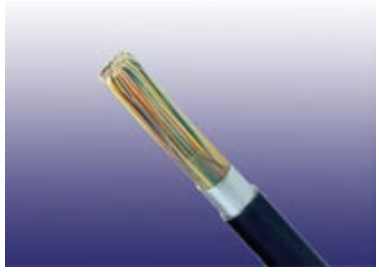
Foam Skin Insulated & AP Sheathed (ALPETH) Jelly Filled Cables to GR-421

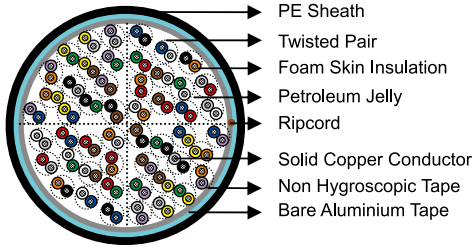
APPLICATION



The cables are designed for use in access or trunk networks, from telephone exchange to subscriber area. The cables are suitable for installation in ducts, direct burial in the ground and also for aerial installation with integral suspension strand. Jelly filled option is for subscriber's cables installed underground or along the edge of pavement. An armoured option is offered for direct burial installations where additional mechanical or rodent protection is required. A figure-8 self support option is offered for aerial installation.

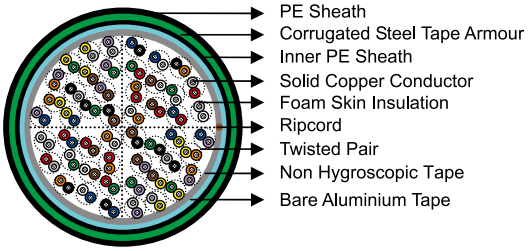
STANDARDS

• Telcordia (Bellcore) GR-421



CONSTRUCTION

• **Conductors:** Solid annealed bare copper, 0.4/0.5/0.63/0.9mm as per ASTM B-3/class 1 of IEC 60028.
• **Insulation:** Foam Skin which is a composite polyethylene insulation made of an inner cellular layer and an outer solid skin as per ASTM D 1248/IEC 60708.
• **Twisted Pairs:** Insulated conductors are twisted into pairs with varying lay length to minimize crosstalk.
• **Cabling Element:** Twisted Pairs.
• **Cable Core Assembly:** Cables with up to 400 pairs are composed of 25-pair units or 12/13-pair units; cables with over 400 pairs are composed of 50 or 100-pair units. Any extra pairs form a separate unit. Units are identified by colour coded binders. Standard construction is per GR-421 given in Cable Make Up Diagram.
• **Core Wrapping(optional):** One or more non-hygroscopic polyester tapes are helically or longitudinally laid with an overlap. These tapes furnish thermal, mechanical as well as high dielectric protection between shielding and individual conductors.
• **Moisture Barrier:** A layer of bare aluminium tape (0.2mm/8mil) is applied longitudinally with overlap over the cable core to provide 100% electrical shielding coverage and ensures a barrier against water vapor. In cables with more than 200 pairs, the aluminum tape may be corrugated for improved cable flexibility.
• **Filling:** The cable core interstices are filled with petroleum jelly to avoid longitudinal water penetration within the cable. The water resistant filling compound is applied to the air space between non-hygroscopic tape and shield, shield and sheath within the cable core.
• **Sheath:** Black low density polyethylene as per ASTM D 1248/IEC 60708, being able to withstand exposure to sunlight, temperature variations, ground chemicals and other environmental contaminants.
• **Ripcord (optional):** Ripcord may be provided for slitting the sheath longitudinally to facilitate its removal.
• **Spare Pairs (optional):** Spare pairs may be incorporated for large pair cables.
• **Continuity Wire (optional):** One tinned copper drain wire may be longitudinally laid to ensure electrical continuity of the screen.



OPTIONAL CONSTRUCTION

- **Armoured Cable**: Steel wire armour or corrugated steel tape armour applied over an optional inner polyethylene sheath. For steel tape version, the 0.15mm/6mil thick steel tape is coated with a copolymer and applied with an overlap. An outer polyethylene sheath is applied over the armour.
- **Self-Support Cables:** A 7-strand galvanized steel strand is used as support wire. Black polyethylene sheath covers both core and support wire in a figure-8 construction.

