

Your customized cabling
solutions for the nuclear industry.



LAPP MULLER - COMPOSITE CABLE - REF - 43723

“A whole range of cables designed for nuclear industry”

Present for more than 30 years in the nuclear field, LAPP MULLER SAS has equipped since 1985 the first fuel assembly handling bridges of the waste processing plant of LA HAGUE in France.

LAPP MULLER SAS has built its reputation by designing and manufacturing high performance cables using constructions and materials to meet the requirement of nuclear engineering cables.

REFERENCES CUSTOMERS

Partner of AREVA and C.E.A. (French nuclear research agency) LAPP MULLER SAS supplies cables for waste processing plants, nuclear power plants, nuclear fuel manufacturing plants or nuclear research centres. LAPP MULLER offers a complete range of cables for all the aspects of nuclear engineering : power, control, coaxial, telecom, umbilical or composite cables for use in buildings, cranes, robots, drag chains, drum reeling systems or pan and tilt cameras. According to customer's need, cables can be individually or overall shielded, armoured, reinforced with Aramid fibre...

LAPP MULLER SAS is also a major partner of the companies in charge of inspection and control of nuclear sites like FRAMATOME, INTERCONTROLE, HYTEC or TECNATOM (in Spain), Electronics Corporation of India Ltd. We provide composite miniaturized radiation resistant cables for embedded camera or sensor on pressure tube or reactor tank inspection robot.



- **FIRE RETARDANT HALOGEN FREE CABLES**

according to IEC 332.3

Control and command cables

- Unscreened cables
"Type CNB 1000 ZH"p.6
- Screened cables
"Type CB 1000 ZH"p.7

- **DRAG CHAIN CABLES "ROBOCABLES FR ZH"**

Radiation resistance :
5 Mrads

- Unscreened cablesp.10
- Screened cables.....p.11

- **RADIATION RESISTANT CABLES "TYPE 10 or MULRAD 2"**

Radiation resistance :
200 or 500 Mrads

- Unscreened cables "type 10A"p.14
- Screened cables "type 10B"p.15
- Unscreened cables "MULRAD 2"p.16
- Screened cables "MULRAD 2 "p.17

- **SPECIAL CABLES**

- Coaxial cables.....p.20
- Cables for bus systems.....p.21
- Flat cables.....p.22
- Cables which can be decontaminated.....p.23-24
- Special cables on studyp.25-30

FR : fire retardant (IEC 60332.3)
FLR: flame retardant (IEC 60332.1)
ZH : zero halogen (IEC 60754)

**“A Complete range of power and control/command cables
within the nuclear power plant”**



• **FIRE RETARDANT HALOGEN FREE CABLES**

- Unscreened control and
command cables 0.6/1 KVolt
Product line "CNB 1000 ZH".....p.6

- Screened control and
command cables 0.6/1 KVolt
Product line "CB 1000 ZH".....p.7

CNB 1000 ZH

0.6/1 KVolt
CONTROL AND COMMAND CABLES

IEC 60332-3
halogen free


metric "LAPP MULLER"- CNB1000- 12G 2.5 - IEC 332-3 - ZH - REF 60375 - OF





Cable make up

Conductors	Plain copper wires, fine strands class 5 according to IEC 60228.
Insulation	Flame retardant XLPE.
Cores identification	Black with sequential numbering imprint in white and green/ yellow conductor.
Type of lay - up	Concentric lay-up of cores in layers. Outer assembling tape.
Sheath	Highly flame retardant halogen free compound - Grey.
Printing	Metric " LAPP MULLER -CNB1000 - construction -IEC 332-3 -ZH - REF...-OF..."


Technical data


 Rated voltage
0.6/1 KVolt

 Temperature range
-20°C + 80°C

 Static bending radius
5x cable diameter.

 Fire resistance
IEC 60332.3

 Halogen free cables
according to
IEC 60754-1 and 2

 Low smoke emission
according to IEC 61034

Article n°	construction	diameter	weight (Kg/Km)	Article n°	construction	diameter	weight (Kg/Km)
60132	2 x 1 ²	8.3	98	60365	12 G 1.5 ²	15.7	338
60351	3 G 1 ²	8.7	111	60366	19 G 1.5 ²	19.0	525
60352	4 G 1 ²	9.4	132	60367	24 G 1.5 ²	22.0	648
60353	5 G 1 ²	10.2	157	60368	30 G 1.5 ²	23.8	770
60354	7 G 1 ²	11.1	170	60369	37 G 1.5 ²	25.0	917
60355	12 G 1 ²	14.6	278	60370	2 x 2.5 ²	9.8	151
60356	19 G 1 ²	17.3	414	60371	3 G 2.5 ²	10.3	178
60357	24 G 1 ²	20.5	531	60372	4 G 2.5 ²	11.2	216
60358	30 G 1 ²	21.6	627	60373	5 G 2.5 ²	12.3	260
60359	37 G 1 ²	23.2	742	60374	7 G 2.5 ²	13.7	305
60360	2 x 1.5 ²	8.8	114	60375	12 G 2.5 ²	18.2	502
60361	3 G 1.5 ²	9.6	131	60376	19 G 2.5 ²	21.5	754
60362	4 G 1.5 ²	10.0	157	60377	24 G 2.5 ²	25.0	936
60363	5 G 1.5 ²	10.9	187	60378	30 G 2.5 ²	26.5	1 124
60364	7 G 1.5 ²	11.8	205	60379	37 G 2.5 ²	28.5	1 347

Other constructions other dimensions,
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CB 1000 ZH

0.6/1 KVolt
SCREENED COMMAND AND CONTROL CABLES

IEC 60332-3
halogen free


metric "LAPP MULLER"- CB1000 - 5G1.5 - IEC 60332-3 -ZH-REF 60436 - OF





Cable make up


Conductors	Plain copper wires, fine strands class 5 according to IEC 60228.
Insulation	Flame retardant XLPE.
Cores identification	< 5 conductors : Blue - brown - black - black -yellow and green conductor. > 5 conductors : Black with sequential imprint in white and yellow/green conductor.
Type of lay - up	Concentric lay-up of cores in layers. Outer assembling tape.
Screen	Braid in tinned copper wires. Minimum optical coverage > 80%.
Sheath	Highly flame retardant halogen free compound - Grey.
Printing	Metric " LAPP MULLER - CB1000 - construction- IEC 60332-3 - ZH - REF...- OF..."


Technical data


 Rated voltage
0.6/1 KVolt

 Temperature range
-20°C + 80°C

 Static bending radius
5x cable diameter.

 Fire resistance
IEC 60332.3

 Halogen free cables
according to
IEC 60754-1 and 2

 Low smoke emission
according to IEC 61034

Article n°	construction	diameter	weight (Kg/Km)	Article n°	construction	diameter	weight (Kg/Km)
60140	2 x 1 ²	8.9	106	60438	12 G 1.5	16.9	429
60424	3 G 1 ²	9.3	125	60439	19 G 1.5 ²	19.8	615
60425	4 G 1 ²	10.0	147	60440	24 G 1.5 ²	22.8	754
60426	5 G 1 ²	10.8	170	60441	30 G 1.5 ²	24.1	882
60427	7 G 1 ²	11.6	208	60442	37 G 1.5 ²	25.8	1 038
60428	12 G 1 ²	15.4	346	60443	2 x 2.5 ²	10.4	153
60429	19 G 1 ²	18.1	495	60444	3 G 2.5 ²	11.0	188
60430	24 G 1 ²	21.3	628	60445	4 G 2.5 ²	11.9	228
60431	30 G 1 ²	22.4	730	60446	5 G 2.5 ²	13.3	282
60432	37 G 1 ²	24.0	854	60447	7 G 2.5 ²	14.5	368
60433	2 x 1.5 ²	9.4	121	60448	12 G 2.5 ²	19.4	608
60434	3 G 1.5 ²	9.9	144	60449	19 G 2.5 ²	22.3	857
60435	4 G 1.5 ²	10.7	171	60450	24 G 2.5 ²	25.8	1 057
60436	5 G 1.5 ²	11.5	199	60451	30 G 2.5 ²	27.3	1 253
60437	7 G 1.5 ²	12.4	246	60452	37 G 2.5 ²	29.7	1 518

Other constructions other dimensions,
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**“A complete range of cables for moving applications
(drag chains, drum reeling systems, cranes...)
and radiation resistant up to 5 Mrads”**



• **DRAG CHAIN CABLES "ROBOCABLES FR ZH"**

- Unscreened cables.....p.10
- Screened cables.....p.11



ROBOCABLES FR ZH

IEC 60332-3
halogen free
radiation resistant

UNSCREENED CABLES

Extra flexible cables for robotic applications with high mechanical stress in bending, torsion, high speed or acceleration. For use in drum reeling systems, cranes, handling bridges, multiaxis robots, drag chains and all other moving systems.

metric "LAPP MULLER"- 19G1 - ROBOCABLE FR-ZH-IEC 60332-3 - REF 37354 - OF



Cable make up

Conductors	Extra flexible class 6 plain copper wires according to IEC 60228.
Insulation	Special polymer for robotic application ZH.
Cores identification	White with sequential imprint in black and yellow/green conductor.
Type of lay - up	Concentric lay-up of cores in layers with short pitch. Outer assembling tape.
Sheath	Highly flame retardant flexible compound ZH - Grey
Printing	Metric "LAPP MULLER - construction - ROBOCABLE FR- ZH - IEC 332.3 - REF -OF..."

