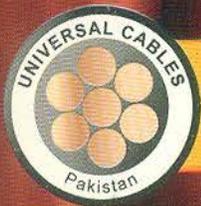




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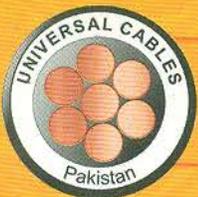
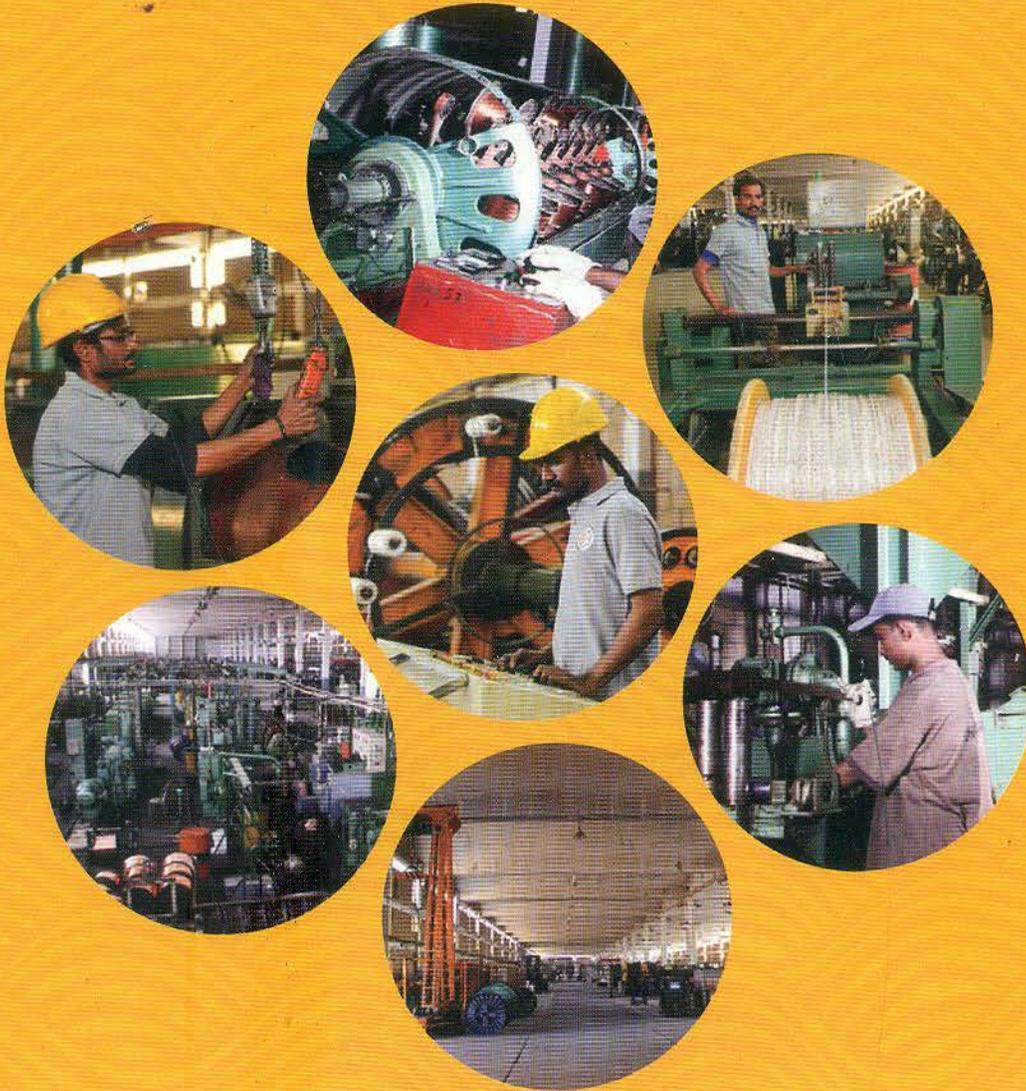
LOW VOLTAGE
XLPE INSULATED CABLES



UNIVERSAL CABLES INDUSTRIES LTD.

About us

The effort of setting up a small yet strong setup in 1978 was the birth of a shining star in the Cable Industry. Initiated as a manufacturer of PVC insulated wires, cables and flexible cords, Universal Cables Industries Ltd. made its mark in its field of expertise. With a diverse product range, foresighted vision and advance technology, Universal Cables Industries Ltd. proudly crossed its benchmark of Quality and Customer satisfaction after it became ISO9001:2008 certified.



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**Cross - linked Polyethylene Insulated Cables
Reference Standard BS 5467**

**XLPE Insulated, Power Cables Non-armoured & Armoured
For Electric Supply
600/1000 V & 1900/3300 V,
And
XLPE Insulated, Armoured Auxiliary Cables
600/1000 V**

**Note: XLPE insulated Power Cables can also be manufactured and
supplied in compliance with IEC 60502-1**

**Incorporating IEE 16th Edition /BS 7671:2001 along with amendment
No.1 (AMD 13628) which comes into effect
on 1st February, 2002**



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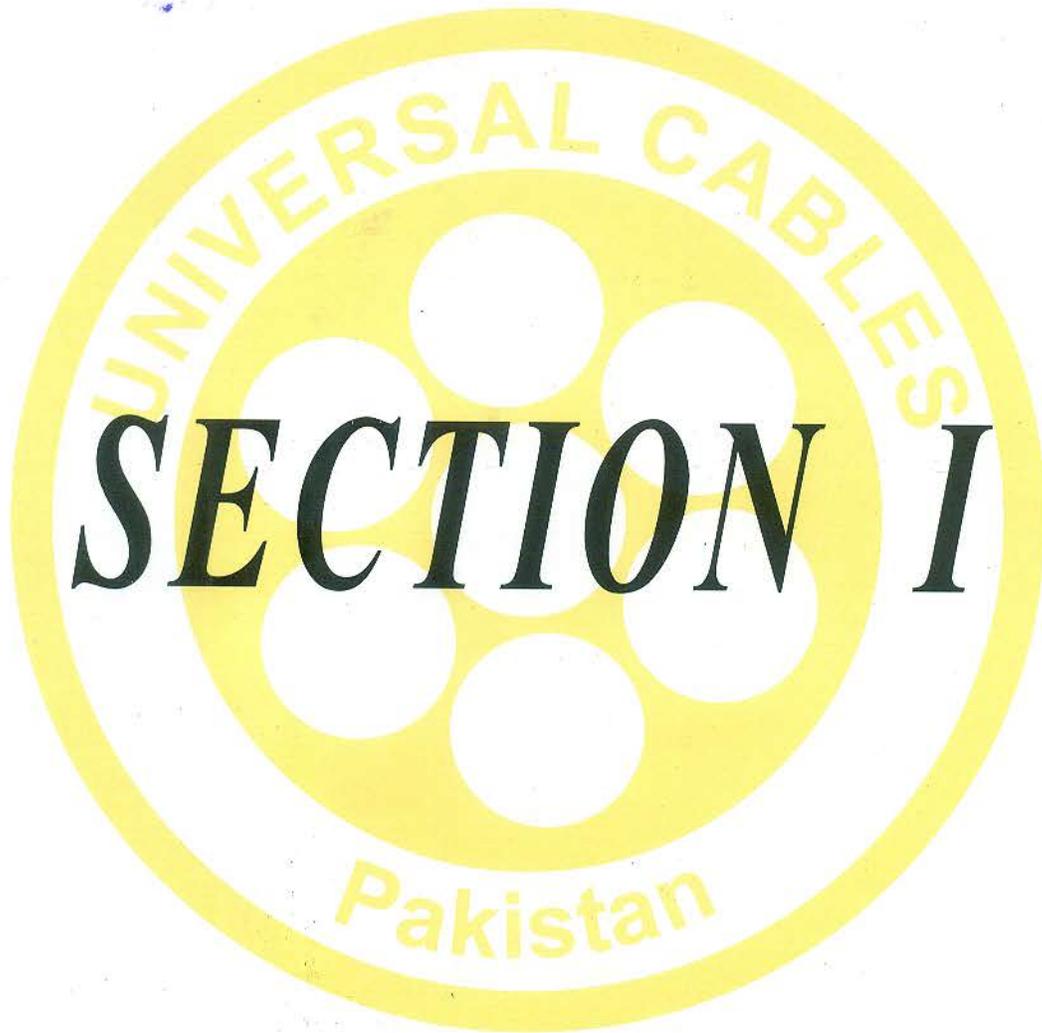
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Section-I Introduction

UNIVERSAL CABLE INDUSTRIES LTD. Established in the year 1978 as small PVC insulated wires, cables and flexible cords manufacturing company. We planned the expansion of our operations facilities, and diversification of product range with a foresighted vision, a pioneering spirit, innovative approach, and the expertise of a highly motivated workforce. Today, we are proud to have a professional team, excellent infrastructure facilities and sales network together synergized for the ultimate objectives of customer satisfaction, quality and safety.

Today, **UCIL** is one of the prime suppliers to the power, automotive, telecommunications, construction and Special Project sectors. It is in the tune with the freedom spirit of Pakistan for economic growth, liberalization and globalization.

UCIL is committed to supplying only the highest quality products along with continuous support for customer's needs and requirements. Our success can be attributed to the consistent production of a superior quality product. In addition to the emphasis on quality, we are continuously devoting significant resources to acquire a unique state of the art operational facilities as well as providing dependable and reliable products and services to the customer.

UCIL is one of the leading companies in producing cables that are tailor made to customer specifications. Here, every customer is considered like an appreciating asset and our services remain always with the customer before and after sales.

Here, the customers are assured of Quality, Reliability and complete customer satisfaction.

At **UCIL** as business entity, all our employees, by their thinking and actions will make sure to exercise optimum utilization of resources, highest quality and best services in the industry. At all times, we will go for an extra mile to help our customers thrive, very much believing that our success depends on theirs.

This catalogue illustrates the construction, dimension, and provides electrical data regarding our new product line of low tension XLPE insulated power and auxiliary cables, in compliance with BS 5467. On specific requirements XLPE power cables in compliance with IEC 60502-1 can also be manufactured and supplied. *We also supply XLPE insulated high tension cables (11kV and 15 kV) imported from reputed sources.* **The production of XLPE cables is a proud addition to the existing range of products** based on BSS and IEC specifications. We also manufacture cables to other international cable standards such as ASTM, JIS, VDE etc. and cater to the specific needs to suit special requirements of our customers. At present we are manufacturing a complete range of low voltage PVC and XLPE insulated electric supply cables, overhead conductors, telecommunication cables, aluminium rod and copper rod and different types of specialty wires and cables. In near future, **UCIL** will start manufacturing High Tension cables in our factory at BIN QASIM, Karachi. We strongly believe in continuous quality improvement and diversification of our product range and services in quest to meet the ever increasing needs of our valued customers.

We are always ready to provide detailed information about our products, services and related technical know-how and we can assure our best attention to meet the expectations and requirements of our valued patrons. Your patronage and advice would always be a source of encouragement and inspiration and will be most cordially welcomed.



Product Range:

**Energy Cables and Conductors Communication,
Automobile, Specialty Wires & Cables, Copper Braids,
Aluminium Rod & Copper Rod**

Establishment:**Head Office / Marketing & Sales Department**

61/C, Jami Commercial Street No.7 Phase - VII, D.H.A.,
Karachi -Pakistan.

Phone # 021-35382392/5 - 35804571-75, **111-786-825**

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E-Mail: sales@ucil.com.pk

URL : www.ucil.com.pk

Factory Building:

Plot No. A-25 North Western Industrial Zone,
Bin Qasim, Karachi.

Phone # 021-34750454-58, Fax # 021-34750461

Regional Sales Office Lahore :

Office # 222, 2nd Floor, Siddiq Trade Center,
72 main Boulebard, Gulberg III, Lahore.

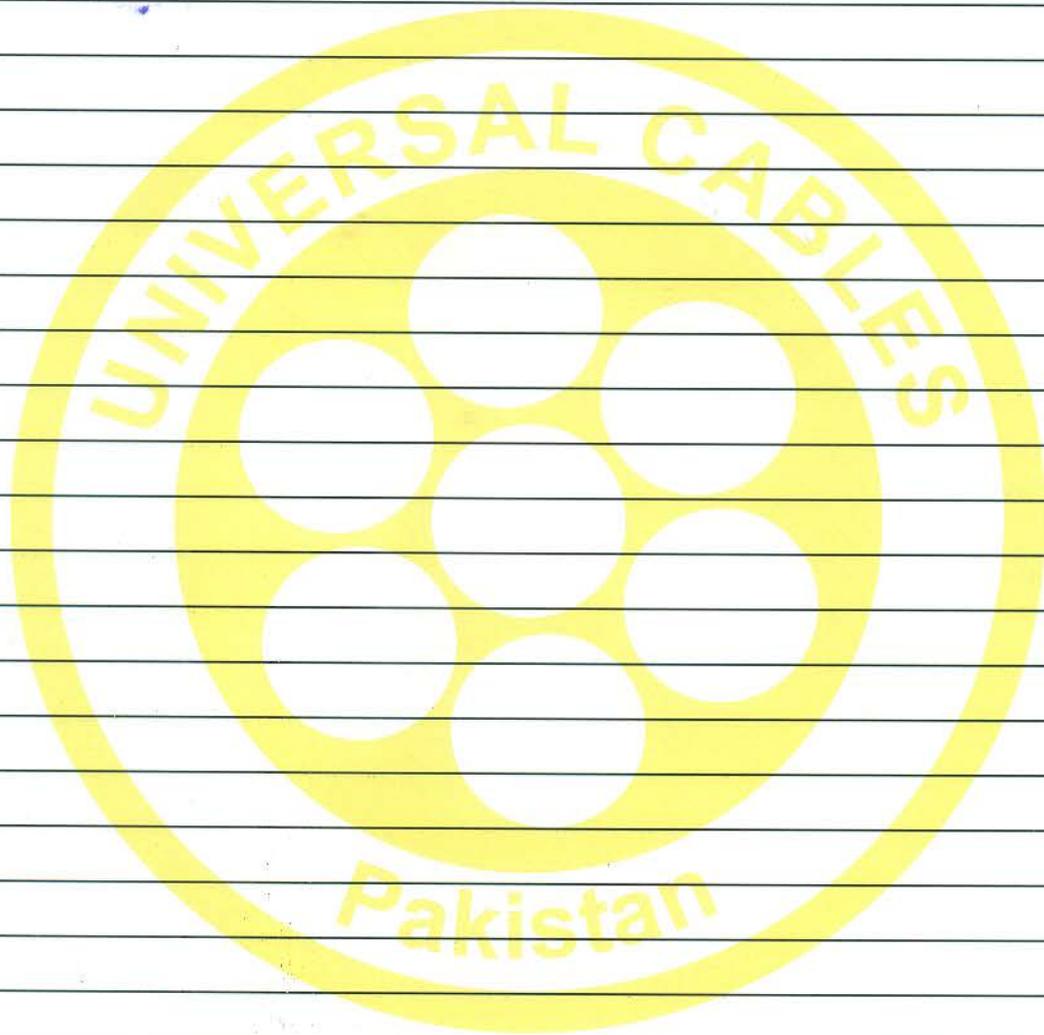
Phone: (042) 35787640-41 Fax: (042) 35787610

E-Mail: lahore@ucil.com.pk



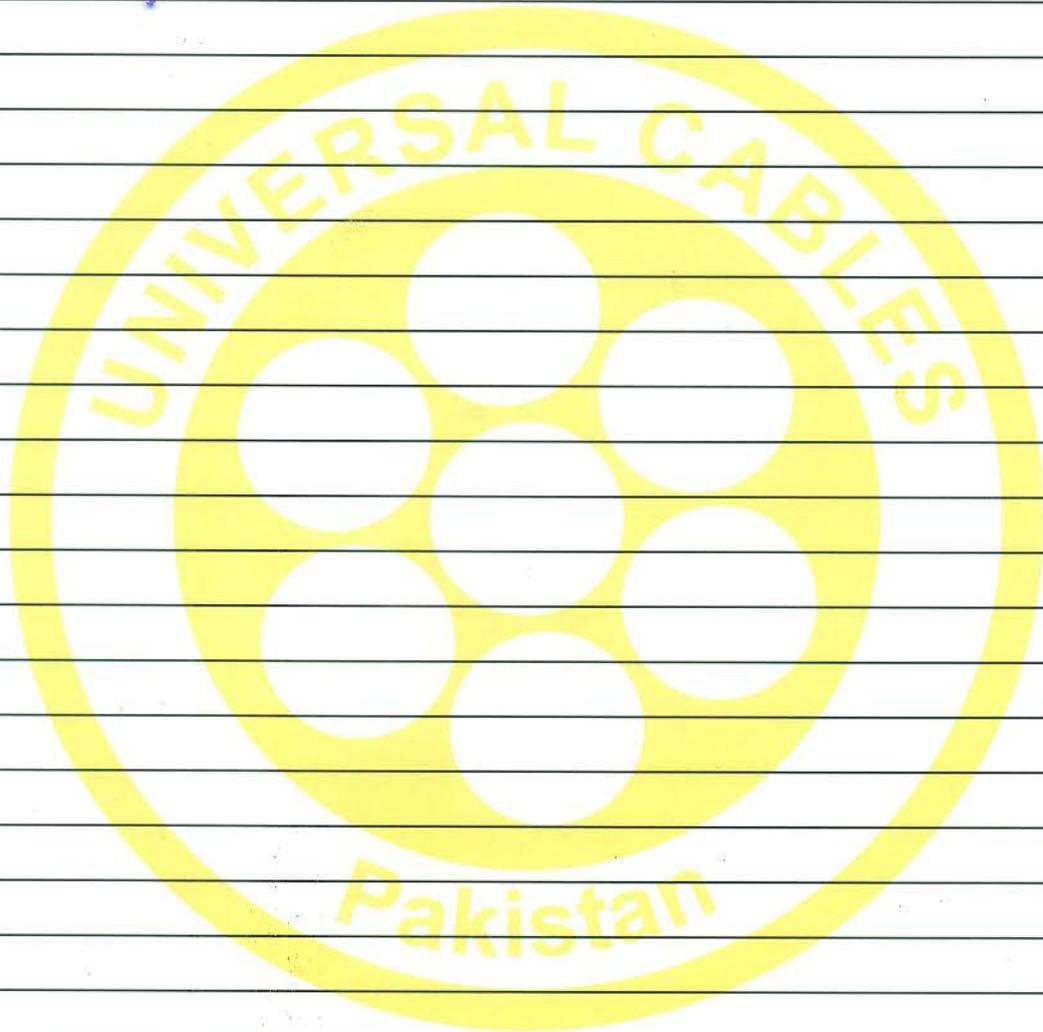
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Section - II

XLPE-As Conductor Insulating Material.

When polyethylene (a linear molecular structure compound) is chemically bonded in a three dimensional structure, it is called as cross-linked polyethylene (XLPE).

The application of heat and pressure is used to trigger cross linking in the presence of organic peroxides as catalyst, which force individual molecules of polyethylene to link with one another to produce *cross-linked* polyethylene "XLPE".

Properties & Advantages of XLPE

XLPE cables are best choice for transmission and distribution lines especially in countries with humid and hot ambience because of their excellent electrical and physical properties.

Dielectric Loss

XLPE as insulation exhibits low dielectric loss which is about two decimal powers lower than that of PVC insulated cables. Since the dielectric constant is also an advantage here, therefore, XLPE cables have lower mutual capacitance resulting in reduced charging currents and earth leakage currents.

Table 1 Characteristics of Thermoplastic and Thermosetting Material used for Wire & Cable

Material Item	Cross linked Polyethylene XLPE	Polyethylene PE	PVC	Butyle Rubber	EP Rubber	Polychloroprene
Specific gravity	0.92	0.92	1.2~1.5	1.4~1.5	1.3~1.4	1.4~1.6
Dielectric strength (kV/mm)	30~50	30~50	20~35	20~30	30~45	15~25
Volume resistivity (ohm-cm)	1018	1018	1012~15	1015	1015	107-12
Dielectric constant	2.3	2.3	5~9	4~5	4~5	7~10
Power factor(%)	0.03	0.03	4~12	1~3	1~2	Not more than 10
Tensile strength (kg/mm ²)	1.4~1.8	1.2~1.5	1.0~2.5	0.4~0.7	0.4~0.9	1.2~2.0
Elongation (%)	500~600	500~600	100~300	300~600	400~650	300~600
Max. operating temperature (°C)	90	75	60~75	80	90	75
Flame resistivity	NG	NG	E	NG	NG	E
Heat deformation	F	G	G	G	F	G
Ozone resistivity	F	F	G	F	E	G
Weather proof	G	G	F	F	F	F
Oil resistivity	E	E	F	NG	NG	G
Resistance to low temp.	F	F	G	G	E	F
Acid resistance	E	E	E	E	E	E
Alkali resistance	E	E	E	G	E	E

E: Excellent F: Fine G: Fairy good NG: Unsuitable

Table 2. Maximum Allowable Conductor Temperature

Insulation Type	Normal Operation	Short-Circuit Condition
XLPE Cable	90°C	250°C
PVC Cable	70°C	160°C
PE Cable	70°C	130°C



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Large Current Carrying Capacity

The remarkable resistance to thermal deformation and good aging property of XLPE cable allow to carry large currents under conductor temperature of 90°C, emergency 130°C or short circuit 250°C conditions.

Installation

An XLPE cable withstand smaller bending radius and is lighter in weight, allowing for easier and trouble free installation.

Jointing and terminating

The splicing and terminating methods for XLPE cables are simpler in comparison to other kind of cables.

XLPE Cables

PVC insulated cables have an excellent service performance record for over the last many decades and today still being used very satisfactorily, however, research and advancement in thermosetting material, such as XLPE, have provided some special advantages and progressively dominating its equivalent materials therefore, to keep pace with ever changing technology advancement in cable making materials, UNIVERSAL have also started manufacturing XLPE insulated LT Power Cables.

We now recommend L T XLPE insulated power cables with complete confidence and belief that these cables will provide the following added features, especially in countries with hot and humid environment, like Pakistan, beside economical advantages.

Higher continuous and short current rating

Eliminating the need of apply de-rating factors because high operating temperature of XPLE. Lighter in weight and less complex jointing and termination techniques, therefore much easier to install.

Note: Provided that certain important features of cable design and construction are considered to obtain optimum performance and ensuring compatibility of materials both within cables and jointing accessories.

