



Flexible control and data transmission cables



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Multi-conductor Copper Control Cable with numbered cores



Recommended Application

- Control and connection cable especially suitable for applications in industrial ambient conditions
- Mainly in dry, damp or wet interiors under medium mechanical load conditions
- Outdoor use with UV-protection only, considering the temperature range
- For free, non-continuously recurring movement application without tensile load or compulsory guidance as well as for fixed installation

Areas of Application

- Machine engineering
- Plant engineering and construction
- Paint-spray lines

- Air conditioning installations
- Power stations

Cable Construction

- Finely stranded bare copper wires
- Core insulation made of PVC Compound P8/1
- Black cores with white numbers
- Cores twisted in layers
- Special PVC-based outer sheath compound Sheath colour RAL 7001 (silver grey)

Customer Advantage

- VDE compliant with production monitoring
- Optimized small outer diameter redounds to reduced space requirement
- The 4 kV test voltage ensures high insulation performance
- Largely resistant to oil and chemicals
- Manufactured free of substances harmful to lacquer (silicon free) and therefore suitable for use in paint shops

Technical Specification

- Flame-retardant accordance to IEC 60332-1-2
- For further technical information see catalogue, Appendix: Selection Table (A) and Technical Tables (T)

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 0,5	4,8
3 G 0,5	5,1
3 x 0,5	5,1
4 G 0,5	5,7
4 x 0,5	5,7
5 G 0,5	6,2
5 x 0,5	6,2
7 G 0,5	6,7
7 x 0,5	6,7
10 G 0,5	8,6
12 G 0,5	8,9
14 G 0,5	9,5
18 G 0,5	10,5
21 G 0,5	11,7

No. of cores and mm ² per conductor	Outer diameter in mm approx.
25 G 0,5	12,4
30 G 0,5	13,3
35 G 0,5	14,5
40 G 0,5	15,4
52 G 0,5	17,3
61 G 0,5	18,5
65 G 0,5	19,6
80 G 0,5	21,1
100 G 0,5	23,6
2 x 0,75	5,4
3 G 0,75	5,7
3 x 0,75	5,7
4 G 0,75	6,2
4 x 0,75	6,2

No. of cores and mm ² per conductor	Outer diameter in mm approx.
5 G 0,75	6,7
5 x 0,75	6,7
7 G 0,75	7,3
7 x 0,75	7,3
9 G 0,75	9,4
10 G 0,75	9,6
12 G 0,75	9,9
12 x 0,75	9,9
15 G 0,75	10,9
16 G 0,75	11,1
18 G 0,75	11,7
21 G 0,75	13,0
25 G 0,75	13,8
26 G 0,75	14,2
34 G 0,75	15,9
41 G 0,75	17,4
50 G 0,75	19,2
51 G 0,75	19,2
61 G 0,75	20,5
65 G 0,75	21,8
80 G 0,75	23,6
100 G 0,75	26,4
2 x 1,0	5,7
3 G 1,0	6,0
3 x 1,0	6,0
4 G 1,0	6,5
4 x 1,0	6,5
5 G 1,0	7,1
5 x 1,0	7,1
6 G 1,0	8,0
7 G 1,0	8,0
7 x 1,0	8,0
8 G 1,0	9,5
9 G 1,0	10,0
10 G 1,0	10,2
12 G 1,0	10,5
12 x 1,0	10,5
14 G 1,0	11,2
16 G 1,0	11,8
18 G 1,0	12,7
18 x 1,0	12,7
20 G 1,0	13,4
20 x 1,0	13,4
25 G 1,0	14,7
26 G 1,0	15,1
34 G 1,0	17,1
36 G 1,0	17,4
40 G 1,0	18,4
41 G 1,0	18,8
50 G 1,0	20,6
56 G 1,0	21,4
61 G 1,0	22,1
65 G 1,0	23,6
80 G 1,0	25,3
100 G 1,0	28,3
2 x 1,5	6,3
3 G 1,5	6,7
3 x 1,5	6,7
4 G 1,5	7,2
4 x 1,5	7,2
5 G 1,5	8,1
5 x 1,5	8,1

No. of cores and mm ² per conductor	Outer diameter in mm approx.
7 G 1,5	8,9
7 x 1,5	8,9
8 G 1,5	10,6
9 G 1,5	11,4
10 G 1,5	11,6
11 G 1,5	11,6
12 G 1,5	12,0
12 x 1,5	12,0
14 G 1,5	12,7
16 G 1,5	13,4
18 G 1,5	14,4
21 G 1,5	15,7
25 G 1,5	16,9
26 G 1,5	17,3
32 G 1,5	18,7
34 G 1,5	19,4
41 G 1,5	21,3
50 G 1,5	23,5
51 G 1,5	23,5
61 G 1,5	25,2
65 G 1,5	26,7
80 G 1,5	28,8
2 x 2,5	7,5
3 G 2,5	8,1
4 G 2,5	8,9
5 G 2,5	10,0
7 G 2,5	11,1
12 G 2,5	14,8
14 G 2,5	15,8
18 G 2,5	17,8
25 G 2,5	20,8
34 G 2,5	24,4
50 G 2,5	29,4
3 G 4,0	9,9
4 G 4,0	10,8
5 G 4,0	12,1
7 G 4,0	13,4
11 G 4,0	17,6
12 G 4,0	18,1
3 G 6,0	11,7
4 G 6,0	13,0
5 G 6,0	14,5
7 G 6,0	16,0
3 G 10,0	14,6
4 G 10,0	16,2
5 G 10,0	18,1
7 G 10,0	20,0
4 G 16,0	18,8
5 G 16,0	21,2
7 G 16,0	23,4
4 G 25,0	23,5
5 G 25,0	26,4
7 G 25,0	29,1
4 G 35,0	26,4
5 G 35,0	29,6

G = with green/yellow protective conductor
x = without protective conductor



The EMC-compliant Copper Control Cable with numbered cores

VDE compliant

Recommended Application

- Mainly where electrical interference fields caused e.g. by electrical motor driven by frequency converters, can disturb signal transmissions

Areas of Application

- Plant engineering and construction
- Conveying and transport systems
- Measurement and control technology
- Production lines
- Air conditioning installations
- Office machines and systems for data processing
- Paint-spray lines

Worth Knowing

- The copper braiding serves as a shielding in order to reduce the reciprocal electromagnetic interference between cable and environment

Cable Construction

- Finely stranded bare copper wires
- Core insulation made of PVC Compound P8/1
- Black cores with white numbers
- Cores twisted in layers
- Inner sheath made of special PVC-based compound, grey colored
- Tinned copper wire braiding
- Transparent outer sheath made of special PVC-based compound.

Customer Advantage

- High shielding coverage and low transfer impedance (max. 250 ohm/km at 30 MHz)
- The transport outer sheath protects the tinned copper braiding against soiling and mechanical damage
- The 4 kV Test voltage ensures high insulation performance
- VDE compliant with production monitoring
- Largely resistant to oil and chemicals
- Manufactured free of substances harmful to lacquer (silicon free) and therefore suitable for use in paint shops

Technical Specification

- Flame-retardant accordance to IEC 60332-1-2
- For further technical information see catalogue appendix: Selection Table (A) and Technical Tables (T)

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 0,5	7,0
3 G 0,5	7,3
3 x 0,5	7,3
4 G 0,5	7,9
4 x 0,5	7,9
5 G 0,5	8,4
5 x 0,5	8,4
7 G 0,5	8,9
7 x 0,5	8,9
12 G 0,5	11,3
12 x 0,5	11,3

No. of cores and mm ² per conductor	Outer diameter in mm approx.
18 G 0,5	13,3
25 G 0,5	15,2
30 G 0,5	16,1
40 G 0,5	18,2
2 x 0,75	7,4
3 G 0,75	7,9
3 x 0,75	7,9
4 G 0,75	8,4
4 x 0,75	8,4
5 G 0,75	8,9
5 x 0,75	8,9

No. of cores and mm ² per conductor	Outer diameter in mm approx.
7 G 0,75	9,7
7 x 0,75	9,7
12 G 0,75	12,3
12 x 0,75	12,3
18 G 0,75	14,5
18 x 0,75	14,5
25 G 0,75	16,6
34 G 0,75	18,9
40 x 0,75	20,5
41 G 0,75	20,6
2 x 1,0	7,9
3 G 1,0	8,2
3 x 1,0	8,2
4 G 1,0	8,7
4 x 1,0	8,7
5 G 1,0	9,5
7 G 1,0	10,2
12 G 1,0	13,3
16 G 1,0	14,6
18 G 1,0	15,5
25 G 1,0	17,5
34 G 1,0	20,3
41 G 1,0	22,0
50 G 1,0	23,8
2 x 1,5	8,5
3 G 1,5	8,9
3 x 1,5	8,9
4 G 1,5	9,6
4 x 1,5	9,6
5 G 1,5	10,3
5 x 1,5	10,3
7 G 1,5	11,3

No. of cores and mm ² per conductor	Outer diameter in mm approx.
7 x 1,5	11,3
12 G 1,5	14,8
18 G 1,5	17,2
25 G 1,5	20,1
34 G 1,5	22,8
41 G 1,5	24,7
50 G 1,5	27,1
2 x 2,5	9,9
3 G 2,5	10,3
4 G 2,5	11,3
5 G 2,5	12,6
7 G 2,5	13,9
12 G 2,5	17,6
2 x 4,0	11,4
4 G 4,0	13,4
5 G 4,0	14,7
2 x 6,0	13,6
4 G 6,0	15,8
5 G 6,0	17,0
7 G 6,0	18,8
2 x 10,0	16,4
3 G 10,0	17,4
4 G 10,0	19,0
5 G 10,0	21,2
7 G 10,0	23,2
2 x 16,0	18,6
4 G 16,0	22,2
5 G 16,0	26,7
4 G 25,0	28,7
5 G 25,0	31,6
4 G 35,0	32,0
5 G 35,0	35,5