Technical data

Rated voltage : 0.6/1 KVolt	Temperature range -15°C + 80°C	Static bending radius: 5x cable diameter.	Fire resistance IEC 60332.3
Halogen free cables according to IEC 60754-1	Low smoke emission according to IEC 61034	Dynamic bending radius : 10x cable diameter.	Radiation resistance 5 Mrads

Mechanical data

Drag chains : yes	Speed: until 2 m/s	Acceleration : until 5 m/s ²	Robots : yes refer to us for torsion > 180° per meter
Drum reeling systems : yes refer to us for length > 20 m	Bending : yes		

Article n°	construction	diameter	weight (Kg/Km)	Article n°	construction	diameter (+/- 5%)	weight (Kg/Km)
46904	2 x 1 ²	6.4	48	39977	19 G 1.5 ²	14.9	400
48758	3 G 1 ²	6.7	70	39979	24 G 1.5 ²	16.6	510
48265	4 G 1 ²	7.3	80	53303	2 x 2.5 ²	8.4	100
37355	5 G 1 ²	7.9	100	45756	3 G 2.5 ²	8.7	130
41910	7 G 1 ²	9.4	130	38065	4 G 2.5 ²	9.7	160
48759	12 G 1 ²	10.9	190	60513	5 G 2.5 ²	10.5	200
37354	19 G 1 ²	13.4	330	38792	7 G 2.5 ²	12.4	270
58747	24 G 1 ²	14.9	410	42843	12 G 2.5 ²	14.7	410
39976	2 x 1.5 ²	6.8	60	44399	19 G 2.5 ²	18.4	660
48206	3 G 1.5 ²	7.2	100	39469	4 G 4	10.9	230
37353	4 G 1.5 ²	7.9	130	41743	4 G 6	14.1	340
45171	5 G 1.5 ²	9	150	50595	4 G 10	16.9	595
39974	7 G 1.5	10.3	180	60514	4 G 16	19.6	900
55873	12 G 1.5 ²	12.1	260	60515	4 G 25	23.2	1270

Other constructions other dimensions,
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ROBOCABLES FR ZH

IEC 60332-3
halogen free
radiation resistant

SCREENED CABLES

Extra flexible cables for robotic applications with high mechanical stress in bending, torsion, high speed or acceleration. For use in drum reeling systems, cranes, handling bridges, multiaxis robots, drag chains and all other moving systems.

metric "LAPP MULLER"- 7G1.5-ROBOCABLE FR-ZH-IEC 60332-3 - REF 51339 - OF



Cable make up

Conductors	Extra flexible class 6 plain copper wires according to IEC 60228.
Insulation	Special polymer for robotic application ZH.
Cores identification	White with sequential imprint in black and yellow/green conductor.
Lay up per pairs (if specified)	Conductors by pairs.
Pairs screening (if specified)	Tinned copper wires spinning.
Type of lay - up	Concentric lay-up of cores in layers with short pitch. Outer assembling tape.
Screen	Braid in tinned copper wires. Minimum optical coverage > 85%.
Sheath	Highly flame retardant flexible compound ZH - Grey
Printing	Metric "LAPP MULLER - construction - ROBOCABLE FR ZH - IEC 332.3 - REF - OF..."

Technical data

Rated voltage : 0.6/1 KVolt	Temperature range -15°C + 80°C	Static bending radius: 5x cable diameter.	Fire resistance IEC 60332.3
Halogen free cables according to IEC 60754-1	Low smoke emission according to IEC 61034	Dynamic bending radius : 10x cable diameter.	Radiation resistance 5 Mrads

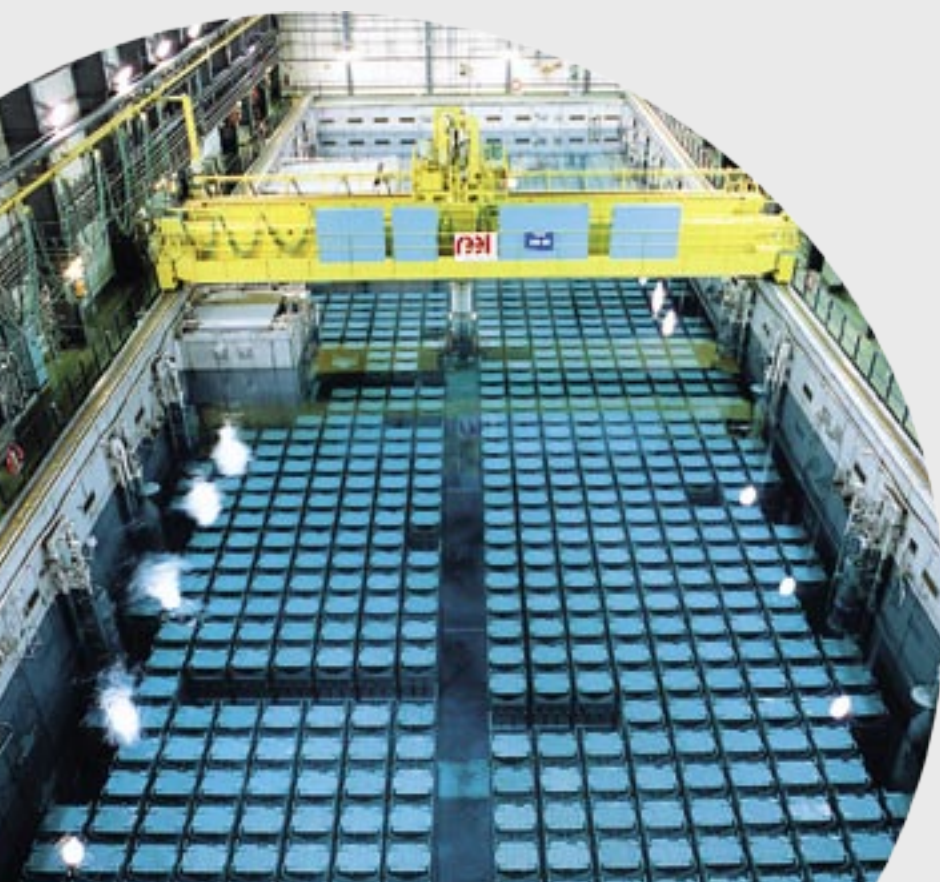
Mechanical data

Drag chains : yes	Speed: until 2 m/s	Acceleration : until 5 m/s ²	Robots : yes refer to us for torsion > 180° per meter
Drum reeling systems : yes refer to us for length > 20 m	Bending : yes		

Article n°	construction	diameter	weight (Kg/Km)	Article n°	construction	diameter (+/- 5 %)	weight (Kg/Km)
60516	4 x 0.50	6.8	80	39820	19 G 1.5 ²	16.5	500
60517	7 x 0.50	7.7	120	60524	3 G 2.5 ²	10.1	190
60518	12 x 0.50	9.7	160	43751	4 G 2.5 ²	11.1	230
60519	19 x 0.50	11	210	60525	5 G 2.5 ²	11.8	270
55315	2 x 1	7.2	70	51118	7 G 2.5 ²	13.4	360
40681	3 G 1 ²	7.8	90	60526	12 G 2.5 ²	15.8	500
46672	4 G 1 ²	8.1	112	overall screened multipairs cables			
48295	5 G 1 ²	8.9	127	60534	3 P 0.5 ²	8.5	95
43747	7 G 1 ²	10.4	181	50240	4 P 0.5 ²	9	125
60520	12 G 1 ²	12.2	270	60535	3 P 1 ²	10.8	160
60521	19 G 1 ²	14	350	57658	4 P 1 ²	11.7	210
60522	27 G 1 ²	16.4	480	individually and overall screened multipairs cables			
45168	2 x 1.5 ²	8	100	60543	3 P 0.5 ²	10.8	170
60523	3 G 1.5 ²	8.6	120	60544	4 P 0.5 ²	11.7	210
48294	4 G 1.5 ²	9.1	135	60545	3 P 1 ²	13.3	260
43741	5 G 1.5 ²	10.1	160	60546	4 P 1 ²	14.5	330
51339	7 G 1.5	11.4	210				
55497	12 G 1.5 ²	13.2	320				

Other constructions other dimensions,
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" A complete range of static and robotic cables
with a high radiation resistance level."



• **HIGH LEVEL RADIATION RESISTANT CABLES**

- Unscreened cables " type 10A" p.14
- Screened cables "type 10B" p.15
- Unscreened cables "MULRAD 2" p.16
- Screened cables " MULRAD 2" p.17



TYPE 10 A

UNSCREENED CABLES

Radiation resistant flexible cables conform to french specification SGN.