Manufacturing Process of XLPE

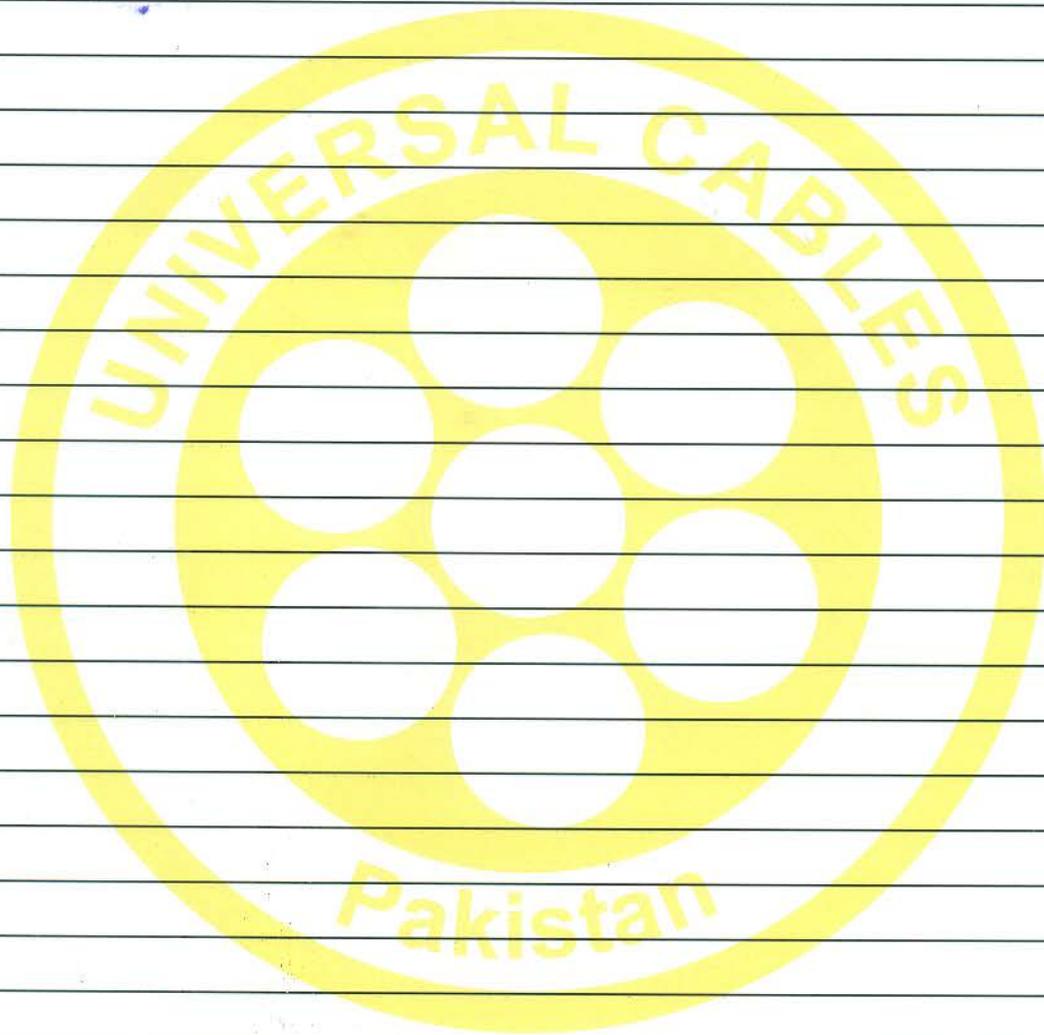
In the manufacturing of low tension XLPE cables as a standard the use of high quality materials (ingredients required for XLPE) is ensured along with latest technology extruders which minimize the risk of introducing external contaminants, to form a compact and homogeneous layer of XLPE insulation and thus guaranteeing high quality XLPE cables. The conductor (smooth, free of burrs and slivers) is paid off continuously through capstan synchronizing with speed of extruders where vulcanizing of polyethylene takes place in the presence of organic peroxides (catalyst). The various required parameters for processing XLPE such as line speed, temperature in addition to dimension are monitored and controlled according to preset values for a quality product having intended characteristic.

Cost Saving XLPE cable vs. PVC cable -An Economic Approach:

This follows from the operating temperatures of insulating materials (Such as 90°C XLPE), one of the economic grounds for cable size selection to minimize the cost of power cable. Here we would like to refer to an exercise under the following captior. "Economic Optimization power cable size (XLPE cable vs. PVC cable)" on page 42 of this publication.

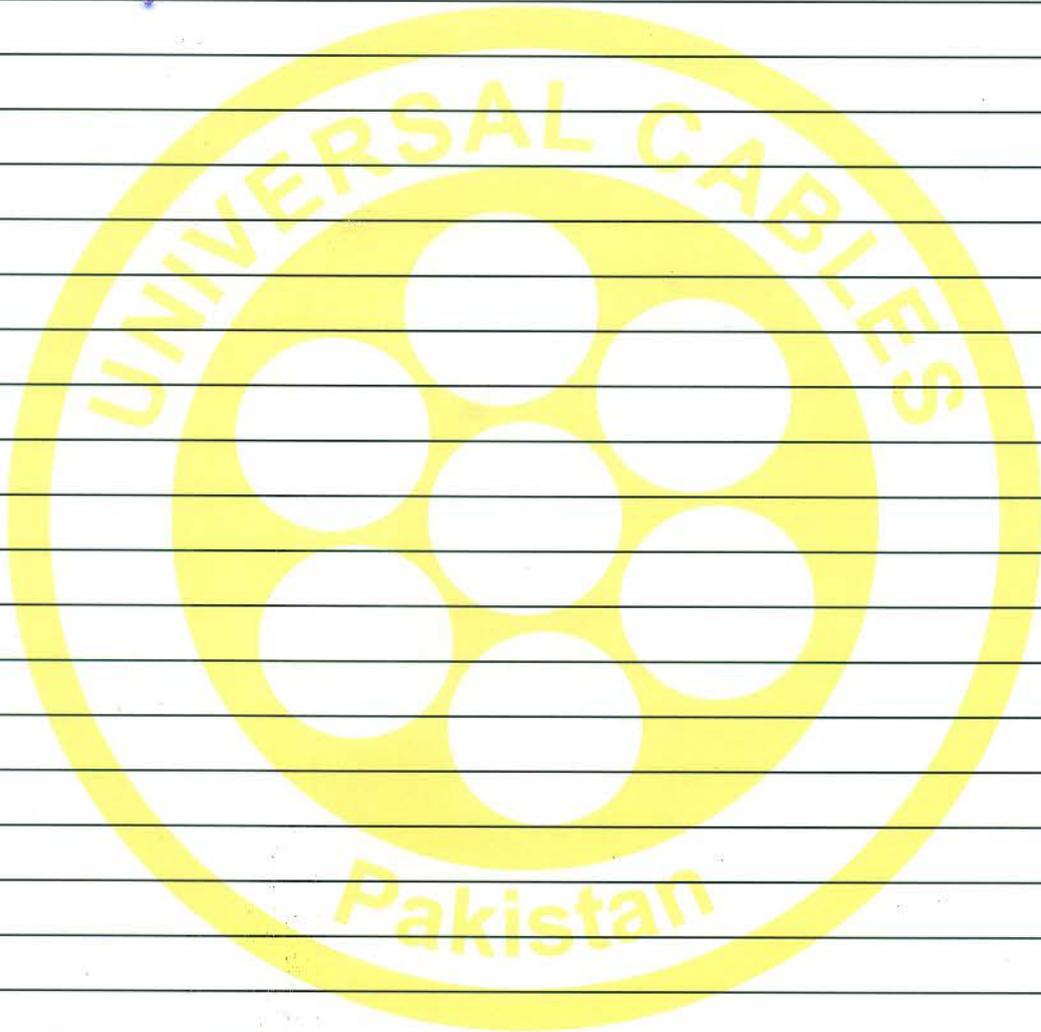


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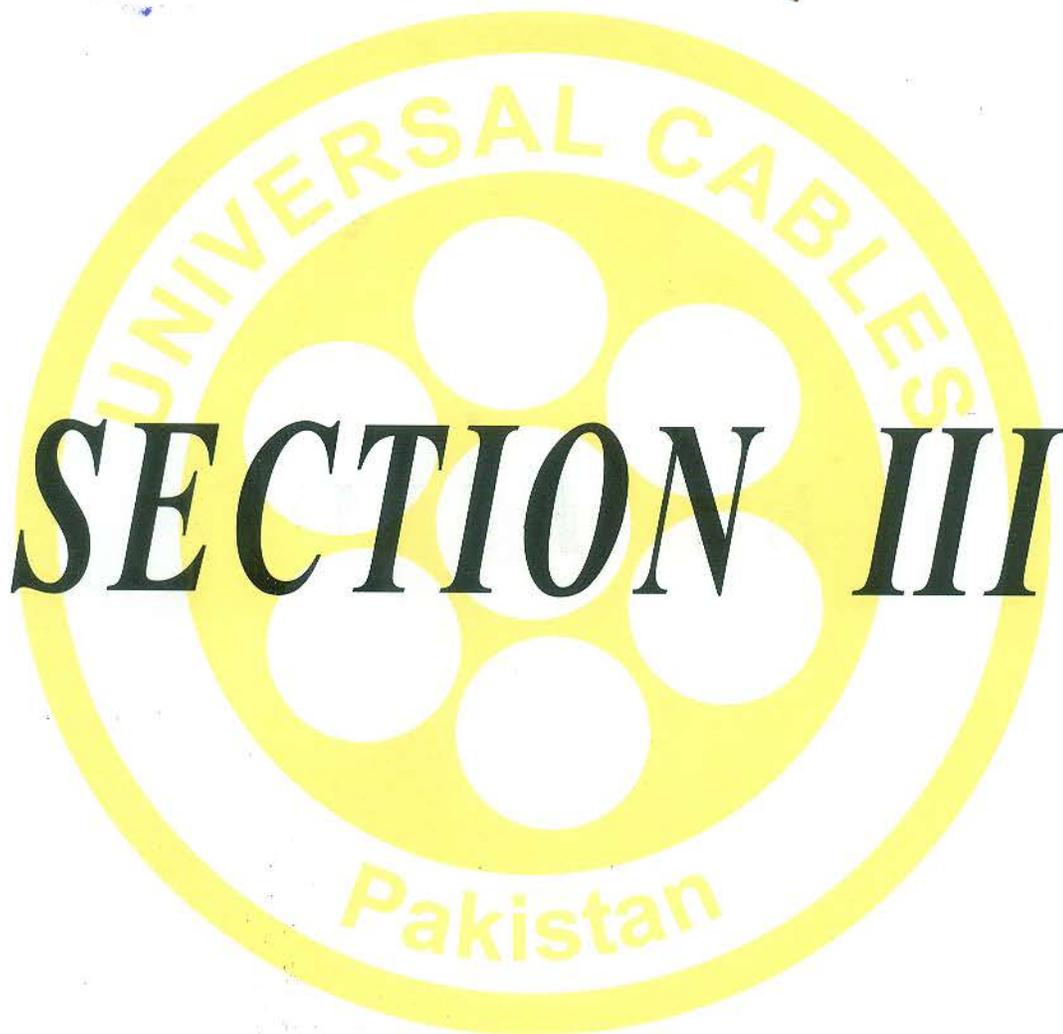


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Section III

General Specification

XLPE insulated, PVC sheathed, non-armoured and armoured, power cables, 600/1000 V and 1900/3300 V to BS 5467

1. Rated Voltage

600/1000 V & 1900/3300 V

(E₀/E; E₀ Volts between conductor and earth,
E volts between conductors)

2. Conductors

The conductors shall be plain annealed copper conductor or aluminium, complying with BS 6360 and IEO 60228. The conductors may be circular solid, circular stranded, circular compacted or shaped stranded as indicated in construction tables.

3. Insulation

The insulation shall be cross-linked polyethylene compound complying with appropriate requirements of BS 5467 and the applicable standards as referred to therein. The insulation is applied by the extrusion process and cross-linked to form a layer of compact and homogeneous insulation to withstand all physical and electrical tests as per BS 5467 including the compliance for spark testing specified in BS 5099.

The test requirements are planned and performed in accordance with the applicable clauses of BS 5467.

4. Identification of Cores*

The cores identification of all cables is done by colours or by numbers as indicated in the table below. The cores shall be identified by colour of XLPE compound or number printed on the surface of insulation.

-Single-core	:	Red and black
-Two	:	Red and black
-Three-core	:	Red, yellow, blue and black
-four-core	:	Red, yellow, blue and black
-Auxiliary cables:		1, 2, 3, 4, 5, 6, 7, in upward sequence.

5. Laying Up

The cores of all cables shall be laid up with right hand direction of lay up to and including 7 cores and alternating left or right hand direction of lay for multi layer core assembly. The fillers where necessary shall be non-hygroscopic, may be integrally applied to make a reasonably circular core assembly ensuring the possibility to remove the bedding and or fillers from the cable without damaging the insulation

6. Bedding (Armoured Cables)

An extruded layer PVC bedding of appropriate grade for armoured cables 600 / 1000 V & 1900 / 3300 V to be provided complying with BS 5467 clause 9 and its sub clauses.

7. Armour

A layer of round armour wire (Galvanized steel wire or plain aluminium wire as applicable) to be provided over PVC bedding complying with BS 5467 clause 11 and its sub-clauses.

8. Oversheath

The oversheath will consist of black PVC compound complying with the appropriate requirements as specified in BS 5467 (including compatibility) and in compliance with BS 7655 section 4.1.

The oversheath of all armoured cables shall be spark tested CBS 5099).

9. Marking & end sealing

The ends of each cable having three or more cores and size 25 mm² and above shall be marked with red or green with cores clockwise or anti-clockwise respectively.

External marking

The external surface of all cables complying with BS-5467 shall be legibly marked with the following elements:

The marking of item (a) to (d) shall be embossed or indentation.

Elements	Example of marking
a) Electric cable	ELECTRIC CABLE
b) Voltage designation	600/1000 V, 3300 V,
c) BS number	600/1000 AUX. BS 5467
d) Manufacturer's name	XYZ
e) Number of cores, type and nominal area of conductor	1) 4 x 50 (Copper Conductor) 2) 4 x 50 ALC Aluminium conductor

Note: The height of the legend elements and other requirements with respect to tabulated approximate diameters of cables (above and below 15 mm) will be in accordance with Amendment No.2 AMD 6829 Feb., 92 to BS5467/89.

The above elements will be provided throughout the length of the cable repeating at intervals not exceeding 550 mm for item (a), (b) and c, and not exceeding 1100 mm for items (d) and (e). Both ends of every length of cable shall be sealed in such a manner that it includes the oversheath.

Year of Manufacture

It shall be provided throughout the length of cable. If on the surface to comply with 14.2(d) & (e) and internal not greater than 550 mm.

10. Minimum internal radii of bends in cables for fixed wiring

Regulation no.522-08-03 IEE 16th Edition IBS 7671:2001

The radius of every bend in wiring system shall be such that conductors and cables shall not suffer damage.

For recommendations for minimum installation radius, reference shall be made to appendix-B BS 5467, in particular for minimum installation radius reference appendix B.3 table 25 page 23

11. Tests on Finished Cables

The following cable integrity tests are carried out on 100% factory lengths in accordance with the applicable cable standard.

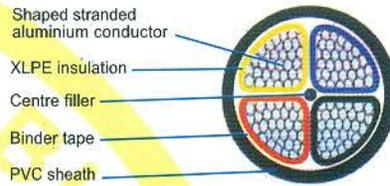
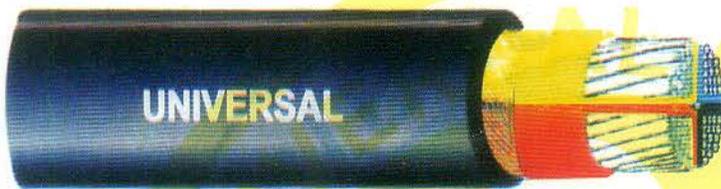
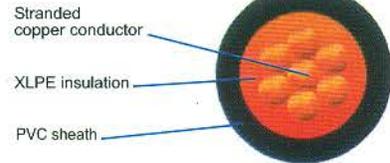
- Cable Marking
- Conductor resistance test
- Armour resistance test
- Voltage test
- Compatibility test
- Test for flame propagation of single cable

Note: The above tests are carried out as per the frequency and methods described in the relevant clauses of BS-5467

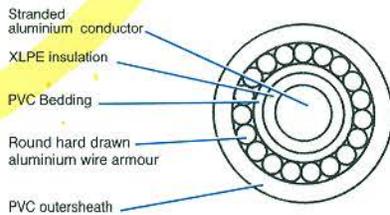
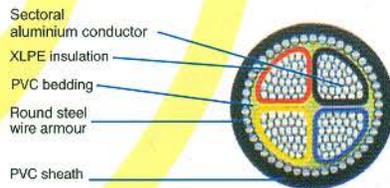
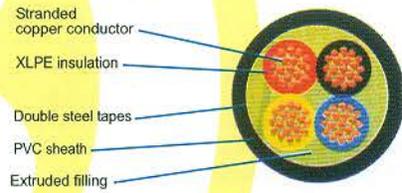


Cable constructional (Figurative) description for various core configuration and conductor material.

Single core and multicore cables with copper or aluminium XLPE insulated, non-armoured overall PVC sheathed 600/1000 V conforming to BS 5467.



Single core and multicore cables with copper or aluminium XLPE insulated, armoured overall PVC sheathed 600/1000 V and 1900/3300 V conforming to BS 5467.



**Construction data tables for non-armoured and armoured cables.
600 / 1000 V**

Ref: Table no: 1,2,3,4,5,& 6, ref: page 7 - 10 copper

Ref: Table no: 7,8,9,10,& 11, ref: page 11 -13 aluminium

1900 / 3300 V

Ref: Table no: 12, & 13, ref: page 13 & 14 copper

Ref: Table no: 14, & 15, ref: page 14 & 15 aluminium



Construction data

Stranded **Copper Conductors** XLPE insulated 600/1000V

Non- armoured and Armoured,PVC Oversheated Cables

Single - core (BS-5467 reference table -10)

Table-1

Nominal area of conductor*	Thickness of insulation	Non - armoured cables		Armoured cables			
		Thickness of sheath	Approximate overall diameter	Thickness of extruded bedding	Nominal armour wire diameter (Aluminium)	Thickness of oversheath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm	mm	mm
50	1.0	1.4	14.2	0.8	0.9	1.5	17.5
70	1.1	1.4	16.2	0.8	1.25	1.5	20.2
95	1.1	1.5	18.3	0.8	1.25	1.6	22.3
120	1.2	1.5	20.2	0.8	1.25	1.6	24.2
150	1.4	1.6	22.4	1.0	1.6	1.7	27.4
185	1.6	1.6	24.7	1.0	1.6	1.8	30.0
240	1.7	1.7	27.7	1.0	1.8	1.8	32.8
300	1.8	1.8	30.6	1.0	1.8	1.9	35.6
400	2.0	1.9	34.2	1.2	2.0	2.0	40.4
500	2.2	2.0	38.0	1.2	2.0	2.1	44.2
630	2.4	2.2	42.9	1.2	2.0	2.2	48.8
800	2.6	2.3	47.8	1.4	2.5	2.4	55.4
1000	2.8	2.4	53.0	1.4	2.5	2.5	60.6

*Circular or circular compacted stranded conductors (class 2)

Construction data

Stranded **Copper Conductors** XLPE insulated 600/1000V

Non- armoured and Armoured,PVC Oversheated Cables

Two- core (BS-5467 reference table -12)

Table-2

Nominal area of conductor	Thickness of insulation	Non - armoured cables		Armoured cables			
		Thickness of sheath	Approximate overall diameter	Thickness of extruded bedding	Nominal armour wire diameter GSW	Thickness of oversheath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm	mm	mm
1.5	0.6	..	..	0.8	0.9	1.3	11.7
1.5*	0.6	..	..	0.8	0.9	1.4	12.3
2.5	0.7	..	..	0.8	0.9	1.4	13.1
2.5*	0.7	..	..	0.8	0.9	1.4	13.6
4*	0.7	..	..	0.8	0.9	1.4	14.7
6*	0.7	..	..	0.8	0.9	1.4	15.9
10*	0.7	..	..	0.8	0.9	1.5	18.0
16*	0.7	1.8	17.2	0.8	1.25	1.5	20.0
25**	0.9	1.8	17.0	0.8	1.25	1.6	20.4
35**	0.9	1.8	18.8	1.0	1.6	1.7	23.4
50**	1.0	1.8	21.0	1.0	1.6	1.8	25.8
70**	1.1	1.8	24.0	1.0	1.6	1.9	29.0
95**	1.1	1.9	26.9	1.2	2.0	2.0	33.1
120**	1.2	2.0	29.9	1.2	2.0	2.1	36.1
150**	1.4	2.2	33.4	1.2	2.0	2.2	39.3
185**	1.6	2.3	37.1	1.4	2.5	2.4	44.7
240**	1.7	2.5	41.7	1.4	2.5	2.5	49.0
300**	1.8	2.6	45.8	1.6	2.5	2.5	53.5
400**	2.0	2.9	51.6	1.6	2.5	2.8	59.0

• Circular solid conductors (class 1)

* Circular or circular compacted stranded conductors (class 2)

** Shaped stranded conductors (class 2)



UNIVERSAL CABLES INDUSTRIES LTD.