G = with green/yellow protective conductor

x = without protective conductor



Copper Control Cable with numbered cores and steel wire braid

Increased mechanical protection - VDE compliant

Recommended Application

- Mainly in dry, damp or wet interiors where increased mechanical protection is required. Outdoor use with UV-protection only, considering the temperature range
- For free, non-continuously recurring movement application without tensile load or compulsory guidance as well as for fixed installation

Areas of Application

- Plant engineering and construction
- Conveying and transport systems
- Paint-spray lines
- Production lines
- Air conditioning installations

Cable Construction

- Finely stranded bare copper wires
- Core insulation made of PVC Compound P8/1
- Black cores with white numbers
- Cores twisted in layers
- Inner sheath made of special PVC-based compound, grey-coloured
- Galvanized steel wire braiding
- Transparent outer sheath made of special PVC-based compound

Customer Advantage

- The galvanized steel wire braiding with high degree of coverage offers simultaneous mechanical protection and partial electromagnetic shielding effect
- The transport outer sheath protect the steel wire braiding against soiling and mechanical damage
- The 4 kV Test Voltage ensures high insulation performance
- VDE compliant with production monitoring
- Largely resistant to oil and chemicals
- Manufactured free of substances harmful to lacquer (silicon free) and therefore suitable for use in paint shops

Technical Specification

- Flame-retardant accordance to IEC 60332-1-2
- Do not store outdoors or in damp interiors

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 0,5	7,8
3 G 0,5	8,1
4 G 0,5	8,5
5 G 0,5	9,2
7 G 0,5	9,7
10 G 0,5	11,6
12 G 0,5	11,9
14 G 0,5	12,5
18 G 0,5	13,9
21 G 0,5	14,9
25 G 0,5	15,6
30 G 0,5	16,5
40 G 0,5	18,8
52 G 0,5	20,7

No. of cores and mm ² per conductor	Outer diameter in mm approx.
61 G 0,5	21,9
2 x 0,75	8,2
3 G 0,75	8,5
4 G 0,75	9,2
5 G 0,75	9,7
7 G 0,75	10,3
9 G 0,75	12,4
12 G 0,75	12,9
15 G 0,75	14,1
18 G 0,75	14,9
21 G 0,75	16,2
25 G 0,75	17,0
34 G 0,75	19,3
41 G 0,75	20,8

No. of cores and mm ² per conductor	Outer diameter in mm approx.
50 G 0,75	22,8
61 G 0,75	23,9
2 x 1,0	8,5
3 G 1,0	8,8
4 G 1,0	9,5
5 G 1,0	10,1
7 G 1,0	11,0
8 G 1,0	12,5
9 G 1,0	13,2
12 G 1,0	13,9
14 G 1,0	14,4
18 G 1,0	15,9
20 G 1,0	16,8
25 G 1,0	18,1
34 G 1,0	20,5
41 G 1,0	22,2
50 G 1,0	24,2
65 G 1,0	27,2
2 x 1,5	9,3
3 G 1,5	9,7
4 G 1,5	10,2
5 G 1,5	11,1
7 G 1,5	11,9
8 G 1,5	14,0
9 G 1,5	14,6
11 G 1,5	14,8
12 G 1,5	15,4
14 G 1,5	15,9

No. of cores and mm ² per conductor	Outer diameter in mm approx.
18 G 1,5	17,6
25 G 1,5	20,3
32 G 1,5	22,1
34 G 1,5	23,0
41 G 1,5	24,9
50 G 1,5	27,1
3 G 2,5	11,1
4 G 2,5	12,1
5 G 2,5	13,2
7 G 2,5	14,3
12 G 2,5	18,2
18 G 2,5	21,4
25 G 2,5	24,4
3 G 4,0	12,7
4 G 4,0	14,0
5 G 4,0	15,1
7 G 4,0	16,4
4 G 6,0	16,2
5 G 6,0	17,7
7 G 6,0	19,2
4 G 10,0	19,4
5 G 10,0	21,5
4 G 16,0	22,4
5 G 16,0	24,6
7 G 16,0	27,2
4 G 25,0	28,9
5 G 25,0	31,8
4 G 35,0	32,2

G = with green/yellow protective conductor

x = without protective conductor



EMC-compliant Copper Control Cable with numbered cores

Low space requirement due to small cable diameter

Recommended Application

- Control and connection cable particularly suitable for applications in industrial and/or EMC-critical environments
- Mainly used for electrical equipments in dry, damp or wet interiors
- Outdoor use with UV-protection only, considering the temperature range
- For free, non-continuously recurring movement application without tensile load or compulsory guidance as well as for fixed installation

Areas of Application

- Plant engineering and construction
- Measurement and control technology
- Air conditioning installations
- Office machines and systems for data processing

Cable Construction

- Finely stranded bare copper wires
- Core insulation made of PVC Compound P8/1
- Black cores with white numbers
- Cores twisted in layers
- Covered with an insulating plastic foil
- Tinned copper wire braiding
- Special PVC-based outer sheath compound
- Sheath colour RAL 7001 (silver grey)

Customer Advantage

- High shielding coverage and low transfer impedance (max. 250 ohm/km at 30 MHz)
- Small outer diameter due to inner sheath renouncement in reduced space requirements
- Largely resistant to oil and chemicals
- Manufactured free of substances harmful to lacquer (silicon free) and therefore suitable for use in paint shops

Technical Specification

- Flame-retardant accordance to IEC 60332-1-2

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 0,5	5,8
3 G 0,5	6,1
3 x 0,5	6,1
4 G 0,5	6,5
4 x 0,5	7,0
5 G 0,5	7,0
5 x 0,5	7,5
7 G 0,5	7,5
7 x 0,5	9,9
12 G 0,5	9,9
12 x 0,5	11,5
18 G 0,5	11,5
18 x 0,5	11,5
25 G 0,5	13,4

No. of cores and mm ² per conductor	Outer diameter in mm approx.
25 x 0,5	13,4
2 x 0,75	6,2
3 G 0,75	6,5
3 x 0,75	6,5
4 G 0,75	7,0
4 x 0,75	7,0
5 G 0,75	7,7
5 x 0,75	7,7
7 G 0,75	8,3
7 x 0,75	8,3
12 G 0,75	10,9
18 G 0,75	12,7
25 G 0,75	14,8
25 x 0,75	14,8

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 1,0	6,5
3 G 1,0	6,5
3 x 1,0	6,8
4 G 1,0	7,3
4 x 1,0	7,3
5 G 1,0	8,1
5 x 1,0	8,1
7 G 1,0	8,8
7 x 1,0	8,8
12 G 1,0	11,5
18 G 1,0	13,9
25 G 1,0	15,9
2 x 1,5	7,1
3 G 1,5	7,5
3 x 1,5	7,5
4 G 1,5	8,2
4 x 1,5	8,2
5 G 1,5	8,9
5 x 1,5	8,9
7 G 1,5	9,9
7 x 1,5	9,9
12 G 1,5	13,0
18 G 1,5	15,6

No. of cores and mm ² per conductor	Outer diameter in mm approx.
25 G 1,5	17,9
34 G 1,5	20,8
3 G 2,5	8,9
4 G 2,5	9,9
5 G 2,5	11,0
7 G 2,5	11,9
12 G 2,5	16,0
18 G 2,5	19,0
25 G 2,5	22,2
4 G 4,0	11,6
7 G 4,0	14,4
4 G 6,0	14,2
7 G 6,0	17,0
4 G 10,0	17,2
5 G 10,0	19,5
7 G 10,0	21,4
4 G 16,0	20,2
5 G 16,0	22,6
7 G 16,0	24,8
4 G 25,0	25,1
5 G 25,0	28,0
4 G 35,0	30,4

G = with green/yellow protective conductor

x = without protective conductor



Connection and Control Cable with coloured/numbered cores and steel wire braid increased mechanical protection



Recommended Application

- Mainly used in dry, damp or wet interiors where increased mechanical protection is required
- Outdoor use with UV-protection only, considering the temperature range
- For free, non-continuously recurring movement application without tensile load or compulsory guidance as well as for fixed installation

Areas of application

- Plant engineering and construction
- Conveying and transport systems
- Machine engineering
- Air conditioning installations

Cable Construction

- Finely stranded bare copper wires
- Core insulation made of PVC Compound P8/1
- Cores twisted in layers
- Core colours see "Technical data"
- Inner sheath made of special PVC-based compound, grey-coloured
- Galvanized steel wire braiding
- Transparent outer sheath made of special PVC-based compound

Customer Advantage

- The galvanized steel wire braiding with degree of coverage offers simultaneous mechanical protection and partial electromagnetic shielding effect
- The transparent outer sheath protect the steel wire braiding against soiling and mechanical damage
- As a result of the special PVC compound P 8/1 and the 4 kV Test Voltage, sizes starting from 1,5 mm² conductor cross section are suitable for a Rated Voltage up to 450/750 V

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 0,5	7,8
3 G 0,5	8,1
4 G 0,5	8,5
5 G 0,5	9,2
6 G 0,5	9,7
7 G 0,5	9,7
8 G 0,5	11,0
10 G 0,5	11,6
12 G 0,5	11,9
14 G 0,5	12,5
16 G 0,5	13,2

No. of cores and mm ² per conductor	Outer diameter in mm approx.
21 G 0,5	14,9
24 G 0,5	15,6
27 G 0,5	16,1
40 G 0,5	18,8
2 x 0,75	8,2
3 G 0,75	8,5
4 G 0,75	9,2
5 G 0,75	9,7
6 G 0,75	10,3
7 G 0,75	10,3
8 G 0,75	11,8

