

TECHNICAL OFFER FOR TELEPHONE CABLE
IN FULL COMPLIANCE WITH TECHNICAL SPECIFICATIONS TC 450

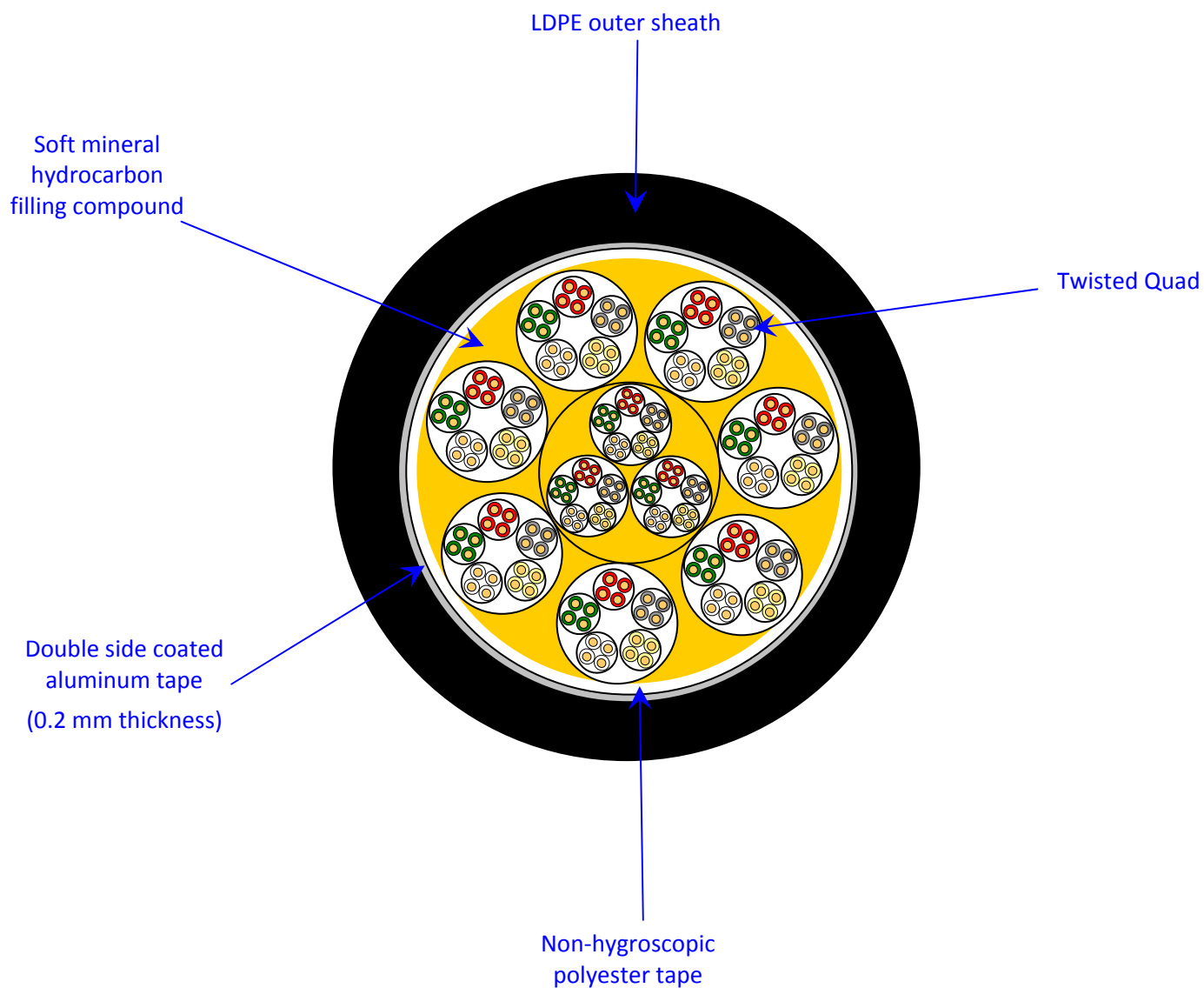


Figure (1) Multi pair Telephone cable –TC 450

(1) INTRODUCTION

Our offer is duct and direct buried telecommunication copper cables. These cables are designed for use as a non-pressurized distribution and junction cables in local telephone networks as well as in private communications systems. Technical comments are prepared for our proposed telephone cable which having the following characteristics:

(2) CABLE DESIGN

- 10 up to 2400 copper pairs with solid conductor size 0.4 mm.
- Foam-skin HDPE insulated wires.
- Insulated wires twisted in Quads.
- Cable core and all interstices are fully filled.
- Cable core covered with polyester tape.
- Double side coated aluminum tape 0.2 mm as a moisture barrier.
- LDPE outer sheath.

(3) CABLE CODE

A-02YSF (L) 2Y **** x 2 x 0.4

**** Refers to the number of pairs

(4) APPLICATIONS

- Distribution cables.
- Telephony.
- Transmission of signal.

(5) SPECIAL FEATURES

- High reliability assured by continuous petroleum filling and a laminated sheath.
- Low transmission loss coupled with.
- Suitable for direct burial or for pulling into ducts.
- Laminated aluminum tape acts as additional moisture barrier.

(6) CABLE CONSTRUCTION

(6.1) CONDUCTOR

The conductor is pure annealed solid copper, smoothly drawn, circular in cross section, uniform in quality, and free from defects. The conductor is in full compliance with IEC 60228 and BS 6360. The conductor has the following electrical and mechanical properties as follows:

Parameters	Unit	Nominal Values
▪ Conductor Dimensions	mm	0.40
▪ Conductor dimension tolerance	mm	+0.004 -0.003
▪ Maximum conductor resistance	Ω / km	143
▪ Conductor Elongation	%	≥ 14
▪ Conductor tensile strength	N/mm^2	$177 \leq \text{T.S} \leq 255$

Table (1)

(6.2) INSULATED WIRES

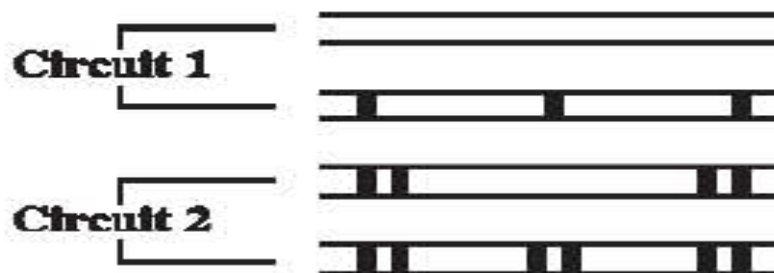
E Each conductor covered with uniformly foam skin high density polyethylene (PE). The insulation is in full compliance with IEC 708-1. The insulation has the following mechanical properties as follows:

Parameters	Unit	Nominal Values
▪ Insulation thickness	mm	0.175
▪ Insulated wire diameter	mm	0.75 ± 0.02
▪ Insulation Elongation	%	≥ 350
▪ Insulation tensile strength	N/mm^2	≥ 19
▪ Insulation adhesive force	N	2 : 12

Table (2)

(6.3) TWINNING PROCESS

Four insulated wires with the appropriate color uniformly twisted together to form a star quad. Each Quad has its own lay length (different) to reduce both capacitance unbalance and cross talk characteristics. The conductor insulation is identified by color coding and black ring markers as follow:



Basic colors of the 4conductor's insulation of each star quad of the basic 5quads sub-unit:

Item	Color
1 st quad	Red
2 nd Quad	Green
3 rd Quad	Gray
4 th Quad	Yellow
5 th Quad	White

(6.4) sub unit (5 Quads) (10 pairs).

Each five quads with, in sequence and color coding are stranded together to form a sub unit 10 pairs.

(6.5) Main unit (5 sub unit) (50 pairs) & (3+7 sub unit) (100").

Five sub units are stranded together to form main units 50 pairs.