ELECTRICAL PROPERTIES

Nominal Conductor Diameter	mm	0.4	0.5	0.63	0.9
Conductor Gauge Size	AWG	26	24	22	19
Maximum Average DC Resistance	Ω/km / Ω/mile	140/225	87/140	55/88.6	27.0/43.4
Maximum Individual DC Resistance	Ω/km / Ω/mile	144.2/232	89.5/144	56.5/91.0	28.0/45.0
Minimum Insulation Resistance @500V DC	MΩ·km / MΩ·mile	1600/1000	1600/1000	1600/1000	1600/1000
Maximum Average Resistance Unbalance	%	1.5	1.5	1.5	1.5
Maximum Individual Resistance Unbalance	%	5	5	5	5
Average Mutual Capacitance	nF/km / nF/kft	48.5-54.0 /14.8-16.5	48.5-54.0 /14.8-16.5	48.5-54.0 /14.8-16.5	48.5-54.0 /14.8-16.5
Maximum Individual Mutual Capacitance	nF/km / nF/kft	57/17.4	57/17.4	57/17.4	57/17.4
Maximum Individual Capacitance Unbalance pair-to-pair	pF/km / pF/kft	145/44	145/44	145/44	145/44
Capacitance Unbalance RMS pair-to-pair	pF/km / pF/kft	45/13.7	45/13.7	45/13.7	45/13.7
Maximum Individual Capacitance Unbalance pair-to-ground	pF/km / pF/kft	2625/800	2625/800	2625/800	2625/800
Maximum Average Capacitance Unbalance pair-to-ground	pF/km / pF/kft	574/175	574/175	574/175	574/175
Maximum Conductor Loop Resistance @20°C	Ω/km / Ω/mile	300/482	192/309	114/183.6	60/96.4
Impedance @1KHz	Ω	994	796	660	445
Impedance @100KHz	Ω	147	134	125	122
Impedance @512KHz	Ω	120	118	117	116
Impedance @1MHz	Ω	117	115	114	113
Maximum Average Attenuation @0.8KHz	dB/km / dB/kft	1.64/0.5	1.30/0.39	1.04/0.32	0.74/0.22
Maximum Average Attenuation @1KHz	dB/km / dB/kft	1.68/0.51	1.35/0.41	1.08/0.33	0.76/0.23
Maximum Average Attenuation @3KHz	dB/km / dB/kft	3.18/0.97	2.52/0.77	2.01/0.61	1.42/0.43
Maximum Average Attenuation @150KHz	dB/km / dB/kft	11.4/3.47	8.3/2.53	6.2/1.89	4.4/1.34
Maximum Average Attenuation @772KHz	dB/km / dB/kft	24.3/7.4	19.4/5.9	15.4/4.7	10.8/3.3
Maximum Average Attenuation @1000KHz	dB/km / dB/kft	27.1/8.25	21.4/6.52	17.5/5.33	12.8/3.89
Dielectric Strength					

(Continued from previous page)

Conductor to Conductor (3secs)	V DC	2400	3000	4000	5000
Conductor to Screen (3secs)	V DC	10000	10000	10000	10000
Minimum EL Far-end Cross-talk-Mean Power Sum					
@150KHz	dB/305m / dB/kft	61	63	63	65
@772KHz	dB/305m / dB/kft	47	49	49	57
@1.6MHz	dB/305m / dB/kft	41	42	43	44
@3.15MHz	dB/305m / dB/kft	35	37	37	39
@6.3MHz	dB/305m / dB/kft	29	31	31	33
Minimum Far-end Cross-talk-Worst Pair Power Sum					
@150KHz	dB/305m / dB/kft	57	57	57	59
@772KHz	dB/305m / dB/kft	43	43	43	45
@1.6MHz	dB/305m / dB/kft	37	37	37	39
@3.15MHz	dB/305m / dB/kft	31	31	31	33
@6.3MHz	dB/305m / dB/kft	25	25	25	27
Minimum Near-end Cross-talk-Mean Power Sum					
@150KHz	dB/305m / dB/kft	58	58	58	58
@772KHz	dB/305m / dB/kft	47	47	47	47
@1.6MHz	dB/305m / dB/kft	43	43	43	43
@3.15MHz	dB/305m / dB/kft	38	38	38	38
@6.3MHz	dB/305m / dB/kft	34	34	34	34
Minimum Near-end Cross-talk-Worst Pair Power Sum					
@150KHz	dB/305m / dB/kft	53	53	53	53
@772KHz	dB/305m / dB/kft	42	42	42	42
@1.6MHz	dB/305m / dB/kft	38	38	38	38
@3.15MHz	dB/305m / dB/kft	33	33	33	33
@6.3MHz	dB/305m / dB/kft	29	29	29	29
Nominal Insulation Thickness	mm	0.175	0.2	0.26	0.3
Nominal Insulated Conductor Diameter	mm	0.75	0.9	1.15	1.5

MECHANICAL AND THERMAL PROPERTIES

Temperature range during operation (fixed state): -30°C – +70°C

Temperature range during installation (mobile state): -20°C – +50°C

Minimum bending radius: 10 x Overall Diameter (unarmoured cables);15 x Overall Diameter (armoured cables)

COLOUR CODE

Standard colour code is per GR-421 given in Colour Code Chart

DIMENSIONS AND WEIGHT

Foam Skin Insulated & AP Sheathed (ALPETH) Jelly Filled Cables to GR-421

Cable Code	Number of Pairs	Nominal Sheath Thickness mm/inch	Nominal Overall Diameter mm/inch	Nominal Weight kg/km / lbs/kft
0.4mm Conductor, 0.75mm Insulated Wire				

