

I-4

POWER AND SEGNALLING CABLES

## **FG70M1-0.6/1 kV**

Flame retardant cables  
halogen free and  
low smoke

---

Use	Page 2
Construction	2
Technical references	3
Quality System	3
FG7M1-0.6/1kV 1 Conductor	4
FG7OM1-0.6/1kV 2 Conductors	4
FG7OM1-0.6/1kV 3 Conductors (without yellow/green)	4
FG7OM1-0.6/1kV 3 Conductors (with yellow/green)	5
FG7OM1-0.6/1kV 4 Conductors (without yellow/green)	5
FG7OM1-0.6/1kV 4 Conductors (with yellow/green)	5
FG7OM1-0.6/1kV 5 Conductors (with yellow/green)	6
FG7M1X-0.6/1kV 2 Conductors helically wound	6
FG7M1X-0.6/1kV 3 Conductors helically wound	6
Control and signalling cables	7
Current carrying coefficients	8
Phases positioning	8
Electrical resistance	8
Reactance	8
Voltage drop	9
Maximum short circuit current	9
Packaging	10
Cable codes	11

# FLAME RETARDANT CABLES, HALOGEN FREE AND LOW SMOKE, G7 ELASTOMERIC COMPOUND AND M1 SHEATHED.

## FG7(O)M1-0.6/1 kV

Power and signalling single and multi-core cables, flame retardant, with low emissions of fumes, toxic and corrosive gasses. These cables are useful wherever there is the risk of fire breaking out and people, systems and equipment have to be protected from the aggression of corrosive gasses.

### Condition of use:

indoor, even in wet rooms and outdoor; in fixed installations on brickwork or metal structures. Installation in ground is also possible.

### Where to use them:

undergrounds, schools, hotels, hospitals, theatres, discoteques, offices, cinemas, supermarkets, airports, railway stations and so on and so forth.

## CONSTRUCTION

## CEI 20-13

## CEI 20-22 III

### Conductor:

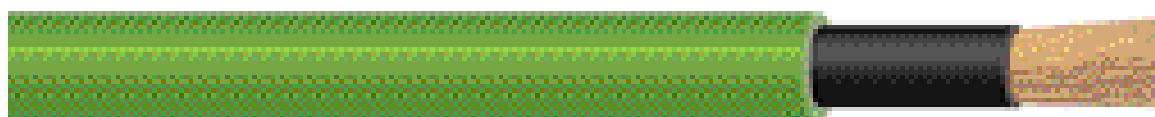
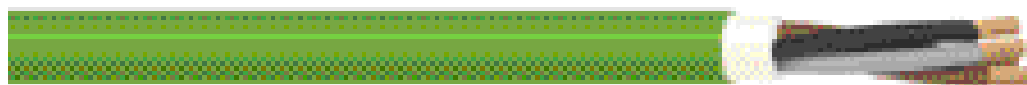
plain annealed copper class 5

### Insulation:

HEPR hard ethylene propylene rubber, type G7

### Sheath:

thermoplastic compound, type M1



### Conductors identification:

- 1 black
- 2 blue - brown
- 3 a) brown - black - grey  
b) yellow/green - blue - brown
- 4 a) blue - brown - black - grey  
b) yellow/green - brown - black - grey
- 5 yellow/green - blue - brown - black - grey
- 7 black with white numbering

### Colour:

- black RAL 9000
- brown RAL 8003
- blue RAL 5015
- yellow RAL 1021
- green RAL 6018
- gray RAL 7001

### Outer sheath colour:

green

### Marking on outer sheath:

without yellow/green TRATOS FG7OM1-0.6/1 kV 3x1.5 CEI 20-22 III CEI 20-13 IEMMEQU year of production metric marking CE  
with yellow/green TRATOS FG7OM1-0.6/1 kV 3G1.5 CEI 20-22 III CEI 20-13 IEMMEQU year of production metric marking CE

## TECHNICAL REFERENCES

CEI 20-13	Rubber insulated cables with rated voltages between 1kV and 30kV
CEI 20-11	Technical characteristics and test requirements for insulation and sheath compounds of electric cables
CEI 20-29	Conductors of insulated cables. Guide to the dimensional limits of circular conductors
CEI 20-35/1-1 EN 50265-2-1	Common test methods for cables under fire conditions - Test for resistance to vertical flame propagation for a single insulated conductor or cable. Part 2-1: procedures - 1kW pre-mixed flame
CEI 20-37/2-1 EN 50267-2-1	Common test methods for cables under fire conditions - Tests on gases evolved during combustion of materials from cables. Part 2-1: procedures - Determination of the amount of halogen acid gas
CEI 20-37/3-0 EN 50268-1	Common test methods for cables under fire conditions - Measurement of smoke density of cables burning under defined conditions. Part 3: apparatus
CEI 20-37/3-1 EN 50268-2	Common test methods for cables under fire conditions - Measurement of smoke density of cables burning under defined conditions. Part 2: procedures
CEI 20-38/1	Fire retardant power with low emission of smokes and toxic corrosive gases, 0.6/1 kV cables
CEI 20-22 III	Tests on electric cables under fire conditions - Part3: tests on bunched wires or cables
CEI 64-8	Electrical installation of buildings
CEI 20-67	Guide to use of 0.6/1 kV cables