Construction data
Stranded **Copper Conductors** XLPE insulated 600/1000V
Non- armoured and Armoured,PVC Oversheated Cables

Three - core (BS-5467 reference table -14)

Table -3

Nominal area of conductor	Thickness of insulation	Non - armoured cables		Armoured cables			
		Thickness of sheath	Approximate overall diameter	Thickness of extruded bedding	Nominal armour wire diameter GSW	Thickness of oversheath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm	mm	mm
1.5	0.6	..	..	0.8	0.9	1.4	12.3
1.5*	0.6	..	..	0.8	0.9	1.4	12.8
2.5	0.7	..	..	0.8	0.9	1.4	13.6
2.5*	0.7	..	..	0.8	0.9	1.4	14.1
4*	0.7	..	..	0.8	0.9	1.4	15.3
6*	0.7	..	..	0.8	0.9	1.4	16.6
10*	0.7	..	..	0.8	1.25	1.5	19.5
16*	0.7	1.8	18.3	0.8	1.25	1.6	21.2
25**	0.9	1.8	19.0	1.0	1.6	1.7	23.6
35**	0.9	1.8	21.0	1.0	1.6	1.8	25.9
50**	1.0	1.8	23.6	1.0	1.6	1.8	28.5
70**	1.1	1.9	27.4	1.0	1.6	1.9	32.2
95**	1.1	2.0	30.8	1.2	2.0	2.1	37.0
120**	1.2	2.1	34.2	1.2	2.0	2.2	40.4
150**	1.4	2.2	37.9	1.4	2.5	2.3	45.5
185**	1.6	2.4	42.5	1.4	2.5	2.4	49.8
240**	1.7	2.6	47.8	1.4	2.5	2.6	55.1
300**	1.8	2.7	52.6	1.6	2.5	2.7	60.2
400**	2.0	3.0	59.2	1.6	2.5	2.9	66.6

* Circular solid conductors (class 1)

* Circular or circular compacted stranded conductors (class 2)

** Shaped stranded conductors (class 2)

GSW: Galvanized steel wire



Construction data
Stranded **Copper Conductors** XLPE insulated 600/1000V
Non- armoured and Armoured, PVC Oversheated Cables

Four- core (BS-5467 reference table -16)

Table -4

Nominal area of conductor	Thickness of insulation	Non - armoured cables		Armoured cables			
		Thickness of sheath	Approximate overall diameter	Thickness of extruded bedding	Nominal armour wire diameter GSW	Thickness of oversheath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm	mm	mm
1.5*	0.6	..	..	0.8	0.9	1.4	13.0
1.5*	0.6	..	..	0.8	0.9	1.4	13.5
2.5*	0.7	..	..	0.8	0.9	1.4	14.5
2.5*	0.7	..	..	0.8	0.9	1.4	15.0
4*	0.7	..	..	0.8	0.9	1.4	16.4
6*	0.7	..	..	0.8	1.25	1.5	18.7
10*	0.7	..	..	0.8	1.25	1.5	21.1
16*	0.7	1.8	20.0	0.8	1.25	1.6	22.9
25**	0.9	1.8	21.4	1.0	1.6	1.7	26.1
35**	0.9	1.8	23.9	1.0	1.6	1.8	28.8
50**	1.0	1.8	26.9	1.0	1.6	1.9	32.0
70**	1.1	2.0	31.5	1.2	2.0	2.1	37.7
95**	1.1	2.1	35.6	1.2	2.0	2.2	41.7
120**	1.2	2.2	39.5	1.4	2.5	2.3	47.1
150**	1.4	2.4	44.1	1.4	2.5	2.4	51.4
185**	1.6	2.6	49.3	1.4	2.5	2.6	56.6
240**	1.7	2.8	55.5	1.6	2.5	2.7	63.0
300**	1.8	3.0	61.4	1.6	2.5	2.9	68.8
400**	2.0	3.2	68.8	1.6	3.15	3.2	78.1

* Circular solid conductors (class 1)

* Circular or circular compacted stranded conductors (class 2)

** Shaped stranded conductors (class 2)

GSW: Galvanized steel wire



UNIVERSAL CABLES INDUSTRIES LTD.

Construction data
 Stranded **Copper Conductors** XLPE insulated 600/1000V
 Non- armoured and Armoured, PVC Oversheated Cables
 Four Core with Reduced Neutral Conductor
 3^{1/2}- core (BS-5467 reference table -18)

Table -5

Nominal cross-sectional area		Thickness in insulation		Non - armoured cables		Armoured cables			
Phase	Neutral	Phase	Neutral	Thickness of sheath	Approximate overall diameter	Thickness of extruded bedding	Nominal armour wire diameter GSW	Thickness of oversheath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm	mm	mm	mm	mm
25**	16*	0.9	0.7	1.8	21.4	1.0	1.6	1.7	26.1
35**	16*	0.9	0.7	1.8	23.2	1.0	1.6	1.8	28.0
50**	25*	1.0	0.9	1.8	26.1	1.0	1.6	1.9	31.2
70**	35*	1.1	0.9	1.9	30.4	1.2	2.0	2.0	36.6
95**	50*	1.1	1.0	2.0	34.8	1.2	2.0	2.1	41.0
120**	70*	1.2	1.1	2.2	39.4	1.2	2.0	2.2	45.3
150**	70*	1.4	1.1	2.3	42.5	1.4	2.5	2.4	50.0
185**	95*	1.6	1.1	2.4	47.7	1.4	2.5	2.5	55.3
240**	120*	1.7	1.2	2.6	53.4	1.6	2.5	2.6	61.0
300**	150*	1.8	1.4	2.8	59.0	1.6	2.5	2.8	66.7
300**	185*	1.8	1.6	2.9	61.2	1.6	2.5	2.8	68.6
400**	185*	2.0	1.6	3.1	66.4	1.6	2.5	3.0	73.8

* Circular or circular compacted stranded conductors

** Shaped stranded conductors

Construction data
 600/1000V armoured auxiliary cables with stranded **Copper Conductors**
 (BS-5467 reference table -23)

Table -6

Number of *cores	Nominal area of conductor (mm ²)	Thickness of insulation mm	Thickness of extruded bedding mm	Nominal armour wire diameter mm	Thickness of oversheath mm	Approximate overall diameter mm
7	1.5	0.6	0.8	0.90	1.4	15.2
12			0.8	1.25	1.5	19.4
19			0.8	1.25	1.6	22.2
27			1.0	1.6	1.7	26.7
37			1.0	1.6	1.8	29.2
7	2.5	0.7	0.8	0.9	1.4	17.1
12			0.8	1.25	1.6	22.4
19			1.0	1.6	1.7	26.6
27			1.0	1.6	1.8	30.7
37			1.0	1.6	1.8	33.8
7	4.0	0.7	0.8	1.25	1.5	19.7
12			1.0	1.6	1.6	25.7
19			1.0	1.6	1.7	29.3
27			1.0	1.6	1.9	34.4
37			1.2	2.0	2.0	39.2

*Circular or circular compacted stranded conductors (Class-2)

" The number of cores given here are preferred. Other numbers are permitted subject to agreement between purchaser and manufacturer, and where such other numbers are manufactured, the dimensional details shall be as for the next highest preferred number of cores.



UNIVERSAL CABLES INDUSTRIES LTD.

Construction data
Stranded **Aluminium Conductors** XLPE insulated 600/1000V
Non- armoured and Armoured, PVC Oversheated Cables
Single - core

Table 7

Nominal area of conductor*	Thickness of insulation	Non - armoured cables		Armoured cables			
		Thickness of sheath	Approximate overall diameter	Thickness of extruded bedding	Nominal armour wire diameter (Aluminium)	Thickness of oversheath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm	mm	mm
50	1.0	1.4	14.2	0.8	0.9	1.5	17.5
70	1.1	1.4	16.2	0.8	1.25	1.5	20.2
95	1.1	1.5	18.3	0.8	1.25	1.6	22.3
120	1.2	1.5	20.2	0.8	1.25	1.6	24.2
150	1.4	1.6	22.4	1.0	1.6	1.7	27.4
185	1.6	1.6	24.7	1.0	1.6	1.8	30.0
240	1.7	1.7	27.7	1.0	1.8	1.8	32.8
300	1.8	1.8	30.6	1.0	1.8	1.9	35.6
400	2.0	1.9	34.2	1.2	2.0	2.0	40.4
500	2.2	2.0	38.0	1.2	2.0	2.1	44.2
630	2.4	2.2	42.9	1.2	2.0	2.2	48.8
800	2.6	2.3	47.8	1.4	2.5	2.4	55.4
1000	2.8	2.4	53.0	1.4	2.5	2.5	60.6

*Circular or circular compacted stranded conductors (class 2)

Construction data
Stranded **Aluminium Conductors** XLPE insulated 600/1000V
Non- armoured and Armoured, PVC Oversheated Cables
Two - core

Table-8

Nominal area of conductor*	Thickness of insulation	Non - armoured cables		Armoured cables			
		Thickness of sheath	Approximate overall diameter	Thickness of extruded bedding	Nominal armour wire diameter GSW	Thickness of oversheath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm	mm	mm
16*	0.7	1.8	17.2	0.8	1.25	1.5	20.0
25**	0.9	1.8	17.0	0.8	1.25	1.6	20.4
35**	0.9	1.8	18.8	1.0	1.6	1.7	23.4
50**	1.0	1.8	21.0	1.0	1.6	1.8	25.8
70**	1.1	1.8	24.0	1.0	1.6	1.9	29.0
95**	1.1	1.9	26.9	1.2	2.0	2.0	33.1
120**	1.2	2.0	29.9	1.2	2.0	2.1	36.1
150**	1.4	2.1	33.4	1.2	2.0	2.2	39.3
185**	1.6	2.2	37.1	1.4	2.5	2.4	44.7
240**	1.7	2.4	41.7	1.4	2.5	2.5	49.0
300**	1.8	2.6	45.8	1.6	2.5	2.5	53.5
400**	2.0	2.9	51.6	1.6	2.5	2.8	59.0

*Circular or circular compacted stranded conductors (class 2)

**Shaped stranded conductors (class 2)

GSW: Galvanized steel wire



Construction data
Stranded **Aluminium Conductors** XLPE insulated 600/1000V
Non- armoured and Armoured, PVC Oversheathed Cables
Three - core

Table 9

Nominal area of conductor (mm ²)	Thickness of insulation mm	Non - armoured cables		Armoured cables			
		Thickness of sheath mm	Approximate overall diameter mm	Thickness of extruded bedding mm	Nominal armour wire diameter GSW mm	Thickness of overshath mm	Approximate overall diameter mm
16*	0.7	1.8	18.3	0.8	1.25	1.6	21.2
25**	0.9	1.8	19.0	1.0	1.6	1.7	23.6
35**	0.9	1.8	21.0	1.0	1.6	1.8	25.9
50**	1.0	1.8	23.6	1.0	1.6	1.8	28.5
70**	1.1	1.9	27.4	1.0	1.6	1.9	32.2
95**	1.1	2.0	30.8	1.2	2.0	2.1	37.0
120**	1.2	2.1	34.2	1.2	2.0	2.2	40.4
150**	1.4	2.2	37.9	1.4	2.5	2.3	45.5
185**	1.6	2.4	42.5	1.4	2.5	2.4	49.8
240**	1.7	2.6	47.8	1.4	2.5	2.6	55.1
300**	1.8	2.7	52.6	1.6	2.5	2.7	60.2
400**	2.0	3.0	59.2	1.6	2.5	2.9	66.6

*Circular or circular compacted stranded conductors (class 2)

**Shaped stranded conductors (class 2)

GSW: Galvanized steel wire

Construction data
Stranded **Aluminium Conductors** XLPE insulated 600/1000V
Non- armoured and Armoured, PVC Oversheathed Cables
Four - core

Table 10

Nominal area of conductor (mm ²)	Thickness of insulation mm	Non - armoured cables		Armoured cables			
		Thickness of sheath mm	Approximate overall diameter mm	Thickness of extruded bedding mm	Nominal armour wire diameter GSW mm	Thickness of overshath mm	Approximate overall diameter mm
16*	0.7	1.8	20.0	20.0	1.25	1.6	22.9
25**	0.9	1.8	21.4	21.4	1.6	1.7	26.1
35**	0.9	1.8	23.9	23.9	1.6	1.8	28.8
50**	1.0	1.8	26.9	26.9	1.6	1.9	32.0
70**	1.1	2.0	31.5	31.5	2.0	2.1	37.7
95**	1.1	2.1	35.6	35.6	2.0	2.2	41.7
120**	1.2	2.2	39.5	39.5	2.5	2.3	47.1
150**	1.4	2.4	44.1	44.1	2.5	2.4	51.4
185**	1.6	2.6	49.3	49.3	2.5	2.6	56.6
240**	1.7	2.8	55.5	55.5	2.5	2.7	63.0
300**	1.8	3.0	61.4	61.4	2.5	2.9	68.8
400**	2.0	3.2	68.8	68.8	3.15	3.2	78.1

*Circular or circular compacted stranded conductors (class 2)

**Shaped stranded conductors (class 2)

GSW: Galvanized steel wire



Construction data
Stranded **Aluminium Conductors** XLPE insulated 600/1000V
Non- armoured and Armoured, PVC Oversheated Cables
Four - core with Reduced Neutral Conductor
3½ core

Table 11

Nominal cross-sectional area		Thickness of insulation		Non - armoured cables		Armoured cables			
Phase	Neutral	Phase	Neutral	Thickness of sheath	Approximate overall diameter	Thickness of extruded bedding	Nominal armour wire diameter GSW	Thickness of overshath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm	mm	mm	mm	mm
25**	16*	0.9	0.7	1.8	21.4	1.0	1.6	1.7	26.1
35**	16*	0.9	0.7	1.8	23.2	1.0	1.6	1.8	28.0
50**	25*	1.0	0.9	1.8	26.1	1.0	1.6	1.9	31.2
70**	35*	1.1	0.9	1.9	30.4	1.2	2.0	2.0	36.6
95**	50*	1.1	1.0	2.0	34.8	1.2	2.0	2.1	41.0
120**	70*	1.2	1.1	2.2	39.4	1.2	2.0	2.2	45.3
150**	70*	1.4	1.1	2.3	42.5	1.4	2.5	2.4	50.0
185**	95*	1.6	1.1	2.4	47.7	1.4	2.5	2.5	55.3
240**	120*	1.7	1.2	2.6	53.4	1.6	2.5	2.6	61.0
300**	150*	1.8	1.4	2.8	59.0	1.6	2.5	2.8	66.7
300**	185*	1.8	1.6	2.9	61.2	1.6	2.5	2.8	68.6
400**	185*	2.0	1.6	3.1	66.4	1.6	2.5	3.0	73.8

*Circular or circular compacted stranded conductors

**Shaped stranded conductors

Construction data
Stranded **Copper Conductors** XLPE insulated 1900/3300V
Armoured, PVC Oversheated Cables
Single - core (BS-5467 reference table-19)

Table 12

Nominal area of conductor*	Thickness of insulation	Thickness of extruded bedding	Nominal armour wire diameter (Aluminium)	Thickness of overshath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm
50	2.0	0.8	1.25	1.6	20.6
70	2.0	0.8	1.25	1.6	22.4
95	2.0	0.8	1.25	1.6	24.3
120	2.0	1.0	1.6	1.7	27.2
150	2.0	1.0	1.6	1.7	28.8
185	2.0	1.0	1.6	1.8	30.8
240	2.0	1.0	1.6	1.8	33.4
300	2.0	1.0	1.6	1.9	36.1
400	2.0	1.2	2.0	2.0	40.4
500	2.2	1.2	2.0	2.1	44.2
630	2.4	1.2	2.0	2.2	48.8
800	2.6	1.4	2.5	2.4	55.4
1000	2.8	1.4	2.5	2.5	60.6

*Circular or circular compacted stranded conductors (class 2)



UNIVERSAL CABLES INDUSTRIES LTD.

Construction data

Stranded **Copper Conductors** XLPE insulated 1900/3300V

Armoured, PVC Oversheathed Cables

Three - core (BS-5467 reference table-21)

Table-13

Nominal area of conductor*	Thickness of insulation	Thickness of extruded bedding	Nominal armour wire diameter GSW	Thickness of oversheath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm
16*	2.0	1.0	1.6	1.8	28.9
25*	2.0	1.0	1.6	1.8	32.2
35*	2.0	1.0	1.6	1.9	35.0
50**	2.0	1.2	2.0	2.0	34.7
70**	2.0	1.2	2.0	2.1	38.0
95**	2.0	1.2	2.0	2.2	41.4
120**	2.0	1.4	2.5	2.3	45.7
150**	2.0	1.4	2.5	2.4	48.5
185**	2.0	1.4	2.5	2.5	51.9
240**	2.0	1.6	2.5	2.6	56.9
300**	2.0	1.6	2.5	2.7	61.2
400**	2.0	1.6	2.5	2.9	66.6

*Circular or circular compacted stranded conductors (class 2)

**Shaped stranded conductors (class 2)

Construction data

Stranded **Aluminium Conductors** XLPE insulated 1900/3300V

Armoured, PVC Oversheathed Cables

Single - core

Table 14

Nominal area of conductor	Thickness of insulation	Thickness of extruded bedding	Nominal armour wire diameter (Aluminium)	Thickness of oversheath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm
50	2.0	0.8	1.25	1.6	20.6
70	2.0	0.8	1.25	1.6	22.4
95	2.0	0.8	1.25	1.6	24.3
120	2.0	1.0	1.6	1.7	27.2
150	2.0	1.0	1.6	1.7	28.8
185	2.0	1.0	1.6	1.8	30.8
240	2.0	1.0	1.6	1.8	33.4
300	2.0	1.0	1.6	1.9	36.1
400	2.0	1.2	2.0	2.0	40.4
500	2.2	1.2	2.0	2.1	44.2
630	2.4	1.2	2.0	2.2	48.8
800	2.6	1.4	2.5	2.4	55.4
1000	2.8	1.4	2.5	2.5	60.6

*Circular or circular compacted stranded conductors (class 2)



UNIVERSAL CABLES INDUSTRIES LTD.

Construction data
 Stranded **Aluminium Conductors** XLPE insulated 1900/3300V
 Armoured, PVC Oversheathed Cables
 Three - core

Table 15

Nominal area of conductor	Thickness of insulation	Thickness of extruded bedding	Nominal armour wire diameter (Aluminium)	Thickness of oversheath	Approximate overall diameter
(mm ²)	mm	mm	mm	mm	mm
16*	2.0	1.0	1.6	1.8	28.9
25*	2.0	1.0	1.6	1.8	32.2
35*	2.0	1.0	1.6	1.9	35.0
50**	2.0	1.2	2.0	2.0	34.7
70**	2.0	1.2	2.0	2.1	38.0
95**	2.0	1.2	2.0	2.2	41.4
120**	2.0	1.4	2.5	2.3	45.7
150**	2.0	1.4	2.5	2.4	48.5
185**	2.0	1.4	2.5	2.5	51.9
240**	2.0	1.6	2.5	2.6	56.9
300**	2.0	1.6	2.5	2.7	61.2
400**	2.0	1.6	2.5	2.9	66.6

*Circular or circular compacted stranded conductors (class 2)

**Shaped stranded conductors (class 2)



Current-Carrying Capacity and Voltage Drop

A. Basis for tabulated current carrying capacity:

The tabulated current carrying capacities relate to continuous loading and single circuit installation method as referred to in the tables and are based on the following criteria:

Note: The details of installation methods are given in Appendix -A, page no.65-70

- For A.C. operating supply only to frequency 49 to 61 Hz.
- Ambient temperature of 30°C
- Conductor operating temperature of 70°C and XLPE 90°C
- The current ratings for single core armoured cables are for the condition of armour bonded at both end to earth.

This to ensure "Full Thermal Current Ratings" for intended service life of the cables, if cables are operated for any prolonged periods at higher than the indicated values of temperature that would result in earlier failure.

The selection of appropriate conductor size will also require to consider the following:

- Over current protection.
- Protection against thermal effects.
- Protection against electric shocks.
- Voltage Drop.
- Terminals' limiting temperature.

B. Correction factors for current-carrying capacity:

The current-carrying capacity of a cable for continuous service is affected by ambient temperature by grouping by partial or total enclosure in thermal insulating material and for a.c. by frequency This text provides correction factors in these respects as follows:

B.1 Ambient temperature measurement

Table-2a (page 25) gives the correction factor to be applied to the tabulated current-carrying capacity depending upon the actual ambient temperature of the location in which the cable is to be installed.

In practice the ambient air temperatures may be determined by thermometers placed in free air as close as practicable to the position at which the cables are installed or are to be installed, subject to the proviso that the measurement are not to be influenced by the heat arising from the cables; thus if the measurements are made while the cables are loaded, the thermometers should be placed about 0.5m or ten times the overall diameter of the cable, whichever is the lesser, from the cables, in the horizontal plane, or 150mm below the lowest of the cables.

Note: The above referred to table does not take account of temperature increase if any, due to solar or other infrared radiation. Where cables are subject to such radiation, the current-carrying capacity may need to be specially calculated.

B.2 Grouping

Tables 1&2 give the correction factors to be applied to the tabulated current-carrying capacity where cables or circuits are grouped.

B.3 other frequencies

In extreme cases, notably for large multicore cables, the reduction in current-carrying capacity of cables carrying, for example, balanced 400 Hz a.c compared with the current-carrying capacity at 50 Hz, may be as much 50%. For small cables and flexible cords such as may be used to supply individual tools, the difference in the 50 Hz and the 400 Hz current-carrying capacities may be negligible.

B.4 Thermal insulation:

In the appropriate tables of current - carrying capacities, provision is made for the installation of cables in thermally insulated wall or ceiling but in contact by thermally conductive surface on one side only, for a cable likely to be totally surrounded by thermally insulating material, the current-carrying capacity may, in the absence of more precise information, be taken as 0.5 times the value applicable to installation method 1 or 2 as appropriate.

*UCIL publication code: WIPS-V104C - Wiring installations and power supply cables.



C. Effective current carrying capacity:

The tabulated values relate to the maximum current that can be carried in the specified conditions without the conductors exceeding the permissible limit of steady state temperature for the type of insulation concerned.

The values of current tabulated represent the effective current-carrying capacity only where no correction factor is applicable. Otherwise the current-carrying capacity corresponds to the tabulated value multiplied by the appropriate factor or factors for ambient temperature, grouping and thermal insulation as applicable

Irrespective of the type of overcurrent protective device associated with the conductors concerned, the ambient temperature correction factors to be used when calculating current-carrying capacity (as opposed to those used when selecting cable sizes) are those given in table-2a.

D. Relationship of current-carrying capacity to other circuit parameters:

The relevant symbols used in the Regulations are as follows:

- I_z the current-carrying capacity of a cable for continuous service, under the particular installation conditions concerned
- I_t the value of current tabulated in this catalogue for the type of cable and installation method concerned for a single in an ambient temperature of 30°C.
- I_b the design current of the circuit i.e. the current intended to be carried by the circuit in normal service.
- I_n the nominal current or current setting of the device protecting the circuit against overcurrent.
- I_2 the operating current (i.e. the fusing current or tripping current for the conventional operating time) of the device protecting the circuit against overload.
- C a correction factor to be applied where the installation conditions differ from those for which values of current-carrying capacities are tabulated reference Tables 3 to 10 (Copper conductor) and 11 to 18 (Aluminium conductor) in this section of the catalogue. The various correction factors are identified as follows.
 - C_a for ambient temperature
 - C_g for grouping,
 - C_i for thermal insulation
 - C_t for operating temperature of conductor.

