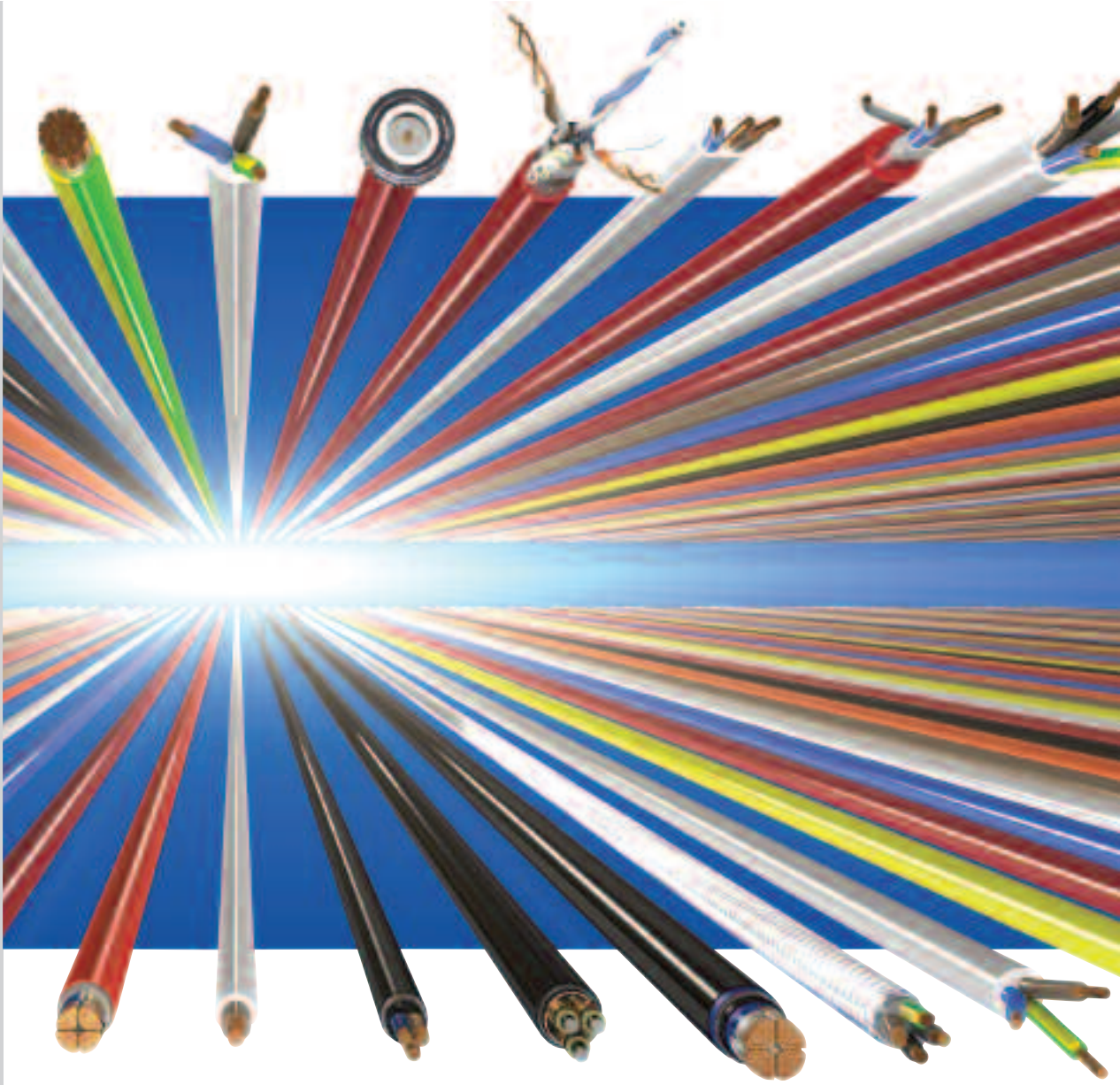
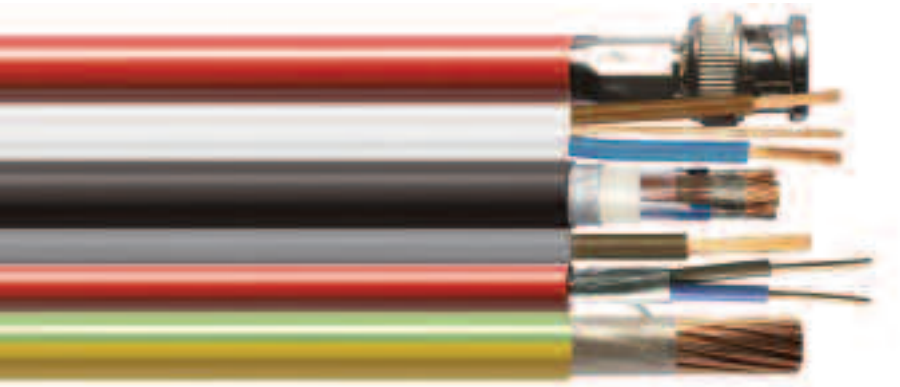
Draka



Product Range

Contents

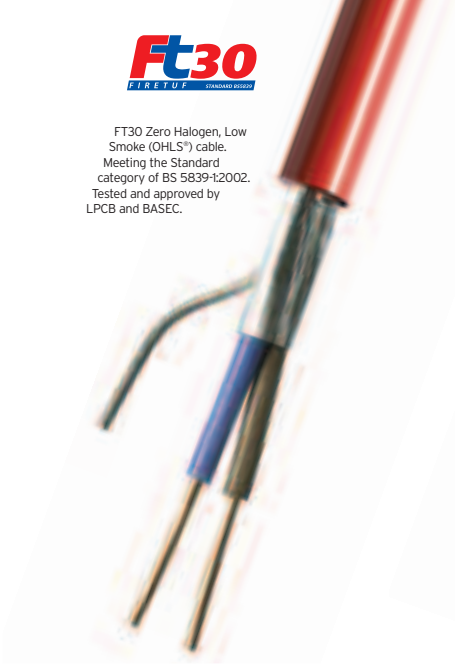


The range at a glance

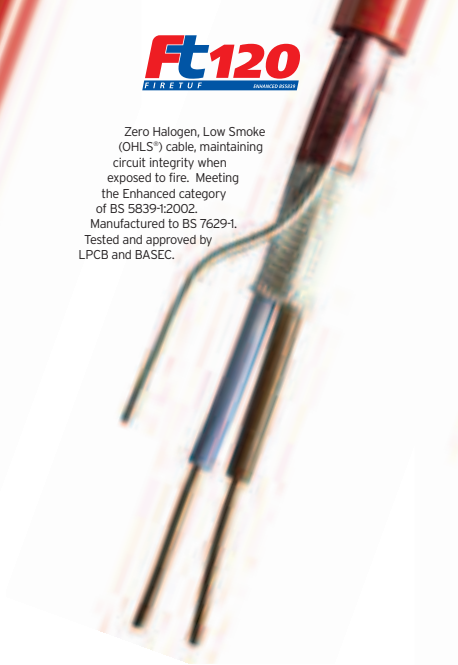
Draka's vast product range covers the great majority of general and industrial applications. All cables conform to an extensive range of British, International and customer specifications.

Draka are a major supplier to the construction industry, with a complete range of housewiring and low voltage supply cables, for use in domestic premises, commercial office developments and public buildings, such as retail business parks, hospitals and sports complexes.

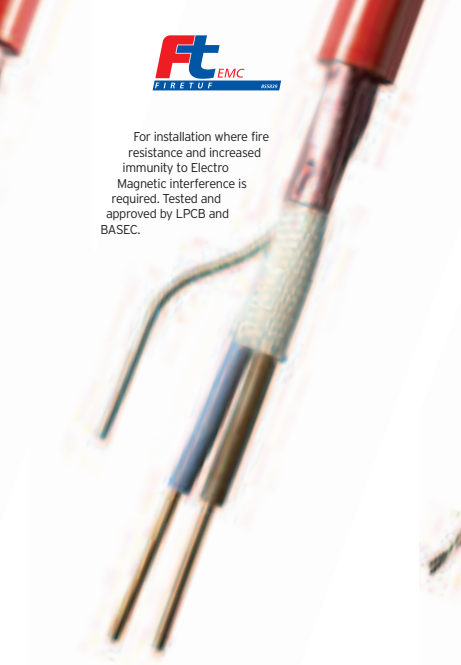
In addition to this general range of energy cables, the company is a market leader in the production of fire performance cables and addresses the needs of a host of specific, individual markets and applications. These include oil and petrochemicals, rail, television, lighting and signalling for motorways and airfields, cables for security systems, and specialist communication and data transmission cables.



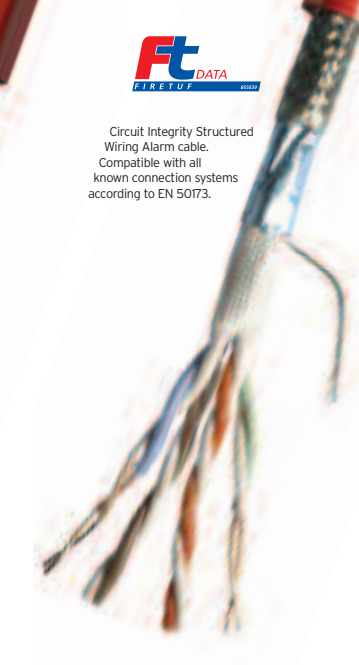
FT30 Zero Halogen, Low Smoke (OHLS®) cable. Meeting the Standard category of BS 5839-1:2002. Tested and approved by LPCB and BASEC.



Zero Halogen, Low Smoke (OHLS®) cable, maintaining circuit integrity when exposed to fire. Meeting the Enhanced category of BS 5839-1:2002. Manufactured to BS 7629-1. Tested and approved by LPCB and BASEC.

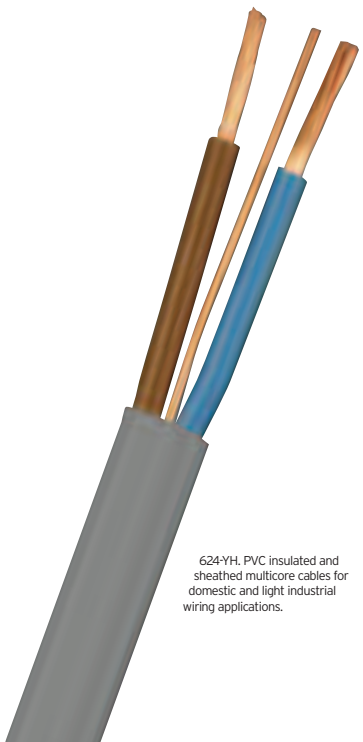


For installation where fire resistance and increased immunity to Electro Magnetic interference is required. Tested and approved by LPCB and BASEC.

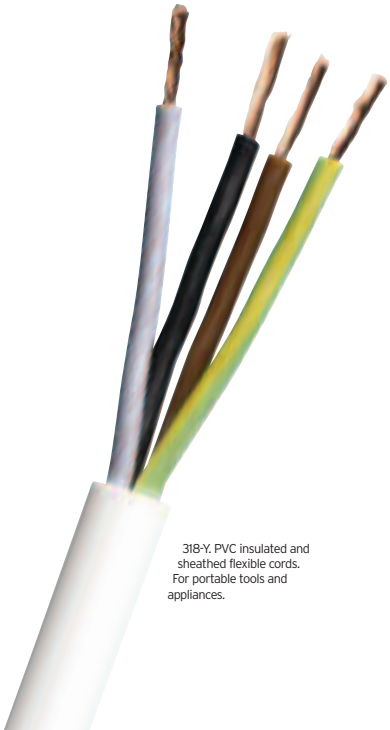


Circuit Integrity Structured Wiring Alarm cable. Compatible with all known connection systems according to EN 50173.

6181YH. PVC insulated and sheathed single core cables for industrial wiring and mains distribution.



624-YH. PVC insulated and sheathed multicore cables for domestic and light industrial wiring applications.



318-Y. PVC insulated and sheathed flexible cords. For portable tools and appliances.

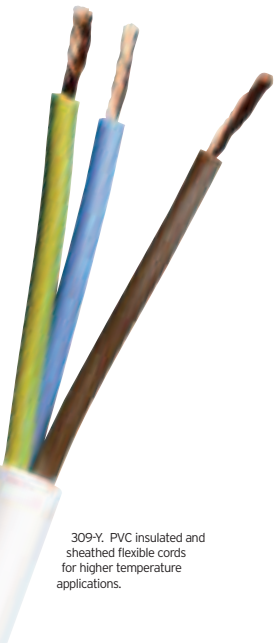
Zero Halogen, Low Smoke (OHLS®) coaxial cable for visual safety systems.

Enhanced circuit integrity 600/1000V power cable meeting the requirements of BS 7346-6 and compliant with 2007 edition of building regulations. Tested and approved by LPCB and BASEC.

Firetuf Power Zero Halogen, Low Smoke (OHLS®) cable with stranded copper conductors and a protective armour layer. Manufactured to BS 7846. Tested and approved by LPCB and BASEC.

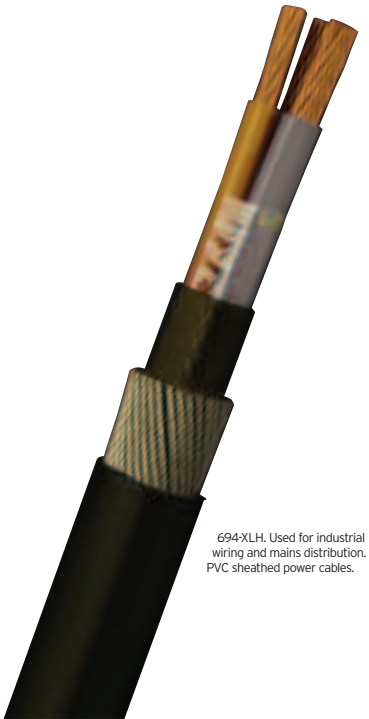
Zero Halogen, Low Smoke (OHLS®) single core cable having enhanced circuit integrity when exposed to fire. Tested and approved by LPCB.

The most trust



309-Y. PVC insulated and sheathed flexible cords for higher temperature applications.

1.9/3.3kV Power Cables. For industrial mains distribution. Available in both PVC and OHLS.

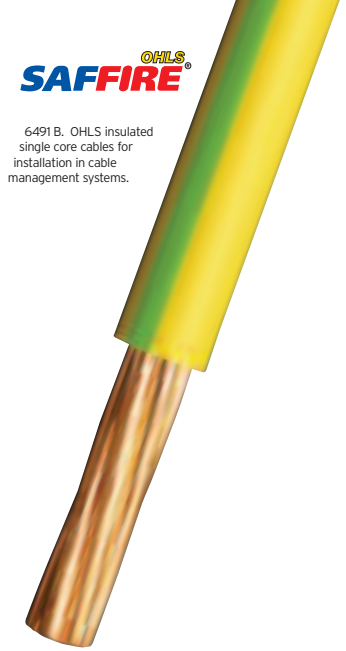


694-XLH. Used for industrial wiring and mains distribution. PVC sheathed power cables.

Type 8, Type 16. PVC insulated overhead power lines.

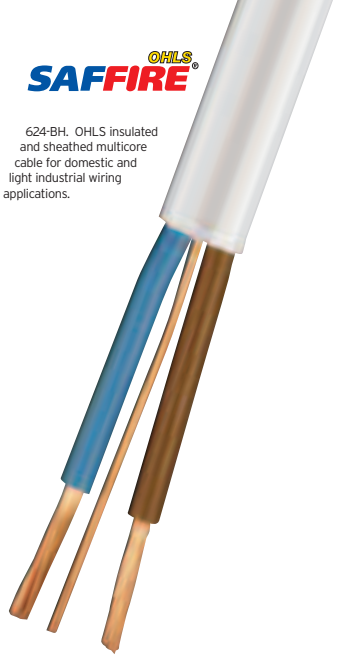
FIRETUF CONNECTA

A Zero Halogen, Low Smoke (OHLS®) modular wiring system, offering time and cost saving benefits whilst delivering the highest level of safety.



SAFFIRE OHLS®

6491 B. OHLS insulated single core cables for installation in cable management systems.



SAFFIRE OHLS®

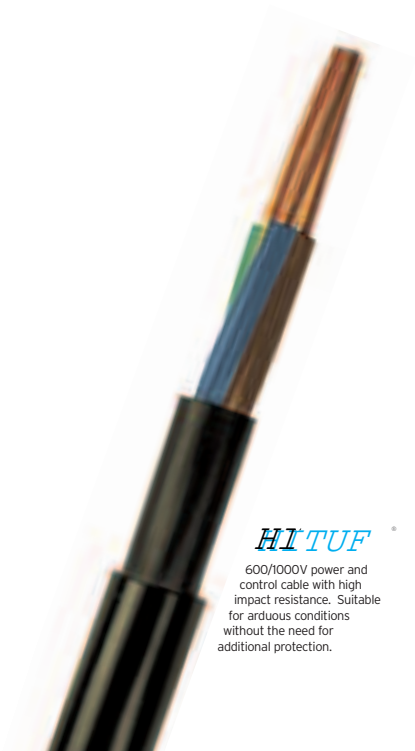
624-BH. OHLS insulated and sheathed multicore cable for domestic and light industrial wiring applications.

SAFI

Swift Fit insulated sheathed flexible in cable for domestic commercial applicati

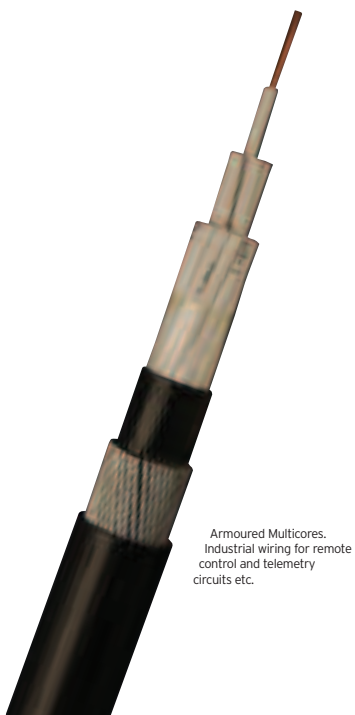
ed cable range

6U81SH 0.6/1kV XLPE insulated single core sheathed cables for industrial wiring and mains service. Available in both PVC and OHLS.



HITUF®

600/1000V power and control cable with high impact resistance. Suitable for arduous conditions without the need for additional protection.



Armoured Multicores. Industrial wiring for remote control and telemetry circuits etc.

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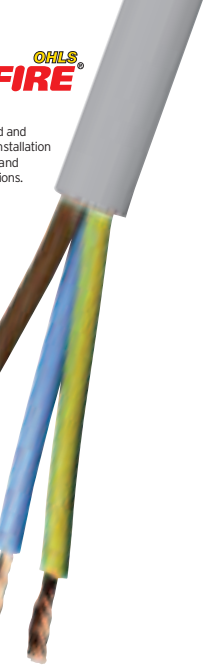

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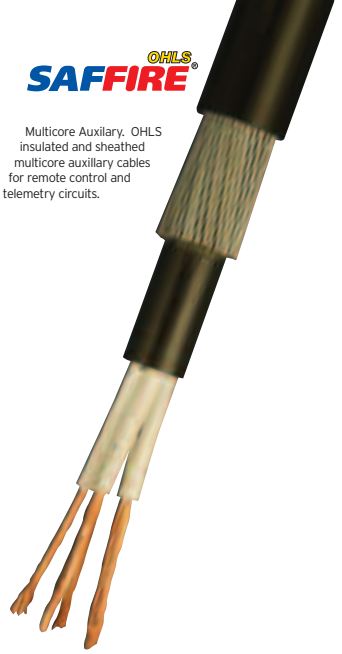
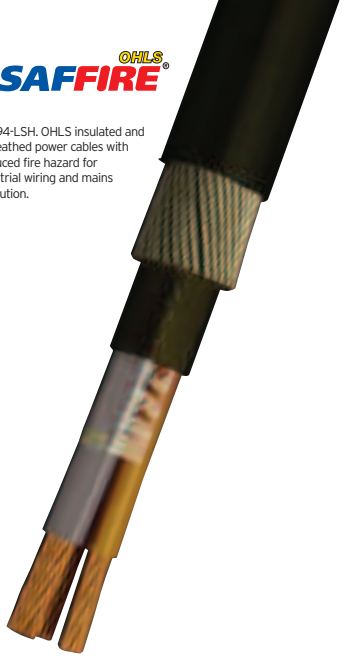


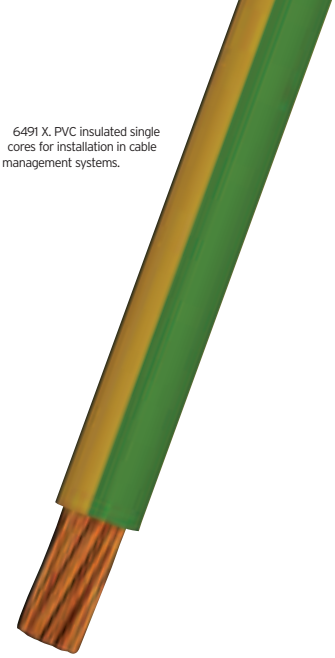
OHLS
SAFFIRE®

Multicore Auxilary. OHLS insulated and sheathed multicore auxillary cables for remote control and telemetry circuits.



OHLS
SAFFIRE®

694-LSH. OHLS insulated and sheathed power cables with reduced fire hazard for industrial wiring and mains distribution.



6491 X. PVC insulated single cores for installation in cable management systems.

HI SHIELD

Hydrocarbon resistant instrumentation cables have applications in environments where attack om oil, solvents or other emicals is likely.

DRAKA 5308

Multipair instrumentation and control cables. Used in the provision of voice and data services and the interconnection of electrical equipment and instruments.

DRAKA 5308

Multipair instrumentation and control cables. Used in the provision of voice and data services and the interconnection of electrical equipment and instruments.

Medium Voltage Power Cables. 6350/11000v power cables for energy distribution. Available in PVC or OHLS.

Draka, the world's mo

When it comes to specifying low voltage cables, you have to choose products from a company you can trust.

Draka is that company, an international cable manufacturer with a turnover of circa 2 billion Euro and over 9,000 employees worldwide. As part of Draka Energy and Infrastructure Europe, a division of Draka Holding NV, we are the leading supplier of fire performance cables, zero halogen and PVC power cables and building wires in the UK.

With over 100 years of in-depth experience, our vast product range has been developed and manufactured with leading edge technology and is backed by the resources of one of the world's major specialist cable companies. Our products have been supplied into numerous oil and petrochemical, mass transit, lighting and signalling for highways and specialist communications and data transmission projects.

In common with all Draka Group companies, our values are based on being trusted, reliable and professional coupled with an emphasis on customer service and innovation.

Draka's UK operations include copper wire drawing and stranding, compound and cable manufacture and distribution.

These extensive facilities give the Company strategic control over all major aspects of its business, from raw materials to the finished product. This enables us to ensure highest product quality, reliability and continuity of supply, for our customers.

Draka holds many national and international product approvals including those administered by BASEC, the British Approvals Service for Cables.

We operate Quality Management systems approved to BS EN ISO 9001 in addition to











st trusted cable brand

OHLS SAFFIRE®

specific customer quality assurance schemes where required.

Part of our continuing success is down to our commitment to ongoing product development through investment in innovation. We are constantly working to improve our product range to meet your specific needs. Indeed, the development of our product range forms the cornerstone of our entire operation.







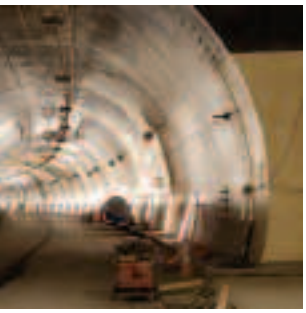


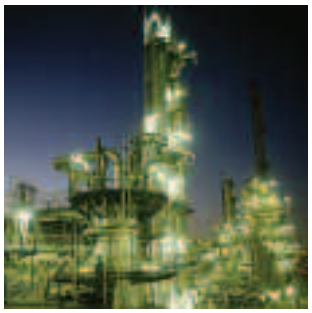
Our prestigious range of cables is produced at our purpose-built Derby site, using the latest plant and machinery, backed by comprehensive development and testing facilities. Moreover, we manufacture the internationally recognised Firetuf range of circuit integrity cables. This range covers cables which maintain essential function in the event of a fire, for the following applications:

- Fire alarm and emergency lighting
- Co-axial CCTV monitoring
- Power and data transmission

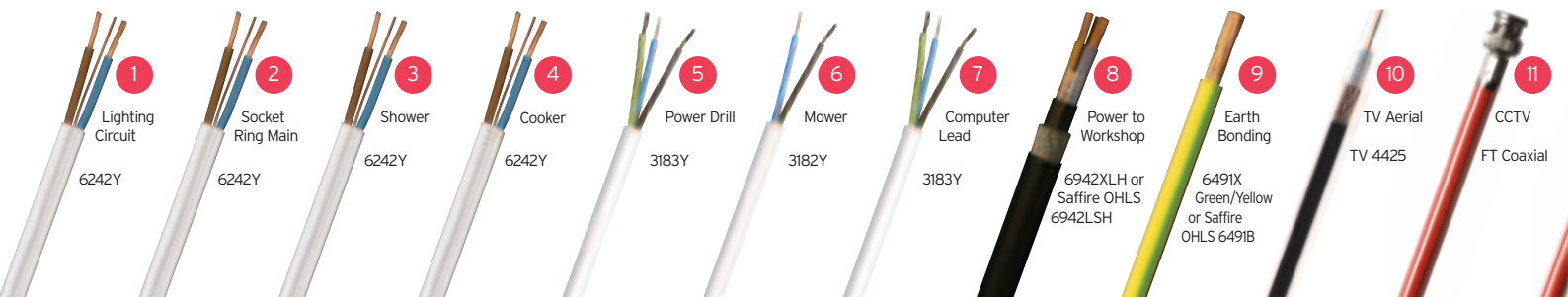
It comes as no surprise therefore, that Draka's market-leading products have been specified for a number of high profile building developments, both in the UK and other international arenas. These include Wembley Arena, the Emirates Stadium for Arsenal FC, London Underground, Channel Tunnel Rail Link, the Bullring Shopping Centre in Birmingham, Heathrow's new Terminal 5, Burj-Al-Arab Hotel in Dubai and the Petronas Twin Towers in Malaysia.

Above all, our values at Draka are not solely concerned with factories, machines and cables, but also with people. The people that produce, sell and administer our products and services, the people that buy these products and services and perhaps most important of all, the people who, without even knowing it, benefit every day from the safety and security provided by Draka products.

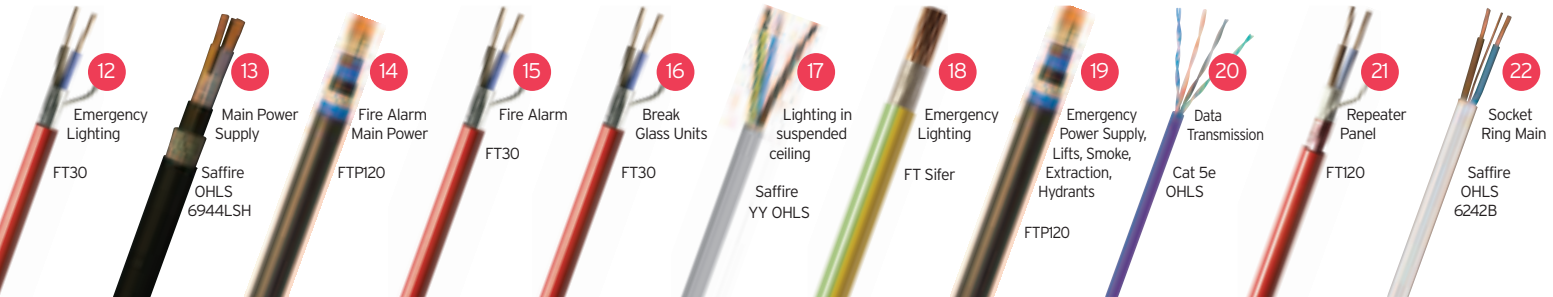





Cables For Eve



ry Application



Draka Firetuf Cables

At Draka, we fully understand the importance of fire performance cables. This is why we are deeply committed to a policy of ongoing product development through investment in innovation.

This is not just because we want our products and range to be consistently improved, so that they are better able to satisfy your needs, but because we understand that lives are at stake and that the performance and effectiveness of our products can help prevent loss of life.

In short, at Draka we know that the safety of occupants and users of public, commercial and industrial premises is of paramount importance. One factor that can play a key role in making buildings and occupants safer is the appropriate use of fire performance cables for critical safety systems, including fire alarms, emergency lighting, PA systems, CCTV systems and other emergency power supplies.

Moreover, the correct selection and installation of these vital safety cables ensures that, in the event of an emergency, systems can continue to function and people will have time to leave the building safely, as well as helping the emergency services to operate effectively.

A perfect example of how our policy of continuous innovation produces better, even more effective products, is the introduction of FT120, which provides enhanced cable performance with all the benefits associated with pliable alarm cable.

Firetuf cables set the standards for others to follow.

Clip & Gland Selection Chart

Cable ref.	Cable ref.	No. of cores	Core area mm²	Fire resistant P-Clip	A2/A2F brass gland ref.**	Nylon OHLS® gland ref.	LUL approved glands
FTES2EH1.5		2	1.5	WP30 (WP30/2*)	M20S	251/93	251-R(LSF)
	FTPLUS2EH1.5	2	1.5	WP34 (WP34/2/3*)	M20S	251/93	251-R(LSF)
FTES3EH1.5		3	1.5	WP32	M20S	251/93	251-R(LSF)
	FTPLUS3EH1.5	3	1.5	WP37	M20S	251/93	251-R(LSF)
FTES4EH1.5		4	1.5	WP37	M20S	251/93	251-R(LSF)
	FTPLUS4EH1.5	4	1.5	WP40	M20S	251/93	251-R(LSF)
FTES2EH2.5		2	2.5	WP37	M20S	251/93	251-R(LSF)
	FTPLUS2EH2.5	2	2.5	WP40	M20S	251/93	251-R(LSF)
FTES3EH2.5		3	2.5	WP37	M20S	251/93	251-R(LSF)
	FTPLUS3EH2.5	3	2.5	WP43	M20S	252/93	252-R(LSF)
FTES4EH2.5		4	2.5	WP43	M20	252/93	252-R(LSF)
	FTPLUS4EH2.5	4	2.5	WP47	M20	252/93	252-R(LSF)
FTES2EH4.0		2	4	WP43	M20	252/93	252-R(LSF)
	FTPLUS2EH4.0	2	4	WP47	M20	252/93	252-R(LSF)
FTES3EH4.0		3	4	WP47	M20	252/93	252-R(LSF)
	FTPLUS3EH4.0	3	4	WP51	M20	254/94	254-R(LSF)
FTES4EH4.0		4	4	WP51	M25	254/94	254-R(LSF)
	FTPLUS4EH4.0	4	4	WP54	M25	254/94	254-R(LSF)
FTEMC2EH1.5		2	1.5	WP34	M20S	251/93	251-R(LSF)
	FTEMC2EH2.5	2	2.5	WP37	M20S	251/93	251-R(LSF)

Clip and nylon gland references are for white, if red is required add the letter "R" after the clip or gland coding.
* Clips for 2 or 3 cables.
** For 'Enhanced' performance with Firetuf Plus, A2 brass glands should be used for through joints.
** For Hazardous Areas, flameproof A2F brass glands should be used.

Approvals and Jointing

All Firetuf cables are tested and Certified by LPCB and BASEC to the latest edition of appropriate Standards.

Firetuf EASYSTRIP Multicore
LPCB Ref.No 361d

Firetuf EASYSTRIP
BASEC Ref.No 004/004/218

BS 5839-1:2002 recommends that cables are installed without joints if possible. When through joints are used, all terminations and other accessories should be such as to minimise the probability of early failure in the event of a fire.

Appropriately jointed Firetuf cables continue to provide circuit integrity up to the full BS 5839 rating.

Current Ratings and Associated Volt Drop

BS 7629 limits maximum conductor temperature (unless enclosed) to 70ºC

	Reference method C (Clipped direct)				Reference Method B* (Enclosed in conduit on a wall or in trunking)			
	One twin cable single phase AC or DC		One 3 or 4 core cable 3 phase		One twin cable single phase AC or DC		One 3 or 4 core cable 3 phase	
Phase conductor CSA mm²	Current Rating A	Volt Drop mV/A/m	Current Rating A	Volt Drop mV/A/m	Current Rating A	Volt Drop mV/A/m	Current Rating A	Volt Drop mV/A/m
1.5	19.5	29	17.5	25	16.5	29	15	25
2.5	27	18	24	15	23	18	20	15
4.0	36	11	32	9.5	30	11	27	9.5

* As defined in Appendix 4, table 4D2A and 4D2B of BS 7671, the IEE Wiring Regulations, 17th Edition. Conductor operating temperature: 70ºC. Ambient temperature: 30ºC

LPCB
TESTED & CERTIFIED
BASEC

FT30 FIRETUF STANDARD BS5839

CIRCUIT INTEGRITY ALARM CABLE

FT30 Zero Halogen Low Smoke cable has been designed and manufactured in the UK to provide superior flame retardance and circuit integrity, together with optimised ease of installation characteristics. Manufactured to BS7629-1 and meeting the Standard category of BS 5839-1:2002. Tested and approved by LPCB and BASEC.

- Fastest ever sheath removal, allowing reduced termination times
- Smallest diameter and most flexible
- Easily dressable
- Smallest bending radius without deformation or cable kinking
- Reduced weight
- Suitable for use in Zone 1 and Zone 2 hazardous areas
- Twisted core construction for improved signal clarity

Construction

Conductors:	Solid or stranded plain annealed copper wire.
Insulation:	Silicone rubber.
Electrostatic screen:	Aluminium/polyester laminated tape.
Conductor (earth):	Solid or stranded tinned annealed copper.
Sheath:	High performance, Thermoplastic Zero Halogen, Low Smoke (OHLS®) compound.

Physical Characteristics

Voltage rating (Uo/U):	300/500V.
Operating temp:	-40˚C to +90˚C (The cable should not be flexed when either the ambient or cable temperature is below 0˚C).
Min. bending radius:	6 x overall diameter of cable.

Standards Achieved

Circuit integrity:	BS 5839-1:2002 Clause 26.2d Standard. BS EN 50200 PH30, PH60 and Annexe E. BS 6387 C, W & Z. IEC 60331-2
Flame propagation:	BS EN 60332-1, BS EN 60332-3.
Acid gas emission:	IEC 60754, BS EN 50267.
Smoke emission:	BS EN 61034

Cable ref.	No. of cores	Conductor Class	CSA mm²	Protective earth conductor CSA mm²	Nominal overall diameter mm	Approx. nett weight kg/km
FTES2EH1.5	2	1	1.5	1.5	7.7	100
FTES3EH1.5	3	1	1.5	1.5	8.0	117
FTES4EH1.5	4	1	1.5	1.5	9.2	145
FTES2EH2.5	2	1	2.5	2.5	8.9	150
FTES3EH2.5	3	1	2.5	2.5	9.5	177
FTES4EH2.5	4	1	2.5	2.5	10.9	220
FTES2EH4.0	2	2	4	4	10.7	225
FTES3EH4.0	3	2	4	4	11.9	275
FTES4EH4.0	4	2	4	4	13.4	340

Ft120 FIRETUF ENHANCED BS5839

CIRCUIT INTEGRITY ALARM CABLE

Zero Halogen, Low Smoke (OHLS®) cable, maintaining circuit integrity when exposed to fire. Meeting the Enhanced category of BS 5839-1:2002. Manufactured to BS 7629-1. Tested and approved by LPCB and BASEC.

FT120 has been specially designed to meet the Enhanced requirements detailed in BS 5839-1:2002, Clause 26.2e. It therefore meets the PH120 class, and additionally meets the requirements for integrated water spray and mechanical shock also described in Clause 26.2e, and detailed in BS 8434 Part 2:2003:

60 mins - fire and mechanical impact, followed by
60 mins - fire, mechanical impact and water

FT120 achieves the Enhanced performance, whilst retaining all the advantages associated with a pliable cable. These include:

- Lower termination costs
- No special tools or training
- Ease of handling and installation
- Available in long lengths
- Twisted core construction to improve signal clarity
- Suitable for use in Zone 1 and Zone 2 hazardous areas

FT120 achieves the Enhanced performance by application of state of the art materials technology, providing advanced resistance to fire and heat, enabling the maintenance of circuit integrity through this most onerous testing protocol.

