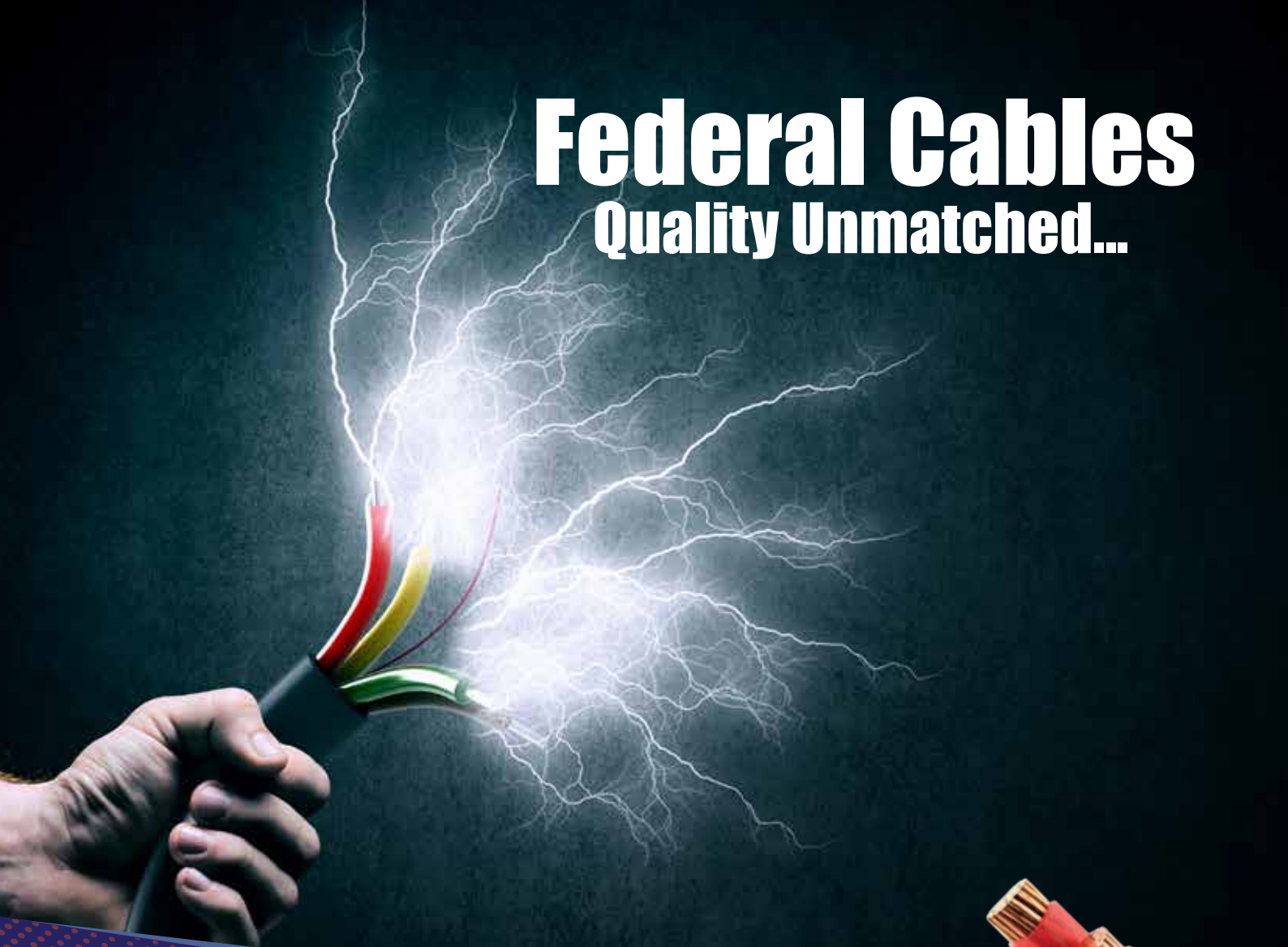


Federal Cables

Quality Unmatched...



Low Voltage Power Cables



Quality Unmatched..
Qualität unübertroffen

www.federalcables.com



INDEX

● Introduction	04
● Product range	04
● Technical advisory services	04
● Quality standard	05
● Manufacturing, Inhouse Testing & Quality Measures	06
● LV XLPE Cables	07
● Specifications	07
● Cable construction	07
● Installation conditions	08
● XLPE Insulated cables as per BS 5467 /IEC 60502-1/BS 6724	11
● Single core armoured cables	11
● Two core armoured cables	12
● Three core armoured cables	13
● Four core armoured cables (CU/AL)	14
● Five core armoured cables	15
● Armoured Auxilliary cables	16
● XLPE Insulated cables as per BS 7889 / IEC 60502-1 Technical data	17
● Single core unarmoured cables	17
● Two core unarmoured cables	18
● Three core unarmoured cables	19
● Four core unarmoured cables	20
● Five core unarmoured cables	21
● Unarmoured Auxilliary cables	22
● Derating factors	23
● Common abbreviations	29
● Drum handling instructions	30





Introduction

“**FEDERAL CABLES**” (**Fedcab**) is part of Federal group of companies established in the year 1999. We are proud partners to the various energy needs of Middle east through different sectors. **Fedcab’s** manufacturing facility is located in Abu Dhabi, UAE with state of the art machineries and integrated technical expertise. Apart from cables, Federal manufactures power and distribution transformers, bus ducts and switchgear Panels.

Fedcab current range of cables include XLPE, PVC, LSZH and HO7RN-F insulation conforming to international standards such as BS, BS EN, IEC, VDE, GOST or any other standard that may be desired by a client.

Product Range

- Low Voltage XLPE or PVC Insulated Power Cables
- LV PVC Insulated building wires
- LV PVC Insulated trirated Panel Wires
- PVC Flexible cables
- LV XLPE Insulated LSZH Cables
- LV LSZH Insulated Wires
- Rubber Insulated HO7RN-F cables
- Fire resistant cables
- Instrumentation Cables
- Control & Auxiliary Cables

Technical Advisory Services

Fedcab has a dedicated technical advisory team to assist customers in choosing the apt product technically suitable for their requirements.



Quality Standard

Quality Management System Certified to ISO 9001

Fedcab's Quality Management System conforming to ISO 9001:2015 is certified by TUV NORD Germany.

Certification to the ISO 9001 standard demonstrates that Fedcab has documented procedures to ensure and demonstrate full compliance with all requirements of the standard and that these procedures are followed by every department in the company, thus ensuring that goods leaving Fedcab's factory are of the best quality and meet customer's requirements in every respect.

Fedcab is committed to supply best quality products which it articulates with the slogan "Quality Unmatched". Fedcab cables are type tested at DEKRA Certification B.V., The Netherlands as below.



Environmental Management System Certified to ISO 14001

Fedcab's Environmental Management System conforms to the ISO 14001:2015 International Environmental Management Standard and is certified by TUV NORD, Germany.

Certification to the ISO 14001:2015 International standard shows that Fedcab has a well defined structure and established working practices aimed at limiting its impact on the environment. Measurement and monitoring of effects, issuing work instructions, training of personnel and taking corrective actions are all essential elements to limiting the impact on the environment. Fedcab has set improvement targets to



reduce the significant environmental impacts associated with its activities and thus ensuring sustainability.

Occupational Health & Safety Assessment Certified To OHSAS 45001:2018

Fedcab is ISO 45001 certified, an internationally accepted Standard for occupational health and safety management systems. This certification demonstrates Fedcab's adherence to sound occupational health & safety practices.

● Manufacturing, Inhouse Testing & Quality Measures

Fedcab takes utmost care while manufacturing its products. We have the latest plant and equipment from manufacturers such as **Niehoff-Germany, Rosendhal-Austria and Royle systems-USA**. We have online diameter gauges from BETA Lasermike, USA, Sikora, Germany and state of the art cable quicke optical non-contact measurement system from Sweden. We have online high voltage testing facility on our extrusion lines. Entire production process is carried out in-house and quality checks are carried out at each stage of production right from raw material to the finished product. We procure raw materials from best available sources which qualify to our in-house quality standards.

