LIBAN CABLES

Quality • Reliability • Innovation

ISO 9001 : 2000 CERTIFIED
BY AFAQ No. QUAL / 1997 / 7034 a

COPPER TELECOMMUNICATION CABLES

CERTIFICATION AFAQ

N° QUAL/1997/7034a

LIBAN CABLES SAL

CONCEPTION, DEVELOPPEMENT, PRODUCTION ET COMMERCIALISATION DE FILS, CORDES ET CABLES NUS ET ISOLES : ELECTRIQUES (BASSE, MOYENNE ET HAUTE TENSION) ET DE TELECOMMUNICATION (A CONDUCTEUR CUIVRE ET A FIBRE OPTIQUE), LE TOUT A USAGE PUBLIC, DOMESTIQUE, INDUSTRIEL ET SPECIAL.

DESIGN, DEVELOPMENT, PRODUCTION AND MARKETING AND SALES OF WIRES, BARE AND INSULATED ROPES AND CABLES : ELECTRICAL (LOW, MEDIUM AND HIGH VOLTAGE) AND OF TELECOMMUNICATION (COPPER CONDUCTOR AND OPTICAL FIBER), FOR PUBLIC, DOMESTIC, INDUSTRIAL AND SPECIAL USE.

Siège social : Sanayeh Rue Justinien Immeuble CCI BP 11 6000 BEYROUTH LIBAN
Usine : Nahr Ibrahim LIBAN

AFAQ certifie que pour les activités et les sites référencés ci-dessus toutes les dispositions mises en oeuvre pour répondre aux exigences requises par la norme internationale :
AFAQ certifies that all the arrangements covering the above mentioned activities and locations are established to meet the requirements of the international standard :

ISO 9001 : 2000

ont été examinées et jugées conformes.
have been examined and found conform.

2003-02-06

(année/mois/jour) Il est valable jusqu'au* *It is valid until** 2006-02-05 (year/month/day)

Le Président du Comité de certification	Le Directeur Général d'AFAQ	Le Représentant de l'Entreprise
The President of the Certification Committee	*The Managing Director of AFAQ*	*On Behalf of the Firm*
A. PIGEONNIER	O. PEYRAT	[illegible]. BOULBOL

AFAQ – 116, AVENUE ARISTIDE BRIAND – BP 40 / F-92224 BAGNEUX CEDEX FRANCE

COPPER
TELECOMMUNICATION CABLES

CONTENTS

1 NOTICE

As this catalogue is not intended to cover all of **LIBAN CABLES SAL** possibilities in Copper Telephone Cables manufacturing, the hereafter listing of the types of cables is not restrictive but only indicative of the main and most current types we manufacture.

On the other hand, our specification sheets are inspired mainly from International Electrotechnical Commission Specifications (IEC) only in order to conform with the sustained trend, noticed both regionally and worldwide, towards these same IEC supposed to inspire any further standardization approaches.

That is why, while consulting this brochure, it is important to keep in mind that:

- any combination or change of the constructional details mentioned in hereafter chapter 5 remains feasible, on base of special conception development, matching any special or different specifications,

- we can offer additional possibilities and alternatives like for example:
  - Pair, quad, and other basic formations
  - Unit or concentric stranding
  - Comparted construction (ex: MIC cables)

- our production encompasses all telecom cables of low, high or special mutual capacitance and conductor gauges ≥ 0.4 mm.

Finally, and within our policy of constant improvement, we reserve the right to alter any part of the information contained in this publication without incurring any obligation. In all cases this brochure being only indicatve, and unless expressly agreed upon, it cannot be considered by any mean as contractual document.

2 INTRODUCTION

Devoted to the manufacturing of electric and telecom cables, Liban Cables is the first and largest supplier in Lebanon and a leader in the Middle-East region.

Liban Cables was founded in 1967 by a group of Lebanese industrialists backed up by the technical assistance of two international leading firms :

- Les Cables de Lyon - France (became ALCATEL afterwards and NEXANS by end 2000)
- Phelps Dodge - U.S.A.

Staffed with qualified engineers and highly skilled technicians, our plant is located in Nahr-Ibrahim at 30 Km from Beirut, where cables are designed and manufactured according to all international specifications : IEC, VDE, UTE, BS and others on customer request.

Early after its foundation, Liban Cables has become the major supplier of the Lebanese market in both the public and private sectors. The product range of Liban Cables covers all Copper and Aluminium electric cables, as well as copper and fiber optic communication cables, in addition to a wide variety of special cables manufactured on customer request.

High quality cables, continuous developments of the production range, direct and fast shipments have contributed in rendering Liban Cables an important exporter for many countries on the three limitrophe continents (Asia, Europe, Africa). Liban Cables products are particularly appreciated by administrations and international contractors operating in the region and seeking reliable and direct supplies of power and communication cables.

3 QUALITY

Step by step, from raw material to final product, quality constitutes a major concern to Liban Cables.

Raw material are continuously and repetitively tested from trial orders till the last batch received afterwards.

Products are tested within two simultaneous procedures :

- A built in quality control system carried out by the production itself at any step of work in process.

- A parallel and contradictory procedure is also carried out on the same stages and products by independent inspectors reporting to the quality control service.

End users and/or third part inspection authorities are also constantly commissioning the finished products and assessing the strict conformity to ordered specifications.

In fact, our ISO 9001 certification stated in Feb 1997 by the International Certification Network (EQNET) is certified by the French Association for Quality Assurance (AFAQ), the well known rigourous and independant accredited European assessor. This certification, which upgraded to ISO 9001:2000 on February 2003, under reference AFAQ Nº QUAL / 1997 / 7034 a, confirms the soundness and the performance of the Quality System we apply for the Design, the Development, the Manufacturing and the Marketing & Sales of all our products.

4 RECOMMENDED ORDERING PARAMETERS

For prompt quotation / supplies, please make sure your inquiries and your orders are securing the following data :

1 - International or Special Standard. (Alternatively, the precise usage of the cable.)

2 - Constructional details (Materials, Pairs / Quads, Mutual Capacitance, Filling,

Screens, Armour, Messenger ...etc).

3 - Other requirements

4 - Packing & Tolerances

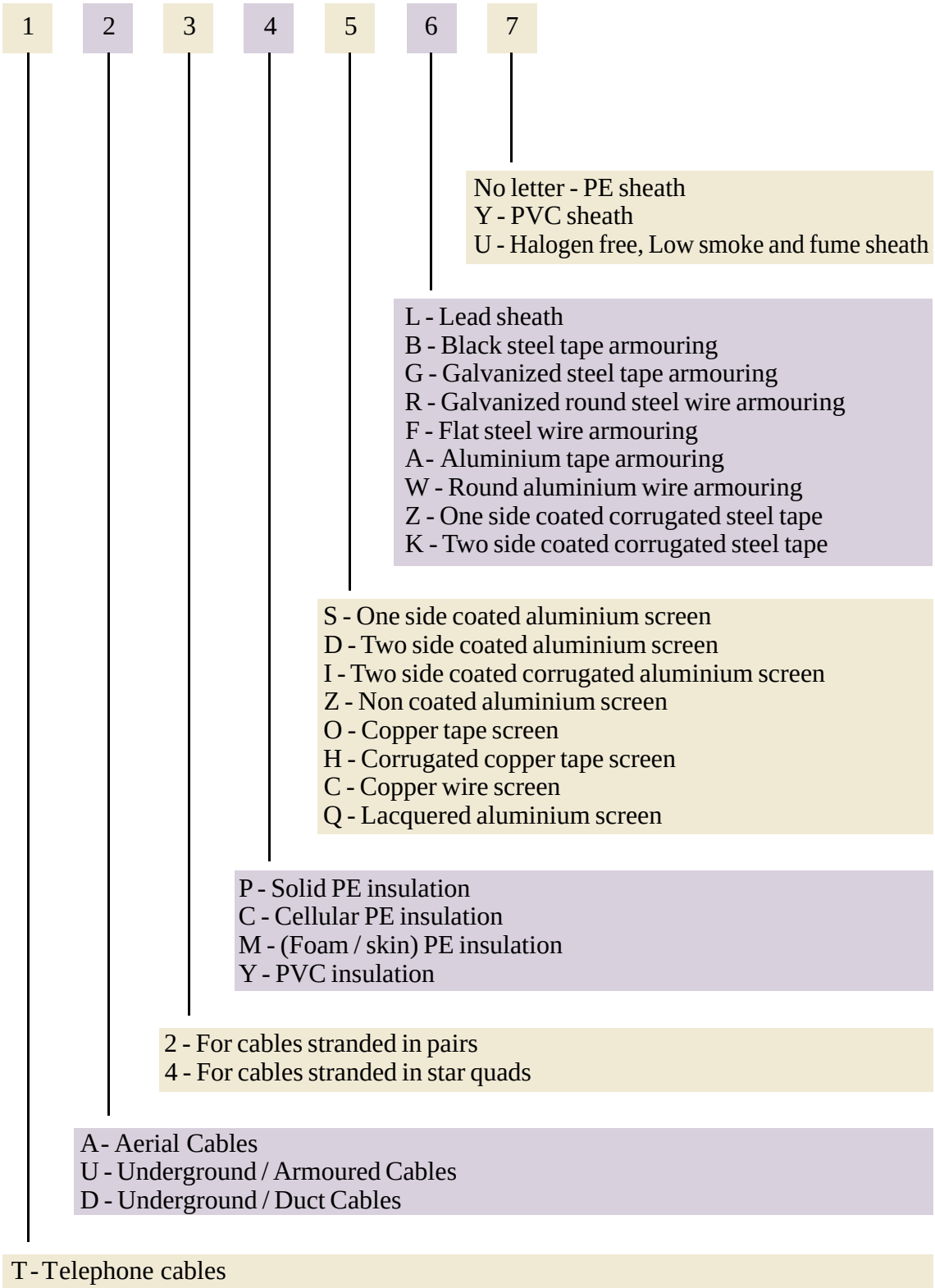
5 - Required delivery time

6 - Required validity

5 OUR TYPE AND CODE DESIGNATION

The type designation is a combination of symbols (letters and numbers) indicating the type, and the main constructional elements of the cable as follows :

OUTDOOR CABLES



Example:

TU2MDG - Telephone cable, underground, pair Type, foam / skin PE insulated, two side coated Aluminium screened, galvanized steel tape armoured.

N.B. : The sequence of the 3rd and 4th characters indicates whether the cable is jelly filled or not. For jelly filled cables, these two characters are interchanged, i.e. the letter indicating the type of insulation (P,C,M or T) comes before the number indicating the type of stranding (2 or 4).

Examples :

TUM2DG - Telephone cable, underground, foam / skin PE insulated, pair Type, jelly filled, two side coated Aluminium screened, galvanized steel tape armoured.

TU2MDG - Same cable but not jelly filled.

INDOOR CABLES

LIBTEL	for unscreened PVC insulated and sheathed cables
LIBTLV	for tinned copper conductor, PVC insulated and sheathed cables
LIBTLS	for screened, PVC insulated and sheathed cables
LIBTLA	for armoured, PVC insulated and sheathed cables

6 DUCTUNDERGROUND NETWORK CABLE USED IN FEEDER AND DISTRIBUTION (FILLED)

6.1
- **polyethylene insulated**
- **longitudinally watertight**
- **polyethylene sheathed**

Specification:
Based on IEC 60708-1 and 60708-2

Type and Application
Our type TDM2D
Pulling in duct

CONSTRUCTION

Conductors
Solid annealed bare copper wire of: 0.4 - 0.5 - 0.6 or 0.8 mm nominal diameter.
Other wire diameters are also available.