No. of cores and mm ² per conductor	Outer diameter in mm approx.
10 G 0,75	12,6
12 G 0,75	12,9
15 G 0,75	14,1
18 G 0,75	14,9
21 G 0,75	16,2
25 G 0,75	17,0
32 G 0,75	18,5
61 G 0,75	23,9
2 x 1,0	8,5
3 G 1,0	8,8
4 G 1,0	9,5
5 G 1,0	10,1
6 G 1,0	11,0
7 G 1,0	11,0
8 G 1,0	12,5
10 G 1,0	13,4
12 G 1,0	13,9
18 G 1,0	15,9
20 G 1,0	16,8
25 G 1,0	18,1
2 x 1,5	9,3
3 G 1,5	9,7
4 G 1,5	10,2
5 G 1,5	11,1
6 G 1,5	11,9
7 G 1,5	11,9
8 G 1,5	14,0
12 G 1,5	15,4
14 G 1,5	15,9

No. of cores and mm ² per conductor	Outer diameter in mm approx.
18 G 1,5	17,6
25 G 1,5	20,3
32 G 1,5	22,1
2 x 2,5	12,1
3 G 2,5	12,6
4 G 2,5	13,9
5 G 2,5	15,2
7 G 2,5	16,3
2 x 4	13,6
4 G 4	15,7
5 G 4	17,1
7 G 4	18,6
3 G 6	15,8
4 G 6	17,2
5 G 6	18,8
7 G 6	20,7
4 G 10	21,3
5 G 10	23,3
7 G 10	25,6
4 G 16	24,1
5 G 16	26,8
4 G 25	29,4
5 G 25	32,6
4 G 35	32,4
5 G 35	36,0
4 G 50	38,8
4 G 70	43,7
4 G 95	50,4

G = with green/yellow protective conductor

X = without protective conductor



Halogen-free Connecting Cable with improved characteristics in case of fire

Flexible, oil-resistant, recyclable, highly flame-retardant

Recommended Application

- Environment friendly, halogen-free Power Connection and Control Cable
- Especially for electrical equipments and installations in industrial environments, dry or damp interiors
- Suitable for fixed installation under medium mechanical load conditions as well as for flexing application at free, non-continuously recurring movement without tensile load or compulsory guidance
- Outdoor use with UV-protection only, considering the temperature range
- Not for direct burial

Cable Construction

- Finely stranded bare copper wires
- Halogen-free core insulation
- Core colours accordance to VDE 0293-308
- Cores twisted in layers
- Sheath of special halogen-free compound
- Sheath colour RAL 7001 (silver grey)

Customer Advantage

- Due to the halogen-free materials, the formation of toxic dioxins and furanes in the case of fire is considerably reduced
- High resistance against oils, grease and their emulsions, thereby suitable for use in areas of stock-removing machine tools
- The newly developed, non cross-linked and halogen-free material is completely recyclable

In combination:

- PVC-and halogen-free accordance to IEC 60754-1
- Low corrosiveness of smoke gases accordance to IEC 60754-2
- Low toxicity of smoke gases accordance to NES 713 part 3
- Low smoke density accordance to IEC 61 034
- Flame-retardant accordance to IEC 60 332-3
- Oil resistant accordance to SEV TB 20 B VDE 0472 Part 803
- Asbestos, CFC, lead and silicon-free
- Hydrolysis-resistant HD 22.10

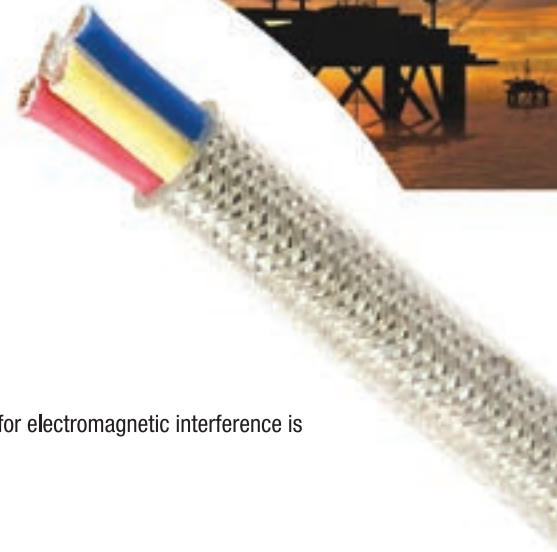
No. of cores and mm ² per conductor	Outer diameter in mm approx.
3 G 1,5	8,6
4 G 1,5	9,4
5 G 1,5	10,6
3 G 2,5	10,5
4 G 2,5	11,6
5 G 2,5	12,5
3 G 4	11,5
4 G 4	12,8
5 G 4	14,0
4 G 6	14,0
5 G 6	16,2
4 G 10	20,4

No. of cores and mm ² per conductor	Outer diameter in mm approx.
5 G 10	22,4
4 G 16	24,5
5 G 16	27,2
4 G 25	28,7
5 G 25	32,5
4 G 35	32,8
5 G 35	37,6
4 G 50	38,0
4 G 70	42,8
4 G 95	47,1
4 G 120	52,4

G = with green/yellow protective conductor
X = without protective conductor



Low capacity double screened motor Connection Cable with coloured cores, 0.6/1 kV



Recommended Application

Ranges of application:

Wherever drives form a signal unit together with cable, frequency converter and motor, and the potential for electromagnetic interference is high because of this. Suitable for :

- Automotive industry
- Conveyor technology
- Machine tool manufacturing
- Paper industry
- Air conditioning installations
- Packaging industry
- Textile production

Cable Construction

Fine wires strands of plain copper wires cores twisted concentrically (this is respectively between the gusset in protective conductors divided into three) Core insulation made from polyethylene (low operating capacity in accordance with VDE 0472 Part 504). Colour coded wires over the cores Aluminium foil with covering copper wire screening braid version with unleaded PVC outer sheath in transparent versions with PE conductor divided into three with unleaded cold-flexible, UV-resistant.

PVC sheath Black

Customer Advantage

The doubled screened motor connecting cable with low operating capacitance of the PE single wires and low screen capacitance enables a low-loss power transmission in comparison with conventional PVC connecting cables

Special Feature

- Temperature range: -55°C up to +125°C
- Halogen-free in accordance with IEC60754-1, Flame retardant in accordance with IEC 60 332.3
- In the event of a fire, the density and toxicity of the smoke gases are reduced together with flame propagation
- Safety in areas with high personnel concentration
- Minimizes damage to buildings and equipment caused by the formation of toxic acid fumes in fires
- Good moisture, ozone-and UV resistance
- Good abrasion resistance

Technical Notes

Flame-retardant accordance to IEC 60332-1-2

No. of cores and mm ² per conductor	Outer diameter in mm approx.
4 G 1,5	11,6
4 G 2,5	13,1
4 G 4,0	15,2
4 G 6,0	16,9
4 G 10	20,4
4 G 16	23,8
4 G 25	28,1
4 G 35	31,2
4 G 50	37,4
4 G 70	42,1
4 G 95	48,3
4 G 120	52,4
4 G 150	59,1
4 G 185	64,3
4 G 240	67,0

G = with green/yellow protective conductor

x = without protective conductor



Single cores **RoHS**

Recommended Application

Switching strands for wiring of:

- Telecommunication devices
- Electronic Components in devices
- Telecommunication systems

PVC single cores for:

- Internal wiring of devices
- Protected laying in and on lights
- Signal systems in and on plaster in tubes

PVC single cores for:

- Laying in conduits, exposed and buried in plaster and in closed installation ducts

Cable Construction

- Fine wire strands
- PVC based core insulation
- Colours or labelling see table
- Flame retardant accordance to (IEC 60332.1)



PVC switch cable in accordance with VDE 0812 with coloured stripes

Cross section mm ²	Outer diameter in mm approx.	m/spool
0,25	1,5	250

Single coloured PVC-wiring cable in accordance with VDE 0281 part 3

Cross section mm ²	Outer diameter in mm approx.	m/coil	m/spool
0,5	2,1	-	250
0,75	2,4	100	250
1,0	2,6	100	250

Single coloured PVC cable in accordance with VDE 0281 part 3

Cross section mm ²	Outer diameter in mm approx.	m/coil	m/spool
1,5	3,0	100	150
2,5	3,7	100	100
4,0	4,3	100	-
6,0	4,9	100	-
10,0	6,5	100	-
16,0	8,0	100	-
25,0	9,8	50	-
35,0	11,0	50	-
50,0	13,0	50	-
70,0	15,5	-	-
95,0	17,0	-	-
120,0	19,7	-	-
150,0	21,3	-	-
185,0	23,5	-	-
240,0	27,4	-	-



The Data Transmission Cables with DIN colour code 47100



Recommended Application

Used as a control and signal cable in electronics of computer systems, electronic control equipments, office machines, balances etc.