### Conductor maximum temperature

90°C on conductor

### Maximum short circuit temperature for 5 seconds duration max

250°C on conductor

### Minimum bending radius

- 4 x O.D. for power cables
- 6 x O.D. for signaling cables

### Maximum applicable pool force on metal conductor

- 5 kg/mm<sup>2</sup> copper size during installation
- 1.5 kg/mm<sup>2</sup> copper size during service

### Minimum installation temperature

0°C

## QUALITY SYSTEM

Our Quality System management includes two certificates: BSI and Aenor (E), in accordance to ISO 9001/2000 covering the production, purchasing of raw materials design and final test including various documents typologies. Tratos Quality System management is under constant control by inspectors working for the certifying bodies.

# Flame retardant cables, halogen free and low smoke, G7 elastomeric compound and M1 sheathed.

## FG7(O)M1-0.6/1 kV

IMQ DAT 98001243

Nominal section mm <sup>2</sup>	Max. diameter cond. wires mm	Nominal conduct. diameter mm	Average insulation thickness mm	Max. outer diameter mm	Indicative weight kg/km	Minimum bending radius mm	Current Rating (A)				Max. cond.resist. at 20°C Ohm/km		
							30°C in air	30°C in pipe in air	20°C ground laying in pipe			20°C ground laying	
									ρ =1	ρ =1.5		ρ =1	ρ =1.5

### FG7M1-0.6/1kV 1 Conductor

1.5	0.26	1.5	0.7	6.6	53	27	23	19	21	20	34	31	13.3
2.5	0.26	1.9	0.7	7.1	65	29	32	28	28	26	44	38	7.98
4	0.31	2.5	0.7	7.6	83	31	44	36	36	34	57	50	4.95
6	0.31	3.0	0.7	8.3	107	34	57	47	46	43	72	63	3.3
10	0.41	3.9	0.7	9.4	152	38	79	65	62	58	96	84	1.91
16	0.41	5.0	0.7	10.4	211	42	108	89	83	78	126	111	1.21
25	0.41	6.0	0.9	12.2	324	49	136	116	109	101	159	140	0.78
35	0.41	7.7	0.9	13.6	410	54	170	145	133	122	190	168	0.554
50	0.41	9.0	1.0	15.4	582	62	206	176	165	149	225	198	0.386
70	0.51	11.0	1.1	17.3	818	70	267	221	205	185	278	245	0.272
95	0.51	12.5	1.1	19.4	1057	78	327	270	243	218	332	293	0.206
120	0.51	14.5	1.2	21.4	1306	86	384	311	273	250	376	331	0.161
150	0.51	16.0	1.4	23.8	1627	96	445	354	325	288	419	369	0.129
185	0.51	17.7	1.6	26.0	1985	104	508	419	363	322	477	420	0.106
240	0.51	20.4	1.7	29.2	2507	117	609	488	426	378	551	486	0.08
300	0.51	23.4	1.8	32.0	3277	135	701	—	485	430	618	544	0.0641

### FG7OM1-0.6/1 kV 2 Conductors

1.5	0.26	1.5	0.7	12.0	127	48	25	21	25	24	35	30	13.3
2.5	0.26	1.9	0.7	13.0	136	52	37	31	30	29	48	42	7.98
4	0.31	2.5	0.7	14.2	221	57	48	39	40	38	62	56	4.95
6	0.31	3.0	0.7	15.4	246	62	64	50	53	50	76	67	3.3
10	0.41	3.9	0.7	17.3	429	70	87	70	69	65	104	91	1.91
16	0.41	5.0	0.7	19.4	577	78	114	90	91	85	137	121	1.21
25	0.41	6.0	0.9	23.0	900	92	150	120	117	110	178	154	0.78
35	0.41	7.7	0.9	25.7	1085	103	184	147	146	137	213	186	0.554
50	0.41	9.0	1.0	29.3	1629	118	226	176	181	169	253	219	0.386