Insulation
One layer of fully coloured solid polyethylene, or one layer of colourless cellular polyethylene covered by a thin layer of fully coloured solid polyethylene (foam-skin).
Radial thickness determined to satisfy the electrical characteristics.

Twisting
2 conductors are twisted into a pair.
Different twisting laylengths are used to minimize crosstalk.
Quad cables are available upon request.

Stranding
In sub-units of 10 pairs, for units of 50 or 100 pairs and for cables of up to 100 pairs.
In units of 50 or 100 pairs for cables of more than 100 pairs.
Other repartition also available.

Spare pairs
Located within the units or between the units of the outer layer of the cable core, they are used to replace the pairs damaged during the manufacturing process.
Cable core construction, identification of conductors and units: see annex A.

Longitudinal watertightness
The cable core interstices are filled with a suitable compound (petroleum jelly) to avoid longitudinal water penetration inside the cable.

Cable core protection
One or more tapes helically or longitudinally laid with an overlap.

Continuity wire (when specified)
One 0.5 mm diameter tinned copper wire is longitudinally laid to ensure the electrical continuity of the screen.

Moisture barrierand screen
One or two side ethylene copolymere coated smooth aluminium tape is longitudinally laid with an overlap.
Nominal thickness of aluminium : 0.15 mm.
Different or corrugated screen also available.

Sheath
Black, high, medium or low density polyethylene.
Nominal radial thickness: as requested or as per the physical characteristics table.

Marking
- manufacturer's identification
- number of pairs and conductor diameter
- sequentially numbered length marking at each meter interval (or as requested).

Usual electrical characteristics

Loop resistance at 20ºC in direct current

Diameter mm	Nominal value Ω/km	Maximum individual value Ω/km
0.4	288.0	300.0
0.5	184.2	191.8
0.6	127.8	133.2
0.65	106.0	114.0
0.8	70.6	73.6
0.9	56.0	60.0
1.2	30.0	32.0

Dielectric strength during 1 mn in direct current*

Between conductors: 0.5 kv
Between conductors and screen : 1 kv
* the test can be achieved under alternative current with half of above voltages.

Insulation resistance under 200 V minimum direct current

Lowest value after 2 mn minimum : 5000 MΩ.km.

Mutual capacitance at 800 Hz

Maximum individual: 64 nF/km.
For cables of equal or more than 20 pairs:
maximum average: 55 nF/km.
cables of low level mutual capacitance (42 nF/km) are also available

Maximum capacitance unbalance at 800 Hz in pF per500 meters length of cable.

	Individual value (pF)		95% values (pF)	
	0.4, 0.5 & 0.6 mm	0.8 mm	0.4, 0.5 & 0.6 mm	0.8 mm
Pair-to-pair	250	160	150	100
Side-to-side	800	500	500	300
Pair-to-earth		1700		1000
Side-to-earth		1700		1000

Maximum calculated attenuation at 800 Hz and 20ºC

ø 0.4 mm 1.79 dB/km
ø 0.5 mm 1.43 dB/km
ø 0.6 mm 1.19 dB/km
ø 0.8 mm 0.90 dB/km

DUCT UNDERGROUND NETWORK CABLE USED IN FEEDER AND DISTRIBUTION

Foam-skin Polyethylene insulated - Petroleum Jelly filled - Polyethylene sheathed (maximum average mutual capacitance 55 nF/Km)

Nominal number of pairs	Nominal Conductor diameter (mm)	Usual number of spare pairs	Approx. cable core diameter (mm)	Nominal sheath thickness (mm)	Approx. nominal outer diameter (mm)	Nominal lineic weight (Kg/Km)	Usual nominal delivery length (m)
10	0.4	0	5	1.5	9	82	1000
20	0.4	0	6	1.5	10	120	1000
30	0.4	0	8	1.5	11	161	1000
50	0.4	1	10	1.5	14	239	1000
70	0.4	1	12	1.5	15	315	1000
100	0.4	2	14	1.5	18	434	1000
150	0.4	3	17	1.5	21	630	1000
200	0.4	4	20	1.8	24	824	500
300	0.4	6	24	1.8	29	1195	500
400	0.4	8	28	1.8	32	1556	500
500	0.4	10	31	2.0	36	1921	500
600	0.4	12	34	2.0	39	2282	300
800	0.4	16	39	2.5	44	2987	300
900	0.4	18	41	2.5	46	3364	300
1000	0.4	20	43	2.5	49	3712	300
1200	0.4	24	47	2.8	53	4411	300
1500	0.4	30	53	2.8	59	5483	300
1800	0.4	36	58	3.2	64	6567	300
2100	0.4	44	63	3.2	69	7626	300
2400	0.4	48	67	3.5	73	8663	300
2700	0.4	54	71	3.5	77	9697	300
3000	0.4	60	75	3.5	81	10729	300
10	0.5	0	6	1.5	10	108	1000
20	0.5	0	8	1.5	12	165	1000
30	0.5	0	10	1.5	13	226	1000
50	0.5	1	12	1.5	16	344	1000
70	0.5	1	14	1.5	18	458	1000
100	0.5	2	17	1.5	21	645	1000
150	0.5	3	21	1.8	25	939	1000
200	0.5	4	24	1.8	29	1224	500
300	0.5	6	30	2.0	34	1787	500
400	0.5	8	34	2.0	39	2352	500
500	0.5	10	38	2.5	43	2897	500
600	0.5	12	42	2.5	47	3469	300
800	0.5	16	48	2.8	53	4553	300
900	0.5	18	51	2.8	57	5129	300
1000	0.5	20	54	2.8	60	5666	300
1200	0.5	24	59	3.2	65	6732	300
1500	0.5	30	66	3.5	72	8348	300
1800	0.5	36	72	3.5	78	10011	300
2100	0.5	42	78	3.5	84	11609	300
10	0.6	0	7	1.5	11	139	1000
20	0.6	0	9	1.5	13	218	1000
30	0.6	0	11	1.5	15	302	1000
50	0.6	1	15	1.5	18	467	1000
70	0.6	1	17	1.5	21	639	1000
100	0.6	2	21	1.8	25	894	1000
150	0.6	3	25	1.8	30	1297	1000
200	0.6	4	29	1.8	33	1707	500
300	0.6	6	35	2.0	40	2507	500
400	0.6	8	41	2.5	46	3315	500
500	0.6	10	46	2.5	51	4088	500
600	0.6	12	50	2.8	55	4860	300
800	0.6	16	58	3.2	63	6444	300
10	0.8	0	9	1.5	13	210	1000
20	0.8	0	12	1.5	16	348	1000
30	0.8	0	15	1.5	19	507	1000
50	0.8	1	20	1.8	23	793	1000
70	0.8	1	23	1.8	28	1081	1000
100	0.8	2	28	1.8	32	1521	1000
150	0.8	3	34	2.0	38	2240	500
200	0.8	4	39	2.5	43	2944	500
300	0.8	6	48	2.8	52	4355	500
400	0.8	8	55	2.8	60	5763	300
500	0.8	10	61	3.2	67	7158	300

⋆ Other conductor gauges, mutual capacitances, different pair count cables and different delivery lengths are also available

6 DUCTUNDERGROUND NETWORK CABLE USED IN FEEDER AND DISTRIBUTION (AIRCORE)

6.2 ■ **polyethylene insulated**
■ **polyethylene sheathed**

Specification:
Based on IEC 60708-1 and 60708-3

Type and Application
Our type TD2PD
Pulling in duct

CONSTRUCTION

Conductors
Solid annealed bare copper wire of: 0.4 - 0.5 - 0.6 or 0.8 mm nominal diameter.
Other wire diameters are also available.

Insulation
Fully coloured **solid** (or foam skin when specified) polyethylene.
Radial thickness determined to satisfy the electrical characteristics.

Twisting
2 conductors are twisted into a **pair**.
Different twisting laylengths are used to minimize crosstalk.
Quad cables are available upon request.

Stranding
In sub-units of 10 pairs, for units of 50 or 100 pairs and for cables of up to 100 pairs.
In units of 50 or 100 pairs for cables of more than 100 pairs.
Other repartition also available.

Spare pairs
Located within the units or between the units of the outer layer of the cable core, they are used to replace the pairs damaged during the manufacturing process.
Cable core construction, identification of conductors and units: see annex A.

Cable core protection
One or more tapes helically or longitudinally laid with an overlap.

Continuity wire (when specified)
One 0.5 mm diameter tinned copper wire is longitudinally laid to ensure the electrical continuity of the screen.

Moisture barrierand screen
One or two side ethylene copolymere coated smooth aluminium tape is longitudinally laid with an overlap.

Nominal thickness of aluminium : 0.15 mm.
Different or corrugated screen also available.

Sheath
Black, high, medium or low density polyethylene.
Nominal radial thickness: as requested or as per the physical characteristics table.

Marking
- manufacturer's identification
- number of pairs and conductor diameter
- sequentially numbered length marking at each meter interval (or as requested).

Usual electrical characteristics

Loop resistance at 20°C in direct current

Diameter mm	Nominal value Ω/km	Maximum individual value Ω/km
0.4	288.0	300.0
0.5	184.2	191.8
0.6	127.8	133.2
0.65	106.0	114.0
0.8	70.6	73.6
0.9	56.0	60.0
1.2	30.0	32.0

Dielectric strength during 1 mn in direct current*

Between conductors: 1 kv
Between conductors and screen : 3 kv
* the test can be achieved under alternative current with half of above voltages.

Insulation resistance under 200 V minimum direct current

Lowest value after 2 mn minimum : 5000 MΩ.km.

Mutual capacitance at 800 Hz

Maximum individual: 64 nF/km.
For cables of equal or more than 20 pairs:
maximum average: 55 nF/km.
cables of low level mutual capacitance (42 nF/km) are also available

Maximum capacitance unbalance at 800 Hz in pF per500 meters length of cable.