Federal Cables have most modern and fully equipped laboratory for testing materials and finished cables. Raw materials, in process materials and finished cables are all tested as per well documented quality norms. The laboratory is manned by engineers and managers having rich experience. We have complete facility for testing cables for fire performance, flame retardance, low smoke and halogen free characteristics etc.

Final testing is done according to the requirement of the various specifications, ensuring full compliance and long term product reliability. In addition to all electrical testing, all cables are subjected to stringent physical and mechanical testing. We have complete Type Testing facility for all types of cables that we produce.



LV XLPE CABLES

Cable type

Cable type covered are given below.

- Plain Copper Conductor, XLPE insulated, Armoured or unarmoured Cables with PVC, PE or FR PVC Outer sheath.
- Single core cables up to and including 1000mm²
- 2 core cables up to and including 400mm²
- 3 core cables up to and including 400mm²
- 4 core & 3.5 core (4 core with reduced neutral) cables up to and including 400mm²
- 5 core cables up to and including 70 mm²
- 1.5 mm², 2.5 mm² & 4 mm² auxiliary cables.

Cables with separate earth and or overall screen for VFD drives up to and including 300mm² are also available on request.

Specifications

- BS 5467- XLPE insulated armoured single and multicore power cables & Auxiliary cables
- BS 6724- XLPE insulated armoured single and multicore power cables & Auxiliary cables
- IEC 60502 (Part1)-XLPE or PVC insulated single/multicore, armoured/unarmoured, Power & control cables
- BS 7889- XLPE insulated single core unarmoured cables
- Cables as per any other International Standard VDE/DIN, ANSI/ICEA, GOST, NF etc or as per customer's specifications can also be supplied.

Cable Construction

1. CONDUCTOR

Plain annealed copper conductor complying with BS EN 60228. The conductor is stranded circular, stranded circular compacted or shaped compacted as per requirement.

2. INSULATION

Insulation material is Cross Linked Polyethylene (XLPE) complying with IEC 60502-1 or type GP8 as per BS 7655-1.3.

2.1 CORE COLORS

European standard for core identification with specific functional requirement for blue and Green-yellow cores termed as the new colour scheme and is given below.

No. of cores	Old colour scheme	New colour scheme
1	Red or Black	Brown or Blue
2	Red & Black	Brown & Blue
3	Red, Yellow & Blue	Brown, Black & Grey
4	Red, Yellow, Blue & Black	Blue, Brown, Black & Grey
5	Red, Yellow, Blue, Black & Green	Green-Yellow, Blue, Brown, Black & Grey



3. ASSEMBLY

The Insulated cores are laid-up together. Polymeric fillers are provided (if required) in the core interstices to provide circular shape and the assembly is wrapped with polypropylene or polyester binder tapes for holding.

4. METALIC SCREEN

Fedcab provides different types of metallic screen whenever required according to the cable design suitable for specific applications. Common screening materials are Copper tapes and Copper / aluminium laminates.

5. BEDDING

Bedding consists of an extruded layer of polymeric material compatible with the operating temperature of the cable.

6. ARMOUR

Armour act as a mechanical protection for the cores against physical damages when the cable is laid. Armour can also serve as an Earth Continuity Conductor (ECC).

Different types of Armoring are Galvanized round steel wire (GSW), Aluminium round wire, Galvanized round steel wire plus tinned copper wires (TCW) for achieving lower armor resistance (when required by customer) and Galvanised double steel tapes.

Aluminum round wire armor (AWA) is generally used for single core cables to be used in ac circuits as aluminum is a non-magnetic material and this reduces losses due to induced currents in the armor.

7. OUTER SHEATH OR JACKET

Outer sheath or Jacket is the overall covering of the cable. It protects the cable from any deleterious elements in the environment where the cable is laid. Different types of materials are used as outer sheath depending on the application.

General purpose PVC Type ST2 compound as specified in IEC 60502-1 or its equivalent PVC Type 9 as per BS 7655-4.2

Medium Density Polyethylene (MDPE): Offers higher protection from water ingress and abrasion.

High density Polyethylene (HDPE) - Offers higher protection from water ingress and abrasion.

Anti Termite & Anti Rodent: Termite and rodent resistance can be built in both types of outer sheath mentioned above by compounding with proper additives.

Flame retardance (FR): Special FR compounds can retard propagation of flame through the cable during fire when used as cable jacket. Oxygen Index of such FR compounds generally needs to be above 30%.

Reduced Propagation and Low Acid Fumes (LSZH): The sheath shall be an extruder layer of type LTS1 conforming to BS 7655-6-1. This material have Oxygen Index above 30% & acid gas emission less than 18% (by weight).

Installation

Depending on the application and the area of use type of cable required can differ. All cables mentioned in this catalogue can be used indoor or outdoor but some reservations are necessary to be followed.

- A) Unarmored cables are not recommended for direct buried applications, unless adequate measures are taken to protect the cable from mechanical damage.
- B) Cables laid directly in ground particularly in sustained wet conditions shall have extruded bedding and outer sheath.



- C) BS6724 LTS1 sheathed cable in indoor fixed installations in industrial areas, buildings or similar applications and for outdoor direct exposure to sunlight should be avoided. As the outer sheath material has lower tear strength care shall be taken while laying. It is recommended cables shall be installed when both the cable and ambient temperature are above 0deg Celsius and have been so for the previous 24h or where special precautions have been taken to maintain the cable above this temperature.

The cable should be stored in covered area between 3 to 48° C and shall not be exposed to direct sunlight. Refer, Page 30 drum handling instructions in detailed.

- D) Armoured cables are not recommended for tray applications, as they may put extra load on the tray, being heavy. In case armoured cables are to be laid in trays, sufficient reinforcement has to be provided to bear the cable weight.
- E) Care should be taken while installing the cables not to damage the outer sheath. Since damage of outer sheath may allow moisture or other pollutants in the surroundings entry and thereby corrosion of armoring especially in the case of Aluminum wire armour. This may lead to the loss of earth continuity.
- F) Cable end caps should not be removed until immediately prior to termination or jointing. Unprotected ends of cable should not be exposed to moisture.
- G) Cable should not be in contact with any hot surface/sharp objects.
- H) Cable support spacing shall be as per IEE wiring regulation so that cable does not suffer damage by its own weight
- I) Due to the relatively high conductor temperature, there is a risk of drying out the surrounding soil, when installed in ground causing an increase in thermal resistivity, which in turn would lead to a higher cable temperature than anticipated. For cables laid directly in the ground, a suitable derating factor should be considered or a lower maximum sustained operating temperature should be assumed to take into account the possible effect of soil drying out.

Minimum Bending Radius

Cable should not be bend below the recommended minimum bending radius 8 times of cable diameter or specified in data sheets; larger installation radius should be used.

Maximum Pulling Tension

Maximum pulling tension shall not exceed the below values while installing the cables. Cables pulled by pulling eye/pulling grip ensuring pulling force is distributed through conductor or armor metallic parts.

Copper cables: $F = 50 \times n \times A$

Where n = number of cores, A = cross-sectional area of conductor (mm²) and F = Pulling tension in N.

Note: If any pulling greases or lubricants are used, same shall be compatible with outer sheath material.



Current Rating

The calculation of the current ratings, Current rating equations (100% load factor) and calculation of losses are based on IEC 60287 series, and the values of Current ratings for underground applications (In Duct or Direct Buried) are derived from the latest issue of ERA Report 'Current Rating Standards for distribution cables 69-30 Part V'. The ratings for a cable installed in Air are adopted from BS 7671, IEE Wiring Regulations, 17th edition.

Current ratings mentioned in the tables below are for the following standard installation conditions. For any change in the installation condition, current ratings in the tables should be multiplied by the respective derating factors.

Max. continuous operating conductor temperature: 90°C

Ambient Air Temperature : 45°C

Ambient Ground Temperature : 35°C

Depth of laying in ground : 0.50 m

Soil Thermal Resistivity : 1.2 K.m/W

IEE Wiring Regulations - Requirement For Cables

The IEE Wiring Regulations for installation and selection of cables cannot be approached in isolation from the other equipments in the installation. In particular the devices providing protection against overload, short circuit, shock by indirect contact and over-heating of protective conductors during an earth fault, affect the selection of cables.