### FG7OM1-0.6/1 kV 3 Conductors (without yellow/green)

1.5	0.26	1.5	0.7	12.5	148	50	22	18.5	19	18	29	25	13.3
2.5	0.26	1.9	0.7	13.6	210	55	33	26	27	26	41	37	7.98
4	0.31	2.5	0.7	14.9	251	60	41	36	32	31	52	46	4.95
6	0.31	3.0	0.7	16.2	327	65	53	43	44	42	66	57	3.3
10	0.41	3.9	0.7	18.2	543	73	61	51	60	56	89	79	1.91
16	0.41	5.0	0.7	20.6	760	83	99	79	75	71	115	102	1.21
25	0.41	6.0	0.9	24.5	1121	98	126	104	101	94	147	129	0.78
35	0.41	7.7	0.9	27.3	1432	110	159	129	121	115	177	156	0.554
50	0.41	9.0	1.0	31.2	2054	125	193	155	150	139	212	186	0.386
70	0.51	11.0	1.1	35.6	3008	143	245	193	187	172	261	229	0.272
95	0.51	12.5	1.1	40.0	3844	160	300	235	228	208	313	276	0.206
120	0.51	14.5	1.2	44.4	4898	178	344	266	262	240	354	309	0.161
150	0.51	16.0	1.4	49.5	5624	198	401	301	300	273	396	347	0.129
185	0.51	17.7	1.6	55.2	7111	221	454	341	342	308	447	390	0.106
240	0.51	20.4	1.7	61.9	9455	248	540	397	400	358	513	455	0.08

Note: the current carrying capacities of four-core were calculated for three active conductors. The current carrying capacities of cables laid in ground were calculated for a depth of m. 0.8.

# Flame retardant cables, halogen free and low smoke, G7 elastomeric compound and M1 sheathed.

IMQ DAT 98001243

**FG7(O)M1-0.6/1 kV**

Nominal section mm <sup>2</sup>	Max. diameter cond. wires mm	Nominal conduct. diameter mm	Average insulation thickness mm	Max. outer diameter mm	Indicative weight kg/km	Minimum bending radius mm	Current Rating (A)				Max. cond.resist. at 20°C Ohm/km		
							30°C in air	30°C in pipe in air	20°C ground laying in pipe			20°C ground laying	
									ρ =1	ρ =1.5		ρ =1	ρ =1.5

### FG7OM1-0.6/1 kV 3 Conductors (with yellow/green)

1.5	0.26	1.5	0.7	12.5	148	50	24	20	25	24	37	32	13.3
2.5	0.26	1.9	0.7	13.6	210	55	34	28	32	31	48	42	7.98
4	0.31	2.5	0.7	14.9	251	60	50	41	42	40	60	54	4.95
6	0.31	3.0	0.7	16.2	327	65	62	50	53	50	78	69	3.3
10	0.41	3.9	0.7	18.2	543	73	87	70	69	65	104	91	1.91
16	0.41	5.0	0.7	20.6	760	83	114	90	91	85	137	121	1.21
25	0.41	6.0	0.9	24.5	1121	98	148	118	117	110	178	157	0.78
35	0.41	7.7	0.9	27.3	1432	110	186	147	143	134	213	186	0.554
50	0.41	9.0	1.0	31.2	2054	125	224	174	178	166	253	222	0.386
70	0.51	11.0	1.1	35.6	3008	143	290	222	221	205	309	271	0.272
95	0.51	12.5	1.1	40.0	3844	160	353	266	266	246	370	324	0.206
120	0.51	14.5	1.2	44.4	4898	178	411	306	311	285	425	372	0.161
150	0.51	16.0	1.4	49.5	5624	198	474	335	357	325	474	416	0.129
185	0.51	17.7	1.6	55.2	7111	221	522	375	403	360	527	460	0.106
240	0.51	20.4	1.7	61.9	9455	248	620	437	470	418	605	536	0.08

### FG7OM1-0.6/1 kV 4 Conductors (without yellow/green)

1.5	0.26	1.5	0.7	13.4	175	54	22	18.5	21	20	31	27	13.3
2.5	0.26	1.9	0.7	14.6	235	59	33	27	25	24	41	37	7.98
4	0.31	2.5	0.7	16.0	307	64	41	34	34	33	52	46	4.95
6	0.31	3.0	0.7	17.5	413	70	55	45	44	42	66	57	3.3
10	0.41	3.9	0.7	19.8	632	80	74	59	60	56	87	77	1.91
16	0.41	5.0	0.7	22.4	868	90	99	79	75	71	113	100	1.21
25	0.41	6.0	0.9	26.8	1431	108	126	104	99	92	147	129	0.78
35+1x25	0.41	7.7/6.0	0.9/0.9	29.2	1827	117	157	127	123	115	179	159	0.554
50+1x25	0.41	9.0/6.0	1.0/0.9	32.4	2596	130	193	155	153	142	210	184	0.386
70+1x35	0.51	11.0/7.7	1.1/0.9	37.0	3375	148	247	195	190	175	257	225	0.272
95+1x50	0.51	12.5/9.0	1.1/1.0	42.0	4274	168	300	235	225	205	312	275	0.206
120+1x70	0.51	14.5/11.0	1.2/1.1	46.9	5515	188	344	266	259	237	357	313	0.161
150+1x95	0.51	16.0/12.5	1.4/1.1	52.5	7006	210	401	302	301	274	393	346	0.129
185+1x95	0.51	17.7/12.5	1.6/1.1	57.3	8410	230	457	342	338	308	444	390	0.106
240+1x150	0.51	20.4/16.0	1.7/1.4	65.5	11104	262	535	396	403	362	514	456	0.08