	Individual value (pF)		95% values (pF)	
	0.4, 0.5 & 0.6 mm	0.8 mm	0.4, 0.5 & 0.6 mm	0.8 mm
Pair-to-pair	250	160	150	100
Side-to-side	800	500	500	300
Pair-to-earth		1700		1000
Side-to-earth		1700		1000

Maximum calculated attenuation at 800 Hz and 20°C

ø 0.4 mm 1.79 dB/km
ø 0.5 mm 1.43 dB/km
ø 0.6 mm 1.19 dB/km
ø 0.8 mm 0.90 dB/km

DUCT UNDERGROUND NETWORK CABLE USED IN FEEDER AND DISTRIBUTION

Solid PE insulated - PE sheathed (maximum average mutual capacitance 55 nF/Km)

Nominal number of pairs	Nominal Conductor diameter (mm)	Usual number of spare pairs	Approx. cable core diameter (mm)	Nominal sheath thickness (mm)	Approx. nominal outer diameter (mm)	Nominal lineic weight (Kg/Km)	Usual nominal delivery length (m)
10	0.4	0	5	1.5	9	71	1000
20	0.4	0	6	1.5	10	107	1000
30	0.4	0	8	1.5	11	143	1000
50	0.4	1	10	1.5	13	211	1000
70	0.4	1	12	1.5	15	278	1000
100	0.4	2	14	1.5	17	380	1000
150	0.4	3	17	1.5	21	548	1000
200	0.4	4	20	1.8	23	708	500
300	0.4	6	24	1.8	28	1034	500
400	0.4	8	27	1.8	31	1358	500
500	0.4	10	31	2.0	35	1703	500
600	0.4	12	34	2.0	38	2016	300
800	0.4	16	39	2.5	43	2639	300
900	0.4	18	41	2.5	46	2961	300
1000	0.4	20	43	2.5	48	3264	300
1200	0.4	24	47	2.8	52	3873	300
1500	0.4	30	53	2.8	58	4819	300
1800	0.4	36	58	3.2	63	5777	300
2100	0.4	42	63	3.2	68	6731	300
2400	0.4	48	67	3.5	72	7645	300
2700	0.4	54	71	3.5	76	8556	300
3000	0.4	60	75	3.5	80	9466	300
10	0.5	0	6	1.5	10	94	1000
20	0.5	0	8	1.5	11	147	1000
30	0.5	0	10	1.5	13	201	1000
50	0.5	1	12	1.5	16	305	1000
70	0.5	1	15	1.5	18	406	1000
100	0.5	2	17	1.5	21	561	1000
150	0.5	3	21	1.8	25	829	1000
200	0.5	4	24	1.8	28	1074	500
300	0.5	6	30	2.0	34	1582	500
400	0.5	8	35	2.0	39	2093	500
500	0.5	10	39	2.5	43	2577	500
600	0.5	12	42	2.5	47	3073	300
800	0.5	16	49	2.8	53	4033	300
900	0.5	18	52	2.8	57	4541	300
1000	0.5	20	54	2.8	60	5015	300
1200	0.5	24	60	3.2	65	5959	300
1500	0.5	30	66	3.5	72	7414	300
10	0.6	0	7	1.5	11	119	1000
20	0.6	0	9	1.5	13	194	1000
30	0.6	0	11	1.5	15	269	1000
50	0.6	1	15	1.5	18	416	1000
70	0.6	1	17	1.5	21	558	1000
100	0.6	2	21	1.8	25	782	1000
150	0.6	3	25	1.8	29	1143	1000
200	0.6	4	29	2.0	33	1505	500
300	0.6	6	36	2.0	40	2238	500
400	0.6	8	41	2.5	46	2944	500
500	0.6	10	46	2.5	51	3633	500
600	0.6	12	50	2.8	55	4353	300
800	0.6	16	58	3.2	63	5722	300
900	0.6	18	61	3.2	67	6438	300
1000	0.6	20	65	3.2	70	7115	300
1200	0.6	24	71	3.5	76	8462	300
10	0.8	0	10	1.5	13	178	1000
20	0.8	0	12	1.5	16	305	1000
30	0.8	0	15	1.5	19	431	1000
50	0.8	1	19	1.5	23	678	1000
70	0.8	1	23	1.8	27	929	1000
100	0.8	2	27	1.8	31	1313	1000
150	0.8	3	34	2.0	38	1963	500
200	0.8	4	39	2.5	43	2574	500
300	0.8	6	47	2.8	52	3790	500
400	0.8	8	55	2.8	60	5019	500
500	0.8	10	61	3.2	67	6249	300
600	0.8	12	68	3.5	73	7437	300

* Other conductor gauges, mutual capacitances, different pair count cables and different delivery lengths are also available

7 DIRECT BURIALUNDERGROUND NETWORK CABLE USED IN FEEDER AND DISTRIBUTION (FILLED)

7.1
- **polyethylene insulated**
- **longitudinally watertight**
- **double steel tape armoured**
- **polyethylene sheathed**

Specification:
Based on IEC 60708-1 and 60708-2

Type and Application
Our type TUM2DG
Directly buried

CONSTRUCTION

Conductors
Solid annealed bare copper wire of: 0.4 - 0.5 - 0.6 or 0.8 mm nominal diameter.
Other wire diameters are also available.

Insulation
One layer of fully coloured **solid** polyethylene or one layer of colourless **cellular** polyethylene covered by a thin layer of fully coloured **solid** polyethylene (**foam-skin**).
Radial thickness determined to satisfy the electrical characteristics.

Twisting
2 conductors are twisted into a **pair**.
Different twisting laylengths are used to minimize crosstalk.
Quad cables are available upon request.

Stranding
In sub-units of 10 pairs, for units of 50 or 100 pairs and for cables of up to 100 pairs.
In units of 50 or 100 pairs for cables of more than 100 pairs.
Other repartition also available.

Spare pairs
Located within the units or between the units of the outer layer of the cable core, they are used to replace the pairs damaged during the manufacturing process.
Cable core construction, identification of conductors and units: see annex A.

Longitudinal watertightness
The cable core interstices are filled with a suitable compound (petroleum jelly) to avoid longitudinal water penetration inside the cable.

Cable core protection
One or more tapes helically or longitudinally laid with an overlap.

Continuity wire (when specified)
One 0.5 mm diameter tinned copper wire is longitudinally laid to ensure the electrical continuity of the screen.

Moisture barrierand screen
One or two side ethylene copolymere coated smooth aluminium tape is longitudinally laid with an overlap.

Nominal thickness of aluminium : 0.15 mm.
Different or corrugated screen also available.

Innersheath
Colourless or black high (or low when specified) density polyethylene.
Nominal radial thickness: as requested or as per the physical characteristics table.

Armour
Double steel tape helically laid on a crepe paper bedding (facultative).
The nominal thickness of each tape is 0.2 mm or 0.5 mm (see the physical characteristics table).

Outersheath
Black low density polyethylene.
Nominal radial thickness: as requested or as per the physical characteristics table.

Marking
- manufacturer's identification
- number of pairs and conductor diameter
- sequentially numbered length marking at each meter interval (or as requested).

Usual electrical characteristics

Loop resistance at 20°C in direct current

Diameter mm	Nominal value Ω/km	Maximum individual value Ω/km
0.4	288.0	300.0
0.5	184.2	191.8
0.6	127.8	133.2
0.65	106.0	114.0
0.8	70.6	73.6
0.9	56.0	60.0
1.2	30.0	32.0

Dielectric strength during 1 mn in direct current*

Between conductors: 0.5 kv
Between conductors and screen : 1 kv
* the test can be achieved under alternative current with half of above voltages.

Insulation resistance under 200 V minimum direct current

Lowest value after 2 mn minimum : 5000 MΩ.km.

Mutual capacitance at 800 Hz

Maximum individual: 64 nF/km.
For cables of equal or more than 20 pairs:
maximum average: 55 nF/km.
cables of low level mutual capacitance (42 nF/km) are also available

Maximum capacitance unbalance at 800 Hz in pF per500 meters length of cable.

	Individual value (pF)		95% values (pF)	
	0.4, 0.5 & 0.6 mm	0.8 mm	0.4, 0.5 & 0.6 mm	0.8 mm
Pair-to-pair	250	160	150	100
Side-to-side	800	500	500	300
Pair-to-earth		1700		1000
Side-to-earth		1700		1000

Maximum calculated attenuation at 800 Hz and 20°C

ø 0.4 mm 1.79 dB/km
ø 0.5 mm 1.43 dB/km
ø 0.6 mm 1.19 dB/km
ø 0.8 mm 0.90 dB/km

DIRECT BURIAL UNDERGROUND NETWORK CABLE USED IN FEEDER AND DISTRIBUTION

Foam-skin Polyethylene insulated - Petroleum Jelly filled
Double steel tape armoured - Polyethylene sheathed
(maximum average mutual capacitance 55 nF/Km)

Number of pairs	Nominal Conductor diameter (mm)	Usual number of spare pairs	Approx. cable core diameter (mm)	Steel tape thickness (mm)	Nominal sheath thickness		Approx. nominal outer diameter (mm)	Nominal lineic weight (Kg/Km)	Usual nominal delivery length (m)
					inner (mm)	outer (mm)			
10	0.4	0	5	0.2	1.5	1.5	12	188	1000
20	0.4	0	6	0.2	1.5	1.5	14	241	1000
30	0.4	0	8	0.2	1.5	1.5	15	296	1000
50	0.4	1	10	0.2	1.5	1.5	17	397	1000
70	0.4	1	12	0.2	1.5	1.5	19	505	1000
100	0.4	2	14	0.2	1.5	1.5	22	646	1000
150	0.4	3	17	0.2	1.5	1.8	25	876	500
200	0.4	4	20	0.2	1.8	1.8	28	1091	500
300	0.4	6	24	0.2	1.8	1.8	32	1522	500
400	0.4	8	28	0.2	1.8	2.0	37	1991	500
500	0.4	10	31	0.5	2.0	2.0	43	2913	300
600	0.4	12	34	0.5	2.0	2.5	46	3347	300
800	0.4	16	39	0.5	2.5	2.5	51	4186	300
900	0.4	18	41	0.5	2.5	2.8	54	4630	300
1000	0.4	20	43	0.5	2.5	2.8	56	5034	300
1200	0.4	24	47	0.5	2.8	2.8	61	5881	300
10	0.5	0	6	0.2	1.5	1.5	14	227	1000
20	0.5	0	8	0.2	1.5	1.5	15	301	1000
30	0.5	0	10	0.2	1.5	1.5	17	381	1000
50	0.5	1	12	0.2	1.5	1.5	20	534	1000
70	0.5	1	14	0.2	1.5	1.5	22	681	1000
100	0.5	2	17	0.2	1.5	1.8	25	894	1000
150	0.5	3	21	0.2	1.8	1.8	30	1241	500
200	0.5	4	24	0.2	1.8	1.8	33	1562	500
300	0.5	6	30	0.2	2.0	2.0	40	2250	500
400	0.5	8	34	0.5	2.0	2.5	47	3433	500
500	0.5	10	38	0.5	2.5	2.5	51	4081	300
600	0.5	12	42	0.5	2.5	2.8	55	4755	300
800	0.5	16	48	0.5	2.8	3.2	62	6047	300
900	0.5	18	51	0.5	2.8	3.2	65	6685	300
1000	0.5	20	64	0.5	3.2	3.5	68	7294	300
10	0.6	0	7	0.2	1.5	1.5	15	270	1000
20	0.6	0	9	0.2	1.5	1.5	17	370	1000
30	0.6	0	11	0.2	1.5	1.5	19	482	1000
50	0.6	1	15	0.2	1.5	1.5	22	682	1000
70	0.6	1	17	0.2	1.5	1.8	25	888	1000
100	0.6	2	21	0.2	1.8	1.8	29	1191	1000
150	0.6	3	25	0.2	1.8	2.0	34	1645	500
200	0.6	4	29	0.2	2.0	2.0	39	2161	500
300	0.6	6	35	0.5	2.0	2.5	48	3617	500
400	0.6	8	41	0.5	2.5	2.8	54	4573	500
500	0.6	10	46	0.5	2.5	2.8	59	5510	300
600	0.6	12	50	0.5	2.8	3.2	64	6396	300
800	0.6	16	58	0.5	3.2	3.5	72	8215	300
10	0.8	0	10	0.2	1.5	1.5	17	364	1000
20	0.8	0	12	0.2	1.5	1.5	20	548	1000
30	0.8	0	15	0.2	1.5	1.5	23	724	1000
50	0.8	1	20	0.2	1.8	1.8	28	1065	1000
70	0.8	1	23	0.2	1.8	1.8	32	1404	1000
100	0.8	2	28	0.2	2.0	2.0	37	1957	500
150	0.8	3	34	0.5	2.0	2.5	46	3302	500
200	0.8	4	39	0.5	2.5	2.5	51	4142	500
300	0.8	6	47	0.5	2.8	2.8	61	5823	500
400	0.8	8	55	0.5	2.8	3.2	68	7408	300
500	0.8	10	61	0.5	3.2	3.5	75	9001	300

* Other conductor gauges, mutual capacitances, different pair count cables and different delivery lengths are also available

7 DIRECTBURIALUNDERGROUND NETWORK CABLE USED IN FEEDER AND DISTRIBUTION (AIRCORE)

7.2
- **polyethylene insulated**
- **double steel tape armoured**
- **polyethylene sheathed**

Specification:
Based on IEC 60708-1 and 60708-3

Type and Application
Our type TU2PDG
Directly buried

CONSTRUCTION

Conductors
Solid annealed bare copper wire of: 0.4 - 0.5 - 0.6 or 0.8 mm nominal diameter.
Other wire diameters are also available.

