

## TYPE TEST REPORT FOR OPGW 25B49z-48M (6608)

**Client:** TERNA  
**Date:** 26<sup>nd</sup> – 29<sup>th</sup> November, 2007  
**Drum tested:** W-06275-T (3.12) and W-06347-W (rest of tests)

The following Composite Fiber Optic Ground Wire (OPGW) cable type tests have been carried out in accordance with the specifications referred:

<u>Tests on wires before stranding</u>	<u>Standard</u>	<u>Date</u>
1.1 Visual aspect, Diameter, section	IEC 61232	Nov 27 <sup>th</sup> 2007
1.2 Mechanical properties of wires	IEC 61232	Nov 27 <sup>th</sup> 2007
1.3 Torsion test of the AS wires	IEC 61232	Nov 27 <sup>th</sup> 2007
1.4 Electrical Resistance	IEC 61232	Nov 27 <sup>th</sup> 2007
1.5 Aluminium thickness AS wires	IEC 61232	Nov 27 <sup>th</sup> 2007
1.6 Hardness of aluminium coating	ISO 6507	Nov 8 <sup>th</sup> 2007
<u>Tests on wires after stranding</u>		
2.1 Visual aspect, Diameter, section	IEC 61232	Nov 27 <sup>th</sup> 2007
2.2 Mechanical properties of wires	IEC 61232	Nov 27 <sup>th</sup> 2007
2.3 Torsion test of the AS wires	IEC 61232	Nov 27 <sup>th</sup> 2007
2.4 Electrical Resistance	IEC 61232	Nov 27 <sup>th</sup> 2007
2.5 Aluminium thickness AS wires	IEC 61232	Nov 27 <sup>th</sup> 2007
2.6 Hardness of aluminium coating	ISO 6507	Nov 8 <sup>th</sup> 2007
<u>Tests on completed cable</u>		
3.1 Cable performance, formation...	CEI EN 50182	Nov 27 <sup>th</sup> 2007
3.2 Mass verification	CEI EN 50182	Nov 27 <sup>th</sup> 2007
3.3 Ultimate tensile strength	CEI EN 50182	Nov 26 <sup>th</sup> 2007
3.4 Q-test	UX LC 3907	Nov 26 <sup>th</sup> 2007
3.5 Stress-strain test	CEI EN 50182	Nov 26 <sup>th</sup> 2007
3.7 Internal self-damping	CIGRE No. 62	Nov 21 <sup>st</sup> 2007
3.8 Aeolian vibrations	UX LC 3907	Nov 17-19 <sup>th</sup> 2007
3.9 Mechanical cycles simulating thermal excursions	UX LC 3907	Nov 19-20 <sup>th</sup> 2007
3.10 Sheave test	IEC 60794-4-1	Nov 26 <sup>th</sup> 2007
3.11 Wire unwrapping	UX LC 3907	Nov 26 <sup>th</sup> 2007
3.12 Attenuation linearity	IEC 60793 C1C	Nov 27 <sup>th</sup> 2007
3.13 Temperature cycles	IEC 794-1-F1	Nov 26-29 <sup>th</sup> 2007

Tests 1.6 and 2.6 are carried out at the laboratories of the Centre de Disseny d'Aliatges Lleugers i Tractaments de Superficie, Universidad Politecnica de Catalunya, Avda. Victor Balaguer, s/n, 08800 Vilanova y la Geltrú, Barcelona, by Eng. Josep A. Picas. Annex A accounts for the Hardness of aluminium coating report before (1.6) and after (2.6) stranding issued by the Centre de Disseny d'Aliatges Lleugers i Tractaments de Superficie from the Universidad Politecnica de Catalunya.

Tests 3.7 to 3.9 are carried out at Nuova Electromeccanica Sud S.p.a. by Ing. C. Garesci, and witnessed by Mr. G. Gennusa from TERN A S.p.a., and by Dr. J. Martin-Regalado, from Prysmian Telecom Cables y Sistemas España. Annex B accounts for the report of those tests.

All the other tests have been performed at Prysmian Telecom Cables y Sistemas, Ctra. C-15 Km-2, Pol. Ind. Masia d'en Notari-PRYSMIAN, 08800 Vilanova y la Geltrú, Barcelona, España, by Dr. J. Martin-Regalado, from Prysmian Telecom Cables y Sistemas España, and have been witnessed by Mr. G. Gennusa from TERN A S.p.a.

Annex C are the attenuation measurements taken by OTDR on all fibers of the cable.

The results for the entire above mentioned test have been found satisfactory as per the following attached reports.



Mr. G. Gennusa - TERN A S.p.a



Dr. Josep Martin – Prysmian Telecom Cables y Sistemas España

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Visual Aspect, Wire Diameter and Section before stranding  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 61232  
**Objective:** To verify the visual aspect, diameter and section of the wires.  
**Instruments:** Vernier MITUOTOYO

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### TEST SETUP AND PROCEDURE:

The visual aspect of the wires is examined by bare eye. The diameter of the AS wires is obtained from the average of two measurements. The section is calculated from the average diameter

### PASS/FAIL:

The values shall be in accordance with the cable specifications. Diameter:  $2.52 \pm 0.04$  mm

### RESULT:

The wire surface of all wires is regular, free from imperfections and defects. The average diameter of the wires is  $2.50 \pm 0.01$  mm. The following table summarizes the results:

Sample	1 <sup>st</sup> [mm]	2 <sup>nd</sup> [mm]	Average [mm]	Surface [mm <sup>2</sup> ]	Pass
1	2.50	2.49	2.495	4.889	OK
2	2.49	2.49	2.490	4.870	OK
3	2.49	2.49	2.490	4.909	OK
4	2.49	2.50	2.495	4.889	OK
5	2.49	2.51	2.500	4.909	OK
6	2.50	2.50	2.500	4.909	OK
7	2.50	2.50	2.500	4.909	OK
8	2.50	2.51	2.505	4.928	OK
9	2.50	2.49	2.495	4.889	OK
10	2.50	2.50	2.500	4.909	OK
11	2.49	2.49	2.490	4.870	OK
12	2.50	2.49	2.495	4.889	OK

### CONCLUSION:

The wires met the requirements for the Test according to the IEC standard.

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Elongation and Tensile strength test on wires before stranding  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 61232  
**Aim:** To determine the tensile properties of the wires as raw material  
**Instruments:** TENSILE MACHINE SHIMADZU AUTOGRAPH AGI50KN

### TEST SETUP AND PROCEDURE:

All AS wires samples before armoring are prepared for the test. The samples are installed between the jaws of the vertical test machine. An external gauge 250mm long is attached to the test specimen. The samples are initially loaded to 82 Kg. The load is continuously increased at a constant rate to determine the load at 1% strain (AS wires only), **L@1%**, the tensile strength, **T<sub>s</sub>**, and the elongation at break, **s**.

### PASS/FAIL:

The pass criteria for the tensile properties of the wires are summarized in the following table:

Type	T <sub>s</sub> [Kg]	T <sub>s</sub> [Kg/mm <sup>2</sup> ]	S [%]	L@1% [Kg/mm <sup>2</sup> ]
AS 20.3%IACS	681	136.6	1.5	122.3

### RESULT:

The following table summarizes the results:

# sample	T <sub>s</sub> [Kg]	T <sub>s</sub> [Kg/mm <sup>2</sup> ]	S [%]	L 1% [Kg/mm <sup>2</sup> ]	Pass
1	780	159.6	2.39	142.2	OK
2	772	158.5	2.21	140.8	OK
3	763	156.7	2.47	138.3	OK
4	785	159.2	2.65	140.5	OK
5	766	155.9	2.14	135.5	OK
6	754	153.7	2.60	132.9	OK
7	773	157.5	2.50	140.0	OK
8	765	155.1	2.44	134.8	OK
9	783	160.1	2.46	142.7	OK
10	779	158.8	2.31	140.6	OK
11	751	154.2	2.16	136.3	OK
12	759	155.3	1.88	135.5	OK

### CONCLUSION:

The wires met the requirements for the test according to IEC standard

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Torsion test on wires before stranding  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 61232  
**Objective:** To verify the mechanical properties of the AS wires.  
**Instruments:** Machine for torsion test on wires

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### **TEST SETUP AND PROCEDURE:**

All AS wire samples before armoring are prepared for the test.. Each specimen, 252mm long, is gripped at its ends in the vises of the torsion machine, one of which is free to move. The sample is twisted by rotating one of the vises at 60 turns/min until fracture is observed. The number of twists at fracture is recorded.

### **PASS/FAIL:**

The wire shall withstand without fracture not less than 20 twists in a length equivalent to 100 times the nominal diameter of the wire.

### **RESULT:**

The following table summarizes the results:

# sample	Number of torsions	Pass
1	44	OK
2	43	OK
3	43	OK
4	46	OK
5	43	OK
6	44	OK
7	45	OK
8	43	OK
9	43	OK
10	44	OK
11	43	OK
12	43	OK

### **CONCLUSION:**

The wires met the requirements for the test according to the IEC standard.

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Electrical resistance of the wires before stranding  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 61232  
**Objective:** To verify the resistance and resistivity of the wires.  
**Instruments:** Thomson Bridge, Micro-ohmmeter RESISTOMAT 2302

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### TEST SETUP AND PROCEDURE:

All AS wire samples before armoring are prepared for the test.. Each wire sample is installed in one arm of the Thomson bridge. The DC resistance per unit length is measured using a micro-ohmmeter on a sample length of 1.0 m. The temperature of the measurement is taken in order to correct the value at room temperature (20°C) according to the following formula:

$$R_{20^{\circ}\text{C}} = R_T / [1 + 0.0036(T - 20)].$$

### PASS/FAIL:

The resistivity of the wires shall not exceed the nominal value:

Type	Resistivity [Ω·mm <sup>2</sup> /Km.]
AS 20.3% IACS	84.80

### RESULT:

The following table summarizes the results:

# sample	T [°C]	R@T [Ω/Km]	R@20°C [Ω/Km]	Resistivity [Ω·mm <sup>2</sup> /Km.]	Pass
1	23.4	15.928	15.735	78.488	OK
2	23.4	15.962	15.769	78.656	OK
3	23.6	15.934	15.730	78.462	OK
4	23.3	15.920	15.733	78.477	OK
5	23.5	15.946	15.748	78.549	OK
6	23.2	16.053	15.870	79.160	OK
7	23.6	15.666	15.466	77.142	OK
8	23.4	15.766	15.575	77.690	OK
9	23.2	16.052	15.869	79.156	OK
10	23.3	15.718	15.533	77.481	OK
11	23.5	15.743	15.547	77.549	OK
12	23.3	15.770	15.585	77.737	OK

### CONCLUSION:

The wires met the requirements for the test according to the IEC standard.

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Aluminium thickness of the AS wires before stranding  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 61232  
**Objective:** To verify the aluminium thickness of the AS wires.  
**Instruments:** Thicknessmeter DELTASCOPE MP-30

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### TEST SETUP AND PROCEDURE:

All AS wire samples before armoring are prepared for the test.. The aluminium thickness is measured at three different points on each sample using a magnetic induction thicknessmeter.

### PASS/FAIL:

The average aluminium thickness shall exceed 10% of the nominal wire radius (126 microns)

### RESULT:

The following table summarizes the results:

# sample	#1	#2	#3	Average thickness [µm]	Pass
1	246	226	221	231	OK
2	222	221	224	222	OK
3	263	259	256	259	OK
4	227	267	266	253	OK
5	250	247	266	254	OK
6	265	224	232	240	OK
7	256	259	266	260	OK
8	216	210	249	225	OK
9	252	223	244	240	OK
10	240	251	262	251	OK
11	259	257	253	256	OK
12	243	231	202	225	OK

### CONCLUSION:

The wires met the requirements for the test according to the IEC standard.

## TEST REPORT

**Type of cable:** **OPGW 25B49z-48M (6608)**  
**Test name:** **Hardness of the Aluminium coating of the AS wires before stranding**  
**Laboratory:** UNIVERSITAT POLITECNICA DE CATALUNYA  
**Test Standard:** **CEI 7-11 / ISO 6507**  
**Objective:** To verify the hardness of the aluminium coating of the AS wires.

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### **TEST SETUP AND PROCEDURE:**

Few AS wire samples before armoring, 7.5cm long each, are taken for the test. The wires are delivered to the laboratory of the University to measure the hardness of the aluminium coating according to the ISO 6507.

### **PASS/FAIL:**

The micro-hardness value shall exceed 35.

### **RESULT:**

The following table summarizes the results:

# sample	Micro-hardness	Pass
1	60	OK
2	59	OK
3	69	OK
4	62	OK
5	60	OK
6	67	OK
7	60	OK
8	56	OK
9	64	OK
10	66	OK
11	56	OK
12	65	OK

### **CONCLUSION:**

The wires met the requirements for the test according to the ISO standard

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Visual Aspect, Wire Diameter and Section after stranding  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 61232  
**Objective:** To verify the visual aspect, diameter and section of the wires.  
**Instruments:** Vernier MITUOTOYO

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### TEST SETUP AND PROCEDURE:

The visual aspect of the wires after stranding is examined by bare eye. The diameter of the AS wires is obtained from the average of two measurements. The section is calculated from the average diameter

### PASS/FAIL:

The values shall be in accordance with the cable specifications. Diameter:  $2.52 \pm 0.04$  mm

### RESULT:

The wire surface of all wires is regular, free from imperfections and defects. The average diameter of the wires is  $2.50 \pm 0.01$  mm. The following table summarizes the results:

Sample	1 <sup>st</sup> [mm]	2 <sup>nd</sup> [mm]	Average [mm]	Surface [mm <sup>2</sup> ]	Pass
1	2.49	2.50	2.495	4.889	OK
2	2.49	2.49	2.490	4.870	OK
3	2.50	2.50	2.500	4.909	OK
4	2.49	2.49	2.490	4.870	OK
5	2.49	2.51	2.500	4.909	OK
6	2.49	2.49	2.490	4.870	OK
7	2.50	2.50	2.500	4.909	OK
8	2.49	2.49	2.490	4.870	OK
9	2.51	2.50	2.505	4.928	OK
10	2.51	2.50	2.505	4.928	OK
11	2.50	2.51	2.505	4.928	OK
12	2.51	2.49	2.500	4.909	OK

### CONCLUSION:

The wires met the requirements for the Test according to the IEC standard.

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Elongation and Tensile strength test on wires after stranding  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 61232  
**Aim:** To determine the tensile properties of the wires as raw material  
**Instruments:** TENSILE MACHINE SHIMADZU AUTOGRAPH AGI50KN

### TEST SETUP AND PROCEDURE:

All AS wires samples after armoring are prepared for the test. The samples are installed between the jaws of the vertical test machine. An external gauge 250mm long is attached to the test specimen. The samples are initially loaded to 82 Kg. The load is continuously increased at a constant rate to determine the load at 1% strain (AS wires only), **L@1%**, the tensile strength, **T<sub>s</sub>**, and the elongation at break, **s**.

### PASS/FAIL:

The pass criteria for the tensile properties of the wires are summarized in the following table:

Type	T <sub>s</sub> [Kg]	T <sub>s</sub> [Kg/mm <sup>2</sup> ]	S [%]	L@1% [Kg/mm <sup>2</sup> ]
AS 20.3%IACS	681	136.6	1.5	122.3

### RESULT:

The following table summarizes the results:

# sample	T <sub>s</sub> [Kg]	T <sub>s</sub> [Kg/mm <sup>2</sup> ]	S [%]	L 1% [Kg/mm <sup>2</sup> ]	Pass
1	769	157.3	1.96	130.6	OK
2	776	159.5	2.69	130.7	OK
3	757	154.1	2.93	125.8	OK
4	761	156.4	2.25	129.3	OK
5	758	154.5	2.81	127.4	OK
6	741	152.2	2.00	125.8	OK
7	762	155.2	2.78	129.3	OK
8	776	159.4	2.25	131.8	OK
9	758	153.8	2.59	123.9	OK
10	771	156.5	2.27	129.5	OK
11	767	155.6	3.05	126.0	OK
12	779	158.7	2.43	127.6	OK

### CONCLUSION:

The wires met the requirements for the test according to IEC standard

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Torsion test on wires after stranding  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 61232  
**Objective:** To verify the mechanical properties of the AS wires.  
**Instruments:** Machine for torsion test on wires

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### **TEST SETUP AND PROCEDURE:**

All AS wire samples after armoring are prepared for the test.. Each specimen, 252mm long, is gripped at its ends in the vises of the torsion machine, one of which is free to move. The sample is twisted by rotating one of the vises at 60 turns/min until fracture is observed. The number of twists at fracture is recorded.

### **PASS/FAIL:**

The wire shall withstand without fracture not less than 20 twists in a length equivalent to 100 times the nominal diameter of the wire.

### **RESULT:**

The following table summarizes the results:

# sample	Number of torsions	Pass
1	42	OK
2	45	OK
3	43	OK
4	43	OK
5	44	OK
6	45	OK
7	44	OK
8	43	OK
9	45	OK
10	41	OK
11	44	OK
12	44	OK

### **CONCLUSION:**

The wires met the requirements for the test according to the IEC standard.

## TEST REPORT

**Type of cable:** OPGW 725B49z-48M (6608)  
**Test name:** Electrical resistance of the wires after stranding  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 61232  
**Objective:** To verify the resistance and resistivity of the wires.  
**Instruments:** Thomson Bridge, Micro-ohmmeter RESISTOMAT 2302

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### TEST SETUP AND PROCEDURE:

All AS wire samples after armoring are prepared for the test.. Each wire sample is installed in one arm of the Thomson bridge. The DC resistance per unit length is measured using a micro-ohmmeter on a sample length of 1.0 m. The temperature of the measurement is taken in order to correct the value at room temperature (20°C) according to the following formula:

$$R_{20^{\circ}\text{C}} = R_T / [1 + 0.0036(T - 20)].$$

### PASS/FAIL:

The resistivity of the wires shall not exceed the nominal value:

Type	Resistivity [Ω·mm <sup>2</sup> /Km.]
AS 20.3% IACS	84.80

### RESULT:

The following table summarizes the results:

# sample	T [°C]	R@T [Ω/Km]	R@20°C [Ω/Km]	Resistivity [Ω·mm <sup>2</sup> /Km.]	Pass
1	23.3	15.842	15.656	78.092	OK
2	23.3	15.988	15.800	78.812	OK
3	23.3	15.709	15.525	77.437	OK
4	23.2	15.815	15.635	77.987	OK
5	23.2	15.848	15.668	78.150	OK
6	23.2	15.898	15.717	78.396	OK
7	23.2	15.898	15.776	78.692	OK
8	23.2	15.870	15.689	78.258	OK
9	23.2	16.036	15.853	79.077	OK
10	23.1	15.891	15.716	78.389	OK
11	23.1	15.990	15.814	78.878	OK
12	23.2	16.032	15.849	79.057	OK

### CONCLUSION:

The wires met the requirements for the test according to the IEC standard.

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Aluminium thickness of the AS wires after stranding  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 61232  
**Objective:** To verify the aluminium thickness of the AS wires.  
**Instruments:** Thicknessmeter DELTASCOPE MP-30

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### TEST SETUP AND PROCEDURE:

All AS wire samples after armoring are prepared for the test.. The aluminium thickness is measured at three different points on each sample using a magnetic induction thicknessmeter.

### PASS/FAIL:

The average aluminium thickness shall exceed 10% of the nominal wire radius (126 microns)

### RESULT:

The following table summarizes the results:

# sample	#1	#2	#3	Average thickness [µm]	Pass
1	258	206	202	222	OK
2	262	239	265	255	OK
3	257	254	237	249	OK
4	226	234	221	227	OK
5	216	259	219	231	OK
6	247	268	264	260	OK
7	273	239	263	258	OK
8	246	221	212	226	OK
9	275	253	282	270	OK
10	236	202	218	219	OK
11	210	237	231	226	OK
12	266	249	243	253	OK

### CONCLUSION:

The wires met the requirements for the test according to the IEC standard.

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Hardness of the Aluminium coating of the AS wires after stranding  
**Laboratory:** UNIVERSITAT POLITECNICA DE CATALUNYA  
**Test Standard:** CEI 7-11 / ISO 6507  
**Objective:** To verify the hardness of the aluminium coating of the AS wires.

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### **TEST SETUP AND PROCEDURE:**

Few AS wire samples after armoring, 7.5cm long each, are taken for the test. The wires are delivered to the laboratory of the University to measure the hardness of the aluminium coating according to the ISO 6507.

### **PASS/FAIL:**

The micro-hardness value shall exceed 35.

### **RESULT:**

The following table summarizes the results:

# sample	Micro-hardness	Pass
1	60	OK
2	62	OK
3	69	OK
4	59	OK
5	59	OK
6	58	OK
7	64	OK
8	57	OK
9	52	OK
10	61	OK
11	57	OK
12	60	OK

### **CONCLUSION:**

The wires met the requirements for the test according to the ISO standard

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Cable performance, formation, diameter, section, lay length  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** CEI EN 50182 / UX LC59 / LC3907  
**Objective:** To verify that the OPGW cable being tested is compliant with the specifications  
**Instruments:** Caliper

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### TEST SETUP AND PROCEDURE:

A one meter OPGW sample is cut. The cable diameter and lay length are measured. The wires are removed and wire diameter is measured on all samples as well as the aluminium tube. The optical core is removed. The PBT tube and fiber colors are checked.

### PASS/FAIL:

The measurements shall be compliant with UX LC59 and LC3907.

### RESULTS:

The following table summarizes the results.

Parameter	UX LC59/LC3907	Cable data sheet	Measurement
# PBT tubes, color	1, BLUE	1, BLUE	OK
# fibers per tub	48	48	OK
Fiber color code	According to table in Par 2.1	According to table in Par. 2.1	OK
# ACS wires	Not specified	12	12 – OK
∅ ACS wires [mm]	Not specified	2.52±0.04	2.49-2.51 – OK
Wire section [mm <sup>2</sup> ]	Not specified	4.988	4.908- OK
∅ <sub>ext</sub> Alum. tube [mm]	Tol. = ± 1.5%	7.50 ± 0.11	7.50 – OK
Thickness Al. tube [mm]	Tol. = ± 10%	1.35 ± 0.14	1.35 – OK
∅ cable [mm]	≤ 11.5 <sup>+1</sup> <sub>-1.5</sub>	12.5	12.5 – OK
Lay ratio	10 to 14	Not specified	14 – OK
Electrical resistance [O/Km]	< 0.9	< 0.65	0.58 – OK

### CONCLUSION:

The cable is full compliant with the cable data sheet and Table UX LC59.