Construction

Conductors:	Solid or stranded plain annealed copper wire.
Insulation:	Enhanced silicone rubber.
Binder:	Enhanced close weave glass tape.
Conductor (earth):	Solid or stranded tinned annealed copper.
Electrostatic screen:	Enhanced aluminium/polyester laminated tape.
Sheath:	Enhanced Thermoplastic Zero Halogen, Low Smoke (OHLS®) compound.

Physical Characteristics

Voltage rating (Uo/U):	300/500V.
Operating temp:	-40˚C to +90˚C (The cable should not be flexed when either the ambient or cable temperature is below 0˚C).
Min. bending radius:	6 x overall diameter of cable.

Standards Achieved

Circuit integrity:	BS 5839-1:2002 Clause 26.2e Enhanced. BS 8434-2:2003. BS EN 50200 PH120. BS 6387 C, W & Z.
Flame propagation:	BS EN 60332-1, BS EN 60332-3.
Acid gas emission:	IEC 60754, BS EN 50267.
Smoke emission:	BS EN 61034

LPCB TESTED & CERTIFIED BASEC

Cable ref.	No. of cores	Conductor Class	CSA mm²	Protective earth conductor CSA mm²	Nominal overall diameter mm	Approx. nett weight kg/km
FTPLUS2EH1.5	2	1	1.5	1.5	8.6	130
FTPLUS3EH1.5	3	1	1.5	1.5	9.0	135
FTPLUS4EH1.5	4	1	1.5	1.5	10.1	170
FTPLUS2EH2.5	2	1	2.5	2.5	9.9	175
FTPLUS3EH2.5	3	1	2.5	2.5	10.6	200
FTPLUS4EH2.5	4	1	2.5	2.5	11.9	250
FTPLUS2EH4.0	2	2	4	4	11.7	250
FTPLUS3EH4.0	3	2	4	4	12.8	300
FTPLUS4EH4.0	4	2	4	4	14.4	370

FIRETUF EMC BS5839

CIRCUIT INTEGRITY ALARM CABLE

In airport environments, where higher than normal levels of electro magnetic radiation are present, alarm systems could be vulnerable to false alarms. Firetuf emc cables were specifically designed to meet the onerous requirements for immunity to Electro Magnetic Interference (EMI) and have been supplied for London Heathrow Terminal 5. Zero Halogen, Low Smoke (OHLS®) cable, maintaining circuit integrity when exposed to fire, meeting the Standard category of BS 5839-1:2002. Manufactured to BS 7629-1. Tested and approved by LPCB and BASEC.

These cables are suitable for installations where a fire situation may pose a major hazard and the maintenance of circuit integrity is a requirement, thereby giving increased protection to life and property. Application of the latest sheath extrusion technology and 100% cover electrostatic screen, gives Firetuf emc its unique advantages which include:

- Increased immunity to EMI
- Available in long length
- Ease of handling and installation
- Lower termination costs
- Twisted core construction to improve signal clarity
- Suitable for use in Zone 1 and Zone 2 hazardous areas

Construction

Conductors:	Solid or stranded plain annealed copper wire.
Insulation:	Silicone rubber.
Binder:	Close weave glass tape.
Electrostatic screen:	Enhanced aluminium/polyester laminated tape.
Conductor (earth):	Solid or stranded tinned annealed copper.
Sheath:	High performance, Thermoplastic Zero Halogen, Low Smoke (OHLS®) compound.

Physical Characteristics

Voltage rating (Uo/U):	300/500V.
Operating temp:	-40˚C to +90˚C (The cable should not be flexed when either the ambient or cable temperature is below 0˚C).
Min. bending radius:	6 x overall diameter of cable.

Standards Achieved

Circuit integrity:	BS 5839-1:2002 Clause 26.2d Standard. BS 8434-1:2003. BS EN 50200 PH30. BS 6387 C, W & Z.
Flame propagation:	IEC 60332-3, IEC 60332-1, BS EN 50265, BS EN 50266.
Acid gas emission:	IEC 60754, BS EN 50267.
Smoke emission:	IEC 61034, BS EN 50268.

Cable ref.	No. of cores	Conductor Class	CSA mm²	Earth CSA mm²	Nominal diameter mm	Approx. nett weight kg/km
FTEMC2EH1.5	2	1	1.5	1.5	8.3	110
FTEMC2EH2.5	2	1	2.5	2.5	9.7	170

FTP120

FIRETUF POWERPLUS BS7346-6

CIRCUIT INTEGRITY ENERGY CABLE

By utilisation of high performance materials, Draka has now enhanced the circuit integrity performance of this design of 600/1000V SWA armoured power cable so as to meet the most onerous requirements of BS8519-2010 - selection and installation of fire resistant power and control cable systems for life safety and fire fighting applications - (previously BS7346-6). Specification for cable systems". The new standard defines fire performance requirements of various types of fire rated cables in maintaining circuit integrity for life safety, fire fighting and property protection systems.

Fire Safety systems include automatic fire suppression facilities, fire detection and alarms, fire compartmentalisation, smoke control and ventilation, sprinkler and wet risers, ventilation and shutters, fire fighting lifts etc, and FTP120 satisfies the 120 minute requirements for all of these systems.

All these systems require secure power supplies in the event of fire and the result of emphasis on the performance of the existing generation of power cables has highlighted the need for enhanced performance.

FTP120 meets the specified requirement of the constructional standard BS7846 and in providing enhanced circuit integrity preserves the handling and installation characteristics of a wire armoured design.

The Building Regulations Approved Document B on fire safety was revised on 1st April 2007 and this now specifies fire performance in accordance with BS7346-6 (now BS8519:2010).

FTP120 can be specified with confidence in meeting the demanding performance required to support modern fire engineering systems in today's buildings.

Construction

Conductors:	Plain annealed stranded copper conductors. For sizes up to and including 35mm² these are circular. Shaped conductors start at 50mm² with the exception of 2 core cables where shaped conductors start at 25mm².
Insulation:	Mica-glass fire-resistant tapes, covered by an extruded layer of cross-linked polyethylene.
Binder:	Polyester tape.
Bedding:	An extruded layer of Zero Halogen, Low Smoke (OHLS®) compound.
Armour:	Single layer of galvanised steel wires.
Sheath:	Thermoplastic Zero Halogen, Low Smoke (OHLS®) compound.

Physical Characteristics

Voltage rating(Uo/U):	600/1000V.
Operating temp:	-40˚C to +90˚C (The cable should not be flexed when either the ambient or cable temperature is below 0˚C).
Min. bending radius:	8 x overall diameter of cable.
Current Rating:	Refer to table 4E4A or 4E4B of BS7671, ERA 69-30 pt V or on pages 103-104.

Note: In the event of a fire, the increase in impedance may require consideration to the installation of larger conductor sizes, to accommodate motor starting loads and the performance of protective conductors.

Standards Achieved

Circuit integrity:	BS8491 20, 60 and 120mins
Acid gas emission:	IEC 60754, BS EN 50267.
Flame propagation:	BSEN 60332-3, BSEN 60332-1
Smoke emission:	BSEN 61034

LPCB TESTED & CERTIFIED BASEC

FTP120 Technical Data

2 Core

Nominal area of conductor mm²	Insulation thickness mm	Nominal armour wire dia. mm	Approx. dia. under armour mm	Approx. overall diameter mm	Approx. cable weight kg/km	Max conductor resistance DC@20°C Ω/km	Max conductor resistance AC@90°C Ω/km	Reactance @50Hz Ω/km	Impedance AC@90°C Ω/km	Max. arm. resistance at 20°C Ω/km
4	0.7	1.25	15.8	23.2	870	4.61	5.878	0.099	5.878	7.9
6	0.7	1.25	17.1	24.5	990	3.08	3.927	0.094	3.928	7
10	0.7	1.25	18.9	26.4	1140	1.83	2.333	0.093	2.335	6
16	0.7	1.25	20.4	27.9	1320	1.15	1.466	0.088	1.469	3.7
25	0.9	1.25	20.6	28.1	1400	0.727	0.927	0.082	0.93	3.7
35	0.9	1.6	22.3	30.5	1820	0.524	0.668	0.077	0.673	2.6
50	1	1.6	24.2	32.4	2140	0.387	0.494	0.076	0.5	2.3
70	1.1	1.6	27.3	35.7	2680	0.268	0.342	0.075	0.349	2
95	1.1	2	30.2	39.7	3530	0.193	0.247	0.074	0.258	1.4
120	1.2	2	32.8	42.6	4170	0.153	0.196	0.072	0.209	4.3
150	1.4	2	35.9	45.9	4940	0.124	0.1597	0.073	0.176	1.2
185	1.6	2.5	39.5	51	6370	0.0991	0.1284	0.073	0.148	0.82
240	1.7	2.5	43.6	55.3	7730	0.0754	0.989	0.072	0.122	0.73
300	1.8	2.5	47.6	59.5	9170	0.0601	0.0801	0.072	0.107	0.67
400	2	2.5	52.9	65.2	11190	0.047	0.0641	0.071	0.096	0.59

3 Core

Nominal area of conductor mm²	Insulation thickness mm	Nominal armour wire dia. mm	Approx. dia. under armour mm	Approx. overall diameter mm	Approx. cable weight kg/km	Max conductor resistance DC@20°C Ω/km	Max conductor resistance AC@90°C Ω/km	Reactance @50Hz Ω/km	Impedance AC@90°C Ω/km	Max. arm. resistance at 20°C Ω/km
4	0.7	1.25	16.8	24.3	970	4.61	5.878	0.099	5.878	7.9
6	0.7	1.25	17.9	25.4	1080	3.08	3.927	0.094	3.928	7
10	0.7	1.25	20	27.5	1270	1.83	2.333	0.093	2.335	4
16	0.7	1.25	21.7	29.1	1500	1.15	1.466	0.088	1.469	3.5
25	0.9	1.6	24.9	35	2110	0.727	0.927	0.082	0.93	2.5
35	0.9	1.6	27.3	35.5	2480	0.524	0.668	0.077	0.673	2.3
50	1	1.6	27.5	35.7	2720	0.387	0.494	0.076	0.5	2
70	1.1	1.6	31.1	39.5	3480	0.268	0.342	0.075	0.349	1.8
95	1.1	2	34.1	43.8	4630	0.193	0.247	0.074	0.258	1.3
120	1.2	2	37.2	47.1	5490	0.153	0.196	0.072	0.209	1.2
150	1.4	2.5	40.9	52.5	6900	0.124	0.1597	0.073	0.176	0.78
185	1.6	2.5	45.2	56.7	8170	0.0991	0.1284	0.073	0.148	0.71
240	1.7	2.5	49.9	61.9	10070	0.0754	0.989	0.072	0.122	0.63
300	1.8	2.5	54.7	66.8	12040	0.0601	0.0801	0.072	0.107	0.58
400	2	2.5	60.9	73.5	14790	0.047	0.0641	0.071	0.096	0.52

4 Core

Nominal area of conductor mm²	Insulation thickness mm	Nominal armour wire dia. mm	Approx. dia. under armour mm	Approx. overall diameter mm	Approx. cable weight kg/km	Max conductor resistance DC@20°C Ω/km	Max conductor resistance AC@90°C Ω/km	Reactance @50Hz Ω/km	Impedance AC@90°C Ω/km	Max. arm. resistance at 20°C Ω/km
4	0.7	1.25	18.1	25.6	1040	4.61	5.878	0.099	5.878	7.9
6	0.7	1.25	19.4	26.9	1240	3.08	3.927	0.094	3.928	7
10	0.7	1.25	21.9	29.3	1440	1.83	2.333	0.093	2.335	3.7
16	0.7	1.6	23.7	31.2	1880	1.15	1.466	0.088	1.469	3.1
25	0.9	1.6	27.3	35.5	2450	0.727	0.927	0.082	0.93	2.3
35	0.9	1.6	30.1	38.2	2930	0.524	0.668	0.077	0.673	2
50	1	1.6	30.6	39.1	3290	0.387	0.494	0.076	0.5	1.8
70	1.1	2	34.5	44.3	4540	0.268	0.342	0.075	0.349	1.2
95	1.1	2	38.5	48.5	5700	0.193	0.247	0.074	0.258	1.1
120	1.2	2.5	42	53.4	7230	0.153	0.196	0.072	0.209	0.76
150	1.4	2.5	46.5	58.1	8500	0.124	0.1597	0.073	0.176	0.68
185	1.6	2.5	51.3	63.3	10210	0.0991	0.1284	0.073	0.148	0.61
240	1.7	2.5	56.8	69.1	12680	0.0754	0.989	0.072	0.122	0.54
300	1.8	2.5	61.9	74.6	15250	0.0601	0.0801	0.072	0.107	0.49
400	2	3.15	70	84.7	19760	0.047	0.0641	0.071	0.096	0.35

Shaped conductors unless otherwise stated. * Circular conductors

FTP120 designs achieve the highest rating of 120 minutes when subjected to integrated testing involving direct impact and high pressure water spray. The details of this test are currently documented in BS 8491, as required in BS 8519:2010. 60 and 30 minute ratings also achieved.

FTP FIRETUF POWER BS7846

CIRCUIT INTEGRITY ENERGY CABLE

Zero Halogen, Low Smoke (OHLS®) cable with stranded copper conductors and a protective armour layer. Manufactured to BS 7846. Tested and approved by LPCB and BASEC.

These cables offer the advantages of an armoured 600/1000 Volt rated, zero halogen, low smoke cable with circuit integrity. They are intended for use in installations where vital circuits are required to continue operation in the event of the outbreak of fire. FTP is particularly suited for use in public buildings and constructions (such as hospitals, theatres, shopping developments, tunnels, mass transit railways, oil & petrochemical plants, power stations and computer installations) where the danger to life, equipment and structures may be greatly increased in the event of a power failure due to fire.

Also available in unarmoured design. Details available upon request.

Construction

Conductors:	Plain annealed stranded copper conductors. For sizes up to and including 35mm² these are circular. Shaped conductors start at 50mm² with the exception of 2 core cables where shaped conductors start at 25mm².
Insulation:	Mica-glass fire-resistant tapes, covered by an extruded layer of cross-linked polyethylene.
Binder:	Polyester tape.
Bedding:	An extruded layer of Zero Halogen, Low Smoke (OHLS®) compound.
Armour:	Single layer of galvanised steel wires.
Sheath:	Thermoplastic Zero Halogen, Low Smoke (OHLS®) compound.

Physical Characteristics

Voltage rating(Uo/U):	600/1000V.
Operating temp:	-40˚C to +90˚C (The cable should not be flexed when either the ambient or cable temperature is below 0˚C).
Min. bending radius:	8 x overall diameter of cable.
Current Rating:	Refer to table 4E4A or 4E4B of BS7671, ERA 69-30 pt V or on pages 103-104.

Note: In the event of a fire, the increase in impedance may require consideration to the installation of larger conductor sizes, to accommodate motor starting loads and the performance of protective conductors.

Standards Achieved

Circuit integrity:	IEC 60331, BS 7846 F2, BS 6387 categories C, W & Z.
Acid gas emission:	IEC 60754, BS EN 50267.
Flame propagation:	BSEN 60332-3, BSEN 60332-1.
Smoke emission:	BSEN 61034

LPCB TESTED & CERTIFIED BASEC

FTP Technical Data

2 Core

Nominal area of conductor mm²	Insulation thickness mm	Nominal armour wire dia. mm	Approx. dia. under armour mm	Approx. overall diameter mm	Approx. cable weight kg/km	Max conductor resistance DC@20°C Ω/km	Max conductor resistance AC@90°C Ω/km	Reactance @50Hz Ω/km	Impedance AC@90°C Ω/km	Max. arm. resistance at 20°C Ω/km
1.5*	0.6	0.9	8.7	13.1	420	12.100	15.428	0.104	15.428	10.7
2.5*	0.7	0.9	10.0	14.6	500	7.410	9.448	0.101	9.448	8.8
4*	0.7	0.9	11.1	15.7	580	4.610	5.878	0.099	5.878	7.9
6*	0.7	0.9	12.3	16.9	660	3.080	3.927	0.094	3.928	7.0
10*	0.7	0.9	14.2	19.0	830	1.830	2.333	0.093	2.335	6.0
16*	0.7	1.25	15.9	21.4	1000	1.150	1.466	0.088	1.469	3.8
25	0.9	1.25	15.7	21.4	1100	0.727	0.927	0.082	0.930	3.7
35	0.9	1.6	17.7	24.3	1550	0.524	0.668	0.077	0.673	2.5
50	1.0	1.6	20.0	26.8	1850	0.387	0.494	0.076	0.500	2.3
70	1.1	1.6	23.0	30.0	2450	0.268	0.342	0.075	0.349	2.0
95	1.1	2.0	26.1	34.1	3350	0.193	0.247	0.074	0.258	1.4
120	1.2	2.0	28.9	37.1	3900	0.153	0.196	0.072	0.209	1.3
150	1.4	2.0	31.9	40.3	4650	0.124	0.160	0.073	0.176	1.2
185	1.6	2.5	35.9	45.7	5950	0.0991	0.128	0.073	0.148	0.82
240	1.7	2.5	40.0	50.0	7350	0.0754	0.099	0.072	0.122	0.73
300	1.8	2.5	44.3	54.5	8700	0.0601	0.080	0.072	0.107	0.67
400	2.0	2.5	49.4	60.0	10750	0.0470	0.064	0.071	0.096	0.59

3 Core

Nominal area of conductor mm²	Insulation thickness mm	Nominal armour wire dia. mm	Approx. dia. under armour mm	Approx. overall diameter mm	Approx. cable weight kg/km	Max conductor resistance DC@20°C Ω/km	Max conductor resistance AC@90°C Ω/km	Reactance @50Hz Ω/km	Impedance AC@90°C Ω/km	Max. arm. resistance at 20°C Ω/km
1.5*	0.6	0.9	9.3	13.7	426	12.100	15.428	0.104	15.428	10.2
2.5*	0.7	0.9	10.6	15.2	540	7.410	9.448	0.101	9.448	8.2
4*	0.7	0.9	11.8	16.4	640	4.610	5.878	0.099	5.878	7.5
6*	0.7	0.9	13.1	17.7	740	3.080	3.927	0.094	3.925	6.6
10*	0.7	1.25	15.1	20.6	1080	1.830	2.333	0.093	2.335	4.0
16*	0.7	1.25	17.0	22.7	1310	1.150	1.466	0.088	1.469	3.6
25*	0.9	1.6	20.0	26.6	1800	0.727	0.927	0.082	0.930	2.5
35*	0.9	1.6	22.3	29.1	2200	0.524	0.668	0.077	0.673	2.3
50	1.0	1.6	22.8	29.6	2450	0.387	0.494	0.076	0.500	2.0
70	1.1	1.6	26.3	33.3	3200	0.268	0.342	0.075	0.349	1.8
95	1.1	2.0	29.9	38.1	4450	0.193	0.247	0.074	0.258	1.3
120	1.2	2.0	33.1	41.5	5300	0.153	0.196	0.072	0.209	1.2
150	1.4	2.5	37.0	46.6	6700	0.124	0.160	0.073	0.176	0.78
185	1.6	2.5	41.1	50.9	8050	0.0991	0.128	0.073	0.148	0.71
240	1.7	2.5	46.0	56.2	9950	0.0754	0.099	0.072	0.122	0.63
300	1.8	2.5	50.9	61.3	12050	0.0601	0.080	0.072	0.107	0.58
400	2.0	2.5	56.9	67.7	14800	0.0470	0.064	0.071	0.096	0.52

4 Core

Nominal area of conductor mm²	Insulation thickness mm	Nominal armour wire dia. mm	Approx. dia. under armour mm	Approx. overall diameter mm	Approx. cable weight kg/km	Max conductor resistance DC@20°C Ω/km	Max conductor resistance AC@90°C Ω/km	Reactance @50Hz Ω/km	Impedance AC@90°C Ω/km	Max. arm. resistance at 20°C Ω/km
1.5*	0.6	0.9	10.1	14.5	520	12.100	15.428	0.104	15.428	9.5
2.5*	0.7	0.9	11.6	16.2	620	7.410	9.448	0.101	9.448	7.7
4*	0.7	0.9	13.0	17.6	730	4.610	5.878	0.099	5.878	6.8
6*	0.7	1.25	14.4	19.9	990	3.080	3.927	0.094	3.925	4.3
10*	0.7	1.25	16.8	22.3	1260	1.830	2.333	0.093	2.335	3.7
16*	0.7	1.25	18.9	24.6	1640	1.150	1.466	0.088	1.469	3.2
25*	0.9	1.6	22.2	28.8	2150	0.727	0.927	0.082	0.930	2.3
35*	0.9	1.6	24.8	31.6	2650	0.524	0.668	0.077	0.673	2.0
50	1.0	1.6	26.2	33.2	3100	0.387	0.494	0.076	0.500	1.8
70	1.1	2.0	30.7	38.9	4400	0.268	0.342	0.075	0.349	1.2
95	1.1	2.0	34.5	42.9	5650	0.193	0.247	0.074	0.258	1.1
120	1.2	2.5	38.7	48.3	7250	0.153	0.196	0.072	0.209	0.76
150	1.4	2.5	42.8	52.6	8550	0.124	0.160	0.073	0.176	0.68
185	1.6	2.5	47.6	57.8	10300	0.0991	0.128	0.073	0.148	0.61
240	1.7	2.5	53.8	64.2	12900	0.0754	0.099	0.072	0.122	0.54
300	1.8	2.5	59.2	70.0	15550	0.0601	0.080	0.072	0.107	0.49
400	2.0	3.15	66.6	79.3	20250	0.0470	0.064	0.071	0.096	0.35

Shaped conductors unless otherwise stated.
* Circular conductors

FIRETUF BS6387

CIRCUIT INTEGRITY ENERGY CABLE

Zero Halogen, Low Smoke (OHLS®) single core cable having enhanced circuit integrity when exposed to fire. Tested and approved by LPCB.

These cables are designed for drawing into trunking and conduit where a fire situation may pose a major hazard and the maintenance of circuit integrity is a requirement. To achieve optimum performance they should be installed in metal conduit.

Construction

Conductors:	Stranded plain annealed copper wire conductor
Insulation:	Mica-glass fire resistant tape covered by an extruded layer of cross-linked Zero Halogen, Low Smoke (OHLS®) insulating compound

Physical Characteristics

Voltage rating (Uo/U):600/1000V.

Operating temp:	-40˚C to +90˚C (The cable should not be flexed when either the ambient or cable temperature is below 0˚C).
Min. bending radius:	8 x overall diameter

Standards Achieved

Circuit integrity:	BS 6387 categories C, W & Z (when applied to a single cable) Exceeds IEC 60331 - 3 hours at 750°C - when the test temperature was increased to 950°C, equivalent to BS 6387 Category C. (This test was also satisfactorily applied to Sifer cable in an earthed metal conduit, as per LPCB guidance notes).
Flame propagation:	BSEN 60332-1, BSEN 60332-3
Acid gas emission:	IEC 60754-1, BSEN 50267-2-1.
Smoke emission:	IEC 61034, BSEN 50268

LPCB TESTED & APPROVED

A full range of insulation colours is available including green/yellow.
Sheathed versions also available. Details available upon request.

Nominal area of conductor mm²	Insulation thickness mm	Mean diameter (upper limit) mm	Approx. weight of cable kg/km	Conductor resistance Max @20°C Ω/km
1.5	0.7	3.9	32	12.10
2.5	0.8	4.6	43	7.41
4	0.8	5.1	55	4.61
6	0.8	5.6	85	3.08
10	1.0	7.1	146	1.83
16	1.0	8.1	198	1.15
25	1.2	9.8	320	0.727
35	1.2	10.9	410	0.524
50	1.4	13.4	549	0.387
70	1.4	15.2	770	0.268
95	1.6	17.6	1140	0.193
120	1.6	19.3	1425	0.153
150	1.8	21.3	1720	0.124
185	2.0	23.7	2155	0.0991
240	2.2	26.8	2900	0.0754
300	2.4	29.7	3540	0.0601
400	2.6	33.3	4410	0.0470
500	2.8	37.2	5660	0.0366
630	2.8	41.3	7140	0.0283

FIRETUF DATA BS5839

CIRCUIT INTEGRITY DATA CABLE

Circuit Integrity Structured Wiring Alarm cable. Compatible with all known connection systems according to EN 50173.

Based on the design for structured wiring (found in IEC 61156 and BS EN 50288), Firetuf Data cable brings together high frequency data transmission and circuit integrity in a one pair, two pair and four pair cable that will continue to transmit data even when being directly attacked by fire.

Firetuf Data has successfully passed BS 5839: 2002 test protocols. This patented design allows the continuation of data transmission in the event of a fire.

Firetuf Data has three designs: one, two and four pair construction all using the same wire size of 0.63mm, overall screened plus a drain wire and braided.

Physical Characteristics

Min. Installation Bend Radius:	8 x Dia.
Min. Fixed Bending Radius:	6 x Dia.
Installation Temp. Range:	0°C to 50°C.
Installed Operating Temp. Range:	-20°C to 60°C.

Electrical Characteristics @ 20°C

Structural Return Loss RI:	>IEC dB.
Characteristic Impedance @ 10MHz:	100±5Ω.
DC Conductor Loop Resistance:	<19Ω/100m.
Max. Resistance unbalance:	≤2%.
Nominal Velocity of Propagation:	57%.
Max. Capacitance unbalance:	1600 pF/km.
Insulation Resistance (500V):	≥5000 MΩ.km.

Standards Achieved

ISO/IEC 11801:1994; EN 50173:1995; EN 50288-2-1

Circuit integrity:	BS 5839-1:2002 Clause 26.2e Enhanced BS 8434-2:2003 BS EN 50200 >PH120 IEC 60331-23 BS 6387 C
Flame propagation:	UL 1581 VW1; BSEN 60332-3
Acid gas emission:	IEC 60754
Smoke emission:	IEC 61034

Cable	Part No.	Nominal Diameter mm	Approx weight kg/km
1 pair	910234	6.8	48
2 pair	910244	8.1	97
4 pair	910245	10.45	122

More detailed data sheets available upon request.

Ft COAXIAL
FIRETUF BS5839

CIRCUIT INTEGRITY COAXIAL CABLE

Zero Halogen, Low Smoke (OHLS®) coaxial cable for visual safety systems.

Fire resistant 75Ω Coax similar to RG59. Ideal for CCTV, security, smoke detection and evacuation monitoring applications, where continued functionality is required during a fire situation. Due to the zero halogen low smoke construction Firetuf Coaxial is ideal for use in public, commercial and industrial environments.

Construction

Conductor:	Plain annealed copper wire.
Insulation:	Dual layer Polyethylene and Silicone rubber.
Binder:	Close weave glass tape.
Screen:	Two layers plain copper wire braid.
Sheath:	Thermoplastic Zero Halogen Low Smoke (OHLS®) compound.

Physical Characteristics

Min. bending radius:	Installation: 10 x overall diameter.
	Fixed: 5 x overall diameter.
Temperature range:	Installation: -5ºC to +60ºC
	Operating: -30ºC to +70ºC
Conductor Diameter:	0.65mm
Overall Diameter:	9.1mm
Approximate weight:	110 kg/km

Electrical Characteristics @ 20ºC

Character impedance		Ω(ohms)	75±5
Attenuation at (nominal)	0,5Mhz	dB/100m	0.65
	1Mhz	dB/100m	0.90
	5Mhz	dB/100m	2.24
	10Mhz	dB/100m	3.35
	100Mhz	dB/100m	15.03
	300Mhz	dB/100m	32.51
Screening Attenuation	30-1000Mhz	dB	>100
	1000-2000Mhz	dB	>95
	2000-3000Mhz	dB	>89
Transfer impedance	5-30 Mhz	mΩ/m	≤5
	Velocity ratio	%	61.4
	DC resistance		
	Inner conductor	Ω/km	55.3
	Outer conductor	Ω/km	3.7
	Return loss		
	5-30Mhz	dB	>22
	30-470MhzdB	>22	
	470-1000Mhz	dB	>18
	1000-3000Mhz	dB	>20
	Electrical strength (1min.)		
	Dielectric	kV d.c.	2.00
	Sheath	kV d.c.	3.75

Standards Achieved

Construction:	BS EN 50117-1 & draft BS EN 50117-2-4 2002, EN 50083-2/A1 screening class A
Circuit integrity:	BS 5839-1:2002 Clause 26.2e Enhanced BS 8434-2:2003 BS EN 50200 >PH120 IEC 60331-23
Flame propagation:	BSEN 60332-3
Acid gas emission:	IEC 60754
Smoke emission:	IEC 601034

CONNECTA
FIRETUF BS6387

MODULAR WIRING SYSTEM

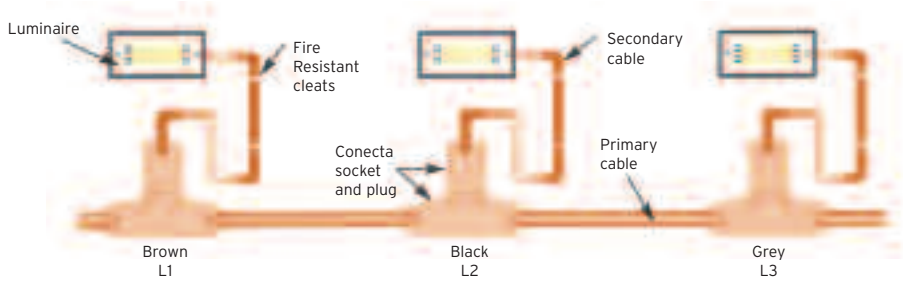
A Zero Halogen, Low Smoke (OHLS®) modular wiring system, offering time and cost saving benefits whilst delivering the highest level of safety.

The Firetuf Connecta system has been designed for ease of installation and cost effectiveness, allied to the overall safety of the system. The Connecta system provides solutions for lighting and power supplies in tunnel environments.

Based on Firetuf power or armoured OHLS® cable, Connecta is available in both fire resistant and flame retardant designs, and also offers ingress protection to IP 67.

Available in the size range 2.5mm^2 to 50mm^2 and manufactured to the bespoke requirements of the client, Connecta offers a time and cost effective solution to a variety of safety critical applications.

Every Connecta system is designed with the clients preset lengths between moulded socket outlets, which are unique to each installation. Secondary outputs are taken from the primary cables via moulded plugs to individual appliances. The system is therefore, easy to install by suitably qualified personnel and requires minimal maintenance.

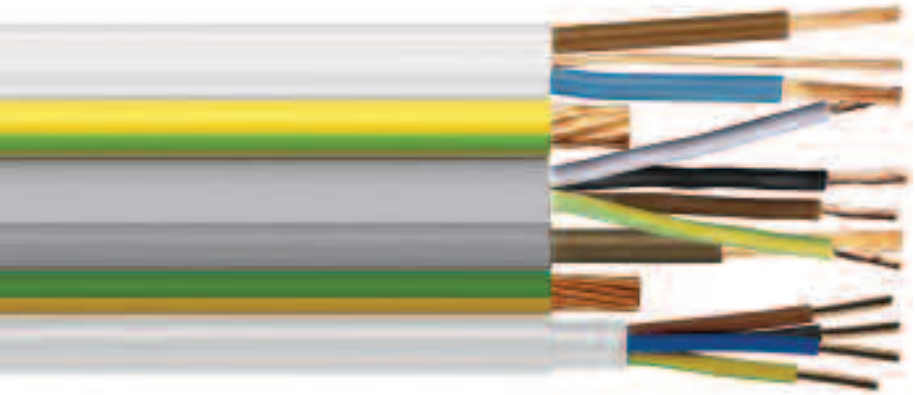


The Connecta system has been installed in the Channel Tunnel Rail Link (CTRL), London Underground, Heathrow Terminal 5 Tunnels, Dublin Port Tunnel, M25 road tunnels and the Singapore Mass Transit Network (MRT) amongst others. The Connecta system offers the following benefits:

- Reduced installation time
- Reduced installation costs
- Circuit integrity equivalent to BS 6387 C,W & Z
- Ingress protection to IP 67
- Minimum maintenance requirements
- System flexibility to meet clients positioning requirements
- Lightweight and compact jointing system

	Small Connecta	Large Connecta	Extra Large Connecta
Diameter (mm)	70	90	90
Length (mm)	150	220	260
Weight (Kg)	1.5	2	2.2

Draka Wiring Cables Saffire OHLS® and PVC



Draka has placed itself at the forefront of cable design and material technology and is able to assist it's customers in meeting ever more demanding requirements placed on cable performance, through an ongoing process of close technical co-operation with its end-users. Illustrating this commitment has been the company's development of its Zero Halogen, Low Smoke OHLS® range of fire performance cables.

Draka UK engineers have developed this range working closely with major specifying and testing bodies such as London Underground, British Nuclear Fuels, BAA and LPCB.

Cables within the Saffire OHLS® range show significantly improved performance, when compared with other cables, in meeting the demands of the specific hazards within a fire situation. This is achieved by the reduction of harmful gases and smoke production during burning.

OHLS® cables are particularly suitable for use in buildings and constructions such as hospitals, theatres, shopping precincts, tunnels and public utilities where protection of life, equipment and structures is essential.

PVC also continues to be a versatile material for general wiring cables. However, where fire hazard is considered a risk to building occupants, halogen free alternatives should be employed.

OHLS SAFFIRE®

6491 B - ENHANCED FIRE SAFETY WIRING CABLE

STANDARD: BS 7211

VOLTAGE RATING: 450/750V

When installed in an earthed metal enclosure, cables are suitable for voltages up to 1000V a.c. or up to 750V to earth d.c.

APPLICATION:

Industrial wiring installations where smoke and acid gas emission would pose a major hazard in the event of fire. These cables are intended for drawing into trunking and conduit. They may also be used inside fixed, protected installations such as light fittings, appliances, switchgear and controlgear, which are to be used in higher temperature zones.

CONSTRUCTION:

Single core cable. Solid or stranded plain copper conductor, Thermosetting Zero Halogen Low Smoke (OHLS®) insulated.

INSULATION COLOURS:

Black, Brown, Yellow†, Blue, Red, Green/Yellow, Grey, Orange, Pink, Turquoise and Violet. White is also available.

BASEC: Certified

MAXIMUM CONDUCTOR TEMPERATURE: 90°C

Note: Where a conductor operates at a temperature exceeding 70°C it shall be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature (see regulation 512-1-2 of BS7671, the 17th Edition of IEE Wiring Regulations).

CURRENT RATING: Refer to tables 4E1A & 4E1B in BS7671 or on pages 99-100

HARMONISED CODE: H07Z-R

FIRE PERFORMANCE CHARACTERISTICS:

Smoke emission:	IEC 61034 , BS EN 50268
Acid gas emission:	IEC 60754-2, BS EN 50267-2
Flame propagation:	IEC 60332-1, BS EN 50265

Nominal area of conductor mm	Class of conductor at 20°C	Conductor Resistance Ω/Km	Insulation thickness (upper limit) mm	Mean overall diameter mm	Approx. nett weight kg/km	Minimum bending radius factor
1.5	2	12.1	0.7	3.4	22	2D
2.5	2	7.41	0.8	4.2	35	2D
4	2	4.6	0.8	4.8	50	2D
6	2	3.08	0.8	5.4	72	2D
10	2	1.83	1.0	6.8	121	2D
16	2	1.15	1.0	8.0	182	2D
25	2	0.727	1.2	9.8	285	2D
35	2	0.524	1.2	11.0	390	3D
50	2	0.387	1.4	13.0	520	3D
70	2	0.268	1.4	15.0	720	3D
95	2	0.193	1.6	17.0	980	3D
120	2	0.153	1.6	19.0	1220	3D
150	2	0.124	1.8	21.0	1500	3D
185	2	0.0991	2.2	23.5	1910	3D
240	2	0.0754	2.2	26.5	2490	6D
300	2	0.0601	2.4	29.5	3100	6D
400	2	0.0470	2.6	33.5	3950	6D
500	2	0.0366	2.8	37.0	5000	6D
630	2	0.0283	2.8	41.0	6350	6D

† Single colour yellow is not harmonised

OHLS SAFFIRE®

624 BH - ENHANCED FIRE SAFETY WIRING CABLE

STANDARD: BS 7211

VOLTAGE RATING: 300/500V

APPLICATION:
Domestic and light industrial wiring, where smoke and acid gas emission would pose a major hazard in the event of fire. Can be clipped to surface, on trays or in free air where there is little risk of mechanical damage. Suitable for laying into trunking or conduit etc. when mechanical protection is required. May be embedded in plaster or laid in walls.

CONSTRUCTION:
Two or three core flat cables with an additional uninsulated copper circuit protective conductor. Solid or stranded plain copper conductors. XLPE insulated, laid parallel with CPC and Zero Halogen Low Smoke (OHLS®) sheathed.