Insulation
Fully coloured **solid** (or foam skin when specified) polyethylene.
Radial thickness determined to satisfy the electrical characteristics.

Twisting
2 conductors are twisted into a **pair**.
Different twisting laylengths are used to minimize crosstalk.
Quad cables are available upon request.

Stranding
In sub-units of 10 pairs, for units of 50 or 100 pairs and for cables of up to 100 pairs.
In units of 50 or 100 pairs for cables of more than 100 pairs.
Other repartition also available.

Spare pairs
Located within the units or between the units of the outer layer of the cable core, they are used to replace the pairs damaged during the manufacturing process.
Cable core construction, identification of conductors and units: see annex A.

Cable core protection
One or more tapes helically or longitudinally laid with an overlap.

Continuity wire (when specified)
One 0.5 mm diameter tinned copper wire is longitudinally laid to ensure the electrical continuity of the screen.

Moisture barrierand screen
One or two side ethylene copolymere coated smooth aluminium tape is longitudinally laid with an overlap.
Nominal thickness of aluminium : 0.15 mm.
Different or corrugated screen also available.

Inner sheath
Colourless or black high (or low when

specified) density polyethylene.
Nominal radial thickness: as requested or as per the physical characteristics table.

Armour
Double steel tape helically laid on a crepe paper bedding (facultative).
The nominal thickness of each tape is 0.2 mm or 0.5 mm (see the physical characteristics table).

Outer sheath
Black low density polyethylene.
Nominal radial thickness: as requested or as per the physical characteristics table.

Marking
- manufacturer's identification
- number of pairs and conductor diameter
- sequentially numbered length marking at each meter interval (or as requested).

Usual electrical characteristics

Loop resistance at 20°C in direct current

Diameter mm	Nominal value Ω/km	Maximum individual value Ω/km
0.4	288.0	300.0
0.5	184.2	191.8
0.6	127.8	133.2
0.65	106.0	114.0
0.8	70.6	73.6
0.9	56.0	60.0
1.2	30.0	32.0

Dielectric strength during 1 mn in direct current*

Between conductors: 1 kv
Between conductors and screen : 3 kv
* the test can be achieved under alternative current with half of above voltages.

Insulation resistance under 200 V minimum direct current

Lowest value after 2 mn minimum : 5000 MΩ.km.

Mutual capacitance at 800 Hz

Maximum individual: 64 nF/km.
For cables of equal or more than 20 pairs:
maximum average: 55 nF/km.
cables of low level mutual capacitance (42 nF/km) are also available

Maximum capacitance unbalance at 800 Hz in pF per500 meters length of cable.

	Individual value (pF)		95% values (pF)	
	0.4, 0.5 & 0.6 mm	0.8 mm	0.4, 0.5 & 0.6 mm	0.8 mm
Pair-to-pair	250	160	150	100
Side-to-side	800	500	500	300
Pair-to-earth		1700		1000
Side-to-earth		1700		1000

Maximum calculated attenuation at 800 Hz and 20°C

ø 0.4 mm 1.79 dB/km
ø 0.5 mm 1.43 dB/km
ø 0.6 mm 1.19 dB/km
ø 0.8 mm 0.90 dB/km

DIRECT BURIAL UNDERGROUND NETWORK CABLE USED IN FEEDER AND DISTRIBUTION

Solid Polyethylene insulated - Double steel tape armoured - Polyethylene sheathed (maximum average mutual capacitance 55 nF/Km)

Number of pairs	Nominal Conductor diameter (mm)	Usual number of spare pairs	Approx. cable core diameter (mm)	Steel tape thickness (mm)	Nominal sheath thickness		Approx. nominal outer diameter (mm)	Nominal lineic weight (Kg/Km)	Usual nominal delivery length (m)
					inner (mm)	outer (mm)			
10	0.4	0	5	0.2	1.5	1.5	12	177	1000
20	0.4	0	6	0.2	1.5	1.5	14	227	1000
30	0.4	0	8	0.2	1.5	1.5	15	277	1000
50	0.4	1	10	0.2	1.5	1.5	18	380	1000
70	0.4	1	12	0.2	1.5	1.5	19	467	1000
100	0.4	2	14	0.2	1.5	1.5	22	594	1000
150	0.4	3	17	0.2	1.5	1.8	25	805	500
200	0.4	4	19	0.2	1.8	1.8	27	995	500
300	0.4	6	24	0.2	1.8	1.8	32	1382	500
400	0.4	8	27	0.2	1.8	1.8	37	1809	500
500	0.4	10	31	0.5	2.0	2.0	43	2704	300
600	0.4	12	34	0.5	2.0	2.0	46	3092	300
800	0.4	16	39	0.5	2.5	2.5	51	3846	300
900	0.4	18	41	0.5	2.5	2.5	54	4250	300
1000	0.4	20	43	0.5	2.5	2.5	56	4612	300
1200	0.4	24	47	0.5	2.8	2.8	61	5369	300
10	0.5	0	6	0.2	1.5	1.5	13	213	1000
20	0.5	0	8	0.2	1.5	1.5	15	283	1000
30	0.5	0	10	0.2	1.5	1.5	17	356	1000
50	0.5	1	12	0.2	1.5	1.5	20	503	1000
70	0.5	1	14	0.2	1.5	1.5	22	629	1000
100	0.5	2	17	0.2	1.5	1.8	25	822	1000
150	0.5	3	21	0.2	1.8	1.8	30	1145	500
200	0.5	4	24	0.2	1.8	1.8	33	1428	500
300	0.5	6	30	0.5	2.0	2.0	42	2542	500
400	0.5	8	35	0.5	2.0	2.5	47	3191	500
500	0.5	10	39	0.5	2.5	2.5	51	3778	300
600	0.5	12	42	0.5	2.5	2.8	55	4392	300
800	0.5	16	49	0.5	2.8	3.2	62	5563	300
900	0.5	18	52	0.5	2.8	3.2	65	6135	300
1000	0.5	20	54	0.5	2.8	3.5	68	6682	300
10	0.6	0	7	0.2	1.5	1.5	15	250	1000
20	0.6	0	9	0.2	1.5	1.5	17	347	1000
30	0.6	0	11	0.2	1.5	1.5	19	456	1000
50	0.6	1	15	0.2	1.5	1.5	22	639	1000
70	0.6	1	17	0.2	1.5	1.8	25	818	1000
100	0.6	2	21	0.2	1.8	1.8	29	1093	1000
150	0.6	3	25	0.2	1.8	2.0	34	1504	1000
200	0.6	4	29	0.2	2.0	2.0	41	2457	500
300	0.6	6	36	0.5	2.0	2.5	48	3367	500
400	0.6	8	41	0.5	2.5	2.8	54	4238	500
500	0.6	10	46	0.5	2.5	2.8	59	5091	300
600	0.6	12	50	0.5	2.8	3.2	64	5913	300
800	0.6	16	58	0.5	3.2	3.5	72	7536	300
10	0.8	0	9	0.2	1.5	1.5	17	332	1000
20	0.8	0	12	0.2	1.5	1.5	20	503	1000
30	0.8	0	15	0.2	1.5	1.5	23	660	1000
50	0.8	1	19	0.2	1.5	1.8	27	963	1000
70	0.8	1	23	0.2	1.8	1.8	31	1267	1000
100	0.8	2	27	0.2	1.8	2.0	37	1766	500
150	0.8	3	34	0.5	2.0	2.5	46	3038	500
200	0.8	4	39	0.5	2.5	2.5	51	3786	500
300	0.8	6	47	0.5	2.8	2.8	61	5290	500
400	0.8	8	55	0.5	2.8	3.2	68	6701	300
500	0.8	10	61	0.5	3.2	3.5	75	8108	300

⋆ Other conductor gauges, mutual capacitances, different pair count cables and different delivery lengths are also available

8 AERIALNETWORK CABLE USED IN DISTRIBUTION (FILLED)

8.1
- **polyethylene insulated**
- **longitudinally watertight**
- **polyethylene sheathed**
- **steel messenger**

Specification:
Based on IEC 60708-1 and 60708-4

Type and Application
Our type TAM2D
Self- supported aerial laying

CONSTRUCTION

Conductors
Solid annealed bare copper wire of: 0.4 - 0.5 - 0.65 or 0.9 mm nominal diameter.
Other wire diameters are also available.

Insulation
One layer of fully coloured **solid** polyethylene or one layer of colourless **cellular** polyethylene covered by a thin layer of fully coloured **solid** polyethylene **(foam-skin).**
Radial thickness determined to satisfy the electrical characteristics.

Twisting
2 conductors are twisted into a **pair**.
Different twisting laylengths are used to minimize crosstalk.
Quad cables are available upon request.

Stranding
In sub-units of 10 pairs, for units of 50 or 100 pairs and for cables of up to 100 pairs.
In units of 50 or 100 pairs for cables of more than 100 pairs.
Other repartition also available.

Spare pairs
Located within the units or between the units of the outer layer of the cable core, they are used to replace the pairs damaged during the manufacturing process.
Cable core construction, identification of conductors and units: see annex A.

Longitudinal watertightness
The cable core interstices are filled with a suitable compound (petroleum jelly) to avoid longitudinal water penetration inside the cable.

Cable core protection
One or more tapes helically or longitudinally laid with an overlap.

Continuity wire (when specified)
One 0.5 mm diameter tinned copper wire is longitudinally laid to ensure the electrical continuity of the screen.

Moisture barrierand screen
One or two side ethylene copolymere

coated smooth aluminium tape is longitudinally laid with an overlap.
Nominal thickness of aluminium : 0.15 mm.
Different or corrugated screen also available.

Messenger
One strand of galvanized steel wires. Diameter of wires, number of wires and minimum breaking strength : as requested or as per the physical characteristics table.

Sheath
Black, high, medium or low density, figure 8 shaped polyethylene including the cable core and the messenger. Nominal radial thickness : as requested or as per the physical characteristics table.

Marking
- manufacturer's identification
- number of pairs and conductor diameter
- sequentially numbered length marking at each meter interval (or as required).

Usual electrical characteristics

Loop resistance at 20°C in direct current

Diameter mm	Nominal value Ω/km	Maximum individual value Ω/km
0.4	288.0	300.0
0.5	184.2	191.8
0.6	127.8	133.2
0.65	106.0	114.0
0.8	70.6	73.6
0.9	56.0	60.0
1.2	30.0	32.0

Dielectric strength during 1 mn in direct current*

Between conductors: 0.5 kv
Between conductors and screen : 1 kv
* the test can be achieved under alternative current with half of above voltages.