## **TEST REPORT**

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Mass verification  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** CEI EN 50182 / UX LC59 / LC3907  
**Objective:** To verify the weight and of the OPGW cable.  
**Instruments:** Scale PRECISA 300C-300D

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### **TEST SETUP AND PROCEDURE:**

The cable mass per unit length is measured on an OPGW 1.0 meter long sample using a calibrated scale.

### **PASS/FAIL:**

The values shall be in accordance with cable data sheet ( $491 \pm 10$  Kg/Km) and Tabella UX LC59 ( $<0.6$  Kg/m). Tolerance =2%

### **RESULT:**

The cable mass per unit length is 491 Kg/Km.

### **CONCLUSION:**

The cable met the requirements for test according to the cable data sheet and Tabella UX LC59.

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Ultimate Tensile Strength  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** CEI EN 50182  
**Aim:** To measure the failing load of the cable.  
**Instruments:** TENSILE EQUIPMENT J. BOT  
EG&G CD400

---

### **TEST SETUP AND PROCEDURE:**

The OPGW cable sample submitted to stress-strain test is installed in a hydraulically activated horizontal test machine (Fig. 3.1). The cable length under test (between dead-end assembly loading points) is 16.0 m. The dead-end assembly have reference NES 8.22.12.003. Cable load is uniformly increased up to the failing load and the Ultimate Tensile Strength (UTS) recorded.

### **PASS/FAIL:**

Cable failure shall not occur below the specified tensile strength (74.5 KN = 7594 Kgf).

### **RESULTS:**

Fig. 3.2 shows cable load vs. time for the test. The cable failure occurs at 9437 Kgf (92.6 KN), that is 124% of the RTS value. Fig. 3.3 shows the cable after failure.

### **CONCLUSION:**

The cable met the requirements for the test according to the CEI standard.



*Fig. 3.1.- Setup for Ultimate Tensile test*

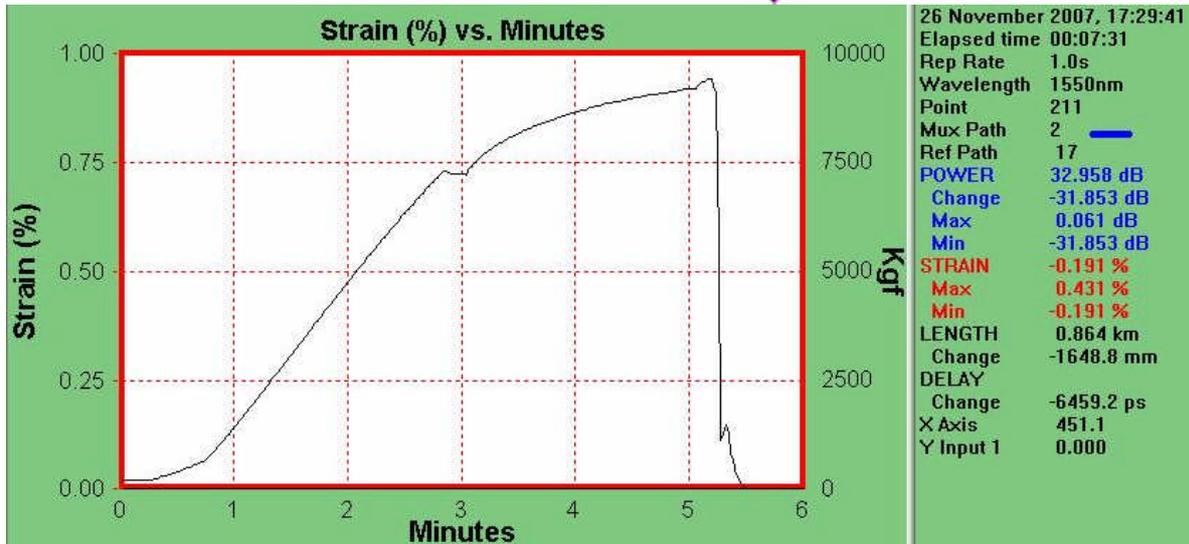


Fig. 3.2.- Cable load vs. time for Tensile test



Fig. 3.3.- Cable aspect after failure

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Q-test  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** UX LC 3907  
**Aim:** To verify the optical properties of the cable up to 70% of the RTS with all fittings installed.  
**Instruments:** TENSILE EQUIPMENT J. BOT, EG&G CD400

---

### **TEST SETUP AND PROCEDURE:**

An OPGW cable sample is installed in a hydraulically activated horizontal test machine. The cable length under test (between dead-end assembly loading points) is 22.0 m. The dead-end assembly are new (unused) with reference NES 8.22.12.003. The suspension clamp is AGS type with reference NES 8.21.11.002. The arrangement of the suspension is such that at 70%RTS , the output angle is 20° both sides. Fig. 4.1 shows the setup of the test.

All 48 fibers are spliced in series for attenuation measurements. The optical length for the test is 1056 meters (48x22m). The attenuation measurement is performed continuously during the test by source and powermeter.

Cable load is raised in intervals up to 70% RTS (5316 Kgf). The load is then released.

### **PASS/FAIL:**

Optical attenuation changes shall not exceed 0,1 dB/Km tested fiber @ 1550 nm up to 60% RTS. Optical attenuation changes in the range 60% to 70% RTS shall be reversible after the load is released.

### **RESULT:**

Fig. 4.2 shows the Load cycle vs. time for the test. The attenuation change never exceeded 0.03 dB/Km up to 70% RTS. The attenuation change is positive which means a slight improvement with increasing load.

### **CONCLUSION:**

The cable met the requirements for the test according to TERNA specifications.

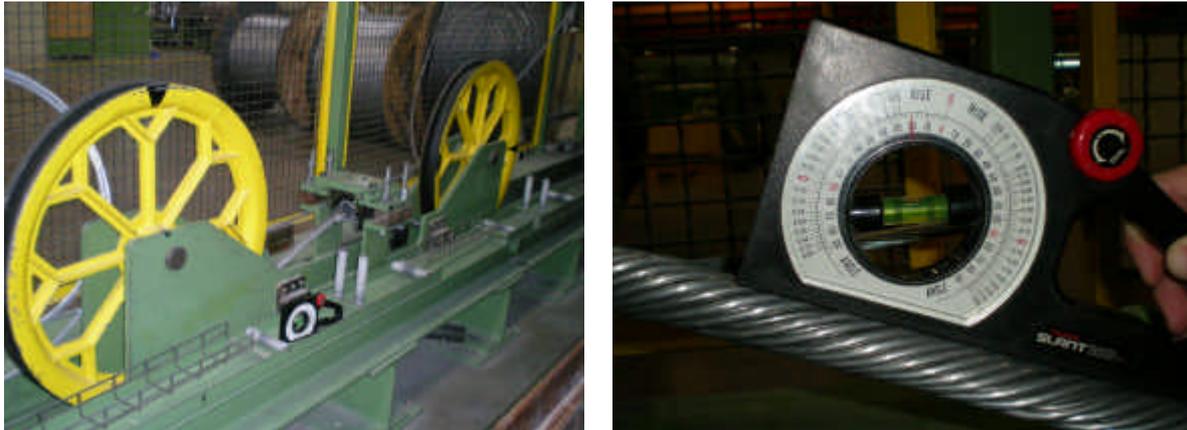


Fig. 4.1.- Setup for Ultimate Tensile test

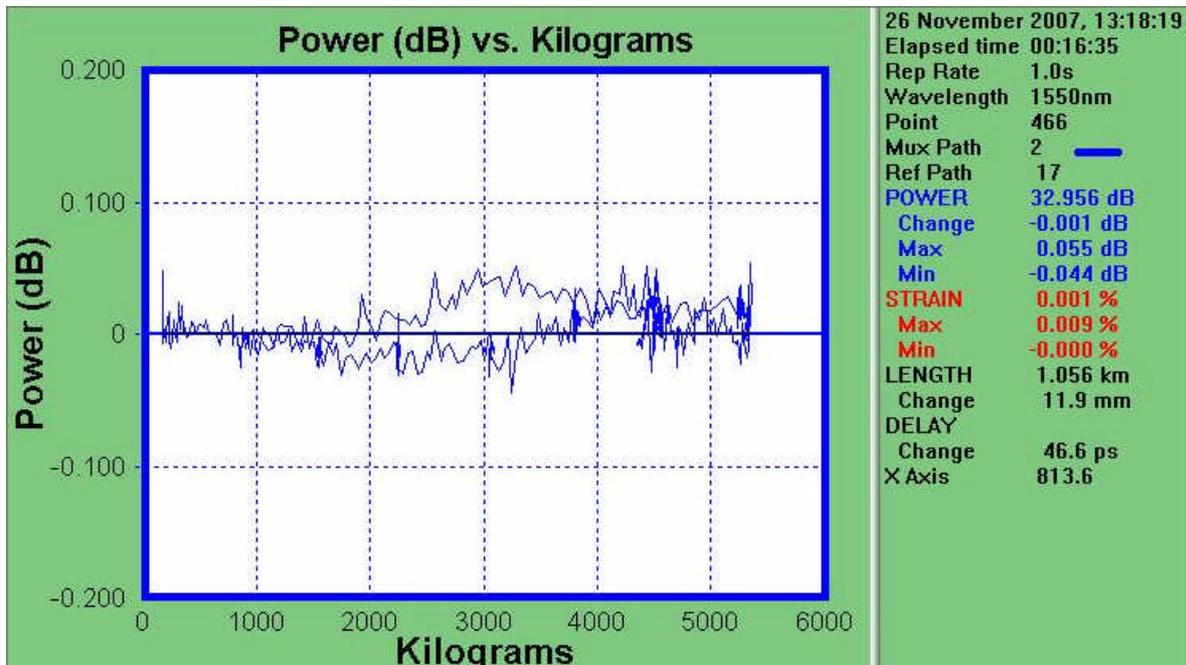


Fig. 4.2.- Attenuation change vs. Load for Q-test

## TEST REPORT

<b>Type of cable:</b>	<b>OPGW 25B49z-48M (6608)</b>
<b>Test name:</b>	<b>Stress strain test</b>
<b>Laboratory:</b>	<b>PRYSMIAN TELECOM ESPAÑA, S.L.</b>
<b>Test Standard:</b>	<b>CEI EN 50182</b>
<b>Aim:</b>	To check the modulus of elasticity of the cable.
<b>Instruments:</b>	TENSILE EQUIPMENT J. BOT EG&G CD400

---

### **TEST SETUP AND PROCEDURE:**

An OPGW cable sample is installed in a hydraulically activated horizontal test machine. The cable length under test (between dead-end assembly loading points) is 16.0 m. The dead-end assembly are new (unused) with reference NES 8.22.12.003. Ambient temperature is recorded before and after the test. Fig. 5.1 shows the setup of the test.

An external fiber sensor (length = 10m) is attached to the cable for strain measurements. For information purposes, all 48 fibers are spliced in series for attenuation measurements. The optical length for the test is 768 meters (48x16m), which are performed continuously during the test by source and powermeter.

The following load cycles is performed (the rate of loading is such that the time to reach 30%RTS is  $1 < t \text{ [min]} < 2$ )

- Load initially 5% RTS and set gages at zero.
- Increase the load until 30% RTS and hold during 30 min. Release to initial load.
- Increase the load until 50% RTS and hold during 60 min. Release to initial load.
- Increase the load until 70% RTS and hold during 60 min. Release to initial load.
- Increase the load until 85% RTS and hold during 60 min. Release to initial load.
- Raise cable load until 100% RTS is reached

The cable modulus shall be determined from the data relative to the range after releasing the load from 70% RTS

### **PASS/FAIL:**

The modulus of the cable shall be in accordance with the cable data sheet:  $120.3 \text{ KN/mm}^2$ , considering a cable cross-area of  $85.9 \text{ mm}^2$ .

### **RESULT:**

Fig. 5.2 shows the Strain vs. Load for the test. For information purposes, the attenuation change ( $<0.05 \text{ dB/Km}$ ) is shown in the upper figure. The attenuation change is positive which means a slight improvement with increasing load. Temperature before and after the test was  $22^\circ\text{C}$ .

Fig. 5.3 shows the stress-strain curve with more detail. The data for the modulus calculation is taken from the release part of the curve after reaching 70% and 85% RTS. Details of the calculation and the final result is shown in Fig. 5.4. The average cable modulus is  $119 \text{ KN/mm}^2$  ( $11900 \text{ daN/mm}^2$ ) in good agreement with that declared in cable data sheet.

### **CONCLUSION:**

The cable met the requirements for the test according to the CEI standard and TERNA specifications.

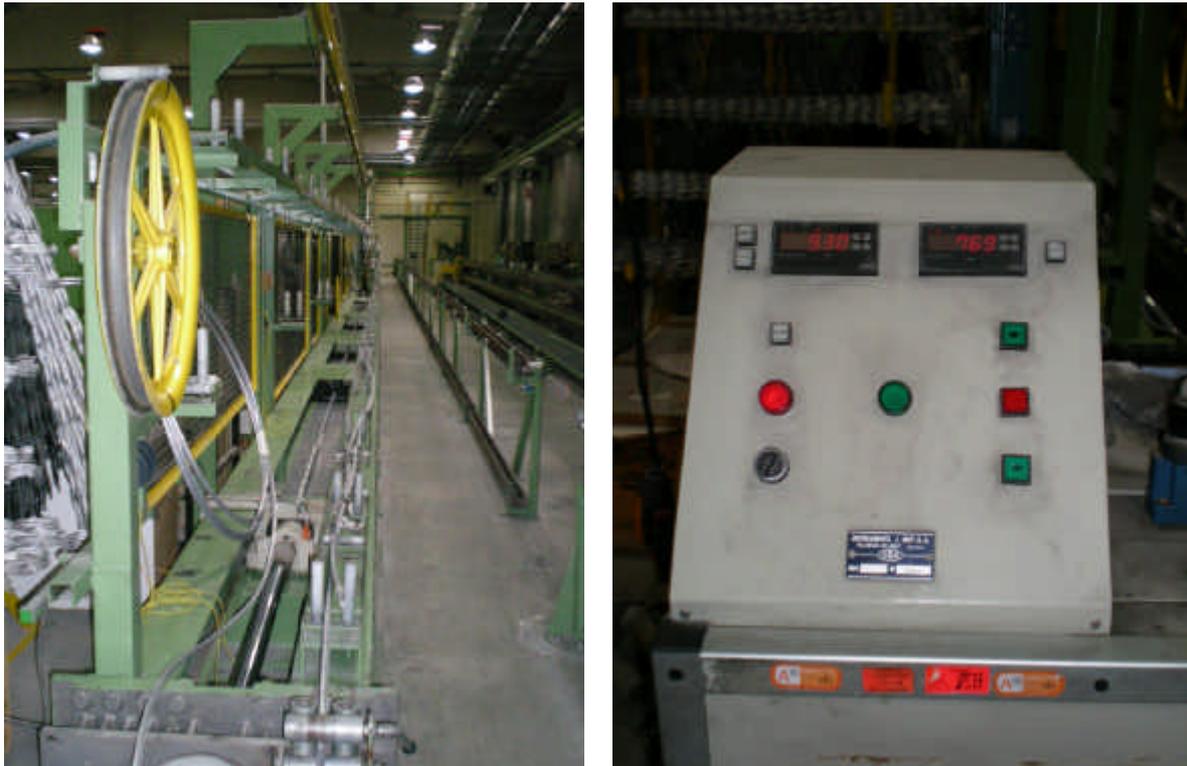


Fig. 5.1.- Setup for Ultimate Tensile test

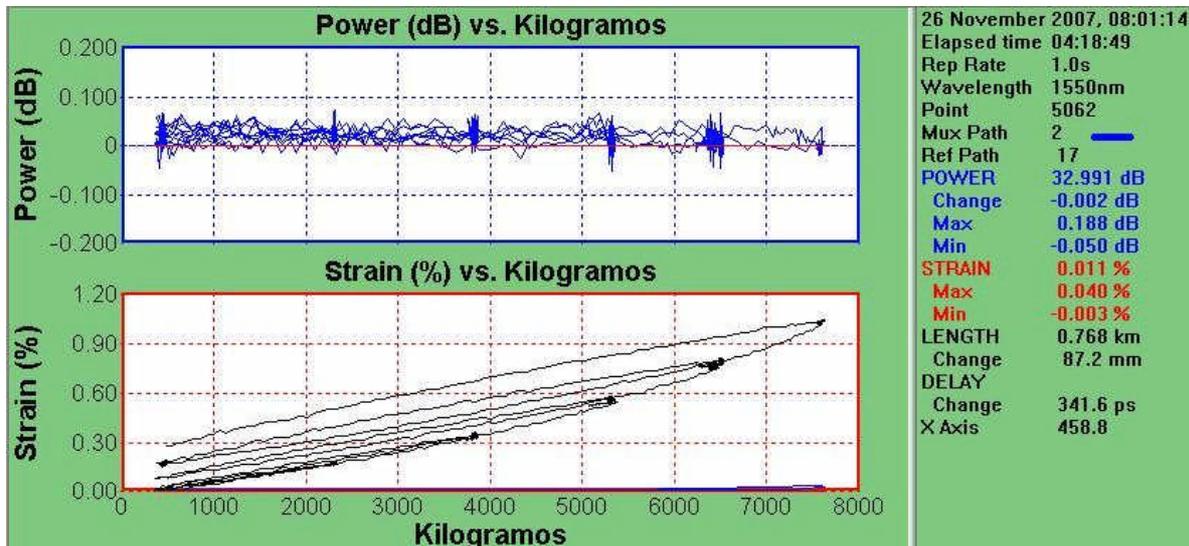


Fig. 5.2.- Attenuation change (up) and Cable strain (down) versus cable load during stress strain test

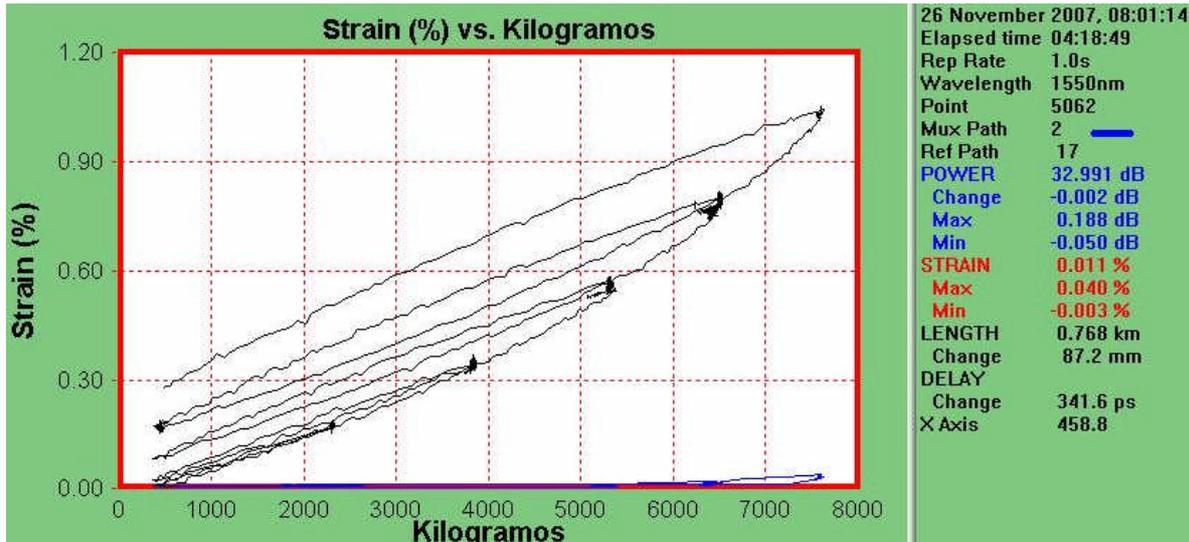


Fig. 5.3.- Cable strain (down) versus cable load during stress strain test

### OPGW 25B49z-48M

Return 70% RTS      Return 85% RTS

Load	Strain cable	Load	Strain cable
5284.8	0.573	6475.2	0.798
4796.8	0.521	6226.4	0.790
4484.6	0.501	6218.0	0.774
4187.2	0.475	6097.0	0.776
3907.2	0.449	5797.4	0.739
3635.2	0.421	5510.8	0.723
3366.0	0.397	5226.6	0.697
3107.4	0.373	4933.4	0.665
2849.0	0.352	4665.2	0.636
2604.8	0.316	4405.6	0.613
2356.8	0.298	4156.6	0.585
2126.8	0.280	3898.0	0.564
1914.4	0.254	3655.0	0.545
1698.4	0.230	3406.0	0.513
1498.6	0.212	3177.2	0.493
1297.6	0.195	2947.8	0.468
1126.2	0.175	2724.2	0.448
952.4	0.159	2508.2	0.416

Strain = A \* Stress + B, where

A = 9.586E-05      A = 9.619E-05  
 B = 0.071      B = 0.186

from which

	1st meas.	2nd meas.	Nominal	Units
E.S.	10234	10198	10333.77	KN
Section	85.9	85.9	85.9	mm <sup>2</sup>
Elast. Coef.	119	119	120.3	KN/mm <sup>2</sup>

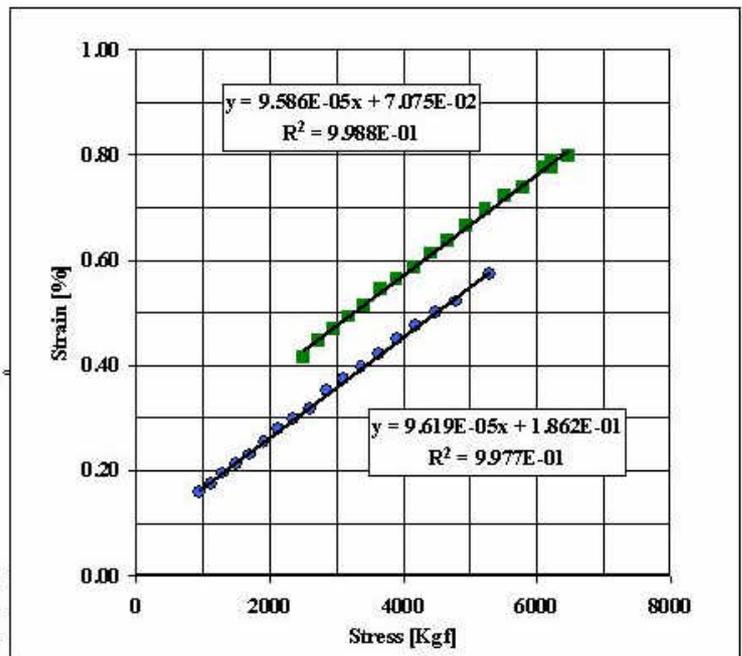


Fig. 5.4.- Calculation of modulus of elasticity test

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Sheave test  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 60794-4-1 Par. 8.3  
**Aim:** To verify that stringing of the OPGW with the recommended sheave size would not damage or degrade the quality of the optical fibers.  
**Instruments:** TENSILE EQUIPMENT J. BOT  
SHEAVE MACHINE, CD400

---

### **TEST SETUP AND PROCEDURE:**

An OPGW sample is installed in a sheave machine. The cable length under test (between deadend assembly loading points) is 18.0 m. All fibers are spliced in series for attenuation measurements. The optical length for the test is 864 meters (48x18m). The attenuation measurements is performed continuously during the test.