IEC 332.3
halogen free
radiation resistant


metric "LAPP MULLER"- 19x0.93 - Type 10 A N G - IEC 332.3 - REF 32479 - OF


Cable make up


Conductors	Tinned copper wires, fine strands class 5 according to IEC 60228 0.60 ² :19x20/100 1.34 ² : 19x30/100 2.5 ² :140x15/100 0.93 ² :19x25/100 1.82 ² : 37x25/100
Insulation	Mulrad.
Cores identification	Natural with sequential imprint in black with or without green/yellow conductor.
Type of lay - up	Concentric lay-up of cores in layers with short pitch. Outer assembling tape.
Sheath	Highly flame retardant compound ZH for nuclear application - Yellow.
Printing	Metric "LAPP MULLER - construction - TYPE 10 A N G - IEC 332.3 - REF -OF..."


Technical data


 Rated voltage :
0.6/1 KVolt


 Temperature range
-20°C + 80°C


 Static bending radius:
5x cable diameter.

 Fire resistance
IEC 60332.3

 Halogen free cables
according to
IEC 60754-1 and 2

 Low smoke emission
according to IEC 61034

 Dynamic bending radius :
20x cable diameter.

 Radiation resistance
200 Mrads

Article n°		construction	diameter	weight (Kg/Km)	Article n°		construction	diameter (+/- 5%)	weight (Kg/Km)
without G/Y	with G/Y				without G/Y	with G/Y			
33097		2 x 0.60 ²	4.7	30	32484	32869	7 x 1.34 ²	8.5	145
33098	33099	3 x 0.60 ²	5	40	32486	32870	12 x 1.34 ²	10.8	225
33100	33101	4 x 0.60 ²	6	45	32487	32871	19 x 1.34 ²	12.5	335
33102	33103	5 x 0.60 ²	6.4	65	32488	32872	37 x 1.34 ²	16.7	615
33104	32626	7 x 0.60 ²	6.8	80	33113		2 x 1.82 ²	6.9	70
33105	33106	12 x 0.60 ²	8.8	130	33114	33115	3 x 1.82 ²	7.3	90
33107	33108	19 x 0.60 ²	10	180	33116	32627	4 x 1.82 ²	7.9	115
33109	33110	37 x 0.60 ²	13	320	33117	33118	5 x 1.82 ²	8.7	140
32473		2 x 0.93 ²	5.3	40	33119	33120	7 x 1.82 ²	9.4	185
32474	32860	3 x 0.93 ²	6.2	55	33121	33122	12 x 1.82 ²	12.1	290
33111	33112	4 x 0.93 ²	6.7	75	33123	33124	19 x 1.82 ²	14	435
32475	32861	5 x 0.93 ²	7.4	90	33125	33126	37 x 1.82 ²	18.8	800
32476	32862	7 x 0.93 ²	7.9	110	32501		2 x 2.5 ²	8.1	95
32477	32863	12 x 0.93 ²	10	175	32502	32874	3 x 2.5 ²	8.8	125
32479	32864	19 x 0.93 ²	11.5	255	33127	33128	4 x 2.5 ²	9.5	160
32480	32865	37 x 0.93 ²	15.1	455	32503	32875	5 x 2.5 ²	10.3	190
32481		2 x 1.34 ²	6.3	60	32504	32877	7 x 2.5 ²	11.2	250
32482	32867	3 x 1.34 ²	6.6	75	32505	32878	12 x 2.5 ²	14.5	400
32522	32974	4 x 1.34 ²	7.1	90	32506	32881	19 x 2.5 ²	17.2	610
32483	32868	5 x 1.34 ²	7.7	110	32507	32882	37 x 2.5 ²	23.2	1140

Other constructions other dimensions,
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TYPE 10 B

SCREENED CABLES

Radiation resistant flexible cables conform to french specification SGN.


IEC 332.3
halogen free
radiation resistant

metric "LAPP MULLER"- 37x1.82 - Type 10 B N G - IEC 332.3 - REF 33162 - OF


Cable make up


Conductors	Tinned copper wires, fine strands class 5 according to IEC 60228 0.60 ² : 19x20/100 1.34 ² : 19x30/100 2.5 ² : 140x15/100 0.93 ² : 19x25/100 1.82 ² : 37x25/100
Insulation	Mulrad.
Cores identification	Natural with sequential imprint in black with or without green/yellow conductor.
Type of lay - up	Concentric lay-up of cores in layers with short pitch. Outer assembling tape.
Screen	Braid in tinned copper wires. Minimum coverage >80%.
Sheath	Highly flame retardant compound ZH for nuclear application - Yellow.
Printing	Metric "LAPP MULLER - construction - TYPE 10 B N.G - IEC 332.3 - REF -OF..."


Technical data


 Rated voltage :
0.6/1 KVolt


 Temperature range
-20°C + 80°C


 Static bending radius:
5x cable diameter.

 Fire resistance
IEC 60332.3

 Halogen free cables
according to
IEC 60754-1 and 2

 Low smoke emission
according to IEC 61034

 Dynamic bending radius :
20x cable diameter.

 Radiation resistance
200 Mrads

Article n°		construction	diameter (+/- 5 %)	weight (Kg/Km)	Article n°		construction	diameter (+/- 5 %)	weight (Kg/Km)
without G/Y	with G/Y				without G/Y	with G/Y			
33129		2 x 0.60 ²	5.4	30	32518	32895	7 x 1.34 ²	9.6	183
33130	33131	3 x 0.60 ²	6.2	40	32519	32898	12 x 1.34 ²	11.9	279
33132	33133	4 x 0.60 ²	6.6	45	3250	32900	19 x 1.34 ²	13.6	396
33134	33135	5 x 0.60 ²	7.1	65	32521	32903	37 x 1.34	17.8	700
33136	33137	7 x 0.60 ²	7.4	80	33149		2 x 1.82 ²	7.6	97
33138	33139	12 x 0.60 ²	9.6	130	33150	33151	3 x 1.82 ²	8	122
33140	33141	19 x 0.60 ²	10.9	180	33152	33153	4 x 1.82 ²	8.6	147
33142	33143	37 x 0.60 ²	13.9	320	33154	33155	5 x 1.82 ²	9.7	172
32508		2 x 0.93 ²	6.8	40	33156	33157	7 x 1.82 ²	10.3	229
32509	32885	3 x 0.93 ²	7.1	55	33158	33159	12 x 1.82 ²	13	352
33144	32976	4 x 0.93 ²	7.4	75	33160	33161	19 x 1.82 ²	14.9	514
32510	33145	5 x 0.93 ²	8.1	90	33162	33163	37 x 1.82 ²	19.9	915
32511	32888	7 x 0.93 ²	8.8	110	33164		2 x 2.5 ²	8.1	127
32512	32889	12 x 0.93 ²	11.1	175	33165	33166	3 x 2.5 ²	9.7	172
32513	33146	19 x 0.93 ²	12.6	255	33167	33168	4 x 2.5 ²	10.4	204
32514	32891	37 x 0.93 ²	16.4	455	33169	33170	5 x 2.5 ²	11.4	241
32515		2 x 1.34 ²	7.6	60	33171	33172	7 x 2.5 ²	12.1	304
32516	32893	3 x 1.34 ²	7.6	75	33173	33174	12 x 2.5 ²	15.7	483
33147	33148	4 x 1.34 ²	7.8	90	33175	33176	19 x 2.5 ²	18.1	697
32517	32894	5 x 1.34 ²	8.8	110	33177	33178	37 x 2.5 ²	24.3	1270

Other constructions other dimensions,
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MULRAD 2

IEC 332.1
halogen free
radiation resistant

UNSCREENED CABLES









Extra flexible cables for drag chains, drum reeling systems, cranes or other moving applications for use in high radiation level environment.

metric "LAPP MULLER"- 19x0.6 - MULRAD 2 -ZH- IEC 332.1 - REF 29330- OF


Cable make up

Conductors	Tinned copper wires, fine strands class 5 according to IEC 60228 0.38 ² : 19x16/100 0.93 ² : 19x25/100 1.82 ² : 37x25/100 0.60 ² : 19x20/100 1.34 ² : 19x30/100 2.5 ² : 140x15/100
Insulation	Mulrad
Cores identification	Natural with sequential imprint in black with or without green/yellow conductor.
Type of lay - up	Concentric lay-up of cores in layers with short pitch. Outer assembling tape.
Sheath	Special Polyurethane compound for nuclear application - Yellow.
Printing	Metric "LAPP MULLER - construction - MULRAD 2- IEC 332.1 -ZH- REF -OF..."