CORE COLOURS: Two core: Brown and Blue. Three core: Brown, Black and Grey.

SHEATH COLOUR: White

BASEC: Certified

MAXIMUM CONDUCTOR TEMPERATURE: 90°C
Note: Where a conductor operates at a temperature exceeding 70°C it shall be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature (see regulation 512-1-2 of BS7671, the 17th Edition of IEE Wiring Regulations).

CURRENT RATING: Refer to table 4D5A in BS7671 or on page 108.

FIRE PERFORMANCE CHARACTERISTICS:

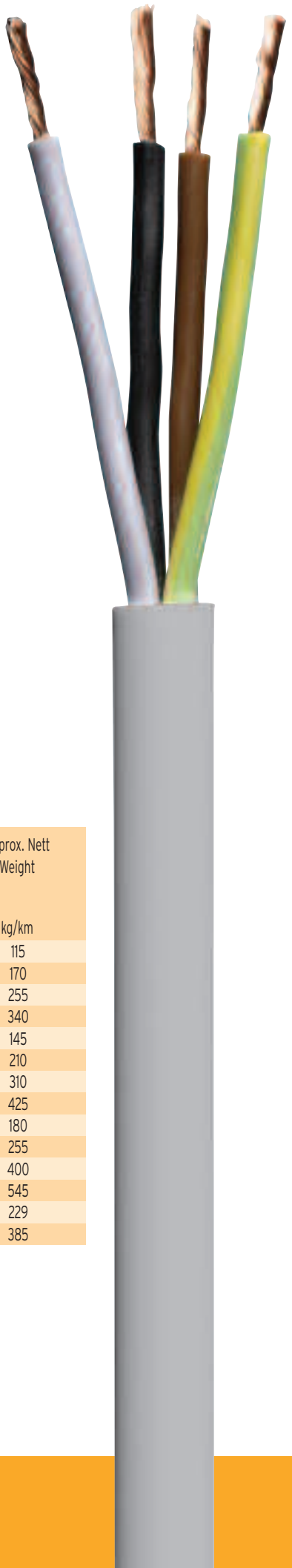
Smoke emission:	BSEN 61034
Acid gas emission:	IEC 60754-2, BS EN 50267-2
Flame propagation:	BSEN 60332-1

Reference number	Nominal area of conductor	Class of conductor	Maximum resistance of conductor at 20°C	Insulation thickness	Sheath thickness	Overall dimensions Upper limit (d xD)	Circuit protective conductor cross-section	Approx. nett weight	Minimum bending radius factor (major axis)
	mm^2		Ω/km	mm	mm	mm	mm^2	kg/km	3D
6242BH	1.0	1	18.1	0.7	0.9	5.0 x 9.1	1.0	67	3D
6242B7H	1 .0	2	18.1	0.7	0.9	5.1 x 9.4	1.0	72	3D
6242BH	1.5	1	12.1	0.7	0.9	5.3 x 9.7	1.0	80	3D
6242B7H	1.5	2	12.1	0.7	0.9	5.4 x 10.0	1.0	85	4D
6242BH	2.5	1	7.41	0.7	1.0	6.0 x 11.2	1.5	113	4D
6242B7H	2.5	2	7.41	0.7	1.0	6.1 x 11.4	1.5	119	4D
6242BH	4	2	4.61	0.7	1.0	6.7 x 12.6	1.5	155	4D
6242BH	6	2	3.08	0.7	1.1	7.5 x 14.6	2.5	219	4D
6242BH	10	2	1.83	0.7	1.2	8.8 x 17.6	*4.0	333	4D
6242BH	16	2	1.15	0.7	1.3	10.1 x 20.5	*6.0	495	4D
6243BH	1.5	1	12.1	0.7	0.9	5.3 x 12.9	1.0	110	4D

* Stranded Class 2 cpc

OHLS SAFFIRE® SWIFTFIT

SWIFTFIT - FLEXIBLE INSTALLATION CABLE



STANDARD: Generally to HD21.14, BS 7211 & PR EN 50525.

VOLTAGE RATING: 300/500V

APPLICATION: Flexible cable for fixed installation within buildings.

CONDUCTOR TYPE: Plain Annealed Copper (Flexible).

CORE COLOURS:
3 Core - Brown, Blue & Green/Yellow.
4 Core - Brown, Black, Grey & Green/Yellow.
5 Core - Brown, Black, Grey, Blue & Green/Yellow.
7+12 Core - White numbered cores & Green/Yellow.

INSULATION MATERIAL: OHLS - Halogen Free Low Smoke.

LAY UP: Twisted Cores.

SHEATH MATERIAL: OHLS - Halogen Free Low Smoke.

SHEATH COLOUR: Grey

MINIMUM BEND RADIUS : 6 x OD

MAXIMUM CONDUCTOR TEMP: 70°C

MINIMUM INSTALLATION TEMP: 0°C

CURRENT RATING: Refer to table 4D2A in BS 7671 or page 97.

FIRE PERFORMANCE CHARACTERISTICS:

Smoke emission: BS EN 61034

Acid gas emission: BS EN 50267-2, IEC 60754-2

Flame propagation: BS EN 60332-1

Ref.	Nominal Area of Conductors mm²	Part Number	Class of Conductor	Maximum Conductor Resistance Ω/km @ 200C	Insulation Thickness mm	Sheath Thickness mm	Nominal Cable Diameter mm	Approx. Nett Weight kg/km
3 Core	1.5	YYOHLS3G1.5GY	5	12.1	0.7	0.9	8.4	115
	2.5	YYOHLS3G2.5GY	5	7.41	0.8	1.1	10.1	170
	4.0	YYOHLS3G4.0GY	5	4.61	0.8	1.2	11.4	255
	6.0	YYOHLS3G6.0GY	5	3.08	0.8	1.3	12.8	340
4 Core	1.5	YYOHLS4G1.5GY	5	12.1	0.7	1.0	9.4	145
	2.5	YYOHLS4G2.5GY	5	7.41	0.8	1.1	11.0	210
	4.0	YYOHLS4G4.0GY	5	4.61	0.8	1.2	12.5	310
	6.0	YYOHLS4G6.0GY	5	3.08	0.8	1.3	14.1	425
5 Core	1.5	YYOHLS5G1.5GY	5	12.1	0.7	1.1	10.4	180
	2.5	YYOHLS5G2.5GY	5	7.41	0.8	1.2	12.1	255
	4.0	YYOHLS5G4.0GY	5	4.61	0.8	1.4	14.1	400
	6.0	YYOHLS5G6.0GY	5	3.08	0.8	1.6	16.0	545
7 Core	1.5	YYOHLS7G1.5GY	5	12.1	0.7	1.2	11.5	229
12 core	1.5	YYOHLS12G1.5GY	5	12.1	0.7	1.5	15.6	385

Frequently Asked Questions

WHY HAS DRAKA PRODUCED SAFFIRE® SWIFTFIT?

The latest installation practises in commercial buildings are showing an increase in the amount of cable basket being used. Draka have produced a cable which will sit straight in the basket off of the drum, and removes the requirement for excessive dressing and strapping down of the cable, thus considerably reducing installation costs.

WHERE CAN THIS CABLE BE USED?

As above, this cable is advantageous in fixed installations, where groups of cables are laid in cable basket. The fact that it is a SAFFIRE® OHLS® cable makes it suitable for all commercial applications

AREN'T THERE A NUMBER OF THESE CABLES ON THE MARKET TODAY?

Yes, however the cables on the market today are generally classed as "Flexible cords", and are not strictly rated as installation cables. Draka have addressed this issue.

HOW IS A "FLEX" DIFFERENT TO SAFFIRE® SWIFTFIT?

Stranded flexible conductors (class 5) are allowed within the standards, to have a higher Conductor resistance (CR) than the equivalent solid or stranded rigid conductors. This equates to between 7 and 10% difference in Conductor resistance. This would, if nothing was done, negatively affect the current rating, by as much as 4%. In respect of this Draka have matched the Conductor resistance of the flexible conductor in the SAFFIRE® YY OHLS® product to meet class 2 (stranded rigid) requirements.

DOES SWIFTFIT HAVE A BASEC APPROVAL?

Draka have worked with BASEC and hold a certificate of assessed design (CAD), however there is no British Standard (BS) against which to manufacture these cables, although they are generally manufactured in accordance with aspects of BS7211, HD 21.14 and PR EN 50525. However, notice has been taken that the intended use for these cables is as an INSTALLATION CABLE and NOT a CORD, and they are therefore not intended to be flexed repetitively. The use of these cables for fixed installations should include consideration of the influences that the cable is subject to in use (Installation methods such as grouping). Please refer to question below on current ratings. All of these factors were taken into account in the formation of the CAD.

IF I INSTALL THESE CABLES, AM I COMPLYING WITH THE WIRING REGULATIONS?

The answer to this is yes, as long as attention is drawn to certain clauses within the 17th edition. These clauses are 120.3, 120.4, 133.1 and 511. Clauses 133.1 and 511 refer to compliance with standards, and there is a statement that everything should comply to a British or Harmonised standard. There is a rider to this that where "equipment is not covered by a British or harmonised standard, or is used outside the scope of its standard, the designer or person responsible for specifying the installation shall confirm that the equipment provides the same degree of safety as that afforded by compliance with the regulations". Work is being undertaken to provide a standard to produce this cable against, and in the meantime, as above, Draka have a "Certificate of Assessed Design" from BASEC, to substantiate the safety of the cable.

WITH RESPECT TO THE WIRING REGULATIONS, WHICH TABLES DO I USE FOR CURRENT RATINGS?

Historically, stranded flexible class 5 conductors have been allowed to have a higher resistance than class 1 (solid) or class 2 (stranded) within BSEN 60228 - the conductor standard for the cable industry. This now means that flexible conductors have a higher resistance than the equivalent class 1 or 2 conductors that are most commonly found in installation cables. This would, if nothing was done, negatively affect the current rating, by as much as 4%. In light of this Draka has responded by matching the conductor resistance for its flexible conductors in these cables, with those of the class 1 and 2 equivalents. In light of this Draka YY OHLS can be rated using table 4D2A from the 17th edition wiring regulations (Multicore 70°C thermoplastic insulated and sheathed cables, non armoured).

DO THESE CABLES HAVE CORE COLOURS, OR IS IT A CASE OF BLACK NUMBERED CORES?

Draka YY OHLS is available in 3, 4 and 5 core designs with core colours as below:-

3 Core – Brown, Blue & Green/Yellow.

4 Core – Brown, Black, Grey & Green/Yellow.

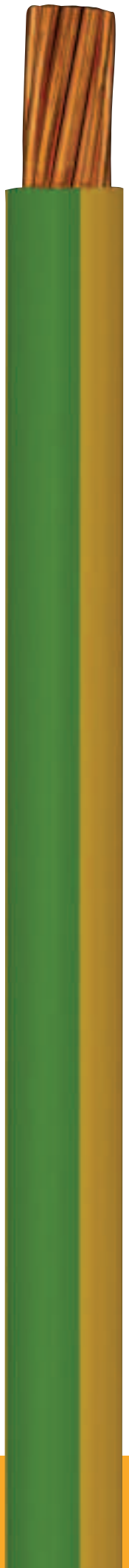
5 Core – Brown, Black, Grey, Blue & Green/Yellow

7+12 Core – White numbered cores & Green/Yellow

Please note that all values shown are nominal, based on current design practices/formulae and could be subject to change. (Rev5 – 20/07/09)

6491 X

GENERAL WIRING CABLE



STANDARD: BS 6004

VOLTAGE RATING: 450/750V (1mm² 300/500V)
When installed in an earthed metal enclosure, cables are suitable for voltages up to 1000V a.c. or up to 750V to earth d.c.

APPLICATION:
Industrial wiring, these cables are intended for installation in trunking and conduit. They may also be used inside fixed, protected installations such as light fittings, appliances, switchgear and control gear.

CONSTRUCTION:
Single core cable. Solid or stranded plain copper conductor, PVC insulated only.

INSULATION COLOURS:
Black, Brown, Yellow†, Blue, Red, Green/Yellow, Grey, Orange, Pink, Turquoise and Violet. White is also available.

BASEC: Certified

MAXIMUM CONDUCTOR TEMPERATURE: 70°C.

CURRENT RATING: Refer to tables 4D1A & 4D1B in BS7671 or on page 94-95.

Nominal area of conductor mm²	Class of conductor	Conductor resistance 20°C Ω/km	Insulation thickness mm	Mean overall diameter (upper limit) mm	Approx. nett weight kg/km	Harmonised codes	Minimum bending radius factor
1.0	1	18.1	0.6	2.7	15	H05V-U	3D
1.5	1	12.1	0.7	3.2	21	H07V-U	3D
1.5	2	12.1	0.7	3.3	22	H07V-R	3D
2.5	1	7.41	0.8	3.9	32	H07V-U	3D
2.5	2	7.41	0.8	4.0	35	H07V-R	3D
4	2	4.61	0.8	4.6	50	H07V-R	3D
6	2	3.08	0.8	5.2	71	H07V-R	3D
10	2	1.83	1.0	6.7	120	H07V-R	3D
16	2	1.15	1.0	7.8	180	H07V-R	3D
25	2	0.727	1.2	9.7	280	H07V-R	3D
35	2	0.524	1.2	10.9	380	H07V-R	4D
50	2	0.387	1.4	12.8	510	H07V-R	4D
70	2	0.268	1.4	14.6	710	H07V-R	4D
95	2	0.193	1.6	17.1	970	H07V-R	4D
120	2	0.153	1.6	18.8	1200	H07V-R	4D
150	2	0.124	1.8	20.9	1480	H07V-R	4D
185	2	0.0991	2.0	23.3	1900	H07V-R	4D
240	2	0.0754	2.2	26.6	2480	H07V-R	6D
300	2	0.0601	2.4	29.6	3100	H07V-R	6D
400	2	0.0470	2.6	33.2	3950	H07V-R	6D
500	2	0.0366	2.8	36.9	5000	H07V-R	6D
630	2	0.0283	2.8	41.1	6350	H07V-R	6D

† Single core yellow is not harmonised.

6181YH

GENERAL WIRING CABLE

STANDARD: BS 6004

VOLTAGE RATING: 300/500V

APPLICATION:
Domestic and light industrial wiring. Can be clipped to surface, on trays or in free air where there is little risk of mechanical damage. Suitable for laying into trunking or conduit etc when mechanical protection is required. May be embedded in plaster.

CONSTRUCTION:
Single core cable. Solid or stranded plain copper conductor, PVC insulated and PVC sheathed.

CORE COLOURS: Brown or Blue.

SHEATH COLOURS: Grey. Other colours available to order.

BASEC: Certified

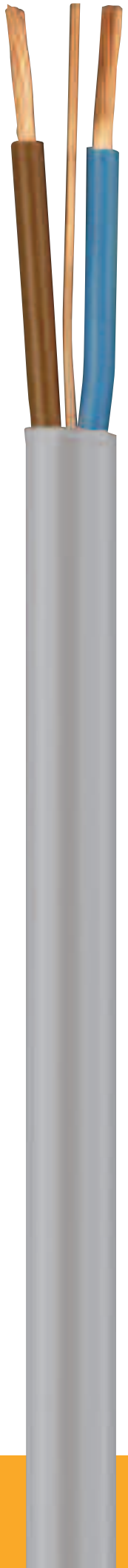
MAXIMUM CONDUCTOR TEMPERATURE: 70°C

CURRENT RATING: Refer to tables 4D1A & 4D1B in BS7671 or "A Closer Look at Cable" or on pages 94-95.

Nominal area of conductor mm²	Class of conductor	Maximum resistance of conductor at 20°C Ω/km	Insulation thickness mm	Sheath thickness mm	Mean overall diameter (upper limit) mm	Approx nett weight kg/km	Minimum bending radius factor
1	1	18.1	0.6	0.8	4.5	27	3D
1.5	1	12.1	0.7	0.8	4.9	36	3D
2.5	1	7.41	0.8	0.8	5.8	52	3D
4	2	4.61	0.9	0.9	6.8	76	3D
6	2	3.08	0.8	0.9	7.4	100	3D
10	2	1.83	1.0	0.9	8.8	160	3D
16	2	1.15	1.0	1.0	10.5	230	4D
25	2	0.727	1.2	1.1	12.5	340	4D
35	2	0.524	1.2	1.1	13.5	440	4D

624-YH

GENERAL WIRING CABLE



STANDARD: BS 6004

VOLTAGE RATING: 300/500V

APPLICATION:
Domestic and light industrial wiring. Can be clipped to surface, on trays or in free air where there is little risk of mechanical damage. Suitable for laying into trunking or conduit etc when mechanical protection is required. May be embedded in plaster or laid in walls.

CONSTRUCTION:
Single, Two or Three core flat cables with an additional uninsulated copper circuit protective conductor. Solid or stranded plain copper conductors. PVC insulated, laid parallel with CPC and PVC sheathed.

CORE COLOURS:
Single core: Brown or Blue.
Two core: Brown and Blue.
Three core: Brown, Black and Grey.

SHEATH COLOUR: Grey

BASEC: Certified

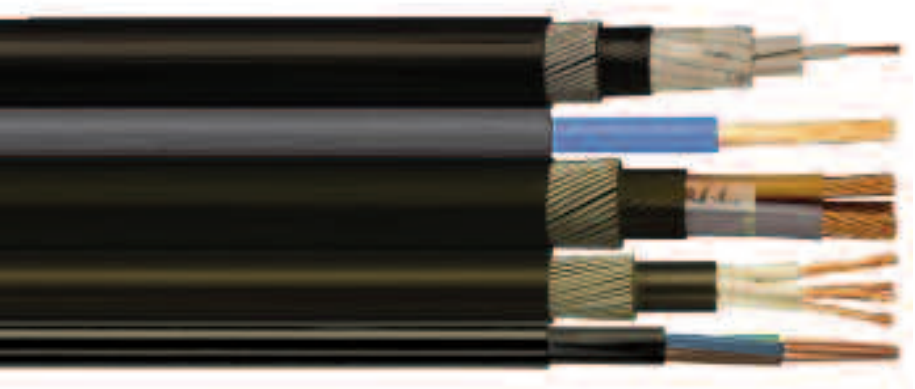
MAXIMUM CONDUCTOR TEMPERATURE: 70°C

CURRENT RATING: Refer to table 4D5A in BS7671 or on page 98.

Reference number	Nominal area of conductor mm²	Class of conductor	Insulation thickness mm	Sheath thickness mm	Overall dimensions Upper limit (d x D) mm	Circuit protective conductor Cross-section mm²	Approx nett weight kg/km	Minimum bending radius factor
6242YH	1	1	0.6	0.9	4.7 x 8.6	1.0	68	3D
2C + CPC	1.5	1	0.7	0.9	5.4 x 9.6	1.0	85	3D
	2.5	1	0.8	1.0	6.2 x 11.5	1.5	123	4D
	4	2	0.8	1.0	7.2 x 13.0	1.5	175	4D
	6	2	0.8	1.1	8.0 x 15.0	2.5	240	4D
	10	2	1.0	1.2	9.6 x 19.0	4.0*	390	4D
	16	2	1.0	1.3	11.0 x 22.5	6.0*	560	4D
6243YH	1	1	0.6	0.9	4.7 x 11.0	1.0	91	4D
3C + CPC	1.5	1	0.7	0.9	5.4 x 12.5	1.0	117	4D
	2.5	1	0.8	1.0	6.2 x 14.5	1.0	170	4D
	4	2	0.8	1.1	7.4 x 18.0	1.5	250	4D
	6	2	0.8	1.1	8.0 x 20.0	2.5	340	4D
	10	2	1.0	1.2	9.6 x 25.5	4.0*	540	6D
	16	2	1.0	1.3	11.0 x 29	6.0*	790	6D
6241YH	1.0	1	0.6	0.9	5.2 x 6.4	1.0	40	3D
1C + CPC	1.5	1	0.7	0.9	5.8 x 7.0	1.0	48	3D

* Stranded class 2 cpc

Draka Power Cables Saffire OHLS® and PVC



Draka has placed itself at the forefront of cable design and material technology and is able to assist it's customers in meeting ever more demanding requirements placed on cable performance, through an ongoing process of close technical co-operation with its end-users. Illustrating this commitment has been the company's development of its Halogen-Free, Low Smoke OHLS® range of fire performance cables.

Draka UK engineers have developed this range working closely with major specifying and testing bodies such as London Underground, British Nuclear Fuels, BAA and LPCB.

Cables within the Saffire OHLS® range show significantly improved performance, when compared with other cables, in meeting the demands of the specific hazards within a fire situation. This is achieved by the reduction of harmful gases and smoke production during burning.

OHLS® cables are particularly suitable for use in buildings and constructions such as hospitals, theatres, shopping precincts, tunnels and public utilities where protection of life, equipment and structures is essential.

PVC also continues to be a versatile material for general wiring cables. However, where fire hazard is considered a risk to building occupants, halogen-free alternatives should be employed.

OHLS SAFFIRE®

694-LSH ENHANCED FIRE SAFETY ENERGY CABLE

STANDARD: BS 6724

VOLTAGE RATING: 600/1000V

APPLICATION:
Industrial wiring and mains distribution, where smoke and acid gas emission would pose a major hazard in the event of fire. Can be laid direct in the ground, or in ducts, clipped to surface, on trays or in free air. May be embedded in concrete.

CONSTRUCTION:
Single, Two, Three, Four and Five core cables. Stranded plain copper conductors, XLPE insulated, cores laid up, extruded Zero Halogen, Low Smoke (OHLS®) bedding, galvanised steel wire armoured (Aluminium wires for single cores) and Zero Halogen, Low Smoke (OHLS®) sheathed.

CORE COLOURS:
Single core: Brown or Blue.
Two core: Brown and Blue.
Three core: Brown, Black and Grey.
Four core: Brown, Black, Grey and Blue.
Five core: Brown, Black, Grey, Green/Yellow and Blue.

SHEATH COLOURS: Black. Other colours available to order.

BASEC: Certified

MINIMUM BENDING RADIUS: 6D circular conductors. 8D shaped conductors.

MAXIMUM CONDUCTOR TEMPERATURE: 90°C.
Note: Where a conductor operates at a temperature exceeding 70°C it shall be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature (see regulation 512-1-2 of BS7671, the 17th Edition of IEE Wiring Regulations).

CURRENT RATING: Refer to table 4E4A or 4E4B of BS7671, ERA69-30 Pt. V or on pages 103-104 and 106-107.

FIRE PERFORMANCE CHARACTERISTICS:

Smoke emission:	BSEN 61034
Acid gas emission:	IEC 60754-1, BS EN 50267
Flame propagation:	BS EN 60332-3 categories A and C

Reference number	Nominal area of conductor	Insulation thickness	Armour wire diameter	Approx. diameter under armour	Approx. overall diameter	Approx. cable weight	Maximum resistance of cable		Reactance @50 Hz	Impedance AC @ 90°C	Star capacitance	Maximum armour resistance at 20°C
							DC at 20°C	AC at 90°C				
	mm^2	mm	mm	mm	mm	kg/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	Ω/km
Single	#50	1.0	0.9	12.7	17.5	800	0.3870	0.4938	0.104	0.505	0.41	1.30
Core	#70	1.1	1.25	14.7	20.2	960	0.2680	0.3410	0.101	0.356	0.46	0.75
Aluminium	#95	1.1	1.25	16.6	22.3	1240	0.1930	0.2469	0.097	0.265	0.53	0.67
Wire	#120	1.2	1.25	18.5	24.2	1510	0.1530	0.1962	0.094	0.217	0.56	0.61
Armour	#150	1.4	1.6	20.8	27.4	1900	0.1240	0.1594	0.095	0.186	0.52	0.42
694AWLSH	*185	1.6	1.6	23.2	30.0	2320	0.0991	0.1280	0.093	0.158	0.54	0.38
	*240	1.7	1.6	26.0	32.8	2930	0.0754	0.0985	0.090	0.134	0.59	0.34
	*300	1.8	1.6	28.6	35.6	3580	0.0601	0.0797	0.088	0.119	0.63	0.31
	*400	2.0	2.0	32.4	40.4	4600	0.0470	0.0635	0.089	0.109	0.62	0.22
	*500	2.2	2.0	36.0	44.2	5770	0.0366	0.0513	0.087	0.101	0.66	0.20
	*630	2.4	2.0	40.4	48.8	7250	0.0283	0.0419	0.085	0.095	0.70	0.18
	*800	2.6	2.5	45.6	55.4	9381	0.0221	0.0349	0.087	0.094	0.85	0.13
	*1000	2.8	2.5	50.6	60.6	11540	0.0176	0.0303	0.085	0.090	0.87	0.12

Reference number	Nominal area of conductor	Insulation thickness	Armour wire diameter	Approx. diameter under armour	Approx. overall diameter	Approx. cable weight	Maximum resistance of cable DC at 20°C	Maximum resistance of cable AC at 90°C	Reactance @ 50Hz	Impedance AC @ 90°C	Star capacitance	Maximum armour resistance at 20°C
	mm²	mm	mm	mm	mm	kg/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	Ω/km
Two	*1.5	0.6	0.9	7.3	12.3	305	12.1000	15.4280	0.104	15.428	0.23	10.20
Core	*2.5	0.7	0.9	8.5	13.6	354	7.4100	9.4480	0.101	9.449	0.25	8.80
Steel	*4	0.7	0.9	9.4	14.7	416	4.6100	5.8780	0.099	5.879	0.27	7.90
Wire	*6	0.7	0.9	10.5	15.9	507	3.0800	3.9270	0.094	3.927	0.30	7.00
Armour	#10	0.7	0.9	12.3	18.0	647	1.8300	2.3330	0.093	2.335	0.32	6.00
6942LSH	#16	0.7	1.25	14.9	20.4	993	1.1500	1.4660	0.088	1.469	0.35	3.70
	25	0.9	1.25	14.7	20.4	1290	0.7270	0.9260	0.082	0.930	0.38	3.70
	35	0.9	1.6	16.8	23.3	1500	0.5240	0.6685	0.077	0.673	0.42	2.60
	50	1.0	1.6	19.0	25.8	1890	0.3870	0.4940	0.076	0.500	0.45	2.30
	70	1.1	1.6	22.0	29.0	2450	0.2680	0.3412	0.075	0.349	0.49	2.00
	95	1.1	2.0	25.1	33.1	3300	0.1930	0.2471	0.074	0.258	0.55	1.40
	120	1.2	2.0	27.9	36.1	4020	0.1530	0.1964	0.072	0.209	0.57	1.30
	150	1.4	2.0	30.9	39.3	4750	0.1240	0.1597	0.073	0.176	0.57	1.20
	185	1.6	2.5	34.9	44.7	6180	0.0991	0.1284	0.073	0.148	0.55	0.82
	240	1.7	2.5	39.0	49.0	7570	0.0754	0.0989	0.072	0.122	0.60	0.73
	300	1.8	2.5	43.3	53.5	9180	0.0601	0.0801	0.072	0.107	0.62	0.67
	400	2.0	2.5	48.4	59.0	10500	0.0470	0.0641	0.071	0.096	0.64	0.59
Three	*1.5	0.6	0.9	7.8	12.6	335	12.1000	15.4280	0.104	15.428	0.23	9.50
Core	*2.5	0.7	0.9	9.2	14.1	388	7.4100	9.4480	0.101	9.449	0.25	8.20
Steel	*4	0.7	0.9	10.0	15.3	471	4.6100	5.8780	0.099	5.879	0.27	7.50
Wire	*6	0.7	0.9	11.2	16.6	576	3.0800	3.9270	0.094	3.928	0.30	6.70
Armour	#10	0.7	1.25	13.1	19.5	884	1.8300	2.3330	0.093	2.335	0.32	4.00
6943LSH	#16	0.7	1.25	15.3	21.6	1159	1.1500	1.4660	0.088	1.469	0.35	3.50
	#25	0.9	1.6	18.9	25.5	1800	0.7270	0.9260	0.082	0.930	0.37	2.50
	#35	0.9	1.6	21.3	28.0	2230	0.5240	0.6685	0.077	0.673	0.42	2.30
	50	1.0	1.6	21.7	28.5	2490	0.3870	0.4940	0.076	0.500	0.45	2.00
	70	1.1	1.6	25.2	32.2	3290	0.2680	0.3412	0.075	0.349	0.49	1.80
	95	1.1	2.0	28.8	37.0	4440	0.1930	0.2471	0.074	0.258	0.55	1.30
	120	1.2	2.0	32.0	40.4	5470	0.1530	0.1964	0.072	0.209	0.57	1.20
	150	1.4	2.5	35.9	45.5	6930	0.1240	0.1597	0.073	0.176	0.55	0.78
	185	1.6	2.5	40.0	49.8	8350	0.0991	0.1284	0.073	0.148	0.55	0.71
	240	1.7	2.5	44.9	55.1	10400	0.0754	0.0989	0.072	0.122	0.60	0.63
	300	1.8	2.5	49.8	60.2	12600	0.0601	0.0801	0.072	0.107	0.62	0.58
	400	2.0	2.5	55.8	66.6	14600	0.0470	0.0641	0.071	0.096	0.64	0.52
Four	*1.5	0.6	0.9	8.5	13.5	365	12.1000	15.4280	0.104	15.428	0.23	8.80
Core	*2.5	0.7	0.9	9.9	15.0	438	7.4100	9.4480	0.101	9.449	0.25	7.70
Steel	*4	0.7	0.9	11.0	16.4	532	4.6100	5.8780	0.099	5.879	0.27	6.80
Wire	*6	0.7	1.25	12.3	18.7	764	3.0800	3.9270	0.094	3.928	0.30	4.30
Armour	#10	0.7	1.25	14.5	21.1	1013	1.8300	2.3330	0.093	2.336	0.32	3.70
6944LSH	#16	0.7	1.25	17.0	22.9	1360	1.1500	1.4660	0.088	1.469	0.35	3.10
	#25	0.9	1.6	21.0	27.6	2160	0.7270	0.9260	0.082	0.930	0.37	2.30
	#35	0.9	1.6	23.6	30.4	2690	0.5240	0.6685	0.077	0.673	0.42	2.00
	50	1.0	1.6	25.0	32.0	3130	0.3870	0.4940	0.076	0.500	0.45	1.80
	70	1.1	2.0	29.5	37.7	4500	0.2680	0.3412	0.075	0.349	0.48	1.20
	95	1.1	2.0	33.3	41.7	5600	0.1930	0.2471	0.074	0.258	0.55	1.10
	120	1.2	2.5	37.5	47.1	7400	0.1530	0.1964	0.072	0.209	0.55	0.76
	150	1.4	2.5	41.6	51.4	8780	0.1240	0.1597	0.073	0.176	0.55	0.68
	185	1.6	2.5	46.4	56.6	10630	0.0991	0.1284	0.073	0.148	0.55	0.61
	240	1.7	2.5	52.6	63.0	13390	0.0754	0.0989	0.072	0.122	0.58	0.54
	300	1.8	2.5	58.0	68.8	16290	0.0601	0.0801	0.072	0.107	0.62	0.49
	400	2.0	3.15	65.4	78.1	19800	0.0470	0.0641	0.071	0.096	0.63	0.35
Five	*1.5	0.6	0.9	9.7	14.3	410	12.1000	15.4280	0.104	15.428	0.23	8.20
Core	*2.5	0.7	0.9	11.7	16.3	470	7.4100	9.4480	0.101	9.449	0.25	6.80
Steel	*4	0.7	0.9	13.0	17.8	710	4.6100	5.8780	0.099	5.879	0.27	6.20
Wire	*6	0.7	1.25	14.5	20.0	876	3.0800	3.9270	0.094	3.928	0.30	3.90
Armour	#10	0.7	1.25	17.2	22.9	1165	1.8300	2.3330	0.093	2.336	0.32	3.40
6945LSH	#16	0.7	1.6	20.0	26.6	1742	1.1500	1.4660	0.088	1.469	0.35	2.20
	#25	0.9	1.6	24.7	31.5	2323	0.7270	0.9260	0.082	0.930	0.37	1.80
	#35	0.9	1.6	27.8	34.8	2932	0.5240	0.6685	0.077	0.673	0.42	1.60
	#50	1.0	2.0	32.4	40.4	4192	0.3870	0.4940	0.076	0.500	0.45	1.10
	#70	1.1	2.0	37.9	46.3	5336	0.2680	0.3412	0.075	0.349	0.48	0.90

Shaped conductors unless otherwise stated. * Circular, non-compacted, conductors. # Compacted circular conductors.

OHLS SAFFIRE®

ENHANCED FIRE SAFETY MULTICORE AUXILIARY CABLE

STANDARD: BS 6724

VOLTAGE RATING: 600/1000V

APPLICATION:
Industrial wiring for remote control and telemetry circuits etc. where smoke and acid gas emission would pose a major hazard in the event of fire. Can be laid direct in the ground, or in ducts, clipped to surface, on trays or in free air. May be embedded in concrete.

CONSTRUCTION:
Multi-core cables. Stranded plain copper conductors, XLPE insulated, cores laid up, extruded Zero Halogen, Low Smoke (OHLS®) bedding, galvanised steel wire armoured and Zero Halogen Low Smoke (OHLS®) sheathed.

CORE COLOURS: White with Black numerals.

SHEATH COLOURS: Black. Other colours available to order.

BASEC: Certified

MINIMUM BENDING RADIUS: 6D

MAXIMUM CONDUCTOR TEMPERATURE: 90°C.
Note: Where a conductor operates at a temperature exceeding 70°C it shall be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature (see regulation 512-1-2 of BS7671, the 17th Edition of IEE Wiring Regulations).

CURRENT RATING: Available upon request.

FIRE PERFORMANCE CHARACTERISTICS:

Smoke emission:	BS EN 61034
Acid gas emission:	IEC 60754-1, BSEN 50267
Flame propagation:	BSEN 60332-1, BSEN 60332-3 categories A and C BSEN 50266 Categories C & A.

Number of cores	Reference number	Nominal area of conductor	Approx. diameter under armour	Approx. diameter over armour	Approx. overall diameter	Approx. nett weight
		mm^2	mm	mm	mm	kg/km
Five	6945LS7W	1.5	9.5	11.3	14.3	420
		2.5	11.2	13.0	16.1	520
		4.0	12.7	15.2	17.8	750
Seven	6947LS7W	1.5	10.2	12.1	15.2	470
		2.5	12.3	14.1	17.1	600
		4.0	14.0	16.5	19.7	890
Twelve	69412LS7W	1.5	13.7	16.2	19.4	780
		2.5	16.3	18.8	22.4	1000
		4.0	19.1	22.2	25.7	1410
Nineteen	69419LS7W	1.5	16.2	18.7	22.2	1000
		2.5	19.9	23.1	26.6	1540
		4.0	22.5	25.7	29.3	1830
Twenty-seven	69427LS7W	1.5	20.0	23.2	26.7	1500
		2.5	24.0	27.2	30.7	1950
		4.0	27.5	30.7	34.4	2500
Thirty-seven	69437LS7W	1.5	22.3	25.5	29.0	1800
		2.5	26.9	30.1	33.8	2350
		4.0	31.0	35.0	39.2	3100
Forty-eight	69448LS7W	1.5	25.4	28.6	32.7	2050
		2.5	31.0	35.0	39.3	3100
		4.0	35.3	39.3	44.1	4100

694AW33XLH to 694333XLH

ENERGY CABLE

STANDARD: BS 5467

VOLTAGE RATING: 1900/3300V (Um 3600V)

APPLICATION:
Industrial and mains distribution. Can be laid direct in the ground, or in ducts, clipped to surface, on trays or in free air. May be embedded in concrete.

CONSTRUCTION:
Single or Three core cables. Stranded plain copper conductors, XLPE insulated, cores laid up, extruded PVC bedding, galvanised steel wire armoured (Aluminium wires for single cores) and PVC sheathed.

CORE COLOURS:
Single core: Brown.
Three core: Brown, Black and Grey.

SHEATH COLOUR: Black

MINIMUM BENDING RADIUS: 6D circular conductors, 8D Shaped conductors.

MAXIMUM CONDUCTOR TEMPERATURE: 90°C
Note: Where a conductor operates at a temperature exceeding 70°C it shall be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature (see regulation 512-1-2 of BS7671, the 17th Edition of IEE Wiring Regulations).

CURRENT RATING: Refer to ERA 69-30 Pt. V or on page 106-107.

Reduced Flame Propagation designs and OHLS® sheathed cables to BS 6724 are also available to order.