Cable Construction

Bare copper wire stranded conductor, PVC core insulation and outer sheath, cores twisted in layers, colour code in accordance with DIN 47100, flame retardant in accordance with EC 60332-1, pebble grey (RAL 7032)

Technical Specification

Considering economic minimum quantities the outer sheath can also be produced in special colours on request which match the special colour design of a device

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 0.14	3,2
3 x 0.14	3,4
4 x 0.14	3,6
5 x 0.14	3,9
7 x 0.14	4,2
8 x 0.14	4,9
10 x 0.14	5,2
12 x 0.14	5,6
14 x 0.14	5,8
16 x 0.14	6,1
20 x 0.14	7,0
21 x 0.14	7,2
25 x 0.14	7,8
28 x 0.14	7,8
30 x 0.14	8,0
36 x 0.14	8,6
37 x 0.14	8,9
40 x 0.14	9,3
44 x 0.14	9,6
50 x 0.14	10,4
56 x 0.14	10,7
2 x 0.25	3,8
3 x 0.25	4,0
4 x 0.25	4,3
5 x 0.25	4,7
7 x 0.25	5,1

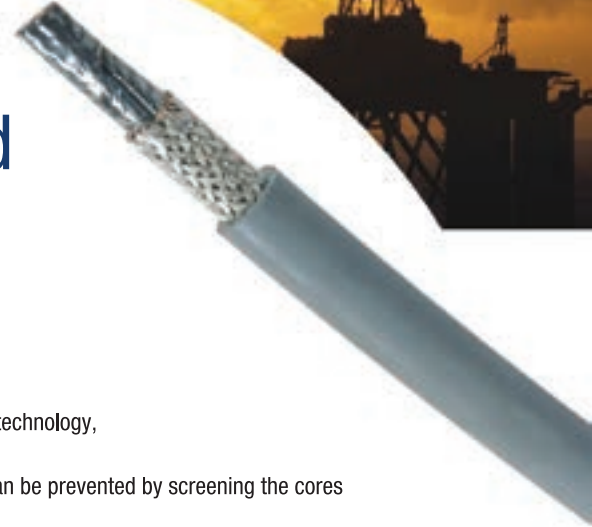
No. of cores and mm ² per conductor	Outer diameter in mm approx.
8 x 0.25	6,2
10 x 0.25	6,8
12 x 0.25	7,0
14 x 0.25	7,3
16 x 0.25	7,7
18 x 0.25	8,1
20 x 0.25	8,6
25 x 0.25	9,6
30 x 0.25	10,3
32 x 0.25	10,7
36 x 0.25	11,1
37 x 0.25	11,4
40 x 0.25	12,0
50 x 0.25	12,9
61 x 0.25	13,7
2 x 0.34	4,2
3 x 0.34	4,4
4 x 0.34	4,8
5 x 0.34	5,5
7 x 0.34	5,9
8 x 0.34	7,1
10 x 0.34	7,6
12 x 0.34	7,8
14 x 0.34	8,2
16 x 0.34	8,7
20 x 0.34	9,6

No. of cores and mm ² per conductor	Outer diameter in mm approx.
21 x 0.34	10,4
25 x 0.34	11,2
30 x 0.34	11,6
32 x 0.34	12,1
36 x 0.34	12,5
40 x 0.34	13,5
50 x 0.34	15,0
2 x 0.5	4,7
3 x 0.5	5,0
4 x 0.5	5,6
5 x 0.5	6,1
7 x 0.5	6,9
8 x 0.5	8,0
10 x 0.5	8,6
12 x 0.5	8,9
16 x 0.5	10,2
20 x 0.5	11,4
25 x 0.5	12,3
30 x 0.5	13,2

No. of cores and mm ² per conductor	Outer diameter in mm approx.
40 x 0.5	15,8
2 x 0.75	5,1
3 x 0.75	5,6
4 x 0.75	6,1
5 x 0.75	6,9
7 x 0.75	7,5
8 x 0.75	8,7
10 x 0.75	9,4
12 x 0.75	10,1
16 x 0.75	11,2
20 x 0.75	12,4
25 x 0.75	14,0
30 x 0.75	14,9
2 x 1.0	5,6
3 x 1.0	5,9
5 x 1.0	7,3
2 x 1.5	6,8
3 x 1.5	7,2
4 x 1.5	7,8



The Data Transmission Cables with copper braid screening and DIN colour code 47100



Recommended Application

- Consistent extension of range, but with colour code DIN 47100. Used for computer systems, MSR technology, office machinery, scales-screened cables with small dimensions
- The signals transmitted along the cores can also interfere with other components. These effects can be prevented by screening the cores
- Screen as braiding or wrapping of tinned copper wire (easy to solder) over the core insulation

Cable Construction

Bare copper wire stranded conductor, PVC core insulation and outer sheath, colour code in accordance with DIN 47100, tin plated copper wire braiding, flame retardant in accordance with IEC 60332-1, pebble grey (RAL 7032)

- PVC-based core insulation
- Tinned copper wire braiding

Technical Specification

Bare copper wire stranded conductor, PVC core insulation and outer sheath, colour code in accordance with DIN 47100, in plated copper wire braiding, flame retardant in accordance with IEC 60332-1, pebble grey (RAL 7032)

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 0.14	3,9
3 x 0.14	4,1
4 x 0.14	4,3
5 x 0.14	4,6
6 x 0.14	4,9
7 x 0.14	4,9
8 x 0.14	5,8
10 x 0.14	6,1
12 x 0.14	6,3
14 x 0.14	6,7
16 x 0.14	6,9
18 x 0.14	7,0
20 x 0.14	7,3
21 x 0.14	7,7
25 x 0.14	7,9
28 x 0.14	8,4
30 x 0.14	8,5
32 x 0.14	8,7
36 x 0.14	9,0
37 x 0.14	9,3

No. of cores and mm ² per conductor	Outer diameter in mm approx.
40 x 0.14	10,4
44 x 0.14	10,7
50 x 0.14	11,1
2 x 0.25	4,5
3 x 0.25	4,7
4 x 0.25	5,0
5 x 0.25	5,6
6 x 0.25	6,0
7 x 0.25	6,0
8 x 0.25	7,1
10 x 0.25	7,5
12 x 0.25	7,7
14 x 0.25	8,0
15 x 0.25	8,3
16 x 0.25	8,4
18 x 0.25	8,8
20 x 0.25	9,3
21 x 0.25	9,6
25 x 0.25	10,7
28 x 0.25	10,8

No. of cores and mm ² per conductor	Outer diameter in mm approx.
30 x 0.25	11,0
32 x 0.25	11,4
36 x 0.25	11,8
40 x 0.25	12,7
44 x 0.25	13,3
50 x 0.25	13,8
61 x 0.25	15,0
2 x 0.34	4,9
3 x 0.34	5,1
4 x 0.34	5,7
5 x 0.34	6,2
6 x 0.34	6,8
7 x 0.34	6,8
8 x 0.34	7,8
10 x 0.34	8,3
12 x 0.34	8,5
14 x 0.34	8,9
15 x 0.34	9,2
16 x 0.34	9,4
18 x 0.34	10,2
20 x 0.34	10,7
21 x 0.34	11,1
25 x 0.34	11,9
28 x 0.34	12,0
30 x 0.34	12,3
32 x 0.34	13,0
36 x 0.34	13,4
40 x 0.34	14,8
44 x 0.34	15,3
50 x 0.34	15,9
2 x 0.5	5,6
3 x 0.5	5,9
4 x 0.5	6,3
5 x 0.5	7,0
6 x 0.5	7,6

No. of cores and mm ² per conductor	Outer diameter in mm approx.
7 x 0.5	7,6
8 x 0.5	8,7
10 x 0.5	9,3
12 x 0.5	9,6
18 x 0.5	11,8
20 x 0.5	12,1
25 x 0.5	13,7
30 x 0.5	14,5
2 x 0.75	6,0
3 x 0.75	6,3
4 x 0.75	7,0
5 x 0.75	7,6
7 x 0.75	8,2
10 x 0.75	10,5
12 x 0.75	10,8
18 x 0.75	13,0
25 x 0.75	15,3
30 x 0.75	15,8
2 x 1.0	6,3
3 x 1.0	6,8
4 x 1.0	7,3
5 x 1.0	8,0
7 x 1.0	8,6
10 x 1.0	11,1
12 x 1.0	11,4
18 x 1.0	13,4
25 x 1.0	16,2
2 x 1.5	7,5
3 x 1.5	7,9
4 x 1.5	8,5
5 x 1.5	9,3
7 x 1.5	10,5
12 x 1.5	13,7
18 x 1.5	16,3
25 x 1.5	19,9



The pair twisted Data Transmission Cables

Recommended Application

- Electronic systems normally have little space available for cable installation
- Short distances and small bending radii required
- Only low currents are normal, therefore use of small conductor cross-section is possible
- These twisted pair data cables are also extremely flexible

Cable Construction

- Bare copper wire stranded conductor
- PVC core insulation and outer sheath
- Colour code in accordance with DIN 47100
- Flame retardant in accordance with IEC 60332-1, pebble grey (RAL 7032)

Technical Specification

- Twisted in pairs to considerably reduce decoupling
- Often, no additional screening is required
- Robust PVC outer sheath

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 2 x 0.14	4,8
3 x 2 x 0.14	4,9
4 x 2 x 0.14	5,5
5 x 2 x 0.14	5,7
6 x 2 x 0.14	6,2
10 x 2 x 0.14	8,0
12 x 2 x 0.14	8,2
14 x 2 x 0.14	8,6
16 x 2 x 0.14	9,1
18 x 2 x 0.14	9,6
25 x 2 x 0.14	11,8
30 x 2 x 0.14	12,2
50 x 2 x 0.14	15,8
2 x 2 x 0.25	6,1
3 x 2 x 0.25	6,2
4 x 2 x 0.25	6,9
6 x 2 x 0.25	7,8
8 x 2 x 0.25	9,2
10 x 2 x 0.25	10,3
2 x 2 x 0.5	7,9
3 x 2 x 0.5	8,0
4 x 2 x 0.5	8,7
8 x 2 x 0.5	12,2
10 x 2 x 0.5	13,2



The pair twisted Data Transmission Cables with copper braid screening

Recommended Application

- Data transmission with good screening, twisted pairs (TP) decouples the cable circuits
- Good protection against the capacitive influence due to electric fields (e.g. power cable)

Cable Construction

- Bare copper wire stranded conductor
- PVC core insulation and outer sheath, TP construction
- Core colours in accordance with DIN 47100, tin plated
- Copper wire braid
- Flame retardant in accordance with IEC 60332-1, pebble grey (RAL 7032)