Ten sub units are stranded together to form main units 100 pairs.

(6.6) Unit identification.

A red color helix binder marks the tracer subunit of every main unit as well as the tracer main units of every cable core. The other subunits and main units are marked by white color helix binder

(6.7) Assembly:

The main unit are stranding together to form the cable core .the construction of the cable core will be as in table (3):

Pair Number	Cable Construction			
	Center	1 st Layer	2 nd layer	3 rd layer
10	1 x 10"			
20	2 x 10"			
30	3 x 10"			
50	5 x 10"			
100	3 x 10"	7 x 10"		
150	3 x 50"			
200	4 x 50"			
250	5 x 50"			
300	1 x 50"	5 x 50"		
400	2 x 50"	6 x 50"		
500	3 x 50"	7 x 50"		
600	1 x 100"	5 x 100"		
800	2 x 100"	6 x 100"		
1000	3 x 100"	7 x 100"		
1200	4 x 100"	8 x 100"		
1400	4 x 100"	10 x 100"		
1500	1 x 100"	5 x 100"	9 x 100"	
1600	1 x 100"	5 x 100"	10 x 100"	
1800	1 x 100"	6 x 100"	11 x 100"	
2000	2 x 100"	7 x 100"	11 x 100"	
2400	3 x 100"	8 x 100"	13 x 100"	

Table (3)

(6.8) CORE FILLING

All interstices of the core are filled with a filling compound in order to block any possible water ingress. The filling compound has homogenous, uniformly mixed, and contain antioxidants. It has colorless and suitable for service in cable project to temperature from 0 up to 70 °C.

(6.9) CORE WRAPPING

Above the cable core, one non-hygroscopic dielectric (polyester) tape is longitudinally applied with an overlap of 20%. The core wrapping provide sufficient heat barrier to prevent visible evidence of the conductor insulation deformation or adhesion between the conductors caused by the adverse heat transfer during jacketing operation.

(6.10) SCREENING (SHIELD) AND MOISTURE BARRIER

A laminated aluminum tape is longitudinally applied over the core with thickness $(0.2 \pm 0.025 \text{ mm})$. The laminated aluminum tape applied with overlap. Both sides of the outer surface of aluminum tape are coated with protective polymer (30 μm thick).

(6.11) PE OUTER SHEATH

Black PE sheath is extruded over the aluminum tape. Due to the process-heat, both elements are perfectly bonded together providing a barrier against the penetration of moisture. The thickness of the outer sheath is as shown in table (4) column (2)

Diameter of the cable(mm)	Nominal Outer sheath thickness (mm)
Up to 10	1.4
Up to 20	1.6
Up to 40	1.8
Up to 50	2.0
Up to 60	2.40
Up to 70	2.60
Up to 80	2.8
More than 80	3.0

Table (4)

(6.12) CABLE MARKING

Each length of cable has a longitudinal printing on the sheath surface indicating the manufacturer, the month/year of manufacture, type of cables, number of pair/conductor diameter and the running length.

The length shall be marked at regular interval of one meter along the outer sheath.

The color of marking will be white.

(7) CABLE ELECTRICAL CHARACTERISTICS.

Parameters	Unit	Nominal Values
▪ Conductor Dimensions	mm	0.4
▪ Loop resistance at 20 °C	Ω/km	300
▪ Mutual Capacitance @ 800 HZ	nf/km	≤ 50
▪ Insulation Resistance @ ▪ Temperature = 20 oC & Testing voltage 500 VDC	GΩ.km	10
▪ Rated Voltage (peak)	volt	225

Table (5)

(8) CABLE MECHANICAL CHARACTERISTICS:

Parameters	Unit	Nominal Values
Number of pairs		10 Up to 2400
Conductor diameter	mm	0.4
Insulation ▪ Type ▪ Thickness	mm	PE – Foam-skin 0.175
Wire dimension	mm	0.75
Screen ▪ Type ▪ Thickness	mm	Aluminum 0.2
Outer Sheath ▪ Type ▪ Thickness	mm	PE – Black As table (4) column (2)

Note: The diameters and weights are representative figures and can be varied by 5 %.