### FG7OM1-0.6/1 kV 4 Conductors (with yellow/green)

1.5	0.26	1.5	0.7	13.4	175	54	24	18.5	19	18	29	25	13.3
2.5	0.26	1.9	0.7	14.6	235	59	33	27	25	24	39	35	7.98
4	0.31	2.5	0.7	16.0	307	64	43	36	34	33	52	46	4.95
6	0.31	3.0	0.7	17.5	413	70	53	43	44	42	66	57	3.3
10	0.41	3.9	0.7	19.8	632	80	74	59	60	56	89	79	1.91
16	0.41	5.0	0.7	22.4	868	90	101	81	77	73	115	102	1.21
25	0.41	6.0	0.9	26.8	1431	108	128	106	99	92	149	131	0.78
35+1G25	0.41	7.7/6.0	0.9/0.9	29.2	1827	117	157	127	121	115	179	158	0.554
50+1G25	0.41	9.0/6.0	1.0/0.9	32.4	2596	130	193	155	153	142	213	187	0.386
70+1G35	0.51	11.0/7.7	1.1/0.9	37.0	3375	148	247	195	187	172	258	226	0.272
95+1G50	0.51	12.5/9.0	1.1/1.0	42.0	4274	168	300	235	228	208	310	273	0.206
120+1G70	0.51	14.5/11.0	1.2/1.1	46.9	5515	188	348	270	258	236	357	313	0.161
150+1G95	0.51	16.0/12.5	1.4/1.1	52.5	7006	210	397	298	301	274	392	343	0.129
185+1G95	0.51	17.7/12.5	1.6/1.1	57.3	8410	230	456	343	340	310	447	392	0.106
240+1G150	0.51	20.4/16.0	1.7/1.4	65.5	11104	262	537	398	406	365	518	458	0.08

Note: the current carrying capacities of four-core were calculated for three active conductors. The current carrying capacities of cables laid in ground were calculated for a depth of m. 0.8.

# Flame retardant cables, halogen free and low smoke, G7 elastomeric compound and M1 sheathed.

## FG7(O)M1-0.6/1 kV

IMQ DAT 98001243

Nominal section mm <sup>2</sup>	Max. diameter cond. wires mm	Nominal conduct. diameter mm	Average insulation thickness mm	Max. outer diameter mm	Indicative weight kg/km	Minimum bending radius mm	Current Rating (A)				Max. cond. resist. at 20°C Ohm/km		
							30°C in air	30°C in pipe in air	20°C ground laying in pipe			20°C ground laying	
									ρ =1	ρ =1.5		ρ =1	ρ =1.5

### FG7OM1-0.6/1 kV 5 Conductors (with yellow/green)

1.5	0.26	1.5	0.7	14.4	226	58	22	18.5	20	18	29	28	13.3
2.5	0.26	1.9	0.7	15.6	251	63	33	27	25	24	41	30	7.98
4	0.31	2.5	0.7	17.3	379	70	41	34	34	33	52	46	4.95
6	0.31	3.0	0.7	18.9	492	76	53	43	44	42	66	59	3.3
10	0.41	3.9	0.7	21.5	775	86	74	59	60	54	89	78	1.91
16	0.41	5.0	0.7	24.4	1059	98	99	79	76	71	113	100	1.21
25	0.41	6.0	0.9	29.3	1742	118	125	103	101	94	146	129	0.78
35	0.41	7.7	0.9	32.8	2262	132	157	127	123	115	180	160	0.554
50	0.41	9.0	1.0	38.2	3191	153	194	156	153	142	213	187	0.386

### FG7M1X-0.6/1 kV 2 Conductors helically wound

2x1x1.5	0.26	1.5	0.7	13.2	108	40	23	19	21	20	34	31	13.3
2x1x2.5	0.26	1.9	0.7	14.2	132	43	32	28	28	26	44	38	7.98
2x1x4	0.31	2.5	0.7	15.2	168	46	44	36	36	34	57	50	4.95
2x1x6	0.31	3.0	0.7	16.6	217	50	57	47	46	43	72	63	3.3
2x1x10	0.41	3.9	0.7	18.9	308	57	79	65	62	58	96	84	1.91
2x1x16	0.41	5.0	0.7	20.9	427	63	108	89	83	78	126	111	1.21
2x1x25	0.41	6.0	0.9	24.5	655	74	136	116	109	101	159	140	0.78
2x1x35	0.41	7.7	0.9	27.3	829	82	170	145	133	122	190	168	0.554
2x1x50	0.41	9.0	1.0	30.9	1176	93	206	176	165	149	225	198	0.386
2x1x70	0.51	11.0	1.1	34.7	1653	104	267	221	205	185	278	245	0.272
2x1x95	0.51	12.5	1.1	38.9	2136	117	327	270	243	218	332	293	0.209
2x1x120	0.51	14.5	1.2	42.8	2639	129	384	311	273	250	376	331	0.161
2x1x150	0.51	16.0	1.4	47.7	3287	143	445	354	325	288	419	369	0.129