Special Feature

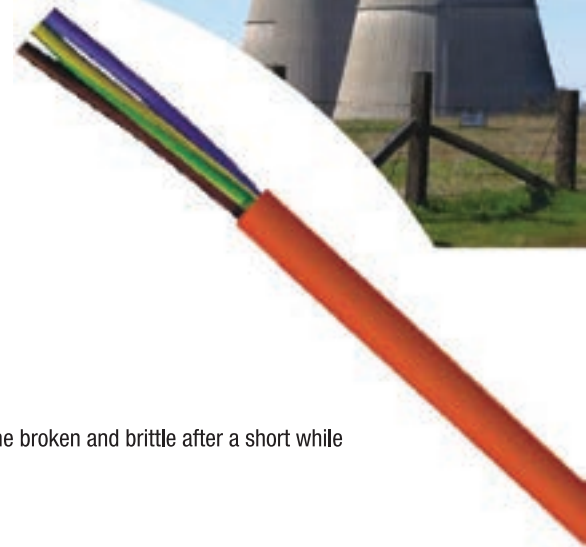
- The twisted core pairs are covered with an impervious copper braid
- Excellent screening against electrical interference. (TP) = twisted pair

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 2 x 0.14	5,7
3 x 2 x 0.14	5,8
4 x 2 x 0.14	6,2
6 x 2 x 0.14	7,1
8 x 2 x 0.14	8,2
10 x 2 x 0.14	8,7
12 x 2 x 0.14	8,9
16 x 2 x 0.14	10,2
20 x 2 x 0.14	11,3
25 x 2 x 0.14	12,5
30 x 2 x 0.14	13,1
2 x 2 x 0.25	7,0
3 x 2 x 0.25	7,1
4 x 2 x 0.25	7,6
6 x 2 x 0.25	8,5
8 x 2 x 0.25	10,3
10 x 2 x 0.25	11,0
12 x 2 x 0.25	11,3
16 x 2 x 0.25	12,5
25 x 2 x 0.25	16,1
2 x 2 x 0.5	8,6
3 x 2 x 0.5	8,7
4 x 2 x 0.5	9,4

No. of cores and mm ² per conductor	Outer diameter in mm approx.
6 x 2 x 0.5	11,1
8 x 2 x 0.5	13,1
12 x 2 x 0.5	14,9
16 x 2 x 0.5	16,5
2 x 2 x 0.75	9,3
3 x 2 x 0.75	9,4
4 x 2 x 0.75	10,7
5 x 2 x 0.75	11,1
6 x 2 x 0.75	12,1
8 x 2 x 0.75	14,7
12 x 2 x 0.75	16,2
2 x 2 x 1.0	10,3
3 x 2 x 1.0	10,4
4 x 2 x 1.0	11,3
5 x 2 x 1.0	11,8



Silicon Cables with high temperature range -50°C up to +180°C



Recommended Application

When, at high ambient temperatures, the insulating materials of conventional cables and wires become broken and brittle after a short while

- Steel and glass works
- Sauna/solarium construction
- Thermal and heating elements
- Lighting technology
- Air conditioning technology
- Oven construction
- Polymer processing

Cable Construction

- Fine strands of tinned copper wires
- Silicone based core insulation
- Cores twisted into layers
- Silicone based outer sheath, colour red

Special Feature

- Temperature range -50°C up to + 180° C
- Halogen-free in accordance with IEC 60754-1
- Flame retardant in accordance with IEC 60 332.1
- Resistant against a multitude of oils and chemical media
- Flexible installation where space is limited
- Possess still insulating properties after combustion due to remaining SiO₂ ash on the conductor

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 0,75	6,4
3 G 0,75	6,8
4 G 0,75	7,6
5 G 0,75	8,5
6 G 0,75	9,2
7 G 0,75	9,2
2 x 1,0	6,6

No. of cores and mm ² per conductor	Outer diameter in mm approx.
3 G 1,0	7,0
4 G 1,0	7,9
5 G 1,0	8,8
6 G 1,0	9,5
7 G 1,0	9,5
2 x 1,5	7,6
3 G 1,5	8,0

No. of cores and mm ² per conductor	Outer diameter in mm approx.
4 G 1,5	8,8
5 G 1,5	9,6
6 G 1,5	10,4
7 G 1,5	10,4
12 G 1,5	14,0
16 G 1,5	16,2
20 G 1,5	17,5
24 G 1,5	19,8
2 x 2,5	8,8
3 G 2,5	9,7
4 G 2,5	10,6
5 G 2,5	11,6
6 G 2,5	12,6
7 G 2,5	12,6

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 4,0	10,8
3 G 4,0	11,5
4 G 4,0	12,6
5 G 4,0	14,0
7 G 4,0	15,6
2 x 6,0	12,4
3 G 6,0	13,2
4 G 6,0	14,7
5 G 6,0	16,6
7 G 6,0	18,6
4 G 10,0	19,4
5 G 10,0	21,6
4 G 16,0	22,0

G = with green/yellow earthing conductor

X = without earthing conductor



The Rubber Sheathed Cables Harmonised (HAR), used worldwide

Recommended Application

Light duty rubber-sheathed cable for:

- Hand-held equipment
- Light workshop devices with light to medium stress
- Dry and damp interiors, as well as for temporary outdoor use

Medium-duty, rubber-sheathed cable for:

- Hand-held equipment
- Lightweight workshop tools subject to medium loads
- Dry and damp interiors, as well as outdoor use

Heavy-duty, rubber-sheathed cable for:

- Tools and agriculture machinery
- High stresses
- Dry and damp interiors, as well as outdoor in industrial water
- Allowed up to 1000 V (0,6/1 kV) alternating voltage within fixed installation in tubes or devices as well as rotor connection cable for motors and similar
- Arrangements from single core rubber-sheathed cables H07RN-F can be used for short-circuit and short-to-ground proof installation in accordance with VDE 0100 Part 520

Cable Construction

H05RR-F

- Fine strands of copper wire
- Rubber core insulation, cores twisted together
- Various colours or printed numbers on black core in accordance with VDE 0293
- Outer sheath of synthetic rubber, flame retardant

H05RN-F

- Fine strands of copper wire
- Rubber core insulation, cores twisted together
- Various colours or printed numbers on black core in accordance with VDE 0293
- Outer sheath of polychloroprene rubber, flame-retardant, ozone-resistant, oil-resistant accordance to EN 60811-2-1

H07RN-F

- Fine strands of copper wire
- Rubber core insulation, cores twisted together
- Various colours or printed numbers on black core in accordance with VDE 0293
- Outer sheath of polychloroprene rubber, flame-retardant, ozone-resistant, oil-resistant accordance to EN 60811-2-1

Technical Specification

- The HAR standard provides both bare and tinned copper wires
- For this reason, both versions can be delivered

No. of cores and mm ² per conductor	Outer diameter in mm approx.
2 x 0,75	5,7 - 7,4
3 G 0,75	6,2 - 8,1
2 x 1,0	6,1 - 8,0
3 G 1,0	6,5 - 8,5
4 G 1,0	7,1 - 9,3
2 x 1,5	7,6 - 9,8
3 G 1,5	8,0 - 10,4
4 G 1,5	9,0 - 11,6
5 G 1,5	9,8 - 12,7
2 x 2,5	9,0 - 11,6
3 G 2,5	9,6 - 12,4
4 G 2,5	10,7 - 13,8
5 G 2,5	11,9 - 15,3
2 x 0,75	5,7 - 7,4
3 G 0,75	6,2 - 8,1
4 G 0,75	6,8 - 8,8
2 x 1,0	6,1 - 8,0
3 G 1,0	6,5 - 8,5
3 G 1,0	8,3 - 10,7
2 x 1,5	8,5 - 11,0
3 G 1,5	9,2 - 11,9
4 G 1,5	10,2 - 13,1
5 G 1,5	11,2 - 14,4
7 G 1,5	14,0 - 17,5
12 G 1,5	17,6 - 22,4
19 G 1,5	20,7 - 26,3
24 G 1,5	24,3 - 30,7
25 G 1,5	25,1 - 25,9
2 x 2,5	10,2 - 13,1
3 G 2,5	10,9 - 14,0
4 G 2,5	12,1 - 15,5
5 G 2,5	13,3 - 17,0
7 G 2,5	16,5 - 20,0
12 G 2,5	20,6 - 26,2
19 G 2,5	25,5 - 31,0
24 G 2,5	28,8 - 36,4
2 x 4,0	11,8 - 15,1
3 G 4,0	12,7 - 16,2
4 G 4,0	14,0 - 17,9

No. of cores and mm ² per conductor	Outer diameter in mm approx.
5 G 4,0	15,6 - 19,9
7 G 4,0	21,0 - 21,8
3 G 6,0	14,1 - 18,0
4 G 6,0	15,7 - 20,0
5 G 6,0	17,5 - 22,2
3 G 10,0	19,1 - 24,2
4 G 10,0	20,9 - 26,5
5 G 10,0	22,9 - 29,1
3 G 16,0	21,8 - 27,6
4 G 16,0	23,8 - 30,1
5 G 16,0	26,4 - 33,3
4 G 25,0	28,9 - 36,6
5 G 25,0	32,0 - 40,4
4 G 35,0	32,5 - 41,1
5 G 35,0	37,0 - 45,0
4 G 50,0	37,7 - 47,5
5 G 50,0	40,0 - 50,8
4 G 70,0	42,7 - 54,0
4 G 95,0	48,4 - 61,0
4 G 120,0	53,0 - 66,0
4 G 150,0	58,0 - 73,0
4 G 185,0	64,0 - 80,0
4 G 240,0	72,0 - 91,0
1 x 1,5	5,7 - 7,1
1 x 2,5	6,3 - 7,9
1 x 4,0	7,2 - 9,0
1 x 6,0	7,9 - 9,8
1 x 10,0	9,5 - 11,9
1 x 16,0	10,8 - 13,4
1 x 25,0	12,7 - 15,8
1 x 35,0	14,3 - 17,9
1 x 50,0	16,5 - 20,6
1 x 70,0	18,6 - 23,3
1 x 95,0	20,8 - 26,0
1 x 120,0	22,8 - 28,6
1 x 150,0	25,2 - 31,4
1 x 185,0	27,6 - 34,4
1 x 240,0	30,6 - 38,3
1 x 300,0	33,5 - 41,9