Table (6)

(9) Product data:

Size	Number of Pairs	Cable weight (Approx.)	Overall diameter (Approx.)	Size	Number of Pairs	Cable weight (Approx.)	Overall diameter (Approx.)
(mm)	(No.)	(kg/k' m)	(mm)	(mm)	(No.)	(kg/km)	(mm)
0.4	10	82	8.5	0.4	800	2049	44.2
	20	129	10.3		1000	3801	49.3
	30	169	11.6		1200	4510	53.5
	50	262	14.3		1400	5284	58.1
	100	459	18.3		1500	5650	59.9
	150	653	21.2		1600	6004	61.7
	200	853	24.2		1800	6749	65.5
	250	1073	26.5		2000	7489	69
	300	1219	28.5		2400	8916	74.9
	400	1585	32.2				
	500	1942	35.4				
	600	2293	38.2				

(10) PACKING CONDITION

Every length will be delivered on non-returnable wooden drum. The wooden drum will be marked with the manufacturer's name in Arabic and English and the direction of rolling. Both ends of the cable shall be sealed to prevent the ingress of moisture during transportation and storage, physical damage, and sealing of filling compound. All other information will be identified on metallic tag which fixed to the reel flange.

- Type of cable.
- Number of pairs and conductor size.
- Length and weight of cable per drum.
- Net and gross weight.
- Manufacturer's name and location.
- Customer's name and destination.
- Production date.
- Purchasing order.

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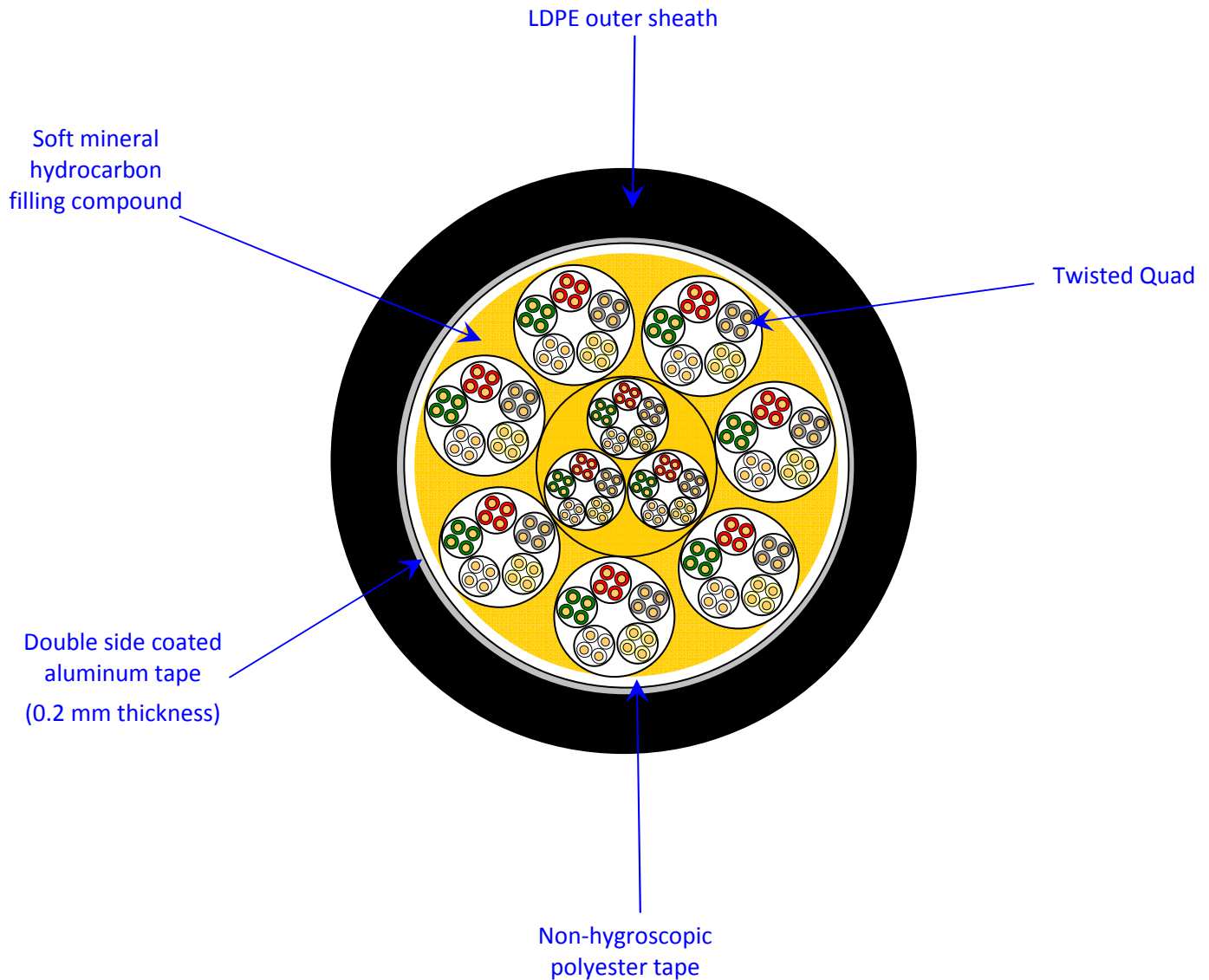


