

# طوكاب Ducab

## PVC Insulated Wiring and Flexible Panel Wiring



حلول متقدمة للكابلات من خلال التقنية والابتداع  
Advanced Cable Solutions Through Technology and Innovation

**BICC**

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Ducab is listed in the following publication issued by the Department of Trade and Industry of the United Kingdom.

“THE DTI QA REGISTER - PRODUCTS AND SERVICES LIST”

Only those companies whose quality system is assessed and certified by U.K. accredited certification bodies appear in the above publication.

## INTRODUCTION

Ducab is a technologically advanced cable manufacturing company, jointly owned by the Investment Corporation of Dubai and Senaat (General Holding Corporation, Abu Dhabi). Established in 1979, since then the company has become a global leader in the development, design, manufacturing, marketing and distribution of copper and aluminum wire and cable products for a variety of industry verticals. It is the first choice for many prestigious clients and contractors due to its record of quality and customer service. Ducab has 5 manufacturing sites across Abu Dhabi, Dubai and the UK that includes 7 independent manufacturing facilities that support its continuous growth.

The manufacturing capability of Ducab is over 115,000 metal tonnes of high, medium and low voltage cables and 110,000 tonnes of copper rod and wire per annum. The products adhere to strict global standards and address the cabling needs for the energy, general construction, industrial, defence, transport and specialty industry verticals. Ducab cables are approved by the Loss Prevention Certificate Board (LPCB), BASEC, DNV, ABS, UL, and Lloyd's Register amongst many others.

The product range includes copper rods and wires, (EC) grade aluminum alloy rods, wires, and bare overhead conductors. High Voltage cables up to 400kV, Medium Voltage cables up to 33kV, Low Voltage power cables, control & auxiliary, wiring and lead-sheathed cables, Low Smoke Zero Halogen cables, Fire-Performance cables and cable components and cable accessories.

Through expanding its world-class facilities across the Middle East, North Africa, Europe, Australia and India, the innovative journey meets the growing demand of customers. Ducab prides itself on setting and maintaining the highest quality standards of power cables. Experienced and highly skilled employees operate state-of-the-art equipment, and conduct extensive testing at every phase of production.

When it comes to advanced cable solutions, Ducab continues its status as the superbrand across the world in 40 countries. Ducab product range covers strong rate of development in specialised products by introducing product lines that are designed for particular sectors, such as PetroBICC, designed for the Oil, Gas and Petrochemical sector, RuBICC, with flexible rubber cables, MarineBICC for ship wiring cables, FlamBICC the Fire-Performance cable series, and NuBICC, which is our 60-year certified cable range for nuclear power plants.

\* This catalogue provides working information on PVC insulated Wiring Cable and DuPan (Ducab flexible panel wires)

## ORDERING ADVICE

Due to the wide range of cables in the catalogue, it is advisable, when ordering, to provide as much information as possible. Please use the following table as a guide:

1. Cable standard / specification number.
2. Voltage designation.
3. Number of cores.
4. Conductor size and type / class.
5. Colour of outer sheath.
6. Screening requirements.
7. Length of cables required and individual drum lengths.\*
8. Any other special requirement, e.g. drum weight limitation, etc.

\*Cables are normally supplied in lengths of 100 metres, 500 metres and 1000 metres depending on conductor size. Other lengths can be supplied if required.

For any specialist advice and assistance on the entire Ducab product range contact the Technical Department, Dubai Cable Company (Private) Limited, P. O. Box 11529, Dubai, U. A. E., Tel: 971-4-815 8888, Fax: 971-4-815 8111.

The information printed in this catalogue is correct/relevant at the time of going to press. This information is subject to change. Please be in touch for updates.

## CUSTOMER SERVICE

### QUALITY, HEALTH, SAFETY, ENVIRONMENTAL MANAGEMENT SYSTEMS

Ducab is committed to providing the customer with total quality excellence products and services that fully meet the expectations and is superior in value to that which can be obtained elsewhere. All manufacturing plants and business operations of Ducab are certified to ISO 9001, Quality Management System. Ducab strongly promotes sustainability and fully committed to protecting the Health, Safety and Welfare of its employees, as well as minimizing the Environmental impact of its business, products and services. Ducab's Health, Safety and Environmental Management systems are certified to OHSAS 18001 and ISO 14001 standards respectively. All management system certifications are issued and maintained through British Approval Services for Cables (BASEC) UK, a specialist certification body for electric cables.

### PRODUCT QUALITY

Reputed certification authorities have approved Ducab products, including BASEC (The British Approvals Service for Cables), Lloyds UK, KEMA (Holland), CPRI (India), ABS, DNV-GL, UL, SGS, LPCB UK (Loss Prevention Certification Board), ESMA (Emirates Authority for Standardization and Metrology) and Dubai/Abu Dhabi Civil Defense. Ducab's business processes and manufacturing process capability are being regularly audited and certified by these certification bodies as part of these product approvals.

As a "learning organization", Ducab has adopted best practices and continually improved Ducab Management systems. Lean Manufacturing Systems, Six Sigma, 5S, TPM, Suggestion Schemes are some of the improvement tools that are being used in Ducab.