In all circumstances I_z must be not less than I_b and I_n also must be not less than I_b . Where the overcurrent device is intended to afford protection against overload I_2 must not exceed 1.45 I_z and I_n must not exceed I_z (seen item E below).

Where the overcurrent device is intended to afford short circuit protection only I_n can be greater than I_z and I_2 can be greater than 1.45 I_z . The protective device is then to be selected for compliance with Regulation 434-03-03.

E. Overload protection

Where overload protection is required the type of protection provided does not affect the current carrying capacity of a cable for continuous service (I_z) but it may affect the choice of conductor size. The operating conditions of a cable are influenced not only by the limiting conductor temperature for continuous service but also by the conductor temperature which might be attained during the conventional operating time of the overload protection device in the event of an overload.



This means that the operating current of the protective device must not exceed $1.45 I_z$. Where the protective device is a fuse to BS 88 or BS 1361, a circuit-breaker to BS EN 60898 or BS EN 60947-2 or a residual current circuit-breaker with integral overcurrent protection to BS EN 61009-1 (RCBO), this requirement is satisfied by selecting a value of I_z not less than I_n .

In practice, because of the standard steps in nominal rating of fuses and circuit-breakers, it is often necessary to select a value of I_n exceeding I_b . In that case, because it is also necessary for I_z in turn to be not less than the selected value of I_n , the choice of conductor cross-sectional area may be dictated by the overload conditions and the current-carrying capacity (I_z) of the conductors will not always be fully used.

The size needed for conductor protected against overload by a BS-3036 semi-enclosed fuse can be obtained by the use of a correction factor, $1.45/2=0.725$, which results in the same degree of protection as that afforded by other overload protective devices. This factor is to be applied to the nominal rating of the fuse as a divisor, thus indicating the minimum value of I_t required of the conductor to be protected. In this case also, the choice of conductor size is dictated by the overload conditions and current carrying capacity (I_z) of the conductors can not be fully used.

F. Determination of the size of cable to be used:

Having established the design current (I_b) of the circuit under consideration, the appropriate procedure described in items E.1 to E.4 below will enable the designer to determine the size of the cable it will be necessary to use. As a preliminary step it is useful to identify the length of the cable run and the permissible voltage drop for the equipment being supplied, as this may be an overriding consideration (see Regulation 525-01-01 page no.23 and item G of this section page 21).

The following steps are required - Know the length of the cable run, permissible voltage drop in mV when divided by I_b and by the cable length of run, will give the value of voltage drop in mV/A/m which can be tolerated. A voltage drop not exceeding that value is identified in the appropriate table and the corresponding cross-sectional area of conductor needed on this account can be read off directly before any other calculations are made.

The conductor size necessary from consideration of the conditions of normal load and overload is then determined. Whilst all correction factors affecting I_z (that is, the factors for ambient temperature, grouping, and thermal insulation) can, if desired be applied to the values of I_t as multipliers, giving the effective I_z for the installation conditions concerned, this involves a process of trial and error until a cross-sectional area is reached which ensure that I_z is not less than I_b and not less than I_n of any protective device it is intended to select. In any event, if a correction factor for protection by a semi-enclosed fuse is necessary, this has to be applied to I_n as a divisor. It is therefore more convenient to apply all the correction factors to I_n as divisors.

This method is used in items F.1 to F.3 and produces a value of current and that value (or the next larger value) can readily be located in the appropriate table of current carrying capacity and the corresponding cross sectional area of conductor can be identified directly. It should be noted that value of I_t appearing against the chosen cross-sectional area is not I_z . It is not necessary to know I_z where the size of conductor is chosen by this method, but if it is desired to identify I_z the value is determined by the method indicated in item C above.

However, this method can not be used for cables installed in enclosed trenches (installation methods 18, 19 and 20 of * Appendix-A page 65-70) because correction factors given in Table-2 are related to conductor cross-sectional areas. For such cables it is therefore necessary to use the process of trial and error described in the third paragraph above, selecting on a trial basis a particular size of cable from, for instance, voltage drop considerations.

***UCIL publication code: WIPS-VI04C-Wiring installations and power supply cables.**

F.1 Where overload protection is afforded by fuse to BS-88 or BS-1361, or a circuit-breaker to BSEN 60898 or BS EN 60947-2 or a residual current circuit-breaker with integral overcurrent protection to BS EN 61009-1 (RCBO)



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F.1.1 For single circuits.

- DIVIDE the nominal current of the protective device (I_n) by any applicable correction factor for ambient temperature (C_a) given in table-2a.
- then further DIVIDE by any applicable correction factor for thermal insulation (C_i).

The size of cable to be used is to be such that its tabulated current-carrying capacity (I_t) is not less than the value of nominal current of the protective device adjusted as above:

$$I_t \geq \frac{I_n}{C_a C_i} \quad (1)$$

F.1.2 For groups

- DIVIDE the nominal current of the protective device (I_n) by the correction factor for grouping (C_g) given in Tables 1-2.

$$I_t \geq \frac{I_n}{C_g} \quad (2)$$

Alternatively, it may be selected in accordance with the following formulae, provided, that the circuits of the group are not liable to simultaneous overload :

$$I_t \geq \frac{I_b}{C_g}, \text{ and} \quad (3)$$

$$I_t \geq \sqrt{I_n^2 + 0.48 I_b^2 \left[\frac{1 - C_g^2}{C_g^2} \right]} \quad (4)$$

The size of cable to be used is to be such that its tabulated single current-carrying capacity (I_t) is not less than the value of I_t calculated in accordance with formula (2) above or where formulae (3) and (4) are used not less than the larger of the resulting two values of I_t . Where correction factors C_a and/or C_i are applicable they are to be applied as divisors to the value of I_t determined by the above formulae.

F2 Where the protective device is a semi-enclosed fuse to BS 3036.

F2 For single circuits .

- DIVIDE the nominal current of the fuse(I_n) by an applicable correction factor for ambient temperature (C_a) given in Table-2a.

- then further DIVIDE by any applicable correction factor for thermal insulation, (C_i).
- then further DIVIDE by 0.725.

The size of the cable to be used is to be such that its tabulated current-carrying capacity (I_t) is not less than the value of nominal current of the fuse adjusted as above:

$$I_t \geq \frac{I_n}{0.725 C_a C_i} \quad (5)$$



F.2.2 For groups

-DIVIDE the nominal current of the fuse I_n by 0.725 and by the applicable correction factor for grouping (C_g) given in Tables 1-2:

$$I_t \geq \frac{I_n}{0.725 C_g} \quad (6)$$

Alternatively, it may be selected by the following formulae, provided that the circuits of the groups are not liable to simultaneous overload:

$$I_t \geq \frac{I_b}{C_g}, \text{ and} \quad (7)$$

$$I_t \geq \sqrt{1.9 I_n^2 + 0.48 I_b^2 \left[\frac{I_n - C_g^2}{C_g^2} \right]} \quad (8)$$

The size of cable to be used is to be such that its tabulated single-circuit current-carrying capacity (I_t) is not less than the value of I_t calculated in accordance with formula (6) above or where formulae (7) and (8) are used, not less than the larger of the resulting two values of I_t .

Where correction factors C_a and/ or C_i are applicable they are to be applied as divisors to the value of I_t determined by the above formulae.

F.3 Where overload protection is not required

Where Regulation 473-01-04 applies and the cable under consideration is not required to be protected against overload, the design current of the circuit (I_b) is to be divided by any applicable correction factors, and the size of the cable to be used is to be such that its tabulated current-carrying capacity (I_t) for the installation method concerned is not less than the value of I_b adjusted as above:

$$I_t \geq \frac{I_b}{C_a C_g C_i} \quad (9)$$

F.4 Variation of installation conditions along a cable route

The procedures in items F.1 to F.3 above are based on the assumption that all the conditions necessitating the use of correction factors apply to the same part of the route of the conductors of the circuit. Where various factors apply to different part of the route, each part may be treated separately, or alternatively only the factor or combination of factors appropriate to the most onerous conditions encountered along the route may be applied to the whole of the route. It is permissible to obtain more precise factors by calculation of the various conductor temperature rises that will occur along such a route, provided that appropriate limiting temperature of the conductor is nowhere exceeded (see Regulation 523-01).



G. Tables of voltage drop

In the tables, values of voltage drop are given for a current of one ampere for a meter run, i.e. for a distance of 1m along the route taken by the cables, and represent the result of the voltage drops in all circuit conductors. The values of voltage drop assume that the conductors are at their maximum permitted normal operating temperatures.

The values in the tables, for a.c. operation apply only to frequencies in the range 49 to 61Hz and for single-core armoured cables the tabulated value apply where the armour is bonded to earth at both ends. The value of voltage drop for cables operating at higher frequencies may be substantially greater.

For a given run, to calculate the voltage drop (in mV) the tabulated value of voltage drop per ampere per meter for the cable concerned has to be multiplied by the length of the run in meters and by the current the cable is intended to carry, namely the design current of the circuit (I_b) in amperes. For three-phase circuits the tabulated mV/A/m values relate to the line voltage and balanced conditions have been assumed.

For cables having conductors of 16mm² or less cross-sectional area their inductances can be ignored and (mV/A/m)_r values only are tabulated. For cables having conductors greater than 16mm², cross-sectional area the impedance values are given as (mV/A/m)_z together with the resistive component (mV/A/m)_r and the reactive component (mV/A/m)_x.

The direct use of the tabulated (mV/A/m)_r or (mV/A/m)_z values as appropriate may lead to pessimistically high calculated values of voltage drop or in other words to unnecessarily low values of permitted circuit lengths.

For example, where the design current of circuit is significantly less than the effective current-carrying capacity of the cable chosen, the actual voltage drop would be less than the calculated value because the conductor temperature (and hence its resistance) will be less than that on which the tabulated m V/A/m had been based.

As regards power factor in a.c. circuits the use of the tabulated m V/A/m values, (for the larger cable sizes the tabulated (mV/A/m)_z values to calculate the voltage drop is strictly correct only when the phase angle of the cable equals that of the load. When the phase angle of the cable does not equal that of the load, the direct use of the tabulated mV/A/m or (mV/A/m)_z values leads to a calculated value of voltage drop higher than the actual value. In some cases it may be advantageous to take account of the load power factor when calculating voltage drop.

Where a more accurate assessment of voltage drop is desirable the following methods may be used.

G.1 Correction for operating temperature

For cables having conductors of cross-sectional area 16 mm² or less the design value of mV/A/m is obtained by multiplying the tabulated value by a factor C, given by

$$C_t = \frac{230 + t_p - \left(C_a^2 C_g^2 - \frac{I_b^2}{I_t^2} \right) (t_p - 30)}{230 + t_p} \quad (10)$$

Where t_p is the maximum permitted normal operating temperature (°C)



This equation applies only where the over current protective device is other than a BS 3036 fuse and where the actual ambient temperature is equal to or greater than 30°C

NOTE: For convenience, the above formula is based on the approximate resistance-temperature coefficient of 0.004 per°C at 20°C for both copper and aluminium conductors.

For cables having conductors of cross-sectional area greater than 16 mm², only resistive component of the voltage drop is affected by the temperature and the factor C_t is therefore applied only to the tabulated value of $(mV/m)_r$ and the design value of $(mV/A/m)_z$ is given by the vector sum of $C_t (mV/A/m)_r$ and $(mV/A/m)_x$

For very large conductor sizes where the resistive component of voltage drop is much less than the corresponding reactive part (i.e. when $x/r \geq 3$) this correction factor need not be considered.

G.2 Correction for load power factor

For cables having conductors of cross-sectional area of 16mm² or less the design value $mV/A/m$ is obtained approximately by multiplying the tabulated value by the power factor of the load, $\cos \phi$.

For cables having conductors of cross-sectional area greater than 16mm² the design value of $mV/A/m$ is given approximately by:

$$\cos \phi (\text{tabulated } (mV/A/m)_r) + \sin \phi (\text{tabulated } (mV/A/m)_x)$$

For single core cables in flat formation the tabulated values apply to the outer cable and may under estimate for the voltage drop between and outer cable and centre cable for cross-sectional area above 240mm and power factors greater than 0.8.

G.3 Combined correction for both operating temperature and load power factor

For items G.1 and G.2 above, where it is considered appropriate to correct the tabulated $mV/A/m$ values for both operating temperature and load power factor, the design values of $mV/A/m$ are given by:

for cables having conductors of 16mm² or less cross-sectional area

$$C_t \cos \phi (\text{tabulated } mV/A/m)$$

for cables having conductors of cross-sectional area greater than 16mm²

$$C_t \cos \phi (\text{tabulated } (mV/A/m)_r) + \sin \phi (\text{tabulated } (mV/A/m)_x)$$

H. Methods of installation of cables:

The methods of installation which are referred to in Table 1-18, are described in Appendix-A. (Page 65-70), provides guidance for the selection of the appropriate cable size.

Tables 3-18 contain current ratings for specific cable constructions. The method of installation distinguished by bold type are reference methods for which the current-carrying capacities given in the above referred to tables have been determined. For other methods in indication is given of the appropriate reference method having values of current-carrying capacity which can safely be applied.

As stated in Regulation 521-07-01 the use of other methods is not precluded, where specified by a suitably qualified electrical engineer; in that case the evaluation of current-carrying capacity may need to be based on experimental work.

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VOLTAGE DROP IN CONSUMERS' INSTALLATION

Ref: IEE 16th Edition/BS-7671:2001

Regulation No. 525 -Voltage drop in consumers' installation

Ref: 525-01-01. Under normal service conditions the voltage at the terminals of any fixed current-using equipment shall be greater than the lower limit corresponding to the British Standard relevant to the equipment.

Where the fixed current-using equipment concerned is not the subject of a British Standard the voltage at the terminal shall be such as not to impair the safe functioning of that equipment.

525-01-02 The requirements of Regulation 525-01-01 are deemed to be satisfied for a supply given in accordance with the Electricity Supply Regulations 1988 as amended if the voltage drop between the origin of the installation (usually the supply terminals) and a socket-outlet or the terminals of the fixed current-using equipment does not exceed 4% of the nominal voltage of the supply.

A greater voltage drop may be accepted for a motor during starting periods and for other equipment with high inrush currents provided that it is verified that the voltage variations are within the limits specified in the relevant British Standards for the equipment or, in the absence of a British Standard, in accordance with the manufacturer's recommendations.

BS-5467 reference appendix A.3 **Current Ratings**

In the foregoing the current ratings are based on IEE Wiring Regulations Sixteenth Edition/BS 7671:2001. For the current ratings for cables installed in situation other than those installed in and around buildings, reference should be made to the Current Rating Standards for Distribution Cables in accordance with ERA 69-30 Part V.



Correction factors for groups of more than one circuit of single - core cables or more than one multi-core cable (to be applied to the corresponding current-carrying capacity for single circuit in tables.)†

†Page/Table : 3/26, 4/27, 5/28, 6/29, 7/30, 8/31, 9/32, 10/33 (Copper Conductor).

†Page/Table: 11/34, 12/35, 13/36, 14/37, 15/38, 16/39, 17/40, 18/41 (Aluminium Conductor)

Table 1

Reference Method of installation Appendix A (page 65-70)		Correction factor (C _g)													
		Number of circuit or multi core cables													
		2	3	4	5	6	7	8	9	10	12	14	16	18	20
Enclosed (Method 3 or 4) or bunched clipped director to a non-metallic surface (method 1)		0.80	0.70	0.65	0.60	0.57	0.54	0.52	0.50	0.48	0.45	0.43	0.41	0.39	0.38
Single layer clipped to a non-metallic surface (Method 1)	Touching	0.85	0.79	0.75	0.73	0.72	0.72	0.71	0.70	---	---	---	---	---	---
	Speed*	0.94	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Single layer multi core on a perforated metallic cable tray, vertical or horizontal (Method 11)	Touching	0.86	0.81	0.77	0.75	0.74	0.73	0.73	0.72	0.71	0.70	---	---	---	---
	Speed*	0.91	0.89	0.88	0.87	0.87	---	---	---	---	---	---	---	---	---
Single layer single core on a perforated metallic cable tray, touching (Method 11)	Horizontal	0.90	0.85	---	---	---	---	---	---	---	---	---	---	---	---
	Vertical	0.85	---	---	---	---	---	---	---	---	---	---	---	---	---
Single layer multi core touching on ladder supports. (Method 13)		0.86	0.82	0.80	0.79	0.78	0.78	0.78	0.77	---	---	---	---	---	---

Spaced* means a clearance between adjacent surface of at least one cable diameter (D_c). Where the horizontal clearances between adjacent cables exceed $2D_c$, no correction factor need be applied.

Notes:

- The factors in the table are applicable to groups of cables of all one size. The value of current derived from application of the appropriate factors is the maximum continuous current by any of the cables in the group.
- 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. *
- When cables having different conductor operating temperatures are grouped, the current rating shall be based on the lowest operating temperature of any cable in the group.
- For installation methods, as referred to above and in the tables (Current carrying capacity) are detailed in *Appendix-A. (Page 65-70)

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**Correction factors for cables installed in enclosed trenches
(Installation Methods 18, 19 & 20 as detailed in Appendix-A Page 65-70)***

The correction factors tabulated below relate to the disposition of cables illustrated in items 18 to 20 of Appendix A (page 65-70) and are applicable to the current-carrying capacities for installation methods 12 or 13 as referred in the other tables and these methods are given in Appendix -A (page 65-70)

CORRECTION FACTORS

Table 2

Conductor cross-sectional area	Installation Method 18				Installation Method 19			Installation Method 20			
	2 single-core cables, or 1 three core cable or four-core cables	3 single-core cables, or 2 two core cable	4 single-core cables, or 2 three core or four-core cables	6 single-core cables, 4 two-core cables or 3 three- or four-core cables	6 single-core cables, 4 two-core cables or 3 three- or four-core cables	8 single-core cables, or 4 three or four core cables	12 single-core cables, 8 two core cables, or 6 three- or four core cable	12 single-core cables, 8 two core cables, or 6 three- or four core cable	18 single-core cables, 12 two core cables, or 9 three- or four core cable	24 single-core cables, 16 two core cables, or 12 three- or four core cable	
1	2	3	4	5	6	7	8	9	10	11	
4	0.93	0.90	0.87	0.82	0.86	0.83	0.76	0.81	0.74	0.69	
6	0.92	0.89	0.86	0.81	0.86	0.82	0.75	0.80	0.73	0.68	
10	0.91	0.88	0.85	0.80	0.85	0.80	0.74	0.78	0.72	0.66	
16	0.91	0.87	0.84	0.78	0.83	0.78	0.71	0.76	0.70	0.64	
25	0.90	0.86	0.82	0.76	0.81	0.76	0.69	0.74	0.67	0.62	
25	0.89	0.85	0.81	0.75	0.80	0.74	0.68	0.72	0.66	0.60	
25	0.88	0.84	0.79	0.74	0.78	0.73	0.66	0.71	0.64	0.59	
70	0.87	0.82	0.78	0.72	0.77	0.72	0.64	0.70	0.62	0.57	
95	0.86	0.81	0.76	0.70	0.75	0.70	0.63	0.68	0.60	0.55	
120	0.85	0.80	0.75	0.69	0.73	0.68	0.61	0.66	0.58	0.53	
150	0.84	0.78	0.74	0.67	0.72	0.67	0.59	0.64	0.57	0.51	
185	0.83	0.77	0.73	0.65	0.70	0.65	0.58	0.63	0.55	0.49	
240	0.82	0.76	0.71	0.63	0.69	0.63	0.56	0.61	0.53	0.48	
300	0.81	0.74	0.69	0.62	0.68	0.62	0.54	0.59	0.52	0.46	
400	0.80	0.73	0.67	0.59	0.66	0.60	0.52	0.57	0.50	0.44	
500	0.78	0.72	0.66	0.58	0.64	0.58	0.51	0.56	0.48	0.43	
630	0.77	0.71	0.65	0.56	0.63	0.57	0.49	0.54	0.47	0.41	

Correction Factors for Ambient Temperatures

Table 2a

Ambient Air Temperature °C	25	30	35	40	45	50	55	60	65	70	75	80	85
Circuit Breaker PVC 70°C	1.03	1.00	0.94	0.87	0.79	0.71	0.61	0.50	0.35	..	..	..	..
IEC 947 XLPE 90°C	1.02	1.00	0.96	0.91	0.87	0.82	0.76	0.71	0.65	0.58	0.50	0.41	0.29
BS 3036 PVC 70°C	1.03	1.00	0.97	0.94	0.91	0.87	0.84	0.69	0.48	..	..	..	..
BS 3036 XLPE 90°C	1.02	1.00	0.98	0.95	0.93	0.91	0.89	0.87	0.85	0.79	0.69	0.56	0.39

The above correction factors for ambient temperatures are applicable to general purpose PVC (70°C). Ref: Table-10

*When cables having different conductor operating temperatures are grouped together the current rating shall be based on the lowest operating temperature of any cable in the group.

- Note:**
1. The factors in Table-10A are applicable to groups of cables all of one size. The value of current derived from application of the appropriate factors is the maximum current to be carried out by any of the cables in the group.
 2. 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.
 3. When the number of the cables used differs from those stated in the table, the derating factor for the next higher stated number of cables shall be used.