Regulation 543 explains how the cross sectional area of the circuit protective conductor should be calculated to avoid its over-heating during a fault to earth. Again the area required depends on the characteristics of the device providing protection against short circuit.

The steel wire armor of standard cables to BS 5467 (XLPE), BS6724 (XLPE) and IEC 60502-1 provides the required area or more, when the protective device is one of the standard fuses or MCB's with a rating not higher than the current rating of the cable (assuming disconnection within 5 seconds).

For the most of the cables the armor is still adequate when the fuse rating is one or two steps, or even more, above the current rating of the cable, the margins being greater for the small sizes and 4 core cables than for the larger sizes and two core cables.

Voltage Drop

When the current flows in conductor, there is a voltage drop between the ends of the conductor. If the wiring has done on the basis of IEE wiring regulations, the Voltage Drop should not exceed to a particular range to make sure the smooth functioning of the system. For low voltage cable network of normal operation, voltage drop could be of 3-5 %.

Calculation of voltage drop :

Single phase circuit : $V_d = 2 I (R \cos\theta + X \sin\theta) L$

Three phase circuit : $V_d = \sqrt{3} I (R \cos\theta + X \sin\theta) L$

Where V_d : Voltage drop (V)

I : Load current (A)

R : AC resistance at operating temperature (Ω /km)

X : Reactance (Ω /km)

L : Length (km)

$\cos\theta$: Power factor

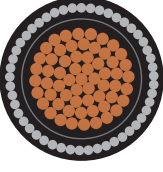
θ : Phase Angle of load



XLPE Insulated, Armoured, PVC (or) LSZH Sheathed LV Cables

Single Core Armoured Cables 600/1000 V, CU/XLPE/AWA/PVC

Single Core Armoured Cables 600/1000 V, CU/XLPE/AWA/LSZH



Nominal Size* (mm ²)	Nominal Insulation Thickness (mm)	Nominal Thickness of Bedding (mm)	Nominal Armour Wire Diameter (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Weight Kg/km	Maximum DC Resistance at @20° C		Current Rating			Approx. Voltage Drop		
							Conductor (Ω/km)	Armour (Ω/km)	In Air (A)	In Ground (A)	In Duct (A)	In Air (V/A/km)	In Ground (V/A/km)	In Duct (V/A/km)
50	1.0	0.8	0.9	1.5	17.0	650	0.387	1.3	192	199	199	0.86	0.88	0.92
70	1.1	0.8	1.25	1.5	19.0	900	0.268	0.75	245	244	240	0.61	0.63	0.69
95	1.1	0.8	1.25	1.6	21.0	1180	0.193	0.67	300	292	282	0.46	0.48	0.55
120	1.2	0.8	1.25	1.6	23.0	1430	0.153	0.61	350	332	315	0.38	0.40	0.47
150	1.4	1.0	1.6	1.7	26.0	1800	0.124	0.42	400	371	342	0.32	0.34	0.42
185	1.6	1.0	1.6	1.8	28.0	2220	0.0991	0.38	460	417	376	0.27	0.29	0.38
240	1.7	1.0	1.6	1.8	31.0	2800	0.0754	0.34	543	480	421	0.23	0.25	0.34
300	1.8	1.0	1.6	1.9	33.0	3420	0.0601	0.31	618	536	459	0.20	0.22	0.31
400	2.0	1.2	2.0	2.0	38.0	4430	0.0470	0.22	706	594	488	0.19	0.21	0.29
500	2.2	1.2	2.0	2.1	41.0	5500	0.0366	0.2	800	658	528	0.17	0.19	0.27
630	2.4	1.2	2.0	2.2	46.0	6950	0.0283	0.18	900	723	570	0.16	0.18	0.25
800	2.6	1.4	2.5	2.4	52.0	8990	0.0221	0.13	978	764	595	0.16	0.18	0.24
1000	2.8	1.4	2.5	2.5	57.0	11070	0.0176	0.12	1060	810	632	0.15	0.17	0.23

In Ground : Three cables directly laid in trefoil touching

In Duct : In single way ducts in trefoil

In Air : Three cables laid in trefoil touching

*Circular or compacted circular stranded conductor - class 2

Two Core Armoured Cables 600/1000 V, CU/XLPE/SWA/PVC as per BS 5467
Two Core Armoured Cables 600/1000 V, CU/XLPE/SWA/LSZH



Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Thickness of Bedding (mm)	Nominal Armour Wire Diameter (mm)	Nominal Outer Sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Weight (kg/km)	Maximum DC Resistance at @20° C		Current Rating			Approx. Voltage Drop		
							Conductor (Ω/km)	Armour (Ω/km)	In Air (A)	In Ground (A)	In Duct (A)	In Air (V/A/km)	In Ground (V/A/km)	In Duct (V/A/km)
1.5 *	0.6	0.8	0.9	1.3	12.0	260	12.1	10.2	25	33	27	31	31	31
2.5 *	0.7	0.8	0.9	1.4	13.0	320	7.41	8.8	34	42	35	19	19	19
4 *	0.7	0.8	0.9	1.4	14.5	380	4.61	7.9	46	56	46	12	12	12
6 *	0.7	0.8	0.9	1.4	15.5	460	3.08	7.0	58	70	58	7.9	7.9	7.9
10 *	0.7	0.8	0.9	1.5	17.5	600	1.83	6.0	80	94	77	4.7	4.7	4.7
16 *	0.7	0.8	1.25	1.5	20.0	850	1.15	3.7	105	121	99	2.89	2.91	2.89
25	0.9	0.8	1.25	1.6	20.0	975	0.727	3.7	136	157	127	1.89	1.91	1.89
35	0.9	1.0	1.6	1.7	22.0	1380	0.524	2.6	168	188	153	1.29	1.31	1.29
50	1.0	1.0	1.6	1.8	24.0	1700	0.387	2.3	203	223	181	0.99	1.01	0.99
70	1.1	1.0	1.6	1.9	28.0	2200	0.268	2.0	255	273	224	0.69	0.71	0.69
95	1.1	1.2	2.0	2.0	31.5	3020	0.193	1.4	315	328	269	0.49	0.51	0.49
120	1.2	1.2	2.0	2.1	33.5	3590	0.153	1.3	363	372	307	0.39	0.41	0.39
150	1.4	1.2	2.0	2.2	37.0	4300	0.124	1.2	415	417	345	0.39	0.41	0.39
185	1.6	1.4	2.5	2.4	41.0	5480	0.0991	0.82	478	470	391	0.29	0.31	0.29
240	1.7	1.4	2.5	2.5	46.0	6800	0.0754	0.73	565	544	453	0.19	0.21	0.19
300	1.8	1.6	2.5	2.6	49.0	8250	0.0601	0.67	643	609	509	0.19	0.21	0.19
400	2.0	1.6	2.5	2.8	55.0	10100	0.0470	0.59	740	687	575	0.18	0.20	0.18

In Ground : Directly laid

In Duct : In Single way ducts

* Circular conductor.
All others are shaped conductors.