G = with green/yellow protective conductor

x = without protective conductor







Conductor Resistances and Conductor Make-up (metric)

Conductor Resistances for annealed-copper-conductors in single and multicore cables $\geq 0.5 \text{ mm}^2$ according to DIN EN 60228 (VDE 0295)

Nominal cross-section in mm^2	Conductor resistance for 20°C for 1 km in Ω (maximum value)			
	of metal coated copper wire		of bare copper wire	
	Class 2	Class 5 + 6	Class 2	Class 5 + 6
0.08		250		243
0.14		142		138
0.25		82		79
0.34		59		57
0.5	36.7	40.1	36	39
0.75	24.8	26.7	24.5	26
1	18.2	20	18.1	19.5
1.5	12.2	13.7	12.1	13.3
2.5	7.56	8.21	7.41	7.98
4	4.7	5.09	4.61	4.95
6	3.11	3.39	3.08	3.3
10	1.84	1.95	1.83	1.91
16	1.16	1.24	1.15	1.21
25	0.734	0.795	0.727	0.78
35	0.529	0.565	0.524	0.554
50	0.391	0.393	0.387	0.386
70	0.27	0.277	0.268	0.272
95	0.195	0.21	0.193	0.206
120	0.154	0.164	0.153	0.161
150	0.126	0.132	0.124	0.129
185	0.1	0.108	0.0991	0.106
240	0.0762	0.0817	0.0754	0.0801
300	0.0607	0.0654	0.0601	0.0641
400	0.0475		0.047	
500	0.0369		0.0366	
630	0.0286		0.0283	
800	0.0224		0.0221	
1000	0.0177		0.0176	


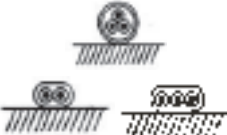


Examples of Conductor Make-up (metric)

Cross section in mm ²	Multi-Wire Strands		Fine-Wire Strands	Super-Fine-Wire Strands			
	Multi-Wire Strands	Multi-Wire Strands		Multi-Wire Strands	Multi-Wire Strands	Multi-Wire Strands	Multi-Wire Strands
0.14				~ 18 x 0.10	~ 18 x 0.1	~ 36 x 0.07	~ 72 x 0.05
0.25			~ 14 x 0.15	~ 32 x 0.10	~ 32 x 0.1	~ 65 x 0.07	~ 128 x 0.05
0.34		7 x 0.25	~ 19 x 0.15	~ 42 x 0.10	~ 42 x 0.1	~ 88 x 0.07	~ 174 x 0.05
0.38		7 x 0.27	~ 12 x 0.20	~ 21 x 0.15	~ 48 x 0.1	~ 100 x 0.07	~ 194 x 0.05
0.5	7 x 0.30	7 x 0.30	~ 16 x 0.20	~ 28 x 0.15	~ 64 x 0.1	~ 131 x 0.07	~ 256 x 0.05
0.75	7 x 0.37	7 x 0.37	~ 24 x 0.20	~ 42 x 0.15	~ 96 x 0.1	~ 195 x 0.07	~ 384 x 0.05
1	7 x 0.43	7 x 0.43	~ 32 x 0.20	~ 56 x 0.15	~ 128 x 0.1	~ 260 x 0.07	~ 512 x 0.05
1.5	7 x 0.52	7 x 0.52	~ 30 x 0.25	~ 84 x 0.15	~ 192 x 0.1	~ 392 x 0.07	~ 768 x 0.05
2.5	7 x 0.67	~ 19 x 0.41	~ 50 x 0.25	~ 140 x 0.15	~ 320 x 0.1	~ 651 x 0.07	~ 1280 x 0.05
4	7 x 0.85	~ 19 x 0.52	~ 56 x 0.30	~ 224 x 0.15	~ 512 x 0.1	~ 1040 x 0.07	
6	7 x 1.05	~ 19 x 0.64	~ 84 x 0.30	~ 192 x 0.20	~ 768 x 0.1	~ 1560 x 0.07	
10	7 x 1.35	~ 49 x 0.51	~ 80 x 0.40	~ 320 x 0.20	~ 1280 x 0.1	~ 2600 x 0.07	
16	7 x 1.70	~ 49 x 0.65	~ 128 x 0.40	~ 512 x 0.20	~ 2048 x 0.1		
25	7 x 2.13	~ 84 x 0.62	~ 200 x 0.40	~ 800 x 0.20	~ 3200 x 0.1		
35	7 x 2.52	~ 133 x 0.58	~ 280 x 0.40	~ 1120 x 0.20			
50	~ 19 x 1.83	~ 133 x 0.69	~ 400 x 0.40	~ 705 x 0.30			
70	~ 19 x 2.17	~ 189 x 0.69	~ 356 x 0.50	~ 990 x 0.30			
95	~ 19 x 2.52	~ 259 x 0.69	~ 485 x 0.50	~ 1340 x 0.30			
120	~ 37 x 2.03	~ 336 x 0.67	~ 614 x 0.50	~ 1690 x 0.30			
150	~ 37 x 2.27	~ 392 x 0.69	~ 765 x 0.50	~ 2123 x 0.30			
185	~ 37 x 2.52	~ 494 x 0.69	~ 944 x 0.50	~ 1470 x 0.40			
240	~ 37 x 2.87	~ 627 x 0.70	~ 1225 x 0.50	~ 1905 x 0.40			
300	~ 61 x 2.50	~ 790 x 0.70	~ 1530 x 0.50	~ 2385 x 0.40			
400	~ 61 x 2.89		~ 2035 x 0.50				
500	~ 61 x 3.23		~ 1768 x 0.60				
630	~ 91 x 2.97		~ 2286 x 0.60				
Visualisation:		Multi-Wire Strands 	Fine-Wire Strands 	Super-Fine-Wire Strands 			



Power Rating

Of wires & cables having nominal voltage up to 1000 V and heat resistant wires & cables, ambient temperature 30°C

Cable or lead category						
	A Single core cable • Rubber insulated • PVC insulated • TPE insulated • Heat resistant	B Multi core cables and cords for home- and portable apparatus • Rubber insulated • PVC insulated • TPE insulated		C Multicore cables + cords, excl. home- + portable apparatus • Rubber insulated • PVC insulated • TPE- insulated • Heat resistant	D Multicore heavy duty rubber cables ≤ 0.6/1kV Single core special rubber cables 0.6/1kV or 1.8/3kV	
Method of installation						
Number of current carrying conductors	1 ³⁾	2	3	2 or 3	3 1 ³⁾	
Nominal Cross Section in mm ²	Current rating in A	Current rating in A		Current rating in A	Current rating in A	
0.081)	1.5	-	-	1	-	-
0.141)	3	-	-	2	-	-
0.251)	5	-	-	4	-	-
0.341)	8	-	-	6	-	-
0.5	122)	3	3	92)	-	-
0.75	15	6	6	12	-	-
1	19	10	10	15	-	-
1.5	24	16	16	18	23	30
2.5	32	25	20	26	30	41
4	42	32	25	34	41	55
6	54	40	-	44	53	70
10	73	63	-	61	74	98
16	98	-	-	82	99	132
25	129	-	-	108	131	176
35	158	-	-	135	162	218
50	198	-	-	168	202	276
70	245	-	-	207	250	347
95	292	-	-	250	301	416
120	344	-	-	292	-	488
150	391	-	-	335	-	566
185	448	-	-	382	-	644
240	528	-	-	453	-	775
300	608	-	-	523	-	898
400	726	-	-	-	-	-
500	830	-	-	-	-	-
Sources of current ratings of table 12-1	DIN VDE 0298-4, 2003-08 Table 11 Column 2	DIN VDE 0298-4, 2003-08 Table 11 Column 3 + 4		DIN VDE 0298-4, 2003-08 Table 11 Column 5	DIN VDE 0298-4, 2003-08 Table 15 Column 4 + 2	

Note:

Design of tables 12 to 13 deviates from (58 pages-). VDE 0298-4 design. In case of doubt, appliance of the current issue of the DIN VDE 0298-4 is obligatory. Table 12-1 values have to be taken into consideration for further applicable converting/derating factors:

- Other ambient temperatures: Table 12-2
- More than 3 current carrying cores of multiconductor cables up to 10 mm²: Table 12-3
- Ambient temperatures > 50°C of heat resistant wire & cables: Table 12-4
- For winded, spooled cables: Table 12-5
- Grouping of single core & multicore cables in conduits, raceways, wire ways, floor & ceiling: Table 12-6
- Grouping of multicore cables in cable trays: Table 12-7
- Grouping of single core cables in cable trays: Table 12-8

1) VDE 0891-1 -borrowed current ratings for conductor sizes < 0.5mm² (0.08-0.34 mm²)

2) In terms of VDE 0298-4, 2003-08, Table 11 column 2 extended range for size 0.5 mm²

3) Clustering of single core cables in touch to each other or bundled cables:

- **On surfaces: Current rating values of Table 12-1 column A or D**

- For 1~A.C. or – or D.C.-circuits a derating factor of 0.76

- For 3~A.C. circuits a derating factor of 0.67 have to be applied before applying conversion factor of Table 12-6

- **Free in air or on cable trays: Current rating values of table 12-1 column A or D**

- For 1~A.C. – or D.C. circuits a derating factor of 0.8

- For 3~A.C. circuits a derating factor of 0.7 have to be applied before applying conversion factor of table 12-8

- **Attention:** Single cores (wires) installed in conduits or pipes in or attached to walls (Installation Methode A1 or B1) in buildings see VDE 0298, tables 3 or 5, column 2, 3, 6, or 7 & table 21



Correction Factors

For ambient temperatures different to 30°C. For heat resistant cables and wires see Table T12-4 (in accordance to DIN VDE 0298-4, 2003-08, Table 17).