Technical data

 Rated voltage : 0.6/1 KVolt	 Temperature range -15°C + 80°C	 Static bending radius: 5x cable diameter.	 Fire resistance IEC 60332.1
 Halogen free cables according to IEC 60754-1 and -2	 Drum reeling systems : yes refer to us for length > 20 m	 Dynamic bending radius : 10x cable diameter.	 Radiation resistance 500 Mrads

Mechanical data

 Drag chains : yes	 Speed: until 1 m/s	 Acceleration : until 3 m/s ²	 Robots : yes refer to us for torsion > 180° per meter
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Article n°		construction	diameter (+/- 5 %)	weight (Kg/Km)	Article n°		construction	diameter (+/- 5 %)	weight (Kg/Km)
without G/Y	with G/Y				without G/Y	with G/Y			
29318		2 x 0.38 ²	4.7	25	29296		2 x 1.34 ²	6.5	57
29799	29373	3 x 0.38 ²	4.9	30	29801	42434	3 x 1.34 ²	6.7	70
29319	42431	4 x 0.38 ²	5.1	35	29294	29390	4 x 1.34 ²	7.3	80
29320	29374	7 x 0.38 ²	6.8	60	29299	29257	7 x 1.34 ²	9.4	135
29321	29375	12 x 0.38 ²	7.9	90	29301	29256	12 x 1.34 ²	11	210
29322	29376	16 x 0.38 ²	8.8	115	29337	29391	16 x 1.34 ²	12.1	270
29323	29377	19 x 0.38 ²	9.7	130	29300	29392	19 x 1.82 ²	13.6	320
29324		2 x 0.60 ²	4.9	30	29338		2 x 1.82 ²	7.1	70
32725	34185	3 x 0.60 ²	5	35	29339	29393	4 x 1.82 ²	8	105
29325	29379	4 x 0.60 ²	6	45	42435	29258	6 x 1.82 ²	9.8	150
42432	35866	5 x 0.60 ²	6.4	60	29340	29394	7 x 1.82 ²	10.6	170
42433	34282	6 x 0.60 ²	7	70	42442	29260	9 x 1.82 ²	12.2	230
29326	29380	7 x 0.60 ²	7.6	80	29341	29395	12 x 1.82 ²	12.2	275
29327	29381	12 x 0.60 ²	8.9	120	29342	29396	16 x 1.82 ²	13.6	355
29329	29384	16 x 0.60 ²	9.8	150	29343	29397	19 x 1.82 ²	15.3	420
29330	29382	19 x 0.60 ²	10.7	180	29302		2 x 2.5 ²	8.5	85
29331		2 x 0.93 ²	5.5	40	32832	42436	3 x 2.5 ²	9	115
29332	29383	4 x 0.93 ²	6.9	55	29298	29253	4 x 2.5 ²	9.6	145
29333	29385	7 x 0.93 ²	8.8	110	32840	42437	6 x 2.5 ²	11.7	205
29334	29386	12 x 0.93 ²	10.2	170	29317	29252	7 x 2.5 ²	12.7	240
29335	29387	16 x 0.93 ²	11.2	215	29303	29398	12 x 2.5 ²	14.9	380
29336	29388	19 x 0.93 ²	12.5	250	29334	29399	16 x 2.5 ²	16.5	490
					29345	29400	19 x 2.5 ²	18.7	585

Other constructions other dimensions,
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e-mail : contact@mullercables.com

MULRAD 2

SCREENED CABLES

Extra flexible cables for drag chains, drum reeling systems, cranes or other moving applications for use in high radiation level environment.









IEC 332.1
halogen free
radiation resistant

metric "LAPP MULLER"- 19x0.93 BLG - MULRAD 2 - IEC 332.1 -ZH- REF 29245- OF

Cable make up

Conductors	Tinned copper wires, fine strands class 5 according to IEC 60228 0.38 ² : 19x16/100 0.93 ² : 19x25/100 1.82 ² : 37x25/100 0.60 ² : 19x20/100 1.34 ² : 19x30/100 2.5 ² : 140x15/100
Insulation	Mulrad
Cores identification	Natural with sequential imprint in black with or without green/yellow conductor.
Type of lay - up	Concentric lay-up of cores in layers with short pitch. Outer assembling tape.
Screen	Braid in tinned copper wires. Minimum coverage > 85%.
Sheath	Special Polyurethane compound for nuclear application - Yellow.
Printing	Metric "LAPP MULLER - construction - MULRAD 2- IEC 332.1 -ZH- REF -OF..."

Technical data

 Rated voltage : 0.6/1 KVolt	 Temperature range -15°C + 80°C	 Static bending radius: 5x cable diameter.	 Fire resistance IEC 60332.1
 Halogen free cables according to IEC 60754-1 and -2	 Drum reeling systems : yes refer to us for length > 20 m	 Dynamic bending radius : 10x cable diameter.	 Radiation resistance 500 Mrads

Mechanical data

 Drag chains : yes	 Speed: until 1 m/s	 Acceleration : until 3 m/s ²	 Robots : yes refer to us for torsion > 180° per meter
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Article n°		construction	diameter (+/- 5 %)	weight (Kg/Km)	Article n°		construction	diameter (+/- 5 %)	weight (Kg/Km)
without G/Y	with G/Y				without G/Y	with G/Y			
29346		2 x 0.38 ²	5	35	29353	29414	16 x 0.93 ²	12.1	260
29347	29401	4 x 0.38 ²	6.4	55	29245	29415	19 x 0.93 ²	13.4	305
29348	29402	7 x 0.38 ²	7.6	80	29354		2 x 1.34 ²	7.2	70
29349	29403	12 x 0.38 ²	8.8	120	29355	29416	4 x 1.34 ²	8.1	110
29350	29404	16 x 0.38 ²	9.7	150	29356	29417	7 x 1.34 ²	10.5	185
29351	29405	19 x 0.38 ²	10.7	165	29357	29418	12 x 1.34 ²	11.9	265
29289		2 x 0.60 ²	6.2	50	29358	29419	16 x 1.34 ²	13	330
32834	42427	3 x 0.60 ²	6.3	60	29359	29420	19 x 1.34 ²	14.5	390
29290	29406	4 x 0.60 ²	6.8	70	29360		2 x 1.82 ²	7.8	85
32838	42428	5 x 0.60 ²	7	80	29361	29421	4 x 1.82 ²	9	145
29291	29407	7 x 0.60 ²	8.6	100	29362	29422	7 x 1.82 ²	11.6	230
32833	42428	8 x 0.60 ²	9	125	29363	29423	12 x 1.82 ²	13.2	335
29292	29408	12 x 0.60 ²	9.9	155	29364	29424	16 x 1.82 ²	14.4	420
40788	29409	16 x 0.60 ²	10.7	190	29365	29425	19 x 1.82 ²	16.4	510
29293	29410	19 x 0.60 ²	11.8	220	29366		2 x 2.5 ²	9.4	130
29261		2 x 0.93 ²	6.8	60	29367	29426	4 x 2.5 ²	10.6	195
32836	42429	3 x 0.93 ²	6.9	75	29368	29427	7 x 2.5 ²	13.7	300
29242	29411	4 x 0.93 ²	7.6	90	29369	29428	12 x 2.5 ²	15.9	460
29295	29412	7 x 0.93 ²	9.8	145	29370	29429	16 x 2.5 ²	17.4	580
29244	29413	12 x 0.93 ²	11.1	210	29371	29430	19 x 2.5 ²	20	680

Other constructions other dimensions,
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**“A complete range of special cables,
designed and manufactured
according to your needs.”**



● **SPECIAL CABLES**

- Coaxial cables.....p.20
- Cables for bus systems.....p.21
- Flat cables.....p.22
- Cables which can be decontaminated (conform to Electricité de France standart PMUC).....p.23-24

Special cables on study

- Composite cables type “FR and FR ZH”.....p.25
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COAXIAL CABLES


VIDEO / DATA CABLES


IEC 332.3


metric "LAPP MULLER" - KX6 - IEC 332.3 - TYPE 9 - REF 43650 - OF N°

Technical data

 Temperature range
-15°C + 70°C
except RG179 -20°à +150°

 Static bending radius :
5x cable diameter.

 Fire resistance
IEC 332.3

 ZH Halogen free cables
according to
IEC 60754-1 and 2
for FR ZH coaxial cables

Electrical data

reference	type	impedance	capacitance	attenuation at 10MHZ	attenuation at 200MHZ	attenuation at 400MHZ
43650 - 43849	RG 59	75 Ohms	67 pF/m	4 dB/100 m	18 dB/100 m	27 dB/100 m
42754 - 43853	RG 11	75 Ohms	67 pF/m	2 dB/100 m	10 dB/100 m	13 dB/100 m
43860 - 43861	RG 58	50 Ohms	100 pF/m	5 dB/100 m	24 dB/100 m	36 dB/100 m
43856 - 43858	RG 178	50 Ohms	100 pF/m	11 dB/100 m	42 dB/100 m	60 dB/100 m
34179	RG 179	50 Ohms	64 pF/m	11 dB/100 m	40 dB/100 m	56 dB/100 m

General data

reference	type	halogen	conductor	cross section conductor	diameter 1st sheath	overall diameter	sheath color
43650	RG 59	yes	7 wires of 20/100 BC*	0.22 mm ²	6.1 mm	8.5 mm	Brown
42754	RG 11	yes	7 wires of 40/100 BC*	0.87 mm ²	10.3 mm	13.8 mm	Brown
43860	RG 58	yes	19 wires of 20/100 TC *	0.60 mm ²	4.95 mm	6.2 mm	White
43856	RG 178	yes	7 wires of 16/100 BC*	0.14 mm ²	2.6 mm	3.8 mm	Black
34179	RG 179	yes	7 wires of 10/100 SC*	0.055 mm ²		2.54 mm	Brown
43849	RG 59	no	7 wires of 20/100 BC*	0.22 mm ²	6.1 mm	8.5 mm	White
43853	RG 11	no	7 wires of 40/100 BC*	0.87 mm ²	10.3 mm	13.8 mm	White
43861	RG 58	no	19 wires of 20/100 TC *	0.60 mm ²	4.95 mm	6.2 mm	White
43858	RG 178	no	7 wires of 16/100 BC*	0.14 mm ²	2.6 mm	3.8 mm	White

* BC : Bare copper
* TC : Tinned copper
* SC : Silver coated copper

Other constructions other dimensions,
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BUS CABLES

BUS CABLES

A wide range of bus cables for static or dynamic use.