Reference number	Nominal area of conductor	Insulation thickness	Armour wire diameter	Approx. diameter under armour	Approx. overall diameter	Approx. cable weight	Maximum resistance of cable		Reactance @50Hz	Impedance AC @ 90°C	Star capacitance	Maximum armour resistance at 20°C
							DC at 20°C	AC at 90°C				
	mm^2	mm	mm	mm	mm	kg/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	Ω/km
Single	50*	2.0	1.25	14.9	20.6	820	0.3870	0.4939	0.114	0.507	0.28	0.75
Core	70*	2.0	1.25	6.7	22.4	1050	0.2680	0.3409	0.107	0.357	0.33	0.67
Aluminium	95*	2.0	1.25	18.6	24.3	1340	0.1930	0.2468	0.102	0.267	0.38	0.61
Wire	120*	2.0	1.6	20.6	27.2	1690	0.1530	0.1960	0.101	0.220	0.39	0.42
Armoured	150*	2.0	1.6	22.2	28.8	1980	0.1593	0.1240	0.098	0.187	0.43	0.39
	185	2.0	1.6	24.0	30.8	2380	0.0991	0.1279	0.095	0.159	0.47	0.37
694AW33XLH	240	2.0	1.6	26.6	33.4	2970	0.0754	0.0985	0.092	0.134	0.54	0.34
	300	2.0	1.6	29.1	36.1	3600	0.0601	0.0796	0.089	0.120	0.59	0.31
	400	2.0	2.0	32.4	40.4	4610	0.0470	0.0635	0.089	0.109	0.62	0.22
	500	2.2	2.0	36.0	44.2	5690	0.0366	0.0513	0.087	0.101	0.66	0.20
	630	2.4	2.0	40.4	48.8	7170	0.0283	0.0419	0.085	0.095	0.70	0.18
	800	2.6	2.5	45.6	55.4	9160	0.0221	0.0349	0.085	0.092	0.71	0.13
	1000	2.8	2.5	50.6	60.6	11280	0.0176	0.0303	0.083	0.089	0.76	0.12
Three	16*	2.0	1.6	22.1	28.9	1610	1.1500	1.4665	0.104	1.470	0.19	1.90
Core	25*	2.0	1.6	25.4	32.2	2070	0.7270	0.9260	0.098	0.931	0.23	1.70
Steel	35*	2.0	1.6	28.0	35.0	2340	0.5240	0.6685	0.091	0.675	0.26	1.80
Wire	50	2.0	2.0	26.7	34.7	3050	0.3870	0.4939	0.088	0.502	0.28	1.30
Armour	70	2.0	2.0	29.8	38.0	3810	0.2680	0.3411	0.084	0.351	0.32	1.20
	95	2.0	2.0	33.0	41.4	4740	0.1930	0.2470	0.081	0.260	0.37	1.10
694333XLH	120	2.0	2.5	36.1	45.7	6080	0.1530	0.1963	0.079	0.211	0.40	0.76
	150	2.0	2.5	38.7	48.5	7020	0.1240	0.1596	0.077	0.177	0.43	0.71
	185	2.0	2.5	41.9	51.9	8280	0.0991	0.1283	0.076	0.149	0.48	0.65
	240	2.0	2.5	46.7	56.9	10320	0.0754	0.0988	0.074	0.123	0.52	0.59
	300	2.0	2.5	50.8	61.2	12310	0.0601	0.0800	0.073	0.108	0.58	0.55
	400	2.0	2.5	55.8	66.6	14790	0.0470	0.0641	0.071	0.096	0.64	0.50

* Circular compacted conductors

694-XLH

ENERGY CABLE

STANDARD: BS 5467

VOLTAGE RATING: 600/1000V

APPLICATION:
Industrial wiring and mains distribution. Can be laid direct in the ground, or in ducts, clipped to surface, on trays or in free air. May be embedded in concrete.

CONSTRUCTION:
Single, Two, Three, Four and Five core cables. Stranded plain copper conductors, XLPE insulated, cores laid up, extruded PVC bedding, galvanised steel wire armoured (Aluminium wires for single cores) and PVC sheathed.

CORE COLOURS:
Single core: Brown or Blue.
Two core: Brown and Blue.
Three core: Brown, Black and Grey.
Four core: Brown, Black, Grey and Blue.
Five core: Brown, Black, Grey, Green/Yellow and Blue.

SHEATH COLOUR: Black. Other colours available to order.

BASEC: Certified

MINIMUM BENDING RADIUS: 6D circular conductors, 8D shaped conductors.

MAXIMUM CONDUCTOR TEMPERATURE: 90°C
Note: Where a conductor operates at a temperature exceeding 70°C it shall be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature (see regulation 512-1-2 of BS7671, the 17th Edition of IEE Wiring Regulations).

CURRENT RATING: Refer to tables 4E4A & 4E4B in BS7671 or ERA 69-30 Pt. V or on page 103-104 and 106-107.

Cables with reduced Flame Propagation and designs with alternative core identification are available to order.

Reference number	Nominal area of conductor	Insulation thickness	Armour wire diameter	Approx. diameter under armour	Approx. overall diameter	Approx. cable weight	Maximum resistance of cable		Reactance @50Hz	Impedance AC at 90°C	Star capacitance	Maximum armour resistance at 20°C
							DC at 20°C	AC at 90°C				
	mm^2	mm	mm	mm	mm	kg/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	Ω/km
Single	#50	1.0	0.9	12.7	17.5	800	0.3870	0.4938	0.104	0.505	0.41	1.30
Core	#70	1.1	1.25	14.7	20.2	960	0.2680	0.3410	0.101	0.356	0.46	0.75
Aluminium	#95	1.1	1.25	16.6	22.3	1240	0.1930	0.2469	0.097	0.265	0.53	0.67
Wire	#120	1.2	1.25	18.5	24.2	1510	0.1530	0.1962	0.094	0.217	0.56	0.61
Armour	#150	1.4	1.6	20.8	27.4	1900	0.1240	0.1594	0.095	0.186	0.52	0.42
694AWXLH	*185	1.6	1.6	23.2	30.0	2320	0.0991	0.1280	0.093	0.158	0.54	0.38
	*240	1.7	1.6	26.0	32.8	2930	0.0754	0.0985	0.090	0.134	0.59	0.34
	*300	1.8	1.6	28.6	35.6	3580	0.0601	0.0797	0.088	0.119	0.63	0.31
	*400	2.0	2.0	32.4	40.4	4600	0.0470	0.0635	0.089	0.109	0.62	0.22
	*500	2.2	2.0	36.0	44.2	5770	0.0366	0.0513	0.087	0.101	0.66	0.20
	*630	2.4	2.0	40.4	48.8	7250	0.0283	0.0419	0.085	0.095	0.70	0.18
	*800	2.6	2.5	45.6	55.4	9381	0.0221	0.0349	0.087	0.094	0.85	0.13
	*1000	2.8	2.5	50.6	60.6	11540	0.0176	0.0303	0.085	0.090	0.87	0.12

Reference number	Nominal area of conductor	Insulation thickness	Armour wire diameter	Approx. diameter under armour	Approx. overall diameter	Approx. cable weight	Maximum resistance of cable DC at 20°C	Maximum resistance of cable AC at 90°C	Reactance @50HzAC	Impedance at 90°C	Star capacitance	Maximum armour resistance at 20°C
	mm^2	mm	mm	mm	mm	kg/km	Ω/km	Ω/km	Ω/km	Ω/km	μF/km	Ω/km
Two	*1.5	0.6	0.9	7.3	12.1	302	12.1000	15.4280	0.104	15.428	0.23	10.20
Core	*2.5	0.7	0.9	8.5	13.6	346	7.4100	9.4480	0.101	9.449	0.25	8.80
Steel	*4	0.7	0.9	9.4	14.7	410	4.6100	5.8780	0.099	5.879	0.27	7.90
Wire	*6	0.7	0.9	10.5	15.9	499	3.0800	3.9270	0.094	3.928	0.30	7.00
Armour	#10	0.7	0.9	12.3	18.0	648	1.8300	2.3330	0.093	2.335	0.32	6.00
6942XLH	#16	0.7	1.25	14.3	20.4	978	1.1500	1.4660	0.088	1.469	0.35	3.70
	25	0.9	1.25	14.7	20.4	1290	0.7270	0.9260	0.082	0.930	0.38	3.70
	35	0.9	1.6	16.8	23.3	1500	0.5240	0.6685	0.077	0.673	0.42	2.60
	50	1.0	1.6	19.0	25.8	1890	0.3870	0.4940	0.076	0.500	0.45	2.30
	70	1.1	1.6	22.0	29.0	2450	0.2680	0.3412	0.075	0.349	0.49	2.00
	95	1.1	2.0	25.1	33.1	3300	0.1930	0.2471	0.074	0.258	0.55	1.40
	120	1.2	2.0	27.9	36.1	4020	0.1530	0.1964	0.072	0.209	0.57	1.30
	150	1.4	2.0	30.9	39.3	4750	0.1240	0.1597	0.073	0.176	0.57	1.20
	185	1.6	2.5	34.9	44.7	6180	0.0991	0.1284	0.073	0.148	0.55	0.82
	240	1.7	2.5	39.0	49.0	7570	0.0754	0.0989	0.072	0.122	0.60	0.73
	300	1.8	2.5	43.3	53.5	9180	0.0601	0.0801	0.072	0.107	0.62	0.67
	400	2.0	2.5	48.4	59.0	10500	0.0470	0.0641	0.071	0.096	0.64	0.59
Three	*1.5	0.6	0.9	7.8	12.6	330	12.1000	15.4280	0.104	15.428	0.23	9.50
Core	*2.5	0.7	0.9	9.2	14.1	390	7.4100	9.4480	0.101	9.449	0.25	8.20
Steel	*4	0.7	0.9	10.0	15.3	464	4.6100	5.8780	0.099	5.879	0.27	7.50
Wire	*6	0.7	0.9	11.2	16.6	568	3.0800	3.9270	0.094	3.928	0.30	6.70
Armour	#10	0.7	1.25	13.1	19.5	866	1.8300	2.3330	0.093	2.335	0.32	4.00
6943XLH	#16	0.7	1.25	15.3	21.6	1152	1.1500	1.4660	0.088	1.469	0.35	3.50
	#25	0.9	1.6	18.9	25.5	1800	0.7270	0.9260	0.082	0.930	0.37	2.50
	#35	0.9	1.6	21.3	28.0	2230	0.5240	0.6685	0.077	0.673	0.42	2.30
	50	1.0	1.6	21.7	28.5	2490	0.3870	0.4940	0.076	0.500	0.45	2.00
	70	1.1	1.6	25.2	32.2	3290	0.2680	0.3412	0.075	0.349	0.49	1.80
	95	1.1	2.0	28.8	37.0	4440	0.1930	0.2471	0.074	0.258	0.55	1.30
	120	1.2	2.0	32.0	40.4	5470	0.1530	0.1964	0.072	0.209	0.57	1.20
	150	1.4	2.5	35.9	45.5	6930	0.1240	0.1597	0.073	0.176	0.55	0.78
	185	1.6	2.5	40.0	49.8	8350	0.0991	0.1284	0.073	0.148	0.55	0.71
	240	1.7	2.5	44.9	55.1	10400	0.0754	0.0989	0.072	0.122	0.60	0.63
	300	1.8	2.5	49.8	60.2	12600	0.0601	0.0801	0.072	0.107	0.62	0.58
	400	2.0	2.5	55.8	66.6	14600	0.0470	0.0641	0.071	0.096	0.64	0.52
Four	*1.5	0.6	0.9	8.5	13.5	365	12.1000	15.4280	0.104	15.428	0.23	8.80
Core	*2.5	0.7	0.9	9.9	15.0	438	7.4100	9.4480	0.101	9.449	0.25	7.70
Steel	*4	0.7	0.9	11.0	16.4	532	4.6100	5.8780	0.099	5.879	0.27	6.80
Wire	*6	0.7	1.25	12.3	18.7	764	3.0800	3.9270	0.094	3.928	0.30	4.30
Armour	#10	0.7	1.25	14.5	21.1	1013	1.8300	2.3330	0.093	2.336	0.32	3.70
6944XLH	#16	0.7	1.25	17.0	22.9	1360	1.1500	1.4660	0.088	1.469	0.35	3.10
	#25	0.9	1.6	21.0	27.6	2160	0.7270	0.9260	0.082	0.930	0.37	2.30
	#35	0.9	1.6	23.6	30.4	2690	0.5240	0.6685	0.077	0.673	0.42	2.00
	50	1.0	1.6	25.0	32.0	3130	0.3870	0.4940	0.076	0.500	0.45	1.80
	70	1.1	2.0	29.5	37.7	4500	0.2680	0.3412	0.075	0.349	0.48	1.20
	95	1.1	2.0	33.3	41.7	5600	0.1930	0.2471	0.074	0.258	0.55	1.10
	120	1.2	2.5	37.5	47.1	7400	0.1530	0.1964	0.072	0.209	0.55	0.76
	150	1.4	2.5	41.6	51.4	8780	0.1240	0.1597	0.073	0.176	0.55	0.68
	185	1.6	2.5	46.4	56.6	10630	0.0991	0.1284	0.073	0.148	0.55	0.61
	240	1.7	2.5	52.6	63.0	13390	0.0754	0.0989	0.072	0.122	0.58	0.54
	300	1.8	2.5	58.0	68.8	16290	0.0601	0.0801	0.072	0.107	0.62	0.49
	400	2.0	3.15	65.4	78.1	19800	0.0470	0.0641	0.071	0.096	0.63	0.35
Five	*1.5	0.6	0.9	9.7	14.3	410	12.1000	15.4280	0.104	15.428	0.23	8.20
Core	*2.5	0.7	0.9	11.7	16.3	470	7.4100	9.4480	0.101	9.449	0.25	6.80
Steel	*4	0.7	0.9	13.0	17.8	710	4.6100	5.8780	0.099	5.879	0.27	6.20
Wire	*6	0.7	1.25	14.5	20.0	876	3.0800	3.9270	0.094	3.928	0.30	3.90
Armour	#10	0.7	1.25	17.2	22.9	1165	1.8300	2.3330	0.093	2.336	0.32	3.40
	#16	0.7	1.6	20.0	26.6	1742	1.1500	1.4660	0.088	1.469	0.35	2.20
	#25	0.9	1.6	24.7	31.5	2323	0.7270	0.9260	0.082	0.930	0.37	1.80
	#35	0.9	1.6	27.8	34.8	2932	0.5240	0.6685	0.077	0.673	0.42	1.60
	#50	1.0	2.0	32.4	40.4	4192	0.3870	0.4940	0.076	0.500	0.45	1.10
	#70	1.1	2.0	37.9	46.3	5336	0.2680	0.3412	0.075	0.349	0.48	0.90

Shaped conductors unless otherwise stated. * Circular, non-compacted, conductors. # Compacted circular conductors.

6945XL7W to 69448XL7W

MULTICORE AUXILLIARY CABLE

STANDARD: BS 5467

VOLTAGE RATING: 600/1000V

APPLICATION:
Industrial wiring for remote control and telemetry circuits etc. Can be laid direct in the ground, or in ducts, clipped to surface, on trays or in free air. May be embedded in concrete.

CONSTRUCTION:
Multi-core cables. Stranded plain copper conductors, XLPE insulated, cores laid up, extruded PVC bedding, galvanised steel wire armoured and PVC sheathed.

CORE COLOURS:
White with Black numerals.

SHEATH COLOUR: Black. Other colours available to order.

BASEC: Certified

MINIMUM BENDING RADIUS: 6D

MAXIMUM CONDUCTOR TEMPERATURE: 90°C.
Note: Where a conductor operates at a temperature exceeding 70°C it shall be ascertained that the equipment connected to the conductor is suitable for the conduct or operating temperature (see regulation 512-1-2 of BS7671, the 17th Edition of IEE Wiring Regulations).

CURRENT RATING: Available upon request.

Reduced Flame Propagation designs are available to order.

Number of cores	Reference number	Nominal area of conductor	Approx. diameter under armour	Approx. diameter over armour	Approx. overall diameter	Approx. nett weight
		mm^2	mm	mm	mm	kg/km
Five	6945XL7W	1.5	9.5	11.3	14.3	420
		2.5	11.2	13.0	16.1	520
		4.0	12.7	15.2	17.8	750
Seven	6947XL7W	1.5	10.2	12.1	15.2	470
		2.5	12.3	14.1	17.1	600
		4.0	14.0	16.5	19.7	890
Twelve	69412XL7W	1.5	13.7	16.2	19.4	780
		2.5	16.3	18.8	22.4	1000
		4.0	19.1	22.2	25.7	1410
Nineteen	69419XL7W	1.5	16.2	18.7	22.2	1000
		2.5	19.9	23.1	26.6	1540
		4.0	22.5	25.7	29.3	1830
Twenty-seven	69427XL7W	1.5	20.0	23.2	26.7	1500
		2.5	24.0	27.2	30.7	1950
		4.0	27.5	30.7	34.4	2500
Thirty-seven	69437XL7W	1.5	22.3	25.5	29.0	1800
		2.5	26.9	30.1	33.8	2350
		4.0	31.0	35.0	39.2	3100
Forty-eight	69448XL7W	1.5	25.4	28.6	32.7	2050
		2.5	31.0	35.0	39.3	3100
		4.0	35.3	39.3	44.1	4100

6U81SH

INDUSTRIAL CABLE

STANDARD: BS 7889

VOLTAGE RATING: 600/1000V

APPLICATION:
Industrial wiring. Can be clipped to surface, on trays or in free air where there is little risk of mechanical damage. Suitable for laying into trunking or conduit etc. when mechanical protection is required. May be embedded in concrete.

CONSTRUCTION:
Single core cable. Stranded plain copper conductor, XLPE insulated and PVC sheathed.

CORE COLOURS: Brown or Blue

SHEATH COLOURS: Black. Other colours available to order.

BASEC: Certified

MAXIMUM CONDUCTOR TEMPERATURE: 90°C.
Note: Where a conductor operates at a temperature exceeding 70°C it shall be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature (see regulation 512-1-2 of BS7671, the 17th Edition of IEE Wiring Regulations).

CURRENT RATING: Refer to Tables 4E1A & 4E1B in BS7671 or on pages 99-100.

Nominal area of conductor	Insulation thickness	Sheath thickness	Mean overall diameter	Approx nett weight (upper limit)	Minimum bending radius factor
mm^2	mm	mm	mm	kg/km	
#50	1.0	1.4	13.7	541	4D
#70	1.1	1.4	15.8	749	4D
#95	1.1	1.5	17.5	1000	4D
#120	1.2	1.5	19.3	1241	4D
#150	1.4	1.6	21.5	1523	4D
185	1.6	1.6	24.7	1942	4D
240	1.7	1.7	27.7	2514	6D
300	1.8	1.8	30.6	3125	6D
400	2.0	1.9	34.2	3967	6D
500	2.2	2.0	38.0	5063	6D
630	2.4	2.2	42.9	6491	6D
800	2.6	2.3	47.8	8233	6D
1000	2.8	2.4	53.0	10305	6D

Circular compacted conductors

HITUF®

ENERGY CABLE

STANDARD: Draka

VOLTAGE RATING: 600/1000V

APPLICATION:
Industrial wiring and mains distribution. Particularly suitable for warehousing, golf courses, flood lighting, farms, water works and gantry wiring. Suitable clipped direct on tray, buried in concrete and in ducting. Can be laid direct in the ground subject to additional mechanical protection as stated in BS7671.

CONSTRUCTION:
Three and four core plain copper stranded conductors, XLPE insulation, PVC inner covering, high impact PVC sheath.

CORE COLOURS: Three core: Green/Yellow, Blue and Brown. Four core: Green/Yellow, Brown, Black and Grey.

SHEATH COLOUR: Black

MINIMUM BENDING RADIUS: 6D

MAXIMUM CONDUCTOR TEMPERATURE: 70°C

CURRENT RATING: Refer to tables 4D2A and 4D2B in BS7671 or on page 97.

Reference number	Nominal Cross-Sectional Area mm^2	Number of Cores	Nominal Diameter of Cable mm	Approx Nett Weight kg/km	Gland Male Conduit Thread Size 20mm	25mm	Fixing Clip Ref.
97HUF3/1.5	1.5	TWO CORE	9.7	140	252/93	253/94	NX4
97HUF3/2.5	2.5	AND EARTH	11.0	190	252/93	253/94	NX4
97HUF4/1.5	1.5	THREE CORE	10.4	160	252/93	253/94	NX4
97HUF4/2.5	2.5	AND EARTH	11.9	225	252/93	253/94	NX5

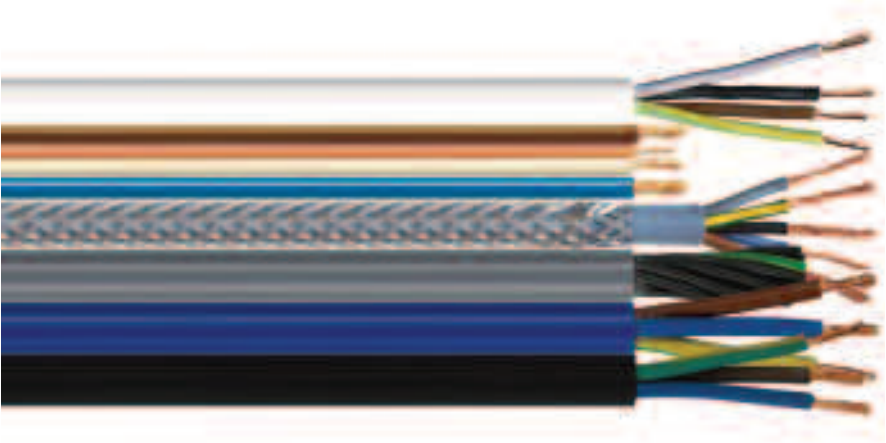
Other sizes available upon request

CABLE ACCESSORIES

Nylon glands: HITUF® cables can be terminated using impact resistant nylon glands fitted with a nitrile rubber bush to provide weatherproof entry. Where these cables are to be installed in Zone 1 and Zone 2 fire risk areas, a flame proof gland should be used.

Nylon cable clip: These clips are impact resistant, weatherproof and resistant to a wide range of chemical attack. The interior edges are radiused.

Draka Flexible Cables



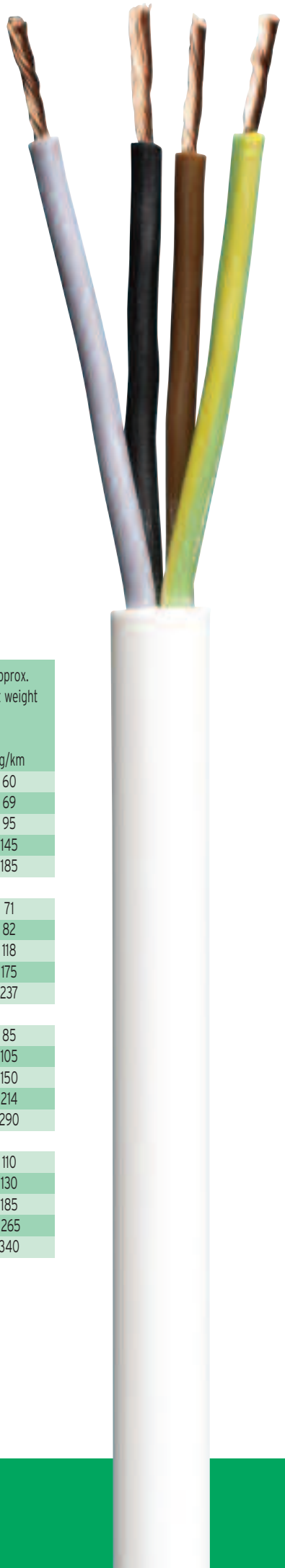
Draka is a key supplier of flexible cables for all applications. These include PVC flexible cords for general purpose use with domestic appliances and portable tools. H07RNF rubber flexible cables are supplied for flexible connection to industrial and agricultural plant and on construction sites.

These cables are used in situations where PVC types would not be suitable, such as hot, cold or damp environments. For outdoor use, where low temperature performance is required, a range of arctic grade PVC flexibles are available. Flexible control flexes are supplied in YY, CY and SY designs for industrial machinery and plant engineering. Finally tri rated, high temperature wiring for the internal connection within electrical panels of equipment is available.

All Draka flexible cables are manufactured to the appropriate UK or harmonized specifications and hold the appropriate certification and approvals.

318-Y

FLEXIBLE CORDS



STANDARD: BS6500/BS7919.

VOLTAGE RATING: 300/500V.

APPLICATION:
General purpose indoors or outdoors in dry or damp situations. Suitable for portable tools, washing machines, vacuum cleaners, lawn mowers, refrigerators. Should not be used where sheath can come in to contact with hot surfaces. Not suitable below 0ºC.

CONSTRUCTION:
Two, Three, Four or Five core circular flexible cord. Flexible plain copper conductors, PVC insulated, cores laid up and PVC sheathed.

CORE COLOURS:
Two core: Blue and Brown.
Three core: Green/Yellow, Blue and Brown.
Four core: Green/Yellow, Brown, Black and Grey.
Five core: Green/Yellow, Blue, Brown, Black and Grey.

SHEATH COLOUR: White. Other colours available to order.

MINIMUM BENDING RADIUS: 3D (Fixed), 6D (Flexing).

MAXIMUM CONDUCTOR TEMPERATURE: 70ºC

CURRENT RATING: Refer to tables 4F3A and 4F3B in BS7671 or page 104.

HARMONISED DESIGNATION: H05VV-F

Reference number	Nominal area of conductor	Class of conductor	Maximum resistance of conductor at 20ºC	Insulation thickness	Sheath thickness	Mean overall diameter		Approx. nett weight
						Lower limit	Upper limit	
	mm^2		Ω/km	mm	mm	mm	mm	kg/km
3182Y	0.75	5	26.00	0.6	0.8	6.0	7.6	60
Twin Circular	1.0	5	19.50	0.6	0.8	6.4	8.0	69
	1.5	5	13.30	0.7	0.8	7.4	9.0	95
	2.5	5	7.98	0.8	1.0	8.9	11.0	145
	4.0	5	4.95	0.8	1.1	10.1	12.0	185
3183Y	0.75	5	26.00	0.6	0.8	6.4	8.0	71
Three Core	1.0	5	19.50	0.6	0.8	6.8	8.4	82
Circular	1.5	5	13.30	0.7	0.9	8.0	9.8	118
	2.5	5	7.98	0.8	1.1	9.6	12.0	175
	4.0	5	4.95	0.8	1.2	11.0	13.0	237
3184Y	0.75	5	26.00	0.6	0.8	6.8	8.6	85
Four Core	1.0	5	19.50	0.6	0.9	7.6	9.4	105
Circular	1.5	5	13.30	0.7	1.0	9.0	11.0	150
	2.5	5	7.98	0.8	1.1	10.5	13.0	214
	4.0	5	4.95	0.8	1.2	12.0	14.0	290
3185Y	0.75	5	26.00	0.6	0.9	7.4	9.6	110
Five Core	1.0	5	19.50	0.6	0.9	8.3	10.0	130
Circular	1.5	5	13.30	0.7	1.1	10.0	12.0	185
	2.5	5	7.98	0.8	1.2	11.5	14.0	265
	4.0	5	4.95	0.8	1.4	13.5	15.5	340

309-Y

HEAT RESISTANT FLEXIBLE CORDS

STANDARD: BS6500/BS7919.

VOLTAGE RATING: 300/500V.

APPLICATION:
General purpose, heat resisting, indoors or outdoors in dry or damp situations. Suitable for portable tools, immersion heaters, washing machines, lawn mowers, refrigerators, especially in higher temperature zones.

CONSTRUCTION:
Two, Three or Four core circular flexible cords. Flexible plain copper conductors, heat resisting PVC insulated, cores laid up and heat resisting PVC sheathed.

CORE COLOURS:
Two core: Blue and Brown. Three core: Green/Yellow, Blue and Brown. Four core: Green/Yellow, Brown, Black and Grey.

SHEATH COLOUR: White. Other colours available to order.

MINIMUM BENDING RADIUS: 3D (Fixed), 6D (Flexing).

MAXIMUM CONDUCTOR TEMPERATURE: 90ºC.
Note: Where a conductor operates at a temperature exceeding 70ºC it shall be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature (see regulation 512-1-2 of BS7671, the 17th Edition of IEE Wiring Regulations).

CURRENT RATING: Refer to Tables 4F3A and 4F3B in BS7671 or on page 104.

HARMONISED DESIGNATION: H05V2V2-F

Reference number	Nominal area of conductor	Class of conductor	Maximum resistance of conductor at 20ºC	Insulation thickness	Sheath thickness	Mean overall diameter		Approx. nett weight
						Lower limit	Upper limit	
	mm^2		Ω/km	mm	mm	mm	mm	kg/km
3092Y	0.5	5	39.00	0.6	0.8	5.6	7.0	46
Twin	0.75	5	26.00	0.6	0.8	6.0	7.6	56
Circular	1.0	5	19.50	0.6	0.8	6.4	8.0	65
	1.5	5	13.30	0.7	0.8	7.4	9.0	80
	2.5	5	7.98	0.8	1.0	8.9	11.0	135
3093Y	0.5	5	39.00	0.6	0.8	5.8	7.2	56
Three	0.75	5	26.00	0.6	0.8	6.4	8.0	61
Core	1.0	5	19.50	0.6	0.8	6.8	8.4	77
Circular	1.5	5	13.30	0.7	0.9	8.0	9.8	108
	2.5	5	7.98	0.8	1.1	9.6	12.0	165
3094Y	0.5	5	39.00	0.6	0.8	6.4	7.8	68
Four	0.75	5	26.00	0.6	0.8	6.8	8.6	80
Core	1.0	5	19.50	0.6	0.9	7.6	9.4	100
Circular	1.5	5	13.30	0.7	1.0	9.0	11.0	140
	2.5	5	7.98	0.8	1.1	10.5	13.0	210

Draka Industrial Cables

Draka have, over many years, established a reputation for the supply of a comprehensive range of multipair and multicore instrumentation cables for application in the provision of voice and data services and for the interconnection of equipment and instruments.

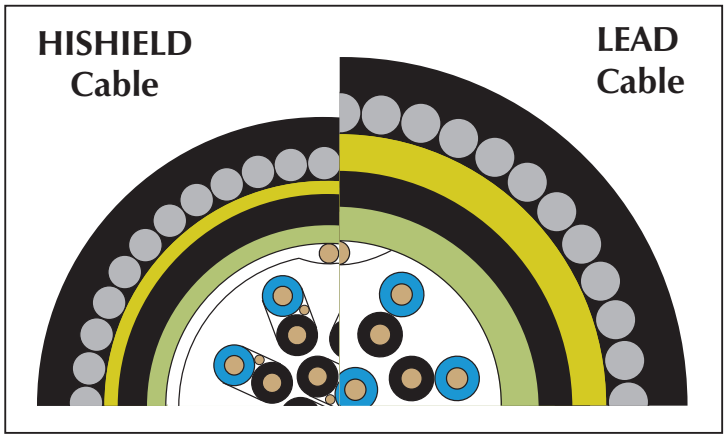
These products were previously manufactured to BS 5308 parts 1 and 2, a specification widely regarded and accepted globally. More recently, a European standard has been introduced EN50288-7, which has also been adopted as a BS-BSEN 50288-7. This has lead to the withdrawl of BS5308. It was recognised that this standard did not cover some important market requirements in terms of design, and as a result Draka has co-operated as a part of the UK cable trade association to produce a publicly available specification- PAS 5308 1 and 2 in 2009. This preserves aspects of BS 5308, and Draka has now branded these cables under the banner "Draka 5308".

HISHIELD

HYDROCARBON RESISTANT CABLE

In applications where cables may be subjected to attack from oils, solvents, gases or other chemicals, designers and installers of critical cabling systems have historically relied upon using conventional lead-sheathed cable to provide maximum protection. However, the use of lead sheathed cable is often unsatisfactory due to its weight, large bending radius and cost.

For applications prone to hydrocarbon attack and moisture penetration, especially relevant to the on-shore oil, gas and petrochemical industries, Draka has developed a new generation of non-permeable cables, utilising a combination of modern materials allied to novel production techniques. This new Hishield® cabling system provides excellent resistance to hydrocarbons, its performance being similar to lead alloy, but with significant advantages.



Cable weight is reduced by up to 70%

Overall diameter is reduced by up to 20%

Bending radius is reduced by up to 25%

Termination time is reduced by up to 50%

Less hazardous to health

In addition to mechanical abuse and attack by aggressive hydrocarbons, cables carrying important data signals and communications may in industrial environments also be subject to Electro-Magnetic Interference (EMI). Draka has recognised this problem and has, therefore, also included an effective metallic screening layer in all Hishield® cables.

TYPICAL CONSTRUCTION:

HI SHIELD®

Protective Layers

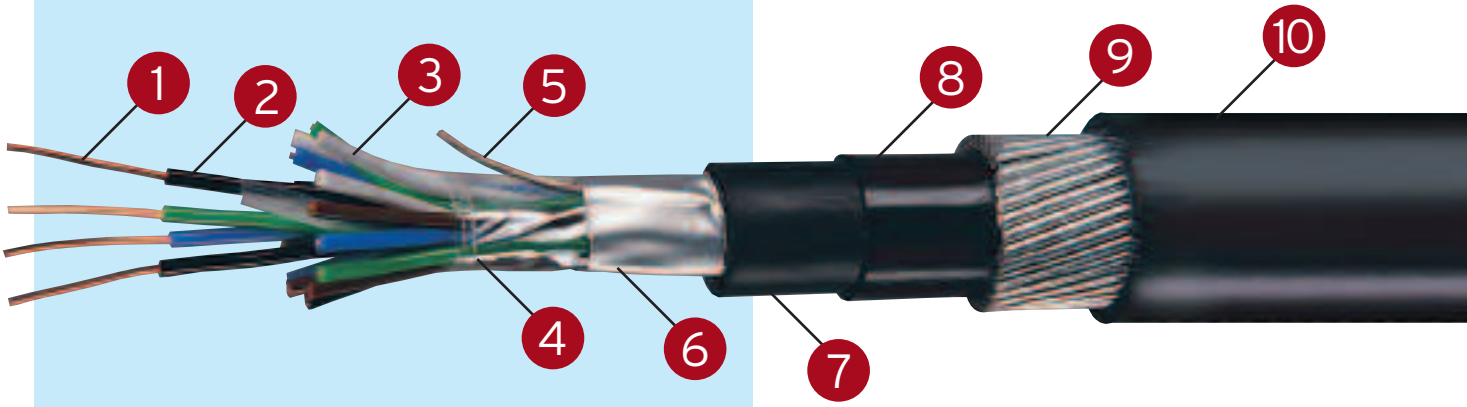
1 Plain annealed copper conductor.

2 PVC/Low Density Polyethylene/Cross-linked Polyethylene (XLPE) insulation.

3 Individual pair screen (optional).

4 Polyester tape.

5 Tinned soft copper drain wire.



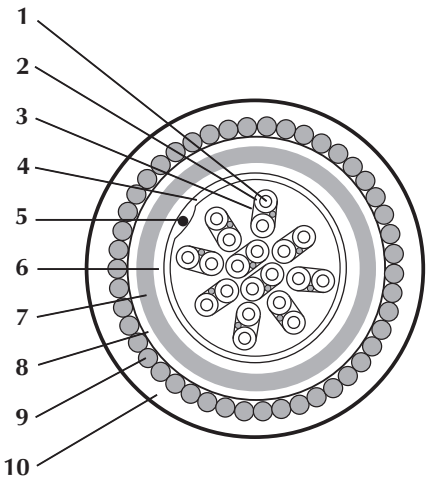
6 Aluminium/Polymer foil tape,
- Impermeable to moisture.
- Protection against EMI.

7 High Density Polyethylene (HDPE) bedding,
- Resistant to inorganic chemicals.

8 Extruded polyamide layer (Nylon),
- Resistant to organic chemicals.

9 Galvanised steel wire armour.

10 HDPE/Fire retardant PVC.



CHEMICAL ATTACK

The often unseen, yet persistent assault from aggressive liquid and air borne chemicals can be a major cause of cable failure.

Chemicals can effect the cable in a variety of ways:

(1) By attacking the sheathing and insulating materials leading to embrittlement and cracking, or causing swelling associated with a dramatic reduction in mechanical strength and physical properties. In both cases premature cable failure is the result.

(2) By disrupting the electrical performance of the cable leading to corruption of transmitted information and ultimate electrical breakdown.

Chemical attack is reduced by the introduction of the Hishield® protective system.