The cable sample is pulled forward and backward 10 times through the 780 mm diameter sheave. Other setup parameter values are the pulling tension: 1140 Kgf (15% of the RTS); the pulled length: 3.2 meters; and the deflection angle: 30°. Fig. 6.1 shows the setup.

Micrometer readings of the cable diameter are performed at the beginning, mid-point and end of the pulled length after and after the test. After the test is complete, the cable strands are removed and the aluminium pipe diameter is measured at the marked points of the pulled length.



*Fig. 6.1.- Setup for Sheave test*

### **PASS/FAIL:**

Optical attenuation changes shall not exceed 0.1 dB/Km tested fiber @1550 nm.

Cable ovality, defined as  $Ovality = \frac{\varnothing_{max} - \varnothing_{min}}{\varnothing_{max} + \varnothing_{min}}$ , shall not exceed 10%.

No evidence of damage shall be observed on the parts of the OPGW submitted to test.

**RESULT:**

Fig. 6.2 shows the attenuation change (up) and the cable load (down) vs. time for the test. The average load during the test is 1200 Kgf, although small variations of  $\pm 3\%$  of this load occur during each cycle. The attenuation change never exceeded 0.05 dB/Km during the test and is reversible after the load is released.

Regarding the deformation of the cable and the aluminium tube, the following tables summarize the results:

#	CABLE DIAMETER.					
	SOUTH		CENTER		NORTH	
	MIN [mm]	MAX [mm]	MIN [mm]	MAX [mm]	MIN [mm]	MAX [mm]
Before	12.51	12.68	12.48	12.62	12.45	12.57
After	12.44	12.69	12.48	12.60	12.42	12.66
Ovality [%]	1.0%		0.5%		0.9%	

#	ALUMINIUM TUBE DIAMETER.					
	SOUTH		CENTER		NORTH	
	MIN [mm]	MAX [mm]	MIN [mm]	MAX [mm]	MIN [mm]	MAX [mm]
After	7.50	7.56	7.50	7.57	7.56	7.54
Ovality [%]	0.3%		0.5%		0.1%	

The averaged cable diameter measured at 1200Kg is 12.55 mm. The maximum measured ovality of the cable,  $[\varnothing_{max} - \varnothing_{min}]/[\varnothing_{max} + \varnothing_{min}]$ , is 1.0% and occurs at south section. The average aluminium tube external diameter outside the tested area is 7.54 mm. After completion of the test, the maximum ovality measured in the aluminium tube,  $Ovality = [\varnothing_{max} - \varnothing_{min}]/[\varnothing_{max} + \varnothing_{min}]$ , is 0.5%, at the center section.

**CONCLUSION:**

The cable met the requirements for the test according to the IEC standard.

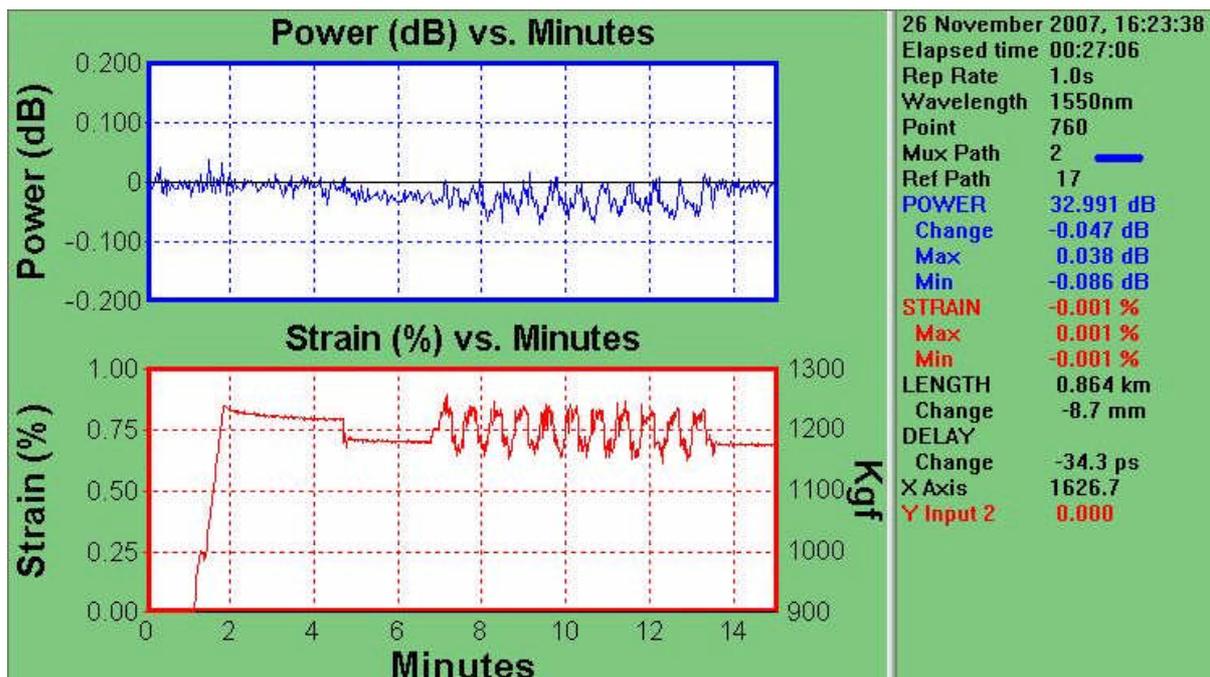


Fig. 6.2.- Attenuation change (up) and Cable load (down) vs. time during sheave test

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Wire unwrapping  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** UX LC 3907  
**Aim:** To verify that the wires do not unwrap when broken up to 18% RTS.  
**Instruments:** TENSILE EQUIPMENT J. BOT  
SHEAVE MACHINE, CD400

---

### **TEST SETUP AND PROCEDURE:**

The cable length under test (between dead-end assembly loading points) is 16.0 m. The dead-end assembly are new (unused) with reference NES 8.22.12.003. Two wires are broken by hand on three different sections of the cable sample (six different broken wires in total). Cable load is increased to 18%RTS and the unwrapped length of the broken wires (if any) is measured.

### **PASS/FAIL:**

The unwrapped length of the wires shall not exceed 40cm. The maximum distance from the wire end to the cable shall not exceed 15cm.

### **RESULT:**

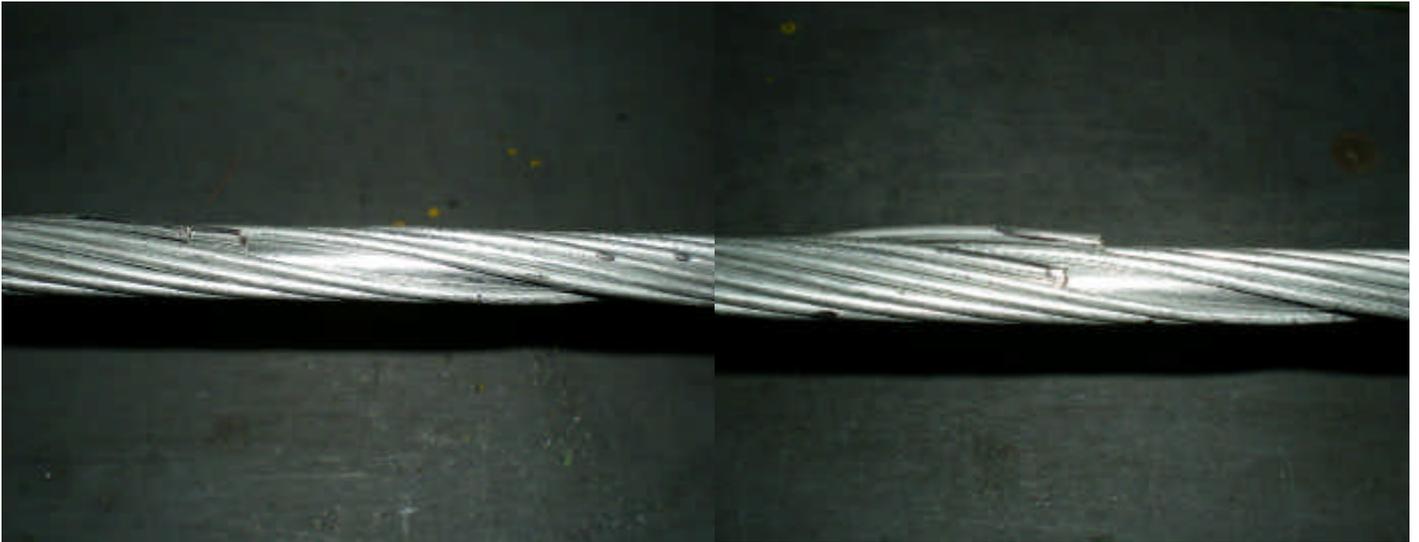
At 18%RTS there is no wire unwrapping in any of the three sections. Cable aspect at the hand-damaged positions is shown in Fig. 7.1. For information, cable load is raised up to 50% RTS. There is no wire unwrapping up to this load value as shown in Fig. 7.2.

### **CONCLUSION:**

The cable met the requirements for the test according to the TERNA standard.



*Fig. 7.1.- Cable aspect at 18% RTS*



*Fig. 7.2.- Cable aspect at 50% RTS*

## TEST REPORT

**Type of cable:** OPGW 25B49z-48M (6608)  
**Test name:** Attenuation coefficients and linearity  
**Laboratory:** PRYSMIAN TELECOM ESPAÑA, S.L.  
**Test Standard:** IEC 793-1-C1C  
**Objective:** To verify the attenuation coefficients of the fiber.  
**Instruments:** OTDR ANRITSU MW9060A

### TEST SETUP AND PROCEDURE:

A drum from production with an OPGW sample 2002 meters long is used for the test. The attenuation coefficients and linearity are obtained by OTDR measurements.

### PASS/FAIL:

The attenuation coefficient shall be in accordance with the specifications: 0.36 dB/Km@ 1310nm and 0.22 dB/Km@ 1550nm. In addition, attenuation steps, if any, shall not exceed 0.05 dB.

### RESULT:

The results are given in the following table.

FIBER	$\alpha_{1310}$ [dB/Km]	$\alpha_{1550}$ [dB/Km]	Atten. Lin.	FIBER	$\alpha_{1310}$ [dB/Km]	$\alpha_{1550}$ [dB/Km]	Atten. Lin.
AMARILLO	0.334	0.198	OK	NEGRO	0.334	0.192	OK
AMARILLO 1	0.327	0.200	OK	NATURAL 1	0.345	0.201	OK
AMARILLO 2	0.326	0.196	OK	NATURAL 2	0.330	0.195	OK
AMARILLO 3	0.332	0.194	OK	NATURAL 3	0.338	0.201	OK
AZUL	0.327	0.195	OK	ROJO	0.332	0.190	OK
AZUL 1	0.330	0.200	OK	ROJO 1	0.340	0.195	OK
AZUL 2	0.330	0.194	OK	ROJO 2	0.325	0.192	OK
AZUL 3	0.327	0.198	OK	ROJO 3	0.327	0.195	OK
BLANCO	0.338	0.204	OK	ROSA	0.334	0.200	OK
BLANCO 1	0.350	0.204	OK	ROSA 1	0.325	0.194	OK
BLANCO 2	0.333	0.204	OK	ROSA 2	0.341	0.211	OK
BLANCO 3	0.329	0.195	OK	ROSA 3	0.335	0.200	OK
GRIS	0.329	0.194	OK	TURQUESA	0.329	0.202	OK
GRIS 1	0.343	0.200	OK	TURQUESA 1	0.330	0.200	OK
GRIS 2	0.330	0.198	OK	TURQUESA 2	0.326	0.196	OK
GRIS 3	0.329	0.195	OK	TURQUESA 3	0.331	0.193	OK
MARRÓN	0.335	0.195	OK	VERDE	0.335	0.200	OK
MARRÓN 1	0.341	0.202	OK	VERDE 1	0.342	0.194	OK
MARRÓN 2	0.324	0.199	OK	VERDE 2	0.335	0.203	OK
MARRÓN 3	0.326	0.200	OK	VERDE 3	0.342	0.195	OK
NARANJA	0.334	0.207	OK	VIOLETA	0.331	0.192	OK
NARANJA 1	0.333	0.205	OK	VIOLETA 1	0.329	0.200	OK
NARANJA 2	0.331	0.200	OK	VIOLETA 2	0.325	0.188	OK
NARANJA 3	0.349	0.212	OK	VIOLETA 3	0.335	0.194	OK
<i>AVERAGE</i>					0.333	0.198	↔
<i>MAXIMUM</i>					0.350	0.212	↔

Annex C contains the OTDR traces for all 48 fibers at 1310 and 1550nm. It can be checked that there are no attenuation steps so that all traces are linear (all points are within two parallel lines translated at  $\pm 0.05$  dB)

**CONCLUSION:**

The cable met the requirements for the test according to the IEC standard and TERNA specifications.

## TEST REPORT

<b>Type of cable:</b>	<b>OPGW 25B49z-48M (6608)</b>
<b>Test name:</b>	<b>Temperature Cycling</b>
<b>Laboratory:</b>	PRYSMIAN TELECOM ESPAÑA, S.L.
<b>Test Standard:</b>	<b>GECOL Specs.</b>
<b>Objective:</b>	To determine the stability behavior of the optical attenuation in the OPGW cable when submitted to temperature cycles.
<b>Instruments:</b>	Temperature chamber INELTEC EG&G CMP500

---

### **TEST SETUP AND PROCEDURE:**

A drum with an OPGW sample 1011 m long is introduced inside the 27m<sup>3</sup> climatic chamber. All 48 fibers are spliced in loops of six fibers for attenuation measurements. The total length under test is 6066m (6fox1011m) for each of the eight measurement channels.

The temperature and the attenuation change are recorded as a function of time with a sampling rate of 1 sample every 5 minutes.

The following cycle is applied

- The drum is pre-conditioned at 25±3°C for 6 hours.
- The temperature is raised to 60°C and kept constant for 4 hours.
- The temperature is loared to -25°C and kept constant for 4 hours.
- The 60°C/-25°C cycle is repeated twice
- The temperature is loared to -40°C and kept constant for 4 hours.
- The temperature is raised to -25°C and kept constant for 4 hours.
- The temperature is raised to +25°C and kept constant for 1 hour

### **PASS/FAIL:**

Optical attenuation changes shall not exceed 0.1 dB/Km during the test

### **RESULT:**

Figs. 8.1 and 8.2 show the Temperature trace and the Attenuation change vs. Time for the test. During the test, the attenuation change never exceeded 0.004 dB/Km (0.025 dB / 6.06 Km) for any of the fibers. Channel 23 showed an erratic attenuation behavior at 1550nm probably due to a problem at the splice organizer (outside the climatic chamber). Nevertheless, attenuation never exceeded 0.02 dB/Km @1550nm (0.12 dB / 6.06 Km)

### **CONCLUSION:**

The cable met the requirements for the test according to TERNA standard.

## OPGW 25B49z-48M

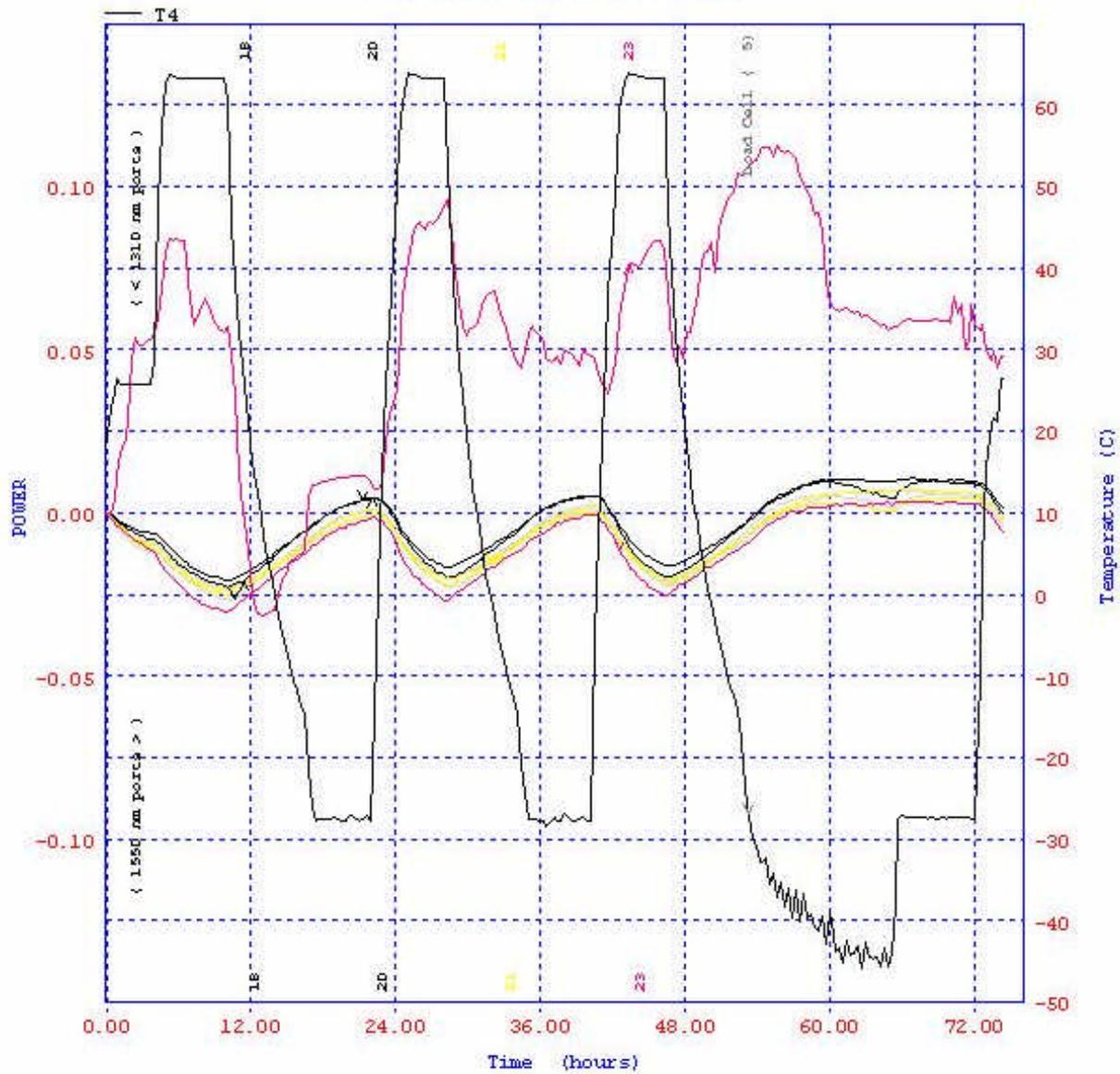


Fig. 8.1.- Temperature trance and attenuation change vs. time for measurement channels 18, 20, 21 and 23

## OPGW 25B49z-48M

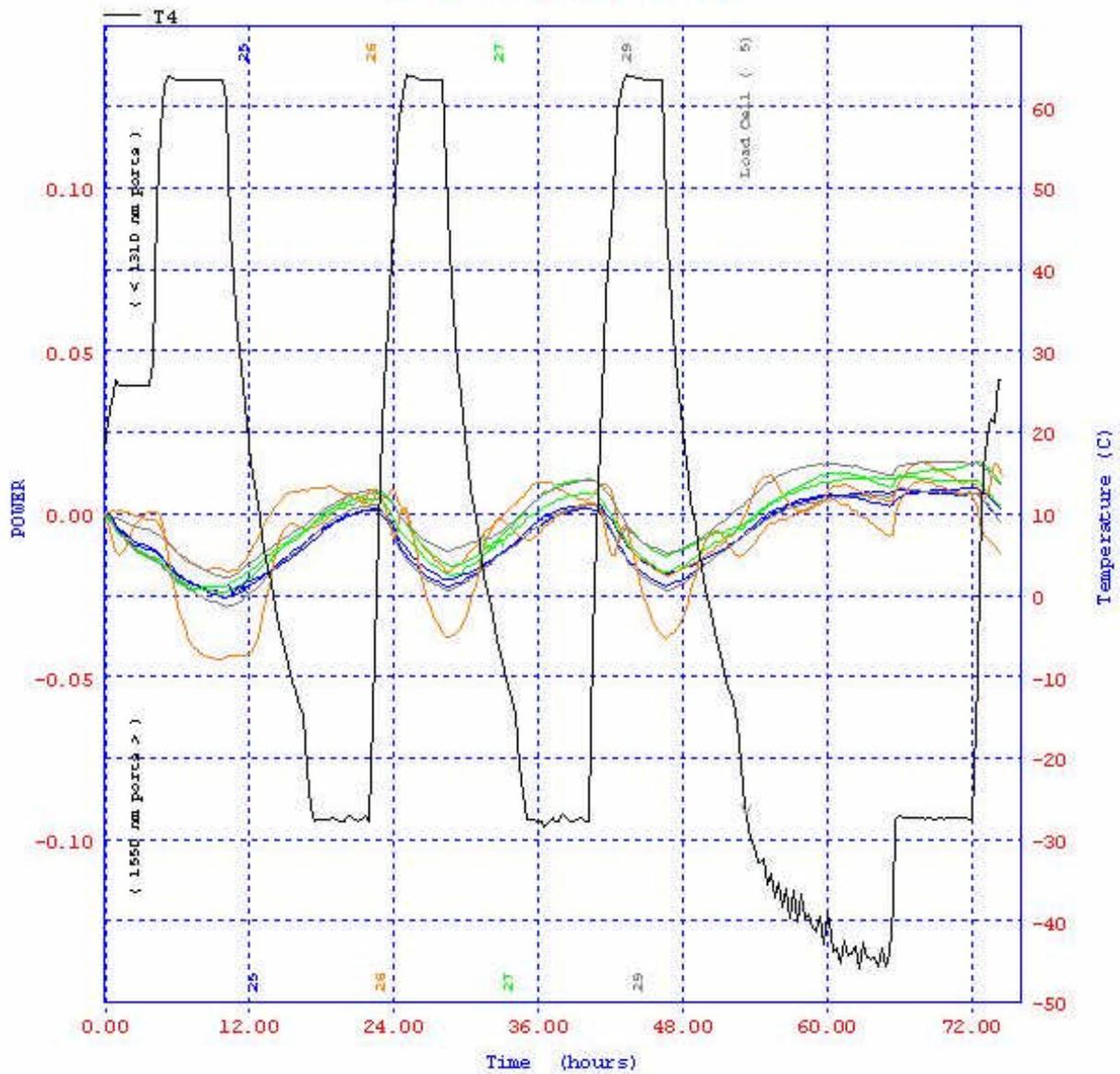


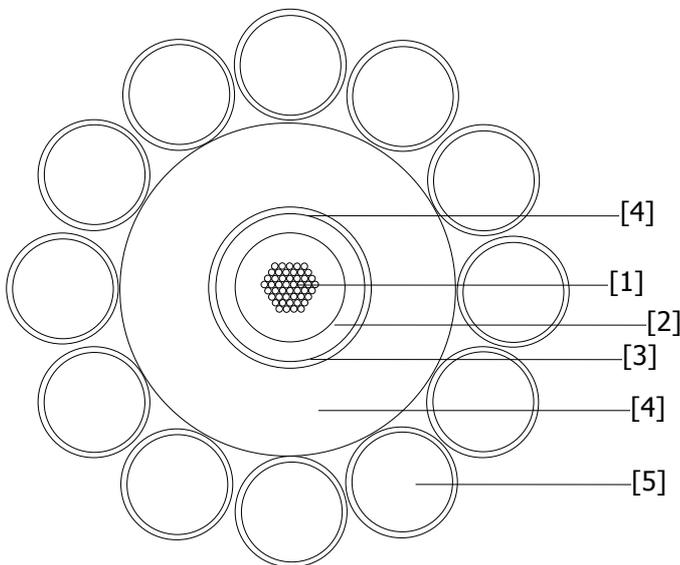
Fig. 8.2.- - Temperature trace and attenuation change vs. time for measurement channels 25, 26, 27 and 29

## Cable data sheet

OPGW 25B49z

Ref: 6608

# OPTICAL GROUND WIRE with capacity for 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 leaves the fibres free from strain even at highest operating loads.