*UCIL publication code: WIPS-V104C - Wiring installations and power supply cables



**Single-core cables,
non-armoured, with or without sheath
(Copper Conductors)**

COMPARISON OF CURRENT-CARRYING CAPACITIES (amperes)

90°C thermosetting (XLPE) insulated cables vs. 70°C thermoplastic (PVC) insulated cables

*IEC 60502 - 1 & BS 5467

BS 6004 & BS 6346

Ambient temperature: 30°C

Ambient temperature: 30°C

Conductor operating temperature: 90°C

Conductor operating temperature: 70 °C

Table 3

Conductor cross-sectional area	Reference Method 4 (enclosed in conduit in thermally insulating wall etc.)		Reference Method 3 (enclosed in conduit on a wall or in trunking etc)		Reference Method 1 (clipped direct)		Reference Method 11 (on a perforated cable tray horizontal or vertical)		Reference Method 12 (free air)		
	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 a.c. 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 & touching	3 or 4 cables, three-phase a.c. flat & touching or trefoil	Horizontal flat spaced	Vertical flat spaced	Trefoil
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
1	14	13	17	15	19	17.5	...	...	...	...	...
1	11	10.5	13.5	12	15.5	14	...	...	...	...	...
1.5	18	17	22	19	22.5	23	...	...	...	...	...
1.5	14.5	13.5	17.5	15.5	20	18	...	...	...	...	...
2.5	24	23	30	26	34	31	...	...	...	...	...
2.5	20	18	24	21	27	25	...	...	...	...	...
4	33	30	40	35	46	41	...	...	...	...	...
4	26	24	32	28	37	33	...	...	...	...	...
6	43	39	51	45	59	54	...	...	...	...	...
6	34	31	41	36	47	43	...	...	...	...	...
10	58	53	71	63	81	74	...	...	...	...	...
10	46	42	57	50	65	59	...	...	...	...	...
16	76	70	93	85	109	99	...	...	...	...	...
16	61	56	76	68	87	79	...	...	...	...	...
25	100	91	126	111	143	130	158	140	183	163	138
25	80	73	101	89	114	104	126	112	146	130	110
35	124	111	156	138	176	161	195	176	226	203	171
35	99	89	125	110	141	129	156	141	181	162	137
50	149	135	189	168	228	209	239	215	274	246	209
50	119	108	151	134	182	167	191	172	219	197	161
70	189	170	240	214	293	268	308	279	351	318	270
70	151	136	192	171	234	214	246	223	281	254	216
95	228	205	290	259	355	326	375	341	426	389	330
95	182	164	232	207	284	261	300	273	341	311	264
120	263	235	336	299	413	379	436	398	495	453	385
120	210	188	269	239	330	303	349	318	396	362	308
150	300	270	375	328	476	436	485	461	570	524	445
150	240	216	300	262	381	349	404	369	456	419	356
185	341	306	426	370	545	500	579	530	651	600	511
185	273	245	341	296	436	400	463	424	521	480	409
240	400	358	500	433	644	590	686	630	769	711	606
240	320	286	400	346	515	472	549	504	615	569	485
300	459	410	573	493	743	681	794	730	886	824	701
300	367	328	458	394	594	545	635	584	709	659	561
400	...	...	683	584	868	793	915	849	1065	994	820
400	...	...	546	467	694	634	732	679	832	795	656
500	...	...	783	666	990	904	1044	973	1228	1150	956
500	...	...	626	533	792	723	835	778	982	920	749
630	...	...	900	764	1130	1033	1191	1115	1423	1338	1069
630	...	...	720	611	904	826	953	892	1138	1070	855
800	...	...	...	...	1288	1179	1358	1275	1581	1485	1214
800	...	...	...	...	1030	943	1086	1020	1265	1188	971
1000	...	...	...	...	1443	1323	1520	1436	1775	1671	1349
1000	...	...	...	...	1154	1058	1216	1149	1420	1337	1079

* The above tabulated values are also relevant to cables manufactured in compliance with IEC 60502.1

Note:-

- 1 Where the conductor is to be protected by a semi-enclosed fuse to BS-3036.
2. The current carrying capacities in columns 2 to 5 are also applicable to flexible cables and to 90°C heat resisting thermoplastic (PVC) cables where the cable are used in fixed installation.
3. Associated voltage drop (Reference Table.4).
- 4 XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



**Single-core cables,
armoured with non-magnetic wire
(Copper Conductors)**

COMPARISON OF CURRENT-CARRYING CAPACITIES (amperes)

90°C thermosetting (XLPE) insulated cables vs. 70°C thermoplastic (PVC) insulated cables

*IEC 60502 - 1 & BS 5467

Ambient temperature: 30 °C

Conductor operating temperature: 90 °C

BS 6346

Ambient temperature: 30 °C

Conductor operating temperature: 70 °C

Table 5

Conductor cross-sectional area	Reference Method 1 (clipped direct)		Reference Method 11 (on a perforated cable tray horizontal or vertical)		Reference Method 12 (free air)						
	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 or 4 cables, three-phase a.c. flat & touching	2 cables, single-phase a.c.		2 cables, d.c.		3 or 4 cables, three-phase a.c.		
					Horizontal flat spaced	Vertical flat spaced	Horizontal spaced	Vertical spaced	Horizontal flat spaced	Vertical flat spaced	3 cables, trefoil
1 (mm ²)	2 (A)	3 (A)	4 (A)	5 (A)	6 (A)	7 (A)	8 (A)	9 (A)	10 (A)	11 (A)	12 (A)
50	237	220	253	232	282	266	284	270	288	266	222
50	193	179	205	189	229	217	229	216	230	212	181
70	303	277	322	293	357	337	356	349	358	331	285
70	245	225	259	238	287	272	294	279	286	263	231
95	367	333	389	352	436	412	446	426	425	393	346
95	296	269	313	285	349	332	357	340	338	313	280
120	425	383	449	405	504	477	519	497	485	449	402
120	342	309	360	327	401	383	415	396	385	357	324
150	488	437	516	462	566	539	600	575	549	510	463
150	393	352	413	373	455	435	479	458	436	405	373
185	557	496	587	524	643	614	688	660	618	574	529
185	447	399	469	422	511	489	548	525	490	456	425
240	656	579	689	612	749	714	815	782	715	666	625
240	525	465	550	492	593	568	648	622	566	528	501
300	755	662	792	700	842	805	943	906	810	755	720
300	594	515	624	547	668	640	748	719	616	578	567
400	853	717	899	767	929	889	1137	1094	848	797	815
400	687	575	723	618	737	707	885	815	674	632	657
500	962	791	1016	851	1032	989	1314	1266	923	871	918
500	763	622	805	673	810	777	1035	997	721	676	731
630	1082	861	1146	935	1139	1092	1528	1474	992	940	1027
630	843	669	891	728	893	856	1218	1174	771	723	809
800	1170	904	1246	987	1204	1155	1809	1744	1042	978	1119
800	919	710	976	777	943	905	1441	1390	84	772	886
1000	1261	961	1345	1055	1289	1238	2100	2026	1110	1041	1214
1000	975	737	1041	808	1008	967	1685	1627	872	816	945

*The above tabulated values are also relevant to cables manufactured in compliance with IEC 60502.1

Note:-

1 Where the conductor is to be protected by a semi-enclosed fuse to BS-3036.

2. Associated voltage drop (Reference Table.6).

4 XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



COMPARISON OF Voltage Drop (mV/A/m)

Voltage Drop (per ampere per meter):

Conductor operating temperature XLPE/PVC: 90 °C/ 70 °C

Table-6

Conductor cross-sectional area	2 cables, d.c.	2 cables, single-phase a.c.						3 or 4 cables, single-phase a.c.								
		Reference Method 1 & 11 (touching)			Reference Method 12 (spaced*)			Reference Method 1, 11 & 12 (in trefoil touching)			Reference Method 1 & 11 (flat touching)			Reference Method 12 (flat spaced*)		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
(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
50	0.93	0.93	0.22	0.95	0.92	0.30	0.97	0.80	0.190	0.82	0.79	0.26	0.84	0.79	0.34	0.86
70	0.67	0.68	0.20	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
70	0.63	0.64	0.21	0.68	0.66	0.29	0.72	0.56	0.180	0.58	0.57	0.25	0.62	0.59	0.32	0.68
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
95	0.46	0.48	0.20	0.52	0.51	0.28	0.58	0.42	0.175	0.45	0.44	0.25	0.50	0.47	0.31	0.57
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
120	0.36	0.39	0.195	0.43	0.42	0.28	0.50	0.33	0.170	0.37	0.36	0.24	0.43	0.40	0.30	0.50
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
150	0.29	0.31	0.190	0.37	0.34	0.27	0.44	0.27	0.165	0.32	0.30	0.24	0.38	0.34	0.30	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
185	0.23	0.26	0.190	0.32	0.29	0.27	0.39	0.22	0.160	0.27	0.25	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
240	0.180	0.20	0.180	0.27	0.23	0.26	0.35	0.175	0.160	0.23	0.20	0.23	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
300	0.145	0.160	0.180	0.24	0.190	0.26	0.32	0.140	0.155	0.21	0.165	0.22	0.28	0.20	0.28	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
400	0.105	0.140	0.175	0.22	0.180	0.24	0.30	0.120	0.130	0.195	0.160	0.21	0.26	0.21	0.25	0.32
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
500	0.086	0.120	0.170	0.21	0.165	0.23	0.29	0.105	0.145	0.180	0.145	0.20	0.25	0.190	0.24	0.30
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
630	0.068	0.105	0.165	0.195	0.150	0.22	0.27	0.091	0.145	0.170	0.135	0.195	0.23	0.175	0.220	0.28
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
800	0.053	0.095	0.160	0.185	0.145	0.21	0.25	0.082	0.140	0.160	0.125	0.180	0.22	0.170	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
1000	0.042	0.091	0.155	0.180	0.140	0.19	0.24	0.079	0.135	0.155	0.125	0.165	0.21	0.165	0.170	0.24

Note:

*Spacings larger than those specified in Method-12 will result in larger voltage drop.

XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



UNIVERSAL CABLES INDUSTRIES LTD.

Multicore cables non-armoured
(Copper Conductors)

COMPARISON OF CURRENT-CARRYING CAPACITIES (amperes)

90°C thermosetting (XLPE) insulated cables vs. 70°C thermoplastic (PVC) insulated cables

*IEC 60502 - 1 & BS 5467

BS 6346

Ambient temperature: 30 °C

Ambient temperature: 30 °C

Conductor operating temperature: 90°C

Conductor operating temperature: 70 °C

Table 7

Conductor cross-sectional area	Reference Method 4 (enclosed in conduit in thermally insulating wall etc.)		Reference Method 3 (enclosed in conduit on a wall or in trunking etc)		Reference Method 1 (clipped direct)		Reference Method 11 (on a perforated cable tray horizontal or vertical)	
	1 two-core cable*, single-phase a.c. or d.c.	1 three-core cable*, or 1 four-core or 1 five-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 or 1 five-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 or 1 five-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 or 1 five-core cable three-phase a.c.
1 (mm ²)	2 (A)	3 (A)	4 (A)	5 (A)	6 (A)	7 (A)	8 (A)	9 (A)
1	14.5	13	17	15	19	17	21	18
1	11	10	13	11.5	15	13.5	17	14.5
1.5	18.5	16.5	22	19.5	24	22	26	23
1.5	14	13	16.5	15	19.5	17.5	22	18.5
2.5	25	22	30	26	33	30	36	32
2.5	18.5	17.5	23	20	27	24	30	25
4	33	30	40	35	45	40	49	42
4	25	23	30	27	36	32	40	34
6	42	38	51	44	58	52	63	54
6	32	29	38	34	46	41	51	43
10	57	51	69	60	80	71	86	75
10	43	39	52	46	63	57	70	60
16	76	68	91	80	107	96	115	100
16	57	52	69	62	85	76	94	80
25	99	89	119	105	138	119	149	127
25	75	68	90	80	112	96	119	101
35	121	109	146	128	171	147	185	158
35	92	83	111	99	138	119	148	126
50	145	130	175	154	209	179	225	192
50	110	99	133	118	168	144	180	153
70	183	164	221	194	269	229	289	246
70	139	125	168	149	213	184	232	196
95	220	197	265	233	328	278	352	298
95	167	150	201	179	258	223	282	238
120	253	227	305	268	382	322	410	346
120	192	172	232	206	299	259	328	276
150	290	259	334	300	441	371	473	399
150	219	196	258	225	344	299	379	319
185	329	295	384	340	506	424	542	456
185	248	223	294	255	392	341	434	364
240	386	346	459	398	599	500	641	538
240	291	261	344	297	461	403	514	430
300	442	396	532	455	693	576	741	621
300	334	298	394	339	530	464	593	497
400	...	...	625	536	803	667	865	741
400	...	...	470	402	634	557	715	597

The above tabulated values are also relevant to cables manufactured in compliance with IEC 60502.1

* with or without a circuit protective conductor.

3. Associated voltage drop (Reference Table.8).

4 XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



COMPARISON OF Voltage Drop (mV/A/m)

Voltage Drop (per ampere per meter):

Conductor operating temperature XLPE/PVC: 90° C / 70° C

Table-8

Conductor cross-sectional area	Two - core cable, d.c.	Two - core cable, single-phase a.c			Three, four or five -core cable, three-phase a.c		
1 (mm ²)	2 (mV/A/m)	3 (mV/A/m)			4 (mV/A/m)		
1	46	46			40		
1	44	44			38		
1.5	31	31			27		
1.5	29	29			25		
2.5	19	19			16		
2.5	18	18			15		
4	12	12			10		
4	11	11			9.5		
6	7.9	7.9			6.8		
6	7.3	7.3			6.4		
10	4.7	4.7			4.0		
10	4.4	4.4			3.8		
16	2.9	2.9			2.5		
16	2.8	2.8			2.4		
		r	x	z	r	x	z
25	1.85	1.85	0.160	1.90	1.60	0.140	1.65
25	1.75	1.750	0.170	1.750	1.500	0.145	1.500
35	1.35	1.35	0.155	1.35	1.15	0.135	1.15
35	1.25	1.250	0.165	1.250	1.100	0.145	1.100
50	0.99	0.99	0.155	1.00	0.86	0.135	0.87
50	0.93	0.930	0.165	0.940	0.800	0.140	0.810
70	0.68	0.67	0.150	0.69	0.59	0.130	0.60
70	0.63	0.630	0.160	0.650	0.550	0.140	0.570
95	0.49	0.50	0.150	0.52	0.43	0.130	0.45
95	0.46	0.470	0.155	0.500	0.410	0.135	0.430
120	0.39	0.40	0.145	0.42	0.34	0.130	0.37
120	0.36	0.380	0.155	0.410	0.330	0.135	0.350
150	0.31	0.32	0.145	0.35	0.28	0.125	0.30
150	0.29	0.300	0.155	0.340	0.260	0.130	0.290
185	0.25	0.26	0.145	0.29	0.22	0.125	0.26
185	0.23	0.250	0.150	0.290	0.210	0.130	0.250
240	0.190	0.200	0.140	0.24	0.175	0.125	0.21
240	0.180	0.190	0.150	0.240	0.165	0.130	0.210
300	0.155	0.160	0.140	0.21	0.140	0.120	0.185
300	0.145	0.155	0.145	0.210	0.135	0.130	0.185
400	0.120	0.130	0.140	0.190	0.115	0.120	0.165
400	0.105	0.115	0.145	0.185	0.100	0.125	0.160

XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



**Multicore armoured cables
(Copper Conductors)**

COMPARISON OF CURRENT-CARRYING CAPACITIES (amperes)

90°C thermosetting (XLPE) insulated cables vs. 70°C thermoplastic (PVC) insulated cables

*IEC 60502 - 1 & BS 5467

Ambient temperature: 30 °C

Conductor operating temperature: 90 °C

BS 6346

Ambient temperature: 30 °C

Conductor operating temperature: 70 °C

Table 9

Conductor cross-sectional area	Reference Method 1 (clipped direct)		Reference Method 11 (on a perforated cable tray horizontal or vertical)	
	1 two - core cable, single - phase a.c. or d.c.	1 three or four - core cable, three-phase a.	1 two - core cable, single - phase a.c. or d.c.	1 three or four - core cable, three-phase a.c.
1 (mm ²)	2 (A)	3 (A)	4 (A)	5 (A)
1.5	27	23	29	25
1.5	21	18	22	19
2.5	36	31	39	33
2.5	28	25	31	26
4	49	42	52	44
4	38	33	41	35
6	62	53	66	56
6	49	42	53	45
10	85	73	90	78
10	67	58	72	62
16	110	94	115	99
16	89	77	97	83
25	146	124	152	131
25	118	102	128	110
35	180	154	188	162
35	145	125	157	135
50	219	187	228	197
50	175	151	190	163
70	279	238	291	251
70	222	192	241	207
95	338	289	354	304
95	269	231	291	251
120	392	335	410	353
120	310	267	336	290
150	451	386	472	406
150	356	306	386	332
185	515	441	539	463
185	405	348	439	378
240	607	520	636	546
240	476	409	516	445
300	698	599	732	628
300	547	469	592	510
400	787	673	847	728
400	621	540	683	590

The above tabulated values are also relevant to cables manufactured in compliance with IEC 60502.1

Note:-

1. Where the conductor is to be protected by a semi-enclosed fuse to BS-3036.
2. Associated voltage drop (Reference Table.10).
3. XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



COMPARISON OF Voltage Drop (mV/A/m)

Voltage Drop (per ampere per meter):

Conductor operating temperature XLPE/PVC: 90°C / 70°C

Table-10

Conductor cross-sectional area	Two - core cable, d.c.	Two - core cable, single-ohase 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)		
1.5	31	31			27		
1.5	29	29			25		
2.5	19	19			16		
2.5	18	18			15		
4	12	12			10		
4	11	11			9.5		
6	7.9	7.9			6.8		
6	7.3	7.3			6.4		
10	4.7	4.7			4.0		
10	4.4	4.4			3.8		
16	2.9	2.9			2.5		
16	2.8	2.8			2.4		
		r	x	z	r	x	z
25	1.85	1.85	0.160	1.90	1.60	0.140	1.65
25	1.75	1.750	0.170	1.750	1.500	0.145	1.500
35	1.35	1.35	0.155	1.35	1.15	0.135	1.15
35	1.25	1.250	0.165	1.250	1.100	0.145	1.100
50	0.98	0.99	0.155	1.00	0.86	0.135	0.87
50	0.93	0.930	0.165	0.940	0.800	0.140	0.810
70	0.67	0.67	0.150	0.69	0.59	0.130	0.60
70	0.63	0.630	0.160	0.650	0.550	0.140	0.570
95	0.49	0.50	0.150	0.52	0.43	0.130	0.45
95	0.46	0.470	0.155	0.500	0.410	0.135	0.430
120	0.39	0.40	0.145	0.42	0.34	0.130	0.37
120	0.36	0.380	0.155	0.410	0.330	0.135	0.350
150	0.31	0.32	0.145	0.35	0.28	0.125	0.30
150	0.29	0.300	0.155	0.340	0.260	0.130	0.290
185	0.25	0.26	0.145	0.29	0.22	0.125	0.26
185	0.23	0.250	0.150	0.290	0.210	0.130	0.250
240	0.195	0.20	0.140	0.24	0.175	0.125	0.21
240	0.180	0.190	0.150	0.240	0.165	0.130	0.210
300	0.155	0.16	0.140	0.21	0.140	0.120	0.185
300	0.145	0.155	0.145	0.210	0.135	0.130	0.185
400	0.120	0.13	0.140	0.190	0.115	0.120	0.165
400	0.105	0.115	0.145	0.185	0.100	0.125	0.160

XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



UNIVERSAL CABLES INDUSTRIES LTD.

**Single-core cables,
non-armoured, with or without sheath
(Aluminium Conductors)**

COMPARISON OF CURRENT-CARRYING CAPACITIES (amperes)

90°C thermosetting (XLPE) insulated cables vs. 70°C thermoplastic (PVC) insulated cables

***IEC 60502 - 1 & BS 5467**

BS 6346

Ambient temperature: 30 °C

Ambient temperature: 30 °C

Conductor operating temperature: 90°C

Conductor operating temperature: 70 °C

Table-11

Conductor cross-sectional area	Reference Method 4 (enclosed in conduit in thermally insulating wall etc.)		Reference Method 3 (enclosed in conduit on a wall or in trunking etc)		Reference Method 1 (clipped direct)		Reference Method 11 (on a perforated cable tray horizontal or vertical)		Reference Method 12(free air)		
	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 a.c. 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 & touching	3 or 4 cables, three-phase a.c. flat & touching or trefoil	Horizontal flat spaced	Vertical flat spaced	Trefoil
	2	3	4	5	6	7	8	9	10	11	12
(mm ²)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)	(A)
50	125	113	157	140	169	149	180	165	210	188	159
50	93	84	118	104	134	123	144	132	163	148	128
70	158	142	200	179	215	189	231	211	271	244	206
70	118	107	150	133	172	159	185	169	210	191	165
95	191	171	242	217	265	234	281	258	322	300	253
95	142	129	181	161	210	194	225	206	256	234	203
120	220	197	281	251	308	273	326	300	387	351	296
120	164	149	210	186	245	226	261	240	298	273	237
150	253	226	...	...	353	314	376	346	448	408	343
150	189	170	234	204	283	261	301	277	344	317	274
185	288	256	...	...	410	366	430	396	515	470	395
185	215	194	266	230	324	299	344	317	394	364	316
240	338	300	...	...	489	438	509	469	611	561	471
240	252	227	312	269	384	354	407	375	466	432	375
300	387	344	...	...	564	507	586	541	708	652	544
300	289	261	358	306	444	410	469	433	538	501	435
380	...	...	...	...	658	594	679	628	798	742	638
380	...	...	413	352	511	472	543	502	625	584	507
480	...	...	...	...	765	692	786	728	927	865	743
480	...	...	477	405	591	546	629	582	726	680	590
600	...	...	...	...	871	791	903	836	1058	990	849
600	...	...	545	462	679	626	722	669	837	787	680
740	...	...	...	...	1001	911	1025	951	1218	1143	979
740	...	...	...	...	771	709	820	761	956	902	776
960	...	...	...	...	1176	1072	1191	1108	1440	1355	1151
960	...	...	...	...	900	823	953	886	1125	1066	907
1200	...	...	...	...	1333	1217	1341	1249	1643	1550	1307
1200	...	...	...	...	1022	926	1073	999	1293	1229	1026

* The above tabulated values are also relevant to cables manufactured in compliance with IEC 60502-1

- Note:**
1. Where the conductor is to be protected by a semi-enclosed fuse to BS-3036.
 2. Associated voltage drop (Reference Table. I2).
 3. XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



COMPARISON OF Voltage Drop (mV/A/m)

Voltage Drop (per ampere per meter):