### FG7M1X-0.6/1 kV 3 Conductors helically wound

3x1x1.5	0.26	1.5	0.7	14.2	162	40	22	18.5	19	18	29	25	13.3
3x1x2.5	0.26	1.9	0.7	15.3	198	43	33	26	27	26	41	37	7.98
3x1x4	0.31	2.5	0.7	16.4	253	46	41	36	32	31	52	46	4.95
3x1x6	0.31	3.0	0.7	17.9	326	50	53	43	44	42	66	57	3.3
3x1x10	0.41	3.9	0.7	20.3	463	57	79	65	62	58	96	84	1.91
3x1x16	0.41	5.0	0.7	22.4	643	63	108	89	83	78	126	111	1.21
3x1x25	0.41	6.0	0.9	26.3	987	74	136	116	109	101	159	140	0.78
3x1x35	0.41	7.7	0.9	29.3	1249	82	170	145	133	122	190	168	0.554
3x1x50	0.41	9.0	1.0	33.2	1773	93	206	176	165	149	225	198	0.386
3x1x70	0.51	11.0	1.1	37.2	2491	104	267	221	205	185	278	245	0.272
3x1x95	0.51	12.5	1.1	41.8	3219	117	327	270	243	218	332	293	0.209
3x1x120	0.51	14.5	1.2	46.1	3977	129	384	311	273	250	376	331	0.161
3x1x150	0.51	16.0	1.4	51.2	4955	143	445	354	325	288	419	369	0.129
3x1x185	0.51	17.7	1.6	56.0	6045	156	508	419	363	322	477	420	0.106
3x1x240	0.51	20.4	1.7	62.8	7634	174	609	488	426	378	551	486	0.08

Note: the current carrying capacities of five-core cables were calculated for three active conductors. The current carrying capacities of cables laid in ground were calculated for a depth of m. 0.8.

# Flame retardant cables, halogen free and low smoke, G7 elastomeric compound and M1 sheathed.

## Control and signalling cables

IMQ DAT 98001242

Nominal section mm <sup>2</sup>	Max. diameter cond. wires mm	Nominal conduct. diameter mm	Average insulation thickness mm	Max. outer diameter mm	Indicative weight kg/km	Minimum bending radius mm	Current Rating (A)				Max. cond.resist. at 20°C 0hm/km		
							30°C in air	30°C in pipe in air	20°C ground laying in pipe			20°C ground laying	
									ρ =1	ρ =1.5		ρ =1	ρ =1.5

### FG7OM1-0.6/1 kV N Conductors (with yellow/green)

5G1.5	0.26	1.5	0.7	14.4	226	87	15	13	22	20	25	22	13.3
7G1.5	0.26	1.5	0.7	15.4	237	93	14	12.5	17	15.5	19.5	17	13.3
10G1.5	0.26	1.5	0.7	18.7	336	113	14	12.5	16.5	15.5	19.5	17	13.4
12G1.5	0.26	1.5	0.7	19.3	402	116	10	8.5	12.5	10	14	11.5	13.4
16G1.5	0.26	1.5	0.7	21.1	423	127	10	8.5	12	10	14	11.5	13.4
19G1.5	0.26	1.5	0.7	22.1	550	133	8	7	12	10	13	12.5	13.4
24G1.5	0.26	1.5	0.7	25.4	739	153	8	7	12	10	13	12.5	13.5
5G2.5	0.26	1.9	0.7	15.6	251	94	23	19	32	29	35	32	7.98
7G2.5	0.26	1.9	0.7	16.8	332	101	16.5	14.5	21	18	23	20	8.06
10G2.5	0.26	1.9	0.7	20.6	544	124	16.5	14.5	21	18	23	20	8.06
12G2.5	0.26	1.9	0.7	21.3	504	128	14.5	13	19	16	21	18.5	8.06
16G2.5	0.26	1.9	0.7	23.3	705	140	14.5	13	19	16	21	18.5	8.06
19G2.5	0.26	1.9	0.7	24.5	720	147	13	11.5	13.5	12	15	13	8.06
24G2.5	0.26	1.9	0.7	28.3	891	170	13	11.5	13.5	12	15	13	8.10

Note: the current carrying capacities of cables laid in ground were calculated for a depth of m. 0.8.