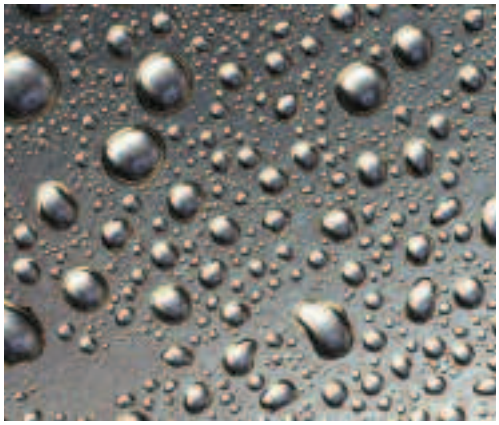
MOISTURE PENETRATION

The additional threat of moisture penetration to the cable core assembly may result in the corruption of transmitted information.

Moisture can cause corruption of the signal by:

(1) Increasing the capacitance and deterioration of other electrical properties.

(2) Increasing the mismatch of information due to the changing characteristic impedance.



Moisture penetration is reduced by the introduction of the Hishield® system.

ELECTRO-MAGNETIC INTERFERENCE (EMI)

This increasingly common form of electrical disturbance occurs when faulty equipment* switching or external interference causes spikes or electrical noise to appear in the power supply. This electrical distortion can effect vital transmission, leading to corrupted or even lost data. Although filters and suppression products are available to reduce the likelihood of EMI, additional protection is recommended to minimise its damaging effects and to help maintain signals free from electro-magnetic interference.

* some correctly functioning equipment also gives rise to EMI.

Draka's Hishield® advanced cabling system can be applied to most types of (BS 5308) instrumentation and control cables, offering non-hazardous protection from chemicals, water, solvents and also effective screening against radio frequency interference (RFI) and EMI. The same protective sheath combination can be applied to most types of control and light power cables.

The Hishield® system reduces the effect of electro-magnetic interference on the cable.

Technical Data for Draka 5308 Cables

	POLYETHYLENE	PVC
Maximum conductor operating temp:	+65˚C	+65˚C
Minimum ambient temp:	-20˚C after installation and only when cable is in a fixed position	-20˚C after installation and only when cable is in a fixed position
* Maximum working voltage:	300/500V r.m.s.	300/500V r.m.s.
Test voltage:	1000V r.m.s. between conductors and between conductors and screen/armour	1000V r.m.s. between conductors and between conductors and screen/armour.
Maximum d.c. conductor resistance:	Conductor size Ω/km at 20C 0.5mm² Class 1 36.8 0.5mm² Class 5 39.7 1.0mm² Class 1 18.4 1.5mm² Class 2 12.3	Conductor size Ω/km at 20C Multicore Multipair 0.5mm² Class 5 39.0 39.7 0.75mm² Class 5 26.0 26.5 1.5mm² Class 2 12.1 12.3
Minimum insulation resistance:	Individual cores - 5000 MΩ/km at 20C Between individual screens-1MΩ/km at 20˚C	Individual cores-25 MΩ/km at 20C Between individual screens-1MΩ/km at 20˚C
Maximum mutual capacitance:	Cables without individual pair screens, 0.5mm² and 1.0mm² - 75pF/m,1.5mm² -85pF/m. All cables with individual pair screens and 1 or 2 pair cables collectively screened, 115 pF/m, except 7/0.53mm (1.5mm²), 120 pF/m.	Pair or adjacent cores - 250 pF/m at 1KHz
Maximum capacitance unbalance:	250 pF/250mm at 1KHz	
Maximum capacitance conductor To screen:		450 pF/m at 1KHz
Maximum L/R ratio:	Conductor size μH/Ω 0.5mm² 25 1.0mm² 25 1.5mm² 40	Conductor size μH/Ω 0.5mm² 25 1.75mm² 25 1.5mm² 40
Minimum bending radius:	8 x overall diameter	8 x overall diameter

* Cables using this composite sheath should not be connected to a low impedance source i.e. the mains power voltage supply.

Please refer to pages 66-73 for the core sizes and configurations.
The new HISHIELD system is also suitable for applications requiring termite and rodent protection.

For further information on specific applications please contact your local sales office.

DRAKA 5308

POLYETHYLENE INSULATED TO PAS 5308 PART 1

This specification covers multipair cables used in the provision of voice and data services and the interconnection of electrical equipment and instruments, particularly in and around process plants, where transducer generated signals are transmitted through marshalled circuits to panels, controllers and associated devices.

Cables to Part 1 are widely used throughout the petroleum industry, while Part 2 are more common to the chemical and petrochemical industries.

Type 1 unarmoured cables are generally for indoor applications.
Type 2 armoured cables are suitable for burial underground.
Type 3 lead sheathed cables are recommended for burial underground where there is a high concentration of hydrocarbons in the soil.

These cables are designed for use in Group II intrinsically safe systems. However it must be noted that cables used when installing an intrinsically safe system are required to conform to any relevant requirement on the certication documents, either for the system or for the intrinsically safe and associated apparatus forming parts of the system.

Cables should also be suitable for the environment in which they are going to be used.

AVAILABILITY:

Cables in this range are manufactured to customer order. Reduced propagation or reduced propagation with reduced HCL emission PVC sheaths can be supplied when requested. Alternative constructions e.g. other conductor sizes or pair/core combinations, generally to this specification, can also be produced to order. Specifications to suit individual customer requirements, based on the PAS 5308 specification, can also be manufactured. Our technical personnel are available to provide information and assistance in designing cables for your specific installation and operating requirements.

RP, RPLHCL.
For applications where flame spread and the emission of acid gas is critical, Draka offer a range of bedding and sheathing compounds with an Oxygen Index between 30 and 35 and, on selected materials acid gas emission of less than 15% by volume at 800°C.

CUSTOMERS SHOULD SPECIFY IF THEY REQUIRE:

RP -	LOI greater than 30
RPLHCL -	LOI greater than 30, acid gas emission less than 15% by volume at 800°C.

Please state a particular LOI if required.

ZERO HALOGEN, LOW SMOKE
For applications where minimal smoke and acid gas emissions are critical, Draka's proprietary OHLS® compounds are rated Zero Halogen, Low Smoke to BSEN 50267 (IEC 60754) and BSEN 61034.

Where any of these options are ordered customers should specify if the compound is required on the bedding (where applicable), the sheath, or both (where applicable). Draka offer designs utilising these materials that can comply with the appropriate category for the cable size in BSEN 60332-3). Please contact us to discuss your particular requirements.

TECHNICAL DATA:

MAXIMUM CONDUCTOR OPERATING TEMP: +65°C

MINIMUM AMBIENT TEMP:
-20°C after installation and only when cable is in a fixed position.

MAXIMUM WORKING VOLTAGE: 300/500V r.m.s.

TEST VOLTAGE:
1000V r.m.s. between conductors and between conductors and screen/armour.

MAXIMUM CONDUCTOR D.C. RESISTANCE:

Conductor Size	Ω/km at 20°C
1/0.80mm (0.5mm²)	36.8
16/0.20mm (0.5mm²)	39.7
1/1.13mm (1.0mm²)	18.4
7/0.53mm (1.5mm²)	12.3

MINIMUM INSULATION RESISTANCE:
Individual conductors - 5000 MΩ/km at 20°C. Between individual screens - 1 M1/km at 20°C

MAXIMUM MUTUAL CAPACITANCE AT 1KHZ: Cables without individual pair screens, 0.5mm² and 1.0mm² - 75 pF/m, 1.5mm² - 85 pF/m. All cables with individual pair screens and 1 or 2 pair cables collectively screened, 115 pF/m.

MAXIMUM CAPACITANCE UNBALANCE: 250pF/250m at 1kHz

MAXIMUM L/R RATIO:

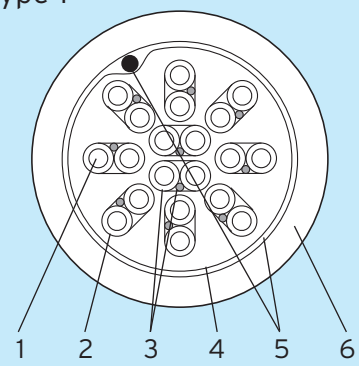
Conductor Size	µH/Ω
0.5mm²	25
1.0mm²	25
1.5mm²	40

SPREAD OF FLAME:
Type 1 complies with EN50265, IEC 60332-1. Type 2 complies as type 1 additionally with EN 50266-2-4, IEC 60332-3C. Type 3 complies as Type 2

MINIMUM BENDING RADIUS:
Type 1 - 5 x overall diameter. Type 2 - 6 x overall diameter.
Type 3 - 15 x overall diameter.

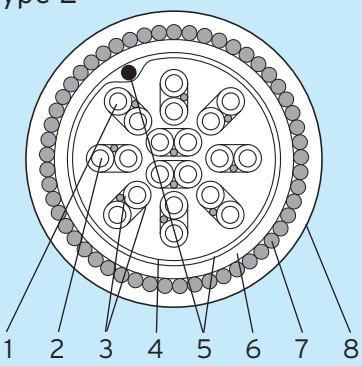
CONSTRUCTION:

Type 1



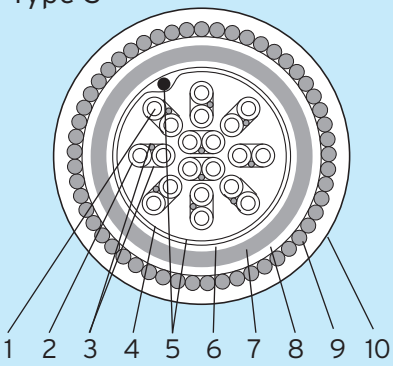
Type 1 -
1 Plain annealed copper wire conductors to BSEN 60228.
2 Polyethylene insulation to BSEN 50290-2-23 (L/MD) or XLPE to BSEN 50290-2-29
3 Individual pair screen (optional):- a) Aluminium/polyester tape, metallic side down, in contact with minimum 0.5mm² tinned copper drain wire. b) Polyester isolating tape(s) numbered for identification
4 Polyester binder tape.
5 Collective screen (optional) - Aluminium/polyester tape, metallic side down, in contact with minimum 0.5mm² tinned copper drain wire.
6 Type TM51 PVC sheath to BSEN 50290-2-22.

Type 2



Type 2 -
1 Plain annealed copper wire conductors to BSEN 60228.
2 Polyethylene insulation to BSEN 50290-2-23 (L/MD) or XLPE to BSEN 50290-2-29
3 Individual pair screen (optional):- a) Aluminium/polyester tape, metallic side down, in contact with minimum 0.5mm² tinned copper drain wire. b) Polyester isolating tape(s) numbered for identification
4 Polyester binder tape.
5 Collective screen (optional) - Aluminium/polyester tape, metallic side down, in contact with minimum 0.5mm² tinned copper drain wire.
6 Polythene bedding conforming to BSEN 50290-2-24 grade LD.
7 Single layer galvanised steel wire armour to BS EN 10257-1
8 Type TM51 PVC sheath to BSEN 50290-2-22.

Type 3



Type 3 -
1 Plain annealed copper wire conductors to BSEN 60228.
2 Polyethylene insulation to BSEN 50290-2-23 (L/MD) or XLPE to BSEN 50290-2-29
3 Individual pair screen (optional):- a) Aluminium/polyester tape, metallic side down, in contact with minimum 0.5mm² tinned copper drain wire. b) Polyester isolating tape(s) numbered for identification
4 Polyester binder tape.
5 Collective screen (optional) - Aluminium/polyester tape, metallic side down, in contact with minimum 0.5mm² tinned copper drain wire.
6 Type TM51 PVC bedding to BSEN 50290-2-22.
7 Lead alloy sheath to BS 801.
8 Type TM51 PVC bedding to BSEN 50290-2-22.
9 Single layer galvanised steel wire armour to BS EN 10257-1.
10 Type TM51 PVC sheath to BSEN 50290-2-22.

PHYSICAL DATA

PAS 5308 Part 1 Type 1 collectively screened, unarmoured

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm^2	Nominal Radial Thickness of Insulation mm	Nominal Diameter of Cable mm	Approx. Nett Weight kg/km
1	1/0.80	0.5	0.5	6.3	50
2	1/0.80	0.5	0.5	7.1	75
5	1/0.80	0.5	0.5	11.6	200
10	1/0.80	0.5	0.5	15.0	270
15	1/0.80	0.5	0.5	17.1	370
20	1/0.80	0.5	0.5	19.4	440
30	1/0.80	0.5	0.5	23.0	630
50	1/0.80	0.5	0.5	28.9	980
1	16/0.20	0.5	0.6	7.0	60
2	16/0.20	0.5	0.6	7.9	80
5	16/0.20	0.5	0.6	13.1	210
10	16/0.20	0.5	0.6	17.2	340
15	16/0.20	0.5	0.6	19.8	440
20	16/0.20	0.5	0.6	22.3	570
30	16/0.20	0.5	0.6	26.9	780
50	16/0.20	0.5	0.6	33.9	1130
1	1/1.13	1.0	0.6	7.4	85
2	1/1.13	1.0	0.6	8.4	115
5	1/1.13	1.0	0.6	14.2	290
10	1/1.13	1.0	0.6	17.4	500
15	1/1.13	1.0	0.6	21.3	670
20	1/1.13	1.0	0.6	24.4	950
30	1/1.13	1.0	0.6	29.0	1030
50	1/1.13	1.0	0.6	37.3	1750
1	7/0.53	1.5	0.6	8.3	100
2	7/0.53	1.5	0.6	9.7	150
5	7/0.53	1.5	0.6	16.4	360
10	7/0.53	1.5	0.6	21.6	690
15	7/0.53	1.5	0.6	25.2	880
20	7/0.53	1.5	0.6	28.5	1230
30	7/0.53	1.5	0.6	34.3	1560
50	7/0.53	1.5	0.6	37.3	2400

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

PHYSICAL DATA

PAS 5308 Part 1 Type 1 individually and collectively screened, unarmoured

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm^2	Nominal Radial Thickness of Insulation mm	Nominal Diameter of Cable mm	Approx. Nett Weight kg/km
2	1/0.8	0.5	0.5	10.3	150
5	1/0.8	0.5	0.5	13.5	250
10	1/0.8	0.5	0.5	18.3	380
15	1/0.8	0.5	0.5	21.1	490
20	1/0.8	0.5	0.5	23.5	640

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Radial Thickness of Insulation mm	Nominal Diameter of Cable mm	Approx. Nett Weight kg/km
30	1/0.8	0.5	0.5	27.9	970
50	1/0.8	0.5	0.5	36.1	1470
2	16/0.2	0.5	0.6	12.0	100
5	16/0.2	0.5	0.6	15.2	250
10	16/0.2	0.5	0.6	21.1	480
15	16/0.2	0.5	0.6	24.5	570
20	16/0.2	0.5	0.6	27.3	780
30	16/0.2	0.5	0.6	32.3	1020
50	16/0.2	0.5	0.6	41.7	1680
2	1/1.13	1.0	0.6	12.8	200
5	1/1.13	1.0	0.6	16.2	290
10	1/1.13	1.0	0.6	22.6	580
15	1/1.13	1.0	0.6	26.2	780
20	1/1.13	1.0	0.6	29.8	1010
30	1/1.13	1.0	0.6	35.4	1430
50	1/1.13	1.0	0.6	44.9	2360
2	7/0.53	1.5	0.6	14.7	250
5	7/0.53	1.5	0.6	18.8	460
10	7/0.53	1.5	0.6	26.5	760
15	7/0.53	1.5	0.6	30.8	1020
20	7/0.53	1.5	0.6	34.4	1350
30	7/0.53	1.5	0.6	41.0	1900
50	7/0.53	1.5	0.6	52.2	3060

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

PHYSICAL DATA

PAS 5308 Part 1 Type 2 collectively screened, armoured

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Insulation Thickness mm	Nominal Diameter over Bedding mm	Nominal Armour Wire Diameter mm	Nominal Diameter of Cable kg/km	Approx. Nett Weight
1	1/0.8	0.5	0.5	6.3	0.9	10.7	200
2	1/0.8	0.5	0.5	7.1	0.9	11.5	260
5	1/0.8	0.5	0.5	11.6	0.9	16.2	460
10	1/0.8	0.5	0.5	15.0	1.25	20.7	790
15	1/0.8	0.5	0.5	17.1	1.25	22.8	1100
20	1/0.8	0.5	0.5	19.4	1.6	26.0	1280
30	1/0.8	0.5	0.5	23.0	1.6	29.8	1520
50	1/0.8	0.5	0.5	28.9	1.6	26.1	2100
1	16/0.2	0.5	0.6	7.0	0.9	11.4	250
2	16/0.2	0.5	0.6	7.9	0.9	12.3	300
5	16/0.2	0.5	0.6	13.1	0.9	17.9	560
10	16/0.2	0.5	0.6	17.2	1.25	22.9	970
15	16/0.2	0.5	0.6	19.8	1.6	26.4	1240
20	16/0.2	0.5	0.6	22.3	1.6	29.1	1640
30	16/0.2	0.5	0.6	26.9	1.6	33.9	1770
50	16/0.2	0.5	0.6	33.9	2.0	42.1	2770

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

(cont'd from page 59)

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Insulation Thickness mm	Nominal Diameter over Bedding mm	Nominal Armour Wire Diameter mm	Nominal Diameter of Cable kg/km	Approx. Nett Weight
1	1/1.13	1.0	0.6	7.4	0.9	11.8	290
2	1/1.13	1.0	0.6	8.4	0.9	13.0	345
5	1/1.13	1.0	0.6	14.2	1.25	19.7	790
10	1/1.13	1.0	0.6	17.4	1.6	24.3	1310
15	1/1.13	1.0	0.6	21.3	1.6	28.1	1740
20	1/1.13	1.0	0.6	24.4	1.6	31.2	2040
30	1/1.13	1.0	0.6	29.0	1.6	36.2	2180
50	1/1.13	1.0	0.6	37.3	2.0	45.7	3500
1	7/0.53	1.5	0.6	8.3	0.9	12.9	320
2	7/0.53	1.5	0.6	9.7	0.9	14.3	420
5	7/0.53	1.5	0.6	16.4	1.25	22.1	940
10	7/0.53	1.5	0.6	21.6	1.6	28.4	1500
15	7/0.53	1.5	0.6	25.2	1.6	32.2	1970
20	7/0.53	1.5	0.6	28.5	2.0	36.5	2400
30	7/0.53	1.5	0.6	34.3	2.0	42.5	3170
50	7/0.53	1.5	0.6	43.6	2.5	53.4	5020

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

PHYSICAL DATA

PAS 5308 Part 1 Type 2 individually and collectively screened, armoured

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Insulation Thickness mm	Nominal Diameter over Bedding mm	Nominal Armour Wire Diameter mm	Nominal Diameter of Cable kg/km	Approx. Nett Weight
2	1/0.80	0.5	0.5	10.3	0.9	14.9	380
5	1/0.80	0.5	0.5	13.5	1.25	19.0	640
10	1/0.80	0.5	0.5	18.3	1.25	24.2	890
15	1/0.80	0.5	0.5	21.2	1.6	27.7	1350
20	1/0.80	0.5	0.5	23.5	1.6	30.3	1470
30	1/0.80	0.5	0.5	27.9	1.6	34.9	1870
50	1/0.80	0.5	0.5	36.1	2.0	44.5	3000
2	16/0.2	0.5	0.6	12.0	0.9	16.8	460
5	16/0.2	0.5	0.6	15.2	1.25	20.9	760
10	16/0.2	0.5	0.6	21.1	1.6	27.9	1300
15	16/0.2	0.5	0.6	24.5	1.6	31.3	1440
20	16/0.2	0.5	0.6	27.3	1.6	34.3	1870
30	16/0.2	0.5	0.6	32.3	2.0	40.5	2400
50	16/0.2	0.5	0.6	41.7	2.5	51.5	3930

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

(cont'd from page 60)

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Insulation Thickness mm	Nominal Diameter over Bedding mm	Nominal Armour Wire Diameter mm	Nominal Diameter of Cable kg/km	Approx. Nett Weight
2	1/1.13	1.0	0.6	12.8	0.9	17.6	515
5	1/1.13	1.0	0.6	16.2	1.25	21.9	950
10	1/1.13	1.0	0.6	22.6	1.6	29.4	1330
15	1/1.13	1.0	0.6	26.2	1.6	33.2	1680
20	1/1.13	1.0	0.6	29.8	2.0	37.8	2540
30	1/1.13	1.0	0.6	35.4	2.0	43.8	2900
50	1/1.13	1.0	0.6	44.9	2.5	54.9	4800
2	7/0.53	1.5	0.6	14.7	1.25	20.4	730
5	7/0.53	1.5	0.6	18.8	1.6	25.4	1180
10	7/0.53	1.5	0.6	26.5	1.6	33.5	1820
15	7/0.53	1.5	0.6	30.8	1.6	38.8	2350
20	7/0.53	1.5	0.6	34.4	2.0	42.6	3030
30	7/0.53	1.5	0.6	41.0	2.5	50.8	4050
50	7/0.53	1.5	0.6	52.2	2.5	62.6	5960

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

PHYSICAL DATA

PAS 5308 Part 1 Type 3 collectively screened, lead sheathed, armoured

Number of pairs	Number and Diameter of wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Insulation Thickness mm	Nominal Diameter under Lead mm	Nominal Diameter over Lead mm	Nominal Diameter over Bedding mm	Nominal Armour Wire Diameter mm	Nominal Diameter of Cable mm	Approx Nett Weight kg/km
1	1/0.80	0.5	0.5	6.3	8.5	10.1	0.9	14.7	610
2	1/0.80	0.5	0.5	7.1	9.3	10.9	0.9	15.4	685
5	1/0.80	0.5	0.5	11.6	13.8	15.4	1.25	21.1	1190
10	1/0.80	0.5	0.5	15.0	17.2	19.2	1.6	25.8	1720
15	1/0.80	0.5	0.5	17.1	19.5	21.5	1.6	28.3	2100
20	1/0.80	0.5	0.5	19.4	22.0	24.0	1.6	30.8	2420
30	1/0.80	0.5	0.5	23.0	25.8	27.8	1.6	34.8	3180
50	1/0.80	0.5	0.5	28.9	31.9	34.3	2.0	42.5	4600
1	16/0.2	0.5	0.6	7.0	9.2	10.8	0.9	15.4	680
2	16/0.2	0.5	0.6	7.9	10.1	11.7	0.9	16.3	760
5	16/0.2	0.5	0.6	13.1	15.3	16.9	1.25	22.6	1350
10	16/0.2	0.5	0.6	17.2	19.6	21.6	1.6	28.4	2115
15	16/0.2	0.5	0.6	19.8	22.4	24.4	1.6	31.2	2500
20	16/0.2	0.5	0.6	22.3	24.9	26.9	1.6	33.9	2895
30	16/0.2	0.5	0.6	26.9	29.9	32.3	2.0	40.5	4100
50	16/0.2	0.5	0.6	33.9	37.3	40.1	2.5	49.7	6000
1	1/1.13	1.0	0.6	7.4	9.6	11.2	0.9	15.8	730
2	1/1.13	1.0	0.6	8.4	10.6	12.2	0.9	17.0	830
5	1/1.13	1.0	0.6	14.2	16.4	18.4	1.6	25.0	1720
10	1/1.13	1.0	0.6	17.4	20.8	22.8	1.6	29.6	2370
15	1/1.13	1.0	0.6	21.3	23.9	25.9	2.0	32.9	2750
20	1/1.13	1.0	0.6	24.4	27.2	29.6	2.0	37.6	3870
30	1/1.13	1.0	0.6	29.0	32.0	34.4	2.0	42.6	4600
50	1/1.13	1.0	0.6	37.3	40.9	43.7	2.5	53.5	7400
1	7/0.53	1.5	0.6	8.3	10.5	12.1	0.9	16.9	810
2	7/0.53	1.5	0.6	9.7	11.9	13.5	1.25	19.0	1060
5	7/0.53	1.5	0.6	16.4	18.8	20.8	1.6	27.4	1915
10	7/0.53	1.5	0.6	21.6	24.2	26.2	1.6	33.2	2935
15	7/0.53	1.5	0.6	25.2	28.0	30.4	2.0	38.4	3900
20	7/0.53	1.5	0.6	28.5	31.5	33.9	2.0	42.1	4730
30	7/0.53	1.5	0.6	34.3	37.7	40.5	2.5	50.1	6600
50	7/0.53	1.5	0.6	43.6	47.6	50.8	2.5	61.0	9300

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

PAS 5308 Part 1 Type 3 individually and collectively screened, lead sheathed, armoured

Number of pairs	Number and Diameter of wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Insulation Thickness mm	Nominal Diameter under Lead mm	Nominal Diameter over Lead mm	Nominal Diameter over Bedding mm	Nominal Armour Wire Diameter mm	Nominal Diameter of Cable mm	Approx Nett Weight kg/km
2	1/0.80	0.5	0.5	10.3	12.5	14.1	1.25	19.6	1055
5	1/0.80	0.5	0.5	13.5	15.7	17.3	1.25	23.0	1390
10	1/0.80	0.5	0.5	18.3	20.7	22.7	1.6	29.3	2175
15	1/0.80	0.5	0.5	21.1	23.7	25.7	1.6	32.7	2600
20	1/0.80	0.5	0.5	23.5	26.3	28.7	2.0	36.5	3400
30	1/0.80	0.5	0.5	27.9	30.9	33.3	2.0	41.3	4060
50	1/0.80	0.5	0.5	36.1	39.7	42.5	2.5	52.1	6400
2	16/0.2	0.5	0.6	12.0	14.2	15.8	1.25	21.5	1250
5	16/0.2	0.5	0.6	15.2	17.4	19.4	1.6	26.0	1770
10	16/0.2	0.5	0.6	21.1	23.7	25.7	1.6	32.7	2695
15	16/0.2	0.5	0.6	24.5	27.3	29.7	2.0	37.7	3760
20	16/0.2	0.5	0.6	27.3	30.3	32.7	2.0	40.9	4155
30	16/0.2	0.5	0.6	32.3	35.5	37.9	2.0	46.3	4790
50	16/0.2	0.5	0.6	41.7	45.5	48.3	2.5	58.5	7500
2	1/1.13	1.0	0.6	12.8	15.0	16.6	1.25	22.3	1330
5	1/1.13	1.0	0.6	16.2	18.6	20.6	1.6	27.2	1940
10	1/1.13	1.0	0.6	22.6	25.2	27.2	1.6	34.2	2920
15	1/1.13	1.0	0.6	26.2	29.2	31.6	2.0	39.8	4000
20	1/1.13	1.0	0.6	29.8	33.0	35.4	2.0	43.8	4780
30	1/1.13	1.0	0.6	35.4	38.8	41.6	2.5	51.4	6100
50	1/1.13	1.0	0.6	44.9	48.9	52.1	2.5	62.5	9300
2	7/0.53	1.5	0.6	14.7	16.9	18.9	1.6	25.5	1670
5	7/0.53	1.5	0.6	18.8	21.2	23.2	1.6	30.0	2280
10	7/0.53	1.5	0.6	26.5	29.5	31.9	2.0	40.1	4070
15	7/0.53	1.5	0.6	30.8	34.0	36.4	2.0	44.8	5150
20	7/0.53	1.5	0.6	34.4	37.8	40.6	2.5	50.2	6345
30	7/0.53	1.5	0.6	41.0	44.8	47.6	2.5	57.6	7600
50	7/0.53	1.5	0.6	52.2	56.5	59.8	2.5	70.6	11400

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

Unscreened pairs: Are identified by means of coloured insulation in the sequence detailed below

Pair No.	a-wire	b-wire	Pair No.	a-wire	b-wire
1	Black	Blue	26	White	Yellow
2	Black	Green	27	Red	Yellow
3	Blue	Green	28	Orange	Yellow
4	Black	Brown	29	Black	Grey
5	Blue	Brown	30	Blue	Grey
6	Green	Brown	31	Green	Grey
7	Black	White	32	Brown	Grey
8	Blue	White	33	White	Grey
9	Green	White	34	Red	Grey
10	Brown	White	35	Orange	Grey
11	Black	Red	36	Yellow	Grey
12	Blue	Red	37	Black	Violet
13	Green	Red	38	Blue	Violet
14	Brown	Red	39	Green	Violet
15	White	Red	40	Brown	Violet
16	Black	Orange	41	White	Violet
17	Blue	Orange	42	Red	Violet
18	Green	Orange	43	Orange	Violet
19	Brown	Orange	44	Yellow	Violet
20	White	Orange	45	Grey	Violet
21	Red	Orange	46	Black	Turquoise
22	Black	Yellow	47	Blue	Turquoise
23	Blue	Yellow	48	Green	Turquoise
24	Green	Yellow	49	Brown	Turquoise
25	Brown	Yellow	50	White	Turquoise

Screened Pairs: Are identified by numbered polyester tapes with each pair having one Black and one Blue core. Two pair unscreened cables are cabled in a quad formation and colour coded in rotation, Black, Blue, Green, Brown.

Printing of cores: On request. Screened and unscreened pairs can be identified by the printing of both words and numerals in a contrasting colour, throughout the length of each core. However where it is used instead of numbered polyester tapes on screened pairs or with a different colour code to that given above, the cable is marked as generally to the standard.

DRAKA 5308

PVC INSULATED TO PAS 5308 PART 2

This specification covers multicore and multipair cables used in the provision of communication services and the interconnection of electrical equipment and instruments, particularly in and around process plants, where transducer generated signals are transmitted through marshalled circuits to panels, controllers and associated devices.

Cables to Part 1 are widely used throughout the petroleum industry, while Part 2 are more common to the chemical and petrochemical industries.

Type 1 unarmoured cables are generally for indoor applications.

Type 2 armoured cables are suitable for burial underground.

These cables are designed for use in intrinsically safe systems. However it must be noted that cables used when installing an intrinsically safe system are required to conform to any relevant requirement on the certication documents, either for the system or for the intrinsically safe and associated apparatus forming parts of the system. Cables should also be suitable for the environment in which they are going to be used.

AVAILABILITY:

Cables in this range are manufactured to customer order. Alternative constructions e.g. other conductor sizes or pair combinations, generally to this specification, can also be produced to order, as can a range of thermocouple, extension and compensating cables. Specifications to suit individual customer requirements, based on the PAS 5308 specification, can also be manufactured. Our technical personnel are available to provide information and assistance in designing cables for your specific installation and operating requirements.

RP, RPLHCL.
For applications where flame spread and the emission of acid gas is critical, Draka offer a range of bedding and sheathing compounds with an Oxygen Index between 30 and 35 and, on selected materials acid gas emission of less than 15% by volume at 800°C.

Customers should specify if they require:
RP- LOI greater than 30
RPLHCL - LOI greater than 30, acid gas emission less than 15% by volume at 800°C.
Please state a particular LOI if required.

ZERO HALOGEN, LOW SMOKE
For applications where minimal smoke and acid gas emissions are critical, Draka UK's proprietary OHLS® compounds are rated Zero Halogen, Low Smoke to BSEN 50267 (IEC 754) and BSEN 61034.

Where any of these options are ordered customers should specify if the compound is required on the bedding (where applicable), the sheath, or both (where applicable). Draka offer designs utilising these materials that can comply with the appropriate category for the cable size in BSEN 60332-3.

Please contact us to discuss your particular requirements.

TECHNICAL DATA:

MAXIMUM CONDUCTOR OPERATING TEMP: +65°C.

MINIMUM AMBIENT TEMP: -20°C after installation and only when cable is in a fixed position.

MAXIMUM WORKING VOLTAGE: 300/500V r.m.s.

TEST VOLTAGE: 1000V r.m.s. between conductors and between conductors and screen/armour.

MAXIMUM CONDUCTOR D.C. RESISTANCE:
Ωkm at 20°C

Conductor Size	Multicore	Multipair
16/0.20mm (0.5mm²)	39.0	39.7
24/0.20mm (0.75mm²)	26.0	26.5
7/0.53mm (1.5mm²)	12.1	12.3

MINIMUM INSULATION RESISTANCE: Individual conductors - 25 MΩ/km at 20°C. Between individual screens - 1 MΩ/km at 20°C

MAXIMUM MUTUAL CAPACITANCE AT 1KHZ:
Pair of adjacent cores - 250 pF/m at 1kHz.

MAXIMUM CAPACITANCE TO SCREEN:
450pF/m at 1kHz

MAXIMUM L/R RATIO:

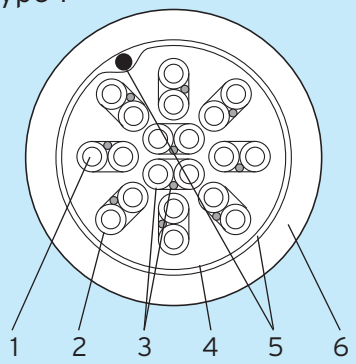
Conductor Size	μH/ΩΩ
0.5mm²	25
1.0mm²	25
1.5mm²	40

SPREAD OF FLAME:
Type 1 complies with EN 50265, IEC 60332-1. Type 2 complies as type 1 additionally with EN50266 NMV 1.5, IEC 60332-3C.

MINIMUM BENDING RADIUS:
Type 1 - 5 x overall diameter. Type 2 - 6 x overall diameter. Type 3 - 15 x overall diameter.

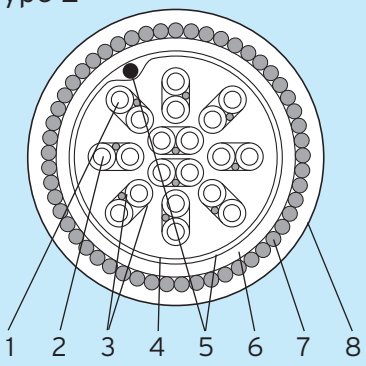
CONSTRUCTION:

Type 1



Type 1 -
1 Plain annealed copper conductors to BSEN 60228.
2 Type TI51 PVC insulation to BSEN 50290-2-21.
3 Individual pair screen (optional)-
a) Aluminium/polyester tape, metallic side down, in contact with minimum 0.5mm² tinned copper drain wire.
b) Polyester isolating tape(s) numbered for identification.
4 Polyester binder tape.
5 Collective screen (optional) - Aluminium/polyester tape, metallic side down, in contact with minimum 0.5mm² tinned copper drain wire.
6 Type TM51 PVC sheath to BSEN 50290-2-22.

Type 2



Type 2 -
1 Plain annealed copper wire conductors to BSEN 60228.
2 Type TI51 PVC insulation to BSEN 50290-2-21.
3 Individual pair screen (optional)-
a) Aluminium/polyester tape, metallic side down, in contact with minimum 0.5mm² tinned copper drain wire.
b) Polyester isolating tape(s) numbered for identification
4 Polyester binder tape.
5 Collective screen (optional) - Aluminium/polyester tape, metallic side down, in contact with minimum 0.5mm² tinned copper drain wire.
6 Type TM51 PVC bedding conforming to BSEN 50290-2-22.
7 Single layer galvanised steel wire armour to BS EN 10257-1.
8 Type TM51 PVC sheath to BSEN 50290-2-22.