Conductor operating temperature XLPE/PVC: 90°C/ 70°C

Table 12

Conductor cross-sectional area	2 cables, single-phase a.c.						3 or 4 cables, single-phase a.c.																		
	2 cables, d.c.	Reference Method 3 & 4 (enclosed in conduit or on a wall)			Reference Method 1 & 11 (touching)			Reference Method 12 (spaced*)			Reference Method 3 & 4 (enclosed in conduit or on a wall)			Reference Methods 1 & 11 & 12 (in trefoil touching)			Reference Method 1 & 11 (flat touching)			Reference Method 12 (flat spaced*)					
	1	2	3			4			5			6			7			8			9				
(mm ²)	(mV/A/m)	(mV/A/m)			(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	r	x	z	r	x	z	r	x	z
50	1.65	1.70	0.30	1.72	1.65	0.190	1.66	1.65	0.28	1.68	1.44	0.26	1.46	1.44	0.165	1.45	1.44	0.24	1.46	1.44	0.32	1.48			
50	1.55	1.60	0.30	1.60	1.55	0.190	1.55	1.55	0.28	1.55	1.35	0.26	1.40	1.35	0.165	1.35	1.35	0.24	1.35	1.35	0.32	1.40			
70	1.13	1.17	0.30	1.21	1.12	0.185	1.14	1.12	0.27	1.15	1.00	0.26	1.04	0.97	0.160	0.98	0.97	0.24	1.00	0.97	0.31	1.02			
70	1.05	1.10	0.30	1.15	1.05	0.185	1.05	1.05	0.27	1.10	0.94	0.26	0.97	0.91	0.160	0.92	0.91	0.24	0.94	0.91	0.31	0.96			
95	0.82	0.86	0.29	0.91	0.82	0.185	0.84	0.82	0.27	0.94	0.75	0.25	0.79	0.71	0.160	0.73	0.71	0.23	0.75	0.71	0.31	0.78			
95	0.77	0.81	0.29	0.86	0.77	0.185	0.79	0.77	0.27	0.82	0.70	0.25	0.74	0.67	0.160	0.69	0.67	0.23	0.71	0.67	0.31	0.74			
120	0.65	0.68	0.29	0.74	0.65	0.180	0.67	0.65	0.27	0.70	0.59	0.25	0.64	0.57	0.155	0.59	0.57	0.23	0.61	0.57	0.31	0.64			
120	0.61	0.64	0.29	0.70	0.61	0.180	0.64	0.61	0.27	0.67	0.55	0.25	0.61	0.53	0.155	0.55	0.53	0.23	0.58	0.53	0.31	0.61			
150	0.53	0.54	0.28	0.61	0.52	0.175	0.55	0.52	0.26	0.58	0.48	0.24	0.54	0.45	0.155	0.47	0.45	0.23	0.50	0.45	0.30	0.54			
150	0.49	0.51	0.28	0.59	0.49	0.175	0.52	0.49	0.26	0.55	0.45	0.24	0.51	0.42	0.155	0.45	0.42	0.23	0.48	0.42	0.30	0.52			
185	0.42	0.45	0.28	0.53	0.43	0.175	0.46	0.42	0.26	0.49	0.38	0.24	0.45	0.36	0.150	0.39	0.36	0.23	0.43	0.36	0.30	0.47			
185	0.39	0.42	0.28	0.50	0.40	0.175	0.43	0.39	0.26	0.47	0.36	0.24	0.44	0.34	0.150	0.37	0.34	0.23	0.41	0.34	0.30	0.46			
240	0.32	0.34	0.27	0.43	0.32	0.170	0.36	0.32	0.26	0.41	0.30	0.24	0.38	0.28	0.150	0.32	0.28	0.22	0.35	0.28	0.30	0.41			
240	0.30	0.32	0.27	0.42	0.30	0.170	0.35	0.30	0.26	0.40	0.28	0.24	0.37	0.26	0.150	0.30	0.26	0.22	0.35	0.26	0.30	0.40			
300	0.26	0.28	0.27	0.38	0.26	0.170	0.31	0.26	0.26	0.36	0.25	0.24	0.34	0.22	0.145	0.27	0.22	0.22	0.31	0.22	0.30	0.37			
300	0.24	0.26	0.27	0.37	0.24	0.170	0.30	0.24	0.26	0.35	0.23	0.23	0.32	0.21	0.145	0.26	0.21	0.22	0.31	0.21	0.30	0.36			
380	0.20	...	...	...	0.21	0.165	0.27	0.21	0.25	0.33	0.20	0.23	0.31	0.180	0.145	0.23	0.180	0.22	0.28	0.180	0.29	0.34			
380	0.190	0.220	0.27	0.35	0.195	0.165	0.26	0.195	0.25	0.32	0.190	0.23	0.30	0.170	0.145	0.22	0.170	0.22	0.28	0.170	0.29	0.34			
480	0.160	...	...	...	0.170	0.165	0.23	0.165	0.25	0.30	0.165	0.23	0.28	0.150	0.140	0.20	0.150	0.22	0.27	0.145	0.29	0.32			
480	0.150	0.180	0.26	0.32	0.155	0.165	0.23	0.155	0.25	0.29	0.155	0.23	0.27	0.140	0.140	0.195	0.140	0.22	0.26	0.135	0.29	0.32			
600	0.130	...	...	...	0.140	0.160	0.21	0.135	0.25	0.28	0.135	0.22	0.26	0.120	0.140	0.185	0.120	0.22	0.25	0.120	0.29	0.31			
600	0.120	0.150	0.26	0.30	0.130	0.160	0.21	0.125	0.25	0.28	0.125	0.22	0.26	0.110	0.140	0.180	0.110	0.22	0.24	0.110	0.29	0.31			
740	0.105	...	...	...	0.115	0.160	0.19	0.110	0.25	0.27	...	...	...	0.100	0.135	0.170	0.100	0.21	0.23	0.095	0.29	0.30			
740	0.099	...	...	...	0.105	0.160	0.19	0.100	0.25	0.27	...	...	...	0.094	0.135	0.165	0.094	0.21	0.23	0.089	0.29	0.30			
960	0.080	...	...	...	0.092	0.155	0.18	0.087	0.24	0.26	...	...	...	0.082	0.135	0.160	0.082	0.21	0.23	0.076	0.29	0.30			
960	0.075	...	...	...	0.086	0.155	0.18	0.082	0.24	0.26	...	...	...	0.077	0.135	0.155	0.077	0.21	0.22	0.071	0.29	0.29			
1200	0.064	...	...	...	0.079	0.155	0.17	0.073	0.24	0.25	...	...	...	0.070	0.135	0.150	0.070	0.21	0.22	0.063	0.28	0.29			
1200	0.060	...	...	...	0.074	0.155	0.17	0.068	0.24	0.25	...	...	...	0.066	0.135	0.150	0.066	0.21	0.22	0.059	0.28	0.29			

Note: *Spacings larger than those specified in Method-12 will result in larger voltage drop.
 XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



**Single-core cables,
armoured with non-magnetic wire
(Aluminium Conductors)**

COMPARISON OF CURRENT-CARRYING CAPACITIES (amperes)

90°C thermosetting (XLPE) insulated cables vs. 70°C thermoplastic (PVC) insulated cables

***IEC 60502 - 1 & BS 5467**

BS 6346

Ambient temperature: 30 °C

Ambient temperature: 30 °C

Conductor operating temperature: 90°C Conductor operating temperature: 70 °C

Table 13

Conductor cross-sectional area	Reference Method 1 (clipped direct)		Reference Method 11 (on a perforated cable tray)		Reference Method 12 (free air)						
	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 or 4 cables, three-phase a.c. flat & touching	2 cables, single-phase a.c.		2 cables, d.c. spaced		3 or 4 cables, three-phase a.c.		
					Horizontal flat spaced	Vertical flat spaced	Horizontal spaced	Vertical spaced	Horizontal flat spaced	Vertical flat spaced	3 cables, trefoil
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)
50	179	165	192	176	212	199	216	197	215	192	162
50	143	133	152	141	168	159	167	157	169	155	131
70	228	209	244	222	269	254	275	253	270	244	207
70	183	168	194	178	212	200	214	202	213	196	168
95	276	252	294	267	328	310	332	307	324	296	252
95	221	202	234	214	259	245	261	247	255	236	205
120	320	291	340	308	378	358	384	357	372	343	292
120	255	233	270	246	299	285	303	288	293	272	238
150	368	333	390	352	429	409	441	411	424	394	337
150	294	267	310	282	340	323	349	333	335	312	275
185	419	378	444	400	490	467	511	480	477	447	391
185	334	303	352	319	389	371	400	382	379	354	315
240	494	443	521	468	576	549	605	572	554	523	465
240	393	354	413	374	457	437	472	452	443	415	372
300	568	508	597	536	654	624	701	666	626	595	540
300	452	405	474	427	520	498	545	523	505	475	430
380	655	573	688	608	735	704	812	780	693	649	625
380	518	452	543	479	583	559	638	613	551	518	497
480	747	642	786	685	825	790	942	906	765	717	714
480	586	501	616	534	655	629	742	715	604	568	568
600	836	706	880	757	909	872	1076	1036	832	780	801
600	658	550	692	589	724	696	859	828	656	618	642
740	934	764	988	824	989	950	1250	1205	890	835	897
740	728	596	769	642	802	770	986	952	707	666	715
960	1056	838	1121	911	1094	1052	1488	1435	970	911	1014
960	819	651	868	706	866	832	1174	1133	770	726	808
1200	1163	903	1236	990	1187	1141	1715	1658	1043	980	1118
1200	893	692	952	756	938	902	1360	1317	822	774	880

* The above tabulated values are also relevant to cables manufactured in compliance with IEC 60502-1

Note:-

- 1 Where the conductor is to be protected by a semi-enclosed fuse to BS-3036.
2. Associated voltage drop (Reference Table.14).
3. XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



COMPARISON OF Voltage Drop (mV/A/m)

Voltage Drop (per ampere per meter):

Conductor operating temperature XLPE/PVC: 90°/70°

Table 14

Conductor cross-sectional area	2 cables, d.c.	2 cables, single-phase a.c.						3 or 4 cables, single-phase a.c.								
		Reference Method 1 & 11 (touching)			Reference Method 12 (spaced*)			Reference Method 1, 11 & 12 (in trefoil touching)			Reference Method 1 & 11 (flat touching)			Reference Method 12 (flat spaced*)		
		(mV/A/m)			(mV/A/m)			(mV/A/m)			(mV/A/m)			(mV/A/m)		
1 (mm ²)	2 (mV/A/m)	3 (mV/A/m)			4 (mV/A/m)			5 (mV/A/m)			6 (mV/A/m)			7 (mV/A/m)		
		r	X	Z	r	X	Z	r	X	Z	r	X	Z	r	X	Z
50	1.60	1.60	0.22	1.60	1.60	0.30	1.60	1.40	0.185	1.40	1.40	0.26	1.40	1.35	0.34	1.40
50	1.55	1.55	0.23	1.55	1.55	0.31	1.55	1.35	0.195	1.35	1.35	0.27	1.35	1.30	0.34	1.35
70	1.10	1.10	0.21	1.15	1.10	0.29	1.15	0.96	0.180	0.98	0.97	0.25	1.00	0.99	0.33	1.05
70	1.05	1.05	0.22	1.10	1.05	0.30	1.10	0.92	0.190	0.93	0.93	0.26	0.96	0.95	0.33	1.00
95	0.82	0.83	0.20	0.85	0.85	0.29	0.90	0.71	0.175	0.74	0.74	0.25	0.78	0.76	0.32	0.83
95	0.77	0.78	0.21	0.81	0.81	0.29	0.86	0.68	0.185	0.70	0.70	0.25	0.75	0.73	0.32	0.80
120	0.66	0.66	0.20	0.69	0.69	0.28	0.74	0.57	0.170	0.60	0.60	0.24	0.64	0.63	0.31	0.70
120	0.61	0.62	0.21	0.66	0.65	0.29	0.71	0.54	0.180	0.57	0.57	0.25	0.62	0.60	0.32	0.68
150	0.52	0.53	0.195	0.57	0.56	0.28	0.62	0.46	0.170	0.49	0.49	0.24	0.54	0.52	0.30	0.60
150	0.49	0.50	0.20	0.54	0.53	0.28	0.60	0.44	0.175	0.47	0.46	0.24	0.52	0.50	0.31	0.58
185	0.42	0.43	0.190	0.47	0.46	0.27	0.54	0.38	0.165	0.41	0.40	0.24	0.47	0.44	0.30	0.53
185	0.39	0.41	0.195	0.45	0.44	0.28	0.52	0.35	0.170	0.39	0.38	0.24	0.45	0.42	0.30	0.51
240	0.32	0.34	0.185	0.39	0.37	0.27	0.45	0.29	0.160	0.34	0.32	0.23	0.39	0.35	0.29	0.46
240	0.30	0.32	0.190	0.37	0.34	0.27	0.44	0.28	0.165	0.32	0.30	0.23	0.38	0.33	0.29	0.44
300	0.26	0.27	0.185	0.33	0.30	0.26	0.40	0.24	0.160	0.29	0.26	0.23	0.34	0.29	0.29	0.41
300	0.24	0.26	0.185	0.32	0.28	0.26	0.39	0.22	0.160	0.27	0.24	0.23	0.34	0.28	0.29	0.40
380	0.21	0.23	0.180	0.29	0.26	0.25	0.36	0.195	0.155	0.25	0.23	0.22	0.32	0.27	0.27	0.38
380	0.190	0.22	0.185	0.28	0.26	0.25	0.36	0.185	0.155	0.24	0.22	0.22	0.32	0.27	0.26	0.38
480	0.160	0.185	0.175	0.25	0.23	0.25	0.34	0.160	0.155	0.22	0.20	0.21	0.29	0.24	0.26	0.35
480	0.150	0.180	0.180	0.25	0.22	0.25	0.33	0.155	0.155	0.22	0.195	0.22	0.29	0.24	0.25	0.35
600	0.130	0.160	0.175	0.24	0.20	0.24	0.31	0.135	0.150	0.20	0.175	0.21	0.27	0.22	0.25	0.33
600	0.120	0.150	0.175	0.23	0.195	0.24	0.31	0.130	0.150	0.200	0.170	0.21	0.27	0.21	0.24	0.32
740	0.105	0.140	0.170	0.22	0.190	0.22	0.29	0.120	0.145	0.190	0.165	0.195	0.26	0.21	0.22	0.30
740	0.097	0.135	0.170	0.22	0.180	0.23	0.29	0.115	0.145	0.185	0.160	0.20	0.26	0.200	0.22	0.30
960	0.080	0.120	0.160	0.20	0.170	0.21	0.27	0.105	0.140	0.175	0.150	0.180	0.24	0.195	0.195	0.28
960	0.075	0.115	0.160	0.20	0.165	0.21	0.27	0.100	0.140	0.175	0.150	0.185	0.24	0.190	0.195	0.27
1200	0.064	0.105	0.160	0.190	0.155	0.20	0.25	0.093	0.135	0.165	0.140	0.175	0.22	0.180	0.185	0.26
1200	0.060	0.110	0.155	0.190	0.160	0.180	0.24	0.094	0.140	0.170	0.145	0.160	0.22	0.185	0.165	0.25

Note: *Spacings larger than those specified in Method-12 will result in larger voltage drop.

XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



UNIVERSAL CABLES INDUSTRIES LTD.

**Multi core cable non-armoured
(Aluminium Conductors)**

COMPARISON OF CURRENT-CARRYING CAPACITIES (amperes)

90°C thermosetting (XLPE) insulated cables vs. 70°C thermoplastic (PVC) insulated cables

***IEC 60502 - 1 & BS 5467**

BS 6004 & BS 6346

Ambient temperature: 30°C

Ambient temperature: 30°C

Conductor operating temperature: 90°C

Conductor operating temperature: 70°C

Table 15

Conductor cross-sectional area	Reference Method 4 (enclosed in conduit in thermally insulating wall etc.)		Reference Method 3 (enclosed in conduit on a wall or in trunking etc)		Reference Method 1 (clipped direct)		Reference Method 11 (on a perforated cable tray 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 a 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)
16	60	55	72	64	84	76	91	77
16	44	41	54	48	66	59	73	61
25	78	71	94	84	101	90	108	97
25	58	53	71	62	83	73	89	78
35	96	87	115	103	126	112	135	120
35	71	65	86	77	103	90	111	96
50	115	104	138	124	154	136	164	146
50	86	78	104	92	125	110	135	117
70	145	131	175	156	198	174	211	187
70	108	98	131	116	160	140	173	150
95	175	157	210	188	241	211	257	227
95	130	118	157	139	195	170	210	183
120	...	180	...	216	...	245	...	263
120	...	135	...	160	...	197	...	212
150	...	206	...	240	...	283	...	304
150	...	155	...	184	...	227	...	245
185	...	233	...	272	...	323	...	347
185	...	176	...	210	...	259	...	280
240	...	273	...	318	...	382	...	409
240	...	207	...	248	...	305	...	330
300	...	313	...	364	...	440	...	471
300	...	237	...	285	...	351	...	381

* The above tabulated values are also relevant to cables manufactured in compliance with IEC 60502-1

Note:- 1. Associated voltage drop (Reference Table.16).

2. XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



UNIVERSAL CABLES INDUSTRIES LTD.

COMPARISON OF Voltage Drop (mV/A/m)

Voltage Drop(per ampere per meter):

Conductor operating temperature XLPE/PVC: 90°C /70°C

Table 16

Conductor cross-sectional area	Two - core cable, d.c.	Two - core cable, single-phase a.c			Three or four cable, three-phase a.c		
		(mV/A/m)			(mV/A/m)		
1	2	3			4		
(mm ²)	(mV/A/m)	r	x	z	r	x	z
16	4.8	4.8			4.2		
16	4.5	4.5			3.9		
25	3.1	3.1	0.165	3.1	2.7	0.140	2.7
25	2.9	2.90	0.175	2.90	2.50	0.150	2.50
35	2.2	2.2	0.160	2.2	1.90	0.140	1.95
35	2.1	2.10	0.170	2.10	1.80	0.150	1.80
50	1.60	1.65	0.160	1.65	1.40	0.135	1.45
50	1.55	1.55	0.170	1.55	1.35	0.145	1.35
70	1.10	1.10	0.155	1.15	0.96	0.135	0.97
70	1.05	1.05	0.165	1.05	0.90	0.140	0.92
95	0.82	0.82	0.150	0.84	0.71	0.130	0.72
95	0.77	0.77	0.160	0.79	0.67	0.140	0.68
120	...	...	...	...	0.56	0.130	0.58
120	...	...	...	...	0.53	0.135	0.55
150	...	...	...	...	0.45	0.130	0.47
150	...	...	...	...	0.42	0.135	0.44
185	...	...	...	...	0.37	0.130	0.39
185	...	...	...	...	0.34	0.135	0.37
240	...	...	...	...	0.28	0.125	0.31
240	...	...	...	...	0.26	0.130	0.30
300	...	...	...	...	0.23	0.125	0.26
300	...	...	...	...	0.21	0.130	0.25

XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



**Multi core armoured cables
(Aluminium Conductors)**

COMPARISON OF CURRENT-CARRYING CAPACITIES (amperes)

90°C thermosetting (XLPE) insulated cables vs. 70°C thermoplastic (PVC) insulated cables

***IEC 60502 - 1 & BS 5467**

Ambient temperature: 30 °C

Conductor operating temperature: 90°C

BS 6346

Ambient temperature: 30 °C

Conductor operating temperature: 70 °C

Table17

Conductor cross-sectional Area	Reference Method 1 (clipped direct)		Reference Method 11 (on a perforated horizontal cable tray or reference method 13 (free air))	
	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
(mm ²)	(A)	(A)	(A)	(A)
16	82	71	85	74
16	68	58	71	61
25	108	92	112	98
25	89	76	94	80
35	132	113	138	120
35	109	94	115	99
50	159	137	166	145
50	131	113	139	119
70	201	174	211	185
70	165	143	175	151
95	242	214	254	224
95	199	174	211	186
120	...	249	...	264
120	...	202	...	216
150	...	284	...	305
150	...	232	...	250
185	...	328	...	350
185	...	265	...	287
240	...	386	...	418
240	...	312	...	342
300	...	441	...	488
300	...	360	...	399

The above tabulated values are also relevant to cables manufactured in compliance with IEC 60502.1

Note:-

1. Where the conductor is to be protected by a semi-enclosed fuse to BS-3036.
2. Associated voltage drop (Reference Table.18).
3. XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



COMPARISON OF Voltage Drop (mV/A/m)

Voltage Drop (per ampere per meter):

Conductor operating temperature XLPE/PVC: 90°C/70°C

Table 18

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		
			r	x	z	r	x	z
1	2	3			4		
(mm ²)	(mV/A/m)	(mV/A/m)			(mV/A/m)		
16	4.8	4.8			4.2		
16	4.5	4.5			3.9		
25	3.1	3.1	0.165	3.1	2.7	0.140	2.7
25	2.9	2.90	0.175	2.90	2.50	0.150	2.50
35	2.2	2.2	0.160	2.2	1.90	0.140	1.95
35	2.1	2.10	0.170	2.10	1.80	0.150	1.80
50	1.60	1.65	0.160	1.65	1.40	0.135	1.45
50	1.55	1.55	0.170	1.55	1.35	0.145	1.35
70	1.10	1.10	0.155	1.15	0.96	0.135	0.97
70	1.05	1.05	0.165	1.05	0.90	0.140	0.92
95	0.82	0.82	0.150	0.84	0.71	0.130	0.72
95	0.77	0.77	0.160	0.79	0.67	0.140	0.68
120	...	...	...	...	0.56	0.130	0.58
120	...	...	...	...	0.53	0.135	0.55
150	...	...	...	...	0.45	0.130	0.47
150	...	...	...	...	0.42	0.135	0.44
185	...	...	...	...	0.37	0.130	0.39
185	...	...	...	...	0.34	0.135	0.37
240	...	...	...	...	0.28	0.125	0.31
240	...	...	...	...	0.26	0.130	0.30
300	...	...	...	...	0.23	0.125	0.26
300	...	...	...	...	0.21	0.130	0.25

XLPE cables related values in light yellow colour background and PVC cables related values in light blue colour background.



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Economic optimization power cable size (XLPE cable vs. PVC cable)

Minimizing cost of cables

Selection of cable size to minimum admissible cross-sectional area of conductor:

The following tabulated current carrying capacities of conductors with same cross sectional area for XLPE cable against the PVC cable is based on the following assumption:

Multicore armoured cables with copper conductor 600/1000V.