# SPECIFICATIONS

## CORRECTION COEFFICIENTS OF CURRENT CARRYING CAPACITY FOR AMBIENT TEMPERATURES DIFFERENT FROM THOSE HERE INDICATED FOR REFERENCE

Type of laying	Temperature (°C)											
	10	15	20	25	30	35	40	45	50	55	60	65
in air*	1.15	1.12	1.08	1.04	1.00	0.96	0.91	0.87	0.82	0.76	0.71	0.65
in ground	1.07	1.04	1.00	0.96	0.93	0.89	0.85	0.80	0.76	0.71	0.65	0.60

\* Non directly exposed to sun light

## POSITIONING OF PHASES SINGLE-CORE CABLES CONNECTED IN PARALLEL TO ENSURE THE CORRECT CURRENT DISPOSITION

### Cables in trefoil setting

Number of triads in the same layer	2		3			4			
		T RS	T SR	T RS	T SR	T RS	T RS	T SR	T RS

### Cables distanced vertically or horizontally

Number of triads in the same layer	2		4			
		RST	TSR	RST	TSR	RST

Note: this scheme has to be repeated for every layer

## ELECTRICAL RESISTANCE AND REACTANCE

Resistance 90°C		
Nominal section mm <sup>2</sup>	Flexible copper conductor, not tinned	
	d.c. Ohm/km	a.c. Ohm/km
1.5	16.95	16.95
2.5	10.17	10.17
4	6.31	6.31
6	4.2	4.2
10	2.43	2.43
16	1.54	1.54
25	0.99	0.99
35	0.71	0.71
50	0.49	0.5
70	0.34	0.35
95	0.26	0.27
120	0.2	0.21
150	0.16	0.17
185	0.13	0.14
240	0.102	0.104
300	0.081	0.085

Reactance a 50 Hz		
Nominal section mm <sup>2</sup>	Flexible copper conductor, not tinned	
	One-pole Ohm/km	Multicore-pole Ohm/km
1.5	0.144	0.100
2.5	0.132	0.094
4	0.122	0.087
6	0.114	0.083
10	0.105	0.078
16	0.098	0.075
25	0.093	0.074
35	0.089	0.072
50	0.085	0.071
70	0.084	0.070
95	0.083	0.069
120	0.080	0.069
150	0.080	0.069
185	0.080	0.069
240	0.078	0.069
300	0.076	0.068

## VOLTAGE DROP

For the calculation of the voltage drop in alternating current(a.c.) apply the following formula:

where:

$$V = \frac{Ct \cdot I \cdot L}{1000}$$

Ct (V/A/Km) = tab. factor [K·(R·cos φ + X·sen φ)]  
 I (A) = carrying current  
 L (m) = line length  
 R (/Km) = electrical resistance at max. working temperature  
 X (/Km) = phase reactance  
 Cos φ = power factor  
 K = 2 for monophasic lines  
 K = 1.73 for three-phase lines

Note: the voltage drop values are valid also for the direct current (d.c.).

### Coefficients (Ct) for calculating the voltage drop at a.c. of flexible cables with HEPR-G7 insulation at 90°C

Nominal section mm <sup>2</sup>	One-pole single-phase			One-pole three-phase			Multi-pole single-phase			Multi-pole three-phase		
	cos φ 0.8	cos φ 0.9	cos φ 1	cos φ 0.8	cos φ 0.9	cos φ 1	cos φ 0.8	cos φ 0.9	cos φ 1	cos φ 0.8	cos φ 0.9	cos φ 1
1.5	27.29	30.64	33.90	23.61	26.50	29.32	27.24	30.60	33.90	23.56	26.47	29.32
2.5	16.34	18.42	20.34	14.21	15.93	17.59	16.38	18.39	20.34	14.17	15.91	17.59
4	10.24	11.46	12.62	8.86	9.92	10.92	10.20	11.43	12.62	8.82	9.89	10.92
6	6.86	7.66	8.40	5.93	6.63	7.27	6.82	7.63	8.40	5.90	6.60	7.27
10	4.01	4.47	4.86	3.47	3.86	4.20	3.98	4.44	4.86	3.44	3.84	4.20
16	2.58	2.86	3.08	2.23	2.47	2.66	2.55	2.84	3.08	2.21	2.45	2.66
25	1.70	1.86	1.98	1.47	1.61	1.71	1.67	1.85	1.98	1.45	1.60	1.71
35	1.23	1.34	1.40	1.06	1.16	1.21	1.21	1.32	1.40	1.04	1.14	1.21
50	0.89	0.96	0.98	0.77	0.83	0.85	0.87	0.94	0.98	0.75	0.82	0.85
70	0.64	0.69	0.68	0.56	0.59	0.59	0.63	0.67	0.68	0.54	0.58	0.59
95	0.52	0.54	0.52	0.45	0.47	0.45	0.50	0.53	0.52	0.43	0.46	0.45
120	0.42	0.43	0.40	0.36	0.37	0.35	0.40	0.42	0.40	0.35	0.36	0.35
150	0.35	0.36	0.32	0.30	0.31	0.28	0.34	0.35	0.32	0.29	0.30	0.28
185	0.30	0.30	0.26	0.26	0.26	0.22	0.29	0.29	0.26	0.25	0.25	0.22
240	0.26	0.26	0.21	0.22	0.22	0.18	0.25	0.25	0.21	0.22	0.21	0.18
300	0.23	0.22	0.17	0.20	0.19	0.15	0.22	0.21	0.17	0.19	0.18	0.15

## MAXIMUM SHORT CIRCUIT CURRENT

This formula can be used to verify the section of the selected conductor:

$$S = \frac{I_{cc} \cdot t}{C}$$

This formula can be used to calculate the maximum short circuit current:

$$I_{cc \max} = \frac{S \cdot C}{t}$$

where:

S = min. copper area conductor (mm<sup>2</sup>)  
 I<sub>cc</sub> = short circuit current (A)  
 t = duration of short circuit (sec.)  
 C = 143 (for G7 cables)

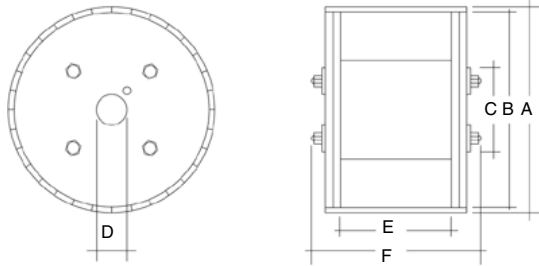
Values of current (C) as related to short circuit initial and final temperatures for copper conductors. Norm CEI 11-17

Starting temperature °C	Final temperature of short circuit °C					
	140	160	180	200	220	250
90	86	100	112	122	131	143
85	90	104	115	125	134	146
80	94	108	119	129	137	149
75	99	111	122	132	140	151
70	103	115	125	135	143	154
65	107	119	129	138	146	157
60	111	122	132	141	149	160
50	118	129	139	147	155	165
40	126	136	145	153	161	170
30	133	143	152	159	166	176

Note: the above formulas are valid for periods of max. 5 seconds. Please refer to Norm CEI 64-8 for exact calculations

# PACKAGING

## DRUMS DIMENSION



- A - Flange diameter including circumference batten
- B - Flange diameter without circumference batten
- C - Inner barrel diameter
- D - Axis hole
- E - Inner width
- F - External width

Drum type	A mm	B mm	C mm	D mm	E mm	F mm	Weight Kg	Volume m <sup>3</sup>
BL 60	690	630	315	80	315	435	30	0.19
BL 70	770	710	355	80	400	515	35	0.28
BL 80	960	800	400	80	450	575	40	0.39
BL 90	960	900	450	80	450	575	50	0.45
BL 100	1.060	1.000	500	80	560	685	60	0.77
BL 120	1.310	1.250	630	80	630	760	100	1.27
BL 140	1.460	1.400	710	80	750	920	140	1.76
BL 160	1.660	1.600	900	80	900	1.070	250	2.80
BL 180	1.860	1.800	1.120	80	1.120	1.320	300	4.20
BL 200	2.060	2.000	1.250	125	1.120	1.320	400	5.20
BL 220	2.300	2.240	1.400	125	1.120	1.320	450	6.30
BL 250	2.510	2.450	1.500	125	1.120	1.320	500	8.20

## DRUM CAPACITIES METERS

Cable diameter mm	Drum type								
	BL 60	BL 80	BL 100	BL 120	BL 160	BL 180	BL 200	BL 220	BL 250
6	1400	3590	—	—	—	—	—	—	—
8	800	2000	—	—	—	—	—	—	—
10	500	1290	—	—	—	—	—	—	—
12	350	850	1800	—	—	—	—	—	—
14	250	650	1350	—	—	—	—	—	—
16	208	500	1000	1800	—	—	—	—	—
18	164	400	800	1350	—	—	—	—	—
20	133	320	650	1100	—	—	—	—	—
22	110	267	550	900	2000	—	—	—	—
24	97	224	450	750	1600	—	—	—	—
26	—	—	379	650	1400	—	—	—	—
28	—	—	327	550	1200	—	—	—	—
30	—	—	285	475	1000	—	1850	—	—
32	—	—	250	450	900	1420	1650	—	—
34	—	—	222	400	800	1250	1450	—	—
36	—	—	198	350	700	1200	1290	—	—
38	—	—	—	300	650	990	1160	1575	—
40	—	—	—	260	575	890	1050	1420	—
42	—	—	—	240	500	800	950	1290	—
44	—	—	—	220	475	725	865	1175	1535
46	—	—	—	200	435	660	790	1075	1405
48	—	—	—	—	400	605	725	985	1290
50	—	—	—	—	370	555	670	910	1190
52	—	—	—	—	340	510	620	840	1100
54	—	—	—	—	320	470	575	780	1020
56	—	—	—	—	295	440	535	725	950
58	—	—	—	—	275	410	500	675	885
60	—	—	—	—	255	380	465	630	825
62	—	—	—	—	240	355	435	590	775
64	—	—	—	—	225	330	410	555	725
66	—	—	—	—	212	310	385	520	685
68	—	—	—	—	200	295	360	490	640

## CENELEC HD 361/CEI 20-27

### Norm reference

- H Harmonised cable
- A National approved cable
- N National cable

### Rated voltage

- 01 100/100V < 300/300V
- 03 300/300V
- 05 300/500V
- 07 450/750V
- 1 600/1000V

### Insulation and sheath

- B HEPR rubber
- B2 HEPR rubber
- E Polyethylene
- N Polychloroprene or equivalent
- N2 Special polychloroprene compound
- N5 Nitrilic rubber
- Q Polyurethan
- Q4 Polyamides
- S Silicon rubber
- T Textile braid
- V PVC standard
- V2 PVC compound t. 90°C
- V3 Low temperature PVC compound
- V5 Oil resisting PVC compound
- X XLPE