PHYSICAL DATA

PAS 5308 Part 2 Type 1 multicore, collectively screened, unarmoured

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Radial Thickness of Insulation mm	Nominal Diameter of Cable mm	Approx. Nett Weight kg/km
2	16/0.2	0.5	0.6	7.0	60
3	16/0.2	0.5	0.6	7.3	75
4	16/0.2	0.5	0.6	7.9	80
6	16/0.2	0.5	0.6	9.3	110
10	16/0.2	0.5	0.6	11.9	180
20	16/0.2	0.5	0.6	14.9	310
40	16/0.2	0.5	0.6	20.1	570
80	16/0.2	0.5	0.6	26.3	1080
2	24/0.2	0.75	0.6	7.3	75
3	24/0.2	0.75	0.6	7.7	90
4	24/0.2	0.75	0.6	8.3	100
6	24/0.2	0.75	0.6	9.9	140
10	24/0.2	0.75	0.6	12.7	220
20	24/0.2	0.75	0.6	16.0	390
40	24/0.2	0.75	0.6	21.7	710
80	24/0.2	0.75	0.6	28.5	1350
2	7/0.53	1.5	0.6	8.3	105
3	7/0.53	1.5	0.6	8.9	135
4	7/0.53	1.5	0.6	9.7	150
6	7/0.53	1.5	0.6	11.7	205
10	7/0.53	1.5	0.6	14.7	330
20	7/0.53	1.5	0.6	18.7	580
40	7/0.53	1.5	0.6	24.6	1065
80	7/0.53	1.5	0.6	33.6	2025

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

PHYSICAL DATA

PAS 5308 Part 2 Type 1 multipair, collectively screened, unarmoured

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Radial Thickness of Insulation mm	Nominal Diameter of Cable mm	Approx. Nett Weight kg/km
1	16/0.2	0.5	0.6	7.0	60
2	16/0.2	0.5	0.6	7.9	80
5	16/0.2	0.5	0.6	12.1	200
10	16/0.2	0.5	0.6	17.2	340
15	16/0.2	0.5	0.6	19.8	480
20	16/0.2	0.5	0.6	22.3	570
30	16/0.2	0.5	0.6	26.9	880
50	16/0.2	0.5	0.6	33.9	1310
1	24/0.2	0.75	0.6	7.3	75
2	24/0.2	0.75	0.6	8.3	100
5	24/0.2	0.75	0.6	14.3	250
10	24/0.2	0.75	0.6	18.7	450
15	24/0.2	0.75	0.6	21.4	600
20	24/0.2	0.75	0.6	24.5	800
30	24/0.2	0.75	0.6	29.5	1080
50	24/0.2	0.75	0.6	37.4	1860
1	7/0.53	1.5	0.6	8.3	100
2	7/0.53	1.5	0.6	9.7	150
5	7/0.53	1.5	0.6	16.4	360
10	7/0.53	1.5	0.6	21.6	670
15	7/0.53	1.5	0.6	25.2	970
20	7/0.53	1.5	0.6	28.5	1230
30	7/0.53	1.5	0.6	34.3	1730
50	7/0.53	1.5	0.6	43.6	2740

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

PHYSICAL DATA

PAS 5308 Part 2 Type 1 multipair, individually and collectively screened, unarmoured

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Radial Thickness of Insulation mm	Nominal Diameter of Cable mm	Approx. Nett Weight kg/km
2	16/0.2	0.5	0.6	12.0	170
5	16/0.2	0.5	0.6	15.2	270
10	16/0.2	0.5	0.6	21.1	520
15	16/0.2	0.5	0.6	24.5	650
20	16/0.2	0.5	0.6	27.3	860
30	16/0.2	0.5	0.6	32.3	1130
50	16/0.2	0.5	0.6	41.7	1880
2	24/0.2	0.75	0.6	12.8	200
5	24/0.2	0.75	0.6	16.3	355
10	24/0.2	0.75	0.6	22.7	560
15	24/0.2	0.75	0.6	26.4	770
20	24/0.2	0.75	0.6	29.8	990
30	24/0.2	0.75	0.6	35.5	1380
50	24/0.2	0.75	0.6	45.0	2225
2	7/0.53	1.5	0.6	14.7	265
5	7/0.53	1.5	0.6	18.8	490
10	7/0.53	1.5	0.6	26.5	820
15	7/0.53	1.5	0.6	30.8	1110
20	7/0.53	1.5	0.6	34.4	1470
30	7/0.53	1.5	0.6	41.0	2070
50	7/0.53	1.5	0.6	52.2	3340

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

PHYSICAL DATA

PAS 5308 Part 2 Type 2 multicore, collectively screened, armoured

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Insulation Thickness mm	Nominal Diameter over Bedding mm	Nominal Armour Wire Diameter mm	Nominal Diameter of Cable kg/km	Approx. Nett Weight
2	16/0.2	0.5	0.6	7.0	0.9	11.4	255
3	16/0.2	0.5	0.6	7.3	0.9	11.7	280
4	16/0.2	0.5	0.6	7.9	0.9	12.3	305
6	16/0.2	0.5	0.6	9.3	0.9	13.9	360
10	16/0.2	0.5	0.6	11.9	0.9	16.7	510
20	16/0.2	0.5	0.6	14.9	1.25	20.6	960
40	16/0.2	0.5	0.6	20.1	1.6	26.7	1440
80	16/0.2	0.5	0.6	26.3	1.6	33.3	2200
2	24/0.2	0.75	0.6	7.3	0.9	11.7	280
3	24/0.2	0.75	0.6	7.7	0.9	12.1	305
4	24/0.2	0.75	0.6	8.3	0.9	12.9	335
6	24/0.2	0.75	0.6	9.9	0.9	14.5	400
10	24/0.2	0.75	0.6	12.7	0.9	17.5	565
20	24/0.2	0.75	0.6	16.0	1.25	21.7	950
40	24/0.2	0.75	0.6	21.7	1.6	28.5	1590
80	24/0.2	0.75	0.6	28.5	1.6	35.7	2450
2	7/0.53	1.5	0.6	8.3	0.9	12.9	330
3	7/0.53	1.5	0.6	8.9	0.9	13.5	380
4	7/0.53	1.5	0.6	9.7	0.9	14.3	420
6	7/0.53	1.5	0.6	11.7	0.9	16.3	540
10	7/0.53	1.5	0.6	14.7	1.25	20.4	750
20	7/0.53	1.5	0.6	18.7	1.6	25.3	1260
40	7/0.53	1.5	0.6	24.6	1.6	31.6	2140
80	7/0.53	1.5	0.6	33.6	2.0	41.8	3300

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

PHYSICAL DATA

PAS 5308 Part 2 Type 2 multipair, collectively screened, armoured

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Insulation Thickness mm	Nominal Diameter over Bedding mm	Nominal Armour Wire Diameter mm	Nominal Diameter of Cable kg/km	Approx. Nett Weight
1	16/0.2	0.5	0.6	7.0	0.9	11.4	255
2	16/0.2	0.5	0.6	7.9	0.9	12.3	305
5	16/0.2	0.5	0.6	13.1	0.9	17.9	610
10	16/0.2	0.5	0.6	17.2	1.25	22.9	1060
15	16/0.2	0.5	0.6	19.8	1.6	26.4	1330
20	16/0.2	0.5	0.6	22.3	1.6	29.1	1800
30	16/0.2	0.5	0.6	26.9	1.6	33.9	1980
50	16/0.2	0.5	0.6	33.9	2.0	42.1	3070
1	24/0.2	0.75	0.6	7.3	0.9	11.7	305
2	24/0.2	0.75	0.6	8.3	0.9	12.9	360
5	24/0.2	0.75	0.6	14.3	1.25	19.8	820
10	24/0.2	0.75	0.6	18.7	1.6	25.3	1250
15	24/0.2	0.75	0.6	21.4	1.6	28.2	1600
20	24/0.2	0.75	0.6	24.5	1.6	31.3	1800
30	24/0.2	0.75	0.6	29.5	2.0	37.5	2570
50	24/0.2	0.75	0.6	37.4	2.0	45.8	3800
1	7/0.53	1.5	0.6	8.3	0.9	12.9	360
2	7/0.53	1.5	0.6	9.7	0.9	14.3	460
5	7/0.53	1.5	0.6	16.4	1.25	22.1	1040
10	7/0.53	1.5	0.6	21.6	1.6	28.4	1610
15	7/0.53	1.5	0.6	25.2	1.6	32.2	2060
20	7/0.53	1.5	0.6	28.5	1.6	35.7	2630
30	7/0.53	1.5	0.6	34.3	2.0	42.5	3460
50	7/0.53	1.5	0.6	43.6	2.0	53.4	5520

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

PHYSICAL DATA

PAS 5308 Part 2 Type 2 multipair, individually and collectively screened, armoured

Number of Pairs	Number and Diameter of Wires no./mm	Nominal Conductor Cross-Sectional Area mm²	Nominal Insulation Thickness mm	Nominal Diameter over Bedding mm	Nominal Armour Wire Diameter mm	Nominal Diameter of Cable kg/km	Approx. Nett Weight
2	16/0.2	0.5	0.6	12.0	0.9	16.8	505
5	16/0.2	0.5	0.6	15.2	1.25	20.9	830
10	16/0.2	0.5	0.6	21.1	1.6	27.9	1420
15	16/0.2	0.5	0.6	24.5	1.6	31.3	1570
20	16/0.2	0.5	0.6	27.3	1.6	34.3	2040
30	16/0.2	0.5	0.6	32.3	2.0	40.5	2610
50	16/0.2	0.5	0.6	41.7	2.5	51.5	4270
2	24/0.2	0.75	0.6	12.8	0.9	17.6	545
5	24/0.2	0.75	0.6	16.3	1.25	22.0	1005
10	24/0.2	0.75	0.6	22.7	1.6	29.5	1400
15	24/0.2	0.75	0.6	26.4	1.6	33.4	1750
20	24/0.2	0.75	0.6	29.8	2.0	37.8	2300
30	24/0.2	0.75	0.6	35.5	2.0	43.9	2460
50	24/0.2	0.75	0.6	45.0	2.5	55.0	4800
2	7/0.53	1.5	0.6	14.7	1.25	20.4	800
5	7/0.53	1.5	0.6	18.8	1.6	25.4	1290
10	7/0.53	1.5	0.6	26.5	1.6	33.5	1990
15	7/0.53	1.5	0.6	30.8	2.0	38.8	2590
20	7/0.53	1.5	0.6	34.4	2.0	42.6	3310
30	7/0.53	1.5	0.6	41.0	2.5	50.8	4380
50	7/0.53	1.5	0.6	52.2	2.5	62.6	6260

NOTE: For cable without a collective screen the nominal cable diameter is reduced by 1mm.

A: Pairs Unscreened pairs: Are identified by means of coloured insulation in the sequence detailed below

Pair No.	a-wire	b-wire	Pair No.	a-wire	b-wire
1	White	Blue	26	RED/Blue	Blue
2	White	Orange	27	RED/Blue	Orange
3	White	Green	28	RED/Blue	Green
4	White	Brown	29	RED/Blue	Brown
5	White	Grey	30	RED/Blue	Grey
6	Red	Blue	31	BLUE/Black	Blue
7	Red	Orange	32	BLUE/Black	Orange
8	Red	Green	33	BLUE/Black	Green
9	Red	Brown	34	BLUE/Black	Brown
10	Red	Grey	35	BLUE/Black	Grey
11	Black	Blue	36	YELLOW/Blue	Blue
12	Black	Orange	37	YELLOW/Blue	Orange
13	Black	Green	38	YELLOW/Blue	Green
14	Black	Brown	39	YELLOW/Blue	Brown
15	Black	Grey	40	YELLOW/Blue	Grey
16	Yellow	Blue	41	WHITE/Orange	Blue
17	Yellow	Orange	42	WHITE/Orange	Orange
18	Yellow	Green	43	WHITE/Orange	Green
19	Yellow	Brown	44	WHITE/Orange	Brown
20	Yellow	Grey	45	WHITE/Orange	Grey
21	WHITE/Blue	Blue	46	ORANGE/Red	Blue
22	WHITE/Blue	Orange	47	ORANGE/Red	Orange
23	WHITE/Blue	Green	48	ORANGE/Red	Green
24	WHITE/Blue	Brown	49	ORANGE/Red	Brown
25	WHITE/Blue	Grey	50	ORANGE/Red	Grey

NOTE: For bi- coloured cores the base colour is shown in capitals.

Screened pairs: Are identified by numbered polyester tapes with each pair having one White and one Blue core. Two pair unscreened or collectively screened cables are cabled in a quad formation and colour coded in rotation, Blue, Green, Orange, Brown.

Printing of cores: On request, screened and unscreened pairs can be identified by the printing of both words and numerals in a contrasting colour, throughout the length of each core. However where it is used instead of numbered polyester tapes on screened pairs or with a different colour code to that given above, the cable is marked as generally to the standard.

B: Cores

Cores are numbered for identification as follows.

Up to 40 cores: All Yellow and identified 1 to 40 with both printed numbers and written word, in Black, e.g. Core 10 would be coloured Yellow and identified by number "10, TEN" in Black.

41 to 80 cores: All cores Black and identified 1 to 40 with both printed numbers and written word, in Yellow, e.g. Core 50 would be coloured Black and identified by number "50, FIFTY" in Yellow.

Draka Infrastructure Cables

With a respected reputation in the LV Industrial market sector, Draka have now introduced a medium voltage cable range for the utilities and industrial sectors and also for rail applications.

These products, together with overhead line products are in the vanguard of Draka's programme of introducing comprehensive product coverage for the infrastructure markets. This programme will also include distribution, service and railway cables.

MV 1 CORE ARMOURED

MEDIUM VOLTAGE POWER DISTRIBUTION CABLES

APPLICATION FIELDS:
1-core armoured power cable.

STANDARD:
BS6622/BS7835

RATED VOLTAGE:
6.35/11 (12) kV

IMPULSE VOLTAGE:
95 kV

FIRE PROPAGATION CLASS:
BS EN 50266-2-4.

TEMPERATURE RANGE:
In continuous operation max. conductor temp 90 ºC. Lowest cable temperature during installation: -10 ºC and below 0 ºC special precaution must be taken.

BENDING RADIUS:
At laying: 12 x D. When installed: 8 x D
D = Overall diameter of cable

Design

CONDUCTOR:
Stranded, round and compacted copper acc. to IEC 60228 class 2

CONDUCTOR SCREEN:
Extruded

INSULATION:
XLPE, nominal thickness = 3.4 mm

INSULATION SCREEN:
Extruded, bonded or strippable

METALLIC SCREEN:
Metallic layer, copper tape

INNER SHEATH:
PVC or PE, black

ARMOUR:
Galvanized aluminium wires

OUTER SHEATH:
PVC or halogen free compound, red

Also available in 22kV and 33kV variants.

Number of cores x cross-section of conductor mm²	Diameter over insulation mm	Diameter over inner sheat (approx.) mm	Diameter of steel wires mm	Overall diameter (approx.) mm	Weight (approx.) Kg/100 m
1x50	16.0	23	1.6	30	140
1x70	17.6	25	1.6	32	160
1x95	19.3	27	1.6	35	210
1x120	20.6	29	1.6	36	240
1x150	22.2	30	2.0	38	270
1x185	23.8	32	2.0	40	220
1x240	26.1	34	2.0	42	380
1x300	28.4	37	2.0	46	480
1x400	31.2	41	2.0	50	570
1x500	34.2	43	2.5	53	690
1x630	37.8	47	2.5	57	840

Electrical data at +20 °C

Number of cores x cross-section of conductor mm²	DC conductor resistance at 20°C Ω/km	AC conductor resistance at 90°C Ω/km	Inductance mH/km	Capacitance µF/km	Reactance at 50 Hz Ω/km	Charging current/phase A/km
1x50	0.387	0.494	0.43	0.24	0.14	0.5
1x70	0.268	0.343	0.40	0.27	0.13	0.5
1x95	0.193	0.248	0.38	0.31	0.12	0.6
1x120	0.153	0.196	0.37	0.33	0.12	0.7
1x150	0.124	0.159	0.36	0.36	0.11	0.7
1x185	0.0991	0.128	0.35	0.40	0.11	0.8
1x240	0.0754	0.098	0.33	0.44	0.10	0.9
1x300	0.0601	0.080	0.32	0.49	0.10	1.0
1x400	0.0470	0.064	0.31	0.55	0.10	1.1
1x500	0.0366	0.051	0.30	0.60	0.09	1.2
1x630	0.0283	0.042	0.29	0.68	0.09	1.4

Current rating

Number of cores x crosssection of conductor mm²	Current rating at core temp. 65 °C in ground* A	Current rating at core temp. 65 °C in air* A	Current rating at core temp. 90 °C in air* A	Max. short-circuit current on the conductor during 1 s at initial temp. 65 °C kA	Max. short-circuit current on the conductor during 1 s at initial temp. 90 °C kA
1x50	205	205	250	7.8	7.1
1x70	255	240	295	11.0	10.0
1x95	295	300	355	14.9	13.6
1x120	335	335	410	18.9	17.2
1x150	380	380	485	23.6	21.5
1x185	425	435	535	29.1	26.5
1x240	485	505	620	47.2	43.0
1x300	545	575	705	46.2	43.0
1x400	625	680	835	62.9	57.4
1x500	695	765	940	78.7	71.7
1x630	755	845	1035	99.1	90.4

*Installation conditions
Ground temperature: 15°C
Depth of laying: 0,65 m
Ground resistivity: 1,0 m x °K/W

Air temperature 25°C
Trefoil with screen grounded in both ends
Nominal values unless otherwise specified.

MV 3 CORE ARMOURED

MEDIUM VOLTAGE POWER DISTRIBUTION CABLES

APPLICATION FIELDS:
3-core armoured power cable.

STANDARD:
BS6622/BS7835

RATED VOLTAGE:
6.35/11 (12) kV

IMPULSE VOLTAGE:
95 kV

FIRE PROPAGATION CLASS:
BS EN 50266-2-4.

TEMPERATURE RANGE:
In continuous operation max. conductor temp 90 ºC. Lowest cable temperature during installation: -10 ºC and below 0 ºC special precaution must be taken.

BENDING RADIUS:
At laying: 12 x D. When installed: 8 x D
D = Overall diameter of cable

Design

CONDUCTOR:
Stranded, round and compacted copper acc. to IEC 60228 class 2

CONDUCTOR SCREEN:
Extruded

INSULATION:
XLPE, nominal thickness = 3.4 mm

INSULATION SCREEN:
Extruded, bonded or strippable

CORE IDENTIFICATION:
Coloured phasetape under screen

METALLIC SCREEN:
Metallic layer, copper tape, over each individual core

FILLER:
PP yarn

INNER SHEATH:
PVC or PE, black

ARMOUR:
Galvanized steel wires

OUTER SHEATH:
PVC or halogen free compound, red

Also available in 22kV and 33kV variants.

Number of cores x cross-section of conductor mm²	Diameter over insulation mm	Diameter over inner sheat (approx.) mm	Diameter of steel wires mm	Overall diameter (approx.) mm	Weight (approx.) Kg/100 m
3x50	16.0	44	2.5	54	600
3x70	17.5	47	2.5	58	750
3x95	19.3	51	2.5	62	800
3x120	20.8	55	2.5	67	850
3x150	22.2	58	2.5	69	950
3x185	24.1	61	2.5	73	1100
3x240	26.3	69	3.15	82	1425
3x300	28.6	72	3.15	86	1700

Electrical data at +20 °C

Number of cores x cross-section of conductor mm²	DC conductor resistance at 20°C Ω/km	AC conductor resistance at 90°C Ω/km	Inductance mH/km	Capacitance µF/km	Reactance at 50 Hz Ω/km	Charging current/phase A/km
3x50	0.387	0.494	0.34	0.24	0.11	0.5
3x70	0.268	0.343	0.33	0.27	0.10	0.6
3x95	0.193	0.248	0.31	0.31	0.10	0.7
3x120	0.153	0.196	0.30	0.33	0.09	0.7
3x150	0.124	0.159	0.29	0.36	0.09	0.8
3x185	0.0991	0.128	0.28	0.40	0.09	0.8
3x240	0.0754	0.098	0.27	0.49	0.09	0.9
3x300	0.0601	0.080	0.26	0.55	0.08	1.0

Current rating

Number of cores x crosssection of conductor mm²	Current rating at core temp. 65 °C in ground* A	Current rating at core temp. 65 °C in air* A	Current rating at core temp. 90 °C in air* A	Max. short-circuit current on the conductor during 1 s at initial temp. 90 °C kA
3x50	175	165	205	7.1
3x70	210	205	250	10.0
3x95	250	240	295	13.6
3x120	285	280	340	17.2
3x150	325	320	390	21.5
3x185	360	360	435	26.5
3x240	415	420	515	34.3
3x300	470	480	590	42.9

*Installation conditions
Ground temperature: 15°C
Depth of laying: 0,65 m
Ground resistivity: 1,0 m x °K/W

Air temperature 25°C
Nominal values unless otherwise specified.

Type 8, Type 16

OVERHEAD LINE

STANDARD: BS 6485

VOLTAGE RATING:
Type 8 is intended for use only where the operating voltage of the power lines does not exceed 650V between conductors or 250V to earth.

Type 16 is intended for use only where the operating voltage of the power lines exceed 650V between conductors and 250V to earth, but does not normally exceed 11000V between conductors or 6600V to earth.

APPLICATION:
Overhead power lines, particularly suitable where power lines cross telecommunication lines. Also Type 8 is intended to provide protection to the public against accidental contact with low voltage power line, for short periods.

CONSTRUCTION:
Single core. Hard drawn plain copper stranded conductor, PVC Covered. Type 8 - 0.8mm radial thickness. Type 16 - 1.6mm radial thickness.

COLOURS: Type 8: Black. Type 16 Green.

MAXIMUM CONDUCTOR TEMPERATURE: 70°C

CURRENT RATING: Available on request.

Alternative conductor stranding to BS 7884 available to order.

Reference number	Nominal area of conductor	Nominal number and diameter of wires in conductor	Conductor resistance at 20°C	Conductor overall diameter	Approx. breaking load	Approx. overall diameter		Approx. nett weight	
						Type 8	Type 16	Type 8	Type 16
	mm^2	no/mm	Ω/km	mm	kN	mm	mm	kg/km	kg/km
Type 8	14	7/1.60	1.298	4.80	5.744	6.8	8.4	160	190
and	16	3/2.65	1.104	5.69	6.59	7.7	9.3	180	220
Type 16	32	3/3.75	0.5514	8.05	12.71	10.5	12.1	350	390
	35	7/2.50	0.5319	7.50	14.097	9.9	11.5	360	400
	70	7/3.55	0.2637	10.65	26.88	13.5	14.7	690	750
	100	7/4.30	0.1804	12.90	37.64	15.7	16.9	990	1060

HEALTH AND SAFETY
SAFE HANDLING AND STORAGE OF CABLE DRUMS

It is recommended that the safety rules relative to handling and storage of cable drums at any establishment should follow the guidance given here unless equivalent or better practices are already in force.

GENERAL PRINCIPLES

The following general principles should govern handling operations:

- Lifting and transporting devices should only be used within their rated (safe working load - SWL) capacity.
- Professional approval should be sought before any lifting or transporting device is used for a purpose for which it was not originally intended.
- Before transporting any object, first ensure it is properly stacked and secured - taking into consideration its nature, the construction of the transport and the journey to be made. Rough or uneven surfaces create extra hazards.
- Where a load is unusual and likely to need special care, ensure all precautions are properly checked and adequately supervised before the load is allowed to move.
- Only authorised personnel should be permitted to use any lifting or transporting devices. Where there is a legal requirement or when driving certain types of equipment or transport, the personnel should be certified or licensed. Typical examples are fork lift truck and crane drivers.

- The use of unauthorised equipment for handling, lifting or transporting cable drums should be prohibited.
- Under no circumstances should case grabs be used for lifting cable drums.

HANDLING AND ROLLING OF DRUMS

Operatives should be properly instructed in the safe rolling of drums, both full and empty, i.e.:

- Always keep a look-out.
- Always push in the direction of travel.
- Never pull with your back to the direction of travel.
- When pushing drums, wearing stout gloves is advised (see recommendations concerning gloves in Section 18.2.1 of the BCA health and safety manual).
- Wherever possible, use a turntable to change the direction of travel. Turntables should be relocked after use. Other methods should only be used if they constitute a safe working practice and the operatives involved have been trained accordingly.
- Take special care to ensure drum movement is always under control on a ramp.
- Avoid rolling drums on inclines where the drum cannot be adequately controlled.
- Under no circumstances should a drum be pushed and then released so that it travels uncontrolled.
- Drums marked 'Roll this way' should always be rolled in the direction indicated.
- To avoid the operative having to stoop, small drums and bobbins should be rolled with a suitable runner. A runner is an L-shaped bar approximately 1.2 m (4 ft) long with a loop handle at the top of the upright. The cross-piece is inserted into the spindle hole of the drum/bobbin (but should not protrude so far out that it becomes a hazard).
- Ensure that only authorised equipment is used when rolling drums. DIY equipment should be prohibited.

BATTENS AND LAGS

The use of strapping or tape to fix battens around drums requires special care. One method of restraining the strapping or tape is the use of a slipping rope strap around the strapping or tape. If it is necessary to remove the strapping or tape then, to prevent lashing or springing ends causing injury, a special tool which holds the two ends of the strapping or tape should be used.

Eye and hand protection should be worn when handling or cutting strapping or tape.

Protruding nails/staples in timbers or battens should be removed during removal of the battens/lags from a drum.

DRUM STORAGE

Cable drums for storage should be securely chocked at floor level, taking into account the following factors. In deciding upon storage areas and methods of stacking, consideration should be given to the evenness and firmness of the ground, the sizes and weights of the drums and the need to prevent any unintended movement when stored.

Account should be taken of environmental conditions that may affect the surface of the ground, the serviceability of the drums, battens or chocks and, if applicable, the stability of drum stacks.

WHEN DRUMS ARE STACKED:

- Drums of cable should not be stored or stacked with their flanges in the horizontal position.
- Where drums are stacked vertically, upper layers should rest in the valleys of the flanges in the layer below.
- Where drums are stacked two or more high, every drum on the ground should be chocked on either side.
- The stability of stacks should be checked periodically.

When moving drums in and out of store, the recommendations given in Section 18.2.1 of the BCA health and safety manual should be followed.

A system of inspection should be implemented to ensure that empty drums are fit for their next intended use. As drums stored in the open may deteriorate over a period of time, a similar system of inspection should be followed. Any drums that have deteriorated to a point that makes them unfit for use should be disposed of in a safe manner. If they have been manufactured from chemically treated timber, disposal should be through a licensed waste disposal contractor.

Current Ratings and Volt Drops

CABLE INSTALLATION

METHODS OF INSTALLATION

Table 4A2 lists the methods of installation for which this appendix provides guidance for the selection of the appropriate cable size. Table 4A3 lists the appropriate tables for selection of current ratings for specific cable constructions. The Reference Methods are those methods of installation for which the current-carrying capacities given in Tables 4DIA to 4J4A have been determined (see below). The use of other methods is not precluded and in that case the evaluation of current-carrying capacity may need to be based on experimental work.

REFERENCE METHODS

The Reference Methods are those methods of installation for which the current-carrying capacity has been determined by test or calculation.

NOTE: It is impractical to calculate and publish current ratings for every installation method, since many would result in the same current rating. Therefore a suitable (limited) number of current ratings have been calculated which cover all of the installation methods stated in Table 4A2 and have been called Reference Methods.

Reference Method A, for example, Installation Methods 1 and 2 of Table 4A2 (non-sheathed cables and multicore cables in conduit in a thermally insulated wall).

The wall consists of an outer weatherproof skin, thermal insulation and an inner skin of wood or wood-like material having a thermal conductance of at least IO W/m^2. K. The conduit is fixed such that it is close to, but not necessarily touching, the inner skin. Heat from the cables is assumed to escape through the inner skin only. The conduit can be metal or plastic.

Reference Method B, for example, Installation Method 4 of Table 4A2 (non-sheathed cables in conduit mounted on a wooden or masonry wall) and Installation Method 5 of Table 4A2 (multicore cable in conduit on a wooden or masonry wall).

The conduit is mounted on a wooden wall such that the gap between the conduit and the surface is less than 0.3 times the conduit diameter. The conduit can be metal or plastic. Where the conduit is fixed to a masonry wall the current-carrying capacity of the non-sheathed or sheathed cable may be higher.

Reference Method C (clipped direct), for example, Installation Method 20 of Table 4A2 (single-core or multicore cable on a wooden or masonry wall)

Cable mounted on a wooden wall so that the gap between the cable and the surface is less than 0.3 times the cable diameter. Where the cable is fixed to or embedded in a masonry wall the current-carrying capacity may be higher.

NOTE: The term 'masonry' is taken to include brickwork, concrete, plaster and similar (but excluding thermally insulating materials).

Reference Method D, for example, Installation Method 70 of Table 4A2 (multicore unarmoured cable in conduit or in cable ducting in the ground).

The cable is drawn into a 100 mm diameter plastic, earthenware or metallic duct laid in direct contact with soil having a thermal resistivity of 2.5 K. m/W and at a depth of 0.8 m. The values given for this method are those stated in this appendix and are based on conservative installation parameters. If the specific installation parameters are known (thermal resistance of the ground, ground ambient temperature, cable depth), reference can be made to the cable manufacturer or the ERA 69-30 series of publications, which may result in a smaller cable size being selected.

NOTE: The current-carrying capacity for cables laid in direct contact with soil having a thermal resistivity of 2.5 K.m/W and at a depth of 0.7 m is approximately 10 % higher than the values tabulated for Reference Method D.

Reference Methods E, F and G, for example, Installation Methods 31 to 35 of Table 4A (single-core or multicore cable in free air).

The cable is supported such that the total heat dissipation is not impeded. Heating due to solar radiation and other sources is to be taken into account. Care is to be taken that natural air convection is not impeded. In practice, a clearance between a cable and any adjacent surface of at least 0.3 times the cable external diameter for multicore cables or 1.0 times the cable diameter for single-core cables is sufficient to permit the use of current-carrying capacities appropriate to free air conditions.

OTHER METHODS

Cable on a floor: Reference Method C applies for current rating purposes.

Cable under a ceiling: This installation may appear similar to Reference Method C but because of the reduction in natural air convection, Reference Method B is to be used for the current rating.

Cable tray systems: A perforated cable tray has a regular pattern of holes that occupy at least 30% of the area of the base of the tray. The current-carrying capacity for cables attached to perforated cable trays should be taken as Reference Methods E or F. The current-carrying capacity for cables attached to unperforated cable trays (no holes or holes that occupy less than 30% of the area of the base of the tray) is to be taken as Reference Method C.

Cable ladder system: This is a construction which offers a minimum of impedance to the air flow around the cables, i.e. supporting metalwork under the cables occupies less than 10% of the plan area. The current-carrying capacity for cables on ladder systems should be taken as Reference Methods E or F.

Cable cleats, cable ties and cable hangers: Cable supports hold the cable at intervals along its length and permit substantially complete free air flow around the cable. The current-carrying capacity for cable cleats, cable ties and cable hangers should be taken as Reference Methods E or F.

Cable installed in a ceiling: This is similar to Reference Method A. It may be necessary to apply the rating factors due to higher ambient temperatures that may arise in junction boxes and similar mounted in the ceiling.

NOTE: Where a junction box in the ceiling is used for the supply to a luminaire, the heat dissipation from the luminaire may provide higher ambient temperatures than permitted in Tables 4DIA to 4J4A (see also Regulation 522.2.1). The temperature may be between 40°C and 50°C, and a rating factor according to Table 4B1 must be applied.

GENERAL NOTES TO ALL TABLES IN THIS APPENDIX

NOTE: Current-carrying capacities are tabulated for methods of installation which are commonly used for fixed electrical installations. The tabulated capacities are for continuous steady-state operation (100 % load factor) for d.c. or a.c. of nominal frequency 50 Hz and take no account of harmonic content.

NOTE: Table 4A2 itemises the reference methods of installation to which the tabulated current-carrying capacities refer.

TABLE 4A1

Schedule of Installation Methods in relation to conductors and cables

Conductors and cables		Installation Method: Without fixings	Clipped direct	Conduit systems	Cable trunking systems*	Cable ducting systems	Cable ladder, cable tray, cable brackets	On insulators	Support wire
Bare conductors		np	np	np	np	np	np	P	np
Non-sheathed cable		np	np	P[1]	P[1]	P[1]	np[1]	P	np
Sheathed cables (including armoured and mineral insulated)	Multicore	P	P	P	P	P	P	n/a	P
	Single-core	n/a	P	P	P	P	P	n/a	P

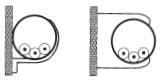
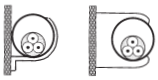
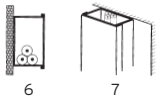
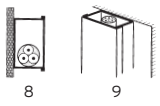
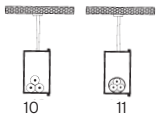
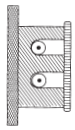
P - Permitted
np - Not permitted.
n/a - Not applicable, or not normally used in practice.
* - including skirting trunking and flush floor trunking

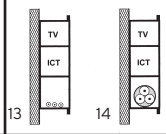
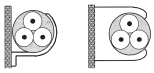
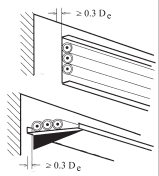
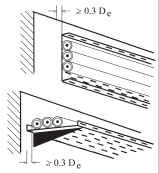
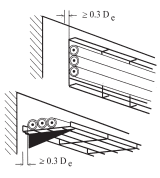
1 Non-sheathed cables which are used as protective conductors or protective bonding conductors need not be laid in conduits or ducts

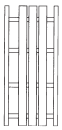
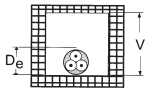
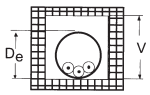
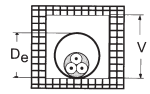
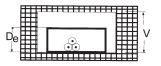
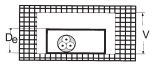
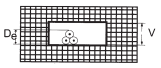
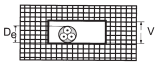
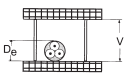
TABLE 4A2 - SCHEDULE OF INSTALLATION METHODS OF CABLES (INCLUDING REFERENCE METHODS) FOR DETERMINING CURRENT-CARRYING CAPACITY

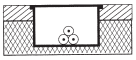
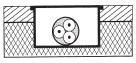
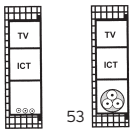
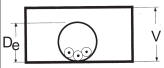
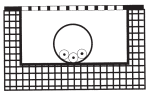
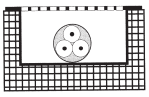
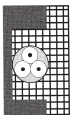
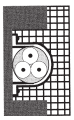
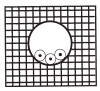
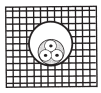
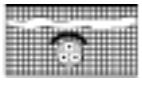
NOTE: The illustrations are not intended to depict actual product or installation practices but are indicative of the method described.

NOTE: The installation and reference methods stated are in line with IEC. However, not all methods have a corresponding rating for all cable types.