In sections where there is a high contamination or in the proximity of the sea, Prysmian recommend greasing the cable.

A reinforcing yarns impregnated by hydrogen absorbent jelly [3] protects the fibres against the optical degradation caused by this element.

The aluminium tube [4] 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 [5].

...provides the cable with:

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

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Rev.:  
01

Date:  
25-may-07

Issued by:  
J.C.Ruiz

# OPGW 25B49z

Ref: 6608

## OPTICAL GROUND WIRE with capacity for 48 optical fibres

### Fibre characteristics

See our technical document reference 4377 SM Light™ and FreeLight™ optical fibres.

### Cable structure

#### Optical core

##### Cables with 24 fibres:

- Without rings: blue, orange, green, brown, slate, white, red, black, yellow, violet, pink, aqua.
- With 1 ring: blue, orange, green, brown, slate, white, red, natural, yellow, violet, pink, aqua.

##### Cables with 48 fibres:

- Without rings: blue, orange, green, brown, slate, white, red, black, yellow, violet, pink, aqua.
- With 1, 2 and 3 rings: blue, orange, green, brown, slate, white, red, natural, yellow, violet, pink, aqua.

### Aluminium Tube

Outer Diameter: 7.5 mm

### Armour

#### Layer 1:

- 12 aluminium-clad steel of 20.3% IACS wires of 2.52 mm.
- Right lay sense (Z).

### Cable characteristics

#### Mechanical and physical

Approximate cable diameter:	12.5 mm
Approximate cable weight:	491 kg/km
Rated tensile strength:	74.5 kN
Maximum load without fibre elongation:	49 kN
Elasticity Modulus*:	120.3 kN/mm <sup>2</sup>
Section*:	85.9 mm <sup>2</sup>
Linear expansion thermal coefficient:	14x10 <sup>-6</sup> °C <sup>-1</sup>
Minimum bending radius:	
• On pulley blocks:	300 mm
• On tensioner devices:	500 mm
• After clamping (slack cable):	300 mm
Operating temperature range:	from -30°C to +70°C

\*for stress-strain calculus

#### Electrical

Electrical resistance (20°C): 0.65 Ω/km  
Short circuit rating from 50°C: 50.0 kA<sup>2</sup>s  
Short circuit current for 0.5 s: 10.0 kA

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Rev.: 01	Date: 25-may-07	Issued by: J.C.Ruiz
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# OPGW 25B49z

Ref: 6608

## OPTICAL GROUND WIRE with capacity for 48 optical fibres

### Routine tests

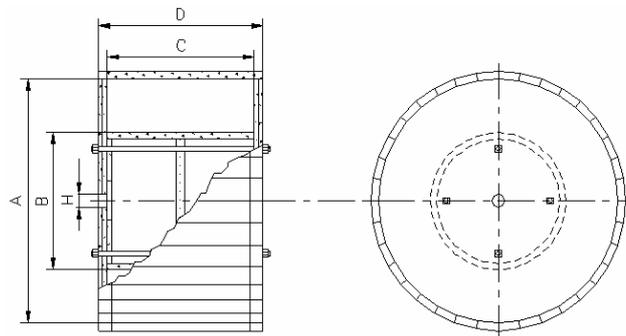
100% of optical fibres will be measured by OTDR technique before leaving factory.

### 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 FO-02 and "Instruction for the installation of the EWJ joint box" reference FO-01.

### Reels

	Type K	Type P
Wheel (A):	1400 mm	2100 mm
Cylinder (B):	950 mm	900 mm
Inside (C):	770 mm	900 mm
Outside (D):	930 mm	1060 mm
Axe (H):	88 mm	105 mm
Weight:		
- empty:	165 kg	440 kg
- full:	2129 kg	5350 kg
Maximum length:	4 km	10 km
Tolerance length of the produced reel: $\pm 3\%$		



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25-may-07

Issued by:  
J.C.Ruiz

## **Annex. A.- Report for hardness of aluminium coating**



Centre de Disseny d'Aliatges Lleugers  
i Tractaments de Superfície  
UNIVERSITAT POLITÈCNICA DE CATALUNYA

## **VICKERS MICROHARDNESS TEST (ISO 6507/3)**

**Cable Reference: OPGW 25B49z, diameter of 12,5 mm, 12 Wires**

**OPGW cable qualification for TERNA**

**CONFIDENTIAL**

**Prysmian Cables y Sistemas Telecom  
España, S.L.**

**Date: 08.11.2007**

Document n°: PRY/07/11/04

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i Tractaments de Superfície  
UNIVERSITAT POLITÈCNICA DE CATALUNYA

To: Josep Martin Regalado  
Prysmian Cables y Sistemas Telecom España, S.L.

## **VICKERS MICROHARDNESS TEST FOR “PRYSMIAN CABLES Y SISTEMAS TELECOM ESPAÑA, S.L. ”**

**(Cable Reference: OPGW 25B49z, diameter of 12,5 mm, 12 Wires)**

**CDAL Report: PRY/07/10/03**

**November 7<sup>th</sup>, 2007**

Josep A. Picas

Surface Treatment Department

A Vickers Microhardness test has been performed on a cable, and on twelve individual wire samples, manufactured and supplied by “PRYSMIAN CABLES Y SISTEMAS TELECOM ESPAÑA”. The cable is designated, according to the identify card issued by PRYSMIAN, as OPGW 25B49z. Such a cable is constituted by 12 steel wires with aluminium coating, which were individually studied. Twelve wire samples before armouring were identified as 2DBD1 to 2DBD12. Wire samples on armoured cable were identified according to the generic designation OPGW 25B49z and individually numbered from 1 to 12. The tests were performed at CDAL, Avda. Victor Balaguer s/n, Vilanova I la Geltrú, 08800 Spain, on November 7<sup>th</sup>, 2007. The test was developed in accordance with EN-ISO 6507/3 Standard.

### **TEST SET-UP**

Metallographic preparation was carried out with some operations, such as cutting, mounting resin, prepolishing, polishing and cleaning, on each wire sample and the cable sample itself. Each sample was placed on a support in order to carry out the test by means of a Fisherscope H100 equipment. After its calibration and optical adjustment, three different regions were selected along the same surface with a straight line generatrix. The minimum spacing between indentations was 1 mm.

Microhardness measurements were indirectly determined through the own equipment software. On the other hand, they were verified, in a direct way, with a LEIKA microscope system by an Image Analysis Software.

### **PRIVATE INFORMATION**

Contents of this report shall not be disclosed without authority of the client.



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CDAL, Avda. Víctor Balaguer s/n, 08800 Vilanova i la Geltrú, Spain.

**TEST CONDITIONS**

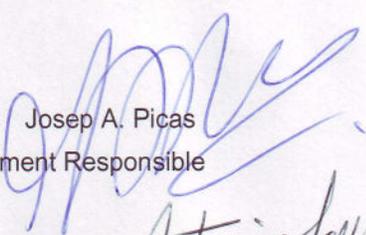
The test was performed taking into account EN-ISO 6507. The applied load and the fixed period of time were 245 mN and 15 seconds, respectively.

**RESULTS**

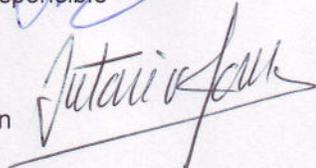
Individual results, as well as their means, related to each wire are enclosed in Annex A, whereas individual and mean load-unload plots for each sample are joined in Annex B.

**CONCLUSIONS**

Every sample displays a microhardness value higher than 52 HV 0.025.

Prepared by:  Josep A. Picas  
Surface Treatment Responsible

Prepared by:  Miquel Punset

Approved by:  A. Forn

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**PRY/07/10/04 ANNEX A**

**25B49Z**

**0.245N/15/1.0s**

Wire	HV1 0.025	HV2 0.025	HV2 0.025	Av. HV 0.025	HV 0.025 Wire	s
1	55	63	61	60	60	4
2	61	62	62	62		
3	71	66	70	69		
4	63	57	56	59		
5	61	58	57	59		
6	62	55	58	58		
7	66	66	61	64		
8	62	55	54	57		
9	56	49	51	52		
10	66	57	59	61		
11	62	60	48	57		
12	63	62	54	60		

**2DBD**

**0.245N/15/1.0s**

Wire	HV1 0.025	HV2 0.025	HV2 0.025	Av. HV 0.025	HV 0.025 Wire	s
1	54	58	68	60	62	4
2	53	61	64	59		
3	63	65	78	69		
4	56	61	68	62		
5	57	58	65	60		
6	62	67	71	67		
7	60	60	61	60		
8	53	54	61	56		
9	59	61	71	64		
10	61	65	72	66		
11	57	58	54	56		
12	69	63	62	65		

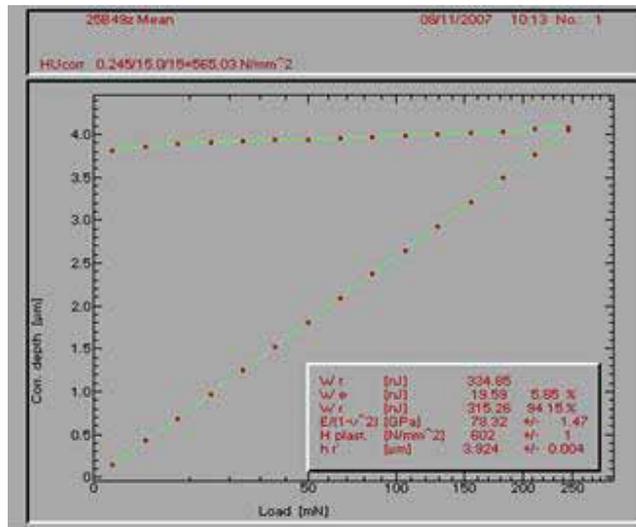


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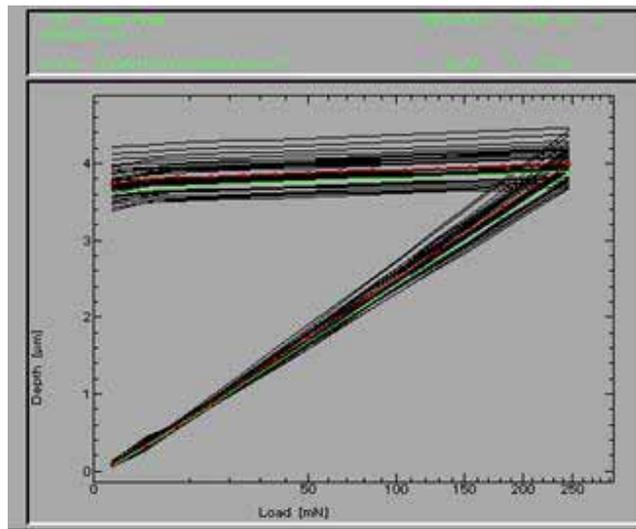
**PRY/07/11/04 ANNEX B**

**Microhardness test: Load-Displacement Curves**

**Cable 25B49z, 12 Wires**

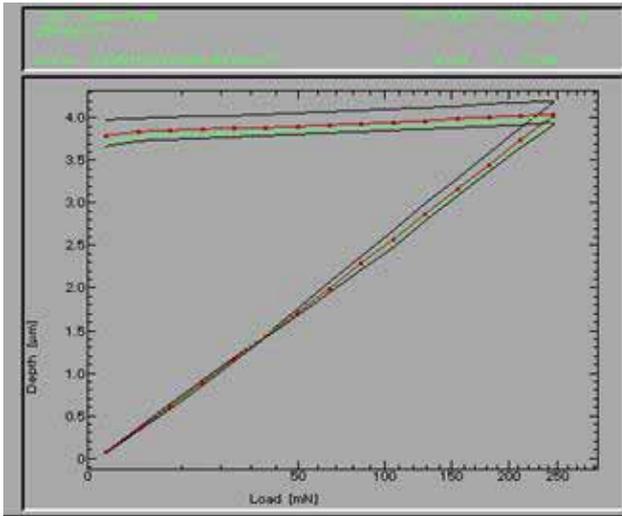


**Mean Curve (all tests on 25B49z)**

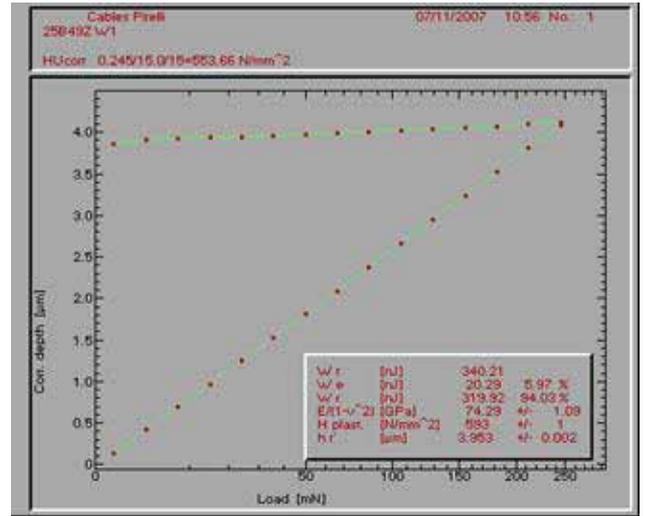


**Individual Curves (all tests on 25B49z)**

Wire 1 (25B49z):

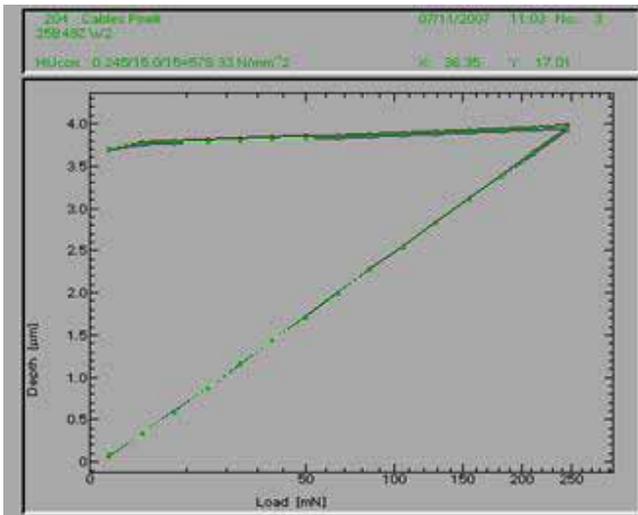


Individual Curves

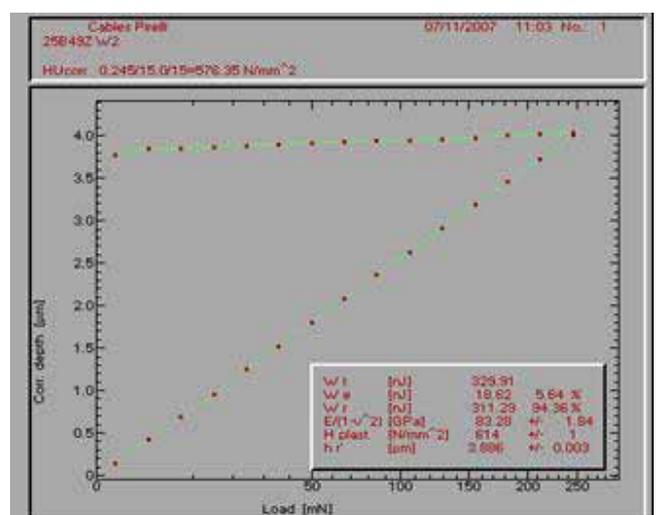


Mean Curve

Wire 2 (25B49z):

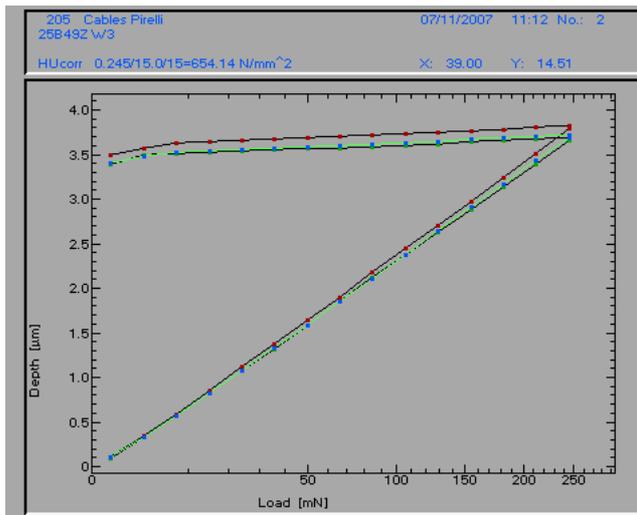


Individual Curves

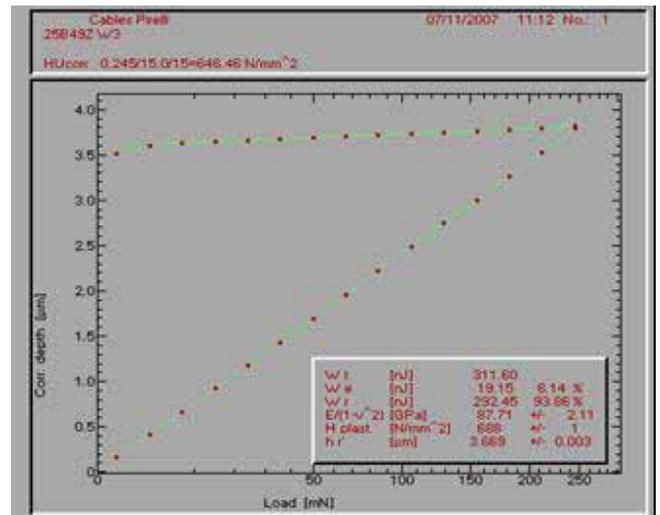


Mean Curve

**Wire 3 (25B49z):**

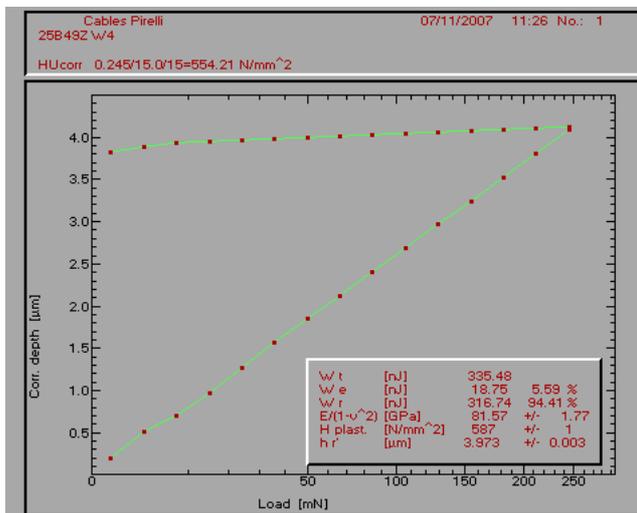


**Individual Curves**

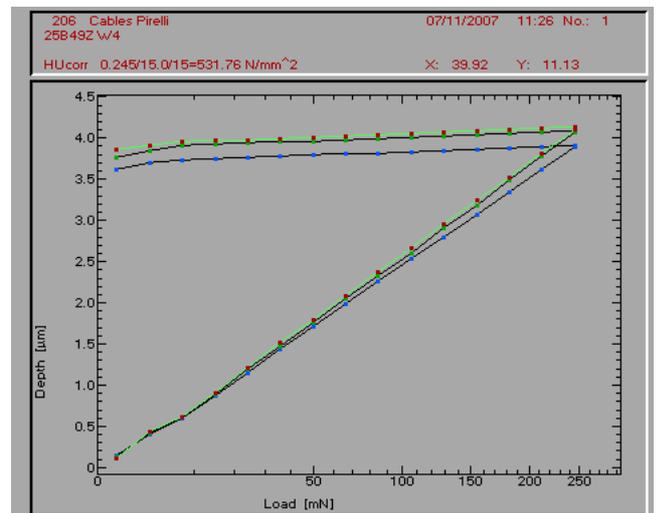


**Mean Curve**

**Wire 4 (25B49z):**



**Individual Curves**

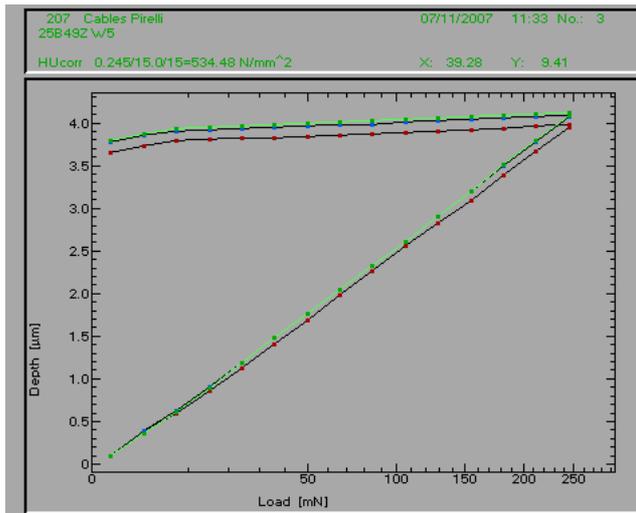


**Mean Curve**

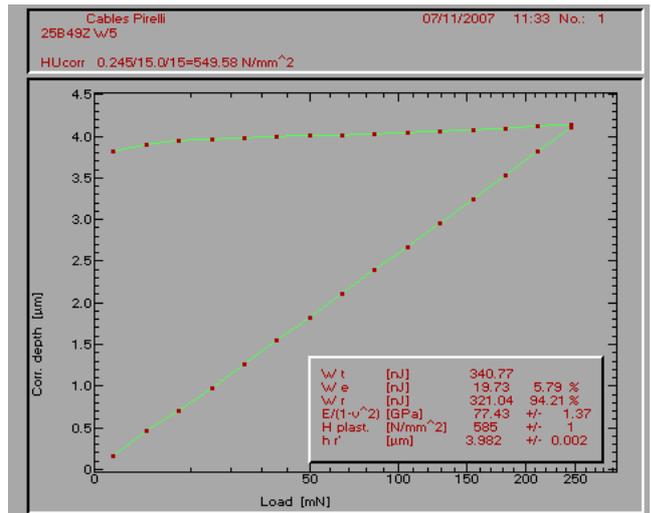


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Wire 5 (25B49z):