(Continued from previous page)

Cable Code	Number of Pairs	Nominal Sheath Thickness mm/inch	Nominal Overall Diameter mm/inch	Nominal Weight kg/km / lbs/kft
TP421-02YSF(A)2Y-20P04	20	1.8/0.071	12.5/0.492	125/84
TP421-02YSF(A)2Y-25P04	25	1.8/0.071	13.5/0.531	150/101
TP421-02YSF(A)2Y-30P04	30	1.8/0.071	14.0/0.551	200/134
TP421-02YSF(A)2Y-50P04	50	1.8/0.071	16.5/0.650	280/188
TP421-02YSF(A)2Y-100P04	100	1.8/0.071	21.0/0.827	450/302
TP421-02YSF(A)2Y-200P04	200	1.9/0.075	27.0/1.06	840/564
TP421-02YSF(A)2Y-300P04	300	2.0/0.079	32.0/1.26	1205/810
TP421-02YSF(A)2Y-400P04	400	2.0/0.079	35.5/1.40	1670/1122
TP421-02YSF(A)2Y-600P04	600	2.2/0.087	42.0/1.65	2430/1633
TP421-02YSF(A)2Y-800P04	800	2.3/0.091	48.0/1.89	3155/2120
TP421-02YSF(A)2Y-900P04	900	2.3/0.091	50.5/1.99	3480/2338
TP421-02YSF(A)2Y-1000P04	1000	2.4/0.094	53.0/2.09	3930/2641
TP421-02YSF(A)2Y-1200P04	1200	2.6/0.102	57.0/2.24	4870/3272
TP421-02YSF(A)2Y-1500P04	1500	2.7/0.106	63.5/2.50	5830/3918
TP421-02YSF(A)2Y-1600P04	1600	2.7/0.106	65.5/2.58	6285/4223
TP421-02YSF(A)2Y-1800P04	1800	2.8/0.110	69.0/2.72	7000/4704
TP421-02YSF(A)2Y-2000P04	2000	2.9/0.114	72.0/2.83	7660/5147
TP421-02YSF(A)2Y-2100P04	2100	2.9/0.114	74.0/2.91	8025/5393
TP421-02YSF(A)2Y-2400P04	2400	3.0/0.118	79.0/3.11	9025/6065
0.5mm Conductor, 0.9mm Insulated Wire				
TP421-02YSF(A)2Y-200P05	200	1.7/0.067	31.0/1.22	1245/837
TP421-02YSF(A)2Y-300P05	300	1.7/0.067	38.0/1.50	1845/1240
TP421-02YSF(A)2Y-400P05	400	1.8/0.071	43.0/1.69	2490/1673
TP421-02YSF(A)2Y-600P05	600	1.8/0.071	50.0/1.97	3650/2453
TP421-02YSF(A)2Y-800P05	800	1.8/0.071	56.5/2.22	4810/3232
TP421-02YSF(A)2Y-900P05	900	1.9/0.075	59.0/2.32	5300/3561
TP421-02YSF(A)2Y-1200P05	1200	1.9/0.075	69.0/2.72	7210/4845
TP421-02YSF(A)2Y-1600P05	1600	2.0/0.079	77.0/3.03	9280/6236
0.63mm Conductor, 1.15mm Insulated Wire				
TP421-02YSF(A)2Y-10P063	10	1.2/0.047	13.5/0.531	160/108
TP421-02YSF(A)2Y-20P063	20	1.2/0.047	16.5/0.650	260/175
TP421-02YSF(A)2Y-30P063	30	1.2/0.047	19.0/0.748	360/242
TP421-02YSF(A)2Y-200P063	200	1.2/0.047	40.5/1.59	2025/1361
TP421-02YSF(A)2Y-300P063	300	1.4/0.055	48.0/1.89	3025/2033
TP421-02YSF(A)2Y-400P063	400	1.5/0.059	55.0/2.17	4025/2705
TP421-02YSF(A)2Y-600P063	600	1.6/0.063	66.0/2.60	5925/3981
TP421-02YSF(A)2Y-900P063	900	1.6/0.063	79.0/3.11	8800/5913
TP421-02YSF(A)2Y-1200P063	1200	1.8/0.071	90.0/3.54	11400/7660
0.9mm Conductor, 1.5mm Insulated Wire				
TP421-02YSF(A)2Y-25P09	25	1.2/0.047	19.8/0.78	528/355
TP421-02YSF(A)2Y-50P09	50	1.2/0.047	26.2/1.03	975/655
TP421-02YSF(A)2Y-100P09	100	1.2/0.047	34.8/1.37	1823/1225
TP421-02YSF(A)2Y-200P09	200	1.2/0.047	48.8/1.92	3578/2404
TP421-02YSF(A)2Y-300P09	300	1.4/0.055	58.4/2.30	5259/3534