

# OPGW

Ref: s002

## OPTICAL GROUND WIRES with capacity up to 48 optical fibres



### Introduction

#### Features and benefits

This cable has been custom designed to best match with customer requirements from optical, electrical, mechanical, quality and cost point of view, optimising diameter, weight, breaking load and short circuit capacity.

Optical core is made of optical fibres [1] covered by small PBT loose buffer tube [2] that protect fibres against high temperatures and at the same time leaves fibres free from strain even at highest operating loads.

Aramid yarns [3].

A Pirelli patented hydrogen absorbent jelly [4] is used to protect optical fibres from hydrogen attack.

The aluminium tube [5] provides the cable with:

- high short circuit capacity minimizing material
- best solution to avoid cable corrosion
- a perfect sealing for the optical core
- a high crush resistance

The wires of...

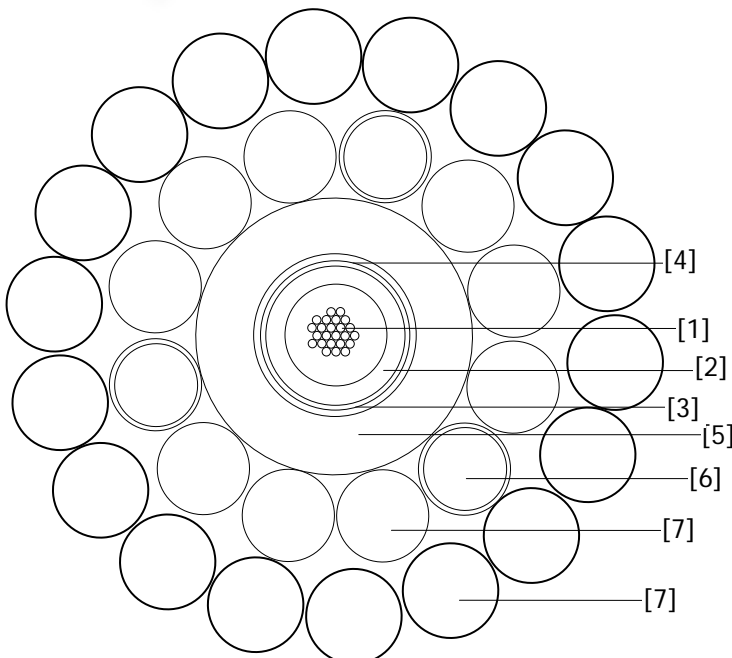
- aluminium clad steel [6].
- aluminium alloy [7].

...provides the cable with:

- the required strength.
- best solution to avoid cable corrosion.
- the remaining short circuit capacity.

### Fibre characteristics

See our technical document reference 4377 SM Light™, FreeLight™, multimode 50/125 and multimode 62.5/125 optical fibres.



©PRYSMIAN 2006, All Rights Reserved.

The information contained within this document must not be copied, reprinted or reproduced in any form, either wholly or in part, without the written consent of Prysmian. The information is believed to be correct at the time of issue. Prysmian reserves the right to amend this specification without prior notice. This specification is not contractually valid unless specifically authorised by Prysmian.

# OPGW

Ref: s002

## OPTICAL GROUND WIRES with capacity up to 48 optical fibres

### Routine tests

100% of optical fibres will be measured by OTDR technique before leaving factory.

### Installation procedure

Prysmian recommends to install the cable described in this specification following the latest version of our "Installation procedures for OPGW fibre optic cable" reference SIG-07-PE-PA-013, "Instruction for the installation of the EWMJ joint box" reference SIG-07-PE-PA-015 and "Instruction for the installation of the EWJ joint box" reference SIG-07-PE-PA-008.