### PERFORMANCE & RELIABILITY

In recognition to the achievements in the areas of Quality, Health, Safety, Environmental, Business Excellence and Sustainability, Ducab has received several awards. The following are just some of the many examples which reinforce Ducab's continuous pursuit of excellence:

- Dubai Chamber CSR Label annually since 2012
- Sheikh Mohammed Bin Rashid Al Maktoum Business Excellence Award in Manufacturing Category - 2009
- Superbrand for the year 2009, 2010, 2011 and 2012
- Emirates Quality Mark from Emirates Authority for Standardization and Meteorology (ESMA) - 2008
- Dubai Quality Award - 1994, 1998, 2004 including two God category awards
- GCC Award for Environmental Excellence - 2002
- RoSPA UK Safety Award - 25 consecutive years, and Order of Distinction Award from 2005
- Safety at Work Award from Dubai Municipality - 2008
- ICD Chairman's Award for Best Economic Value Creation Award - 2008
- Gulf Excellence Award



## 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 1.5mm<sup>2</sup> to 630mm<sup>2</sup> 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 specifications for “Conductors in insulated cables and cords”. Wiring cables with solid copper conductors are offered up to 2.5mm<sup>2</sup>.

### 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 mm <sup>2</sup>	PVC insulated, non-sheathed 6491X, 450/750V	
	** Maximum diameter mm	Approximate Weight 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 TI 3 (erswhile 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 meters and the design current. For three-phase circuits the tabulated mV/A/m values relate to the line voltage.

For cables of 16mm<sup>2</sup> 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 16mm<sup>2</sup>, mV/A/m values based on resistance (r) and inductance (x) are significant. However for brevity, Table 2, for single core cables of sizes 25mm<sup>2</sup> & 35mm<sup>2</sup>, 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 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 <sup>2</sup>	Current carrying capacities (amperes)		Voltage Drop (mV/A/m)		Conductor Cross Sectional Area mm <sup>2</sup>	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	3 or 4 cables three phase ac	2 cables single phase ac			3 or 4 cables three phase ac		
								x	y	z	x	y	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 25mm<sup>2</sup> and 35mm<sup>2</sup> 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 for													
		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 single core 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)		0.85	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 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 ignore for the purpose of obtaining the rating factor for the rest of the group.



## CONDUCTOR RESISTANCE

**TABLE 5**

Nominal conductor area mm <sup>2</sup>	Maximum diameter of conductor mm	Maximum conductor resistance per km at 20°C ohm	Nominal conductor area mm <sup>2</sup>	Maximum diameter of conductor mm	Maximum conductor resistance per km at 20°C ohm
1.5*	1.38	12.1	50	8.6	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:

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

Where,

$$k = 0.115$$

A = Cross sectional Area of conductor

t = Duration in seconds

e.g. Short circuit rating of 300mm<sup>2</sup> Cu conductor for 1 second.

$$I = 0.115 \times 300 / 1 \\ = 34.5\text{kA/sec.}$$

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

## INTRODUCTION:

Ducab flexible panel wires made as per BS 6231 Type CK are intended for use in the wiring of switch, control, metering, relay and instrumentation panels of power switchgear. It is also used for such purposes as internal connections in rectifier equipment and its motor starters and controllers. They are intended for use at AC voltage not exceeding 600 V to earth and DC voltage not exceeding 1000 V to earth. When installed in equipment they are suitable for wiring circuits for which the prescribed AC test voltage does not exceed 4 kV R.M.S. for 1 minute.

Salient features of Ducab panel wires are as mentioned below.

Standard:	BS 6231, Type CK
Conductor:	Plain annealed circular class 5 flexible copper conductor as per BS EN 60228. Tinned conductor can be offered for special requests.
Insulation:	Heat Resistant PVC type Tl3 as per BS EN 50363-3, suitable for continuous operating temperature of 90°C. Special PVC for 105°C operating temperature is also available upon request.
Voltage rating :	600/1000 V
Temperature range:	-15°C to 90°C operating temperature Cable installation temperature shall be above 0°C
Flame test:	BS EN / IEC 60332-1
Minimum Bending radius:	3 x O.D. for cable diameter up to 10 mm, 4 x O.D. for cable diameter above 10 mm up to 25 mm and 6 x O.D. for cable diameter greater than 25 mm
Colours:	Green/Yellow (bi-colour combination), Red, Black, Blue, Brown, Grey, Orange, Pink, Turquoise, Violet and White



TECHNICAL DATA					
Conductor Size	Nominal Insulation thickness	Approx. Cable diameter	Approx. cable weight	DC resistance @ 20°C	Current rating* (1 phase)
(sqmm)	(mm)	(mm)	(kg/km)	(ohm/km)	(Amp)
1 x 0.5	0.8	2.7	11	39	11.5
1 x 0.75	0.8	2.9	14	26	16
1 x 1	0.8	3.1	17	19.5	19
1 x 1.5	0.8	3.4	22	13.3	24
1 x 2.5	0.8	3.9	33	7.98	32
1 x 4	0.8	4.4	47	4.95	43
1 x 6	0.8	4.9	66	3.30	56
1 x 10	1.0	6.3	111	1.91	79
1 x 16	1.0	7.4	169	1.21	105
1 x 25	1.2	9.0	264	0.780	141
1 x 35	1.2	10.4	350	0.554	178
1 x 50	1.4	12.3	491	0.386	217
1 x 70	1.4	14.0	688	0.272	276
1 x 95	1.6	16.0	931	0.206	337
1 x 120	1.6	17.7	1154	0.161	400
1 x 150	1.8	19.8	1421	0.129	457
1 x 185	2.0	21.8	1779	0.106	526
1 x 240	2.2	24.8	2346	0.0801	634

\*: Current rating at 30°C ambient temperature

DERATING FACTORS FOR CHANGE IN AMBIENT TEMPERATURE:							
Ambient temperature	25°C	30°C	35°C	40°C	45°C	50°C	
Factor	1.02	1.00	0.96	0.91	0.87	0.82	



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