IEC 332.3

metric "LAPP MULLER" - 4 PAIRS 0.22 BL - CAT.5 - IEC 332.3 - REF 46646 - OF



Technical data



Temperature range
-10°C + 70°C



Static bending radius :
5x cable diameter.



Dynamic bending radius :
15x cable diameter.



Fire resistance
IEC 332.3



Halogen free cables
according to
IEC 60754-1 and 2
for FR ZH cables

Electrical data

reference	type	impedance	capacitance	cable application	Radiation resistance
46646	S-FTP Cat 5	100 Ω	< 46 pF/m	Static use	1 MRad
53438	S-FTP Cat 5	100 Ω	< 46pF/m	Static use	1 MRad
57675	S-FTP Cat 5	100 Ω	< 46pF/m	Dynamic use	1 Mrad
56993	S-FTP Cat 6	100 Ω	< 46 pF/m	Static use	1 Mrad
60219	RS485	120 Ω	< 50 pF/m	Dynamic use and immergeable	1 MRad
60264	BUS CAN	120 Ω	-	Dynamic use	1 MRad
60216	PROFIBUS	150 Ω	< 30pF/m	Dynamic use	1 MRad
38561	BUS FIP	150 Ω	< 37pF/m	Dynamic use	1 MRad

General data

reference	type	halogen	construction	conductor	overall diameter	sheath color
46646	S-FTP Cat 5	yes	4 pairs 0.22 mm ² shielded	bare	10.5 mm	Blue
53438	S-FTP Cat 5	no	4 pairs 0.22 mm ² shielded	bare	10.5 mm	Blue
57675	S-FTP Cat 5	no	4 pairs 0.12 mm ² shielded	flexible	10.5 mm	Black
56993	S-FTP Cat 6	no	4 pairs 0.22 mm ² shielded	bare	12.5 mm	Blue
60219	RS485	yes	1 pair 0.34 mm ² shielded	flexible	6.7 mm	Black
60264	BUS CAN	no	1 pair 0.34 mm ² shielded	extra flexible	8.7 mm	Purple
60216	PROFIBUS	no	1 pair 0.34 mm ² shielded	extra flexible	10.8 mm	Purple
38561	BUS FIP	no	1 pair 0.34 mm ² shielded	extra flexible	10.8 mm	Black

Other constructions other dimensions,
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Fax +33(0) 4 94 43 38 16
e-mail : contact@mullercables.com

FLAT ROBOCABLES ZH

FLAT CABLES

Extra flexible cables for moving bridge festoons or special moving machines.

IEC 332.3
halogen free
radiation resistant

metric "LAPP MULLER" - construction - ROBOCABLE ZH - IEC 332.3 - REF... -OF...



Cable make up

Conductors	Extra flexible class 6 plain copper conductors according to IEC 60228.
Insulation	Miniaturized polymer special robotic ZH.
Cores identification	White with sequential imprint in black. Green/yellow conductor.
Sheath	Highly flame retardant flexible thermoplastic elastomer ZH - Grey
Printing	Metric "LAPP MULLER - construction - ROBOCABLE ZH - IEC 332.3 - REF... -OF..."

Technical data

 Rated voltage : 0.6/1 KVolt	 Temperature range -15°C + 80°C	 Static bending radius : 5x cable diameter.	 Fire resistance according to IEC 332.3
 Halogen free cables according to IEC 60754-1	 Low smoke emission according to IEC 61034	 Dynamic bending radius : 10x cable diameter.	 Radiation resistance 5MRads

Article n°	construction	dimensions	weight (Kg/Km)
54401	12 G 1 ²	30 x 3.8	250
60537	16 G 1 ²	38 x 3.8	330
60555	20 G 1 ²	47 x 3.8	410
58520	24 G 1 ²	56 x 3.8	476
60556	4 G 1.5 ²	15.2 x 4.3	120
45760	5 G 1.5 ²	16.5 x 4.3	150
60557	7 G 1.5 ²	25.1 x 4.3	190
45761	4 G 2.5 ²	16.7 x 4.9	180
49407	5 G 2.5 ²	21.1 x 4.9	200
60558	7 G 2.5 ²	32.9 x 4.9	280
53304	4 G 4 ²	21.7 x 5.8	260
59060	7 G 4 ²	36.4 x 5.8	490
49406	4 G 6 ²	26.9 x 7.1	410
52440	4 G 10 ²	31.7 x 8.7	580
60559	4 G 16 ²	31.1 x 19	920
60560	4 G 25 ²	41.9 x 12.6	1360

Other constructions other dimensions,
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CABLES WHICH CAN BE DECONTAMINATED

Inspection cables for nuclear power plants
(conform to Electricité de France standart PMUC)

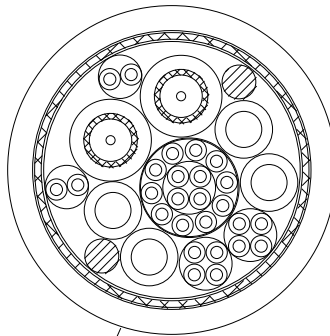
Sheath concentration in sulphur, chlore and brome
< 1000ppm

ART 43723 COMPOSITE CABLE FOR USE ON INSPECTION ROBOT IN COOLANT CHANNEL OR IN NUCLEAR TANK

"LAPP MULLER" - COMPOSITE CABLE - REF 43723 - OF N°

Cable make up

2 coaxials 75 Ω with low capacitance 70 pF/m
1 strand of 14 conductors 0.25 mm²
2 strands of 4 conductors 0.25 mm²
2 strands of 2 conductors 0.25 mm²
4 conductors of 2.5 mm²
Overall tinned copper braid.
Sheath which can be decontaminated.
Black sheath



diameter 15.5 mm ± 0.7 mm

General characteristics

Rated voltage :
Conductors 0.25 mm² : 250 Volts
Conductors 2.5 mm² : 600 Volts
Linear resistance:
Conductors 0.25 mm² ≤ 85.3 Ω/Km
Conductors 2.5 mm² ≤ 9 Ω/Km
Static bending radius ≥ 75 mm
Dynamic bending radius ≥ 150 mm
Temperature range : - 20°C to +80°C
Weight 0.43 Kg/m

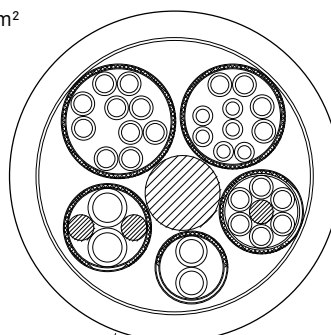
HALOGEN FREE cable
Cable for dynamic use.
Radiation resistance : 130 Mrads

ART 30228 COMPOSITE CABLE FOR USE ON INSPECTION ROBOT IN COOLANT CHANNEL OR IN NUCLEAR TANK

"LAPP MULLER" - COMPOSITE CABLE - REF 30228 - OF N°

Cable make up

1 screened strand of 3 pairs 0.34mm² and 2 pairs 0.6mm²
1 screened strand of 5 pairs 0.6mm²
1 screened strand of 6 conductors 0.6 mm²
1 screened strand of 2 conductors 1.5mm²
1 screened strand of 2 conductors 1mm²
Sheath which can be decontaminated.
Light blue sheath.



diameter 15.8 mm ± 0.8 mm

General characteristics

Rated voltage :
Conductors 0.34 mm² and 0.60 mm²: 250 Volts
Conductors 1 mm² and 1.5 mm² : 600 Volts
Linear resistance :
Conductors 0.34 mm² ≤ 68.5 Ω/Km
Conductors 0.60 mm² ≤ 35.4 Ω/Km
Conductors 1 mm² ≤ 21.5 Ω/Km
Conductors 1.5 mm² ≤ 14.6 Ω/Km
Static bending radius ≥ 80 mm
Dynamic bending radius ≥ 160 mm
Temperature range : - 30°C to +80°C
Weight 0.40 Kg/m

HALOGEN FREE cable
Cable for dynamic use
Radiation resistance : 20 Mrads

Other constructions other dimensions,
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CABLES WHICH CAN BE DECONTAMINATED

Inspection cables for nuclear power plants
(conform to Electricité de France standart PMUC)

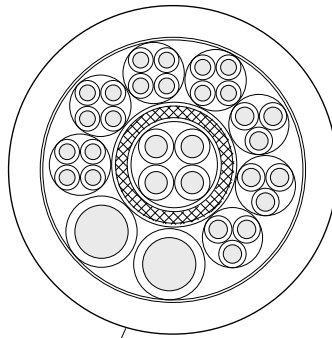
Sheath concentration in
sulphur, chlore and brome
< 1000ppm

ART 21857 COMPOSITE CABLE FOR USE ON INSPECTION ROBOT IN COOLANT CHANNEL OR IN NUCLEAR TANK

“ LAPP MULLER” - COMPOSITE CABLE – REF 21857 - OF N° “

Cable make up

1 screened strand of 4 conductors 0.75mm²
2 conductors 2.5 mm²
9 conductors 0.34 mm²
16 conductors 0.25 mm²
Sheath which can be decontaminated.
Yellow sheath.