### Cable structure

#### Optical core

1 tube (blue) filled with water blocking compound with up to 48 fibres:

fibre number	fibre colour without rings	fibre number	fibre colour with 1 ring	fibre number	fibre colour with 2 rings	fibre number	fibre colour with 3 rings
1	blue	13	blue	25	blue	37	blue
2	orange	14	orange	26	orange	38	orange
3	green	15	green	27	green	39	green
4	brown	16	brown	28	brown	40	brown
5	slate	17	slate	29	slate	41	slate
6	white	18	white	30	white	42	white
7	red	19	red	31	red	43	red
8	black	20	natural	32	natural	44	natural
9	yellow	21	yellow	33	yellow	45	yellow
10	violet	22	violet	34	violet	46	violet
11	pink	23	pink	35	pink	47	pink
12	aqua	24	aqua	36	aqua	48	aqua

©PRYSMIAN 2006, All Rights Reserved.

The information contained within this document must not be copied, reprinted or reproduced in any form, either wholly or in part, without the written consent of Prysmian. The information is believed to be correct at the time of issue. Prysmian reserves the right to amend this specification without prior notice. This specification is not contractually valid unless specifically authorised by Prysmian.



Rev.:  
01

Date:  
29-may-06

Issued by:  
J.C.Ruiz

# OPGW

## OPTICAL GROUND WIRES with capacity up to 48 optical fibres

Ref: s002

### Cable characteristics

The lay direction of armour will be right (Z). The operational temperatures of OPGW will be from -50°C to +80°C.

### Cables up to 24 fibres

#### Cables of 16.9 and 18.6 mm $\phi$

Reference:	6167	6168	6169	6170	6171	5757	6172	6173
Name:	69M68 Dz	69M64 Dz	69M57 Dz	69M53 Dz	86Q84 Dz	86Q73 Dz	86Q77 Dz	86Q66 Dz
Aluminium tube diameter (mm):	6.2	6.2	6.2	6.2	7.9	7.9	7.9	7.9
n°ACS <sup>(1)</sup> + n°AA <sup>(2)</sup> wires (inner layer):	10+0	8+2	5+5	3+7	12+0	7+5	9+3	4+8
n°ACS <sup>(1)</sup> + n°AA <sup>(2)</sup> wires (outer layer):	16+0	16+0	16+0	16+0	18+0	18+0	18+0	18+0
Wires diameter (mm):	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67
Approximate cable diameter (mm):	16.9	16.9	16.9	16.9	18.6	18.6	18.6	18.6
Approximate cable weight (kg/km):	682	638	572	528	839	729	773	663
Rated tensile strength <sup>(3)</sup> (kN):	95	84.8	69.5	59.2	113.3	87.7	98	72.4
Rated tensile strength <sup>(3)</sup> (N/mm <sup>2</sup> ):	586	523	429	365	558	432	483	357
Ultimate tensile strength (kN):	105	94	77	65	125	97	108	80
Ultimate tensile strength (N/mm <sup>2</sup> ):	648	580	475	401	616	478	532	394
Maximum recommended load (kN):	39.1	35.2	29.3	25.4	46.6	36.8	40.7	30.9
Maximum recommended load (N/mm <sup>2</sup> ):	241	217	181	157	230	181	200	152
Maximum admissible load in punctual extreme climatic conditions (kN):	47.5	42.4	35.4	32	56.7	45.6	49	40.5
Maximum admissible load in punctual extreme climatic conditions (N/mm <sup>2</sup> ):	293	262	219	198	279	225	241	200
Elasticity Modulus <sup>(4)</sup> (kN/mm <sup>2</sup> ):	96.4	89.8	80.1	73.5	94.5	81.5	86.7	73.7
Section <sup>(4)</sup> (mm <sup>2</sup> ):	162	162	162	162	203	203	203	203
Linear expansion thermal coefficient (x10 <sup>-6</sup> °C <sup>-1</sup> ):	17.1	17.9	19.4	20.7	17.2	19.1	18.3	20.5
Minimum bending radius:								
- On pulley blocks (mm):	300	300	300	300	400	400	400	400
- On tensioner devices (mm):	700	700	700	700	750	750	750	750
- After clamping <sup>(5)</sup> (mm):	300	300	300	300	300	300	300	300
Electrical resistance (20°C):	0.258	0.245	0.227	0.217	0.199	0.181	0.188	0.171
Short circuit rating from 40°C (kA2s):	198.3	203.1	209.3	212.8	318.7	332.2	327.2	338.6
Short circuit current for 0.3 s (kA):	25.7	26	26.4	26.6	32.6	33.3	33	33.6

©PRYSMIAN 2006, All Rights Reserved.

