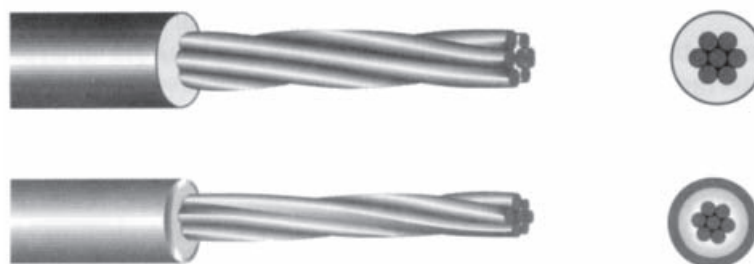


PRODUCT RANGE

This publication provides details of the following types of wiring cables:

6491X - Single core, PVC insulated non-sheathed cables, available in size range 1.5mm² to 630mm² and rated 450/750V. These cables can be considered to have a voltage rating up to 1000V a.c. when installed in fixed protected installations eg. lighting fittings and inside appliances, switchgear and control gear.



The above wiring cables conform to BS 6004 specification for "PVC insulated cables (non-armoured) for electric power and lighting". The cables also generally satisfy the International Specification IEC 60227 (6491 X only) and German standard VDE 0281 for "PVC insulated cables and cords with rated voltage not exceeding 750V"

CONSTRUCTION

CONDUCTORS

Wiring cable conductors are stranded, high conductivity plain annealed copper wires meeting the requirements of class 2 in BS 60228 and IEC 60228 specifications for "Conductors in insulated cables and cords". Wiring cables with solid copper conductors are offered up to 2.5mm².

INSULATION

The insulation of standard wiring cables is PVC grade Type TI 1 of BS 7655 (formerly BS 6746) suitable for a maximum continuous conductor operating temperature of 70°C.

Where specifically required, wiring cables can be offered with heat resistant PVC insulation, Type TI 3 (90°C).

CORE IDENTIFICATION

Unless specifically agreed otherwise, insulation colours are in accordance with BS 6004 specifications as follows:
Single Core: Red, Black, Blue, Green/Yellow, Brown, Grey.

Note: Insulation colors other than the above may be manufactured on customer request.

FINISH

Wiring cables have a smooth finish and are continuously marked with DUCAB by printing or embossing on the external surface.

RANGE, DIMENSIONS AND WEIGHTS

SINGLE CORE PVC INSULATED CABLES

Table 1

Nominal Conductor area	PVC insulated, non-sheathed 6491X, 450/750V	
	** Maximum diameter	Approximate Weight
mm ²	mm	kg/km
1.5*	3.2	21
1.5	3.3	23
2.5*	3.9	33
2.5	4.0	35
4	4.6	50
6	5.2	70
10	6.7	120
16	7.8	180
25	9.7	280
35	10.9	370
50	12.8	500
70	14.6	700
95	17.1	970
120	18.8	1190
150	20.9	1470
185	23.3	1840
240	26.6	2400
300	29.6	3010
400	33.2	3820
500	36.9	4900
630	41.1	6100

*Note: Conductors are solid, all others are stranded. Refer to Table 5 for details.

** These dimensions are Ducab's maximum and also apply to wiring insulated with Heat Resistant PVC, Type T1 3 (erstwhile Type 5). The weight (kg/km) of Heat Resistant PVC wiring cables will be slightly less than the standard 6491X cables shown above.

PERFORMANCE CHARACTERISTICS

VOLTAGE RATINGS

The non-sheathed general purpose type 6491X cables are rated 450/750V (450V to earth, 750V between conductors). These cables are considered suitable for fixed protected installations in lighting fittings and inside appliances, switchgear and control gear for voltages up to 1000V a.c. or up to 750V to earth d.c..

CURRENT CARRYING CAPACITIES AT AMBIENT TEMPERATURE 30°C

The tabulated current carrying capacities relate to continuous loading and are also known as the "full thermal ratings" implying that the cables will operate at their maximum conductor continuous temperature of 70°C. The data is extracted from IEE Wiring Regulations (BS 7671).