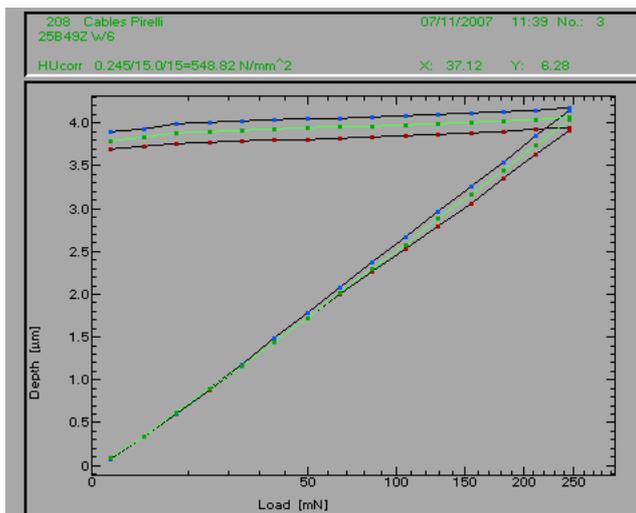


Individual Curves

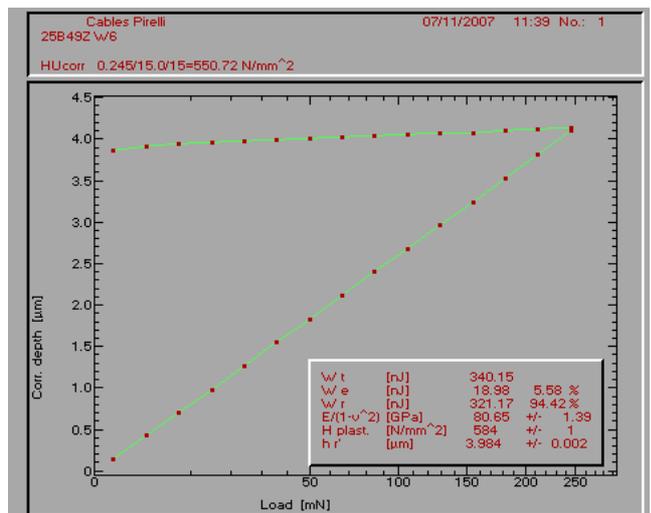


Mean Curve

Wire 6 (25B49z):



Individual Curves

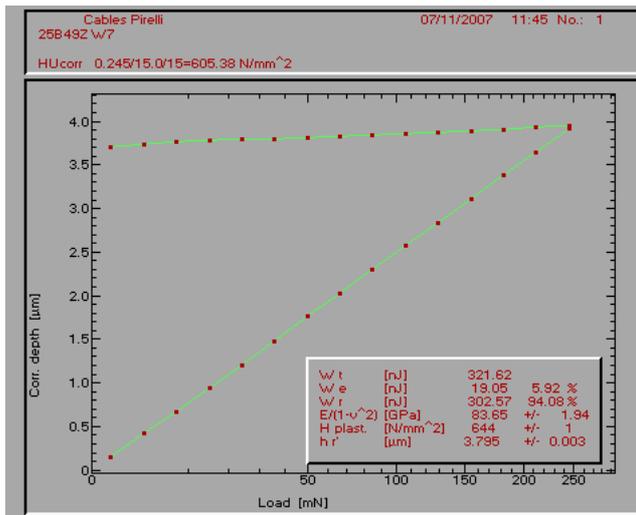


Mean Curve

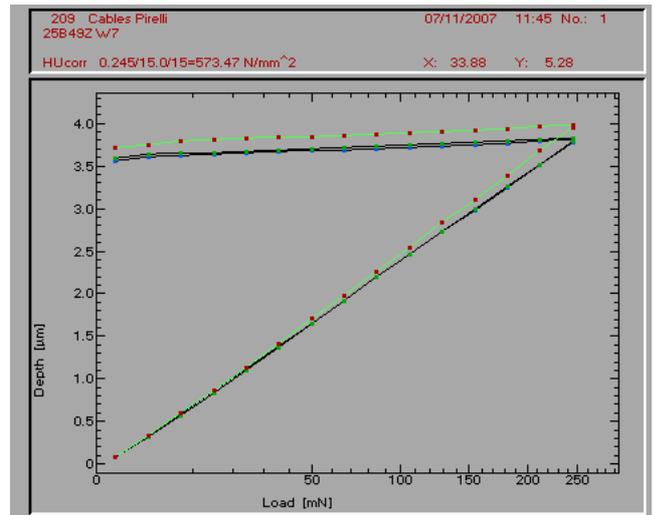


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Wire 7 (25B49z):

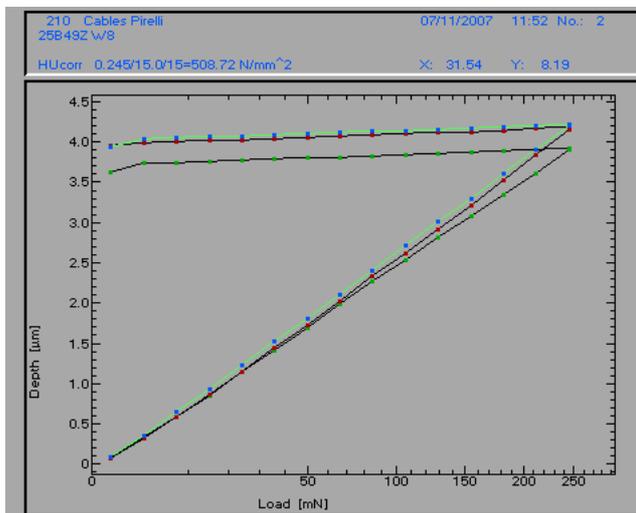


Individual Curves

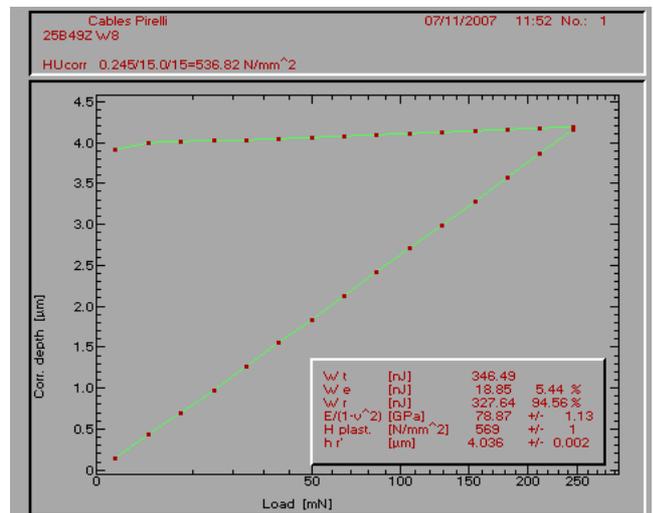


Mean Curve

Wire 8 (25B49z):



Individual Curves

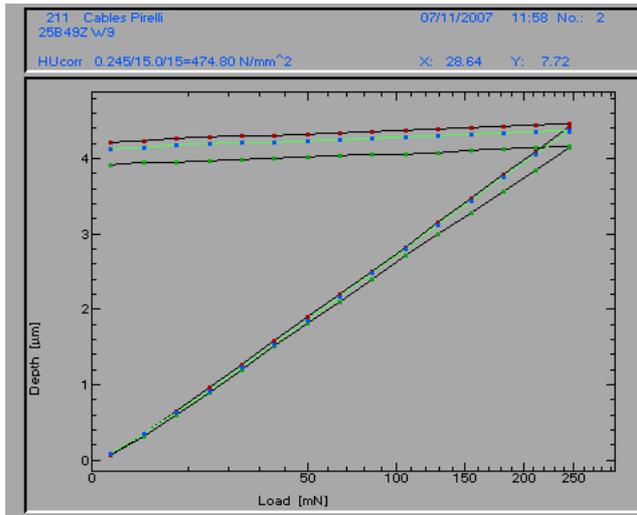


Mean Curve

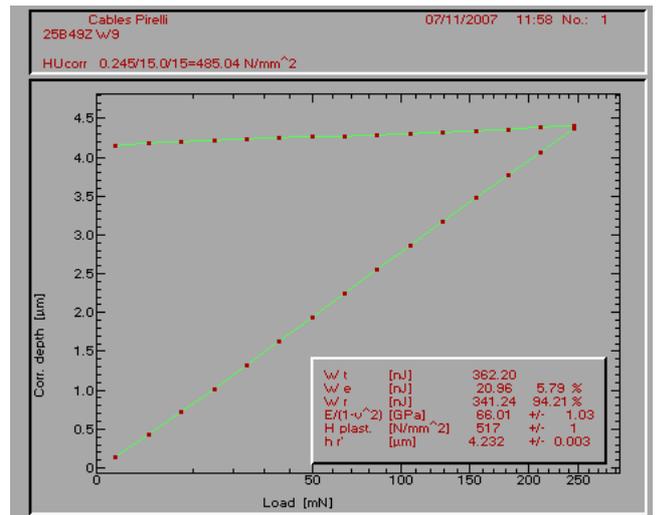


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Wire 9 (25B49z):

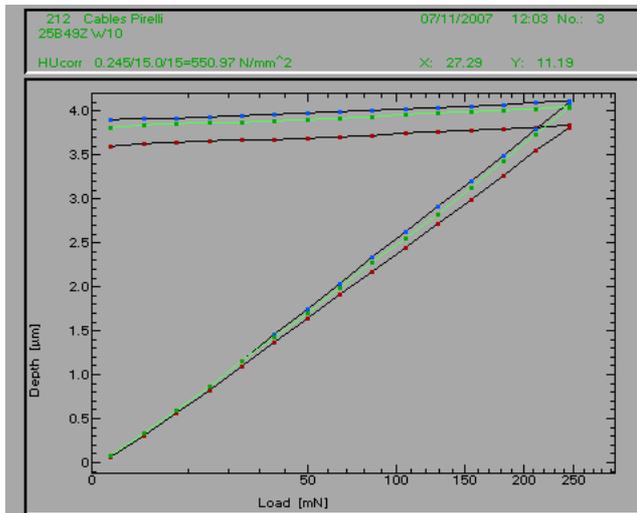


Individual Curves

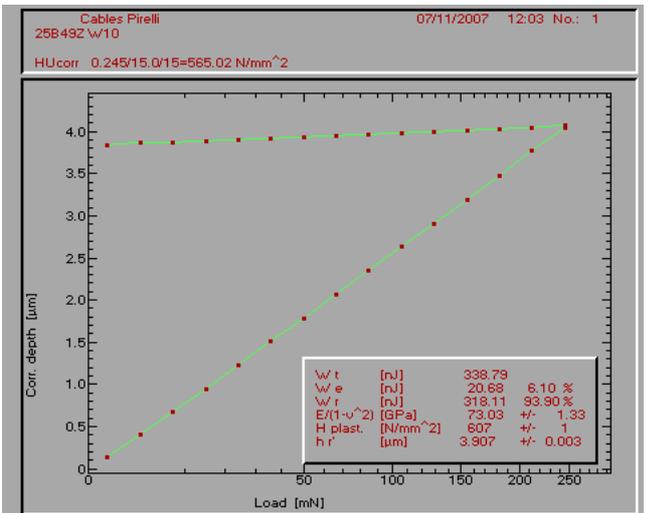


Mean Curve

Wire 10 (25B49z):



Individual Curves

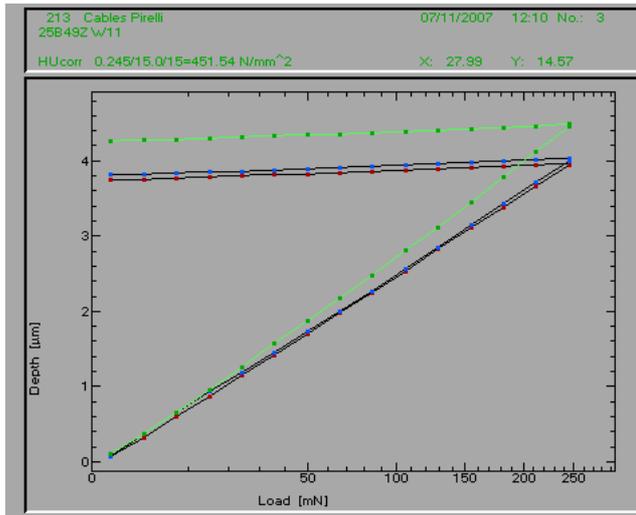


Mean Curve

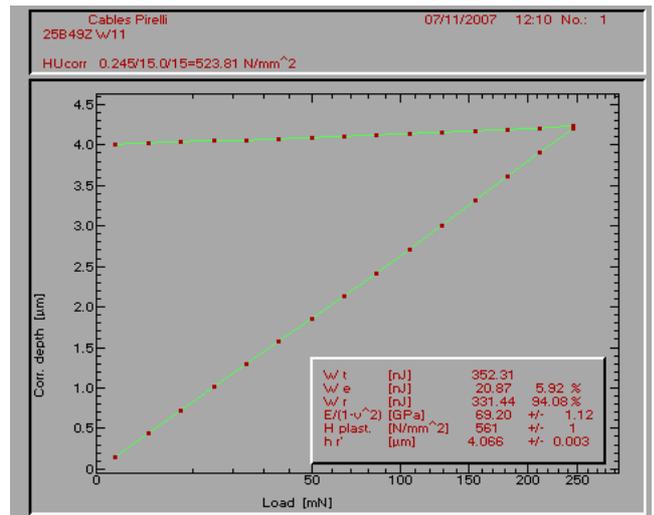


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Wire 11 (25B49z):

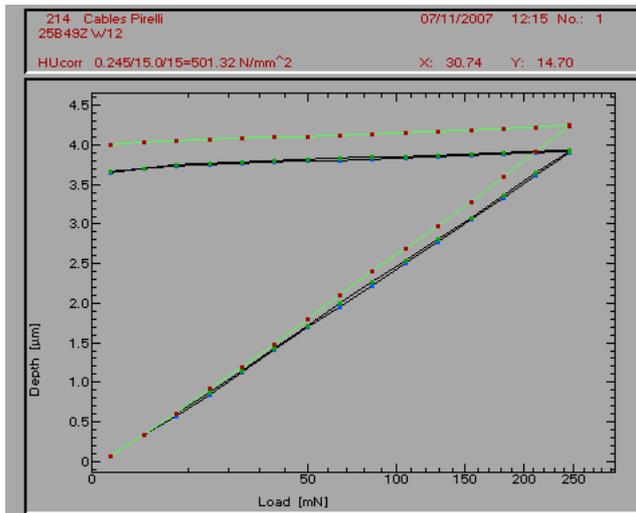


Individual Curves

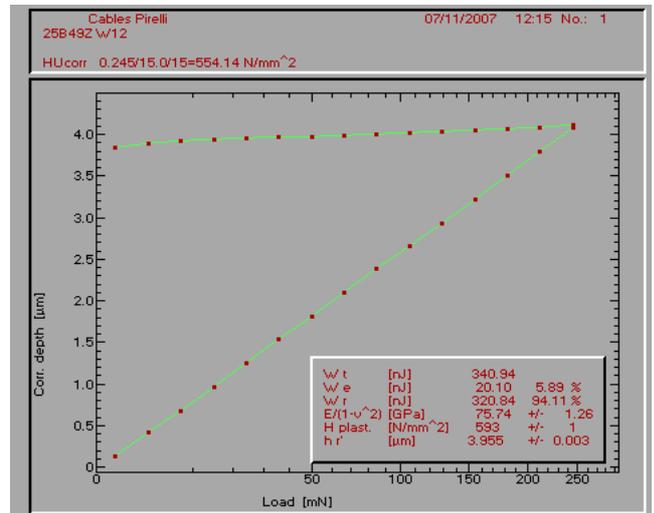


Mean Curve

Wire 12 (25B49z):



Individual Curves

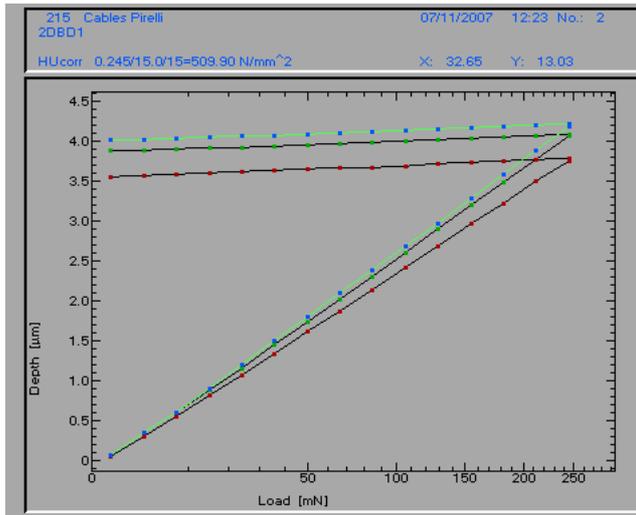


Mean Curve

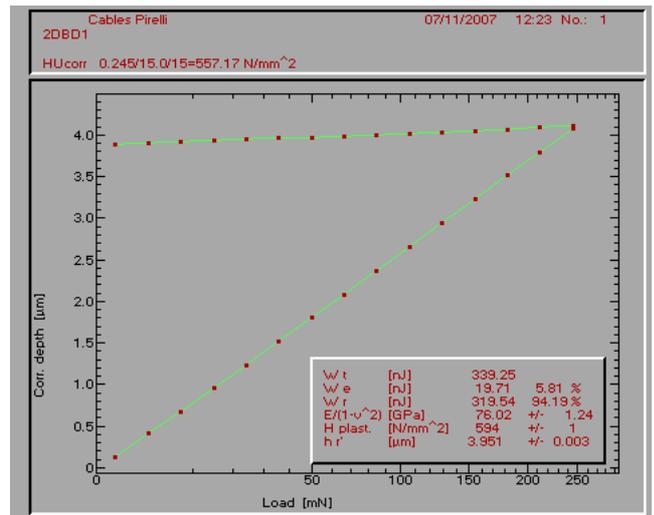


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Wire (2DBD1):