**Three Core Armoured Cables 600/1000 V, CU/XLPE/SWA/PVC
Three Core Armoured Cables 600/1000 V, CU/XLPE/SWA/LSZH**



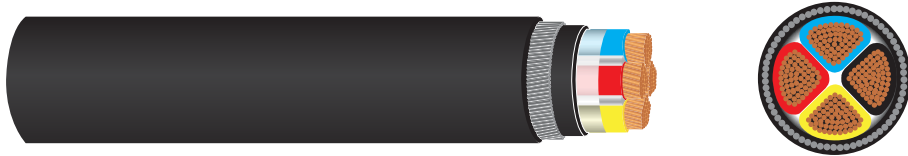
Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Thickness of Bedding (mm)	Nominal Armour Wire Diameter (mm)	Nominal Outer Sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Weight (kg/km)	Maximum DC Resistance at @20° C		Current Rating			Approx. Voltage Drop			
							Conductor (Ω /km)	Armour (Ω /km)	In Air (A)	In Ground (A)	In Duct (A)	In Air (V/A/km)	In Ground (V/A/km)	In Duct (V/A/km)	
1.5 *	0.6	0.8	0.9	1.3	12.5	285	12.1	9.5	22	28	22	27	27	27	27
2.5 *	0.7	0.8	0.9	1.4	13.5	360	7.41	8.2	29	36	29	36	29	16	16
4 *	0.7	0.8	0.9	1.4	15.0	435	4.61	7.5	39	47	39	47	39	10	10
6 *	0.7	0.8	0.9	1.4	16.5	530	3.08	6.7	49	59	49	59	48	6.8	6.8
10 *	0.7	0.8	1.25	1.5	19.0	810	1.83	4	68	79	65	79	65	4.0	4.0
16 *	0.7	0.8	1.25	1.6	21.0	1035	1.15	3.5	89	102	83	102	83	2.5	2.5
25	0.9	1.0	1.6	1.7	22.5	1450	0.727	2.5	116	131	107	131	107	1.69	1.69
35	0.9	1.0	1.6	1.8	25.0	1800	0.524	2.3	143	157	128	157	128	1.19	1.19
50	1.0	1.0	1.6	1.8	27.5	2260	0.387	2	173	187	152	187	152	0.89	0.89
70	1.1	1.0	1.6	1.9	31.0	3000	0.268	1.8	218	229	187	229	187	0.59	0.59
95	1.1	1.2	2.0	2.1	35.5	4110	0.193	1.3	269	274	226	274	226	0.49	0.49
120	1.2	1.2	2.0	2.2	38.5	4940	0.153	1.2	312	312	258	312	258	0.39	0.39
150	1.4	1.4	2.5	2.3	43.0	6350	0.124	0.78	357	349	291	349	291	0.29	0.29
185	1.6	1.4	2.5	2.4	47.0	7550	0.0991	0.71	411	394	329	394	329	0.29	0.29
240	1.7	1.4	2.5	2.6	52.0	9450	0.0754	0.63	485	455	380	455	380	0.21	0.19
300	1.8	1.6	2.5	2.7	58.0	11450	0.0601	0.58	553	509	427	509	427	0.19	0.19
400	2.0	1.6	2.5	2.9	63.0	14200	0.0470	0.52	636	574	490	574	490	0.21	0.19

In Ground : Directly laid
In Duct : In Single way ducts

* Circular conductor.
All others are shaped conductors.

Four Core Armoured Cables 600/1000 V, CU/XLPE/SWA/PVC

Four Core Armoured Cables 600/1000 V, CU/XLPE/SWA/LSZH

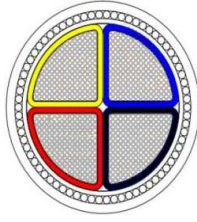


Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Thickness of Bedding (mm)	Nominal Armour Wire Diameter (mm)	Nominal Outer Sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Weight (Kg/km)	Maximum DC Resistance at @20° C		Current Rating			Approx. Voltage Drop		
							Conductor (Ω/km)	Armour (Ω/km)	In Air (A)	In Ground (A)	In Duct (A)	In Air (V/A/km)	In Ground (V/A/km)	In Duct (V/A/km)
1.5 *	0.6	0.8	0.9	1.3	13.0	320	12.1	8.8	22	28	22	27	27	27
2.5 *	0.7	0.8	0.9	1.4	14.5	410	7.41	7.7	29	36	29	16	16	16
4 *	0.7	0.8	0.9	1.4	15.5	510	4.61	6.8	39	47	39	10	10	10
6 *	0.7	0.8	1.25	1.5	18.0	725	3.08	4.3	49	59	48	6.8	6.8	6.8
10 *	0.7	0.8	1.25	1.5	20.5	960	1.83	3.7	68	79	65	4.0	4.0	4.0
16 *	0.7	0.8	1.25	1.6	22.5	1250	1.15	3.1	89	102	83	2.5	2.5	2.5
25	0.9	1.0	1.6	1.7	25.5	1810	0.727	2.3	116	131	107	1.69	1.71	1.69
35	0.9	1.0	1.6	1.8	28.5	2280	0.524	2.0	143	157	128	1.19	1.21	1.19
50	1.0	1.0	1.6	1.9	31.0	2900	0.387	1.8	173	187	152	0.89	0.91	0.89
70	1.1	1.2	2.0	2.1	37.0	4110	0.268	1.2	218	229	187	0.59	0.61	0.59
95	1.1	1.2	2.0	2.2	40.5	5240	0.193	1.1	269	274	226	0.49	0.51	0.49
120	1.2	1.4	2.5	2.3	45.5	6800	0.153	0.76	312	312	258	0.39	0.41	0.39
150	1.4	1.4	2.5	2.4	50.0	8100	0.124	0.68	357	349	291	0.29	0.31	0.29
185	1.6	1.4	2.5	2.6	55.0	9800	0.0991	0.61	411	394	329	0.29	0.31	0.29
240	1.7	1.6	2.5	2.7	61.0	12300	0.0754	0.54	485	455	380	0.19	0.21	0.19
300	1.8	1.6	2.5	2.9	66.5	14950	0.0601	0.49	553	509	427	0.19	0.21	0.19
400	2.0	1.8	3.2	3.2	76.0	19500	0.0470	0.35	636	574	490	0.19	0.21	0.19

In Ground : Directly laid

In Duct : In Single way ducts

* Circular conductor.
All others are shaped conductors.



FOUR CORE ARMORED CABLE 600/1000 V, AL/XLPE/SWA/PVC - IEC 60502-1



Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Thickness of Bedding (mm)	Nominal Wire Diameter (mm)	Nominal Armour Wire Diameter (mm)	Nominal Outer Sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Weight (Kg/km)	Current Rating			Maximum Resistance at @20°C	Approximate Voltage Drop per Ampere Per Meter (milli-volt / A/M)
								In Air (A)	In Ground (A)	In Duct (A)		
16 *	0.7	1.0	1.6	1.6	1.8	23.2	1000	74	91	74	1.91	4.20
25	0.9	1.0	1.6	1.6	1.8	25.0	1200	98	116	95	1.20	2.70
35	0.9	1.0	1.6	1.6	1.9	27.6	1420	120	139	113	0.868	1.95
50	1.0	1.0	1.6	1.6	2.0	30.6	1730	145	165	135	0.641	1.45
70	1.1	1.2	2.0	2.0	2.1	36.3	2500	185	203	167	0.443	0.97
95	1.1	1.2	2.0	2.0	2.3	40.0	2950	224	244	201	0.320	0.72
120	1.2	1.2	2.5	2.5	2.4	44.8	3870	264	278	230	0.253	0.58
150	1.4	1.4	2.5	2.5	2.6	49.5	4540	305	311	259	0.206	0.47
185	1.6	1.4	2.5	2.5	2.7	54.2	5340	350	353	294	0.164	0.39
240	1.7	1.6	2.5	2.5	2.9	60.1	6470	418	409	342	0.125	0.31
300	1.8	1.6	2.5	2.5	3.1	66.0	7640	488	461	386	0.100	0.26
400	2.0	1.6	3.15	3.15	3.4	75.2	10180	562	523	443	0.0778	0.25

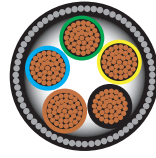
* Circular Conductor

Installation Conditions: Ambient Air Temperature : 30°C Ground Temperature : 15°C

Depth of Laying : 0.5 m



Five Core Armoured Cables 600/1000 V, CU/XLPE/SWA/PVC
Five Core Armoured Cables 600/1000 V, CU/XLPE/SWA/LSZH



Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Thickness of Bedding (mm)	Nominal Armour Wire Diameter (mm)	Nominal Outer Sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Weight (Kg/km)	Maximum DC Resistance at @20° C		Current Rating			Approx. Voltage Drop			
							Conductor (Ω/km)	Armour (Ω/km)	In Air (A)	In Ground (A)	In Duct (A)	In Air (V/A/km)	In Ground (V/A/km)	In Duct (V/A/km)	
1.5	0.6	0.8	0.9	1.4	14.0	370	12.1	8.2	22	28	22	27	27	27	27
2.5	0.7	0.8	0.9	1.4	15.5	470	7.41	6.8	29	36	29	16	16	16	16
4	0.7	0.8	0.9	1.5	17.0	590	4.61	6.2	39	47	39	10	10	10	10
6	0.7	0.8	1.25	1.5	19.5	845	3.08	3.9	49	59	48	6.8	6.8	6.8	6.8
10	0.7	0.8	1.25	1.6	22.0	1130	1.83	3.4	68	79	65	4.0	4.0	4.0	4.0
16	0.7	1.0	1.6	1.7	26.0	1640	1.15	2.2	89	102	83	2.5	2.5	2.5	2.5
25	0.9	1.0	1.6	1.8	30.0	2300	0.727	1.8	116	131	107	1.69	1.71	1.71	1.69
35	0.9	1.0	1.6	1.9	33.0	2820	0.524	1.6	143	157	128	1.19	1.21	1.21	1.19
50	1.0	1.2	2.0	2.0	38.5	3940	0.387	1.1	173	187	152	0.89	0.91	0.91	0.89
70	1.1	1.2	2.0	2.2	43.5	5200	0.268	0.94	218	229	187	0.59	0.61	0.61	0.59

In Ground : Directly laid

In Duct : In Single way ducts

*Circular /Circular compacted stranded conductor (class 2)

**Armoured Auxiliary Cables 600/1000 V, CU/XLPE/SWA/PVC
Armoured Auxiliary Cables 600/1000 V, CU/XLPE/SWA/LSZH**



Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Thickness of Bedding (mm)	Nominal Armour Wire Diameter (mm)	Nominal Outer Sheath Thickness (mm)	Approx. Overall Diameter (mm)	Approximate Weight (Kg/km)	Maximum DC Resistance at @20° C		Current Rating			Approx. Voltage Drop				
							Conductor (Ω /km)	Armour (Ω /km)	In Air (A)	In Ground (A)	In Duct (A)	In Air (V/A/km)	In Ground (V/A/km)	In Duct (V/A/km)		
7X1.5		0.8	0.9	1.4	15.0	440	12.1	7.5	16	19	16	27	27	27	27	27
12X1.5		0.8	1.25	1.5	19.0	715	12.1	4.0	13	16	13	27	27	27	27	27
19X1.5		0.8	1.25	1.6	21.5	950	12.1	3.5	11	13	11	27	27	27	27	27
27X1.5	0.6	1.0	1.6	1.7	26.0	1355	12.1	2.3	10	12	10	27	27	27	27	27
37X1.5		1.0	1.6	1.7	28.5	1650	12.1	2.0	9	10	9	27	27	27	27	27
48X1.5		1.0	1.6	1.8	32.0	2040	12.1	1.8	8	9	8	27	27	27	27	27
7X2.5		0.8	0.9	1.4	16.5	560	7.41	6.3	22	24	21	16	16	16	16	16
12X2.5		0.8	1.25	1.6	21.5	945	7.41	3.5	18	20	18	16	16	16	16	16
19X2.5		1.0	1.6	1.7	26.0	1440	7.41	2.3	15	17	15	16	16	16	16	16
27X2.5	0.7	1.0	1.6	1.8	30.0	1820	7.41	1.9	12	14	13	16	16	16	16	16
37X2.5		1.0	1.6	1.8	33.0	2245	7.41	1.7	11	12	11	16	16	16	16	16
48X2.5		1.2	2.0	2.0	38.5	3020	7.41	1.2	10	12	10	16	16	16	16	16
7X4		0.8	1.25	1.5	19.0	835	4.61	4.0	29	32	28	10	10	10	10	10
12X4		1.0	1.6	1.6	25.0	1385	4.61	2.3	24	27	23	10	10	10	10	10
19X4	0.7	1.0	1.6	1.7	28.5	1800	4.61	2.0	20	22	19	10	10	10	10	10
27X4		1.0	1.6	1.9	33.5	2340	4.61	1.7	17	20	16	10	10	10	10	10
37X4		1.2	2.0	2.0	38.0	3300	4.61	1.2	15	17	15	10	10	10	10	10
48X4		1.2	2.0	2.1	43.0	4000	4.61	1.0	14	16	13	10	10	10	10	10



XLPE Insulated, Unarmoured, PVC Sheathed Low Voltage Cables

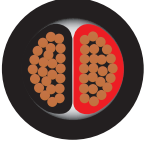
Single Core Unarmoured Cables 600/1000 V, CU/XLPE/PVC as per BS 7889/IEC 60502-1



Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Cable weight (Kg/km)	Maximum DC Resistance at @20° C		Current Rating		Approx. Voltage Drop	
					Conductor (Ω/km)	In Air (A)	In Air (V/A/km)	In Air (V/A/km)		
50	1.0	1.4	14.0	525	0.387	185	0.86			
70	1.1	1.4	16.0	715	0.268	236	0.61			
95	1.1	1.5	18.0	970	0.193	292	0.46			
120	1.2	1.5	20.0	1210	0.153	342	0.38			
150	1.4	1.6	22.0	1480	0.124	394	0.32			
185	1.6	1.6	24.5	1800	0.0991	457	0.27			
240	1.7	1.7	27.0	2355	0.0754	546	0.23			
300	1.8	1.8	30.0	2940	0.0601	632	0.20			
400	2.0	1.9	34.0	3730	0.0470	736	0.19			
500	2.2	2.0	38.0	4780	0.0366	852	0.17			
630	2.4	2.2	42.0	6180	0.0283	984	0.16			
800	2.6	2.3	47.0	7880	0.0221	1118	0.16			
1000	2.8	2.4	52.0	9790	0.0176	1247	0.15			

In Air : Three cables laid in trefoil touching

Two Core Unarmoured Cables 600/1000 V, CU/XLPE/PVC as per IEC 60502-1



Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Cable weight (Kg/km)	Maximum DC Resistance at @20° C Conductor (Ω/km)	Current Rating		Approx. Voltage Drop	
						In Air (A)	In Air (V/A/km)		
1.5 *	0.7	1.8	10.0	115	12.1	23	31		
2.5 *	0.7	1.8	11.0	140	7.41	32	19		
4 *	0.7	1.8	12.0	175	4.61	42	12		
6 *	0.7	1.8	13.0	225	3.08	54	7.9		
10 *	0.7	1.8	15.0	320	1.83	71	4.7		
16 *	0.7	1.8	16.5	445	1.15	103	2.89		
25	0.9	1.8	16.0	610	0.727	129	1.89		
35	0.9	1.8	18.0	800	0.524	160	1.29		
50	1.0	1.8	20.0	1040	0.387	195	0.99		
70	1.1	1.8	22.5	1420	0.268	247	0.69		
95	1.1	2.0	25.5	1950	0.193	305	0.49		
120	1.2	2.1	28.0	2440	0.153	356	0.39		
150	1.4	2.2	31.0	3000	0.124	408	0.39		
185	1.6	2.3	35.0	3700	0.0991	472	0.29		
240	1.7	2.5	40.0	4830	0.0754	563	0.19		
300	1.8	2.7	44.0	6020	0.0601	650	0.19		
400	2.0	2.9	49.0	7660	0.0470	756	0.18		

* Circular conductor.
All others are shaped conductors.



Three Core Unarmoured Cables 600/1000 V, CU/XLPE/PVC as per IEC 60502-1



Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Cable weight (kg/km)	Maximum DC Resistance at @20° C		Current Rating		Approx. Voltage Drop	
					Conductor (Ω/km)	In Air (A)	In Air (V/A/km)	In Air (V/A/km)		
1.5 *	0.7	1.8	10.5	130	12.1	20	27			
2.5 *	0.7	1.8	11.5	160	7.41	29	16			
4 *	0.7	1.8	12.5	220	4.61	36	10			
6 *	0.7	1.8	14.0	280	3.08	47	6.8			
10 *	0.7	1.8	16.0	430	1.83	61	4.0			
16 *	0.7	1.8	17.5	610	1.15	89	2.5			
25	0.9	1.8	18.0	870	0.727	111	1.69			
35	0.9	1.8	20.0	1150	0.524	137	1.19			
50	1.0	1.8	23.0	1520	0.387	167	0.89			
70	1.1	1.9	26.0	2120	0.268	212	0.59			
95	1.1	2.0	29.0	2860	0.193	262	0.49			
120	1.2	2.1	32.5	3600	0.153	306	0.39			
150	1.4	2.3	36.0	4440	0.124	351	0.29			
185	1.6	2.4	39.5	5480	0.0991	406	0.29			
240	1.7	2.6	45.0	7110	0.0754	483	0.19			
300	1.8	2.8	50.0	8880	0.0601	558	0.19			
400	2.0	3.1	56.0	11290	0.0470	647	0.19			

* Circular conductor.
All others are shaped conductors.