Single circuit 4 core cable 3 phase system on perforated horizontal or vertical tray (open air),

Ambient temperature 30°C & conductor operating temperature: XLPE/PVC:- 90°C/70°C

Cross-sectional area mm ²	Current carrying capacity (A)		Percentage increase in current %
	PVC	XLPE	
25	110	131	19
35	135	162	20
50	163	197	20
70	207	251	21
95	251	304	21
120	290	353	22
150	332	406	22
185	378	463	22
240	445	546	23
300	510	628	23
400	590	728	23

Percentage is gradually increasing with increase in size

The above table shows that for same cross-sectional area of conductor, XLPE insulated cables have larger current carrying capacity as compared to PVC insulated cables.

Ref: Table- 9 page 32 of this catalogue (UCIL publication code LTXLP-IV06C).

If a load of 500 A is worked out for a circuit (Based on above assumed conditions), after applying the criteria for cable size rationalization comprising the following steps:

Short circuit current rating and its duration, voltage drop, correction factors for group of more than one circuit, ambient temperature and cable installation methods and so on.

(Avoiding localized heat, solar radiation or high ambient temperature)

Then, based on above tabulated values of current carrying capacities there are two options and obviously the recommended option would be 240mm² XLPE cable with 546 A. against 300mm² PVC Cable with 510 A., provided that the criteria of cable size rationalization, compatibility of system and other accessories are fully satisfied. This can be considered as the basis (Large current carrying capacity of XLPE), for Economic optimization of power cable size beside having other advantages of XLPE over PVC as discussed earlier in this catalogue. Ref: page 4 Section II.

Cost Saving

The saving in initial cost in such cases can be worked out from the following simple equation:

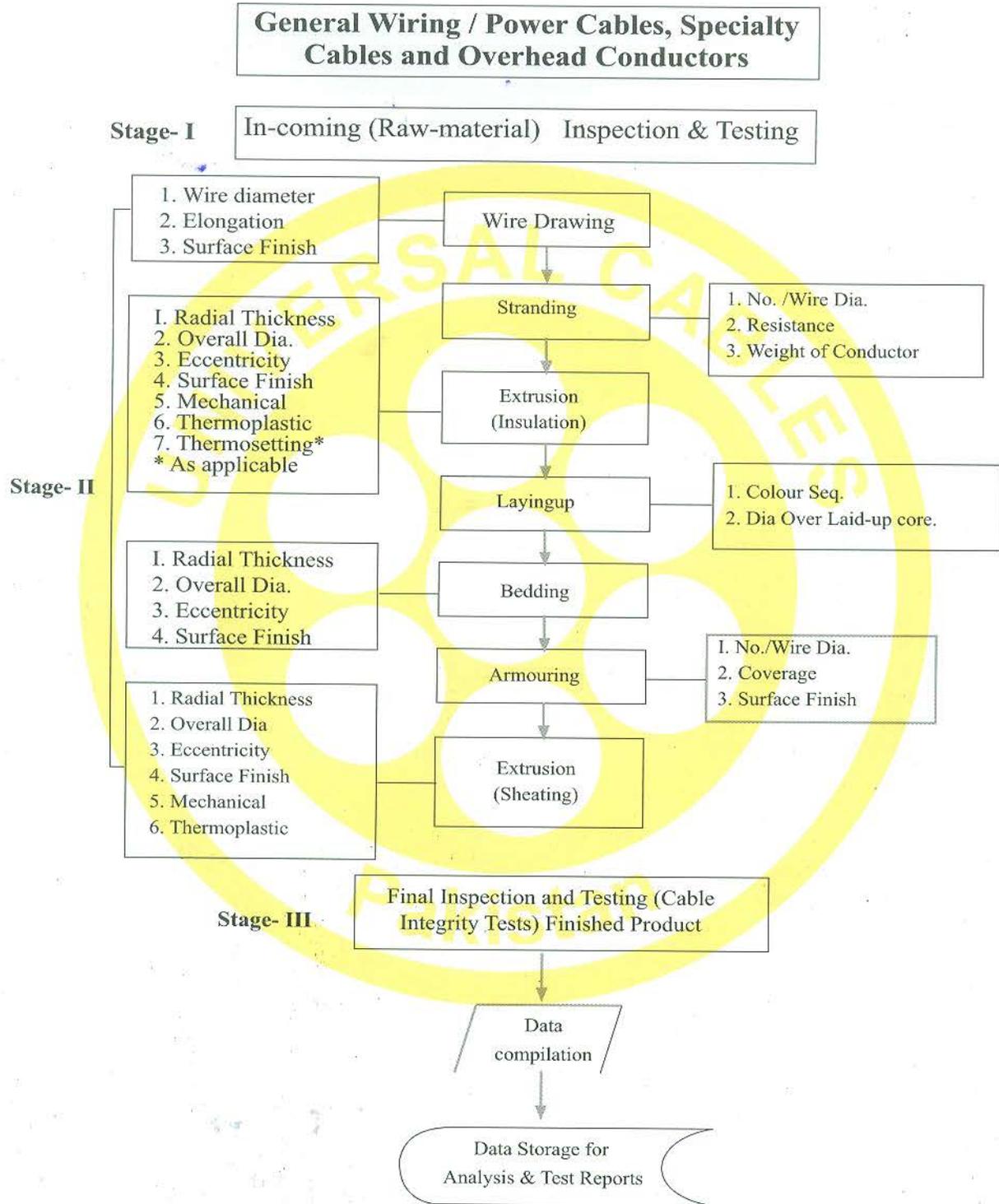
$$\frac{C_p - C_x}{C_p} \times 100 = \% \text{ saving in cost where } C_p = \text{cost of PVC cable Rs/m}$$

$$C_x = \text{cost of XLPE cable Rs/m}$$

From the above equation we can know the cost increase for PVC cable against the XLPE cable or saving in cost for using XLPE cable and this is one of the bases which can help us for economic optimization for any other power cable size



Flow Chart
A Three Prong Approach towards Quality
Stage-I In-coming material, Stage-II In process and Stage-III Finished product



Note: The above referred to thermoplastic and thermosetting tests are carried out in accordance with BS-5467 and IEC 60502 I. and the standards as referred to therein. For details, contact UCIL Technical Department.



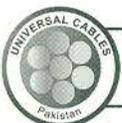
Schedule of test based on test categories for components and complete cable.

For the following categories of tests reference should be made to the relevant tables and clauses for tests methods and frequencies. (BS 5467)

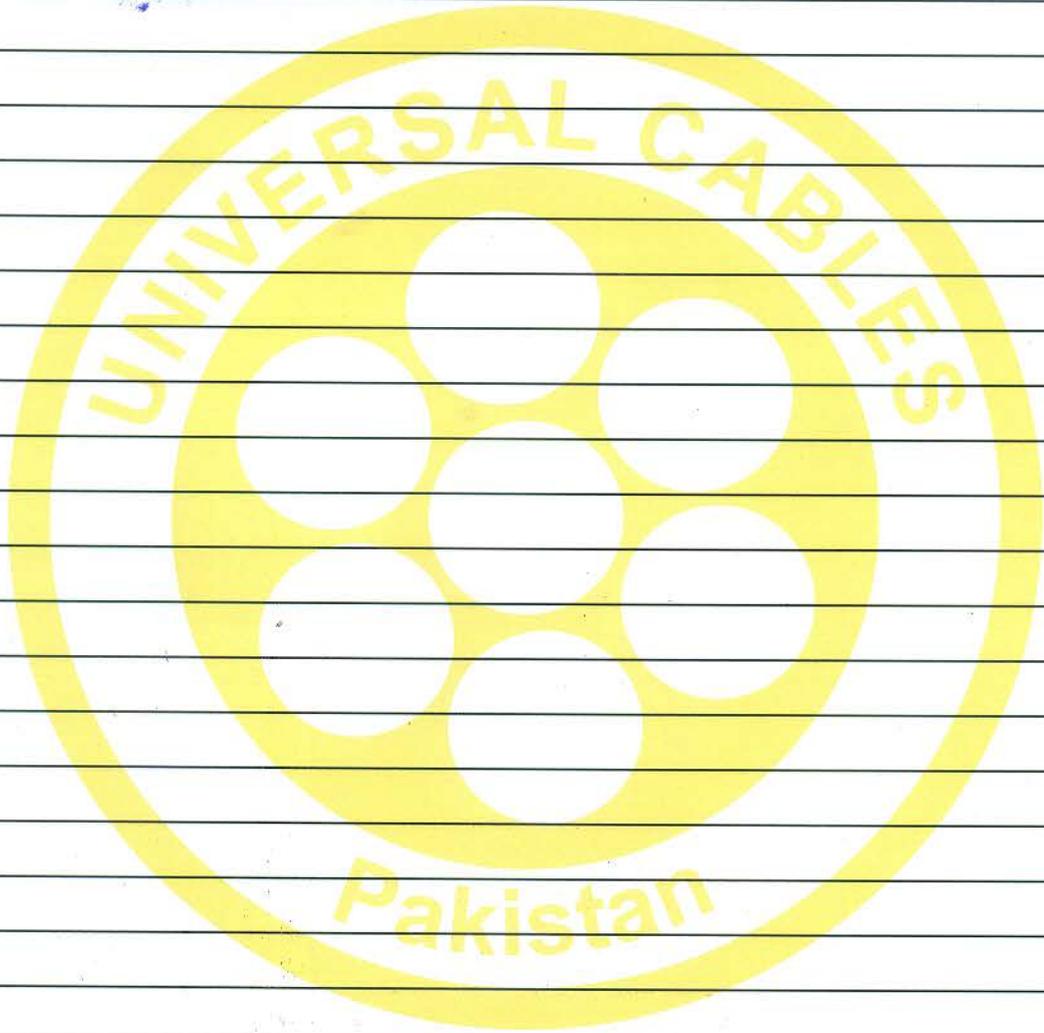
Routine Tests [R], regular sample test [RS], special sample tests [SS], and type test [T].

Test on components	Reference clause (BS-5467)	Category
Conductor	4	RS
Insulation:		
*Material	5	T
Application	5	RS
Spark test	5	R
Thickness	6	RS
Core identification	7	RS
Laying up	7&8	RS
Bedding:		
Extruded:		
(a) *Material properties	9.2&9.3	T
(b) Thickness	10	RS
Armour:		
Wire armour		
(a) Diameter	11.2(a)	SS
(b) Zinc coating (mass)	11.2(b)	SS
(c) Wrapping test	11.2(c)	SS
(d) Tensile test (aluminium wire)	11.2(d)	SS
Oversheath:		
*Material	12	T
Thickness, non-armoured cable	13.1	RS
Thickness, armoured cable	13.2	RS
Spark test	12	R
Test on complete cables.		
Cable markings	14	R
Conductor resistance	4	R
Armour resistance	11.5	RS
Voltage test	17.3	R
Compatibility test	5 and 12	T
Test for flame propagation of single cable	19.6	SS

* All the required tests on materials and electrical tests on finished cables are carried out as per UCIL internal specifications. (Including thermoplastic and thermosetting tests, where required).

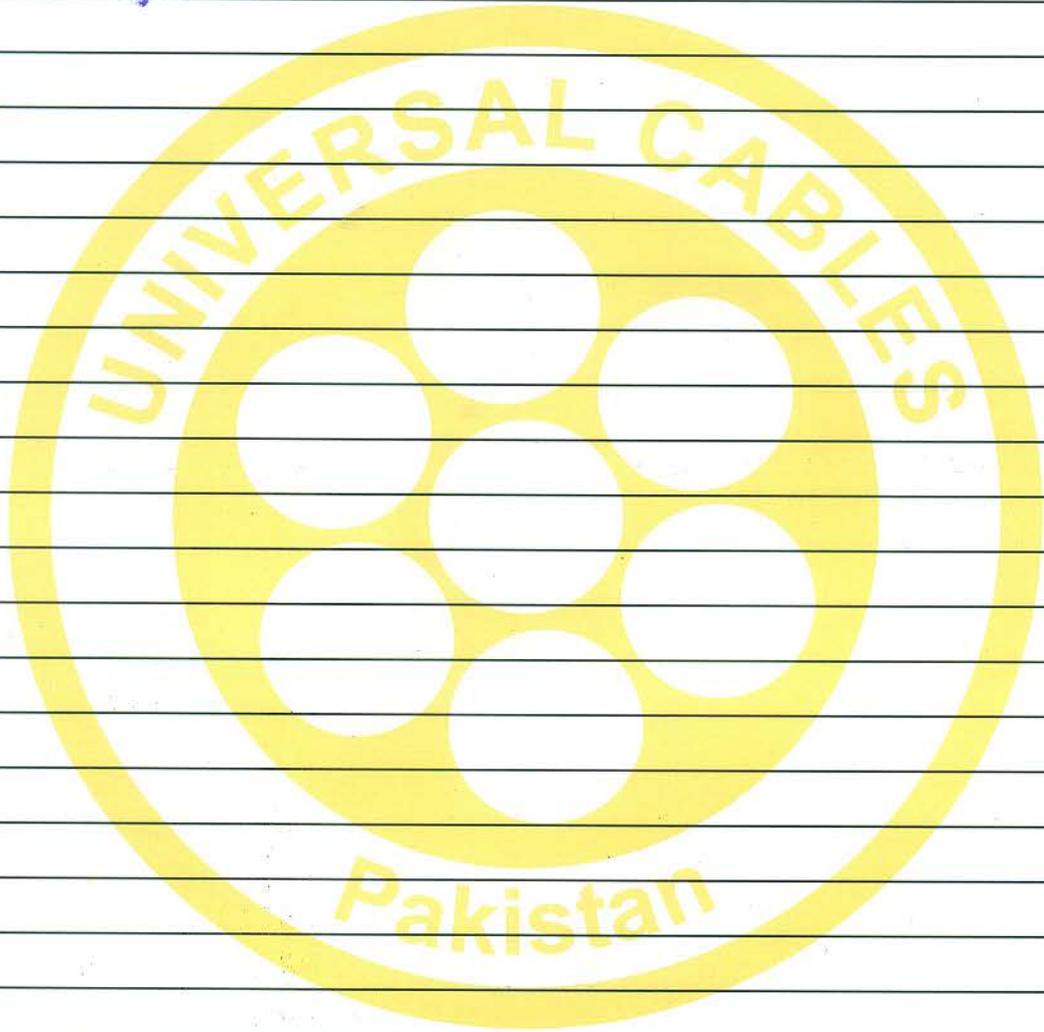


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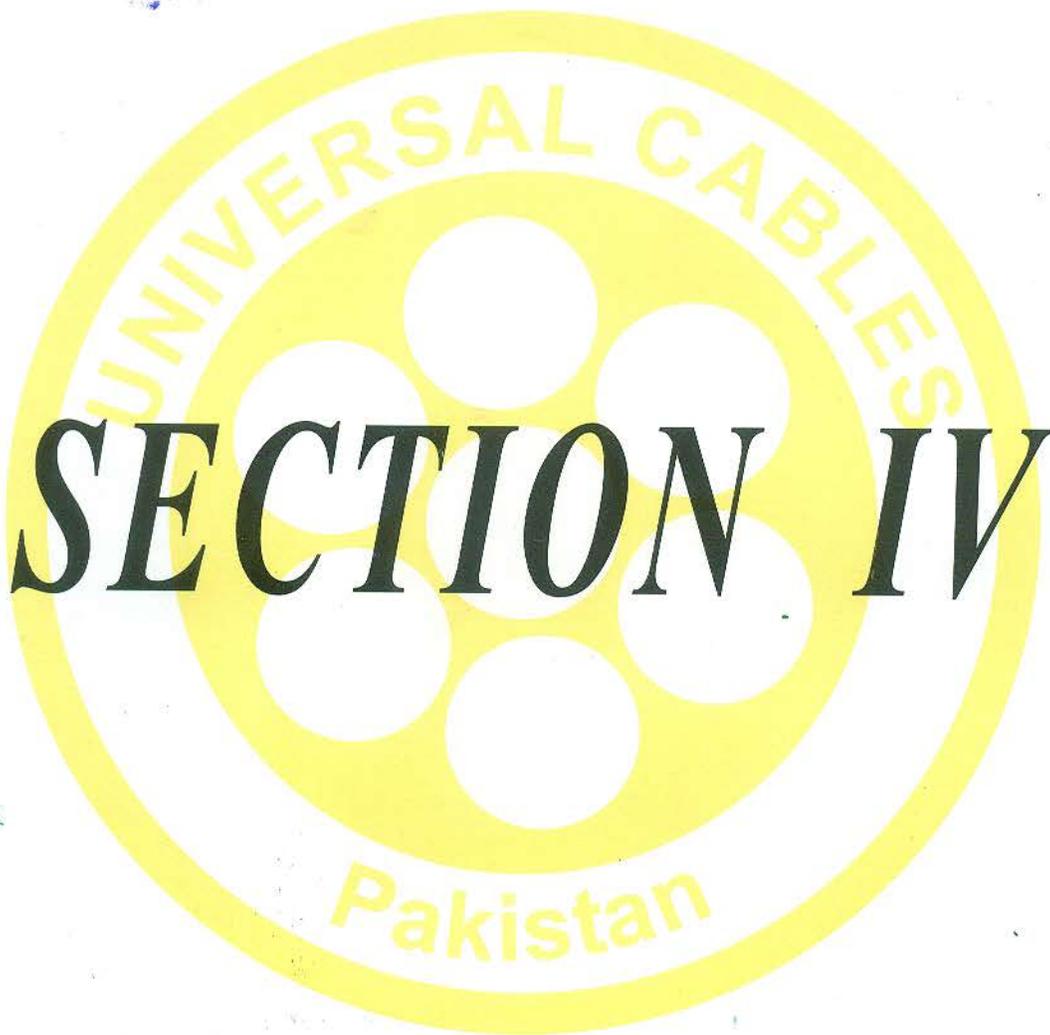


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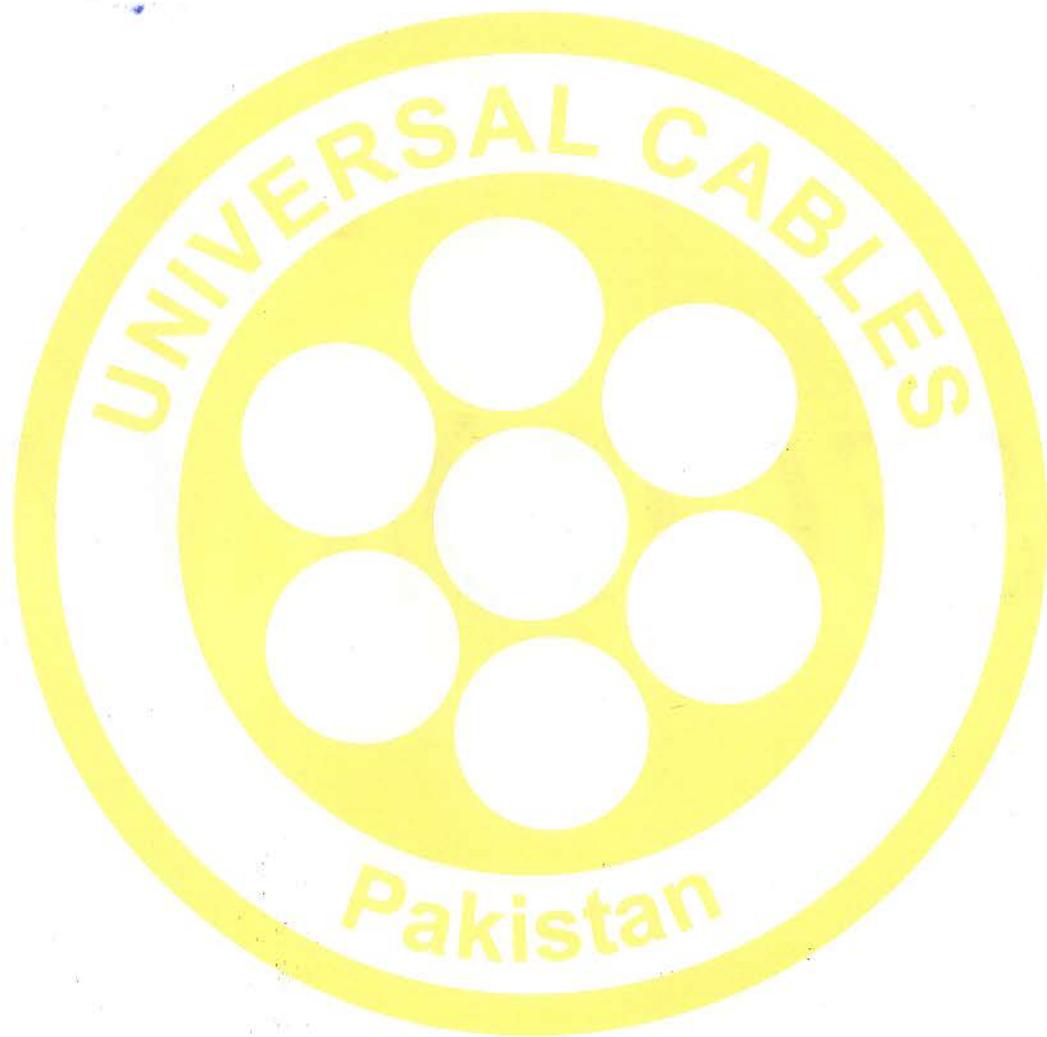
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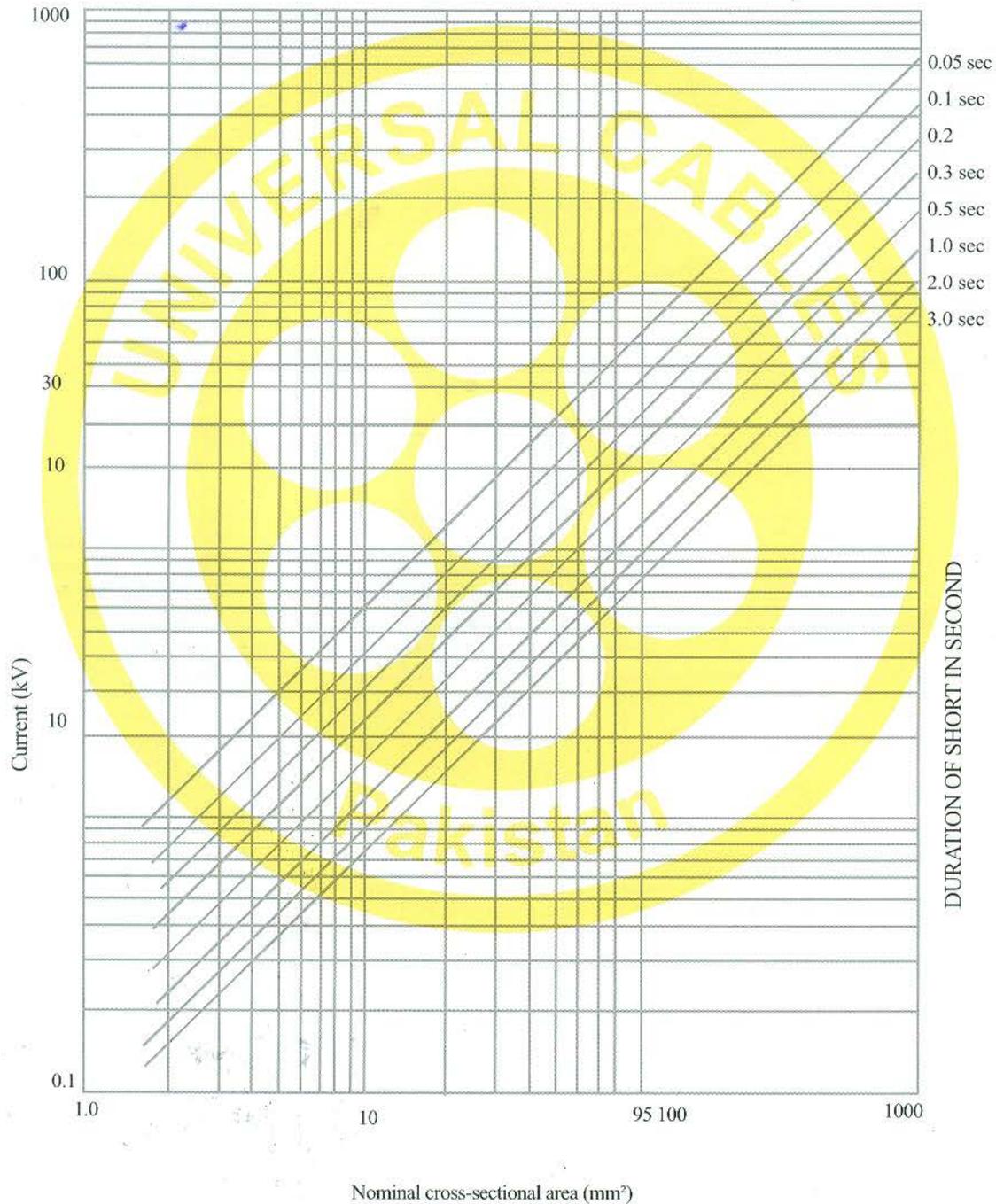
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Section-IV