Insulation resistance under 200 V minimum direct current

Lowest value after 2 mn minimum : 5000 MΩ.km.

Mutual capacitance at 800 Hz

Maximum individual: 64 nF/km.
For cables of equal or more than 20 pairs:
maximum average: 55 nF/km.
cables of low level mutual capacitance (42 nF/km) are also available

Maximum capacitance unbalance at 800 Hz in pF per500 meters length of cable.

	Individual value (pF)		95% values (pF)	
	0.4, 0.5 & 0.6 mm	0.8 mm	0.4, 0.5 & 0.6 mm	0.8 mm
Pair-to-pair	250	160	150	100
Side-to-side	800	500	500	300
Pair-to-earth		1700		1000
Side-to-earth		1700		1000

Maximum calculated attenuation at 800 Hz and 20°C

ø 0.4 mm	1.79 dB/km
ø 0.5 mm	1.43 dB/km
ø 0.65 mm	1.11 dB/km
ø 0.9 mm	0.81 dB/km

AERIAL NETWORK CABLE USED IN DISTRIBUTION

Foam skin Polyethylene insulated - Petroleum jelly filled Polyethylene sheathed - Steel messenger (maximum average mutual capacitance 55 nF/Km)

Nominal number of pairs	Nominal Conductor diameter (mm)	Usual number of spare pairs	Approx. cable core diameter (mm)	Nominal sheath thickness (mm)	Messenger		Nom. outer dimension hght. X dia. (mm)	Nominal lineic weight (Kg/Km)	Usual nominal delivery length (m)
					Dim. Nbr.X dia. (mm)	Mini. break load (daN)			
10	0.4	0	5	1.5	7 X 0.9	670	16 X 8.0	136	1000
20	0.4	0	6	1.5	7 X 0.9	670	18 X 9.5	177	1000
30	0.4	0	7	1.5	7 X 1.2	1190	20 X 10.9	252	1000
50	0.4	1	10	1.5	7 X 1.2	1190	22 X 13.0	330	1000
70	0.4	1	11	1.5	7 X 1.2	1190	24 X 14.7	404	1000
100	0.4	2	14	1.5	7 X 1.2	1190	26 X 16.9	515	1000
150	0.4	3	17	1.5	7 X 1.6	2110	30 X 19.8	760	1000
200	0.4	4	19	1.8	7 X 1.6	2110	34 X 23	965	1000
10	0.5	0	6	1.5	7 X 0.9	670	17 X 8.9	158	1000
20	0.5	0	8	1.5	7 X 0.9	670	19 X 10.8	220	1000
30	0.5	0	9	1.5	7 X 1.2	1190	22 X 12.4	309	1000
50	0.5	1	12	1.5	7 X 1.2	1190	24 X 15.1	426	1000
70	0.5	1	14	1.5	7 X 1.2	1190	26 X 17.1	530	1000
100	0.5	2	17	1.5	7 X 1.2	1190	29 X 19.7	695	1000
150	0.5	3	20	1.8	7 X 1.6	2110	35 X 25	1060	1000
200	0.5	4	23	1.8	7 X 1.6	2110	38 X 28	1320	1000
10	0.65	0	7	1.5	7 X 1.2	1190	20 X 10.0	240	1000
20	0.65	0	10	1.5	7 X 1.2	1190	22 X 13.2	336	1000
30	0.65	0	12	1.5	7 X 1.2	1190	25 X 15.4	431	1000
50	0.65	1	16	1.5	7 X 1.2	1190	28 X 19.0	625	1000
70	0.65	1	18	1.5	7 X 1.6	2110	32 X 22	865	1000
100	0.65	2	22	1.8	7 X 1.6	2110	37 X 26	1170	600
150	0.65	3	27	1.8	7 X 1.6	2110	42 X 31	1640	600
200	0.65	4	31	2.0	7 X 1.6	2110	47 X 36	2110	600
10	0.9	0	10	1.5	7 X 1.2	1190	22 X 13.1	330	1000
20	0.9	0	13	1.5	7 X 1.2	1190	26 X 16.4	505	600
30	0.9	0	16	1.5	7 X 1.2	1190	29 X 19.5	680	600
50	0.9	1	21	1.8	7 X 1.6	2110	36 X 25	1120	600
70	0.9	1	25	1.8	7 X 1.6	2110	40 X 29	1460	600
100	0.9	2	30	2.0	7 X 1.6	2110	45 X 34	1990	600
150	0.9	3	36	2.0	7 X 2.0	3300	53 X 41	2930	600

* Other conductor gauges, mutual capacitances, different pair count cables and different delivery lengths are also available

Typical conditions of laying:

Maximal distance between the supports (span): 50 m.
Nominal sag for a 50 m span at 15ºC without overload: 0.66 m.

security coefficient > 3 in the following extreme climatic conditions:

Hypothesis A: 100 km/h wind speed (pressure: 480 pa) at 15ºC.
Hypothesis B: 60 km/h wind speed (pressure: 180 pa) - 10ºC without ice.

security coefficient > 2 in the following extreme climatic conditions:

Hypothesis C: ice sleeve of 5 mm thickness at - 10ºC without wind.

8 AERIALNETWORK CABLE USED IN DISTRIBUTION (AIRCORE)

8.2
- **polyethylene insulated**
- **polyethylene sheathed**
- **steel messenger**

Specification:
Based on IEC 60708-1 and 60708-4

Type and Application
Our type TA2MD
Self- supported aerial laying

CONSTRUCTION

Conductors
Solid annealed bare copper wire of: 0.4 - 0.5 - 0.65 or 0.9 mm nominal diameter. Other wire diameters are also available.

Insulation
One layer of fully coloured **solid** polyethylene or one layer of colourless **cellular** polyethylene covered by a thin layer of fully coloured **solid** polyethylene **(foam-skin).**
Radial thickness determined to satisfy the electrical characteristics.

Twisting
2 conductors are twisted into a **pair**.
Different twisting laylengths are used to minimize crosstalk.
Quad cables are available upon request.

Stranding
In sub-units of 10 pairs, for units of 50 or 100 pairs and for cables of up to 100 pairs.
In units of 50 or 100 pairs for cables of more than 100 pairs.
Other repartition also available.

Spare pairs
Located within the units or between the units of the outer layer of the cable core, they are used to replace the pairs damaged during the manufacturing process.
Cable core construction, identification of conductors and units: see annex A.

Cable core protection
One or more tapes helically or longitudinally laid with an overlap.

Continuity wire (when specified)
One 0.5 mm diameter tinned copper wire is longitudinally laid to ensure the electrical continuity of the screen.

Moisture barrierand screen
One or two side ethylene copolymere coated smooth aluminium tape is longitudinally laid with an overlap.
Nominal thickness of aluminium : 0.15 mm.
Different or corrugated screen also available.

Messenger
One strand of galvanized steel wires. Diameter of wires, number of wires and minimum breaking strength : as requested or as per the physical characteristics table.

Sheath
Black, high, medium or low density, figure 8 shaped polyethylene including the cable core and the messenger. Nominal radial thickness : as requested or as per the physical characteristics table.

Marking
- manufacturer's identification
- number of pairs and conductor diameter
- sequentially numbered length marking at each meter interval (or as required).

Usual electrical characteristics

Loop resistance at 20°C in direct current

Diameter mm	Nominal value Ω/km	Maximum individual value Ω/km
0.4	288.0	300.0
0.5	184.2	191.8
0.6	127.8	133.2
0.65	106.0	114.0
0.8	70.6	73.6
0.9	56.0	60.0
1.2	30.0	32.0

Dielectric strength during 1 mn in direct current*

Between conductors: 0.5 kv
Between conductors and screen : 1 kv
* the test can be achieved under alternative current with half of above voltages.

Insulation resistance under 200 V minimum direct current

Lowest value after 2 mn minimum : 5000 MΩ.km.

Mutual capacitance at 800 Hz

Maximum individual: 64 nF/km.
For cables of equal or more than 20 pairs:
maximum average: 55 nF/km.
cables of low level mutual capacitance (42 nF/km) are also available

Maximum capacitance unbalance at 800 Hz in pF per500 meters length of cable.

	Individual value (pF)		95% values (pF)	
	0.4, 0.5 & 0.6 mm	0.8 mm	0.4, 0.5 & 0.6 mm	0.8 mm
Pair-to-pair	250	160	150	100
Side-to-side	800	500	500	300
Pair-to-earth		1700		1000
Side-to-earth		1700		1000

Maximum calculated attenuation at 800 Hz and 20°C

ø 0.4 mm 1.79 dB/km
ø 0.5 mm 1.43 dB/km
ø 0.65 mm 1.11 dB/km
ø 0.9 mm 0.81 dB/km

AERIAL NETWORK CABLE USED IN DISTRIBUTION

Foam skin Polyethylene insulated - Polyethylene sheathed - Steel messenger (maximum average mutual capacitance 55 nF/Km)

Nominal number of pairs	Nominal Conductor diameter (mm)	Usual number of spare pairs	Approx. cable core diameter (mm)	Nominal sheath thickness (mm)	Messenger		Nom. outer dimension hght. X dia. (mm)	Nominal lineic weight (Kg/Km)	Usual nominal delivery length (m)
					Dim. Nbr.X dia. (mm)	Mini. break load (daN)			
10	0.4	0	5	1.5	7 X 0.9	670	16 X 8.0	129	1000
20	0.4	0	6	1.5	7 X 0.9	670	18 X 9.4	166	1000
30	0.4	0	7	1.5	7 X 1.2	1190	20 X 10.7	234	1000
50	0.4	1	10	1.5	7 X 1.2	1190	22 X 12.9	306	1000
70	0.4	1	11	1.5	7 X 1.2	1190	24 X 14.6	370	1000
100	0.4	2	13	1.5	7 X 1.2	1190	26 X 16.7	466	1000
150	0.4	3	16	1.5	7 X 1.6	2110	30 X 19.6	680	1000
200	0.4	4	19	1.5	7 X 1.6	2110	33 X 23	840	1000
10	0.5	0	5	1.5	7 X 0.9	670	17 X 8.6	148	1000
20	0.5	0	7	1.5	7 X 0.9	670	19 X 10.3	198	1000
30	0.5	0	8	1.5	7 X 1.2	1190	21 X 11.7	280	1000
50	0.5	1	11	1.5	7 X 1.2	1190	23 X 14.1	378	1000
70	0.5	1	13	1.5	7 X 1.2	1190	25 X 16.1	472	1000
100	0.5	2	15	1.5	7 X 1.2	1190	28 X 18.5	610	1000
150	0.5	3	19	1.5	7 X 1.6	2110	32 X 22	895	1000
200	0.5	4	21	1.8	7 X 1.6	2110	36 X 26	1140	1000
10	0.65	0	6	1.5	7 X 1.2	1190	19 X 9.8	216	1000
20	0.65	0	9	1.5	7 X 1.2	1190	21 X 11.9	295	1000
30	0.65	0	10	1.5	7 X 1.2	1190	23 X 13.9	373	1000
50	0.65	1	13	1.5	7 X 1.2	1190	26 X 16.8	530	1000
70	0.65	1	16	1.5	7 X 1.6	2110	30 X 19.2	740	1000
100	0.65	2	19	1.8	7 X 1.6	2110	34 X 23	995	600
150	0.65	3	23	1.8	7 X 1.6	2110	38 X 28	1370	600
200	0.65	4	27	1.8	7 X 1.6	2110	42 X 31	1730	600
10	0.9	0	9	1.5	7 X 1.2	1190	21 X 12.1	291	1000
20	0.9	0	12	1.5	7 X 1.2	1190	24 X 15	440	600
30	0.9	0	14	1.5	7 X 1.2	1190	27 X 17.6	585	600
50	0.9	1	19	1.5	7 X 1.6	2110	32 X 22	940	600
70	0.9	1	22	1.8	7 X 1.6	2110	37 X 26	1250	600
100	0.9	2	26	1.8	7 X 1.6	2110	41 X 31	1680	600
150	0.9	3	32	1.9	7 X 2.0	3300	48 X 37	2470	600

⋆ Other conductor gauges, mutual capacitances, different pair count cables and different delivery lengths are also available

Typical conditions of laying:

Maximal distance between the supports (span): 50 m.
Nominal sag for a 50 m span at 15ºC without overload: 0.66 m.

security coefficient > 3 in the following extreme climatic conditions:

Hypothesis A : 100 km/h wind speed (pressure: 480 pa) at 15ºC.
Hypothesis B : 60 km/h wind speed (pressure: 180 pa) - 10ºC without ice.

security coefficient > 2 in the following extreme climatic conditions:

Hypothesis C : ice sleeve of 5 mm thickness at - 10ºC without wind.