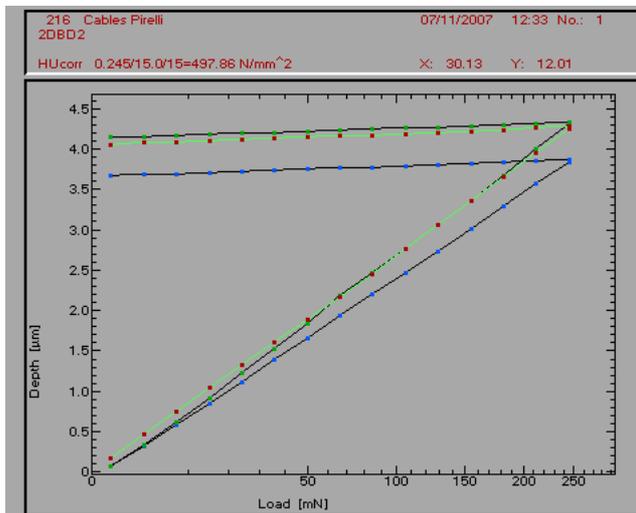


Individual Curves

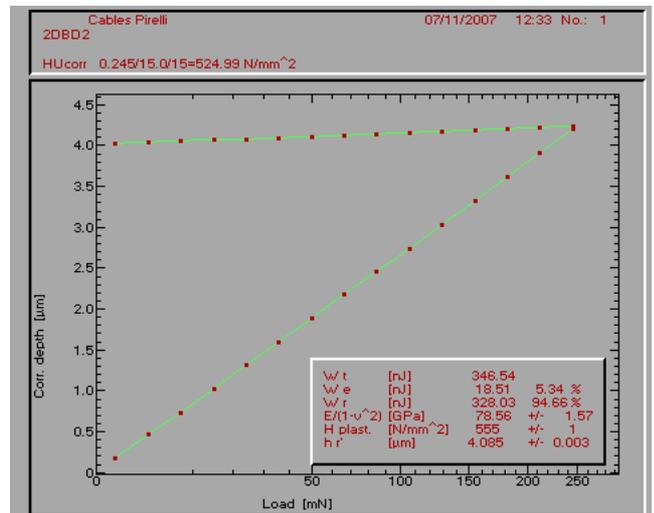


Mean Curve

Wire (2DBD2):



Individual Curves

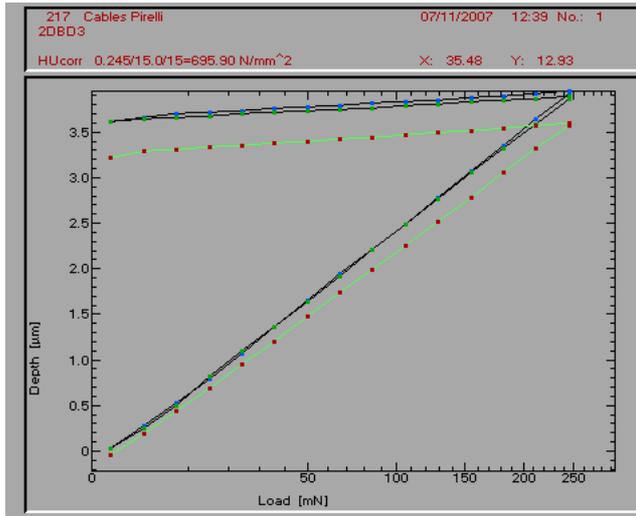


Mean Curve

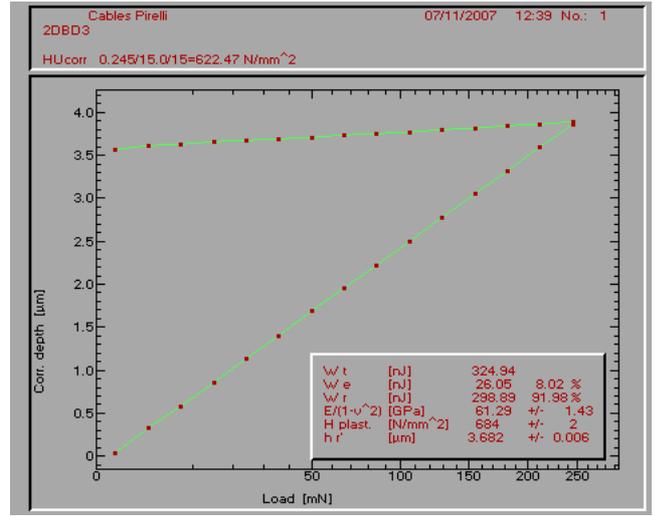


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Wire (2DBD3):

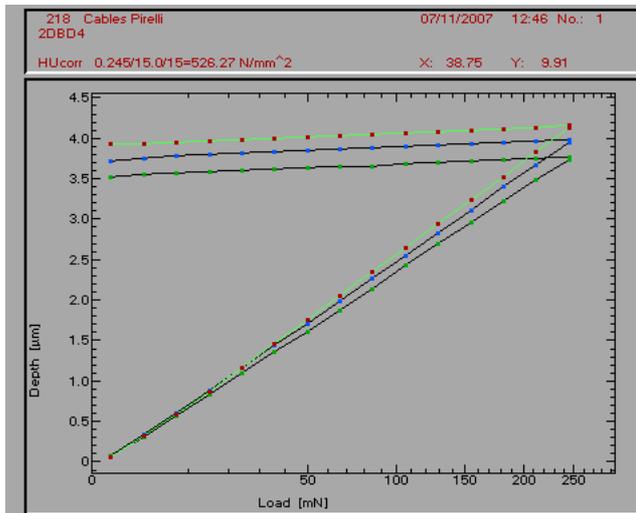


Individual Curves

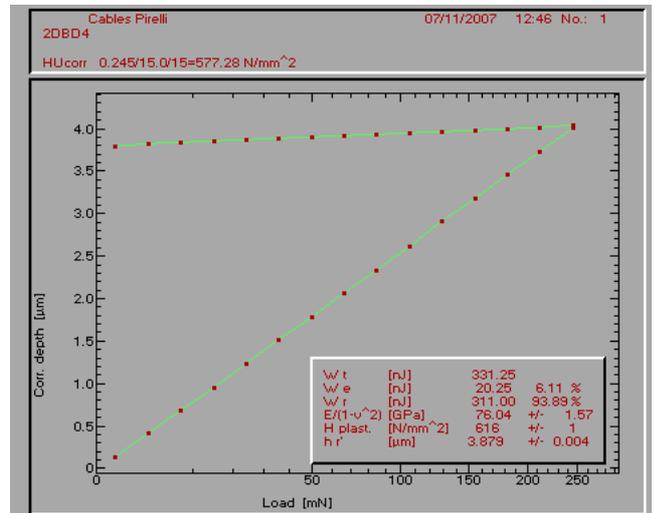


Mean Curve

Wire (2DBD4):



Individual Curves

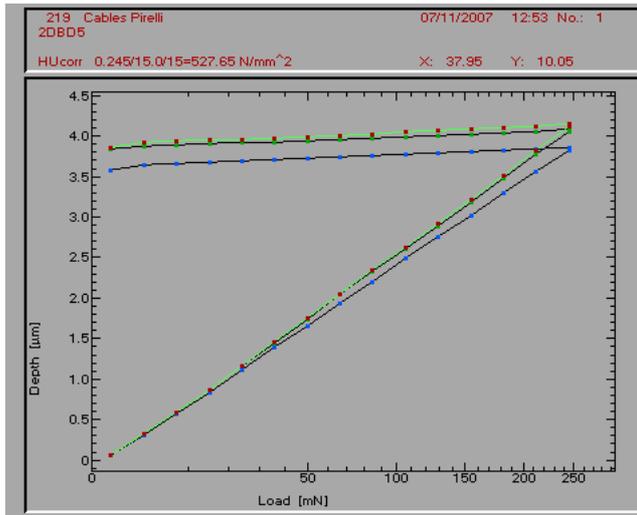


Mean Curve

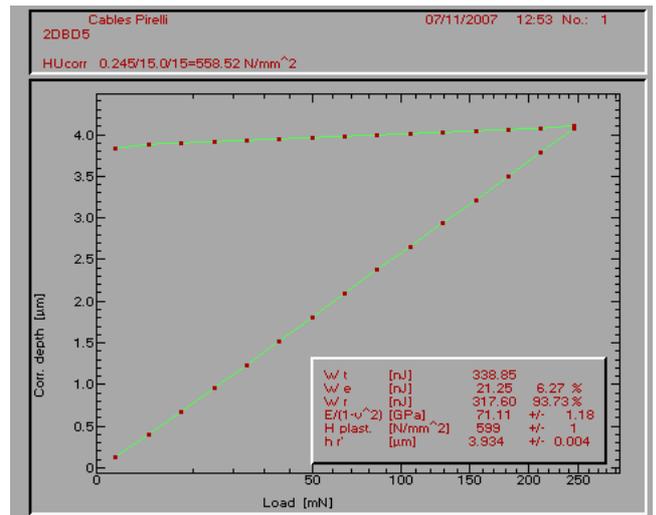


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Wire (2DBD5):

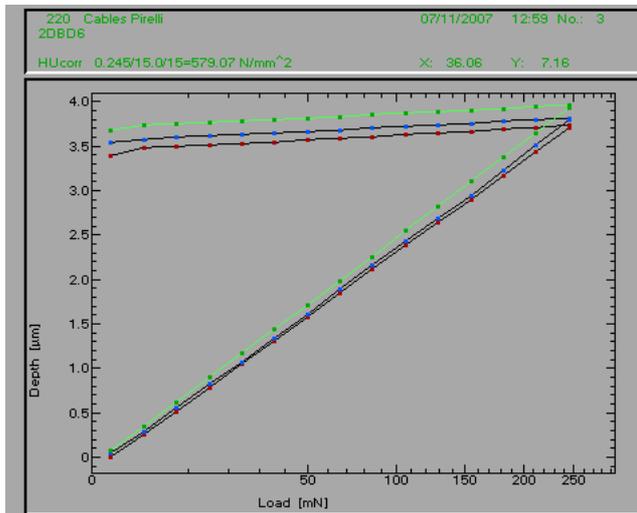


Individual Curves

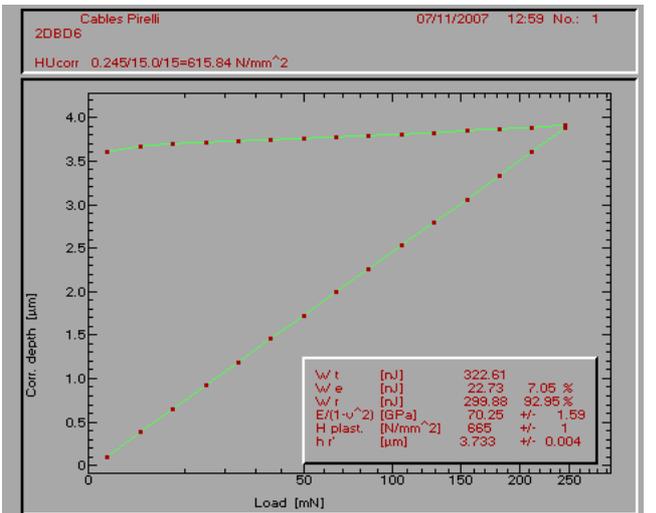


Mean Curve

Wire (2DBD6):



Individual Curves

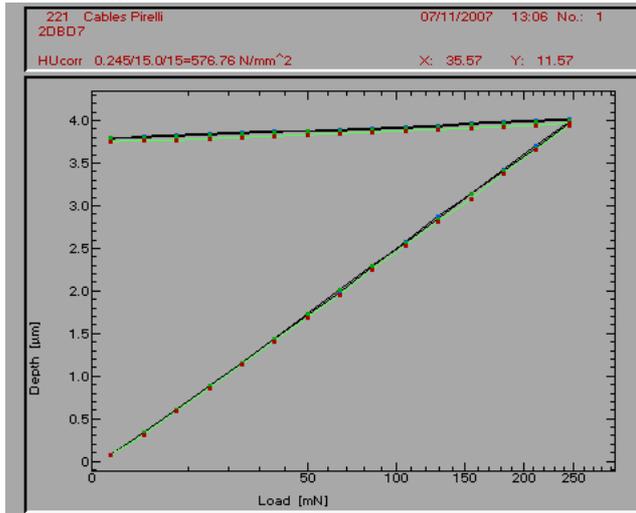


Mean Curve

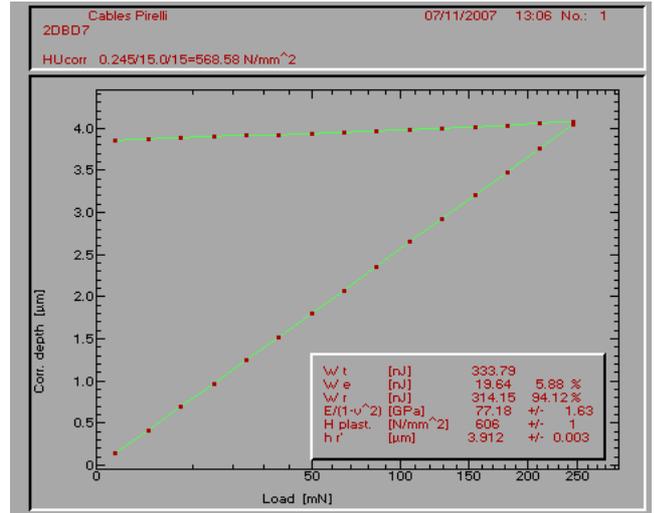


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Wire (2DBD7):

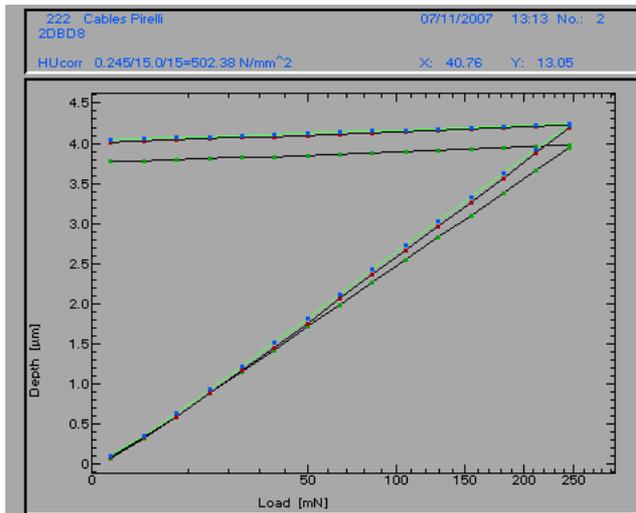


Individual Curves

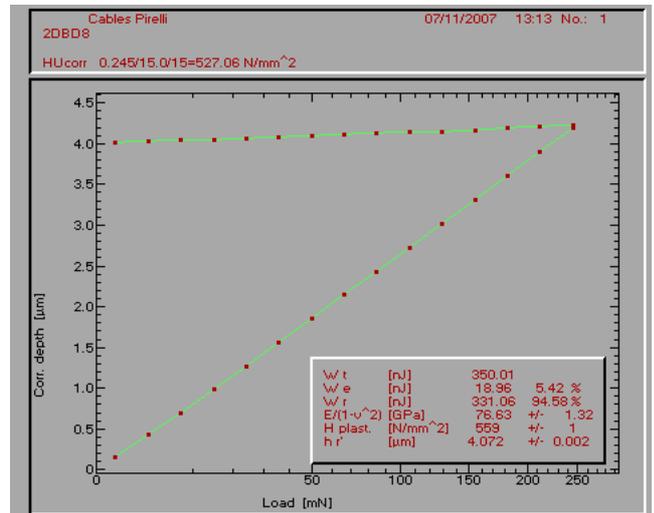


Mean Curve

Wire (2DBD8):



Individual Curves

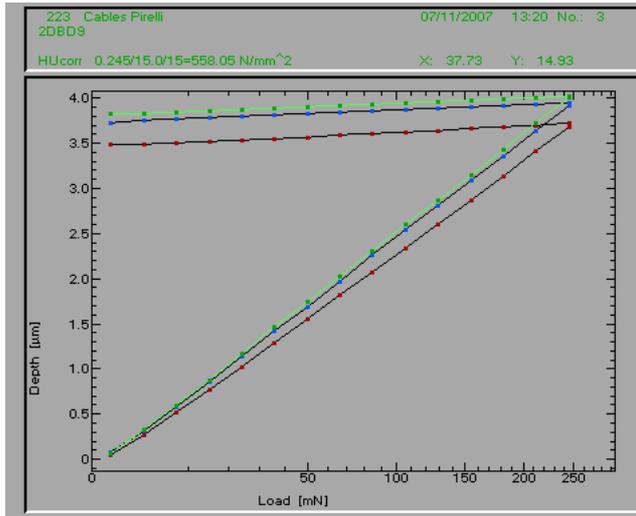


Mean Curve

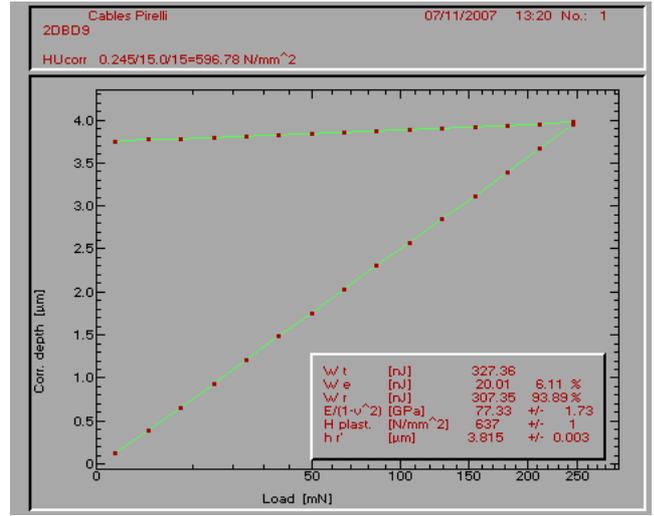


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Wire (2DBD9):

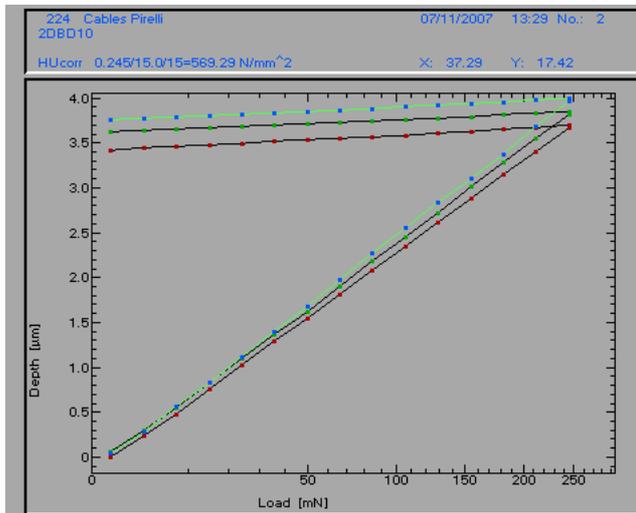


Individual Curves

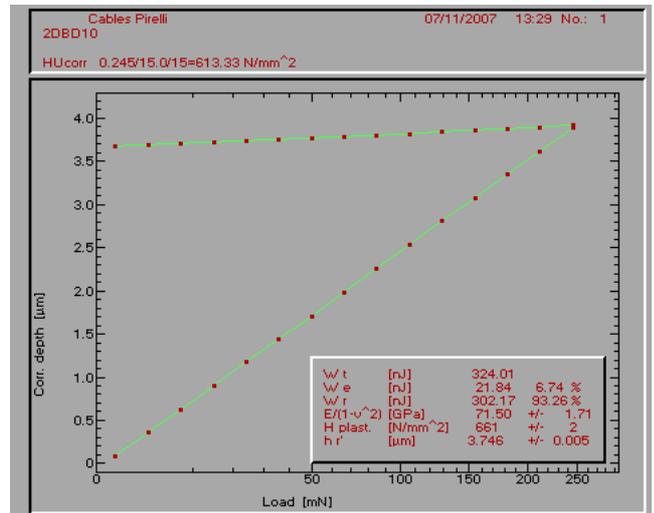


Mean Curve

Wire (2DBD10):



Individual Curves

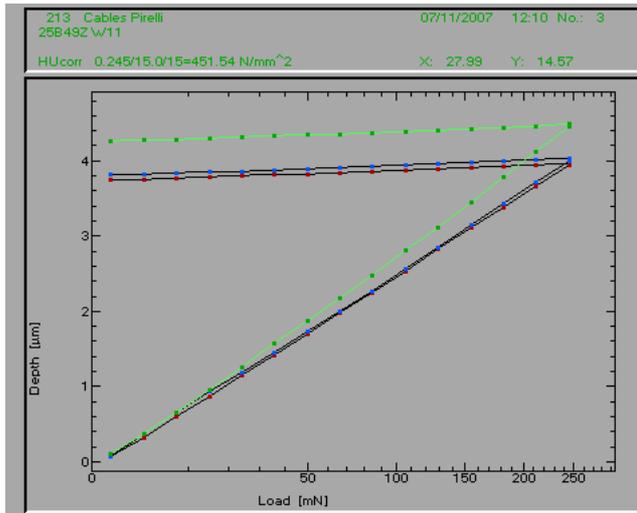


Mean Curve

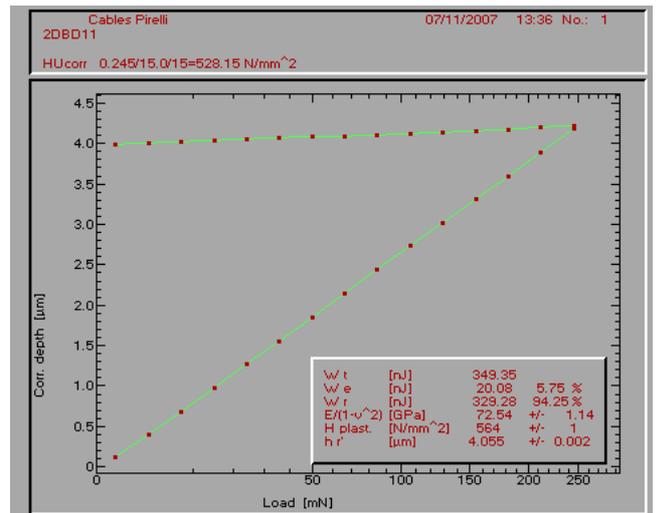


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Wire (2DBD11):

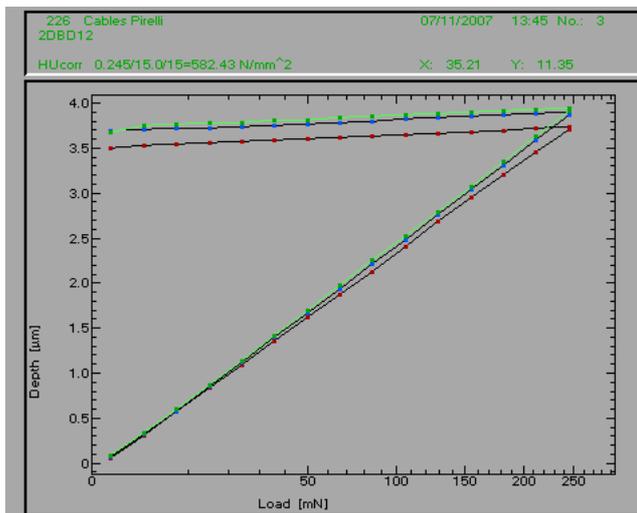


Individual Curves

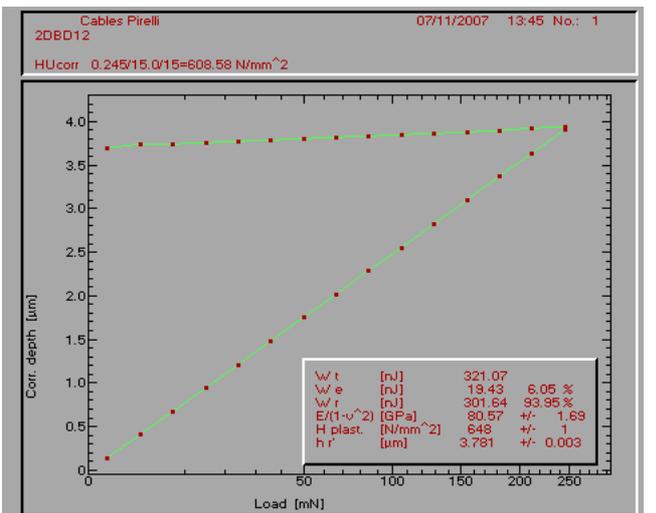


Mean Curve

Wire (2DBD12):



Individual Curves



Mean Curve

**PRY/07/10/04 ANNEX C**



**FISHERSCOPE H100 Equipment**

Where:

- A) Fisherscope H100 equipment Assembled.
- B) Hardware Unit.
- C) Positioning System.
- D) Mechanical Indentation System and Microscopy adjustment unit.