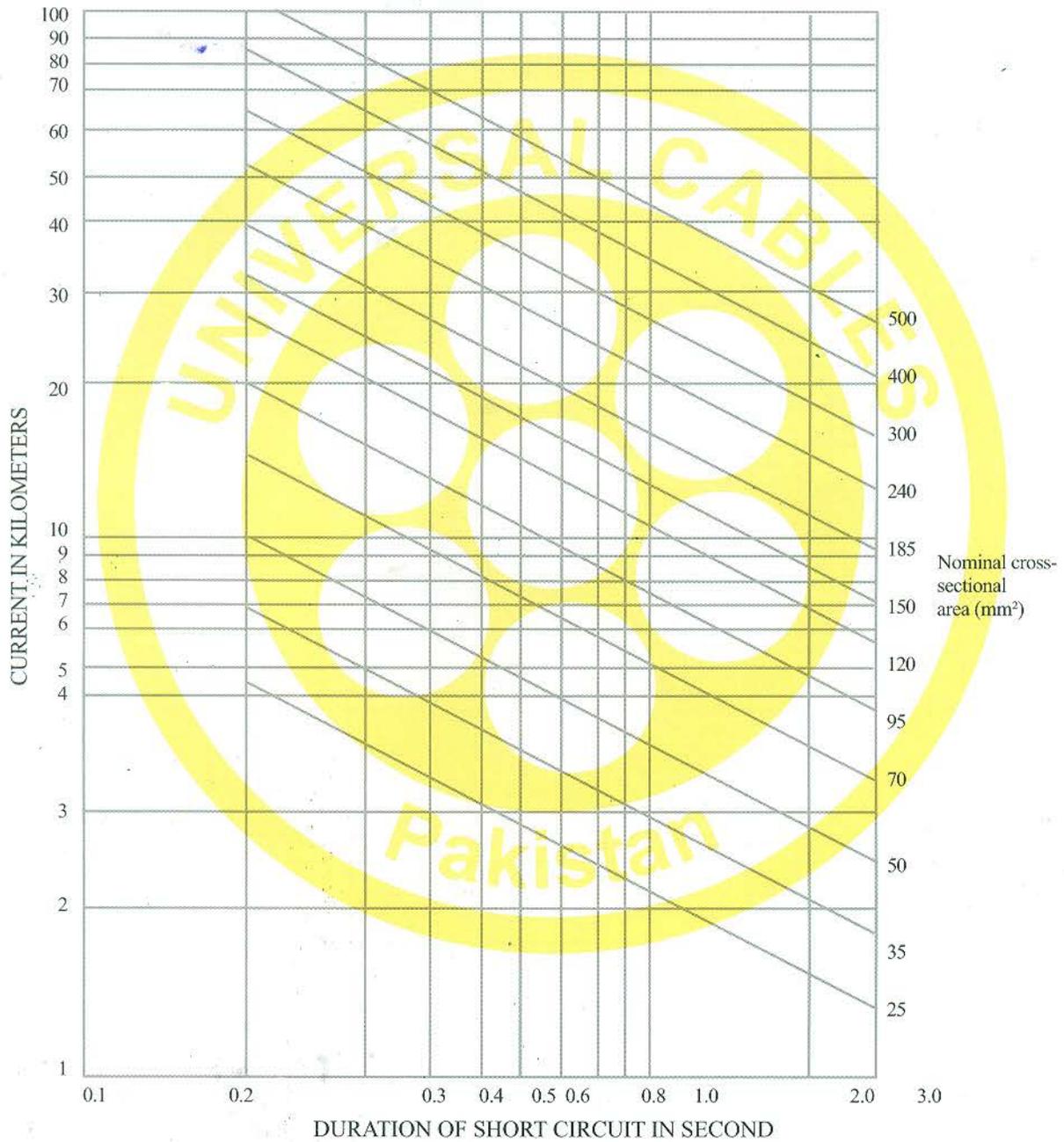
Short Circuit Rating of Copper Conductors

The values of fault current in the following graph are based on the cable being fully loaded at the start of the short circuit (conductor temperature 90°C) and a final conductor temperature of 250°C, and it should be ensured that the accessories associated with the cable are also capable of operation at these values of fault current and temperature.



Short Circuit Rating of Stranded Aluminium Conductors

The values of fault current in the following graph are based on the cable being fully loaded at the start of the short circuit (conductor temperature 90°C) and a final conductor temperature of 250°C, and it should be ensured that the accessories associated with the cable are also capable of operation at these values of fault current and temperature.



Comparison between standard imperial and nearest standard metric sizes of conductors for electrical cables.

Table - A

Standard Imperial stranding /wire diameter	inch ² converted to		Nearest Metric Stranded Size to	No. and nominal diameter of wires in circular conductor
	inch	inch ²			mm^{2}	mm^{2}
3/.029"	0.0020	1.29	1.5	1/1.38
3/.036"	0.0030	1.94	1.5	7/0.53
7/.029"	0.0045	2.90	2.5	1/1.77
7/.036"	0.0070	4.52	4	7/0.85
7/.044"	0.010	6.45	6	7/1.04
7/.052"	0.0145	9.35	10	7/1.35
7/.064"	0.0225	14.52	16	7/1.70
19/.052"	0.04	25.81	25	7/2.14
19/.064"	0.06	38.71	35	7/2.52
19/.072"	0.075	48.39	50	19/1.78
19/.083"	0.10	64.52	70	19/2.14
37/.072"	0.15	96.77	95	19/2.52
37/.083"	0.20	129.0	120	37/2.03
37/.093"	0.25	161.3	150	37/2.25
37/.103"	0.30	193.6	185	37/2.52
61/.093"	0.40	258.1	240	61/2.25
61/.103"	0.50	322.6	300	61/2.52
91/.093"	0.60	387.1	400	61/2.85
91/.103"	0.75	483.9	500	61/3.20
127/.103"	1.0	645.2	630	127/2.52
127/.112"	1.25	806.4	800	127/2.85
127/.123"	1.50	967.7	1000	127/3.20



Conductor Resistance and Temperature Correction Factors

Table-B

Part-1

Copper and Aluminium conductors
Maximum resistance in accordance
with BS-6360 and IEC 60228

Nominal cross-sectional area of conductor mm ²	Maximum resistance at 20°C Ω / Km	
	Copper	Aluminium
0.5	36.0	--
0.75	24.5	--
1	18.1	--
1.5	12.1	--
2.5	7.41	--
4	4.61	7.41
6	3.08	4.61
10	1.83	3.08
16	1.15	1.91
25	0.727	1.20
35	0.524	0.868
50	0.387	0.641
70	0.268	0.443
95	0.193	0.320
120	0.153	0.253
150	0.124	0.206
185	0.0991	0.164
240	0.0754	0.125
300	0.0601	0.100
400	0.0470	0.0778
500	0.0366	0.0605
630	0.0283	0.0469
800	0.0221	0.0367
1000	0.0176	0.0291

Part-2

Temperature Correction Factor
Resistance temperature coefficient at 20°C
Aluminium - .00403 & Copper - .00393

Temperature°C	Correction Factors	
	Aluminium	Copper
5	1.0643	1.0626
6	1.0598	1.0582
7	1.0553	1.0538
8	1.0508	1.0495
9	1.0464	1.0452
10	1.0420	1.0409
11	1.0376	1.0367
12	1.0333	1.0325
13	1.0290	1.0283
14	1.0248	1.0241
15	1.0206	1.0200
16	1.0164	1.0160
17	1.0122	1.0119
18	1.0081	1.0079
19	1.0040	1.0039
20	1.0000	1.0000
21	0.9960	0.9961
22	0.9920	0.9922
23	0.9881	0.9883
24	0.9841	0.9845
25	0.9802	0.9807
26	0.9764	0.9770
27	0.9726	0.9732
28	0.9688	0.9625
29	0.9650	0.9658
30	0.9613	0.9622
31	0.9580	0.9590
32	0.9540	0.9551
33	0.9510	0.9522
34	0.9470	0.9483
35	0.9430	0.9444
40	0.9254	0.9271
45	0.9085	0.9105
50	0.8921	0.8945



Formulae for Calculation of Rated Current for Electric Circuits.

Table -C

To calculate	Given	D.C.	A.C.Single Phase	A.C.Three Phase
Current (A)	kW	$A = \frac{1000 \times kW}{V}$	$A = \frac{1000 \times kW}{V}$	$A = \frac{1000 \times kW}{1.73 \times V \times \text{x.p.f.}}$
Current (A)	kVA	--	$A = \frac{1000 \times kVA}{V}$	$A = \frac{1000 \times kVA}{V}$
Current (A)	hp	$A = \frac{746 \times \text{hp}}{V \times \text{eff.}}$	$A = \frac{746 \times \text{hp}}{V \times \text{eff.} \times \text{x.p.f.}}$	$A = \frac{746 \times \text{hp}}{1.73 \times \text{eff.} \times \text{x.p.f.}}$
Power (kW)	VA	$kW = \frac{A \times V}{1000}$	$kW = \frac{A \times V \times \text{p.f.}}{1000}$	$kW = \frac{1.73 \times A \times V}{1000}$
Apparent Power (kVA)	VA	--	$kV = \frac{A \times V}{1000}$	$kVA = \frac{1.73 \times A \times V}{1000}$

p.f = Power factor of equipment or system under consideration.

eff = Efficiency of motor or machinery.

V = Line voltage



Important information:

To obtain the following. Information reference is made to the relevant UCIL publication codes:

- Characteristics of conductor materials
- Salient characteristics of polyvinyl chloride compounds (PVC)
- Schedule of installation methods for cables
- Safety precautions and cable drums handling

WIPS-VI04C Wiring installation and power supply cables.

- General engineering data-earthing leads, copper bonding leads, continuity conductors etc.,
- Fundamental requirement of safety, inspection and testing

C&T - VII04C Cables & tables (Guidance for installation of cables)

- Note: 1- XLPE insulated cables in compliance with IEC 60502 and customer's specification can also be manufactured and supplied.
- 2- XLPE insulated cables for high tension (11 kV - 15 kV), are imported from reputable sources, can also be supplied.
- 3- In near future, UCIL will start manufacturing High Tension cables in their factory at Port Qasim Karachi.

List of Universal Cable publications, reference codes and their description:**Ref: codes****Description**

WIPS-VI04C	Wiring installation & power supply
USWC-I05C	Universal specialty wires & cables
GWC-III05LC	General wiring (Leaflet)
PCNA-III05LC	Power cables non-armoured-leaf let
PCAR-III05LC	Power cables armoured leaflet
PCXLP-IV06LC	Power cables XLPE insulated leaflet
HTXLP- V05C	High tension XLPE power cables
L TXLP-IV06C	Low tension XLPE power cables
UPAG-VIII04L	Universal products at glance
C&T - VII04C	Cables & tables (Guidance for. Installation of wires & cables)
UCCT -OI05T	Universal conductors & cables conversion table (with scale em/inch)
UCID-OI05T	Universal cables installation data (with scale em/inch)
UTIND-VIII04D	Universal telephone index

Notes: 1. PSQCA-Certification mark licence.

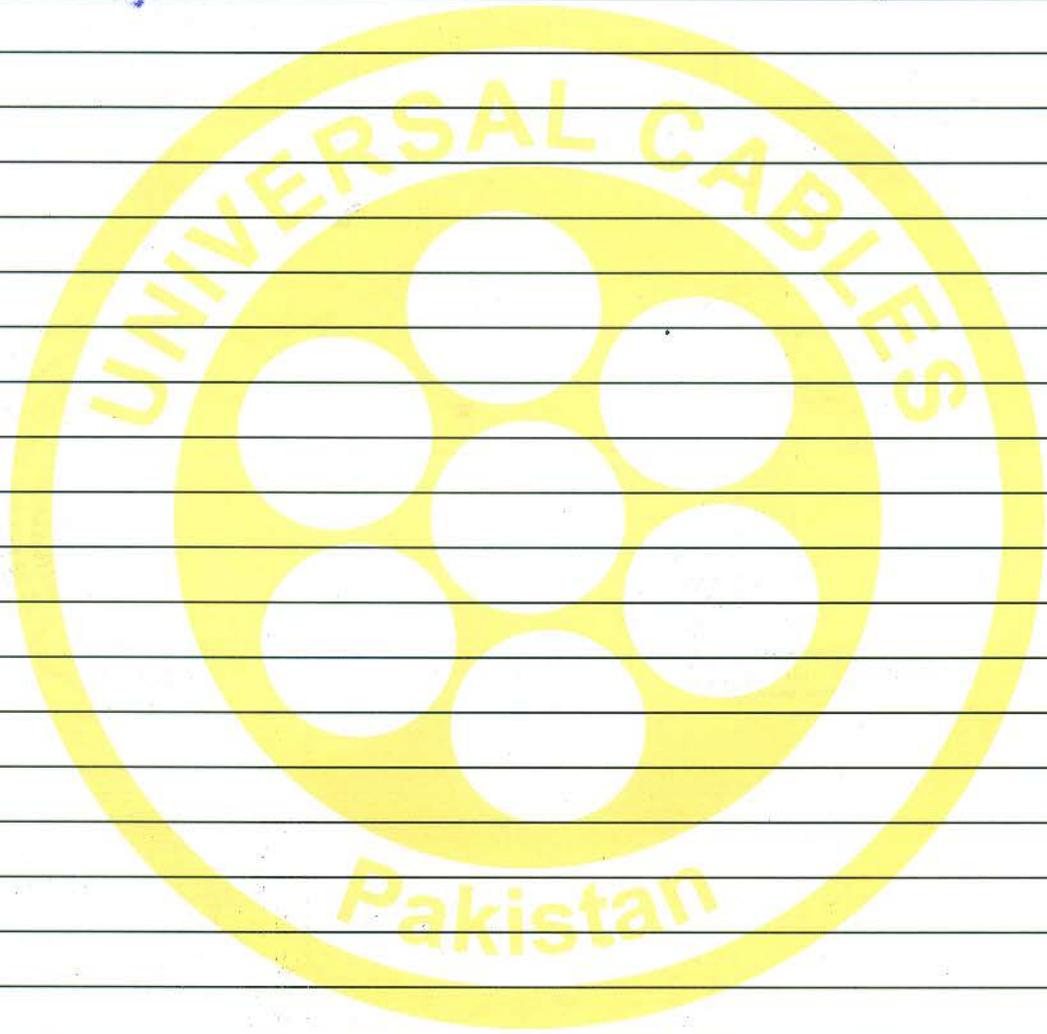
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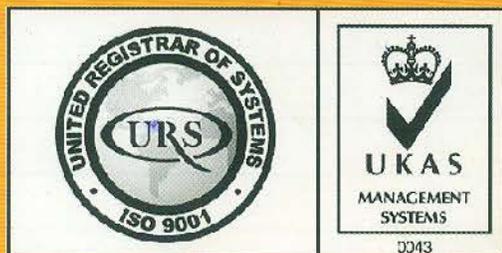
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Certificates & Memberships



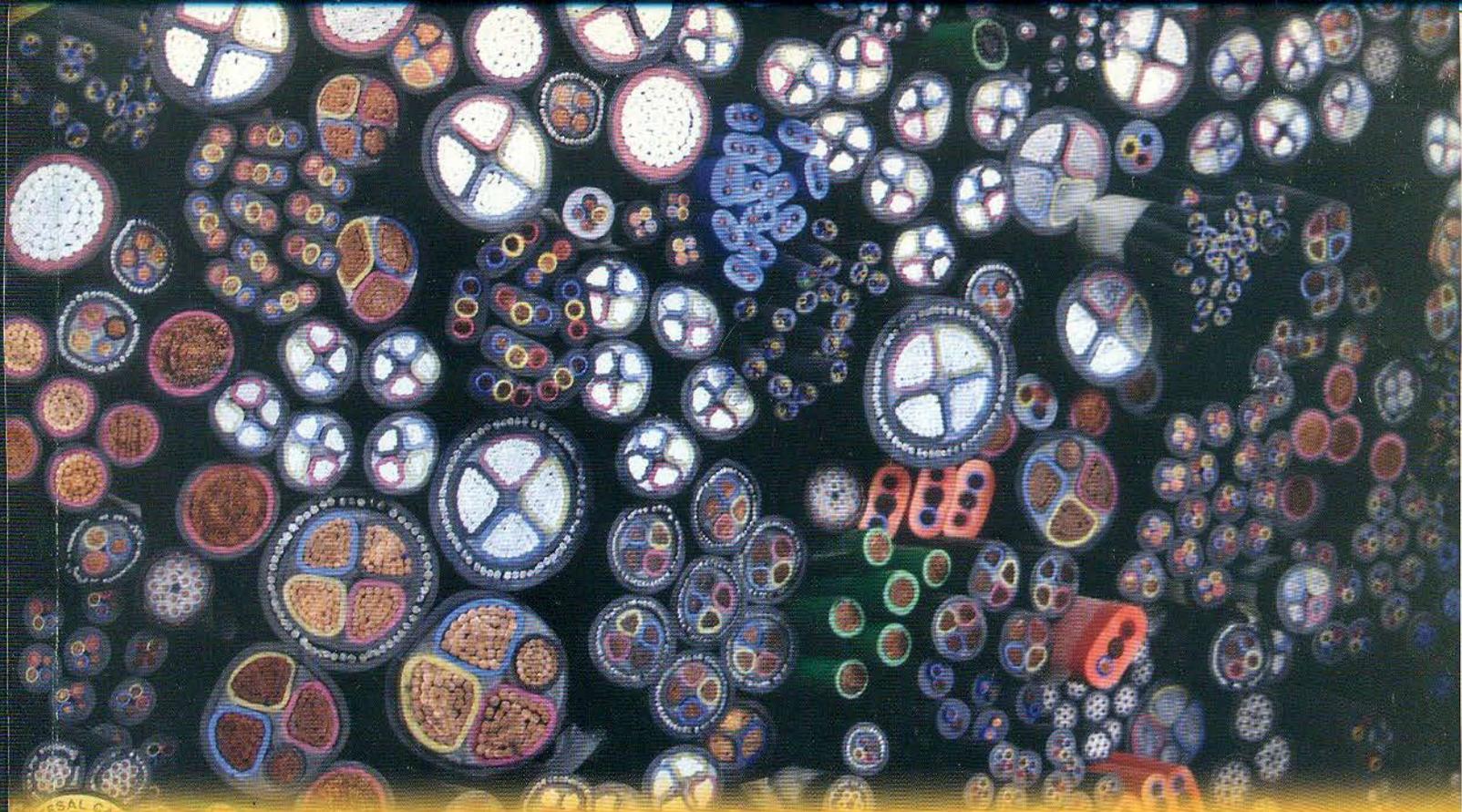
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- PVC & XLPE Insulated

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- As per WAPDA & K-Electric Specifications

FLEXIBLE CABLES

- Flexible L.T. Power & General Wiring Cables
- Flat Type (Submersible Cables)

CONTROL CABLES

- Solid, Stranded & Flexible Conductors
- Armoured & Un-Armoured

GENERAL WIRING

- Solid, Stranded & Flexible Conductors
- Imperial Sizes

INSTRUMENTATION CABLES

- Armoured & Un-Armoured
- Collective Aluminium Foil Shielded
- Individual & Collective Aluminium Foil Shielded

COPPER BRAID SHIELDED CABLES

- Solid, Stranded & Flexible Conductors

COPPER TAPE SCREENING CABLES

- As per Wapda, BS & IEC Specifications

H.T CABLES (IMPORTED)

- As per K-Electric & IEC Specifications

COPPER ROD 8 MM AS PER ASTM B49

Aluminium ROD 9.5 MM AS PER ASTM 233/97

AERIAL BUNDLE CABLES

TELEPHONE CABLES

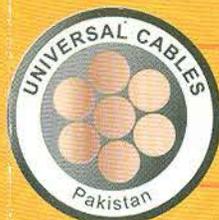
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