Rated temperature of the conductor of wire or cable (See product page of the catalogue, Technical Data, Temperature range: upper value for static and/or flexing)					
	60°C	70°C	80°C	85°C	90°C
Ambient temperature in°C	Correction Factor, applicable to current value of T12-1				
10	1.29	1.22	1.18	1.17	1.15
15	1.22	1.17	1.14	1.13	1.12
20	1.15	1.12	1.1	1.09	1.08
25	1.08	1.06	1.05	1.04	1.04
30	1	1	1	1	1
35	0.91	0.94	0.95	0.95	0.96
40	0.82	0.87	0.89	0.9	0.91
45	0.71	0.79	0.84	0.85	0.87
50	0.58	0.71	0.77	-	0.82
55	0.41	0.61	0.71	-	0.76
60	-	0.5	0.63	-	0.71
65	-	0.35	0.55	-	0.65
70	-	-	0.45	-	0.58
75	-	-	0.32	-	0.5
80	-	-	-	-	0.41
85	-	-	-	-	0.29

Correction Factors

For multiconductor cables and cords, having conductor size up to 10 mm² (DIN VDE 0298-4, 2003-08. Table 26)

Number of current carrying conductors	Correction factor for cables in free air	Correction factor for cables in earth (burial)
5	0.75	0.7
7	0.65	0.6
10	0.55	0.5
14	0.5	0.45
19	0.45	0.4
24	0.4	0.35
40	0.35	0.3
61	0.3	0.25



Correction Factors of heat resistant cables and wires

For ambient temperatures different to 30°C. For heat resistant cables and wires see Table T12-4 (in accordance to DIN VDE 0298-4, 2003-08, Table 17).

Cables and wires classified according to its rated temperature of the conductor (See product page of the catalogue Technical Data, Temperature Range, for upper value for static and/or flexing use)				
	ÖLFLEX® HEAT 105 H07V2-K ÖLFLEX®-FD ROBUST H07Z-K 90 °C	Halogen free single core H07Z-K 110 °C	ÖLFLEX® HEAT 145	ÖLFLEX® HEAT 180 Silicone rubber
Ambient temperature in °C	Correction factor, applying to current value of Table 12-1, column A, C or D for heat resistant wires and cables (Source: DIN VDE 0298-4, 2003-08, Table 18)			
up to 50	1	1	1	1
55	0.94	1	1	1
60	0.87	1	1	1
65	0.79	1	1	1
70	0.71	1	1	1
75	0.61	1	1	1
80	0.5	1	1	1
85	0.35	0.91	1	1
90	-	0.82	1	1
95	-	0.71	1	1
100	-	0.58	0.94	1
105	-	0.41	0.87	1
110	-	-	0.79	1
115	-	-	0.71	1
120	-	-	0.61	1
125	-	-	0.5	1
130	-	-	0.35	1
135	-	-	-	1
140	-	-	-	1
150	-	-	-	1
155	-	-	-	0.91
160	-	-	-	0.82
165	-	-	-	0.71
170	-	-	-	0.58
175	-	-	-	0.41

Correction Factors

Of spooled/winded cables (DIN VDE 0298-4, 2003-8. Table 27)


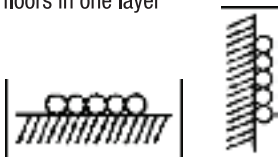
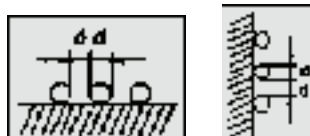
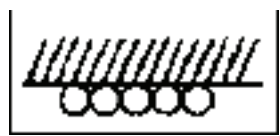
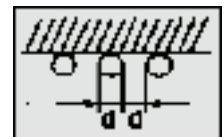
Number of layers on spool, reel or drum	1	2	3	4	5
Correction Factor	0.8	0.61	0.49	0.42	0.38

For helix-type coiled/winded cables (spiral in one layer) the Correction Factor is 0.8



Correction Factors

Grouping on the wall, floor, ceiling in conduits or closed wire ways
(in accordance to DIN VDE 0298-4, 2003-08, Table 21).

Number of current-carrying multicore cables or number of groups of 2- or 3-phase A.C. circuits single core cables.															
Type of installation (method)	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20
In floors or walls which are in contact between each other bunched directly as well as in conduits or in wire ways 	1	0.8	0.7	0.65	0.6	0.57	0.54	0.52	0.5	0.48	0.45	0.43	0.41	0.39	0.38
In touch between each other, directly attached to walls or floors in one layer 	1	0.85	0.79	0.75	0.73	0.72	0.72	0.71	0.7	0.7	0.7	0.7	0.7	0.7	0.7
With clearance of "d" between each other, directly attached to walls or floors in one layer 	1	0.94	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
In touch between each other, directly attached to ceilings 	0.95	0.81	0.72	0.68	0.66	0.64	0.63	0.62	0.61	0.61	0.61	0.61	0.61	0.61	0.61
With clearance of "d" between each other, directly attached to ceilings in one layer 	0.95	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85

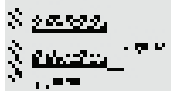
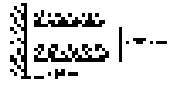





○ - Symbol of one single core or one multicore cable

Notice: Correction Factors can be applied only to similar loaded cables of a similar type of installation (wiring method) and nominal cross sections differ one step only

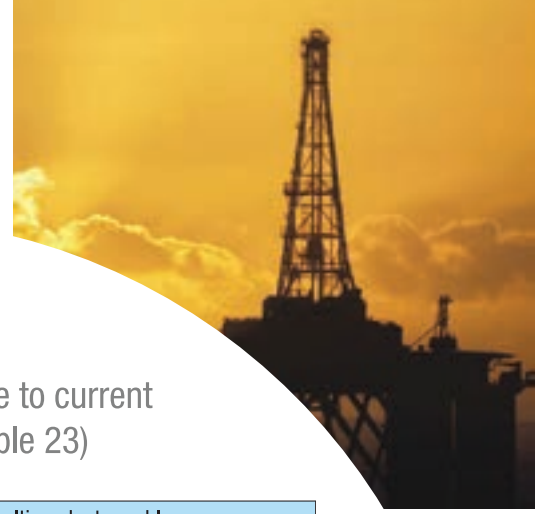


Correction Factors

for grouping/clustering of multiconductor cables in cable trays
(in accordance to DIN VDE 0298-4, 2003-08, table 22)

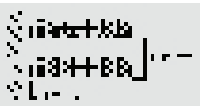
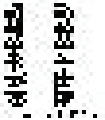
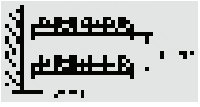
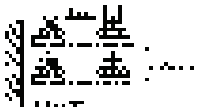


Cable arrangement		Number of cable trays	Number of multiconductor cables						
			1	2	3	4	6	9	
		Correction Factors							
Cable tray, Non-punched	in touch 	1	0.97	0.84	0.78	0.75	0.71	0.68	
		2	0.97	0.83	0.76	0.72	0.68	0.63	
		3	0.97	0.82	0.75	0.71	0.66	0.61	
		6	0.97	0.81	0.73	0.69	0.63	0.58	
Cable tray, punched (ventilated)	in touch 	1	1	0.88	0.82	0.79	0.76	0.73	
		2	1	0.87	0.8	0.77	0.73	0.68	
		3	1	0.86	0.79	0.76	0.71	0.66	
		6	1	0.84	0.77	0.73	0.68	0.64	
	with space 	1	1	1	0.98	0.95	0.91	–	
		2	1	0.99	0.96	0.92	0.87	–	
		3	1	0.98	0.95	0.91	0.85	–	
	in touch 	1	1	0.88	0.82	0.78	0.73	0.72	
		2	1	0.88	0.81	0.76	0.71	0.7	
		with space 	1	1	0.91	0.89	0.88	0.87	–
			2	1	0.91	0.88	0.87	0.85	–
	Cable tray, ladder type	in touch 	1	1	0.87	0.82	0.8	0.79	0.78
2			1	0.86	0.81	0.78	0.76	0.73	
3			1	0.85	0.79	0.76	0.73	0.7	
6			1	0.83	0.76	0.73	0.69	0.66	
with space 		1	1	1	1	1	1	–	
		2	1	0.99	0.98	0.97	0.96	–	
		3	1	0.98	0.97	0.96	0.93	–	

Note: Correction Factors are applicable to similar loaded cables of a similar type of installation (wiring method) of groups of cables, lying in one-layer only, as shown in this page. Correction Factors are not applicable to cables lying on top to each other as well as if minimum distance required according to the table it is not guaranteed. In such cases Correction Factors of this table have to be additional corrected too. i.e according Table 12-6



Correction Factors

For grouping/clustering of single core cables in cable trays. Applicable to current values of table 12-1 (Origin of T12-8 = DIN VDE 0298-4 2003-08, Table 23)

Cable arrangement		Number of cable trays	Number of multiconductor cables			Applicable as a multiplier of the rated values of:
			1	2	3	
		Correction Factors				
Cable tray, punched (ventilated)	in touch 	1	0.98	0.91	0.87	Three cables, horizontal array, one-layer configuration
		2	0.96	0.87	0.81	
		3	0.95	0.85	0.78	
	in touch 	1	0.96	0.86	–	Three cables, vertical array, one-layer configuration
		2	0.95	0.84	–	
		3	–	–	–	
Cable tray, ladder type 	1	1	0.97	0.96	Three cables, horizontal array, one-layer configuration	
	2	0.98	0.93	0.89		
	3	0.97	0.9	0.86		
Cable tray, punched (ventilated)		1	1	0.98	0.96	Three cables, vertical array, one-layer configuration
		2	0.97	0.93	0.89	
		3	0.96	0.92	0.86	
		1	1	0.91	0.89	Three cables, horizontal array, one-layer configuration
		2	1	0.9	0.86	
		3	–	–	–	
Cable tray, ladder type 	1	1	1	1	Three cables, horizontal array, one-layer configuration	
	2	0.97	0.95	0.93		
	3	0.96	0.94	0.9		