Four Core Unarmoured Cables 600/1000 V, CU/XLPE/PVC as per IEC 60502-1



Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Cable weight (Kg/km)	Maximum DC Resistance at @20° C		Current Rating		Approx. Voltage Drop	
					Conductor (Ω/km)	In Air (A)	In Air (V/A/km)	In Air (V/A/km)		
1.5 *	0.7	1.8	11.0	160	12.1	20	27			
2.5 *	0.7	1.8	12.5	205	7.41	29	16			
4 *	0.7	1.8	13.5	275	4.61	36	10			
6 *	0.7	1.8	15.0	360	3.08	47	6.8			
10 *	0.7	1.8	17.0	540	1.83	61	4.0			
16 *	0.7	1.8	19.0	790	1.15	89	2.5			
25	0.9	1.8	21.5	1155	0.727	111	1.69			
35	0.9	1.8	23.5	1520	0.524	137	1.19			
50	1.0	1.9	26.0	2010	0.387	167	0.89			
70	1.1	2.0	30.5	2820	0.268	212	0.59			
95	1.1	2.1	34.0	3810	0.193	262	0.49			
120	1.2	2.3	38.0	4805	0.153	306	0.39			
150	1.4	2.4	42.5	5900	0.124	351	0.29			
185	1.6	2.6	47.5	7290	0.0991	406	0.29			
240	1.7	2.8	53.5	9480	0.0754	483	0.19			
300	1.8	3.0	59.5	11810	0.0601	558	0.19			
400	2.0	3.3	68.0	15090	0.0470	647	0.19			

* Circular conductor.
All others are shaped conductors.



Five Core Unarmoured Cables 600/1000 V, CU/XLPE/PVC as per IEC 60502-1



Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Cable weight (Kg/km)	Maximum DC Resistance at @20° C		Current Rating In Air (A)	Approx. Voltage Drop	
					Conductor (Ω/km)	In Air (V/A/km)		In Air (V/A/km)	
1.5	0.7	1.8	11.5	170	12.1	20	27		
2.5	0.7	1.8	13.0	220	7.41	27	16		
4	0.7	1.8	14.0	320	4.61	36	10		
6	0.7	1.8	16.0	415	3.08	47	6.8		
10	0.7	1.8	18.0	650	1.83	61	4.0		
16	0.7	1.8	20.0	955	1.15	89	2.5		
25	0.9	1.8	24.0	1440	0.727	111	1.69		
35	0.9	1.8	27.0	1570	0.524	137	1.19		
50	1.0	2.0	31.0	2540	0.387	167	0.89		
70	1.1	2.1	35.5	3500	0.268	212	0.59		

Unarmoured Auxiliary Cables 600/1000 V, CU/XLPE/PVC as per IEC 60502-1



Nominal Size (mm ²)	Nominal Insulation Thickness (mm)	Nominal Outer sheath Thickness (mm)	Approx. Overall Cable Diameter (mm)	Approx. Cable weight (kg/km)	Maximum DC Resistance at @20° C		Current Rating		Approx. Voltage Drop	
					Conductor (Ω /km)	In Air (A)	In Air (V/A/km)	In Air (V/A/km)		
7X1.5	0.6	1.8	13.0	235	12.1	15	27	27		
12X1.5		1.8	17.0	350	12.1	12	27	27		
19X1.5		1.8	19.0	500	12.1	10	27	27		
27X1.5		1.8	22.5	670	12.1	9	27	27		
37X1.5	0.7	1.8	26.0	880	12.1	8	27	27		
48X1.5		1.8	29.0	1100	12.1	7	27	27		
7X2.5		1.8	14.5	310	7.41	20	16	16		
12X2.5		1.8	18.0	470	7.41	16	16	16		
19X2.5	0.7	1.8	21.0	690	7.41	14	16	16		
27X2.5		1.8	25.0	940	7.41	11	16	16		
37X2.5		1.8	28.0	1240	7.41	10	16	16		
48X2.5		1.9	32.0	1600	7.41	10	16	16		
7X4	0.7	1.8	16.0	410	4.61	26	10	10		
12X4		1.8	20.0	660	4.61	22	10	10		
19X4		1.8	23.5	970	4.61	18	10	10		
27X4		1.8	28.5	1350	4.61	16	10	10		
37X4	0.7	1.9	31.5	1810	4.61	14	10	10		
48X4		2.1	36.0	2340	4.61	13	10	10		



Rating Factors

Following rating factors shall be applied to the current ratings when the actual installation conditions differ from the standard conditions mentioned above.

INSTALLATION CONDITION FOR CABLES BURIED UNDER GROUND

For a cable installed direct buried, the following tables will be used to calculate the current rates based on the actual soil thermal resistivity, Ground ambient temperature and the Depth of Laying

Ground temperature	15 °C	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C
Rating factors	1.16	1.13	1.08	1.03	1.00	0.95	0.90

Rating Factors for Depth of Laying

(To Centre Of Cable Or Trefoil Group Of Cables)

Depth of laying m	Cables laid direct in ground		
	Up to 50mm ²	70mm ² to 300 mm ²	Above 300 mm ²
0.50	1.00	1.00	1.00
0.75	0.98	0.97	0.95
0.80	0.97	0.96	0.94
1.00	0.95	0.93	0.92
1.25	0.94	0.92	0.89
1.50	0.93	0.90	0.87
1.75	0.92	0.89	0.86
2.00	0.91	0.88	0.85
2.50	0.90	0.87	0.84
Above 3.00	0.89	0.85	0.82

Rating Factors for Variation in Thermal Resistivity of Soil

(Average Values)

Size (mm ²)	Soil thermal resistivity in k. m/W									
	0.7	0.8	0.9	1.0	1.2	1.5	2.0	2.5	3.0	3.5
Single core cables										
Up to 50	1.21	1.16	1.11	1.07	1.0	0.91	0.81	0.73	0.68	0.63
70 to 185	1.22	1.16	1.12	1.07	1.0	0.91	0.81	0.73	0.68	0.63
240 to 1000	1.23	1.17	1.12	1.07	1.0	0.91	0.80	0.73	0.67	0.62
Multicore cables										
Up to 4	1.12	1.09	1.07	1.04	1.0	0.94	0.85	0.79	0.74	0.69
6 to 16	1.15	1.11	1.08	1.05	1.0	0.93	0.84	0.77	0.72	0.66
25 to 50	1.17	1.13	1.09	1.06	1.0	0.92	0.83	0.76	0.71	0.65
70 to 185	1.19	1.14	1.10	1.06	1.0	0.92	0.82	0.75	0.69	0.63
240 to 400	1.20	1.15	1.10	1.07	1.0	0.92	0.81	0.74	0.69	0.63



Group Rating Factors for Circuits of Three Single Core Cables in Trefoil or Laid Flat Touching, In Horizontal Formation

Number of Circuits	Spacing of Circuits					
	Touching		Spacing			
	Trefoil	Laid flat	cm 15	cm 30	cm 45	cm 60
2	0.78	0.81	0.83	0.88	0.91	0.93
3	0.66	0.70	0.73	0.79	0.84	0.87
4	0.61	0.64	0.68	0.73	0.81	0.85
5	0.56	0.60	0.64	0.73	0.79	0.85
6	0.53	0.57	0.61	0.71	0.78	0.82

Group Rating Factors for Multicore Cables in Horizontal Formation

Number of cables in group	Spacing of Circuits				
	Touching	cm 15	cm 30	cm 45	cm 60
2	0.81	0.87	0.91	0.93	0.95
3	0.70	0.78	0.84	0.88	0.90
4	0.63	0.74	0.81	0.86	0.89
5	0.59	0.70	0.78	0.84	0.87
6	0.55	0.68	0.77	0.83	0.87

INSTALLATION CONDITIONS FOR CABLES IN DUCTS

A duct is an enclosure of metal or an insulating material other than conduit or cable trunking, intended for the protection of cables which are drawn in after erection of the ducting.