8 AERIALNETWORK CABLE USED IN DISTRIBUTION (FILLED)

8.3
- **polyethylene insulated**
- **longitudinally watertight**
- **double steel tape armoured**
- **polyethylene sheathed**
- **steel messenger**

Specification:
Based on IEC 60708-1 and 60708-2

Type and Application
Our type TAM2DG
Self- supported aerial laying

CONSTRUCTION

Conductors
Solid annealed bare copper wire of: 0.4 - 0.5 - 0.65 or 0.9 mm nominal diameter. other wire diameters are also available.

Insulation
One layer of fully coloured **solid** polyethylene or one layer of colourless **cellular** polyethylene covered by a thin layer of fully coloured **solid** polyethylene **(foam-skin).**
Radial thickness determined to satisfy the electrical characteristics.

Twisting
2 conductors are twisted into a **pair**.
Different twisting laylengths are used to minimize crosstalk.
Quad cables are available upon request.

Stranding
In sub-units of 10 pairs, for units of 50 or 100 pairs and for cables of up to 100 pairs.
In units of 50 or 100 pairs for cables of more than 100 pairs.
Other repartition also available.

Spare pairs
Located within the units or between the units of the outer layer of the cable core, they are used to replace the pairs damaged during the manufacturing process.
Cable core construction, identification of conductors and units: see annex A.

Longitudinal watertightness
The cable core interstices are filled with a suitable compound (petroleum jelly) to avoid longitudinal water penetration inside the cable.

Cable core protection
One or more tapes helically or longitudinally laid with an overlap.

Continuity wire (when specified)
One 0.5 mm diameter tinned copper wire is longitudinally laid to ensure the electrical continuity of the screen.

Moisture barrierand screen
One or two side ethylene copolymere coated smooth aluminium tape is longitudinally laid with an overlap.
Nominal thickness of aluminium : 0.15 mm.
Different or corrugated screen also available.

Innersheath
Colourless or black high (or low when specified) density polyethylene.
Nominal radial thickness: as requested or as per the physical characteristics table.

Armour
Double steel tape helically laid on a crepe paper bedding (facultative).
The nominal thickness of each tape is 0.2 mm or 0.5 mm.

Outer sheath
Black low density polyethylene.
Nominal radial thickness: as requested or as per the physical characteristics table.

Marking
- manufacturer’s identification
- number of pairs and conductor diameter
- sequentially numbered length marking at each meter interval (or as required).

Usual electrical characteristics

Loop resistance at 20°C in direct current

Diameter mm	Nominal value Ω/km	Maximum individual value Ω/km
0.4	288.0	300.0
0.5	184.2	191.8
0.6	127.8	133.2
0.65	106.0	114.0
0.8	70.6	73.6
0.9	56.0	60.0
1.2	30.0	32.0

Dielectric strength during 1 mn in direct current*

Between conductors: 0.5 kv
Between conductors and screen : 1 kv
* the test can be achieved under alternative current with half of above voltages.

Insulation resistance under 200 V minimum direct current

Lowest value after 2 mn minimum : 5000 MΩ.km.

Mutual capacitance at 800 Hz

Maximum individual: 64 nF/km.
For cables of equal or more than 20 pairs:
maximum average: 55 nF/km.
cables of low level mutual capacitance (42 nF/km) are also available

Maximum capacitance unbalance at 800 Hz in pF per500 meters length of cable

	Individual value (pF)		95% values (pF)	
	0.4, 0.5 & 0.6 mm	0.8 mm	0.4, 0.5 & 0.6 mm	0.8 mm
Pair-to-pair	250	160	150	100
Side-to-side	800	500	500	300
Pair-to-earth		1700		1000
Side-to-earth		1700		1000

Maximum calculated attenuation at 800 Hz and 20°C

ø 0.4 mm 1.79 dB/km
ø 0.5 mm 1.43 dB/km
ø 0.65 mm 1.11 dB/km
ø 0.9 mm 0.81 dB/km

AERIAL NETWORK CABLE USED IN DISTRIBUTION

Foam skin Polyethylene insulated - Petroleum jelly filled - Double steel tape armoured Polyethylene sheathed - Steel messenger (maximum average mutual capacitance 55 nF/Km)

Nominal number of pairs	Nominal Conductor diameter (mm)	Usual number of spare pairs	Approx. cable core diameter (mm)	Nominal sheath thickness (mm)		Messenger		Nom. outer dimension hght. X dia. (mm)	Nominal lineic weight (Kg/Km)	Usual nominal delivery length (m)
				Inner	Outer	Dim. Nbr.X dia. (mm)	Mini. break load (daN)			
10	0.4	0	5	1.5	1.5	7 X 1.2	1190	21 X 12.2	295	1000
20	0.4	0	6	1.5	1.5	7 X 1.2	1190	23 X 13.7	354	1000
30	0.4	0	8	1.5	1.5	7 X 1.2	1190	24 X 14.9	407	1000
50	0.4	1	10	1.5	1.5	7 X 1.2	1190	26 X 17.1	515	1000
70	0.4	1	11	1.5	1.5	7 X 1.2	1190	28 X 18.7	610	1000
100	0.4	2	14	1.5	1.5	7 X 1.2	1190	30 X 21	745	1000
150	0.4	3	17	1.5	1.8	7 X 1.6	2110	35 X 25	1060	1000
200	0.4	4	19	1.8	1.8	7 X 1.6	2110	39 X 28	1300	1000
10	0.5	0	6	1.5	1.5	7 X 1.2	1190	22 X 13.0	325	1000
20	0.5	0	8	1.5	1.5	7 X 1.2	1190	21 X 14.9	408	1000
30	0.5	0	9	1.5	1.5	7 X 1.2	1190	26 X 16.5	485	1000
50	0.5	1	12	1.5	1.5	7 X 1.2	1190	28 X 19.1	635	1000
70	0.5	1	14	1.5	1.5	7 X 1.6	2110	32 X 22	830	1000
100	0.5	2	17	1.5	1.8	7 X 1.6	2110	35 X 25	1050	1000
150	0.5	3	20	1.8	1.8	7 X 1.6	2110	40 X 29	1410	1000
200	0.5	4	23	1.8	2.0	7 X 1.6	2110	43 X 33	1740	1000
10	0.65	0	7	1.5	1.5	7 X 1.2	1190	24 X 14.7	393	1000
20	0.65	0	10	1.5	1.5	7 X 1.2	1190	27 X 17.3	525	1000
30	0.65	0	12	1.5	1.5	7 X 1.2	1190	29 X 19.4	645	1000
50	0.65	1	16	1.5	1.8	7 X 1.2	1190	33 X 24	915	1000
70	0.65	1	19	1.5	1.8	7 X 1.6	2110	37 X 27	1190	1000
100	0.65	2	22	1.8	1.8	7 X 1.6	2110	42 X 31	1550	600
150	0.65	3	27	1.8	2.0	7 X 1.6	2110	47 X 36	2100	600
200	0.65	4	31	2.0	2.0	7 X 1.6	2110	52 X 41	2630	600
10	0.9	0	10	1.5	1.5	7 X 1.2	1190	26 X 17.1	515	1000
20	0.9	0	13	1.5	1.5	7 X 1.2	1190	30 X 21	735	600
30	0.9	0	16	1.5	1.8	7 X 1.2	1190	34 X 25	970	600
50	0.9	1	21	1.8	1.8	7 X 1.6	2110	40 X 30	1480	600
70	0.9	1	25	1.8	2.0	7 X 1.6	2110	45 X 34	1900	600
100	0.9	2	30	2.0	2.0	7 X 1.6	2110	50 X 39	2500	600
150	0.9	3	36	2.0	2.5	7 X 2.0	3300	60 X 47	3610	600

* Other conductor gauges, mutual capacitances, different pair count cables and different delivery lengths are also available

Typical conditions of laying:

Maximal distance between the supports (span): 50 m.
Nominal sag for a 50 m span at 15ºC without overload: 0.66 m.

security coefficient > 3 in the following extreme climatic conditions:

Hypothesis A : 100 km/h wind speed (pressure: 480 pa) at 15ºC.
Hypothesis B : 60 km/h wind speed (pressure: 180 pa) - 10ºC without ice.

security coefficient > 2 in the following extreme climatic conditions:

Hypothesis C : ice sleeve of 5 mm thickness at - 10ºC without wind.

8 AERIALNETWORK CABLE USED IN DISTRIBUTION (AIRCORE)

8.3
- **polyethylene insulated**
- **double steel tape armoured**
- **polyethylene sheathed**
- **steel messenger**

Specification:
Based on IEC 60708-1 and 60708-3

Type and Application
Our type TA2MDG
Self- supported aerial laying

CONSTRUCTION

Conductors
Solid annealed bare copper wire of: 0.4 - 0.5 - 0.65 or 0.9 mm nominal diameter.

Insulation
One layer of fully coloured **solid** polyethylene or one layer of colourless **cellular** polyethylene covered by a thin layer of fully coloured **solid** polyethylene **(foam-skin).**
Radial thickness determined to satisfy the electrical characteristics.

Twisting
2 conductors are twisted into a **pair**.
Different twisting laylengths are used to minimize crosstalk.
Quad cables are available upon request.

Stranding
In sub-units of 10 pairs, for units of 50 or 100 pairs and for cables of up to 100 pairs.
In units of 50 or 100 pairs for cables of more than 100 pairs.
Other repartition also available.

Spare pairs
Located within the units or between the units of the outer layer of the cable core, they are used to replace the pairs damaged during the manufacturing process.
Cable core construction, identification of conductors and units: see annex A.

Cable core protection
One or more tapes helically or longitudinally laid with an overlap.

Continuity wire (when specified)
One 0.5 mm diameter tinned copper wire is longitudinally laid to ensure the electrical continuity of the screen.

Moisture barrierand screen
One or two side ethylene copolymere coated smooth aluminium tape is longitudinally laid with an overlap.
Nominal thickness of aluminium : 0.15 mm.
Different or corrugated screen also available.