Installation Method			
No.	Examples	Description	Reference Method to be used to determine current-carrying capacity
1		Non-sheathed cables in conduit in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10 W/m²K	A
2		Multicore cable in conduit in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10 W/m²K	A
3		Multicore cable direct in a thermally insulated wall with an inner skin having a thermal conductance of not less than 10 W/m²K	A
4		Non-sheathed cables in conduit on a wooden or masonry wall or spaced less than 0.3 x conduit diameter from it [c]	B
5		Multicore cable in conduit on a wooden or masonry wall or spaced less than 0.3 x conduit diameter from it [c]	B
6 7		Non-sheathed cables in cable trunking on a wooden or masonry wall 6 - run horizontally [b] 7 - run vertically [b, c]	B
8 9		Multicore cable in cable trunking on a wooden or masonry wall 8 - run horizontally [h] 9 - run vertically [b, c]	B*
10 11		Non-sheathed cables in suspended cable trunking [b] Multicore cable in suspended cable trunking [b]	B B
12		Non-sheathed cables run in mouldings [c,e]	A

No.	Examples	Description	Reference Method to be used to determine current-carrying capacity
13 14		Non-sheathed cables in skirting trunking Multicore cable in skirting trunking	B B
15		Non-sheathed cables in conduit or single-core or multicore cable in architrave [c, f]	A
16		Non-sheathed cables in conduit or single-core or multicore cable in window frames [c, f]	A
20		Single-core or multicore cables: fixed on (clipped direct), or spaced less than 0.3 x cable diameter from a wooden or masonry wall [c]	C
21		Single-core or multicore cables: fixed directly under a wooden or masonry ceiling	B (Higher than standard ambient temperatures may occur with this installation method)
22		Single-core or multicore cables: spaced from a ceiling	E,F or G* (Higher than standard ambient temperatures may occur with this installation method)
23		Not used.	
30		Single-core or multicore cables: on unperforated tray run horizontally or vertically [c, h]	C with item 2 of Table 4C1
31		Single-core or multicore cables: on perforated tray run horizontally or vertically [c, h]	E or F
32		Single-core or multicore cables: on brackets or on a wire mesh tray run horizontally or vertically [c, h]	E or F
33		Single-core or multicore cables: - spaced more than 0.3 times the cable diameter from a wall	E,F or G*
34		Single-core or multicore cables: - on a ladder [c]	E or F

No.	Examples	Description	Reference Method to be used to determine current-carrying capacity
33		Single-core or multicore cables: - spaced more than 0.3 times the cable diameter from a wall	E,F or G*
34		Single-core or multicore cables: - on a ladder [c]	E or F
35		Single-core or multicore cable suspended from or incorporating a support wire or harness	E or F
36		Bare or non-sheathed cables on insulators	G
40		Single-core or multicore cable in a building void [c, h, i]	Where 1.5 De ≤ V <20 De use B
41		Non-sheathed cables in conduit in a building void in masonry having a thermal resistivity not greater than 2 K.m/W [c, i, j]	Where 1.5 De ≤ V <20 De use B
42		Single-core or multicore cable in conduit in a building void in masonry having a thermal resistivity not greater than 2 K.m/W [c, j]	Where 1.5 De ≤ V <20 De use B
43		Non-sheathed cables in cable ducting in a building void in masonry having a thermal resistivity not greater than 2 K.m/W [c, i, j]	Where 1.5 De ≤ V <20 De use B
44		Single-core or multicore cable in cable ducting in a building void in masonry having a thermal resistivity not greater than 2 K. m/W [c,i,j]	Where 1.5 De ≤ V <20 De use B
45		Non-sheathed cables in cable ducting in masonry having a thermal resistivity not greater than 2 K.m/W [c, h, i]	Where 1.5 De ≤ V <50 De use B
46		Single-core or multicore cable in cable ducting in masonry having a thermal resistivity not greater than 2 K.m/W [c, h, i]	Where 1.5 De ≤ V <50 De use B
47		Single-core or multicore cable: - in a ceiling void - in a suspended floor [h, i]	Where 1.5 De ≤ V <50 De use B
50		Non-sheathed cables in flush cable trunking in the floor	B

No.	Examples	Description	Reference Method to be used to determine current-carrying capacity
50		Non-sheathed cables in flush cable trunking in the floor	B
51		Multicore cable in flush cable trunking in the floor	B
52		Non-sheathed cables in flush trunking [c]	B
53		Multicore cable in flush trunking [c]	B
54		Non-sheathed cables or single-core cables in conduit in an unventilated cable channel run horizontally or vertically [c, i, k, m]	Where 1.5 De ≤ V <20 De use B
55		Non-sheathed cables in conduit in an open or ventilated cable channel in the floor [l, m]	B
56		Sheathed single-core or multicore cable in an open or ventilated cable channel run horizontally or vertically [m]	B
57		Single-core or multicore cable direct in masonry having a thermal resistivity not greater than 2 K.m/W - without added mechanical protection [n, o]	C
58		Single-core or multicore cable direct in masonry having a thermal resistivity not greater than 2 K.m/W - with added mechanical protection [n, o] (i.e. capping)	C
59		Non-sheathed cables or single-core cables in conduit in masonry having a thermal resistivity not greater than 2 K.m/W [o]	B
60		Multicore cables in conduit in masonry having a thermal resistivity not greater than 2 K.m/W [o]	B
70		Multicore unarmoured cable in conduit or in cable ducting in the ground	D
71		Single-core unarmoured cable in conduit or in cable ducting in the ground	D
72		Sheathed, armoured or multicore cables direct in the ground: without added mechanical protection (see note)	D
73		Sheathed, armoured or multicore cables direct in the ground: with added mechanical protection (e.g. cable covers) (see note)	D

b Values given for Installation Method B in Appendix 4 are for a single circuit. Where there is more than one circuit in the trunking the group rating factor given in Table 4C1 is applicable, irrespective of the presence of an internal barrier or partition.

c Care is needed where the cable runs vertically and ventilation is restricted. The ambient temperature at the top of the vertical section can be much higher.

e The thermal resistivity of the enclosure is assumed to be poor because of the material of construction and possible air spaces. Where the construction is thermally equivalent to installation Methods 6 or 7, Reference Method B may be used.

f The thermal resistivity of the enclosure is assumed to be poor because of the material of construction and possible air spaces. Where the construction is thermally equivalent to Installation Methods 6, 7, 8, or 9, Reference Method B may be used.

g The factors in Table 4C1 may also be used.

h De = the external diameter of a multi core cable:
- 2.2 x the cable diameter when three single-core cables are bound in trefoil, or
- 3 x the cable diameter when three single-core cables are laid in flat formation.

i V = the smaller dimension or diameter of a masonry duct or void, or the verti cal depth of a rectangular duct, floor or ceiling void or channel. The depth of the channel is more important than the width.

j De = external diameter of conduit or vertical depth of cable ducting.

k De = external diameter of conduit

l For multi core cable installed as Method 55, use current-carrying capacity for Reference Method B.

m It is recommended that these Installation Methods are used only in areas where access is restricted to authorised persons so that the reduction in current-carrying capacity and the fire hazard due to the accumulation of debris can be prevented.

n For cables having conductors not greater than 16 mm^2, the current-carrying capacity may be higher.

o Thermal resistivity of masonry is not greater than 2 K.m/W. The term masonry is taken to include brickwork, concrete, plaster and the like (excludes thermally insulating materials).

* Still under consideration in IEC.

NOTE: The inclusion of directly buried cables is satisfactory where the soil thermal resistivity is of the order of 2.5 K.m/W For lower soil resistivities, the current-carrying capacity for directly buried cables is appreciably higher than for cables in ducts.

INSTALLATION METHODS SPECIFICALLY FOR FLAT TWIN AND EARTH CABLES IN THERMAL INSULATION)

Installation Method			
No.	Examples	Description	Reference Method to be used to determine current-carrying capacity
100		Installation methods for flat twin and earth cable clipped direct to a wooden joist above a plasterboard ceiling with a minimum U value of 0.1 W/m^2K and with thermal insulation not exceeding 100 mm in thickness	Method 100 for cable type covered by Table 4D5
101		Installation methods for flat twin and earth cable clipped direct to a wooden joist above a plasterboard ceiling with a minimum U value of 0.1 W/m^2K and with thermal insulation exceeding 100 mm in thickness	Method 101 for cable type covered by Table 4D5
102		Installation methods for flat twin and earth cable in a stud wall with thermal insulation with a minimum U value of 0.1 W/m^2K with the cable touching the inner wall surface	Method 102 for cable type covered by Table 4D5
103		Installation methods for flat twin and earth cable in a stud wall with thermal insulation with a minimum U value of 0.1 W/m^2K with the cable not touching the inner wall surface	Method 103 for cable type covered by Table 4D5 with a current rating factor of 0.5 in accordance with Regulation 523.7

Wherever practicable, a cable is to be fixed in a position such that it will not be covered with thermal insulation.

Regulation 523.7, BS 5803-5: Appendix C: Avoidance of overheating of electric cables, Building Regulations Approved document B and Thermal insulation: avoiding risks, BR 262, BRE, 2001 refer.

CALCULATION OF INSTALLED CONTINUOUS CURRENT RATING OF A CABLE

The following information should not be considered a substitute for BS 7671, which should always be consulted.

1. Consider the installation arrangement i.e. BS 7671 installation or ERA 69-30 part V parameters.

2. Ascertain the maximum ambient temperature where the cables will be installed and select the appropriate temperature correction factor from table 4C1 for BS 7671 installation or table ERA-1 for ERA parameters.

3. Consider any grouping arrangement and select the appropriate grouping factor from table 4B1 or 4B3 for BS7671 installation or refer to ERA report 69-30 part III.

4. For auxiliary cables, (with more than 5 cores) select the appropriate factor from table "A" according to the number of loaded cores.

5. Select a tabulated current rating for the appropriate reference installation method, cable type and size from tables 4D1A to 4E4A for BS 7671 installation or tables ERA-2 and ERA-3, for ERA parameters.

6. Multiply the tabulated current and the various factors together to obtain the continuous current rating.

NOTE: BS7671 regulation 525-01-02 requires that the voltage drop between the origin of an installation and a socket outlet or the terminals of fixed equipment does not exceed 4% of the nominal voltage of the supply. Voltage drop may be checked using tables 4D1B to 4E4B and 4D5A.

TABLE 4A3 - SCHEDULE OF CABLE SPECIFICATIONS AND CURRENT RATING TABLES

Specification number	Specification title	Applicable current rating Tables	Conductor operating temperature
BS 5467	Electric cables - Thermosetting insulated armoured cables for voltages of 600/1000 V and 1900/3300 V.	4E3,4E4, 4J3,4J4	90°C
BS 6004	Electric cables- PVC insulated, non-armoured cables for voltages up to and including 450/750 V, for electric power, lighting and internal wiring. Thermoplastic insulated and sheathed flat cable with protective conductor to Table 8.	4D1,4D2 4D5	70°C 70°C
BS 6231	Electric cables - single-core pvc insulated flexible cables of rated voltage 600/1000 V for switchgear and controlgear wiring	4D1	70 °C*
BS 6500	Electric cables - Flexible cords rated up to 300/500 V, for use with appliances and equipment intended for domestic, office and similar environments.	4F3	60°C, 90°C
BS 6724	Electric cables - Thermosetting insulated, armoured cables for voltages of 600/1000 V and 1900/3300 V, having low emission of smoke and corrosive gases when affected by fire.	4E3,4E4, 4J3,4J4	90°C
BS 7211	Electric cables - Thermosetting insulated, non-armoured cables for voltages up to and including 450/750 V, for electric power, lighting and internal wiring, and having low emission of smoke and corrosive gases when affected by fire.	4E2	90°C
BS 7629-1	Specification for 300/500 V fire-resistant electric cables having low emission of smoke and corrosive gases when affected by fire - Part 1: Multicore cables.	4D2	70°C
BS 7846	Electric cables - 600/1000 V armoured fire-resistant cables having thermosetting insulation and low emission of smoke and corrosive gases when affected by fire.	4E3,4E4, 4J3,4J4	90°C
BS 7889	Electric cables - Thermosetting insulated, unarmoured cables for a voltage of 600/1000 V.	4EI	90°C
BS 7919	Electric cables - Flexible cables rated up to 450/750 V, for use with appliances and equipment intended for industrial and similar environments.	4F1,4F2, 4F3	60°C, 90°C, 180°C

* Cables to BS 6231 when installed in conduit or trunking are rated to 70°C.

TABLE 4B1 - RATING FACTORS FOR AMBIENT AIR TEMPERATURES OTHER THAN 30ºC TO BE APPLIED TO THE CURRENT-CARRYING CAPACITIES FOR CABLES IN FREE AIR

Ambient temperature ºC [a]	Insulation 70ºC Thermoplastic	90ºC Thermosetting
25	1.03	1.02
30	1.00	1.00
35	0.94	0.96
40	0.87	0.91
45	0.79	0.87
50	0.71	0.82
55	0.61	0.76
60	0.50	0.71
65	-	0.65
70	-	0.58
75	-	0.50
80	-	0.41
85	-	-
90	-	-
95	-	-

[a] For higher ambient temperatures, consult manufacturer.

TABLE 4B2 - RATING FACTORS FOR AMBIENT GROUND TEMPERATURES OTHER THAN 20ºC TO BE APPLIED TO THE CURRENT-CARRYING CAPACITIES FOR CABLES BURIED DIRECT IN THE GROUND OR IN A AN UNDERGROUND CONDUIT SYSTEM TO BS EN 50086-2-4.

Ground temperature ºC	Insulation 70ºC thermoplastic	Insulation 90ºC thermosetting
10	1.10	1.07
15	1.05	1.04
20	1.00	1.00
25	0.95	0.96
30	0.89	0.93
35	0.84	0.89
40	0.77	0.85
45	0.71	0.80
50	0.63	0.76
55	0.55	0.71
60	0.45	0.65
65	-	0.60
70	-	0.53
75	-	0.46
80	-	0.38

TABLE 4B3 - RATING FACTORS FOR CABLES BURIED DIRECT IN THE GROUND OR IN AN UNDERGROUND CONDUIT SYSTEMS TO BS EN 50086-2-4 FOR SOIL THERMAL RESISTIVITIES OTHER THAN 2.5 K.m/W TO BE APPLIED TO THE CURRENT-CARRYING CAPACITIES FOR REFERENCE METHOD D

Thermal resistivity, K.m/W	0.5	0.8	1	1.5	2	2.5	3
Rating factor for cables in buried ducts	1.28	1.20	1.18	1.1	1.05	1	0.96
Rating factor for direct buried cables	1.88	1.62	1.5	1.28	1.12	1	0.90

NOTE 1: The rating factors given have been averaged over the range of conductor sizes and types of installation including in the relevant tables in this appendix. The overall accuracy of factors is within ± 5%.

NOTE 2: The rating factors are applicable to cables drawn into buried ducts. For cables laid direct in the ground the rating factors for thermal resistivities less than 2.5 K.m/W will be higher. Where more precise values are required they may be calculated by methods given in BS 7769 (BS IEC 60287).

NOTE 3: The rating factors are applicable to ducts buried at depths of up to 0.8 m.

TABLE 4C1 - RATING FACTORS FOR ONE CIRCUIT OR ONE MULTICORE CABLE OR FOR A GROUP OF CIRCUITS, OR A GROUP OF MULTICORE CABLES, TO BE USED WITH CURRENT-CARRYING CAPACITIES OF TABLES 4D1A TO 4J4A

Arrangement (cables touching)	Number of circuits or multicore cables												To be used with current-carrying capacities, Reference
	1	2	3	4	5	6	7	8	9	12	16	20	
Bunched in air, on a surface, embedded or enclosed	1.00	0.80	0.70	0.65	0.60	0.57	0.54	0.52	0.50	0.45	0.41	0.38	Methods A to F
Single layer on wall or floor	1.00	0.85	0.79	0.75	0.73	0.72	0.72	0.71	0.70	0.70	0.70	0.70	Method C
Single layer multicore on a perforated horizontal or vertical cable tray system	1.00	0.88	0.82	0.77	0.75	0.73	0.73	0.72	0.72	0.72	0.72	0.72	Method E & F
Single layer multicore on cable ladder system or cleats etc.,	1.00	0.87	0.82	0.80	0.80	0.79	0.79	0.78	0.78	0.78	0.78	0.78	Method E & F

NOTE 1: These factors are applicable to uniform groups of Cables, equally loaded.

NOTE 2: Where horizontal clearances between adjacent cables exceeds twice their overall diameter, no rating factor need be applied.

NOTE 3: The same factors are applied to: - groups of two or three single-core cable -- multi core cables.

NOTE 4: If a system consists of both two- and three-core cables, the total number of cables is taken as the number of circuits, and the corresponding factor is applied to the tables for two loaded conductors for the two-core cables, and to the Tables for three loaded conductors for the three-core cables.

NOTE 5: If a group consists of n single-core cables it may either be considered as n/2 circuits of two loaded conductors or n/3 circuit of three loaded conductors.

NOTE 6: The rating factors given have been averaged over the range of conductor sizes and types of installation included in Tables 4D1A to 4J4A the overall accuracy of tabulated values is within 5%.

NOTE 7: For some installations and for other methods not provided for in the above table, it may be appropriate to use factors calculated for specific cases, see for example Tables 4C4 and 4C5.

NOTE 8: When cables having differing conductor operating temperature are grouped together the current rating is to be based upon the lowest operating temperature of any cable in the group.

NOTE 9: If, due to known operating conditions, a cable is expected to carry not more than 30% of its grouped rating, it may be ignored for the purpose of obtaining the rating factor for the rest of the group. For example, a group of N loaded cables would normally require a group factor of Cg applied to the tabulated It. However, if M cables in the group carry loads which are not greater than 0.3 CgIt amperes the other cables can be sized by using the group factor corresponding to (N-M) cables.

TABLE 4C2 - RATING FACTORS FOR MORE THAN ONE CIRCUIT, CABLES LAID DIRECTLY IN THE GROUND-REFERENCE METHOD D IN TABLES 4D1A - 4J4A SINGLE CORE OR MULTICORE CABLES

Number of circuits	Cable to cable reference (a)				
	Nil (cables touching)	One cable diameter	0.125m	0.25m	0.5m
2	0.75	0.80	0.85	0.90	0.90
3	0.65	0.70	0.75	0.80	0.85
4	0.60	0.60	0.70	0.75	0.80
5	0.55	0.55	0.65	0.70	0.80
6	0.50	0.55	0.60	0.70	0.80

Multicore cables

Single cables

NOTE 1: Values given apply to an installation depth of 0.7m and a soil thermal resistivity of 2.5 K.m/W. These are average values for the ranges of cable sizes and types quoted for Tables 4D1A to 4J4A. The process of averaging, together with rounding off, can result in some cases in errors of up to ± 10%. (where more precise values are required they may be calculated by methods given in BS 7769 (BS IEC 60287).

NOTE 2: In case of a thermal resistivity lower than 2.5 K.m/W the rating factors can be, in general, be increased and can be calculated by the methods given in BS 7769 (BS IEC 60287).

TABLE 4C3 - RATING FACTORS FOR MORE THAN ONE CIRCUIT, CABLES LAID IN DUCTS IN THE GROUND - REFERENCE METHOD D IN THE TABLES 4D1A - 4J4A

Multicore cables in single-way ducts

Number	Duct-to-duct clearance (α)			
	Nil (ducts of cables	0.25m touching	0.5m	1.0m
2	0.85	0.90	0.95	0.95
3	0.75	0.85	0.90	0.95
4	0.70	0.80	0.85	0.90
5	0.65	080	0.85	0.90
6	0.60	0.80	0.80	0.90

Multicore cables

NOTE 1: Values given apply to an installation depth of 0.7m and a soil thermal resistivity of 2.5 K.m/W. These are average values for the ranges of cable sizes and types quoted for Tables 4D1A to 4J4A. The process of averaging, together with rounding off, can result in some cases in errors of up to ± 10%. (where more precise values are required they may be calculated by methods given in BS 7769 (BS IEC 60287).

NOTE 2: In case of a thermal resistivity lower than 2.5 K.m/W the rating factors can be, in general, be increased and can be calculated by the methods given in BS 7769 (BS IEC 60287).

Single-core cables in non-ferrous single-way ducts

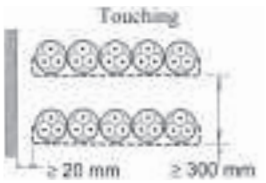
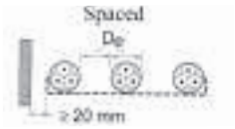
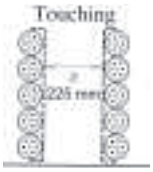
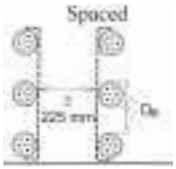
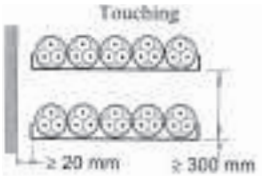
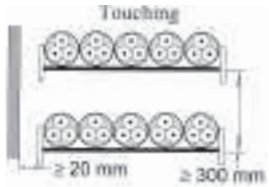
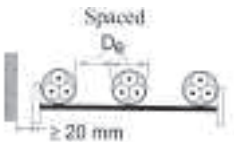
Number of cables	Duct-to-duct clearance (α)			
	Nil (ducts touching	0.25m	0.5m	1.0m
2	0.80	0.90	0.90	0.95
3	0.70	0.80	0.85	0.90
4	0.65	0.75	0.80	0.90
5	0.60	0.70	0.80	0.90
6	0.60	0.70	0.80	0.90

Single-core cables

NOTE 1: Values given apply to an installation depth of 0.7m and a soil thermal resistivity of 2.5 K.m/W. These are average values for the ranges of cable sizes and types quoted for Tables 4D1A to 4J4A. The process of averaging, together with rounding off, can result in some cases in errors of up to ± 10%. (where more precise values are required they may be calculated by methods given in BS 7769 (BS IEC 60287).

NOTE 2: In case of a thermal resistivity lower than 2.5 K.m/W the rating factors can be, in general, be increased and can be calculated by the methods given in BS 7769 (BS IEC 60287).

TABLE 4C4 - RATING FACTORS FOR GROUPS OF MORE THAN ONE MULTICORE CABLE, TO BE APPLIED TO REFERENCE CURRENT-CARRYING CAPACITIES FOR MULTICORE CABLES IN FREE AIR - REFERENCE METHOD E IN TABLES 4D1A - 4J4A

Installation Method in Table 4A2			No.of trays or ladders	No.of cables per tray or ladders 1	2	3	4	6	9
Perforated cable tray systems (Note 3)	31		1	SEE ITEM 4 OF TABLE 4C1					
			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
			6	1.00	0.84	0.77	0.73	0.68	0.64
			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	-
Vertical Perforated cable tray systems (Note 4)	31		1	SEE ITEM 4 OF TABLE 4C1					
			2	1.00	0.88	0.81	0.76	0.71	0.70
			1	1.00	0.91	0.89	0.88	0.87	-
			2	1.00	0.91	0.88	0.87	0.85	-
Unperforated cable tray systems	30		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 ladder systems, cleats, wire mesh tray, etc (Note 3)	32 33 34		1	SEE ITEM 4 OF TABLE 4C1					
			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
			6	1.00	0.84	0.77	0.73	0.68	0.64
			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	-

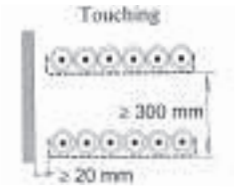
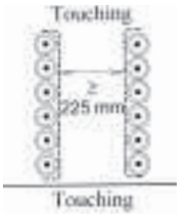
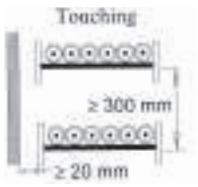
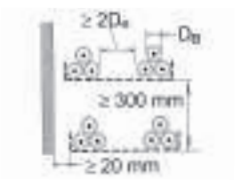
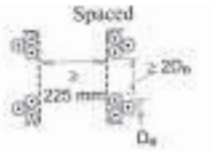
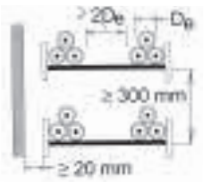
NOTE 1: Values given are averages for the cable types and range of conductor sizes considered in Tables 4D1A to 4J4A. The spread of values is generally less than 5%.

NOTE 2: Factors apply to single layer groups of cables as shown above and do not apply when cables are installed in more than one layer touching each other. Values for such installations may be significantly lower and must be determined by an appropriate method.

NOTE 3: Values are given for vertical spacing between cable trays of 300mm and at least 20mm between cable trays and wall. For closer spacing the factors should be reduced.

NOTE 4: Values are given for horizontal spacing between cable trays of 225mm with cable trays mounted back to back. For closer spacing the factors should be reduced.

TABLE 4C5 - RATING FACTORS FOR GROUPS OF ONE OR MORE CIRCUITS OF SINGLE CORE CABLES, TO BE APPLIED TO REFERENCE CURRENT-CARRYING CAPACITIES FOR ONE CIRCUIT OF SINGLE CORE CABLE IN FREE AIR - REFERENCE METHOD F IN TABLES 4D1A - 4J4A

Installation Method in Table 4A2			No.of trays or ladders	No.of three-phrase circuits per tray or ladder			Use as a multiplier to rating for
				1	2	3	
Perforated cable tray systems (Note 3)	31		1 2 3	0.98 0.96 0.95	0.91 0.87 0.85	0.87 0.81 0.78	Three cables in horizontal formation
Vertical Perforated cable tray systems (Note 4)	31		1 2	0.96 0.95	0.86 0.84	- -	Three cables in vertical formation
Cable ladder systems, cleats, wire mesh tray, etc (Note 3)	32 33 34		1 2 3	1.00 0.98 0.97	0.97 0.93 0.90	0.96 0.89 0.86	Three cables in horizontal formation
Perforated cable tray systems (Note 3)	31		1 2 3	1.00 0.97 0.96	0.98 0.93 0.92	0.96 0.89 0.86	Three cables in trefoil formation
Vertical Perforated cable tray systems (Note 4)	31		1 2	1.00 1.00	0.91 0.90	0.89 0.86	
Cable ladder systems, cleats, wire mesh tray, etc (Note 3)	32 33 34		1 2 3	1.00 0.97 0.96	1.00 0.95 0.94	1.00 0.93 0.90	

NOTE 1: Values given are averages for the cable types and range of conductor sizes considered in Tables 4D1A to 4J4A. The spread of values is generally less than 5%.
NOTE 2: Factors apply to single layer groups of cables (or trefoil groups) as shown above and do not apply when cables are installed in more than one layer touching each other. Values for such installations may be significantly lower and must be determined by an appropriate method.
NOTE 3: Values are given for vertical spacing between cable trays of 300mm and at least 20mm between cable trays and wall. For closer spacing the factors should be reduced.
NOTE 4: Values are given for horizontal spacing between cable trays of 225mm with cable trays mounted back to back. For closer spacing the factors should be reduced.
NOTE 5: For circuits having more than one cable in parallel per phase, each 3 phase set of conductors is to be considered as a circuit for the purpose of this table.

TABLE 4D1A - SINGLE CORE 70ºC THERMOPLASTIC INSULATED CABLES, NON-ARMOURED, WITH OR WITHOUT SHEATH (COPPER CONDUCTORS)

Current-carrying capacity (Amperes):
Ambient temperature: 30ºC
Conductor operating temperature: 70ºC

Conductor cross-sectional area	Reference Method A (enclosed in conduit in thermally insulating wall etc.)		Reference Method B (enclosed in conduit on a wall or in trunking etc)		Reference Method C (clipped direct)		Reference Method F (in free air or on a perforated cable tray, horizontal or vertical)				
							Touching			Spaced by one diameter	
	2 cables, single-phase A.C or D.C	3 or 4 cables, three -phase A.C	2 cables, single-phase A.C or D.C	3 or 4 cables, three - phase A.C 2 cables,	single-phase AC or D.C flat & touching 3 or 4	cables, three-phase A.C flat & touching or trefoil 2 cables,	single-phase A.C or D.C flat 3 cables,	three-phase A.C flat 3 cables,	three-phase A.C trefoil, 2 cables,	single-phase A.C or D.C. or 3 cables three-phase A.C. flat	
										Horizontal	Vertical
1	2	3	4	5	6	7	8	9	10	11	12
mm^2	A	A	A	A	A	A	A	A	A	A	A
1	11	10.5	13.5	12	15.5	14	-	-	-	-	-
1.5	14.5	13.5	17.5	15.5	20	18	-	-	-	-	-
2.5	20	18	24	21	27	25	-	-	-	-	-
4	26	24	32	28	37	33	-	-	-	-	-
6	34	31	41	36	47	43	-	-	-	-	-
10	46	42	57	50	65	59	-	-	-	-	-
16	61	56	76	68	87	79	-	-	-	-	-
25	80	73	101	89	114	104	131	114	110	146	130
35	99	89	125	110	141	129	162	143	137	181	162
50	119	108	151	134	182	167	196	174	167	219	197
70	151	136	192	171	234	214	251	225	216	281	254
95	182	164	232	207	284	261	304	275	264	341	311
120	210	188	269	239	330	303	352	321	308	396	362
150	240	216	300	262	381	349	406	372	356	456	419
185	273	245	341	296	436	400	463	427	409	521	480
240	320	286	400	346	515	472	546	507	485	615	569
300	367	328	458	394	594	545	629	587	561	709	659
400	-	-	546	467	694	634	754	689	656	852	795
500	-	-	626	533	792	723	868	789	749	982	920
630	-	-	720	611	904	826	1005	905	855	1138	1070
800	-	-	-	-	1030	943	1086	1020	971	1265	1188
1000	-	-	-	-	1154	1058	1216	1149	1079	1420	1337

TABLE 4D1B

Conductor operating temperature: 70°C
Voltage drop (millivolts per ampere per metre)

Conductor cross-sectional area	2 cables D.C.	2 cables - single phase A.C. Reference Methods A & B (Enclosed in conduit or trunking)			2 cables - single phase A.C. Reference Methods C & F (clipped direct, on tray or in free air)					
					Cables Touching			Cables Spaced*		
1	2	3			4			5		
mm²	mV/A/m		mV/A/m			mV/A/m			mV/A/m	
1	44		44			44			44	
1.5	29		29			29			29	
2.5	18		18			18			18	
4	11		11			11			11	
6	7.3		7.3			7.3			7.3	
10	4.4		4.4			4.4			4.4	
16	2.8		2.8			2.8			2.8	
		r	x	z	r	x	z	r	x	z
25	1.75	1.80	0.33	1.80	1.75	0.20	1.75	1.75	0.29	1.80
35	1.25	1.30	0.31	1.30	1.25	0.195	1.25	1.25	0.28	1.30
50	0.93	0.95	0.30	1.00	0.93	0.190	0.95	0.93	0.28	0.97
70	0.63	0.65	0.29	0.72	0.63	0.185	0.66	0.63	0.27	0.69
95	0.46	0.49	0.28	0.56	0.47	0.180	0.50	0.47	0.27	0.54
120	0.36	0.39	0.27	0.47	0.37	0.175	0.41	0.37	0.26	0.45
150	0.29	0.31	0.27	0.41	0.30	0.175	0.34	0.29	0.26	0.39
185	0.23	0.25	0.27	0.37	0.24	0.170	0.29	0.24	0.26	0.35
240	0.180	0.195	0.26	0.33	0.185	0.165	0.25	0.185	0.25	0.31
300	0.145	0.160	0.26	0.31	0.150	0.165	0.22	0.150	0.25	0.29
400	0.105	0.130	0.26	0.29	0.120	0.160	0.20	0.115	0.25	0.27
500	0.086	0.110	0.26	0.28	0.098	0.155	0.185	0.093	0.24	0.26
630	0.068	0.094	0.25	0.27	0.081	0.155	0.175	0.076	0.24	0.25
800	0.053		-		0.068	0.150	0.165	0.061	0.24	0.25
1000	0.042		-		0.059	0.150	0.160	0.050	0.24	0.24

* Spacings larger than one cable diameter will result in a larger voltage drop

Conductor cross-sectional area	3 or 4 cables - Three phase A.C. Reference Methods A & B (Enclosed in conduit or trunking)			3 or 4 cables - Three phase A.C. Reference Method C & F (clipped direct, on tray or in free air)								
				Cables touching, trefoil			Cables touching, flat			Cables spaced*, flat		
1	6			7			8			9		
mm²		mV/A/m			mV/A/m			mV/A/m			mV/A/m	
1		38			38			38			38	
1.5		25			25			25			25	
2.5		15			15			15			15	
4		9.5			9.5			9.5			9.5	
6		6.4			6.4			6.4			6.4	
10		3.8			3.8			3.8			3.8	
16		2.4			2.4			2.4			2.4	
	r	x	z	r	x	z	r	x	z	r	x	z
25	1.50	0.29	1.55	1.50	0.175	1.50	1.50	0.25	1.55	1.50	0.32	1.55
35	1.10	0.27	1.10	1.10	0.170	1.10	0.24	1.10	1.10	1.10	0.32	1.15
50	0.81	0.26	0.85	0.80	0.165	0.82	0.80	0.24	0.84	0.80	0.32	0.86
70	0.56	0.25	0.61	0.55	0.160	0.57	0.55	0.24	0.60	0.55	0.31	0.63
95	0.42	0.24	0.48	0.41	0.155	0.43	0.41	0.23	0.47	0.40	0.31	0.51
120	0.33	0.23	0.41	0.32	0.150	0.36	0.32	0.23	0.40	0.32	0.30	0.44
150	0.27	0.23	0.36	0.26	0.150	0.30	0.26	0.23	0.34	0.26	0.30	0.40
185	0.22	0.23	0.32	0.21	0.145	0.26	0.21	0.22	0.31	0.21	0.30	0.36
240	0.17	0.23	0.29	0.160	0.145	0.22	0.160	0.22	0.27	0.160	0.29	0.34
300	0.14	0.23	0.27	0.130	0.140	0.190	0.130	0.22	0.25	0.130	0.29	0.32
400	0.12	0.22	0.25	0.105	0.140	0.175	0.105	0.21	0.24	0.100	0.29	0.31
500	0.10	0.22	0.25	0.086	0.135	0.160	0.086	0.21	0.23	0.081	0.29	0.30
630	0.08	0.22	0.24	0.072	0.135	0.150	0.072	0.21	0.22	0.066	0.28	0.29
800		-		0.060	0.130	0.145	0.060	0.21	0.22	0.053	0.28	0.29
1000		-		0.052	0.130	0.140	0.052	0.20	0.21	0.044	0.28	0.28

TABLE A - MULTICORE CONTROL AND AUXILIARY CABLES.

Where more than two cores carry an appreciable current, the rating factors listed below should be applied to the two core values.

Number of cores.	3	4	5	6	7	10	12	14
Rating factor.	0.86	0.72	0.68	0.62	0.57	0.51	0.47	0.46
Number of cores.	19	24	27	30	37	44	46	48
Rating factor.	0.41	0.38	0.37	0.36	0.33	0.33	0.33	0.33

SHORT CIRCUIT CURRENT RATINGS FOR PVC INSULATED CABLE

Short circuit ratings for PVC insulated armoured cables to BS 6346 and non-armoured cables to BS 6004.

Conductor size mm^2	One second rating amp
1	115
1.5	173
2.5	288
4	460
6	690
10	1150
16	1850
25	2875
35	4025
50	5750
70	8050
95	10930
120	13800
150	17250
185	21280
240	27600
300	34500
400	41200
500	51500
630	64900

The ratings are based on a maximum permissible conductor temperature of 160°C for sizes up to 300mm2and 140°C for 400mm^2 and above, the temperature at the commencement of the fault being 70°C. It is assumed that all the heat generated during the fault is retained in the conductor. For fault times other than one second, the appropriate rating given in column 2 above should be divided by the square root of the fault time in seconds.

CONDUCTOR TEMPERATURE

$$T_c = \left[\left(\frac{I_b}{I_t}\right)^2 \times (T_p - TA_R)\right] + TA$$

Where

T_p = Maximum permitted conductor temperature, (°C)
T_c = Conductor temperature for load current
I_b = Design current of circuit
I_t = Tabulated current rating
TA_R = Ambient temperature rating for current I_t
TA = Ambient temperature

NOTE: The above formula enables the system designer to calculate the actual conductor running temperature for current loadings other than those stated in the tables.

SHORT CIRCUIT CURRENT RATINGS FOR THERMOSETTING INSULATED CABLES

Short circuit ratings for XLPE insulated and thermosetting OHLS® insulated cables to BS 5467, BS 6724 and BS 7211.

Conductor size mm^2	One second rating amp
1	140
1.5	210
2.5	350
4	570
6	850
10	1400
16	2200
25	3600
35	5000
50	6800
70	9800
95	13600
120	17200
150	21100
185	26500
240	34900
300	43700
400	55900
500	70600
630	90800

The ratings are based on a maximum permissible conductor temperature of 250°C, the temperature at the commencement of the fault being 90°C. It is assumed that all the heat generated during the fault is retained in the conductor. For fault times other than one second, the appropriate rating given in column 2 above should be divided by the square root of the fault time in seconds.

TABLE 4D2A - MULTICORE 70°C THERMOPLASTIC INSULATED AND THERMOPLASTIC SHEATHED CABLES, NON-ARMOURED (COPPER CONDUCTORS)

Current-Carrying Capacity (amperes):
Ambient temperature: 30°C
Conductor operating temperature: 70°C

Conductor cross- sectional area	Reference method A (enclosed in conduit an thermally insulated wall etc)		Reference method B (enclosed in conduit on a wall or ceiling, or in trunking)		Reference method C (clipped direct)		Reference method E (in free air or on a perforated cable tray etc, horizontal or vertical)	
	1 two-core cable*, single phase A.C. or D.C.	1 three-core cable* or 1 four-core cable, three-phase A.C.	1 two core cable*, single phase A.C. or D.C.	1 three-core cable* or 1 four-core cable, three-phase A.C. 1	two core cable*, single phase A.C. or D.C.	1 three-core cable* or 1 four-core cable, three-phase A.C.	1 two core cable,* single phase A.C. or D.C.	1 three-core cable* or 1 four-core cable, three-phase A.C.
1	2	3	4	5	6	7	8	9
mm^2	A	A	A	A	A	A	A	A
1	11	10	13	11.5	15	13.5	17	14.5
1.5	14	13	16.5	15	19.5	17.5	22	18.5
2.5	18.5	17.5	23	20	27	24	30	25
4	25	23	30	27	36	32	40	34
6	32	29	38	34	46	41	51	43
10	43	39	52	46	63	57	70	60
16	57	52	69	62	85	76	94	80
25	75	68	90	80	112	96	119	101
35	92	83	111	99	138	119	148	126
50	110	99	133	118	168	144	180	153
70	139	125	168	149	213	184	232	196
95	167	150	201	179	258	223	282	238
120	192	172	232	206	299	259	328	276
150	219	196	258	225	344	299	379	319
185	248	223	294	255	392	341	434	364
240	291	261	344	297	461	403	514	430
300	334	298	394	339	530	464	593	497
400	-	-	470	402	634	557	715	597

*With or without protective conductor

TABLE 4D2B

VOLTAGE DROP (per ampere per metre):
Conductor operating temperature: 70°C

Conductor cross-sectional area	Two-core cable D.C.	Two-core cable single phase A.C.			Three or four-core cable three phase A.C.		
1	2	3			4		
mm^2	mV/A/m	mV/A/m			mV/A/m		
1	44	44			38		
1.5	29	29			25		
2.5	18	18			15		
4	11	11			9.5		
6	7.3	7.3			6.4		
10	4.4	4.4			3.8		
16	2.8	2.8			2.4		
		r	x	z	r	x	z
25	1.75	1.75	0.170	1.75	1.50	0.145	1.50
35	1.25	1.25	0.165	1.25	1.10	0.145	1.10
50	0.93	0.93	0.165	0.94	0.80	0.140	0.81
70	0.63	0.63	0.160	0.65	0.55	0.140	0.57
95	0.46	0.47	0.155	0.50	0.41	0.135	0.43
120	0.36	0.38	0.155	0.41	0.33	0.135	0.35
150	0.29	0.30	0.155	0.34	0.26	0.130	0.29
185	0.23	0.25	0.150	0.29	0.21	0.130	0.25
240	0.180	0.190	0.150	0.24	0.165	0.130	0.21
300	0.145	0.155	0.145	0.21	0.135	0.130	0.185
400	0.105	0.115	0.145	0.185	0.100	0.125	0.160

TABLE 4D5 - 70°C THERMOPLASTIC INSULATED AND SHEATHED FLAT CABLE WITH PROTECTIVE CONDUCTOR (COPPER CONDUCTORS)

Current-Carrying Capacity (amperes) and VOLTAGE DROP (per ampere per metre):
Ambient temperature: 30°C
Conductor operating temperature: 70°C

Conductor cross-sectional area	Reference Method 100# (above a plasterboard ceiling covered by thermal insulation NOT EXCEEDING 100mm in thickness	Reference Method 101# (above a plasterboard ceiling covered by thermal insulation EXCEEDING 100mm in thickness	Reference Method 102# (in a stud wall with thermal insulation with cable TOUCHING the inner wall surface	Reference Method 103# (in a stud wall with thermal insulation with cable NOT TOUCHING the inner wall surface	Reference Method C* (clipped direct)	Reference Method A* (enclosed in conduit in an insulated wall	Voltage Drop (per ampere per metre)
1	2	3	4	5	6	7	8
(mm^2)	(A)	(A)	(A)	(A)	(A)	(A)	(mV/A/m)
1	13	10.5	13	8	16	11.5	44
1.5	16	13	16	10	20	14.5	29
2.5	21	17	21	13.5	27	20	18
4	27	22	27	17.5	37	26	11
6	34	27	35	23.5	47	32	7.3
10	45	36	47	32	64	44	4.4
16	57	46	63	42.5	85	57	2.8

A* For full installation method refer to Table 4A2 Installation Method 2 but for flat twin and earth cable.