diameter 12.8 mm ± 0.6 mm

General characteristics

Rated voltage :
Conductors 0.25 mm² and 0.34 mm² : 250 Volts
Conductors 0.75 mm² and 2.5 mm² : 600 Volts
Linear resistance :
Conductors 0.25 mm² ≤ 85.3 Ω/Km
Conductors 0.34 mm² ≤ 68.5 Ω/Km
Conductors 0.75 mm² ≤ 28.6 Ω/Km
Conductors 2.5 mm² ≤ 9 Ω/Km
Static bending radius ≥ 65 mm
Dynamic bending radius ≥ 130 mm
Temperature range : - 30°C à +80°C
Weight 0.26 Kg/m

HALOGEN FREE cable
Cable for dynamic use
Radiation resistance : 20 Mrads

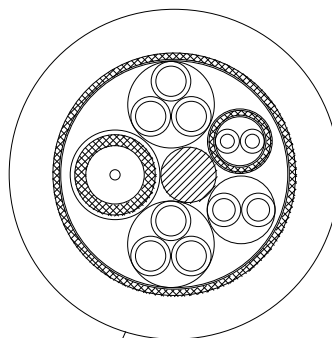
ART 41231 COMPOSITE CABLE FOR REMOTE OPERATING VEHICLE

Application : CCTV inspection in nuclear pool.

“ LAPP MULLER” - COMPOSITE CABLE – REF 41231 - OF N°

Cable make up

2 triads 0.60 mm²
1 screened pair 0.14mm²
(tinned copper spinning)
1 coaxial (capacitance ≤ 100 pF/m)
1 pair 0.34 mm²
Aramid braid
Sheath which can be decontaminated.
Red sheath



diameter 9.9 mm ± 0.4 mm

General characteristics

Rated voltage :
Conductors 0.14 mm² and 0.34 mm² : 250 Volts
Conductors 0.60 mm² : 600 Volts
Linear resistance :
Conductors 0.14 mm² ≤ 157.1 Ω/Km
Conductors 0.34 mm² ≤ 68.5 Ω/Km
Conductors 0.60 mm² ≤ 35.4 Ω/Km
Static bending radius ≥ 50 mm
Dynamic bending radius ≥ 100 mm
Temperature range : - 30°C to +80°C
Weight 0.13 Kg/m

HALOGEN FREE cable
Cable for dynamic use
Very good resistance to borinated water.
Breaking strength of the aramid braid: 250DaN.
Radiation resistance : 20 Mrads

Other constructions other dimensions,
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COMPOSITE CABLES

Fire retardant cables

IEC 60332.3

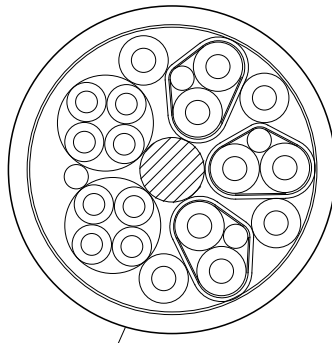
ART 21142 COMPOSITE CABLE TYPE 21

Application : instrumentation cable for a radiation sensor in nuclear power plant area.

“LAPP MULLER” - COMPOSITE CABLE - IEC 60332.3 - TYPE 21 - REF 21142 - OF N°

Cable make up

3 screened pairs of 0.60 mm²
2 strands of 4 conductors of 0.50 mm²
4 conductors of 0.50 mm²
Generally screened with
an Aluminium/Polyester tape
Highly flame retardant PVC sheath
Orange sheath



diameter 13 mm

General characteristics

Conductors rated voltage : 250 Volts
Linear resistance :
Conductors 0.50 mm² ≤ 44.1 Ω/Km
Conductors 0.60 mm² ≤ 35.4 Ω/Km
Nominal characteristic impedance : 50 Ω à 10 MHz
Nominal linear capacitance ≤ 100 pF/m à 1000Hz
Static bending radius ≥ 80 mm
Dynamic bending radius ≥ 200 mm
Temperature range : - 20°C to +75°C
Weight 0.21 Kg/m

Fire resistance : IEC 60332.3
Cable for static use

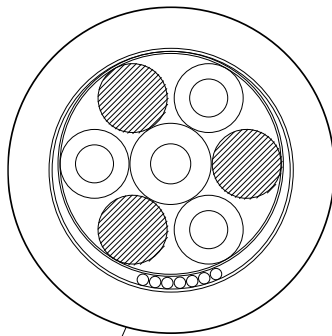
ART 45057 COMPOSITE CABLE WITH TUBE

Application : electrical supply of an instrumentation system.

“LAPP MULLER” - COMPOSITE CABLE - IEC 60332.3 - REF 45057 - OF N°

Cable make up

3 Conductors 0.5 mm²
1 Polyamid tube 1 x 2 mm
Generally screened with an aluminium/polyester
tape and drain wire
Flame retardant XLPE sheath
Black sheath



diameter 7.85 mm + 0.15 - 0.3 mm

General characteristics

Conductors rated voltage : 250 Volts
Linear resistance :
Conductors 0.50 mm² ≤ 41 Ω/Km
Capacitance between conductors : 85pF/m à 1 KHz
Static bending radius ≥ 40 mm
Dynamic bending radius ≥ 160 mm
Temperature range : - 20°C à +80°C
Weight 0.06 Kg/m

Fire resistance : IEC 60332.3
HALOGEN FREE cable

Other constructions other dimensions,
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COMPOSITE CABLES

ROBOTIC CABLES

Extra flexible cables for drag chains, drum reeling systems, cranes and other moving applications.

ROBOCABLES FR ZH

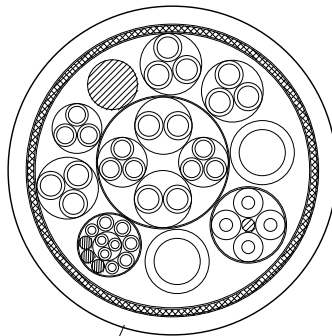
ART 59949 COMPOSITE CABLE WITH OPTICAL FIBRES

Application : Electrical supply of a robot using a drag chain.

"LAPP MULLER" - COMPOSITE CABLE - ROBOCABLE FR ZH - IEC 332.3 - REF 59949 - OF N°

Cable make up

3 triads 1.5 mm²
 1 strand of 4 optical fibres
 3 triads 0.25 mm²
 1 strand of 5 conductors 0.25 mm²
 and of 4 conductors 0.5 mm²
 2 pairs 2.5 mm²
 2 conductors of 6 mm²
 Shielded by a tinned copper braid.
 Sheath in flexible elastomer special robotic.
 Black sheath



diameter 22.5 mm ± 0.5mm

General characteristics

Rated voltage :
 Conductors 0.25 mm² and 0.50 mm² : 250 Volts
 Conductors 1.5 mm², 2.5 mm² and 6 mm² : 600 Volts
 Linear resistance :
 Conductors 0.25 mm² ≤ 85.3 Ω/Km
 Conductors 0.50 mm² ≤ 44.1 Ω/Km
 Conductors 1.5 mm² ≤ 14.6 Ω/Km
 Conductors 2.5 mm² ≤ 9 Ω/Km
 Conductors 6 mm² ≤ 3.47 Ω/Km
 Static bending radius ≥ 150 mm
 Dynamic bending radius ≥ 230 mm
 Temperature range : - 15°C à +80°C
 Weight 0.75 Kg/m

Fire resistance : IEC 60332.3
 HALOGEN FREE cable
 Radiation resistance : 5 Mrads

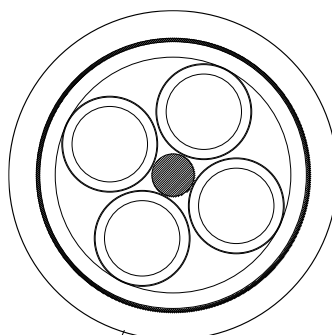
ART 58056 TRACTION REINFORCED CABLE 4G25 mm²

Application : Embedded drum on drilling machine for mines.

"LAPP MULLER" - 4G25 - IEC 332.3 - ZH - REF 58056 - OF N°

Cable make up

4 conductors 25 mm²
 Inner sheath in flexible elastomer
 Aramid braid
 Sheath in flexible elastomer special robotic
 White sheath



diameter 29.8 mm ± 1.5 mm

General characteristics

Conductors rated voltage 25 mm² : 600 Volts
 Linear resistance :
 Conductors 25 mm² ≤ 0.82 Ω/Km
 Static bending radius ≥ 200 mm
 Dynamic bending radius ≥ 360 mm
 Temperature range : - 15°C à +80°C
 Weight 1.77 Kg/m

Fire resistance : IEC 60332.3
 HALOGEN FREE cable
 Breaking strength of the aramid braid: 300 DaN

Other constructions other dimensions,
 Please contact us.
 Tel +33(0) 4 94 56 65 00
 Fax +33(0) 4 94 43 38 16
 e-mail : contact@mullercables.com

COMPOSITE CABLES

Halogen free flexible radiation resistant cables, conform to french specification SGN.