The tabulated current rating capacities also relate to installations where the overload protection is afforded by a fuse to BS 88 or BS 1361 or a miniature circuit breaker. Where the conductor is protected by a semi-enclosed fuse to BS 3036, the size of the conductor is to be such that its tabulated current carrying capacity is not less than the value of the fuse rating adjusted by multiplier 1.38 in addition to the correction factors for ambient temperature, thermal insulation and grouping. For details refer to IEE Wiring Regulations.

VOLTAGE DROP DATA

For a given cable run, to calculate the voltage drop (in mV), the tabulated value (mV/A/m) has to be multiplied by the cable route length in metres and the design current. For three-phase circuits the tabulated mV/A/m values relate to the line voltage.

For cables of 16mm² or less cross sectional area, the inductance can be ignored and mV/A/m values are based on resistance (r) only. For cables of cross sectional area greater than 16mm², mV/A/m values based on resistance (r) and inductance (x) are significant. However for brevity, Table 2, for single core cables of sizes 25mm² & 35mm², list (mV/A/m) z values based on total impedance (z) only.

Where the power factor of the A.C. load is widely different from the cable power factor, use of (mV/A/m) z values for calculating the volt drop may give a pessimistically high value. For detailed information, reference should be made to Appendix 4 of the IEE Wiring Regulations.

SINGLE CORE PVC INSULATED NON-SHEATHED CABLES - CABLES IN CONDUIT ON A WALL OR CEILING OR IN TRUNKING (REFERENCE METHOD 3)

Table 2

Conductor Cross Sectional Area mm ²	Current carrying capacities (amperes)		Voltage Drop (mV/A/m)		Conductor Cross Sectional Area mm ²	Current carrying capacities (amperes)		Voltage Drop (mV/A/m)					
	2 cables single phase ac or dc	3 or 4 cables three phase ac	2 cables single phase ac	3 or 4 cables three phase ac		2 cables single phase ac or dc	3 or 4 cables three phase ac	2 cables single phase ac			3 or 4 cables three phase ac		
								r	x	z	r	x	z
1	13.5	12	44	38	50	151	134	0.95	0.30	1.00	0.81	0.26	0.85
1.5	17.5	15.5	29	25	70	192	171	0.65	0.29	0.72	0.56	0.25	0.61
2.5	24	21	18	15	95	232	207	0.49	0.28	0.56	0.42	0.24	0.48
4	32	28	11	9.5	120	269	239	0.39	0.27	0.47	0.33	0.23	0.41
6	41	36	7.3	6.4	150	300	262	0.31	0.27	0.41	0.27	0.23	0.36
-	-	-	-	-	185	341	296	0.25	0.27	0.37	0.22	0.23	0.32
10	57	50	4.4	3.8	240	400	346	0.195	0.26	0.33	0.17	0.23	0.29
16	76	68	2.8	2.4	300	458	394	0.160	0.26	0.31	0.14	0.23	0.27
*25	101	89	1.8	1.55	400	546	467	0.130	0.26	0.29	0.12	0.22	0.25
*35	125	110	1.3	1.10	500	626	533	0.110	0.26	0.28	0.10	0.22	0.25
					630	720	611	0.094	0.25	0.27	0.08	0.22	0.24

* Voltage drop for sizes 25mm² and 35mm² are based on total impedance 'z' only. For 'r' and 'x' data, IEE Wiring Regulations should be referred to.

Note: Data in the above table is based on IEE Wiring Regulations. The current carrying capacities of Heat Resistant PVC insulated cables are higher, please refer to Technical Department if data is required.

THERMAL INSULATION

Current ratings pertaining to cables or cable conduits totally surrounded by thermally insulating material are not included in the above tables. For such situations, in the absence of precise information, a rating factor of 0.5 may be applied to the appropriate current ratings.

For multicore cables, current ratings of cables installed in thermally insulated ceilings but in contact with a thermally conductive surface on one side are stated. For similar information applicable to single core cables, reference should be made to the IEE Wiring Regulations.