C* For full installation method refer to Table 4A2 Installation Method 20 but for flat twin and earth cable.

100# For full installation method refer to Table 4A2 Installation Method 100.

101# For full installation method refer to Table 4A2 Installation Method 101.

102# For full installation method refer to Table 4A2 Installation Method 102.

103# For full installation method refer to Table 4A2 Installation Method 103.

Wherever practicable, a cable is to be fixed in a position such that it will not be covered with thermal insulation.

Regulation 523.7, BS 5803-5: Appendix C: Avoidance of overheating of electric cables.

Building Regulations Approved document B and Thermal insulation: avoiding risks, BR 262, BRE, 2001 refer.

TABLE 4E1A - SINGLE CORE 90°C THERMOSETTING INSULATED CABLES, UNARMOURED, WITH OR WITHOUT SHEATH (COPPER CONDUCTORS)

Current-Carrying Capacity (amperes):
Ambient temperature: 30°C
Conductor operating temperature: 90°C

Conductor cross-sectional area	Reference Method A (enclosed in conduit in thermally insulating wall etc.)		Reference Method B (enclosed in conduit on a wall or in trunking etc)		Reference Method C (clipped direct)		Reference Method F (in free air or on a perforated cable tray, horizontal or vertical etc) Touching			Reference Method G (in free air) Spaced by one cable diameter	
	2 cables, single-phase A.C or D.C	3 or 4 cables, three -phase A.C	2 cables, single-phase A.C or D.C	3 or 4 cables, three - phase A.C 2 cables,	single-phase AC or D.C flat & touching 3 or 4	cables, three-phase A.C flat & touching or trefoil 2 cables,	single-phase A.C or D.C flat 3 cables,	three-phase A.C flat 3 cables,	three-phase A.C trefoil 2 cables,	single-phase A.C or D.C or 3 cables three-phase A.C flat	
										Horizontal	Vertical
1	2	3	4	5	6	7	8	9	10	11	12
mm^2	A	A	A	A	A	A	A	A	A	A	A
1	14	13	17	15	19	17.5	-	-	-	-	-
1.5	19	17	23	20	25	23	-	-	-	-	-
2.5	26	23	31	28	34	31	-	-	-	-	-
4	35	31	42	37	46	41	-	-	-	-	-
6	45	40	54	48	59	54	-	-	-	-	-
10	61	54	75	66	81	74	-	-	-	-	-
16	81	73	100	88	109	99	-	-	-	-	-
25	106	95	133	117	143	130	161	141	135	182	161
35	131	117	164	144	176	161	200	176	169	226	201
50	158	141	198	175	228	209	242	216	207	275	246
70	200	179	253	222	293	268	310	279	268	353	318
95	241	216	306	269	355	326	377	342	328	430	389
120	278	249	354	312	413	379	437	400	383	500	454
150	318	285	393	342	476	436	504	464	444	577	527
185	362	324	449	384	545	500	575	533	510	661	605
240	424	380	528	450	644	590	679	634	607	781	719
300	486	435	603	514	743	681	783	736	703	902	833
400	-	-	683	584	868	793	940	868	823	1085	1008
500	-	-	783	666	990	904	1083	998	946	1253	1169
630	-	-	900	764	1130	1033	1254	1151	1088	1454	1362
800	-	-	-	-	1288	1179	1358	1275	1214	1581	1485
1000	-	-	-	-	1443	1323	1520	1436	1349	1775	1671

1. Where a conductor operates at a temperature exceeding 70°C it must be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature (see Regulation 512.1.2).

2. Where cables in this table are connected to equipment or accessories designed to operate at a temperature not exceeding 70°C, the current ratings given in the equivalent tables for 70°C thermoplastic insulated cables (Table 4D1A) must be used (Regulations 523.1).

TABLE 4E1B

VOLTAGE DROP (per ampere per metre):
Conductor operating temperature: 90°C

Conductor cross-sectional area	2 cables D.C.	2 cables - single phase A.C. Reference Methods A & B (Enclosed in conduit or trunking)			2 cables - single phase A.C. Reference Methods C, F & G (Clipped direct, on tray or in free air) Cables Touching			Cables Spaced*		
1	2		3			4			5	
mm²	mV/A/m		mV/A/m			mV/A/m			mV/A/m	
1	46		46			46			46	
1.5	31		31			31			31	
2.5	19		19			19			19	
4	12		12			12			12	
6	7.9		7.9			7.9			7.9	
10	4.7		4.7			4.7			4.7	
16	2.9		2.9			2.9			2.9	
		r	x	z	r	x	z	r	x	z
25	1.85	1.85	0.31	1.90	1.85	0.190	1.85	1.85	0.28	1.85
35	1.35	1.35	0.29	1.35	1.35	0.180	1.35	1.35	0.27	1.35
50	0.99	1.00	0.29	1.05	0.99	0.180	1.00	0.99	0.27	1.00
70	0.68	0.70	0.28	0.75	0.68	0.175	0.71	0.68	0.26	0.73
95	0.49	0.51	0.27	0.58	0.49	0.170	0.52	0.49	0.26	0.56
120	0.39	0.41	0.26	0.48	0.39	0.165	0.43	0.39	0.25	0.47
150	0.32	0.33	0.26	0.43	0.32	0.165	0.36	0.32	0.25	0.41
185	0.25	0.27	0.26	0.37	0.26	0.165	0.30	0.25	0.25	0.36
240	0.190	0.21	0.26	0.33	0.20	0.160	0.25	0.195	0.25	0.31
300	0.155	0.175	0.25	0.31	0.160	0.160	0.22	0.155	0.25	0.29
400	0.120	0.140	0.25	0.29	0.130	0.155	0.20	0.125	0.24	0.27
500	0.093	0.120	0.25	0.28	0.105	0.155	0.185	0.098	0.24	0.26
630	0.072	0.100	0.25	0.27	0.086	0.155	0.175	0.078	0.24	0.25
800	0.056		-		0.072	0.150	0.170	0.064	0.24	0.25
1000	0.045		-		0.063	0.150	0.165	0.054	0.24	0.24

* Spacings larger than one cable diameter will result in a larger voltage drop.

Conductor cross-sectional area	3 or 4 cables - Three phase A.C. Reference Methods A & B (Enclosed in conduit or trunking)			3 or 4 cables - Three phase A.C. Reference Method C, F & G (clipped direct, on tray or in free air) Cables touching, Trefoil			3 or 4 cables - Three phase A.C. Reference Method C, F & G (clipped direct, on tray or in free air) Cables touching, Flat			Cables spaced*, Flat		
1		6			7			8			9	
mm²		mV/A/m			mV/A/m			mV/A/m			mV/A/m	
1		40			40			40			40	
1.5		27			27			27			27	
2.5		16			16			16			16	
4		10			10			10			10	
6		6.8			6.8			6.8			6.8	
10		4.0			4.0			4.0			4.0	
16		2.5			2.5			2.5			2.5	
	r	x	z	r	x	z	r	x	z	r	x	z
25	1.60	0.27	1.65	1.60	0.165	1.60	1.60	0.190	1.60	1.60	0.27	1.65
35	1.15	0.25	1.15	1.15	0.155	1.15	1.15	0.180	1.15	1.15	0.26	1.20
50	0.87	0.25	0.90	0.86	0.155	0.87	0.86	0.180	0.87	0.86	0.26	0.89
70	0.60	0.24	0.65	0.59	0.150	0.61	0.59	0.175	0.62	0.59	0.25	0.65
95	0.44	0.23	0.50	0.43	0.145	0.45	0.43	0.170	0.46	0.43	0.25	0.49
120	0.35	0.23	0.42	0.34	0.140	0.37	0.34	0.165	0.38	0.34	0.24	0.42
150	0.29	0.23	0.37	0.28	0.140	0.31	0.28	0.165	0.32	0.28	0.24	0.37
185	0.23	0.23	0.32	0.22	0.140	0.26	0.22	0.165	0.28	0.22	0.24	0.33
240	0.185	0.22	0.29	0.170	0.140	0.22	0.170	0.165	0.24	0.170	0.24	0.29
300	0.150	0.22	0.27	0.140	0.140	0.195	0.135	0.160	0.21	0.135	0.24	0.27
400	0.125	0.22	0.25	0.110	0.135	0.175	0.110	0.160	0.195	0.110	0.24	0.26
500	0.100	0.22	0.24	0.090	0.135	0.160	0.088	0.160	0.180	0.085	0.24	0.25
630	0.088	0.21	0.23	0.074	0.135	0.150	0.071	0.160	0.170	0.068	0.23	0.24
800		-		0.062	0.130	0.145	0.059	0.155	0.165	0.055	0.23	0.24
1000		-		0.055	0.130	0.140	0.050	0.155	0.165	0.047	0.23	0.24

* Spacings larger than one cable diameter will result in a larger voltage drop.

TABLE 4E2A- MULTICORE 90°C THERMOSETTING INSULATED AND THERMOPLASTIC SHEATHED CABLES, NON-ARMOURED

Current carrying capacity (amperes)
Ambient Temperature 30°C
Conductor operating temperature 90°

Conductor cross-sectional area	Reference method A (enclosed in conduit in thermally insulating wall etc)		Reference method B (enclosed in conduit on a wall or in trunking etc)		Reference method C (clipped direct)		Reference method E (free air or on a perforated cable tray etc, horizontal or vertical)	
	1 two core cable*, single-phase a.c. or d.c.	1 three or four core cable*, three-phase a.c. 1 two core	cable*, single-phase a.c. or d.c. 1 three or	four core cable*, three-phase a.c. 1 two core	cable*, single-phase a.c. or d.c. 1 three or four core	cable*, three-phase a.c. 1 two core	cable*, single-phase a.c. or d.c. 1 three or four	core cable*, three-phase a.c.
1	2	3	4	5	6	7	8	9
(mm2)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
1	14.5	13	17	15	19	17	21	18
1.5	18.5	16.5	22	19.5	24	22	26	23
2.5	25	22	30	26	33	30	36	32
4	33	30	40	35	45	40	49	42
6	42	38	51	44	58	52	63	54
10	57	51	69	60	80	71	86	75
16	76	68	91	80	107	96	115	100
25	99	89	119	105	138	119	149	127
35	121	109	146	128	171	147	185	158
50	145	130	175	154	209	179	225	192
70	183	164	221	194	269	229	289	246
95	220	197	265	233	328	278	352	298
120	253	227	305	268	382	322	410	346
150	290	259	334	300	441	371	473	399
185	329	295	384	340	506	424	542	456
240	386	346	459	398	599	500	641	538
300	442	396	532	455	693	576	741	621
400	-	-	625	693	803	667	865	741

* with or without protective conductor

1. Where a conductor operates at a temperature exceeding 70°C it must be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature(see Regulation 512.1.2)

2. Where cables in this table are connected to equipment or accessories designed to operate at a temperature not exceeding 70°C thermoplastic insulated cables (Table 4D2A) must be used (see also regulation 523.1)

TABLE 4E2B

VOLTAGE DROP (per ampere per metre):
Conductor operating temperature: 90°C

Conductor cross-sectional area	Two-core cable D.C.	Two-core cable single phase A.C.			Three or four-core cable three phase A.C.		
1	2	3			4		
mm²	mV/A/m	mV/A/m			mV/A/m		
1	46	46			40		
1.5	31	31			27		
2.5	19	19			16		
4	12	12			10		
6	7.9	7.9			6.8		
10	4.7	4.7			4.0		
16	2.9	2.9			2.5		
		r	x	z	r	x	z
25	1.85	1.85	0.160	1.90	1.60	0.140	1.65
35	1.35	1.35	0.155	1.35	1.15	0.135	1.15
50	0.98	0.99	0.155	1.00	0.86	0.135	0.87
70	0.67	0.67	0.150	0.69	0.59	0.130	0.60
95	0.49	0.50	0.150	0.52	0.43	0.130	0.45
120	0.39	0.40	0.145	0.42	0.34	0.130	0.37
150	0.31	0.32	0.145	0.35	0.28	0.125	0.30
185	0.25	0.26	0.145	0.29	0.22	0.125	0.26
240	0.195	0.200	0.140	0.24	0.175	0.125	0.21
300	0.155	0.160	0.140	0.21	0.140	0.120	0.185
400	0.120	0.130	0.140	0.190	0.115	0.120	0.165

TABLE 4E3A- SINGLE CORE 90°C ARMOURED THERMOSETTING INSULATED CABLES (NON-MAGNETIC ARMOUR)

Current carrying capacity (amperes)
Ambient Temperature 30°C
Conductor operating temperature 90°

Conductor cross-sectional area	Reference Method C (clipped direct)		Reference method F (In free air or on a perforated cable tray, horizontal or vertical)		Reference method F (In free air or on a perforated cable tray, horizontal or vertical)						
	Touching 2 cables, single-phase a.c. or d.c. flat Touching	3 or 4 cables, three-phase a.c. flat Touching	2 cables, single-phase a.c. or d.c. flat Touching	3 cables, three-phase a.c.flat Horizontal	Touching 3 cables, three-phase a.c.trefoil	Spaced by one cable diameter 2 Cables, d.c.		Spaced by one cable diameter 2 cables, single phase a.c.		Spaced by one cable diameter 3 or 4 cables, 3 phase a.c.	
						Vertical	Horizontal	Vertical	Horizontal	Vertical	
1	2	3	4	5	6	7	8	9	10	11	12
mm²	A	A	A	A	A	A	A	A	A	A	A
50	237	220	253	232	222	284	270	282	266	288	266
70	303	277	322	293	285	356	349	357	337	358	331
95	367	333	389	352	346	446	426	436	412	425	393
120	425	383	449	405	402	519	497	504	477	485	449
150	488	437	516	462	463	600	575	566	539	549	510
185	557	496	587	524	529	688	660	643	614	618	574
240	656	579	689	612	625	815	782	749	714	715	666
300	755	662	792	700	720	943	906	842	805	810	755
400	853	717	899	767	815	1137	1094	929	889	848	797
500	962	791	1016	851	918	1314	1266	1032	989	923	871
630	1082	861	1146	935	1027	1528	1474	1139	1092	992	940
800	1170	904	1246	987	1119	1809	1744	1204	1155	1042	978
1000	1261	961	1345	1055	1214	2100	2026	1289	1238	1110	1041

1. Where a conductor operates at a temperature exceeding 70°C it must be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature(see Regulation 512.1.2)

2. Where cables in this table are connected to equipment or accessories designed to operate at a temperature not exceeding 70°C thermoplastic insulated cables (Table 4D2A) must be used (see also regulation 523.1)

TABLE 4E3B

Voltage drop (millivolts per ampere per metre)
Conductor operating temperature: 90°C.

Conductor cross-sectional area	2 cables D.C.	Reference Methods C & F (clipped direct, on tray or in free air)						Reference Methods C & F (clipped direct, on tray or in free air)								
		2 cables - single phase A.C.						3 or 4 cables - Three phase A.C.								
		Touching			Spaced*			Trefoil & Touching			Flat & Touching			Flat & Spaced*		
1	2	3			4			5			6			7		
mm^2	mV/A/m	mV/A/m			mV/A/m			mV/A/m			mV/A/m			mV/A/m		
		r	x	z	r	x	z	r	x	z	r	x	z	r	x	z
50	0.98	0.99	0.21	1.00	0.98	0.29	1.00	0.86	0.180	0.87	0.84	0.25	0.88	0.84	0.33	0.90
70	0.67	0.68	0.200	0.71	0.69	0.29	0.75	0.59	0.170	0.62	0.60	0.25	0.65	0.62	0.32	0.70
95	0.49	0.51	0.195	0.55	0.53	0.28	0.60	0.44	0.170	0.47	0.46	0.24	0.52	0.49	0.31	0.58
120	0.39	0.41	0.190	0.45	0.43	0.27	0.51	0.35	0.165	0.39	0.38	0.24	0.44	0.41	0.30	0.51
150	0.31	0.33	0.185	0.38	0.36	0.27	0.45	0.29	0.160	0.33	0.31	0.23	0.39	0.34	0.29	0.45
185	0.25	0.27	0.185	0.33	0.30	0.26	0.40	0.23	0.160	0.28	0.26	0.23	0.34	0.29	0.29	0.41
240	0.195	0.21	0.180	0.28	0.24	0.26	0.35	0.180	0.155	0.24	0.21	0.22	0.30	0.24	0.28	0.37
300	0.155	0.170	0.175	0.25	0.195	0.25	0.32	0.145	0.150	0.21	0.170	0.22	0.28	0.20	0.27	0.34
400	0.115	0.145	0.170	0.22	0.180	0.24	0.30	0.125	0.150	0.195	0.160	0.21	0.27	0.20	0.27	0.33
500	0.093	0.125	0.170	0.21	0.165	0.24	0.29	0.105	0.145	0.180	0.145	0.20	0.25	0.190	0.24	0.31
630	0.073	0.105	0.165	0.195	0.150	0.23	0.27	0.092	0.145	0.170	0.135	0.195	0.24	0.175	0.23	0.29
800	0.056	0.090	0.160	0.190	0.145	0.23	0.27	0.086	0.140	0.165	0.130	0.180	0.23	0.175	0.195	0.26
1000	0.045	0.092	0.155	0.180	0.140	0.21	0.25	0.080	0.135	0.155	0.125	0.170	0.21	0.165	0.180	0.24

NOTE: Spacings larger than one cable diameter will result in a larger voltage drop.

TABLE 4E4A - MULTICORE 90°C ARMOURED THERMOSETTING INSULATED CABLES (COPPER CONDUCTORS)

Current-carrying capacity (Amperes):
Air Ambient temperature: 30°C
Ground Ambient temperature: 20°C
Conductor operating temperature: 90°C

Conductor cross-sectional area	Reference method C (Clipped direct)		Reference method E (in free air or on a perforated cable tray etc, horizontal or vertical)		Reference method D (direct in ground or in ducting in ground, in or around buildings)	
	1 two core cable single phase A.C. or D.C.	1 three or 1 four core cable three phase A.C.	1 two core cable single phase A.C.or D.C.	1 three or four core cable three phase A.C.	1 two core cable single phase A.C.or D.C.	1 three or four core cable three phase A.C.
1	2	3	4	5	6	7
mm^2	A	A	A	A	A	A
1.5	27	23	29	25	25	21
2.5	36	31	39	33	33	28
4	49	42	52	44	43	36
6	62	53	66	56	53	44
10	85	73	90	78	71	58
16	110	94	115	99	91	75
25	146	124	152	131	116	96
35	180	154	188	162	139	115
50	219	187	228	197	164	135
70	279	238	291	251	203	167
95	338	289	354	304	239	197
120	392	335	410	353	271	223
150	451	386	472	406	306	251
185	515	441	539	463	343	281
240	607	520	636	546	395	324
300	698	599	732	628	446	365
400	787	673	847	728	-	-

1. Where a conductor operates at a temperature exceeding 70°C it must be ascertained that the equipment connected to the conductor is suitable for the conductor operating temperature (See Regulation 512.1.2).

2. Where cables in this table are connected to equipment or accessories designed to operate at a temperature not exceeding 70°C, the current ratings given in the equivalent table for 70°C thermoplastic insulated cables (Table 4D4A) must be used (see also Regulation 523.1).

TABLE 4E4B

VOLTAGE DROP (per ampere per metre)
Conductor operating temperature: 90°C

Conductor cross-sectional area	Two-core cable D.C.	Two-core cable single phase A.C.			Three or four-core cable three phase A.C.		
1	2	3			4		
mm²	mV/A/m	mV/A/m			mV/A/m		
1.5	31	31			27		
2.5	19	19			16		
4	12	12			10		
6	7.9	7.9			6.8		
10	4.7	4.7			4.0		
16	2.9	2.9			2.5		
		r	x	z	r	x	z
25	1.85	1.85	0.160	1.90	1.60	0.140	1.65
35	1.35	1.35	0.155	1.35	1.15	0.135	1.15
50	0.98	0.99	0.155	1.00	0.86	0.135	0.87
70	0.67	0.67	0.150	0.69	0.59	0.130	0.60
95	0.49	0.50	0.150	0.52	0.43	0.130	0.45
120	0.39	0.40	0.145	0.42	0.34	0.130	0.37
150	0.31	0.32	0.145	0.35	0.28	0.125	0.30
185	0.25	0.26	0.145	0.29	0.22	0.125	0.26
240	0.195	0.20	0.140	0.24	0.175	0.125	0.21
300	0.155	0.16	0.140	0.21	0.140	0.120	0.185
400	0.120	0.13	0.140	0.190	0.115	0.120	0.165

TABLE 4F3A - FLEXIBLE CORDS, NON-ARMOURED (COPPER CONDUCTORS)

CURRENT CARRYING CAPACITY (amperes):
and MASS SUPPORTABLE (kg):

Conductor cross-sectional area	Current-carrying capacity Single-phase A.C.	Current-carrying capacity Three-phase A.C.	Maximum mass supportable by twin flexible cord (see Regulations 522.7.2 and 559.6.1.5)
1	2	3	4
mm²	A	A	kg
0.5	3	3	2
0.75	6	6	3
1.0	10	10	5
1.25	13	-	5
1.5	16	16	5
2.5	25	20	5
4.0	32	25	5

Where cable is on a reel see the notes to Table 4F1A.

RATING FACTOR FOR AMBIENT TEMPERATURE

60°C thermoplastic or thermosetting insulated cords:

Ambient temperature	35°C	40°C	45°C	50°C	55°C
Rating Factor	0.91	0.82	0.71	0.58	0.41

90°C thermoplastic or thermosetting insulated cords:

Ambient temperature	35°C to 50°C	55°C	60°C	65°C	70°C
Rating Factor	1.0	0.96	0.83	0.67	0.47

90°C thermoplastic or thermosetting insulated cords:

Ambient temperature	35°C to 120°C	125°C	130°C	135°C	140°C	145°C
Rating Factor	1.0	0.96	0.85	0.74	0.60	0.42

Glass fibre cords:

Ambient temperature	35°C to 150°C	155°C	160°C	165°C	170°C	175°C
Rating Factor	1.0	0.92	0.82	0.71	0.57	0.40

TABLE 4F3B

VOLTAGE DROP (per ampere per metre)
Conductor operating temperature: 60°C*

Conductor cross-sectional area	D.C. or single-phase A.C	Three-phase A.C.
1	2	3
mm²	A	mV/A/m
0.5	93	80
0.75	62	54
1.0	46	40
1.25	37	-
1.5	32	27
2.5	19	16
4.0	12	10

NOTE: *The tabulated values above are for 60°c thermoplastic or thermosetting insulated flexible cords and for other types of flexible cords they are to be multiplied by the following factors:

FOR:	
90°C thermoplastic or thermosetting insulated	1.09
180°C thermosetting insulated	1. 31
185°C glass fibre	1.43

TABLE 4F1A - 60°C THERMOSETTING INSULATED FLEXIBLE CABLES WITH SHEATH, NON-ARMOURED (COPPER CONDUCTORS)

CURRENT CARRYING CAPACITY (amperes):
Ambient temperature: 30°C
Conductor operating temperature: 60°C

Conductor cross-sectional area	Single-phase A.C. or D.C.	Three-phase A.C.	Single-phase A.C. or D.C.
	1 two-core cable, with or without protective conductor	1 three-core, four-core or five-core cable	2 single-core cables
1	2	3	4
mm^2	A	A	A
4	30	26	-
6	39	34	-
10	51	47	-
16	73	63	-
25	97	83	-
35	-	102	140
50	-	124	175
70	-	158	216
95	-	192	258
120	-	222	302
150	-	255	347
185	-	291	394
240	-	343	471
300	-	394	541
400	-	-	644
500	-	-	738
630	-	-	861

NOTE:
1. The current ratings tabulated are for cables in free air but may also be used for cables resting on a surface. If the cable is to be wound on a drum on load the ratings should be reduced in accordance with NOTE 2 below and for cables which may be covered, NOTE 3 below.

2. Flexible cables wound on reeling drums.

The current ratings of cables used on reeling drums are to be reduced by the following factors:

A. Radial type drum
Ventilated: 85%
Unventilated: 75%

B. Ventilated cylindrical type drum
1 layer of cable: 85%
2 layers of cable: 65%
3 layers of cable: 45%
4 layers of cable: 35%

A radial drum is one where the spiral layers of cable are accommodated between closely spaced flanges; if fitted with solid flanges the ratings given above should be reduced and the drum is described as non-ventilated. If the flanges have suitable apertures, the drum is described as ventilated. A ventilated cylindrical cable drum is one where layers of cable are accommodated between widely spaced flanges and the drum and end flanges have suitable ventilating apertures.

3. Where cable may be covered over or coiled up whilst on load, or the air movement over the cable restricted, the current rating should be reduced. It is not possible to specify the amount of reduction, but the table of rating factors for reeling drums can be used as a guide.

TABLE 4F1B

CURRENT CARRYING CAPACITY (amperes):
Conductor operating temperature: 60°C

Conductor cross-sectional area	Two-core cables, D.C.	Two-core cable single-phase A.C.			1 three-core, four-core or five-core cable, three-phase A.C.			2 single-core cables, touching			
								D.C.	Single-phase A.C. *		
1	2	3			4			5	6		
(mm^2)	(mV/A/m)	(mV/A/m)			(mV/A/m)			(mV/A/m)	(mV/A/m)		
4	12	12			10			-	-		
6	7.8	7.8			6.7			-	-		
10	4.6	4.6			4.0			-	-		
16	2.9	2.9			2.5			-	-		
		r	x	z	r	x	z		r	x	z
25	1.80	1.80	0.175	1.85	1.55	0.150	1.55	-	-	-	-
35	-	-	-	-	1.10	0.150	1.15	1.31	1.31	0.21	1.32
50	-	-	-	-	0.83	0.145	0.84	0.91	0.91	0.21	0.93
70	-	-	-	-	0.57	0.140	0.58	0.64	0.64	0.20	0.67
95	-	-	-	-	0.42	0.135	0.44	0.49	0.49	0.195	0.53
120	-	-	-	-	0.33	0.135	0.36	0.38	0.38	0.190	0.43
150	-	-	-	-	0.27	0.130	0.30	0.31	0.31	0.190	0.36
185	-	-	-	0.22	0.130	0.26	0.25	0.25	0.190	0.32	
240	-	-	-	-	0.170	0.130	0.21	0.190	0.195	0.185	0.27
300	-	-	-	-	0.135	0.125	0.185	0.150	0.155	0.180	0.24
400	-	-	-	-	-	-	-	0.115	0.120	0.175	0.21
500	-	-	-	-	-	-	-	0.090	0.099	0.170	0.20
630	-	-	-	-	-	-	-	0.068	0.079	0.170	0.185

NOTE 1: * A larger voltage drop will result if the cables are spaced.

TABLE ERA 2 - SINGLE CORE XLPE INSULATED 600/1000V AND 1900/3300V CABLES WITH COPPER CONDUCTORS, ERA PARAMETERS (ERA 69-30 PT.V)

Sustained current rating (AMP) (50Hz)

Nominal conductor area mm^2	600/1000V three single core cables in trefoil arrangement				1900/3300V three single core cables in trefoil arrangement		
	Direct Armoured	Duct Armoured (Trefoil Ducts)	Air Unarmoured	Air Armoured	Direct Armoured	Duct Armoured (Trefoil Ducts)	Air Armoured
50	231	231	223	231	222	219	240
70	284	278	284	295	271	264	300
95	340	327	352	362	324	310	368
120	386	366	412	420	366	342	428
150	431	396	475	483	409	376	487
185	485	437	551	555	460	414	556
240	558	489	658	654	528	464	656
300	623	534	761	745	589	506	747
400	691	567	887	851	651	535	851
500	765	615	1027	963	720	579	963
630	841	664	1186	1084	789	624	1084
800	888	692	1347	1178	831	650	1178
1000	942	735	1503	1278	880	689	1278

Cables shall only be continuously operated at their tabulated rating if the minimum current at which circuit protection is designed to operate does not exceed 1.45 times (in the case of cables in air or in ducts) or 1.3 times (in the case of cables laid direct in the ground) the values given above

.

Standard depth of laying	0.5m for 600/1000 Volt Cables 0.8m for 1900/3300 Volt Cables
Thermal resistivity of soil	1.2 K.m/W
Standard ground temperature	15°C
Ambient air temperature	25°C
Maximum conductor temperature	90°C

TABLE ERA 3 - TWIN AND MULTICORE CORE XLPE INSULATED 600/1000V AND 1900/3300V CABLES WITH COPPER CONDUCTORS, ERA PARAMETERS (ERA 69-30 PT.V)

Sustained current rating (AMP) (50Hz)

Nominal conductor area mm²	600/1000V one twin core armoured cable			600/1000V one three or four core armoured cable			1900/3300V one three core armoured cable		
	Direct	Duct	Air	Direct	Duct	Air	Direct	Duct	Air
1.5	38	31	31	32	26	26	-	-	-
2.5	49	41	41	42	34	35	-	-	-
4	65	53	55	55	45	47	-	-	-
6	81	67	70	69	56	59	-	-	-
10	109	89	95	92	75	82	-	-	-
16	141	115	126	119	96	107	114	96	112
25	183	148	164	152	124	140	147	124	149
35	219	178	202	182	149	172	175	147	177
50	259	211	244	217	177	209	207	174	213
70	317	260	306	266	218	263	254	214	268
95	381	313	378	319	263	324	304	257	328
120	433	357	437	363	300	376	345	293	380
150	485	401	499	406	338	430	387	328	432
185	547	455	576	458	382	495	436	371	496
240	632	527	680	529	442	584	502	428	583
300	708	592	775	592	496	666	563	480	667
400	799	669	892	667	570	766	633	549	765

Cables shall only be continuously operated at their tabulated rating if the minimum current at which circuit protection is designed to operate does not exceed 1.45 times (in the case of cables in air or in ducts) or 1.3 times (in the case of cables laid direct in the ground) the values given above.

Standard depth of laying	0.5m for 600/1000 Volt Cables 0.8m for 1900/3300 Volt Cables
Thermal resistivity of soil	1.2 K.m/W
Standard ground temperature	15°C
Ambient air temperature	25°C
Maximum conductor temperature	90°C

CONDUCTOR RESISTANCE'S FOR COPPER AND ALUMINIUM CONDUCTORS

Maximum Resistance (ohms per km @ 20° C)

Conductor area	Solid Conductor (Class 1)			Stranded (Class 2)			Flexible (class 5 & 6)	
	Copper Plain	Copper Metal Coated	Aluminium	Copper Plain	Copper Metal Coated	Aluminium	Copper Plain	Copper Metal Coated
mm^2	Ω	Ω	Ω	Ω	Ω	Ω	Ω	Ω
0.22	_	_	_	_	_	_	92.0	92.4
0.5	36.0	36.7	_	36.0	36.7	_	39.0	40.1
0.75	24.5	24.8	_	24.5	24.8	_	26.0	26.7
1.0	18.1	18.2	_	18.1	18.2	_	19.5	20.0
1.5	12.1	12.2	18.1	12.1	12.2	_	13.3	13.7
2.5	7.41	7.56	12.1	7.41	7.56	_	7.98	8.21
4	4.61	4.70	7.41	4.61	4.70	7.41	4.95	5.09
6	3.08	3.11	4.61	3.08	3.11	4.61	3.30	3.39
10	1.83	1.84	3.08	1.83	1.84	3.08	1.91	1.95
16	1.15	1.16	1.91	1.15	1.16	1.91	1.21	1.24
25	0.727	_	1.20	0.727	0.734	1.20	0.78	0.795
35	0.524	_	0.868	0.524	0.529	0.868	0.554	0.565
50	0.387	_	0.641	0.387	0.391	0.641	0.386	0.393
70	0.268	_	0.443	0.268	0.270	0.443	0.272	0.277
95	0.193	_	0.320	0.193	0.195	0.320	0.206	0.210
120	0.153	_	0.253	0.153	0.154	0.253	0.161	0.164
150	0.124	_	0.206	0.124	0.126	0.206	0.129	0.132
185	_	_	0.164	0.0991	0.100	0.164	0.106	0.108
240	_	_	0.125	0.0754	0.0762	0.125	0.081	0.0817
300	_	_	0.100	0.0601	0.0607	0.100	0.0641	0.0654
400	_	_	-	0.0470	0.0475	0.0778	0.0486	0.0495
500	_	_	-	0.0366	0.0369	0.0605	0.0384	0.0391
630	_	_	-	0.0283	0.0286	0.0469	0.0287	0.0292
800	_	_	-	0.0221	0.0224	0.0367	-	-
1000	_	_	-	0.0176	0.0177	0.0291	-	-

RESISTANCE CORRECTION FACTORS FOR TEMPERATURE (FROM 20°C)

Temperature of component	Correction factor For Copper	Correction factor ForFor Aluminium	Correction factor Steel
20	1.000	1.000	1.000
25	1.020	1.020	1.025
30	1.039	1.040	1.050
35	1.059	1.060	1.075
40	1.079	1.081	1.100
45	1.098	1.101	1.125
50	1.118	1.121	1.150
55	1.138	1.141	1.175
60	1.157	1.161	1.200
65	1.177	1.181	1.225
70	1.197	1.202	1.250
75	1.216	1.222	1.275
80	1.236	1.242	1.300
85	1.256	1.262	1.325
90	1.275	1.282	1.350
95	1.295	1.302	1.375
100	1.314	1.322	1.400
105	1.334	1.343	1.425

REQUIREMENTS FOR INSTALLATION OF CABLES AND FLEXIBLE CORDS

Minimum Bending radius

Cable construction	* Overall diameter or Conductor type	Factor to be applied to the O.D.* of cable to determine the minimum internal bending radius
Non-armoured with circular conductors	≤10mm ›10 ≤25 ›25	3 (2)† 4 (3)† 6
Non-armoured with shaped conductors	any	8
Armoured with circular conductors	any	6
Armoured with shaped conductors	any	8
Flexible cords	≤25mm ≤25mm	3 (fixed) 6 (flexing)

* To be taken as the major axis for flat cables

† The figure in brackets relates to single core with circular stranded conductors, installed in conduit ducting or trunking.

MAXIMUM SPACING OF CLEATS / CLIPS FOR FIXED WIRING OF SINGLE CABLES

	Non armoured, sheathed cables		Armoured cables	
* Overall diameter of cables (mm)	Horizontal † mm	Vertical † mm	Horizontal † mm	Vertical † mm
Not exceeding 9	250	400	-	-
Exceeding 9 but not 15	300	400	350	450
Exceeding 15 but not 20	350	450	400	550
Exceeding 20 but not 40	400	550	450	600
Exceeding 40 but not 50	600	800	900	1100
Exceeding 50 but not 60	750	1000	950	1100
Exceeding 60 but not 70	900	1200	1000	1200
Exceeding 70	1000	1400	1200	1400

* To be taken as the major axis for flat cables

† The spacings stated for horizontal runs may be applied also to runs at an angle of more than 30° from the vertical. For runs at an angle of 30° or less from the vertical, the vertical spacings are applicable.

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