LINE TYPE 10

ART 14423 COMPOSITE CABLE POWER/CONTROL/COMMAND

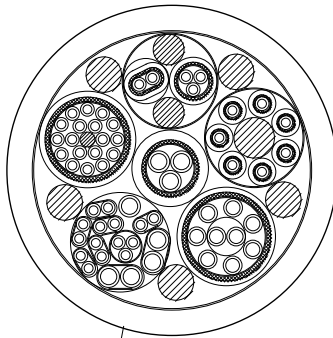
Application : Electrical supply of a moving bridge.



"LAPP MULLER" - COMPOSITE CABLE - IEC 332.3 - TYPE 10 - REF 14423 - OF N°

Cable make up

- 1 screened strand of 9 conductors 1.34 mm²
- 1 screened strand of 7 conductors 0.6 mm² individually.
- 1 screened strand of 18 conductors 0.6 mm²
- 1 strand composed of :
 - 6 pairs of 0.6 mm²
 - 1 triad 0.6 mm²
 - 2 pairs of 1.82 mm²
 - 1 conductor yellow/green of 1.82 mm²
- 1 strand composed of :
 - 1 screened triad 0.6 mm²
 - 1 screened pair of 0.6 mm²
 - 1 screened strand of 3 conductors 1.82 mm²
- Thermoplastic sheath for nuclear application.
- Yellow sheath



diameter 33.5 mm ± 1.7 mm

General characteristics

- Conductors rated voltage : 600 Volts
- Linear resistance :
 - Conductors 0.60 mm² ≤ 35.4 Ω/Km
 - Conductors 1.34 mm² ≤ 15.7 Ω/Km
 - Conductors 1.82 mm² ≤ 11.8 Ω/Km
- Static bending radius ≥ 200 mm
- Dynamic bending radius ≥ 500 mm
- Temperature range : - 20°C à +80°C
- Weight 1.45 Kg/m
- Fire resistance : IEC 60332.3
- HALOGEN FREE cable
- Radiation resistance : 200 Mrads

ART 56894 COMPOSITE CABLE/CONTROL/COMMAND/VIDEO

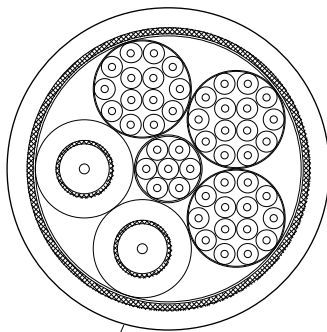
Application : Electrical supply of an inspection robot.



"LAPP MULLER" - 2 COAXIALS + 49 X 0.25 MM² - IEC 332.3 -TYPE 10 -REF 56894 -OF N°

Cable make up

- 3 strands of 14 conductors 0.25mm²
- 1 strand of 7 conductors of 0.25mm²
- 2 coaxials of 75Ω with low capacitance 70pF/m
- Overall tinned copper braid.
- Thermoplastic sheath for nuclear application.
- Yellow sheath



diameter 17.2 mm ± 1.1 mm

General characteristics

- Conductors rated voltage 0.25 mm² : 600 Volts
- Linear resistance :
 - Conductors 0.25 mm² ≤ 85.3 Ω/Km
- Static bending radius ≥ 70 mm
- Dynamic bending radius ≥ 175 mm
- Temperature range : - 20°C à +80°C
- Weight 0.48 Kg/m
- Fire resistance : IEC 60332.3
- HALOGEN FREE cable
- Radiation resistance : 200 Mrads

Other constructions other dimensions,
Please contact us.
Tel +33(0) 4 94 56 65 00
Fax +33(0) 4 94 43 38 16
e-mail : contact@mullercables.com

COMPOSITE CABLES

Extra flexible cables for drag chains, drum reeling systems, cranes and other moving applications.

LINE MULRAD 2

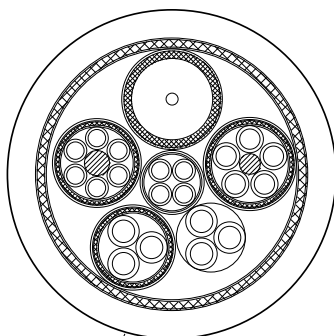
ART 30201 COMPOSITE CABLE WITH CONTROL/COMMAND AND VIDEO COMPONENTS.

Application : Electrical supply of a moving video camera. Cable installed on a drag chain.

"LAPP MULLER" - CABLE COMPOSITE CAMERA1 - MULRAD 2 - IEC 332.1 - ZH - REF 30201- OF N°

Cable make up

- 1 coaxial KX6 75 Ohms
- 1 strand of 4 conductors of 0.25 mm²
- 1 screened strand of 6 conductors of 0.25 mm²
- 1 screened strand of 5 conductors of 0.38 mm²
- 1 strand of 3 conductors of 0.60 mm².
- 1 screened strand of 3 conductors of 0.60 mm²
- Overall tinned copper braid
- Polyurethane sheath for nuclear application
- Yellow sheath



diameter 16 mm ± 0.8 mm

General characteristics

- Conductors rated voltage : 600 Volts
- Linear resistance :
- Conductors 0.25 mm² ≤ 84.5 Ω/Km
- Conductors 0.38 mm² ≤ 55.8 Ω/Km
- Conductors 0.60 mm² ≤ 35.4 Ω/Km
- Static bending radius ≥ 80 mm
- Dynamic bending radius ≥ 160 mm
- Temperature range : - 15°C à +80°C
- Weight 3.6 Kg/m

- Fire resistance : IEC 60332.1
- HALOGEN FREE cable
- Radiation resistance : 500 Mrads

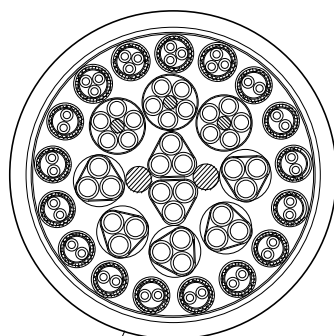
ART 46810 TRACTION REINFORCED COMPOSITE CABLE POWER/CONTROL/COMMAND

Application : Electrical supply of a moving bridge with a drag chain.

"LAPP MULLER"-CABLE COMPOSITE-MULRAD 2-IEC 332.1 -ZH- REF 46810 -OF N°

Cable make up

- 4 screened strands of 3 conductors 0.38 mm²
- 3 strands of 5 conductors 1.34 mm²
- 7 strands of 3 conductors 1.82 mm²
- 13 screened pairs of 0.38 mm²
- Aramid braid
- Polyurethane sheath for nuclear application
- Yellow sheath



diameter 32 mm ± 1 mm

General characteristics

- Conductors rated voltage : 600 Volts
- Linear resistance :
- Conductors 0.38 mm² ≤ 56.5 Ω/Km
- Conductors 1.34 mm² ≤ 15.8 Ω/Km
- Conductors 1.82 mm² ≤ 11.7 Ω/Km
- Static bending radius ≥ 160 mm
- Dynamic bending radius ≥ 400 mm
- Temperature range : - 15°C à +80°C
- Weight 1.6 Kg/m

- Fire resistance : IEC 60332.1
- HALOGEN FREE cable
- Breaking strength of the aramid braid:
800 DaN without conductor degradation
- Radiation resistance : 500 Mrads

Other constructions other dimensions,
Please contact us.
Tel +33(0) 4 94 56 65 00
Fax +33(0) 4 94 43 38 16
e-mail : contact@mullercables.com

UMBILICAL CABLES

Extra flexible cables for drag chains, drum reeling systems, cranes and other moving applications with high mechanical stress.

ROBOCABLES FLR ZH

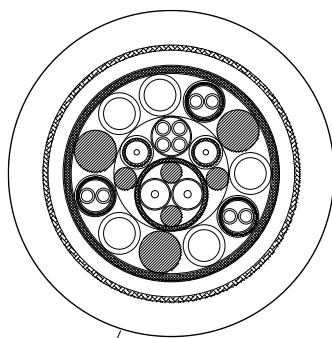
ART 56496 COMPOSITE ROBOCABLE FLR ZH

Application : Electrical supply of an inspection robot through a drum reeling system.

“LAPP MULLER” - COMPOSITE CABLE - ROBOCABLE FLR ZH - IEC 332.1 - REF 56496- OF N°

Cable make up

2 coaxials 75 Ohms
 1 pair 0.25 mm² PROFIBUS
 3 screened pairs 0.6 mm².
 4 conductors of 0.6 mm²
 5 conductors of 4 mm²
 Overall tinned copper braid
 Inner polyurethane sheath
 Aramid braid
 Final polyurethane sheath with high mechanical performances
 Black sheath



diameter 26 mm ± 1mm

General characteristics

Rated voltage :
 Conductors 0.25 mm² : 48 Volts
 Conductors 0.6 mm² : 250 Volts
 Conductors 4 mm² : 600 Volts
 Linear resistance :
 Conductors 0.25 mm² ≤ 84.5 Ω/Km
 Conductors 0.6 mm² ≤ 35.4 Ω/Km
 Conductors 4 mm² ≤ 5.1 Ω/Km
 PROFIBUS pair impedance : 150 Ω
 Static bending radius ≥ 160 mm
 Dynamic bending radius ≥ 260 mm
 Temperature range : - 15°C à +80°C
 Weight 1 Kg/m

Fire resistance : IEC 60332.1
 HALOGEN FREE cable
 Breaking strength of the aramid braid:
 350 DaN without conductor degradation
 Radiation resistance : 20 Mrads

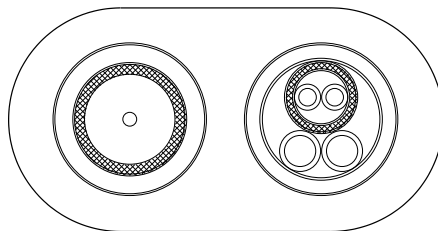
ART 49395 FLAT CABLE CONTROL/VIDEO

Application : Electrical supply of a camera and its lighting system. Cable used in a nuclear pool.