RATING FACTORS FOR AMBIENT TEMPERATURE OTHER THAN 30°C, THE TABULATED CURRENT RATINGS SHOULD BE ADJUSTED BY FACTORS AS FOLLOWS:

Table 3

Ambient temperature °C		25	30	35	40	45	50	55	60	65	70	75	80	85
Overload protection afforded by device other than semi-enclosed fuse to BS 3036	Heat resisting PVC (90°C)*	1.03	1.0	0.97	0.94	0.91	0.87	0.84	0.80	0.76	0.71	0.61	0.5	0.35
	Ordinary PVC (70°C)	1.03	1.0	0.94	0.87	0.79	0.71	0.61	0.50	0.35	-	-	-	-
Semi-enclosed fuse to BS 3036 (formerly coarse excess current protection)	Heat resisting PVC (90°C)*	1.03	1.0	0.97	0.94	0.91	0.87	0.84	0.80	0.76	0.72	0.68	0.63	0.49
	Ordinary PVC (70°C)	1.03	1.0	0.97	0.94	0.91	0.87	0.84	0.69	0.48	-	-	-	-

* These factors are applicable only to ratings in Table 2.

CORRECTION FACTORS FOR GROUPS OF CABLES (REF. IEE WIRING REGULATION)

Table 4

Method of Installation		Correction factor													
		Number of circuits or multicore cables													
		2	3	4	5	6	7	8	9	10	12	14	16	18	20
Enclosed in conductor trunking (Method 3 or 4) or bunched and clipped directly to 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	-	-	-	-	-	-
	Spaced*	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 multicore on a perforated metal 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	-	-	-	-
	Spaced*	0.91	0.89	0.88	0.87	0.87	-	-	-	-	-	-	-	-	-
Single layer single core on a perforated metal cable tray, touching (Method 11)	Horizontal	0.90	0.85	-	-	-	-	-	-	-	-	-	-	-	-
	Vertical	0.85	-	-	-	-	-	-	-	-	-	-	-	-	-
Single layer multicore 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 surfaces of at least one cable diameter (D). Where the horizontal clearances between adjacent cables exceeds 2D no correction factor need be applied.

Notes to Table 4:

- The factors in the table are applicable to groups of cables all of one size. The value of current derived from application of the appropriate factors is the maximum continuous current to be carried 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.

CONDUCTOR RESISTANCE

Table 5

Nominal conductor area mm ²	Maximum diameter of conductor mm	Maximum conductor resistance per km at 20°C ohm	Nominal conductor area mm ²	Maximum diameter of conductor mm	Maximum conductor resistance per km at 20°C ohm
1.5*	1.38	12.1	50	8.30	0.387
1.5	1.59	12.1	70	10.00	0.268
2.5*	1.78	7.41	95	11.70	0.193
2.5	2.01	7.41	120	13.15	0.153
-	-	-	150	14.55	0.124
4	2.55	4.61	185	16.30	0.0991
6	3.12	3.08	240	18.75	0.0754
10	4.05	1.83	300	21.00	0.0601
16	4.85	1.15	400	23.90	0.0470
25	6.15	0.727	500	28.40	0.0366
35	7.25	0.524	630	31.70	0.0283

CONDUCTOR SHORT CIRCUIT RATINGS

Short circuit rating of copper conductor shall be calculated using following formula:

Short circuit current $I = kA/\sqrt{t}$

Where,

$k = 0.115$

$A =$ Cross sectional Area of conductor

$t =$ Duration in seconds

e.g. Short circuit rating of 300mm² Cu conductor for 1 second.

$$I = 0.115 \times 300 / \sqrt{1}$$

$$= 34.5 \text{ kA/sec.}$$

The values of short circuit ratings derived from above formula based on the PVC insulated cable being fully loaded at the start of the short circuit conductor temperature of 70°C and final conductor temperature of 160°C.

WIRING CABLE INSTALLATION

Wiring cables should be installed in accordance with IEE Wiring Regulations, or local installation regulations.

Minimum internal radius at bends:

CABLE DIAMETER	Minimum internal radius
Up to 10mm	3 x cable diameter
Exceeding 10mm but less than 25mm	4 x cable diameter
Exceeding 25mm	6 x cable diameter