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- 10 up to 1200 copper pairs with solid conductor size 0.6 mm.
- Foam-skin HDPE insulated wires.
- Insulated wires twisted in Quads.
- Cable core and all interstices are fully filled.
- Cable core covered with polyester tape.
- Double side coated aluminum tape 0.2 mm as a moisture barrier.
- LDPE outer sheath.

(3) CABLE CODE

A-02YSF (L) 2Y 50 x 2 x 0.6

(4) APPLICATIONS

- Distribution cables.
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Parameters	Unit	Nominal Values
▪ Conductor Dimensions	mm	0.6
▪ Conductor dimension tolerance	mm	+0.008 -0.003
▪ Maximum conductor resistance	Ω / km	62
▪ Conductor Elongation	%	≥ 18
▪ Conductor tensile strength	N/mm ²	$177 \leq T.S \leq 255$

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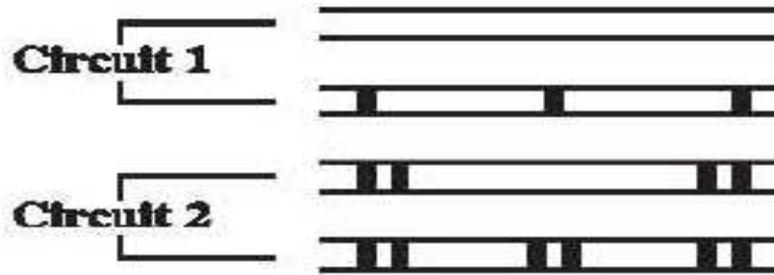
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Parameters	Unit	Nominal Values
▪ Conductor Dimensions	mm	0.6
▪ Insulation thickness	mm	0.24
▪ Insulated wire diameter	mm	1.08 ± 0.02
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Note: The diameters and weights are representative figures and can be varied by 5 %.

Table (6)

(9)Product data:

Size	Number of Pairs	Cable weight (Approx.)	Overall diameter (Approx.)
(mm)	(No.)	(kg/km)	(mm)
0.6	10	128	10.1
	20	216	12.7
	30	311	15.1
	50	472	18.1
	100	880	24.4
	150	1296	28.9
	200	1675	32.6
	250	2054	35.9
	300	2428	38.9
	400	3.38	45.3
	500	3986	50
	600	4708	53.8
	800	6348	63.3
	1000	7893	70.5
	1200	9429	77

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- Net and gross weight.
- Manufacturer's name and location.
- Customer's name and destination.
- Production date.
- Purchasing order.

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