“LAPP MULLER” - 1 KX 6 + 1 PBL 0.34 + 2 X 1 - ROBOCABLE FLR ZH - IEC 332.1 - REF 49395 - OF N°

Cable make up

1 coaxial KX6 75 Ohms
 1 cable composed of 1 pair 1 mm²
 and a screened pair 0.34 mm²
 Final polyurethane sheath with high mechanical performances
 Black sheath



diameter 9.1 ± 0.5 mm x 17.6 ± 0.9 mm

General characteristics

Rated voltage :
 Conductors 0.34 mm² : 250 Volts
 Conductors 1 mm² : 600 Volts
 Linear resistance :
 Conductors 0.34 mm² ≤ 62.8 Ω/Km
 Conductors 1 mm² ≤ 21.5 Ω/Km
 Static bending radius ≥ 45 mm
 Dynamic bending radius ≥ 90 mm
 Temperature range : - 15°C à +80°C
 Weight 0.19 Kg/m

Fire resistance : IEC 60332.1
 HALOGEN FREE cable
 Very good resistance to borinated water
 Radiation resistance : 20 Mrads

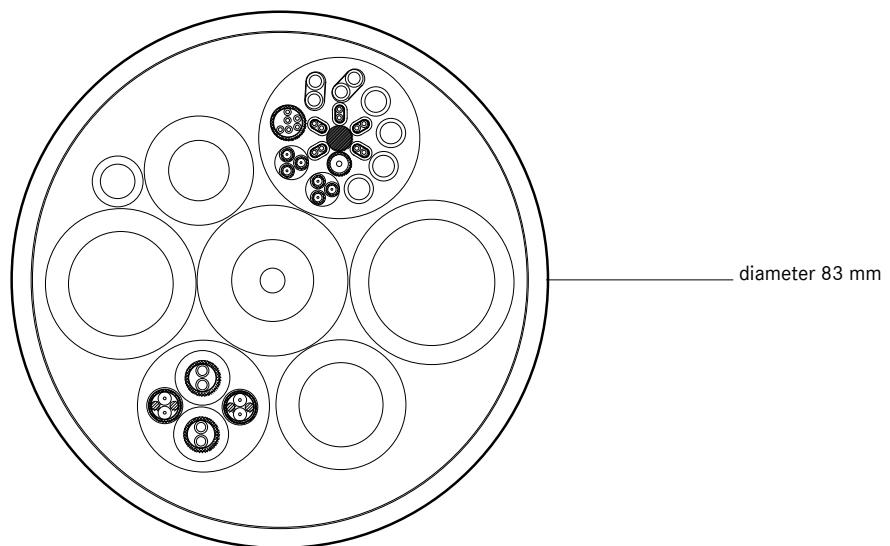
Other constructions other dimensions,
 Please contact us.
 Tel +33(0) 4 94 56 65 00
 Fax +33(0) 4 94 43 38 16
 e-mail : contact@mullercables.com

ART 41449

UMBILICAL CABLE INCLUDING ELECTRICAL COMPONENTS (for power, command and video) AND HIGH/LOW PRESSURE HOSES (hydraulic and pneumatic)

"LAPP MULLER" - COMPOSITE CABLE - ROBOCABLE FLR ZH - IEC 332.1 - REF 41449 - OF N°

Application : Electrical supply of a cleaning robot for high radiation level zone.



Cable make up

- 1 UHP hose 3100 bars diameter : 16.8 mm
- 1 HP 180 bars diameter : 23.4 mm
- 1 hydraulic hose 240 bars diameter : 20.2 mm
- 1 hydraulic hose 240 bars diameter : 17 mm
- 1 pneumatic hose 7 bars diameter : 25.5 mm
- 1 hose for pressure balance : 8 mm
- 4 conductors 6 mm²
- 4 conductors 2.5 mm²
- 8 screened pairs of 0.6 mm²
- 2 screened pairs of 0.22 mm² (data bus RS485)
- 2 screened pairs of 0.25 mm² (data bus FIP)
- 6 coaxials RG174 (50 Ohms)
- 1 coaxial KX15 (50 Ohms)
- Inner polyurethane sheath
- Aramid braid
- Final polyurethane sheath with high mechanical performances
- Black sheath

General characteristics

- Conductors rated voltage : 600 Volts
- Linear resistance :
 - Conductors 0.22 mm² ≤ 96 Ω/Km
 - Conductors 0.6 mm² ≤ 35.4 Ω/Km
 - Conductors 2.5 mm² ≤ 8.8 Ω/Km
 - Conductors 6 mm² ≤ 3.63 Ω/Km
- Static bending radius ≥ 400 mm
- Dynamic bending radius ≥ 800 mm
- Temperature range : - 20°C to +60°C
- Weight 4.2 Kg/m
- Fire resistance : IEC 60332.1
- HALOGEN FREE cable
- Breaking strength of the aramid braid: 800 DaN without conductors degradation
- Radiation resistance : 10 Mrads

Other constructions other dimensions,
Please contact us.
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e-mail : contact@mullercables.com

“ LAPP MULLER, your partner for total cabling solutions, customized cables and short lengths ”.



Marine and underwater

LAPP MULLER has successfully worked with many Coastal and Deep-sea engineering companies as well as Oceanographical Research Institutes and O.E.M. providers of equipment to the offshore gas and oil industry. Providing both composite electrical and optical cables for many applications such as ROVs (Remote Operated Vehicles), seabed vehicle umbilicals to ship and submarine borne types for the French Navy, with their relevant specifications. These cables can be supplied as complete systems terminated with any preferred style of connector from galvanised, stainless steel to titanium types as either rigid or flexible assemblies dependent on customer specifications.

Robotic and automation

LAPP MULLER has more than 25 successful years in robotic and chain carry-cable applications. Working in partnership with many companies supplying original equipment into the industrial sector with applications such as machine tools, robots and gantries integrating power lines, power/control, signal, servomotors and safety control systems. Lapp Muller's knowledge and expertise have seen the production of both hybrid and dynamic cable designs ideally suited to withstand the severe mechanical demands of continual and repeated bending as well as the harsh working environment where welding, moulding and chemical processes take place.

Oil & gas

LAPP MULLER cables have been used in many applications for both exploration as well as production on oil and gas platforms around the world. Found in day to day maintenance equipment to the actual positioning systems used for the location of platforms and pipelines to all important safety equipment. Additionally LAPP MULLER cables can also be seen in valve control and monitoring equipment used for gas transportation.

Harbour

LAPP MULLER technology can be found in many containerised ports , where the need for mixed umbilical links within the winding cables is required.

Airport

LAPP MULLER ultra flexible cables are to be found in many airside applications such as rollers on aerobridges and taxiway power-stations used to energize the aircraft's electrical systems when on the ground. Both the construction and materials used in these cables make them ideal to withstand both the harsh mechanical and chemical conditions that these applications demand.

Miscellaneous

LAPP MULLER cables can also be found in many other industrial sectors such as medical, petrochemical, telecommunications, leisure and defence. Cables for applications such as silo control in agriculture, ski and chair lifts control in the leisure industry, safety systems used in large buildings from railway stations to municipal complexes. Due to their lightness and high mechanical specification, technologically advanced products such as Araline cables make them ultra competitive and ideal for these applications. In fact anywhere the need for integrity of the cables is paramount particularly because of safety demands or where severe environmental conditions are to be experienced LAPP MULLER cables are to be found

Certification ISO 9001 V2000



LAPP MULLER

Through thousands of kilometres of cable
LAPP MULLER links man and machine in every field of activity

Head Office and Manufacturing Plant

(and for estimates)

ZA du Grand Pont

Chemin du Peyrat

F-83310 GRIMAUD

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contact@mullercables.com



Founded in 1939 by M. Jean Muller, the Muller et Landais company used to make electric cables for the construction industry. Then the company quickly turned to the manufacture of specially designed electrical cables and more specifically to moving and composite cables.

In 1980, the firm became MULLER SA. Muller met a growing demand for special cables and was then expanding its skills to high tech applications and complete cable systems with fitted connectors.

In 2003, Muller became LAPP MULLER integrating into LAPP group, with its 2500 employees, its 15 production sites, and its 35 sales companies.

Reference of the LAPP group for cables with technology, LAPP MULLER covers a number of specialisms including design studies, tests and "turnkey" systems.



www.mullercables.com

A Lapp Group Company