The recommended size of duct with respect to the cable diameter is given below.

RECOMMENDED DUCT DIMENSIONS AND CABLE SIZES

Overall cable diameter	Inside diameter of duct	Outside diameter of duct
≤ 65 mm	100 mm	130 mm
> 65 ≤ 90 mm	125 mm	160 mm

Where conditions of operation can be fairly accurately estimated and details of the soil along the route is available, it is possible to determine the current ratings more precisely by the use of estimated maximum ground temperature, soil thermal resistivity derating, grouping factors, and derating factors for the depths of laying, given in Tables .



Rating Factors of Variation in Thermal Resistivity of Soil For Installation in Ducts (Average Values)

Size mm ²	Soil thermal resistivity in k. m/W									
	0.7	0.8	0.9	1.0	1.2	1.5	2.0	2.5	3.0	3.5
Single core cables										
Up to 50	1.11	1.08	1.06	1.04	1.0	0.94	0.87	0.82	0.77	0.73
70 to 185	1.13	1.10	1.07	1.04	1.0	0.94	0.86	0.80	0.75	0.72
240 to 1000	1.15	1.11	1.08	1.05	1.0	0.93	0.85	0.78	0.72	0.68
Multicore cables										
Up to 4	1.04	1.03	1.02	1.02	1.0	0.98	0.94	0.90	0.87	0.85
6 to 16	1.05	1.04	1.03	1.02	1.0	0.97	0.93	0.88	0.86	0.83
25 to 50	1.06	1.05	1.03	1.02	1.0	0.96	0.92	0.87	0.83	0.81
70 to 185	1.08	1.06	1.04	1.03	1.0	0.95	0.90	0.85	0.81	0.78
240 to 400	1.10	1.07	1.05	1.03	1.0	0.95	0.88	0.83	0.78	0.75

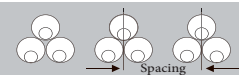
Rating Factors Of Depth Of Laying

(To Centre Of Duct Or Trefoil Group Of Ducts)

Depth of laying m	Cables laid in duct	
	Single core	Multi core
0.50	1.00	1.00
0.75	0.96	0.98
0.80	0.95	0.98
1.00	0.93	0.96
1.25	0.91	0.95
1.50	0.89	0.94
1.75	0.88	0.94
2.00	0.87	0.93
2.50	0.86	0.92
Above 3.00	0.85	0.91

Group Rating Factors For Single Core Cables In Trefoil Single Way Ducts, Horizontal Formation (Average Values)

Number of cables in group	Spacing of Circuits		
	Touching	45 cm	60 cm
2	0.87	0.91	0.93
3	0.78	0.84	0.87
4	0.74	0.81	0.85
5	0.70	0.79	0.85
6	0.69	0.78	0.82



Group Rating Factors for Multicore Cables in Single Way Ducts, Horizontal Formation (Average Values)

Number of cables in group	Spacing of Circuits			
	Touching	30 cm	45 cm	60 cm
2	0.90	0.93	0.95	0.96
3	0.83	0.88	0.91	0.93
4	0.79	0.85	0.89	0.92
5	0.75	0.83	0.88	0.91
6	0.73	0.82	0.87	0.90

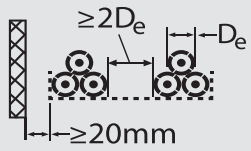
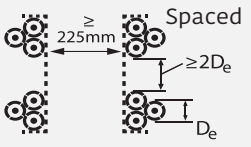
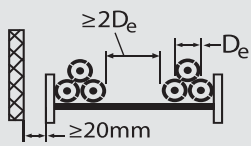
INSTALLATION CONDITIONS FOR CABLES IN AIR

Cables installed in air could have many forms of installation methods as described in BS 7671, IEE wiring regulation 17th edition. It is assumed that cables are not exposed to the direct sunlight and away from any external heat sources. Additionally there are more de-rating factors tables for other methods of installation, the user has to review BS7671- IEE Wiring Regulations for Electrical Installations, 17th Edition for detailed information

Rating Factors for Other Ambient Air Temperatures

Air Temperature	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C	55 °C
Rating Factor	1.20	1.16	1.11	1.07	1.00	0.94	0.89

Group rating factors for more than one circuit of single core cables

Method of Installation	Number of trays	Number of three-phase circuits (Note 3)			Use as a multiplier to rating for	
		1	2	3		
Perforated trays (Note 1)		1	1.00	0.98	0.96	Three cables intrefoil formation
	2	0.97	0.93	0.89		
	3	0.96	0.92	0.86		
Vertical perforated trays (Note 2)		1	1.00	0.91	0.89	
	2	1.00	0.90	0.86		
Ladder supports, cleats, etc.		1	1.00	1.00	1.00	
	2	0.97	0.95	0.93		
	3	0.96	0.94	0.90		


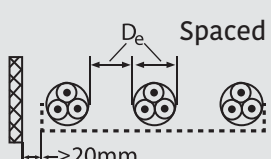
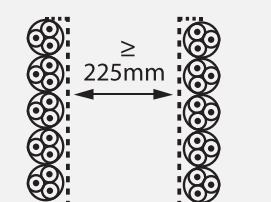
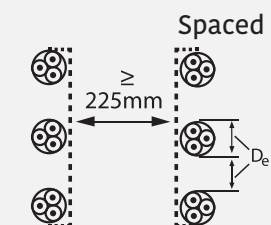
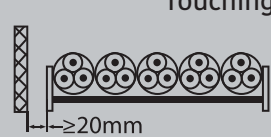
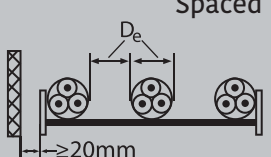
Note 1: Values are given for vertical spacings between trays of 300 mm. For closer spacing, the factors should be reduced

Note 2: Values are given for horizontal spacings between trays of 225 mm with trays mounted back to back. For closer spacing, the factors should be reduced

Note 3: For circuits having more than one cable in parallel per phase, each three phase conductors should be considered as a circuit for the purpose of this table.



Group rating factors for more than one multicore cable for installation in Air

Method of Installation		Number of trays	Number of cables					
			1	2	3	4	6	9
Cables on perforated trays	 <p>Touching</p>	1	1.00	0.88	0.82	0.79	0.76	0.73
		2	1.00	0.87	0.80	0.77	0.73	0.68
		3	1.00	0.86	0.79	0.76	0.71	0.66
	 <p>Spaced</p>	1	1.00	1.00	0.98	0.95	0.91	-
		2	1.00	0.99	0.96	0.92	0.87	-
		3	1.00	0.98	0.95	0.91	0.85	-
Cables on vertical perforated trays	 <p>Touching</p>	1	1.00	0.88	0.82	0.78	0.73	0.72
		2	1.00	0.88	0.81	0.76	0.71	0.70
	 <p>Spaced</p>	1	1.00	0.91	0.89	0.88	0.87	-
		2	1.00	0.91	0.88	0.87	0.85	-
Cables on ladder supports, cleats, etc	 <p>Touching</p>	1	1.00	0.87	0.82	0.80	0.79	0.78
		2	1.00	0.86	0.80	0.78	0.76	0.73
		3	1.00	0.85	0.79	0.76	0.73	0.70
	 <p>Spaced</p>	1	1.00	1.00	1.00	1.00	1.00	-
		2	1.00	0.99	0.98	0.97	0.96	-
		3	1.00	0.98	0.97	0.96	0.93	-

Note 1: Values are given for vertical spacings between trays of 300 mm and at least 20 mm between trays and wall. For closer spacing, the factors should be reduced.

Note 2: Values are given for horizontal spacing between trays of 225 mm with trays mounted back to back. For closer spacing, the factors should be reduced.