Inner sheath
Colourless or black high (or low when specified) density polyethylene.
Nominal radial thickness: as requested or as per the physical characteristics table.

Armour
Double steel tape helically laid on a crepe paper bedding (facultative).
The nominal thickness of each tape is 0.2 mm or 0.5 mm

Outersheath
Black low density polyethylene.
Nominal radial thickness: as requested or as per the physical characteristics table.

Marking
- manufacturer's identification
- number of pairs and conductor diameter
- sequentially numbered length marking at each meter interval (or as required).

Usual electrical characteristics

Loop resistance at 20°C in direct current

Diameter mm	Nominal value Ω/km	Maximum individual value Ω/km
0.4	288.0	300.0
0.5	184.2	191.8
0.6	127.8	133.2
0.65	106.0	114.0
0.8	70.6	73.6
0.9	56.0	60.0
1.2	30.0	32.0

Dielectric strength during 1 mn in direct current*

Between conductors: 0.5 kv
Between conductors and screen : 1 kv
* the test can be achieved under alternative current with half of above voltages.

Insulation resistance under 200 V minimum direct current

Lowest value after 2 mn minimum : 5000 MΩ.km.

Mutual capacitance at 800 Hz

Maximum individual: 64 nF/km.
For cables of equal or more than 20 pairs:
maximum average: 55 nF/km.
cables of low level mutual capacitance (42 nF/km) are also available

Maximum capacitance unbalance at 800 Hz in pF per 500 meters length of cable

	Individual value (pF)		95% values (pF)	
	0.4, 0.5 & 0.6 mm	0.8 mm	0.4, 0.5 & 0.6 mm	0.8 mm
Pair-to-pair	250	160	150	100
Side-to-side	800	500	500	300
Pair-to-earth		1700		1000
Side-to-earth		1700		1000

Maximum calculated attenuation at 800 Hz and 20°C

ø 0.4 mm	1.79 dB/km
ø 0.5 mm	1.43 dB/km
ø 0.65 mm	1.11 dB/km
ø 0.9 mm	0.81 dB/km

AERIAL NETWORK CABLE USED IN DISTRIBUTION

Foam skin Polyethylene insulated - Double steel tape armoured Polyethylene sheathed - Steel messenger (maximum average mutual capacitance 55 nF/Km)

Nominal number of pairs	Nominal Conductor diameter (mm)	Usual number of spare pairs	Approx. cable core diameter (mm)	Nominal sheath thickness (mm)		Messenger		Nom. outer dimension hght. X dia. (mm)	Nominal lineic weight (Kg/Km)	Usual nominal delivery length (m)
				Inner	Outer	Dim. Nbr.X dia. (mm)	Mini. break load (daN)			
10	0.4	0	5	1.5	1.5	7 X 0.9	670	20 X 12.0	249	1000
20	0.4	0	6	1.5	1.5	7 X 0.9	670	22 X 13.5	304	1000
30	0.4	0	8	1.5	1.5	7 X 1.2	1190	24 X 14.8	389	1000
50	0.4	1	10	1.5	1.5	7 X 1.2	1190	26 X 17.0	489	1000
70	0.4	1	11	1.5	1.5	7 X 1.2	1190	28 X 18.6	575	1000
100	0.4	2	13	1.5	1.5	7 X 1.2	1190	30 X 21	695	1000
150	0.4	3	16	1.5	1.8	7 X 1.6	2110	35 X 25	975	1000
200	0.4	4	19	1.8	1.8	7 X 1.6	2110	28 X 28	1190	1000
10	0.5	0	5	1.5	1.5	7 X 0.9	670	21 X 12.7	267	1000
20	0.5	0	7	1.5	1.5	7 X 0.9	670	23 X 14.3	347	1000
30	0.5	0	8	1.5	1.5	7 X 1.2	1190	25 X 15.8	448	1000
50	0.5	1	11	1.5	1.5	7 X 1.2	1190	27 X 18.2	575	1000
70	0.5	1	13	1.5	1.5	7 X 1.2	1190	29 X 21	695	1000
100	0.5	2	15	1.5	1.8	7 X 1.2	1190	33 X 24	890	1000
150	0.5	3	19	1.5	1.8	7 X 1.6	2110	37 X 27	1220	1000
200	0.5	4	21	1.8	1.8	7 X 1.6	2110	41 X 30	1510	1000
10	0.65	0	6	1.5	1.5	7 X 1.2	1190	23 X 13.9	359	1000
20	0.65	0	9	1.5	1.5	7 X 1.2	1190	25 X 16.0	465	1000
30	0.65	0	10	1.5	1.5	7 X 1.2	1190	27 X 17.8	565	1000
50	0.65	1	14	1.5	1.5	7 X 1.2	1190	30 X 21	765	1000
70	0.65	1	16	1.5	1.8	7 X 1.6	2110	35 X 24	1030	1000
100	0.65	2	19	1.8	1.8	7 X 1.6	2110	39 X 28	1330	600
150	0.65	3	23	1.8	1.9	7 X 1.6	2110	43 X 32	1770	600
200	0.65	4	27	1.8	1.9	7 X 1.6	2110	47 X 36	2180	600
10	0.9	0	9	1.5	1.5	7 X 1.2	1190	25 X 16.1	463	1000
20	0.9	0	12	1.5	1.5	7 X 1.2	1190	18 X 19.1	650	600
30	0.9	0	14	1.5	1.5	7 X 1.2	1190	31 X 22	830	600
50	0.9	1	19	1.5	1.8	7 X 1.6	2110	37 X 27	1270	600
70	0.9	1	22	1.8	1.8	7 X 1.6	2110	41 X 31	1630	600
100	0.9	2	26	1.8	1.9	7 X 1.6	2110	46 X 35	2130	600
150	0.9	3	32	1.9	1.9	7 X 2.0	3300	53 X 41	3000	600

⋆ Other conductor gauges, mutual capacitances, different pair count cables and different delivery lengths are also available

Typical conditions of laying:

Maximal distance between the supports (span): 50 m.
Nominal sag for a 50 m span at 15ºC without overload: 0.66 m.

security coefficient > 3 in the following extreme climatic conditions:

Hypothesis A : 100 km/h wind speed (pressure: 480 pa) at 15ºC.
Hypothesis B : 60 km/h wind speed (pressure: 180 pa) - 10ºC without ice.

security coefficient > 2 in the following extreme climatic conditions:

Hypothesis C : ice sleeve of 5 mm thickness at - 10ºC without wind.

9 INDOOR USE TELEPHONE CABLES USED FOR TELEPHONE EXCHANGES, SWITCHBOARD & PRIVATE TELEPHONE

Specification:
Based on IEC 60189-1/2

- PVC insulated
- PVC sheathed

Types and Applications

LIBTEL	Indoor surface and conduit wiring
LIBTLV	Switchboard cable, tinned conductors
LIBTLS	Screened
LIBTLA	Armoured for use where mechanical stresses are encountered

CONSTRUCTION

Conductors
Copper 0.5 - 0.6 mm diameter bare or tinned.

Insulation
PVC coloured in the mass with surface ring marking for identification.

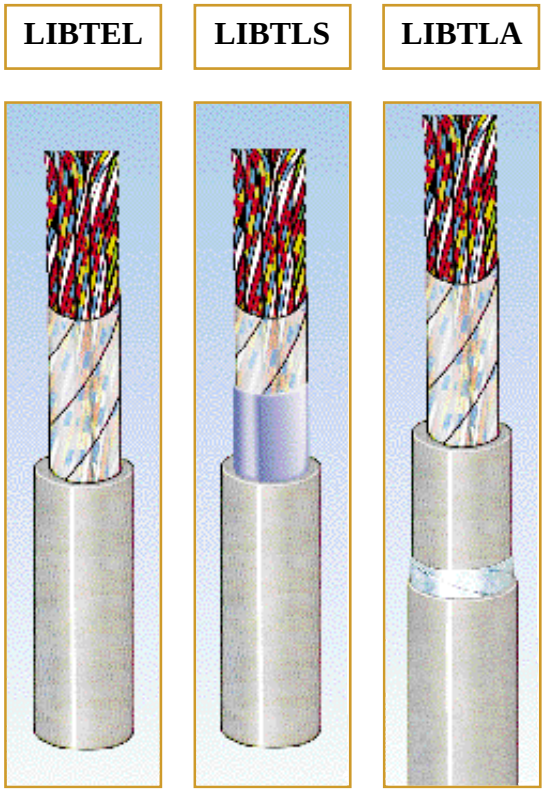
Twisting
Pair or other as request.

Stranding
Concentric including earth continuity insulated tinned wire, protected with overlapped non-hygroscopic tape.
Identification of conductors :
see **annex B**.

Moisture barrierand screen
(S - type) Aluminium foil applied with overlap.

Armour
(A - type) double steel tape applied on inner PVC sheath.

Outersheath
Grey PVC : A rip cord is laid up under the sheath for easy stripping.



Usual electrical characteristics

Loop resistance at 20°C in direct current, max

0.5 mm diameter	195.6	ohm / km
tinned	202	ohm / km
0.6 mm diameter	135.8	ohm / km
tinned	139	ohm / km

Mutual capacitance at 1000 Hz
Maximum : 120 nF/km.

Insulation resistance min. **500 MΩ .km**

INDOOR USE
TELEPHONE CABLES
PVC insulated and PVC sheathed

	Type LIBTEL LIBTLV		Type LIBTELS		Type LIBTELA			
Nominal number of pairs	Nominal Overall diameter (mm)	Net weight kg / km	Nominal Overall diameter (mm)	Net weight kg / km	Nominal Overall diameter (mm)	Net weight kg / km	Standard Packing	Delivery length m
CONDUCTOR DIAMETER 0.5 mm								
1	3	11	3.8	20	---	---	C	100
2	4.2	22	4.8	28	---	---	C	100
3	4.5	27	5.1	34	---	---	C	100
4	4.9	32	5.4	40	---	---	C	100
5	5.2	37	5.8	46	---	---	C	100
6	5.3	41	5.9	50	---	---	C	100
7	5.5	46	6.1	56	---	---	C	100
8	5.7	51	6.6	67	---	---	C	100
9	5.9	55	6.7	70	---	---	C	100
10	6.4	67	6.8	72	10	172	D	500 / 1000
15	7.7	100	8	105	10.5	208	D	500 / 1000
20	8.6	118	8.8	131	11.5	245	D	500 / 1000
25	9.5	151	9.6	157	12.5	280	D	500 / 1000
30	10	176	10.5	182	13	314	D	500 / 1000
40	12	236	12.5	243	14.5	394	D	500 / 1000
50	13	273	13.5	299	16	463	D	500 / 1000
70	15	387	15	397	17.5	585	D	500 / 1000
100	17.5	510	17.5	555	21	770	D	500 / 1000

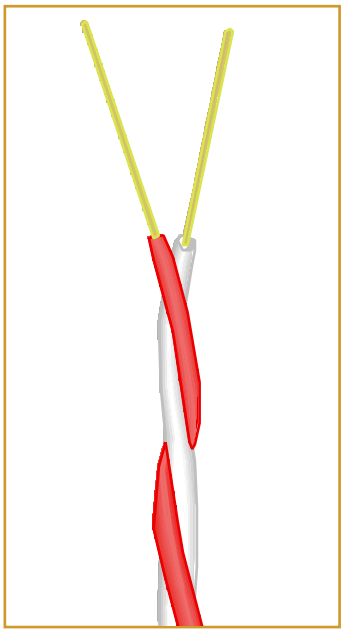
Standard Packing : C : Coils
D : Drums

Other Sizes are also available

Application
These cables are intended for inside distributing frame jumper wiring

Types

JW	PVC insulated
JWV	tinned copper wire, PVC insulated
JWN	PVC insulated, nylon jacketed
JWVN	same as JWN but with tinned conductor



CONSTRUCTION

Conductor
Solid, annealed, bare or tinned copper wire, diameter 0.5 mm.