The information contained within this document must not be copied, reprinted or reproduced in any form, either wholly or in part, without the written consent of Prysmian. The information is believed to be correct at the time of issue. Prysmian reserves the right to amend this specification without prior notice. This specification is not contractually valid unless specifically authorised by Prysmian.



Rev.:  
01

Date:  
29-may-06

Issued by:  
J.C.Ruiz

# OPGW

## OPTICAL GROUND WIRES with capacity up to 48 optical fibres

Ref: s002

### Cables up to 48 fibres

#### Cables of 16.5 and 17.3 mm $\phi$

Reference:	6148	6149	6150	6151	6152	6153	6154	6155
Name:	65L65 Dz	65L60 Dz	65L54 Dz	65L49 Dz	73N72 Dz	73N65 Dz	73N59 Dz	73N54 Dz
Aluminium tube diameter (mm):	7	7	7	7	7.8	7.8	7.8	7.8
n°ACS <sup>(1)</sup> + n°AA <sup>(2)</sup> wires (inner layer):	12+0	9+3	6+6	3+9	13+0	9+4	6+7	3+10
n°ACS <sup>(1)</sup> + n°AA <sup>(2)</sup> wires (outer layer):	18+0	18+0	18+0	18+0	19+0	19+0	19+0	19+0
Wires diameter (mm):	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37
Approximate cable diameter (mm):	16.5	16.5	16.5	16.5	17.3	17.3	17.3	17.3
Approximate cable weight (kg/km):	648	596	544	492	717	647	594	542
Rated tensile strength <sup>(3)</sup> (kN):	88.7	76.6	64.5	52.4	96	79.9	67.8	55.7
Rated tensile strength <sup>(3)</sup> (N/mm <sup>2</sup> ):	581	502	422	343	562	468	397	326
Ultimate tensile strength (kN):	98	85	71	58	106	88	75	61
Ultimate tensile strength (N/mm <sup>2</sup> ):	642	557	465	380	620	515	439	357
Maximum recommended load (kN):	36.5	31.8	27.2	22.6	39.5	33.3	28.7	24
Maximum recommended load (N/mm <sup>2</sup> ):	239	208	178	148	231	195	168	140
Maximum admissible load in punctual extreme climatic conditions (kN):	44.4	38.3	33.5	29.3	48	40	35.9	32.3
Maximum admissible load in punctual extreme climatic conditions (N/mm <sup>2</sup> ):	291	251	219	192	281	234	210	189
Elasticity Modulus <sup>(4)</sup> (kN/mm <sup>2</sup> ):	96.2	88.1	79.9	71.7	94.9	85.1	77.8	70.5
Section <sup>(4)</sup> (mm <sup>2</sup> ):	152.7	152.7	152.7	152.7	170.9	170.9	170.9	170.9
Linear expansion thermal coefficient (x10 <sup>-6</sup> °C <sup>-1</sup> ):	17.1	18.1	19.4	21	17.2	18.5	19.7	21.2
Minimum bending radius:								
- On pulley blocks (mm):	300	300	300	300	300	300	300	300
- On tensioner devices (mm):	650	650	650	650	700	700	700	700
- After clamping <sup>(5)</sup> (mm):	300	300	300	300	300	300	300	300
Electrical resistance (20°C):	0.27	0.253	0.239	0.226	0.238	0.221	0.209	0.199
Short circuit rating from 40°C (kA2s):	177.8	183	187.4	191.1	225.3	232.6	237.2	241.1
Short circuit current for 0.3 s (kA):	24.3	24.7	25	25.2	27.4	27.8	28.1	28.3

©PRYSMIAN 2006, All Rights Reserved.

The information contained within this document must not be copied, reprinted or reproduced in any form, either wholly or in part, without the written consent of Prysmian. The information is believed to be correct at the time of issue. Prysmian reserves the right to amend this specification without prior notice. This specification is not contractually valid unless specifically authorised by Prysmian.



