the sheath regularly for abrasion and mechanical damage.

Sheath marking

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FEICHUN FC-MCR-R-C [cross-section] 0.6/1 kV [year] [serial no.] [metre mark]
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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

Order example: FC-MCR-R-C 19G1 C 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.

11 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.

Mine-specific approvals (for example coal-mine safety marks, MSHA, or ATEX / IECEx for gassy atmospheres) are not implied by this datasheet; they depend on the project, the machine and the country and are arranged with the end user.

12 Related Datasheets

Variants of this cable with a different sheath, configuration or voltage. All datasheets are in PDF format.

- FC-MCR-S-C 19G 0.6/1 kV – 19-core reeling control cable with overall tinned-copper braid screen, CSP rubber
- FC-MCR-A-C 19G 0.6/1 kV – 19-core reeling control cable with overall tinned-copper braid screen, PUR low-temp
- FC-MCR-R-C 16G 0.6/1 kV – 16-core reeling control cable with overall tinned-copper braid screen, CPE rubber
- FC-MCR-R-C 24G 0.6/1 kV – 24-core reeling control cable with overall tinned-copper braid screen, CPE rubber
- FC-MCR-R 19G 0.6/1 kV – 19-core reeling control cable, CPE rubber
- FC-MCR-R-C-HT 19G 0.6/1 kV – 19-core reeling control cable with overall tinned-copper braid screen, with aramid tensile support braid, CPE rubber
- FC-MCR-R-C 14G 0.6/1 kV – 14-core reeling control cable with overall tinned-copper braid screen, CPE rubber
- FC-MCR-R-C 25G 0.6/1 kV – 25-core reeling control cable with overall tinned-copper braid screen, CPE rubber

Overview of all datasheets: Mining Reeling Control Cables 300/500 V and 0.6/1 kV

Frequently asked questions

What is FC-MCR-R-C 19G used for?
Typical applications include control, signal and measuring circuits of drill rigs, LHD machines, shuttle cars and mobile crushers supplied through a cable reel.

What are the outer diameter and minimum bending radius of 19G1 C?
The outer diameter is 22.2 to 23.6 mm and the minimum bending radius in moving or reeling operation is 236 mm (6 to 10 × D depending on diameter).

What minimum reel core diameter is needed for 19G1 C?
At least 472 mm, which is twice the minimum bending radius of 236 mm. A larger core diameter extends cable life.

What current can each core of 19G1 C carry?
The table gives 9 A per core in free air at 30 °C ambient, already reduced for the number of cores; apply the ambient temperature factor and, on a reel, the layer factor.

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How much tensile load can 19G1 C take, and how long can it hang freely?

The permissible pull force is 285 N. With a weight of about 650 kg/km this corresponds to a free-hanging vertical length of about 44 m before the rated pull is reached; apply your own safety factor for hoisting or suspended installations.

What is the voltage drop and heat loss of 19G1 C at rated current?

At 9 A and a conductor temperature of 90 °C the voltage drop is about 44.8 V per 100 m and the conductor loss about 4.0 W per metre (maximum resistance 19.500 Ω/km at 20 °C).

Is this cable halogen-free?

No. The CPE rubber sheath contains halogen. If halogen-free cables are required, select the PUR version of the same construction.

Which cross-sections are available?

FC-MCR-R-C 19G: 0.75, 1, 1.5, 2.5 mm². Other sizes and special designs can be produced to order.

Does this datasheet include mine-specific approvals?

No. Mine-specific approvals, such as coal-mine safety marks, MSHA or ATEX/IECEx for gassy atmospheres, depend on the project and the country and are not implied by this document. Send the requirements to FeiChun technical support.

13 Trademark Notice and Intellectual Property

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