Insulation
PVC coloured for identification.

Jacket
(type JWN and JWVN) abrasion resistant nylon.

Stranding
Two to five conductors twisted together.

Electrical characteristics at 20°C

Conductor resistance : max 92 Ω / km
Insulation resistance : min 1000 MΩ / km

DIMENSIONAL CHARACTERISTICS

	Type JW / V		Type JWN		
Number of conductors	Overall diameter (mm)	Net weight kg / km	Overall diameter (mm)	Net weight kg / km	Delivery length (coils) m
CONDUCTOR DIAMETER 0.5 mm					
1	1.1	3.0	1.1	2.8	500
2	2.2	6.0	2.2	5.7	500
3	2.4	9.0	2.4	8.5	500
4	2.7	12	2.7	11.5	250
5	3.0	15	3.0	14.0	250

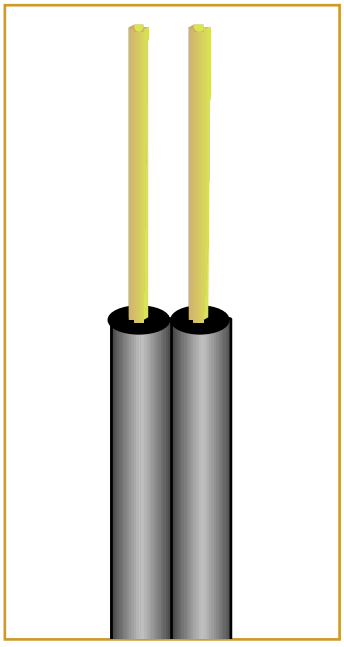
11 DROP WIRE

Application

These cables are intended for connecting telephone aerial cable to the subscriber's premises

Types

DWIRE	Hard copper conductor, PE jacketed
DWIREY	Hard copper conductor, PVC jacketed



CONSTRUCTION

Conductor

Hard copper wire

Laid-Up

The two conductors are laid-up parallel and jacketed. A ridge is longitudinally extruded along one edge for conductor identification

Jacket

DWIRE type : Black polyethylene type 2 C to BS 6234

DWIREY type: Hard PVC tightly adhered to the conductor type 2 to BS 6746

Electrical characteristics at 20°C

Conductor resistance, max.

- Hard drawn copper	0.8 mm diameter	35.0	Ω / km
	0.9 mm diameter	28.0	Ω / km
	1.0 mm diameter	24.0	Ω / km

Insulation resistance, min.

- PE jacketed	5000	MΩ . km
- PVC jacketed	100	MΩ . km

DIMENSIONAL CHARACTERISTICS

Type	Copper Conductor diameter mm	Jacket nature	Overall dimensions width x height mm	Net weight kg / km	Delivery length (coils) m
DWIRE	0.8	PE	2.6 X 5.7	20	500
	0.9	PE	2.7 X 5.9	23	500
	1.0	PE	3.0 X 6.5	28	500
DWIREY	0.8	PVC	2.6 X 5.7	24	500
	0.9	PVC	2.7 X 5.9	27	500
	1.0	PVC	3.0 X 6.5	33	500

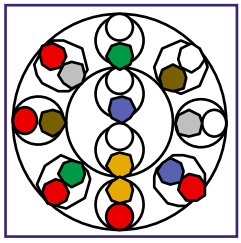
ANNEX A

IDENTIFICATION OF CONDUCTORS AND UNITS AND CABLE CORE CONSTRUCTION OF UNDERGROUND AND AERIAL NETWORK CABLES

(any othercombination remaining also available on request)

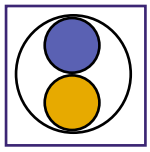
Identification of conductors

Pair Nº	Colourof insulation		Pair Nº	Colourof insulation	
	Cond. A	Cond. B		Cond. A	Cond. B
1	White	blue	6	red	blue
2	White	orange	7	red	orange
3	White	green	8	red	green
4	White	brown	9	red	brown
5	White	grey	10	red	grey

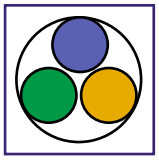


sub-unit of base (10 pairs)

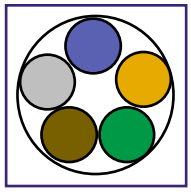
Identification of basic sub-units, construction of 50 and 100 pair units, and cable cores of up to 100 pairs



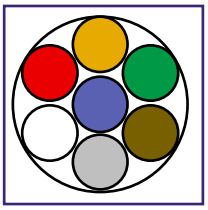
20 pairs



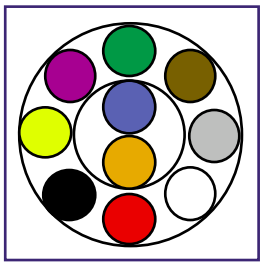
30 pairs



50 pairs

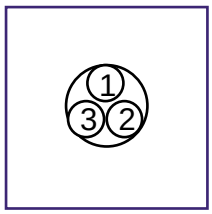


70 pairs

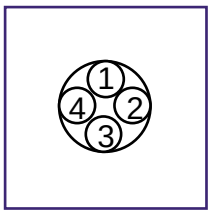


100 pairs

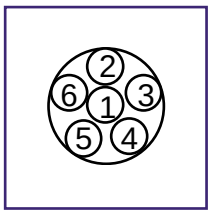
Identification of basic units and cable core constructions forcables of more than 100 pairs - Numbered units



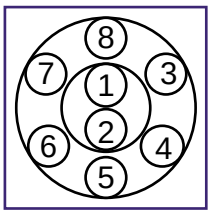
150 pairs (3 x 50p)



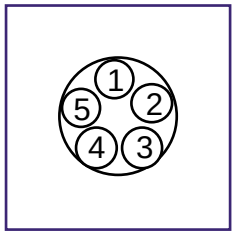
200 pairs (4 x 50p)



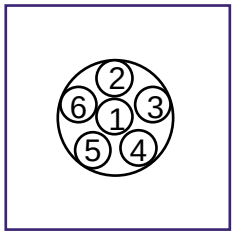
300 pairs (6 x 50p)



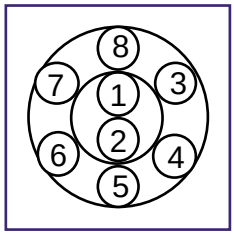
400 pairs (8 x 50p)



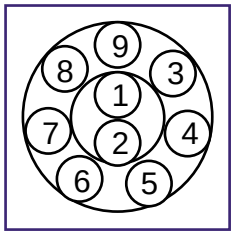
500 pairs (5 x 100p)



600 pairs (6 x 100p)

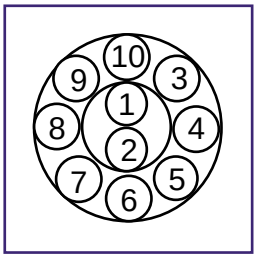


800 pairs (8 x 100p)

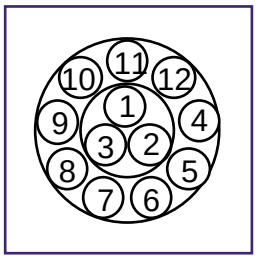


900 pairs (9 x 100p)

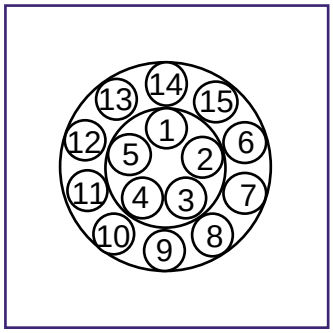
Identification of basic units and cable core constructions forcables of more than 100 pairs - Numbered units (continuation)



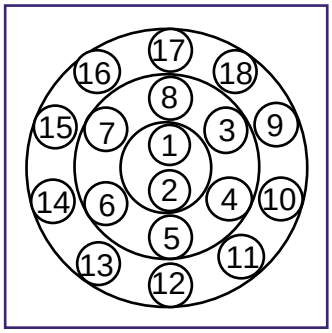
1000 pairs (10 x 100p)



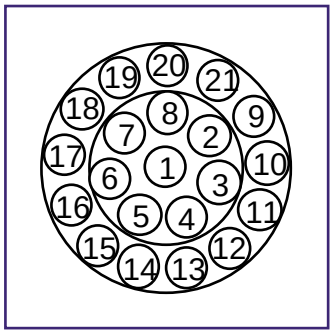
1200 pairs (12 x 100p)



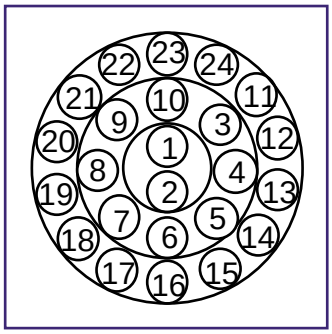
1500 pairs (15 x 100p)



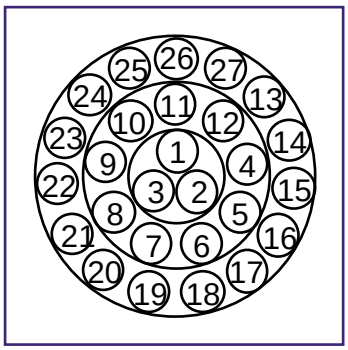
1800 pairs (18 x 100p)



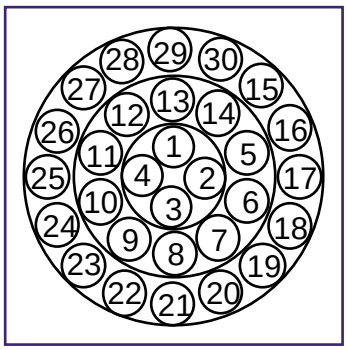
2100 pairs (21 x 100p)



2400 pairs (24 x 100p)



2700 pairs (27 x 100p)



3000 pairs (30 x 100p)

ANNEX B

Identification of conductors in Indooruse telephone cables - LIBTEL

Pair Nº	Colorcode		
	Wire A	Wire B	
		Basic	Ring
1	Red	White	—
2	Blue	White	—
3	Yellow	White	—
4	Green	White	—
5	Black	White	—
6	Red	White	Red
7	Blue	White	Red
8	Yellow	White	Red
9	Green	White	Red
10	Black	White	Red
11	Red	White	Blue
12	Blue	White	Blue
13	Yellow	White	Blue
14	Green	White	Blue
15	Black	White	Blue
16	Red	White	Yellow
17	Blue	White	Yellow
18	Yellow	White	Yellow
19	Green	White	Yellow
20	Black	White	Yellow
21	Red	White	Green
22	Blue	White	Green
23	Yellow	White	Green
24	Green	White	Green
25	Black	White	Green
26	Red	White	Black
27	Blue	White	Black
28	Yellow	White	Black
29	Green	White	Black
30	Black	White	Black
31	Red	White	—
32	Blue	White	—
etc...			

- Color of insulation of 1 triad

Wire A : Blue Wire B : White Wire C : Red