**Annex. B.- Report for Internal selfdamping, Aeolian vibrations and Mechanical cycles simulatimg thermal excursions. NESS**

# **NUOVA ELETTROMECCANICA SUD S.p.A.**

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**OPTICAL GROUNDWIRE  
OPGW PRYSMIAN 25B49z  $\phi$  12,5mm**

**SUSPENSION CLAMP FOR OPGW NES 8.21.11.002**

**TENSION CLAMP FOR OPGW NES 8.22.12.003**

**TYPE TESTS ACCORDING:**

**TERNA UX LC3907 rev.00**

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**Test Report N° 000098/07**

**DATE: 17-21/11/07**

**Test site: N.E.S. laboratory - Campo Calabro (RC) - Italy**

**For TERNA S.P.A.:**

**Mr. G. Gennusa**\_\_\_\_\_

**For PRYSMIAN CABLES Y SISTEMAS Mr. J. Martin Regalado**\_\_\_\_\_

**Responsabile del laboratorio N.E.S.:**

**Mr. C. Garescì**\_\_\_\_\_

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## **TESTS:**

- 1. Aeolian vibration fatigue test (ref. TERNA UX LC3907, Test U)**
  - 2. Mechanical cycles simulating thermal excursions (ref. TERNA UX LC3907, Test V)**
  - 3. Internal self damping of the cable (ref. TERNA UX LC3907, Test T)**
-

**1. Aeolian vibration fatigue test (ref. TERNA UX LC3907, Test U)**

A length of 60m OPGW Prysmian 25B49z, equipped with tension clamps NES, has been loaded between the ends of the test span at 1341 daN corresponding to 18% of the UTS of the OPGW, with a tail of 10m at each extremity for optical measurements. A suspension clamp NES has been installed at the middle of the span with an exit angle of the OPGW of 5°.

The vibrations on the OPGW has been induced by means an electromechanical shaker.

The values of parameters used for the test are:

Resonance frequency:	51.641 Hz
Load:	1341 daN
Bending:	450 µstrain
Cycles:	10 <sup>7</sup>

The bending of the cable have been measured and recorded by means of two of strain gages installed within 2mm from the latest point of contact of the OPGW and the clamps.

All fibres have been spliced in series for OTDR optical measurements.

Optical measurements have been carried out at the beginning, during and at the end of the test.

A spectral analysis of the attenuation trace have been performed in the band 0-300Hz.

**Test Results:**

- No failure in any part of the OPGW have been observed .
- No variations occurred in the attenuation value from the beginning to the end of the test within the measurement precision of 0.02dB/Km.
- No spectral component in the band 0-300 Hz have been observed

**Satisfactory**

**2. Mechanical cycles simulating thermal excursions (ref. TERNA UX LC3907, Test V)**

A length of 60m OPGW Prysmian 25B49z, equipped with tension clamps NES, has been anchored between the ends of the test span at 1341 daN corresponding to 18% of the UTS of the OPGW, with a tail of 10m at each extremity for optical measurements.

All fibres have been spliced in series for OTDR optical measurements.

Fifty mechanical cycles have been performed in sequence passing from 596 daN (8% of UTS of the OPGW) to 4097 daN (55% of UTS of the OPGW). Each cycle had a duration of 30 min.

Optical measurements have been carried out at the beginning, during and at the end of the test.

**Test result:** No variations occurred in the attenuation value from the beginning to the end of the test within the measurement precision of 0.02dB/Km.

**Satisfactory**

**3. Internal self damping of the cable (ref. TERNA UX LC3907, Test T)**

The test has been carried out in conformity with CIGRE' n° 62 1979. The power method has been adopted.

A test span of 42,5m has been used.

The cable has been loaded at 1341daN corresponding to 18% of UTS of the cable, passing through rigid, square-faced end plates to minimize energy losses at the extremity of the span.

The vibration table has been connected to the OPGW by an elastic mean, at a distance of 0,7m from a span extremity. This distance guarantees the positioning of the table far from any nodal point for all the test frequency range.

A piezoelectric load cell has been interposed between the elastic mean and the OPGW. A piezoelectric accelerometer have been positioned over the OPGW.

The span has been excited at 5 different resonance. The resonance conditions have been verified checking the hysteretic cycles.

The amplitudes have been checked and measured by means a laser displacement transducer.

The values of frequency, displacement at antinode, velocity at antinode, the ratio of displacement and diameter and power per meter have been measured, recorded and diagrammed.

freq (Hz)	Displ. (mm)	Vel. (Hz*mm)	Y/D	Pow(mW/m)
29,71	1,070	31,790	0,064	0,282
29,71	2,220	65,956	0,133	1,106
29,71	3,260	96,855	0,195	3,082
41,6	0,750	31,200	0,045	0,518
41,6	1,550	64,480	0,093	2,471
41,6	2,300	95,680	0,138	5,412
41,6	2,480	103,168	0,149	7,224
51,5	0,610	31,415	0,037	0,776
51,5	1,100	56,650	0,066	3,529
51,5	2,100	108,150	0,126	7,412
61,41	0,510	31,319	0,031	1,341
61,41	0,910	55,883	0,054	4,471
61,41	1,510	92,729	0,090	9,412
73,29	0,350	25,652	0,021	1,553
73,29	0,850	62,297	0,051	5,224
73,29	1,350	98,942	0,081	14,588

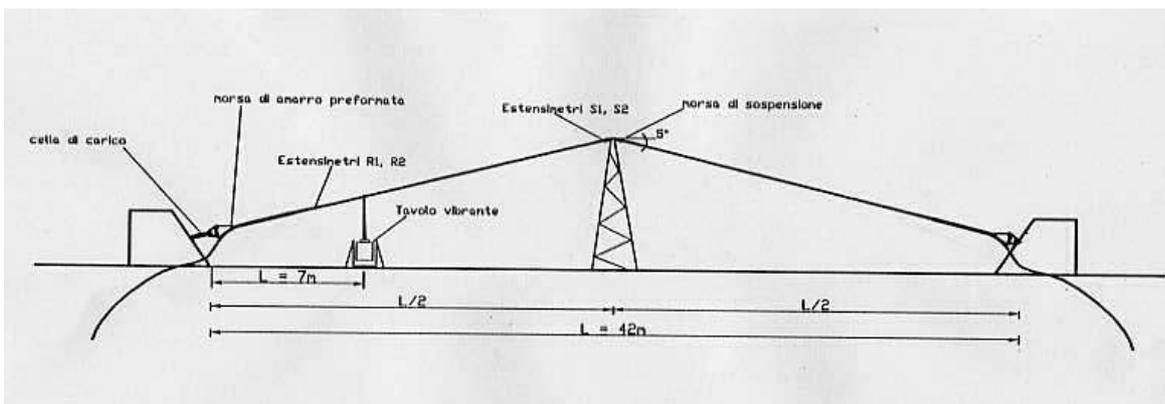
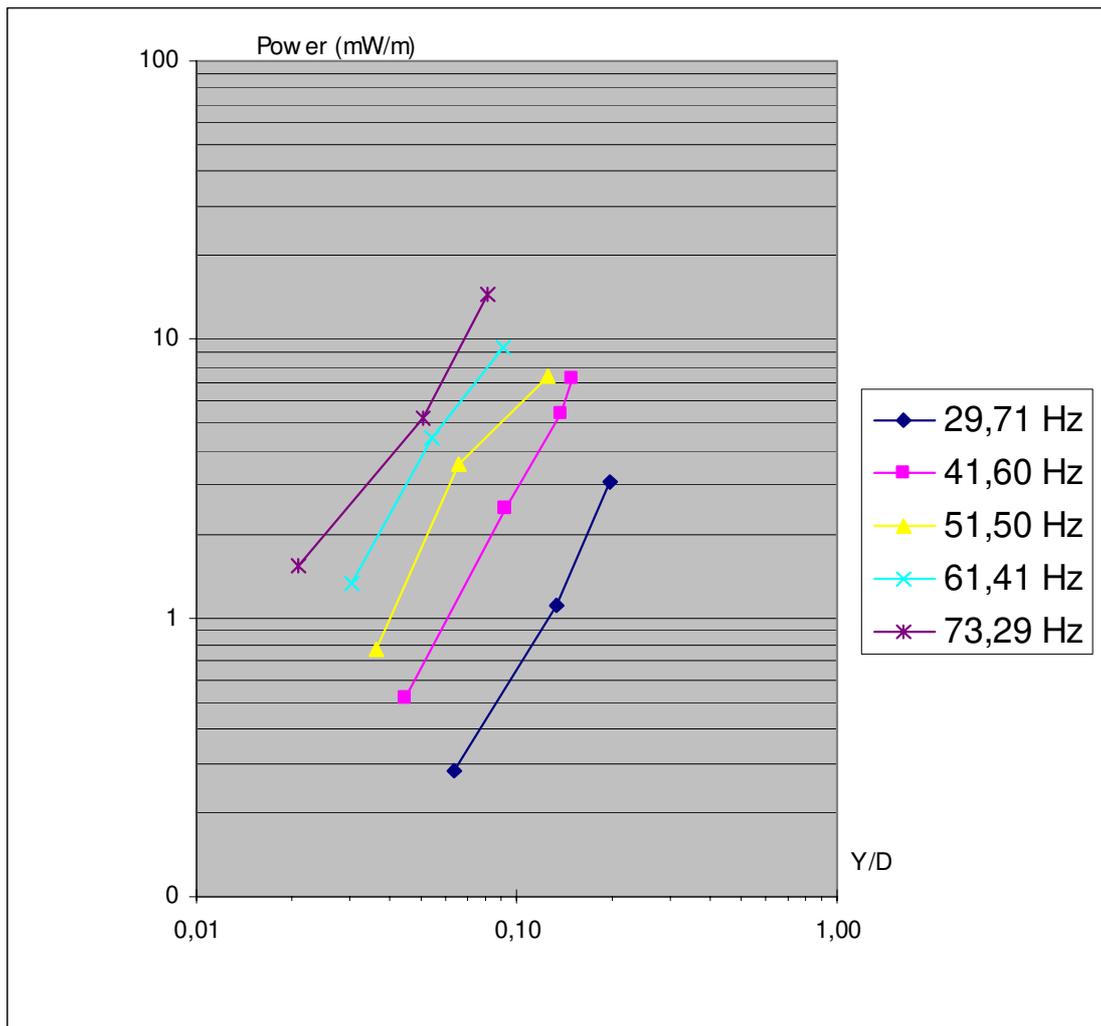


Fig.1. OPGW Prysmian 25B49z, Suspension clamp NES 8.21.11.002, tension clamp NES 8.22.12.003. Test U "Aeolian vibration fatigue test". Test Set up

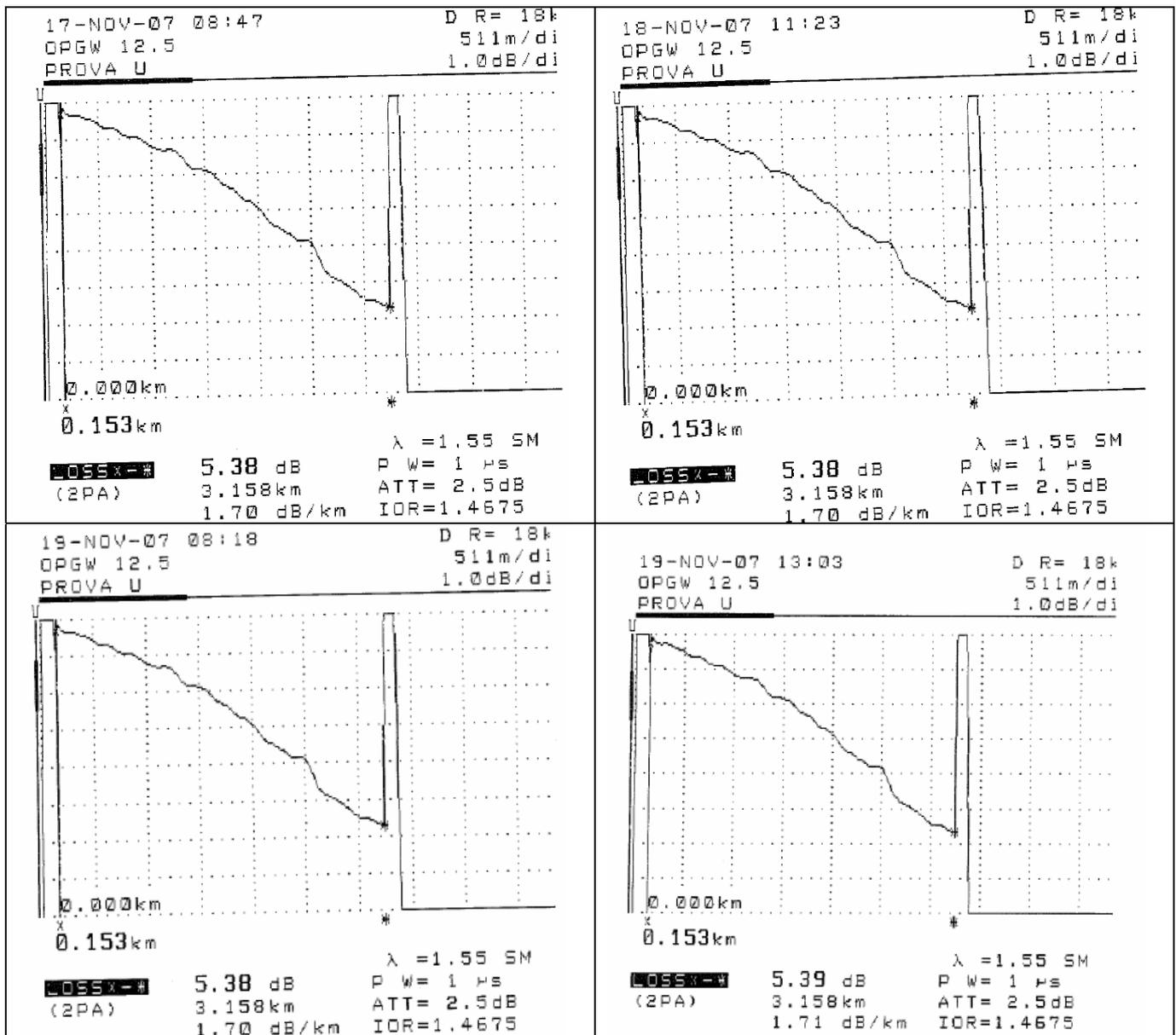
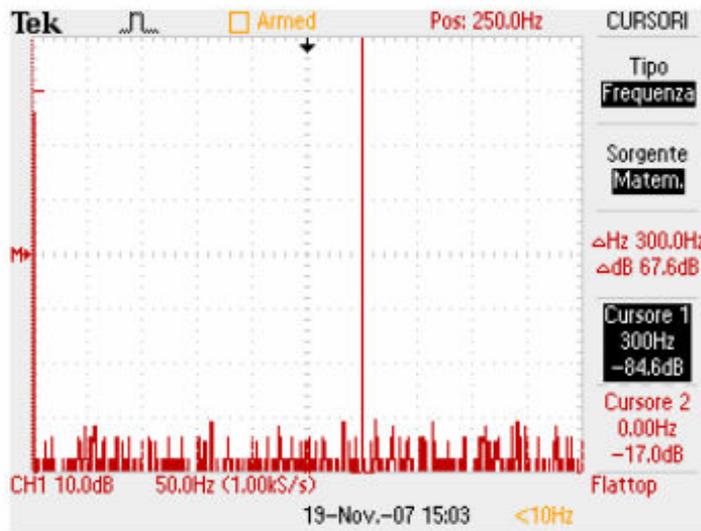


Fig.2. OPGW Prysmian 25B49z, Suspension clamp NES 8.21.11.002, tension clamp NES 8.22.12.003.  
 Test U "Aeolian vibration fatigue test".  
 Optical measurement at beginning during, and at the end of test.



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Fig.3. OPGW Prysmian 25B49z, Suspension clamp NES 8.21.11.002, tension clamp NES 8.22.12.003. Test U “Aeolian vibration fatigue test”. Spectral analysis of the attenuation trace in the band 0-300 Hz.

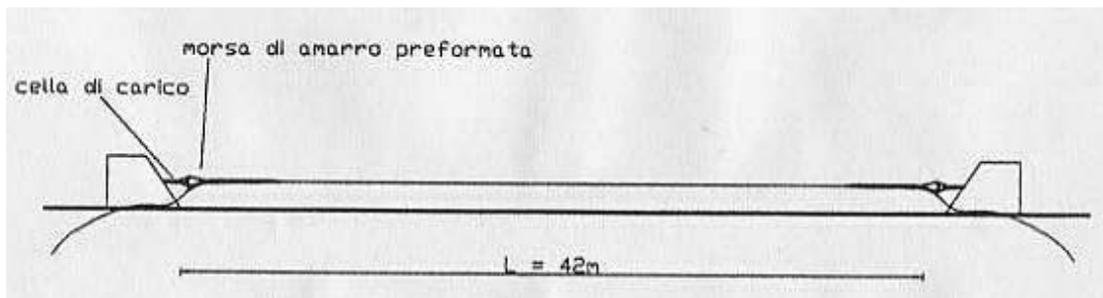
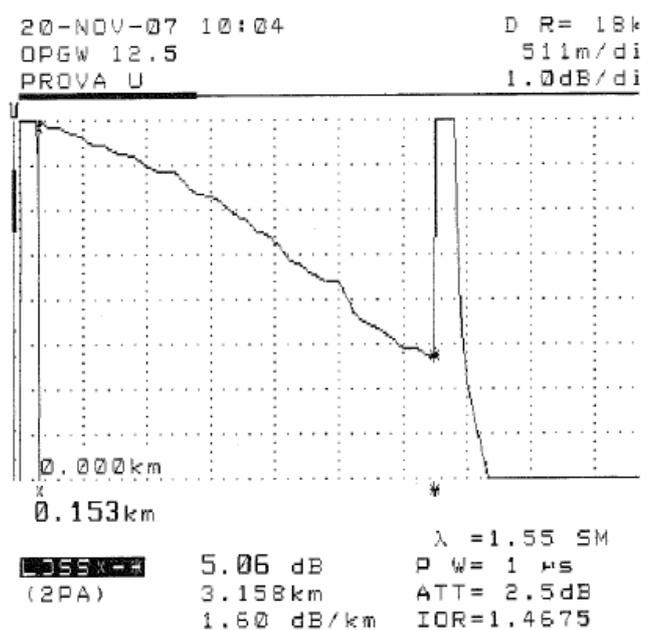
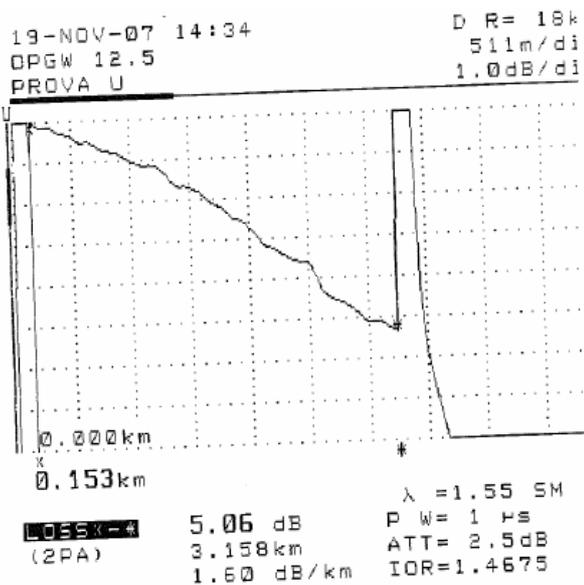


Fig.4. OPGW Prysmian 25B49z, tension clamp NES 8.22.12.003. Test V “Mechanical cycles simulating thermal excursions”. Test set up