### Metal sheath

- A2 Aluminium sheath, extruded or sealed, smooth
- A3 Aluminium sheath, extruded or sealed, corrugated
- A4 Aluminium sheath on single core
- A5 Aluminium tape sheath
- C Copper concentric conductor
- C2 Copper sheath
- C3 Corrugated copper sheath
- C4 Copper braid screen
- C7 Copper tape, wire or flat wire screen

### Armour

- Z2 Steel wires armour
- Z3 Steel flat wires armour
- Z4 Steel tape armour
- Z5 Steel braid armour
- Y2 Aluminium wires armour
- Y6 Steel and copper wires armour or steel tape and copper wires armour

### Conductor flexibility

- F Flexible conductor class 5 (Cenelec HD 22 sect. 6)
- H Very flexible conductor class 6
- K Flexible conductor class 5
- R Round stranded conductor class 2
- U Solid conductor class 1
- Z Special shaped and/or material conductor

## CEI-UNEL 35011

### Conductor flexibility

- A Aluminium conductor
- F Flexible conductor class 5
- FF Very flexible conductor class 6
- R Round stranded conductor class 2
- S Shaped stranded conductor class 2
- U Solid conductor class 1

### Insulation

- E Polyethylene
- G7 HEPR rubber
- G10 Cross linked elastomeric compound halogen free and low smoke t. 90°C
- G20 Cross linked elastomeric compound halogen free and low smoke t. 90°C
- M9 Thermoplastica compound halogen free and low smoke t. 70°C
- R PVC compound t. 70°C T1 T2 standard
- R2 R2 high quality
- R3 PVC compound t. 105°
- R4 Polyamides compound
- R7 PVC compound t. 90°C TI3
- T One or more mica glass tapes or closed glass braid

### Screens and concentric conductors

- C Concentric copper conductor
- H1 Tape, flat wire or copper wire screen
- H2 Copper braid screen
- H3 Double copper braid screen
- H4 Longitudinally and corrugated steel tape screen
- H5 Longitudinally aluminium coated tape

### Non-metal sheathes

- E Polyethylene
- E4 Cross linked polyethylene sheath E4M
- G Rubber sheath
- K Polychloroprene sheath
- R4 Polyamide compound sheath
- M1 Thermoplastica compound halogen free and low smoke t. 70°C
- M2 Elastomeric compound halogen free and low smoke
- M3 Elastomeric compound halogen free and low smoke
- M4 Elastomeric compound halogen free and low smoke

### Armour

- A Aluminium smooth sheath or metallic braid armour
- A1 Aluminium sheath
- F Steel wires armour
- H4 Corrugated steel tape armour
- N Steel tape armour
- Z Steel flat wire armour

### Cable shape

- O Round
- D Flat
- X Helically wound

Tratos Cavi S.p.A. reserves the right to modify at any time technical dimensional and weight characteristics shown in this catalogue to improve the features of its products. However these will still be in accordance to the mentioned standards.

There is no responsibility of the manufacturer for damages to persons and property in case of improper use and/or neglecting the recommendations for using cables and norms contained in this catalogue.

**TRATOS**



ALMA S.r.l.  
Via Stadio, 2  
52036 Pieve S. Stefano - Italy  
Tel. +39 0575 7941  
Fax +39 0575 798026

TRATOS CAVI S.p.a.  
Via Stadio, 2  
52036 Pieve S. Stefano - Italy  
Tel. +39 0575 7941  
Fax +39 0575 798026  
commerciale@tratos.it

TRATOS CAVI S.p.a.  
filiale Catania  
XIII Str. Strad. V.Lancia  
Loc. Piano D'Arce  
95121 Catania - Italy  
Tel. +39 095 7482101  
Fax +39 095 291059

TRATOS H.V. S.p.a.  
Via Pian di Guido, 45  
52036 Pieve S. Stefano - Italy  
Tel. +39 0575 799429  
Fax +39 0575 796907

TRATOS Ltd  
UK - Park Road  
Holmewood Industrial Park  
Holmewood - Chesterfield  
DERBYSHIRE S42 5UW  
Tel. +44 01246 858000  
Fax +44 01246 858001

NORTH WEST CABLES Ltd  
School lane, Knowsley  
Merseyside L34 9HD  
Tel. +44 01515 483888  
fax +44 0151 549 1169

TRATOS CAVI Iberica S.L.  
Spain  
Paseo de los Parques 6, bloque 6, 1D  
28109 Alcobendas (Madrid)  
Tel./ Fax +34 91 6255887

POWER AND SEGNALLING CABLES

## FG70M1-0.6/1 kV

Flame retardant cables  
halogen free and  
low smoke