AC resistance, Reactance at 50 HZ and Short circuit ratings

Nominal Size	AC resistance at 90°C		Reactance at 50 Hz			Short circuit rating* Duration 1 Sec.
	Single core	Multicore	Single core cables		Multicore cables	
			Armoured	Unarmoured	(Arm & Unarm)	
(mm ²)	(Ω/km)	(Ω/km)	(Ω/km)	(Ω/km)	(Ω/km)	(kA)
1.5	15.43	15.43	--	0.147	0.105	0.215
2.5	9.45	9.45	--	0.137	0.099	0.358
4	5.88	5.88	--	0.128	0.093	0.572
6	3.93	3.93	--	0.119	0.089	0.858
10	2.33	2.33	--	0.111	0.084	1.430
16	1.47	1.47	--	0.103	0.081	2.288
25	0.927	0.927	--	0.103	0.081	3.575
35	0.668	0.669	--	0.098	0.079	5.01
50	0.494	0.494	0.114	0.093	0.078	7.15
70	0.342	0.343	0.106	0.088	0.074	10.01
95	0.247	0.248	0.102	0.086	0.072	13.59
120	0.196	0.197	0.097	0.085	0.072	17.16
150	0.16	0.16	0.096	0.085	0.073	21.45
185	0.128	0.129	0.095	0.083	0.072	26.46
240	0.0988	0.0999	0.093	0.082	0.071	34.32
300	0.0801	0.0814	0.092	0.079	0.071	42.90
400	0.064	0.0659	0.09	0.08	0.07	57.20
500	0.052		0.089	0.078		71.50
630	0.0425		0.087	0.078		90.09
800	0.0358		0.086	0.076		114.40
1000	0.031		0.085	0.075		143.00

* Maximum conductor temperature at the end of short circuit is 250°C



Common Abbreviations

THERMO PLASTIC

PVC-Polyvinyl Chloride

PE-Polyethylene,Polythene

LSZH-Low smoke zero halogen

LDPE-Low Density Polyethylene

MDPE-Medium Density Polyethylene

HDPE-High Density Polyethylene

PUR-Polyurethane (Thermosetting also)

TPE - Thermoplastic elastomer

PA-Polyamide

METALLIC LAYERS

AWA-Aluminum Wire Armour

SWA/GSWA- Galvanized Steel Wire Armour

GSDT - Galvanized Steel Double Tape Armour

PBE-Lead Alloy E barrier sheath

GSWB-Galvanized steel wire braid

TCWB-Tinned Copper Wire Braid

PCWB-Plain Copper Wire Braid

ABWB-Annealed Brass Wire Braid

Al-PE-Aluminium Polymer Foil

CT - Copper Tape

THERMOSETTING

XLPE-Cross Linked Polyethylene

SR-Silicon Rubber

XLLSZH-Cross Linked LSZH

PUR-Polyurethane

EPR-Ethylene Propylene Rubber

PCP-Polychloroprene

CPE-Chlorinated Polyethylene

EVA-Ethylene Vinyl Acetate

EMA-Ethylene Methyl Acrylate

CABLE MATERIAL CODES

Nil - Copper

A - Aluminium

Y - PVC

2X - XLPE

2Y - Polyethylene

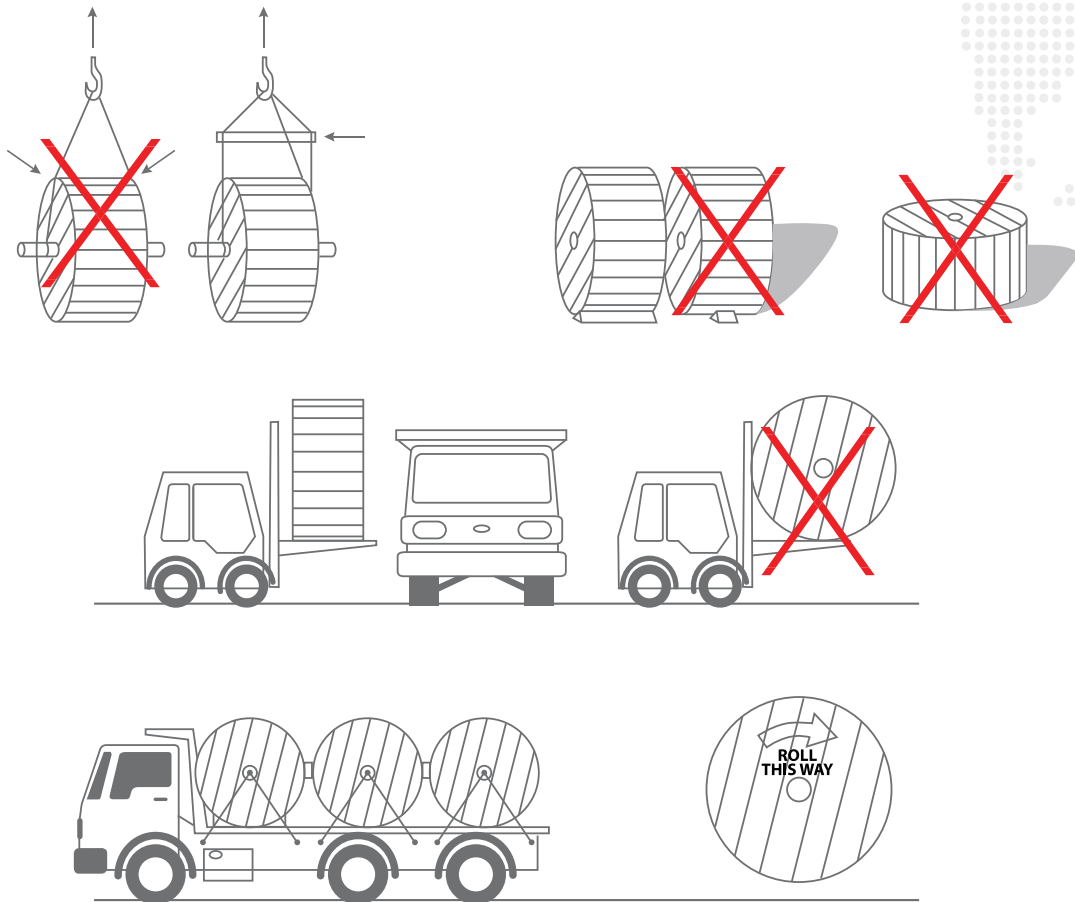
W - Galvanized steel wire armour

Wa - Aluminium wire armour



Drum Handling Instructions

The movement of cable drums by forklift truck is the preferred method. Most drums of cable are within a weight range that permits their movement by this method. In general, the forklift truck method of drum handling is only applicable where a hard and level ground surface is available. This is required in the intended storage area. In this case a forklift capable of lifting about 12 tones will be required (maximum drum weight plus contingency). It is also necessary to ensure that the forklift truck tines are capable of traversing the width of the drum and provide support to both flanges. For the smaller drums, tines of 1200 mm length will be satisfactory. The larger drums will require tines of 1800 mm length. For the larger drums, for example containing 33 kV or 132 kV cables or long lengths of cable, it will be necessary to have tines at least 2500 mm so that the cable drums are adequately supported by both drum danges



LSZH cables need to be handled with care during installation because special additives are used in polymer sheath LSF compound material to give the typical flame retardant characteristics like high oxygen index , low halogen, low smoke , no acid gas liberation etc.

LSZH Cable Installation guidelines and best practices:-

- Morning time preferred for installation where ambient temperature is comparatively low.
- Should not expose to direct sunlight for considerable period before installation i.e., the temp. of the cable sheath should be below 40 degree Celsius.
- Special LSF compatible accessories and fixings are recommended for installations requiring enhanced fire performance.
- Do not use Wire/Rope directly on cable sheath for pulling.
- Special care on uneven surface , welding points and joints of cable trays to avoid outer sheath damage.
- Rollers and bends should be free from any kind sharpness and protrusions that may damage sheath.





fedcab

Quality Unmatched..

Federal Cables(fedcab)

P.O.Box-9769, ICAD-II, Abu Dhabi, United Arab Emirates.

Phone: +971 2 55 12788 / 5592229, Fax: +971 2 55 12328

E-Mail: sales@federalcables.com, info@federalcables.com, www.federalcables.com