Rev.:  
01

Date:  
29-may-06

Issued by:  
J.C.Ruiz

# OPGW

Ref: s002

## OPTICAL GROUND WIRES with capacity up to 48 optical fibres

### Cables of 18.1 and 18.8 mm $\phi$

Reference:	6156	6157	6158	6159	6160	6161	6162	6163
Name:	81P79 Dz	81P72 Dz	81P67 Dz	81P61 Dz	88Q85 Dz	88S77 Dz	88S71 Dz	88S66 Dz
Aluminium tube diameter (mm):	8.6	8.6	8.6	8.6	9.3	9.3	9.3	9.3
n°ACS <sup>(1)</sup> + n°AA <sup>(2)</sup> wires (inner layer):	14+0	10+4	7+7	4+10	15+0	10+5	7+8	4+11
n°ACS <sup>(1)</sup> + n°AA <sup>(2)</sup> wires (outer layer):	20+0	20+0	20+0	20+0	21+0	21+0	21+0	21+0
Wires diameter (mm):	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37
Approximate cable diameter (mm):	18.1	18.1	18.1	18.1	18.8	18.8	18.8	18.8
Approximate cable weight (kg/km):	787	717	665	612	854	767	714	662
Rated tensile strength <sup>(3)</sup> (kN):	103.5	87.3	75.3	63.2	110.9	90.7	78.6	66.5
Rated tensile strength <sup>(3)</sup> (N/mm <sup>2</sup> ):	545	459	396	333	532	435	377	319
Ultimate tensile strength (kN):	114	97	83	70	123	100	87	73
Ultimate tensile strength (N/mm <sup>2</sup> ):	600	511	437	368	590	479	417	350
Maximum recommended load (kN):	42.5	36.4	31.7	27.1	45.6	37.8	33.2	28.6
Maximum recommended load (N/mm <sup>2</sup> ):	224	192	167	143	219	181	159	137
Maximum admissible load in punctual extreme climatic conditions (kN):	51.8	44.5	40.7	36.7	55.5	47.2	43.2	39.9
Maximum admissible load in punctual extreme climatic conditions (N/mm <sup>2</sup> ):	273	234	214	193	266	226	207	191
Elasticity Modulus <sup>(4)</sup> (kN/mm <sup>2</sup> ):	93.7	84.9	78.3	71.8	92.7	82.8	76.8	70.8
Section <sup>(4)</sup> (mm <sup>2</sup> ):	190	190	190	190	208.6	208.6	208.6	208.6
Linear expansion thermal coefficient (x10 <sup>-6</sup> °C <sup>-1</sup> ):	17.3	18.5	19.6	20.9	17.4	18.8	19.8	21
Minimum bending radius:								
- On pulley blocks (mm):	400	400	400	400	400	400	400	400
- On tensioner devices (mm):	700	700	700	700	750	750	750	750
- After clamping <sup>(5)</sup> (mm):	300	300	300	300	300	300	300	300
Electrical resistance (20°C):	0.21	0.197	0.188	0.18	0.189	0.175	0.168	0.161
Short circuit rating from 40°C (kA2s):	281.5	289.6	294.7	299.1	342.5	353.1	358.4	362.9
Short circuit current for 0.3 s (kA):	30.6	31.1	31.3	31.6	33.8	34.3	34.6	34.8

<sup>(1)</sup> Aluminium clad steel wires according to IEC 1232 class 20SA type A.

<sup>(2)</sup> Aluminium alloy wires according to IEC 104 type A.

<sup>(3)</sup> According to IEEE 1138.

<sup>(4)</sup> For stress-strain calculus.

<sup>(5)</sup> Slack cable.

©PRYSMIAN 2006, All Rights Reserved.

The information contained within this document must not be copied, reprinted or reproduced in any form, either wholly or in part, without the written consent of Prysmian. The information is believed to be correct at the time of issue. Prysmian reserves the right to amend this specification without prior notice. This specification is not contractually valid unless specifically authorised by Prysmian.



Rev.:  
01

Date:  
29-may-06

Issued by:  
J.C.Ruiz