Note: Correction Factors are applicable to similar loaded cables of a similar type of installation (wiring method) of groups of single core cables, lying in one-layer or delta configuration only, as shown in this page. Conversion Factors are not applicable to cables lying on top to each other as well as if minimum distance required according to the table is not guaranteed. In such cases correction Factors of this table have to be additional corrected too. I.e according Table 12-6. In cases where a splitting into certain numbers of parallel groups of cables is needed, each group of 3 current carrying cables is considered as being one entire circuit




Power Ratings of Rubber Cables

H07RN-F and A07RN-F in industrial application usage
(in accordance with DIN VDE 0298-4, Aug. 2003 Table 13)

Rated temperature at the conductor	60°C						
Ambient Temperature	30°C						
Installation - Method Free in air							
Number of current carrying conductors	2	3	2	2	3	3	3
Conductors Nominal Cross Section in mm ²	Current rating in A						
1	-	-	15	15.5	12.5	13	13.5
1.5	19	16.5	18.5	19.5	15.5	16	16.5
2.5	26	22	25	26	21	22	23
4	34	30	34	35	29	30	30
6	43	38	43	44	36	37	38
10	60	53	60	62	51	52	54
16	79	71	79	82	67	69	71
25	104	94	105	109	89	92	94
35	129	117	-	135	110	114	-
50	162	148	-	169	138	143	-
70	202	185	-	211	172	178	-
95	240	222	-	250	204	210	-
120	280	260	-	292	238	246	-
150	321	300	-	335	273	282	-
185	363	341	-	378	309	319	-
240	433	407	-	447	365	377	-
300	497	468	-	509	415	430	-
400	586	553	-	-	-	-	-
500	970	634	-	-	-	-	-
630	784	742	-	-	-	-	-
Correction Factors for:							
Other ambient temperatures	See Table T 12-2						
Grouping/Clustering	-	T 12-8			T 12-7		-
Spooled/winded cables	-	-			T 12-5		
Multiconductor cables			-		T 12-3		-

Certificates



National Accreditation Board for Testing and Calibration Laboratories
(A Constituent Board of Quality Council of India)

NABL/IT-1049 19.12.2022

A K MITTAL
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Subject: Renewal of Accreditation with advisory

Dear Sir,

I am pleased to inform you that NABL has examined the assessment report of your laboratory and decided the renewal of accreditation in accordance with ISO/IEC 17025:2017 in the discipline of Electrical testing as per scope recommended by the assessment team.

Laboratory is advised to clarify the following within 10 days:

1. Review unit of range of testing for Mel flow index in the scope.
2. Provide range of testing for Vicat softening point in the scope.
3. Review range of testing and MU along with observed value at which MU has been estimated for Temperature index test in the scope.
4. Review unit and range of testing for Dielectric power factor in the scope.
5. Provide MU in same unit as that of range of testing for cold elongation test in the scope.
6. Review range of testing and MU for insulation resistance test in the scope.


The Accreditation Certificate Number TC-6110 for Electrical testing with issue date 31.07.2022 valid till 30.07.2024 with amendment 14.12.2022 is under preparation. Being an accredited laboratory of NABL, you must fulfill all the Terms and Conditions laid down in our document NABL-131. You are requested to follow NABL-133 (current issue) for using NABL symbol.

The continuation of accreditation is subject to compliance of NABL norms & satisfactory annual surveillance. Accreditation is subject to annual surveillance. Lab is required to submit documents for annual surveillance within 10-12 months from the date of accreditation for continuation of accreditation.

All the personnel proposed by the laboratory to report, review and authorize the results are accepted.
For use of NABL Accredited CAB Certified ILAC MBA Mark on test reports, lab needs to seek approval on NABL web portal.

Yours Sincerely,
Upasna Jain
upnas@nabl.gov.org

NABL House, Plot 45, Sector 44, Gurgaon 122 003, Haryana, India
Tel No: +91-124-4679700 (30 lines) * Fax: +91-124-4679799 * Website: www.nabl-india.org



Certificate No: 10000375627-MSC-UKAS-IND
Place and date: London, 14 October 2020


Appendix to Certificate

KEI Industries Ltd.
Locations included in the certification are as follows:

Site Name	Site Address	Site Scope
KEI Industries Ltd.	SP 919, 920, 922, RIICO Industrial Area, Phase - III, Bhiwadi, District: Alwar - 301 019, Rajasthan, India	Design, Development, Manufacture and Services of cables, wires & conductors (HT/EHV/LT, power, control, instrumentation), thermocouples, elastomeric cables, winding & flexible wires and stainless steel wires for wide range of applications.
KEI Industries Ltd.	A-280 - 284, SP4-870, Chopanki Industrial Area, Bhiwadi, District: Alwar - 301 019, Rajasthan, India	Design, development, manufacture and services of cables, wires & conductors (HT/EHV/LT, power, control, instrumentation), thermocouples, winding & flexible wires for wide range of applications.
KEI Industries Ltd.	Plot No. 07, Survey No. 99/2P, Madhuban Industrial Estate, Rakholi, Silvassa - 396 230, Dadra & Nagar Haveli, India	Design, Development, Manufacture and Services of cables, wires & conductors (LT, power, control, instrumentation), thermocouples, winding & flexible wires for wide range of applications.
KEI Industries Ltd.	Plot No. SP2-874, Industrial Area, Pathredi, Bhiwadi, Dist. Alwar - 301 019, Rajasthan, India	Design, Development, Manufacture and Services of cables, wires & conductors (HT/EHV/LT, power, control, instrumentation), thermocouples, winding & flexible wires for wide range of applications.

Lack of fulfillment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV GL Business Assurance UK Limited, 4th Floor, Vivo Building, 30 Stamford Street, London, SE1 9LQ, United Kingdom.
TEL: +44(0) 203 816 4000. www.dnvgl.co.uk

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Certificate No: 10000341129-MSC-UKAS-IND
Place and date: London, 20 October 2020


Appendix to Certificate

KEI Industries Ltd.
Locations included in the certification are as follows:

Site Name	Site Address	Site Scope
KEI Industries Ltd.	SP 919, 920, 922, RIICO Industrial Area, Phase - III, Bhiwadi, District: Alwar - 301 019, Rajasthan, India	Design, development, manufacture and services of cables, wires & conductors viz., HT/EHV/LT power, control, instrumentation, thermocouples, elastomeric cables, winding & flexible wires and stainless steel wires for wide range of applications.
KEI Industries Ltd.	Plot No. 07, Survey No. 99/2P, Madhuban Industrial Estate, Rakholi, Silvassa - 396 230, Dadra & Nagar Haveli, India	Design, development, manufacture and services of cables, wires & conductors viz., LT power, control, instrumentation, thermocouples, winding & flexible wires for wide range of applications.
KEI Industries Ltd.	A-280 - 284, SP4-870, Chopanki Industrial Area, Bhiwadi, District: Alwar - 301 019, Rajasthan, India	Design, development, manufacture and services of cables, wires & conductors viz., HT/EHV/LT power, control, instrumentation, thermocouples, winding & flexible wires for wide range of applications.
KEI Industries Ltd.	Plot No. SP2-874, Industrial Area, Pathredi, Bhiwadi, Dist. Alwar - 301 019, Rajasthan, India	Design, development, manufacture and services of cables, wires & conductors viz., HT/EHV/LT power, control, instrumentation, thermocouples, winding & flexible wires for wide range of applications.

Lack of fulfillment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV GL Business Assurance UK Limited, 4th Floor, Vivo Building, 30 Stamford Street, London, SE1 9LQ, United Kingdom.
TEL: +44(0) 203 816 4000. www.dnvgl.co.uk

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Certificate No: 10000375626-MSC-UKAS-IND
Place and date: Chennai, 14 October 2020

Appendix to Certificate

KEI Industries Ltd.
Locations included in the certification are as follows:

Site Name	Site Address	Site Scope
KEI Industries Ltd.	SP 919, 920, 922, RIICO Industrial Area, Phase - III, Bhiwadi, District: Alwar - 301 019, Rajasthan, India	Design, development, manufacture and services of cables, wires & conductors (HT/EHV/LT, power, control, instrumentation), thermocouples, elastomeric cables, winding & flexible wires & stainless-steel wires for wide range of applications.
KEI Industries Ltd.	A-280 - 284, SP4-870, Chopanki Industrial Area, Bhiwadi, District: Alwar - 301 019, Rajasthan, India	Design, development, manufacture and services of cables, wires & conductors (HT/EHV/LT, power, control, instrumentation), thermocouples, winding and flexible wires for wide range of applications.
KEI Industries Ltd.	Plot No. 07, Survey No. 99/2P, Madhuban Industrial Estate, Rakholi, Silvassa - 396 230, Dadra & Nagar Haveli, India	Design, development, manufacture and services of cables, wires & conductors (LT, power, control, instrumentation), thermocouples, winding and flexible wires for wide range of applications.
KEI Industries Ltd.	Plot No. SP2-874, Industrial Area, Pathredi, Bhiwadi, Dist. Alwar - 301 019, Rajasthan, India	Design, development, manufacture and services of cables, wires & conductors (HT/EHV/LT, power, control, instrumentation), thermocouples, winding and flexible wires for wide range of applications.
KEI Industries Ltd.	D-99 Okhla Industrial Area, Phase-I, New Delhi - 110 020, India	Design, development & marketing of cables, wires and conductors (HT/EHV/LT, power, control, instrumentation), thermocouples, elastomeric cables, winding & flexible wires and stainless steel wires for wide range of applications.

Lack of fulfillment of conditions as set out in the Certification Agreement may render this Certificate invalid.
ACCREDITED UNIT: DNV GL Business Assurance UK Limited, 4th Floor, Vivo Building, 30 Stamford Street, London, SE1 9LQ, United Kingdom.
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KEI Industries Limited

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