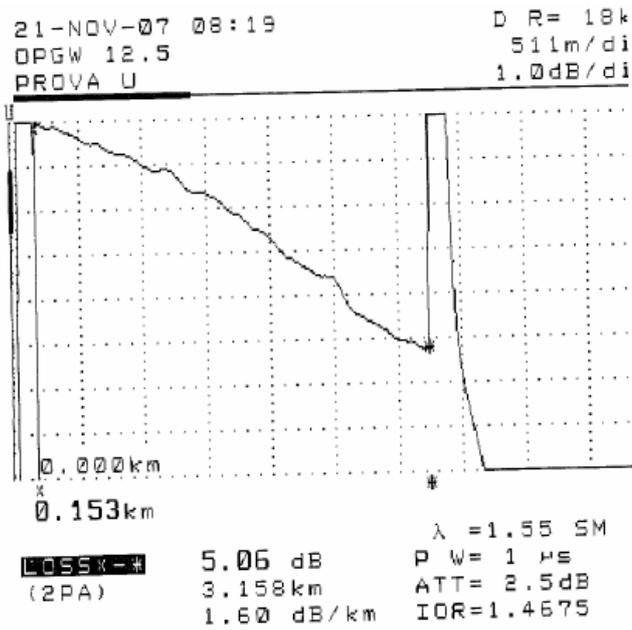
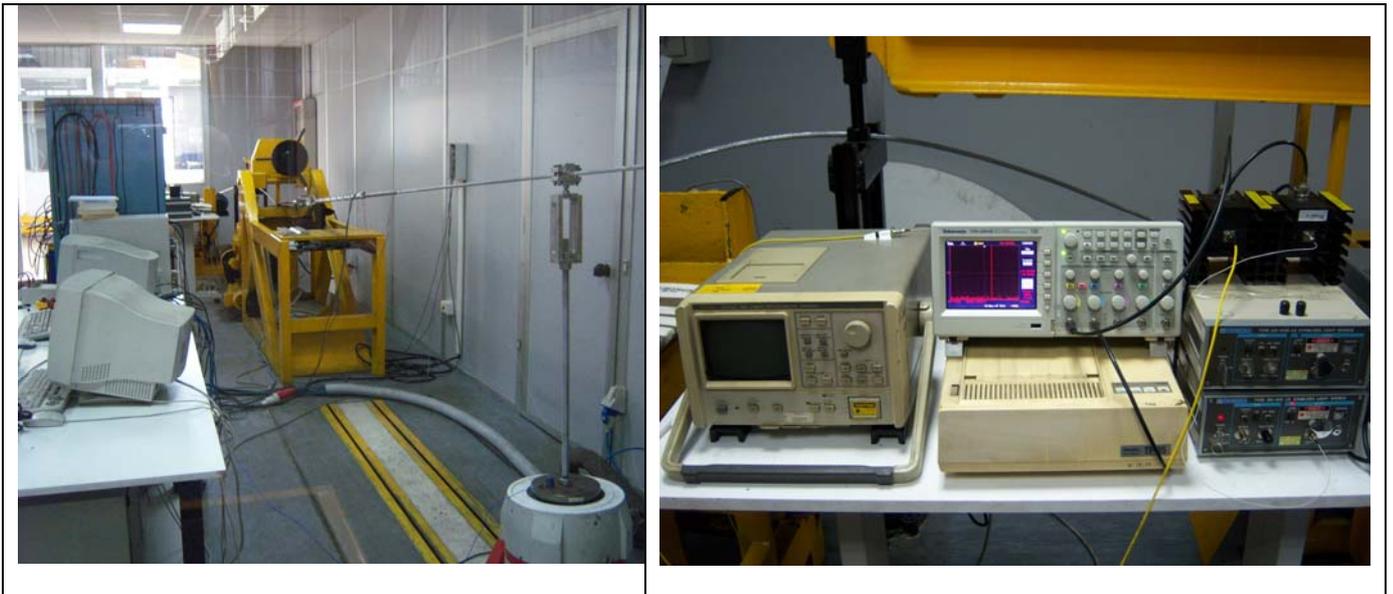


Fig.5. OPGW Prysmian 25B49z, tension clamp NES 8.22.12.003.  
Test V “Mechanical cycles simulating thermal excursions”.  
Optical measurement at beginning during, and at the end of test.



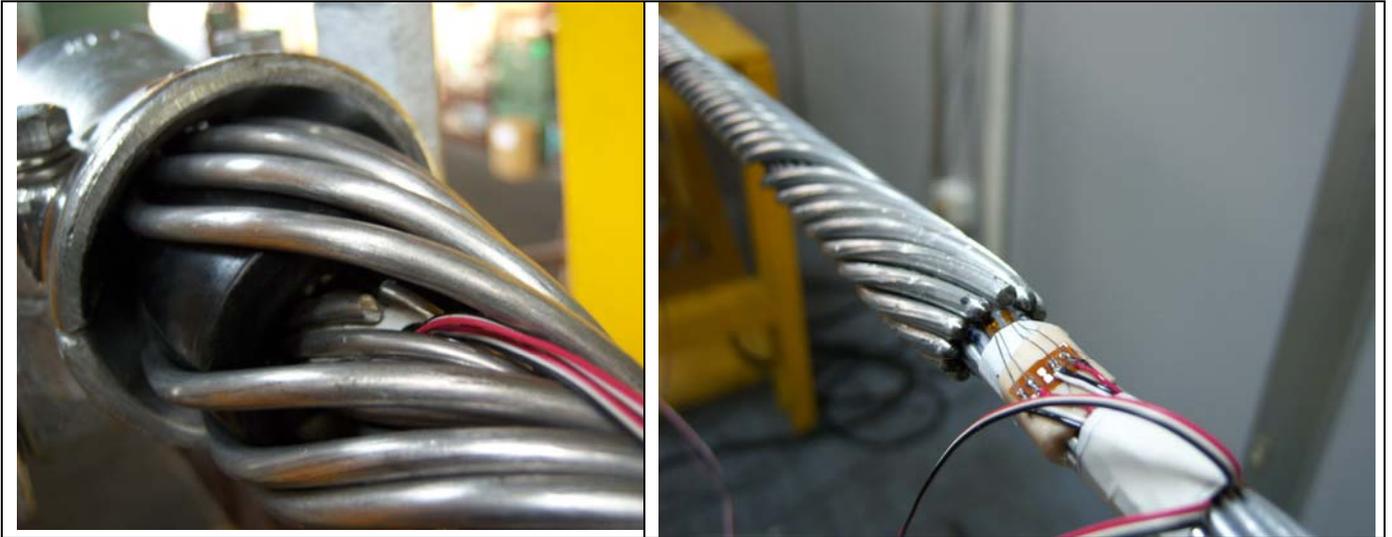
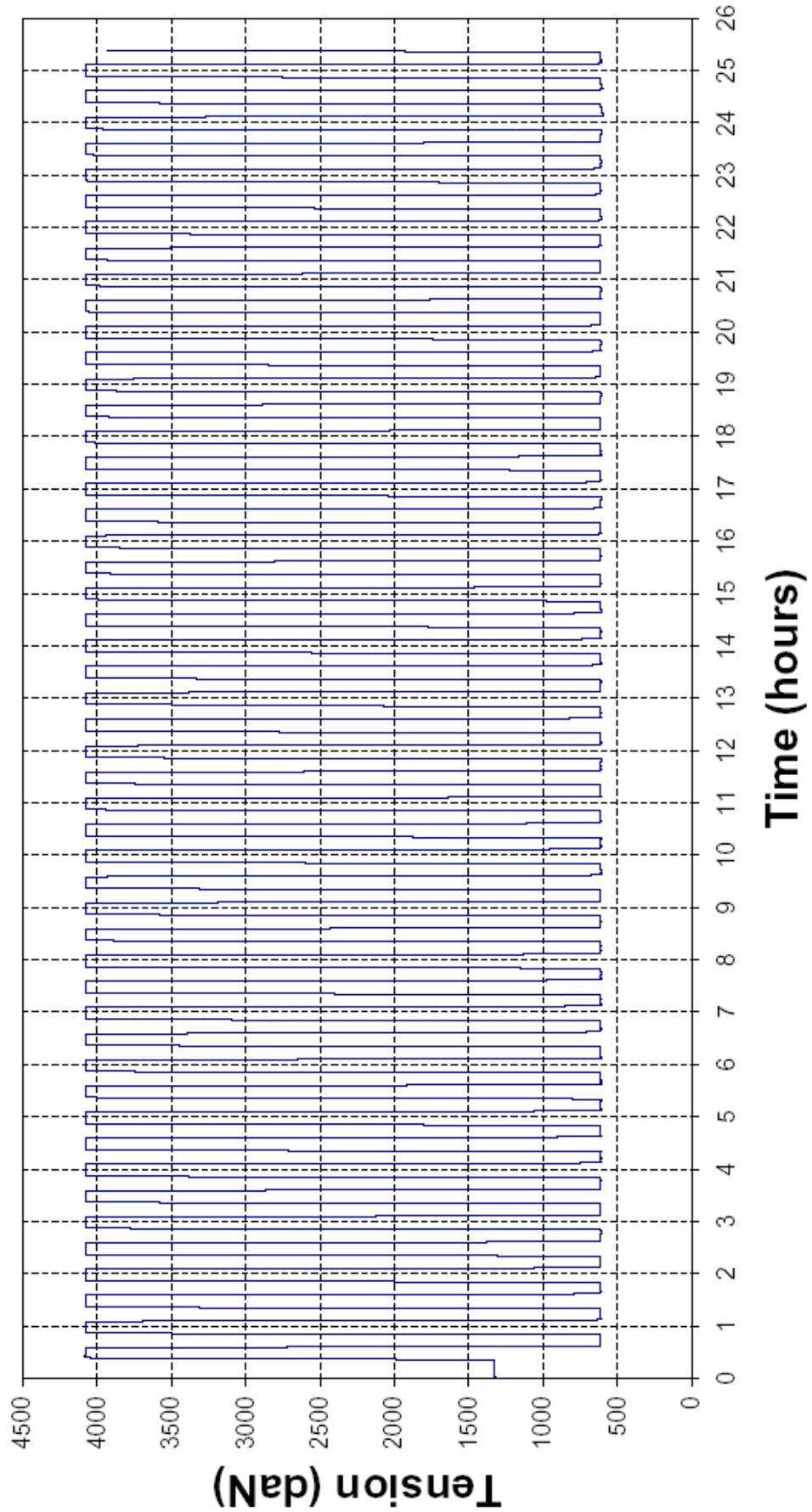


Fig.6. OPGW Prysmian 25B49z, Suspension clamp NES 8.21.11.002, tension clamp NES 8.22.12.003.  
Test U “Aeolian vibration fatigue test”.

**Terna UX LC 3907 - Test V**  
**Mechanical cycles simulating thermal excursions**  
Cable: Prysmian 12.5 25B49z - Tension Clamp: NES 8.22.12.003  
UTS=74.5 kN S1=1341 daN S2=596 daN S3=4097 daN



**N.E.S. NUOVA ELETTROMECCANICA SUD SpA**  
 Zona Industriale - 89052 CAMPO CALABRO (RC) - ITALIA

**VIBRATION FATIGUE TEST**

Specifica TERNIA UX LC3907, prova U

Sample MORSETTERIA PER CPGW NES  
 Code NES 82212003 - 82111002  
 Cable manufacturer Pysmian Cables and Systems  
 Cable Type Pysmian 2EB49z  
 Cable diameter (mm) 13  
 Bending required (µstrain) 450  
 Tension load (daN) 1341  
 Cycles number 10000000  
 Test frequency (Hz) 51.641  
 Initial Test date 17/11/2007 08:43:24  
 Final test date 19/11/2007 14:31:02

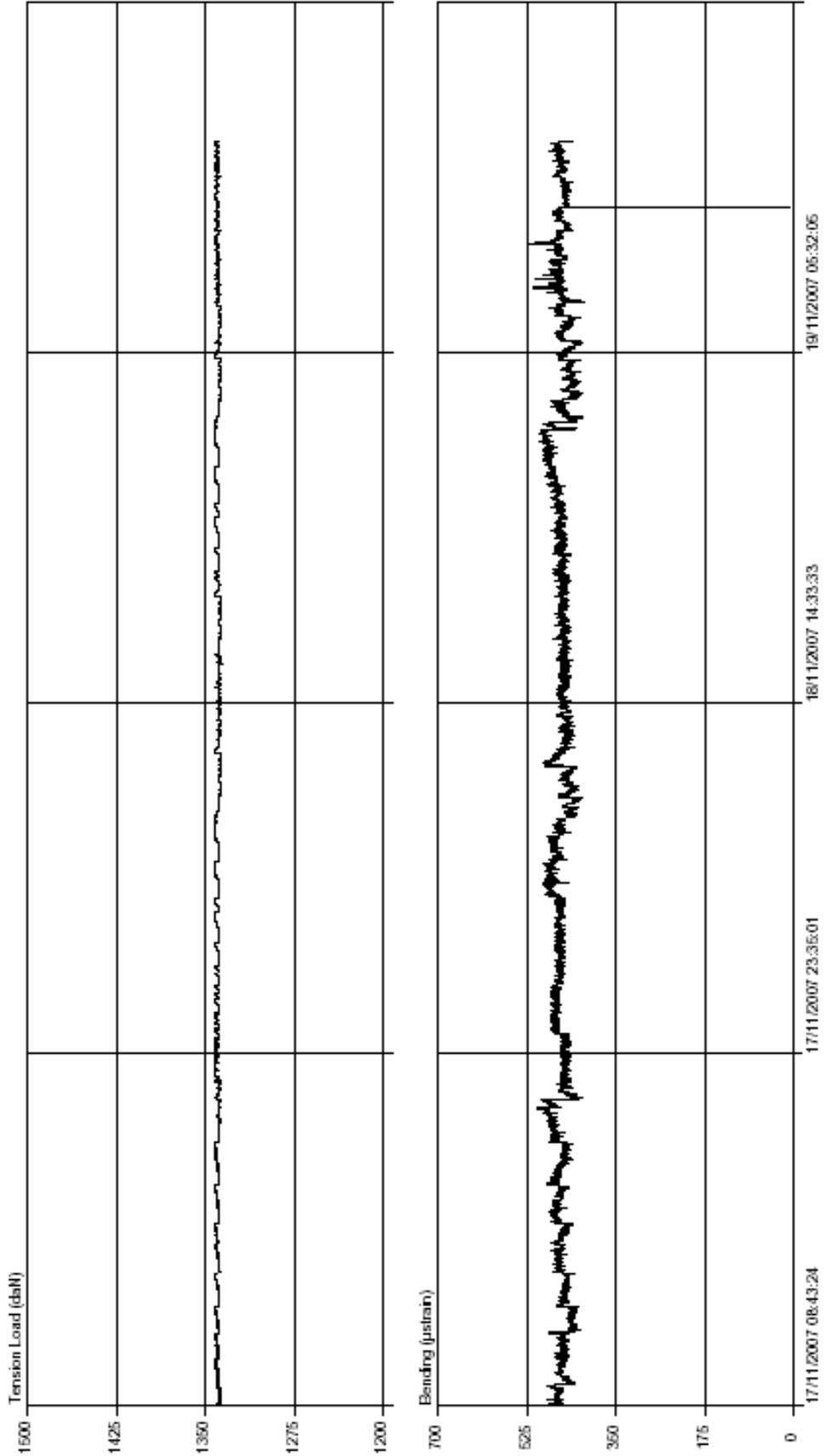




Fig.7. . OPGW Prysmian 25B49z, tension clamp NES 8.22.12.003.  
Test V “Mechanical cycles simulating thermal excursions”.



Fig.8. OPGW Prysmian 25B49z - Test T “Internal damping”.

## **Annex. C.- Attenuation measurements**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020 **N° ANALYSIS:** 40060000 **CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27/11/2007 **PHASE:** ARMOURED

**DRUM:** W06347W **LENGHT(Mts):** 2004

ColourTub	NumTub	ColourFiber	TypeFiber	ATT.1310	ATT.1550
BLUE	1	AQUA	M	0.33	0.20
BLUE	1	AQUA 1	M	0.33	0.20
BLUE	1	AQUA 2	M	0.33	0.20
BLUE	1	AQUA 3	M	0.33	0.19
BLUE	1	BLACK	M	0.33	0.19
BLUE	1	BLUE	M	0.33	0.20
BLUE	1	BLUE 1	M	0.33	0.20
BLUE	1	BLUE 2	M	0.33	0.19
BLUE	1	BLUE 3	M	0.33	0.20
BLUE	1	BROWN	M	0.34	0.20
BLUE	1	BROWN 1	M	0.34	0.20
BLUE	1	BROWN 2	M	0.32	0.20
BLUE	1	BROWN 3	M	0.33	0.20
BLUE	1	GREEN	M	0.34	0.20
BLUE	1	GREEN 1	M	0.34	0.19
BLUE	1	GREEN 2	M	0.34	0.20
BLUE	1	GREEN 3	M	0.34	0.20
BLUE	1	NATURAL 1	M	0.35	0.20
BLUE	1	NATURAL 2	M	0.33	0.20
BLUE	1	NATURAL 3	M	0.34	0.20
BLUE	1	ORANGE	M	0.33	0.21
BLUE	1	ORANGE 1	M	0.33	0.21
BLUE	1	ORANGE 2	M	0.33	0.20
BLUE	1	ORANGE 3	M	0.35	0.21
BLUE	1	PINK	M	0.33	0.20
BLUE	1	PINK 1	M	0.33	0.19
BLUE	1	PINK 2	M	0.34	0.21
BLUE	1	PINK 3	M	0.34	0.20
BLUE	1	RED	M	0.33	0.19
BLUE	1	RED 1	M	0.34	0.20
BLUE	1	RED 2	M	0.33	0.19
BLUE	1	RED 3	M	0.33	0.20
BLUE	1	SLATE	M	0.33	0.19
BLUE	1	SLATE 1	M	0.34	0.20
BLUE	1	SLATE 2	M	0.33	0.20
BLUE	1	SLATE 3	M	0.33	0.20

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020 **N° ANALYSIS:** 40060000 **CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27/11/2007 **PHASE:** ARMOURED

**DRUM:** W06347W **LENGHT(Mts):** 2004

ColourTub	NumTub	ColourFiber	TypeFiber	ATT.1310	ATT.1550
BLUE	1	VIOLET	M	0.33	0.19
BLUE	1	VIOLET 1	M	0.33	0.20
BLUE	1	VIOLET 2	M	0.33	0.19
BLUE	1	VIOLET 3	M	0.34	0.19
BLUE	1	WHITE	M	0.34	0.20
BLUE	1	WHITE 1	M	0.35	0.20
BLUE	1	WHITE 2	M	0.33	0.20
BLUE	1	WHITE 3	M	0.33	0.20
BLUE	1	YELLOW	M	0.33	0.20
BLUE	1	YELLOW 1	M	0.33	0.20
BLUE	1	YELLOW 2	M	0.33	0.20
BLUE	1	YELLOW 3	M	0.33	0.19

	M	
	At Max	0.35
1310	At Media	0.33
	At Min	0.32
	At Max	0.21
1550	At Media	0.20
	At Min	0.19

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

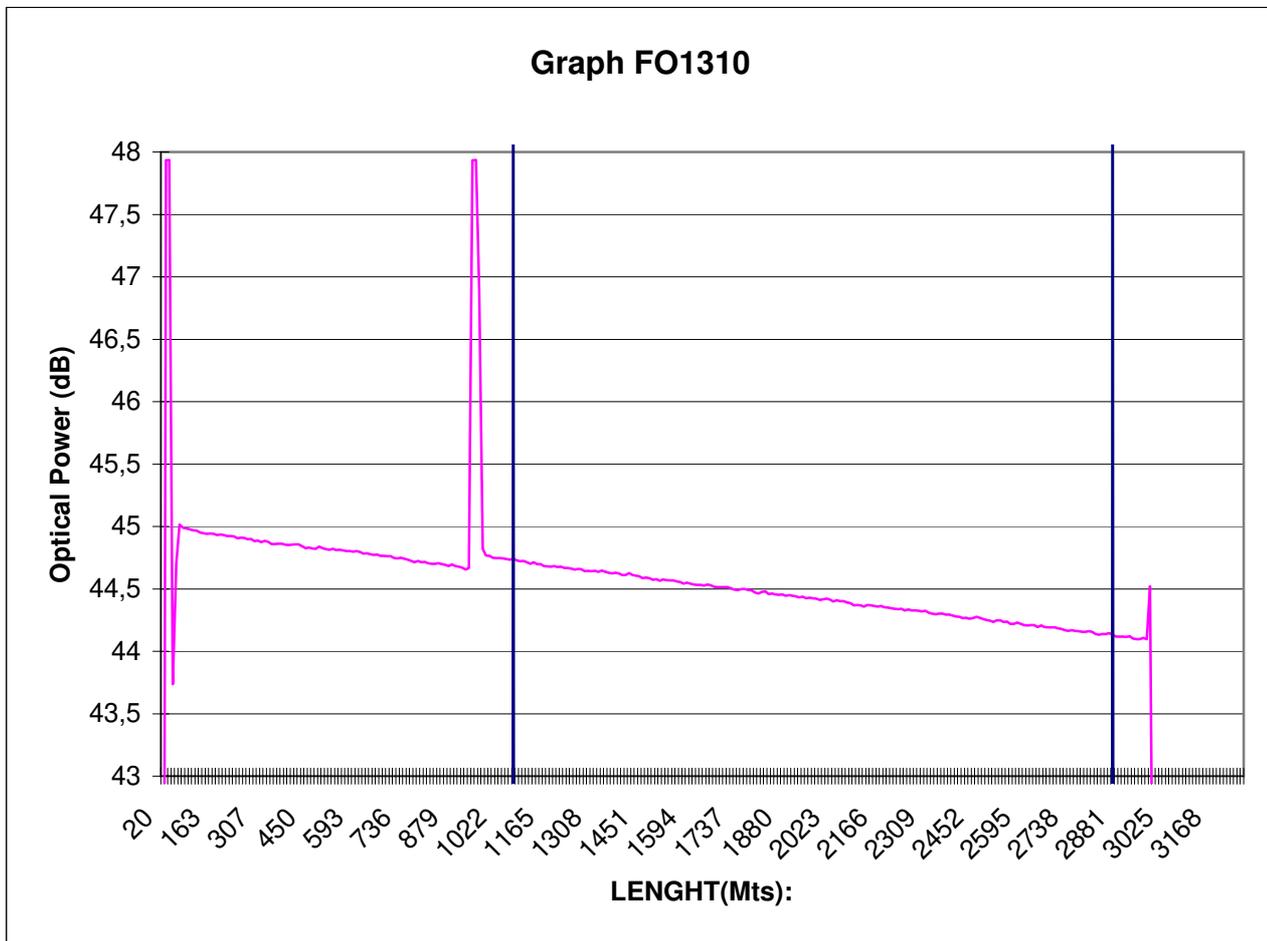
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:AQUA**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.329

Attenuation between markers (dB): 0.592  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

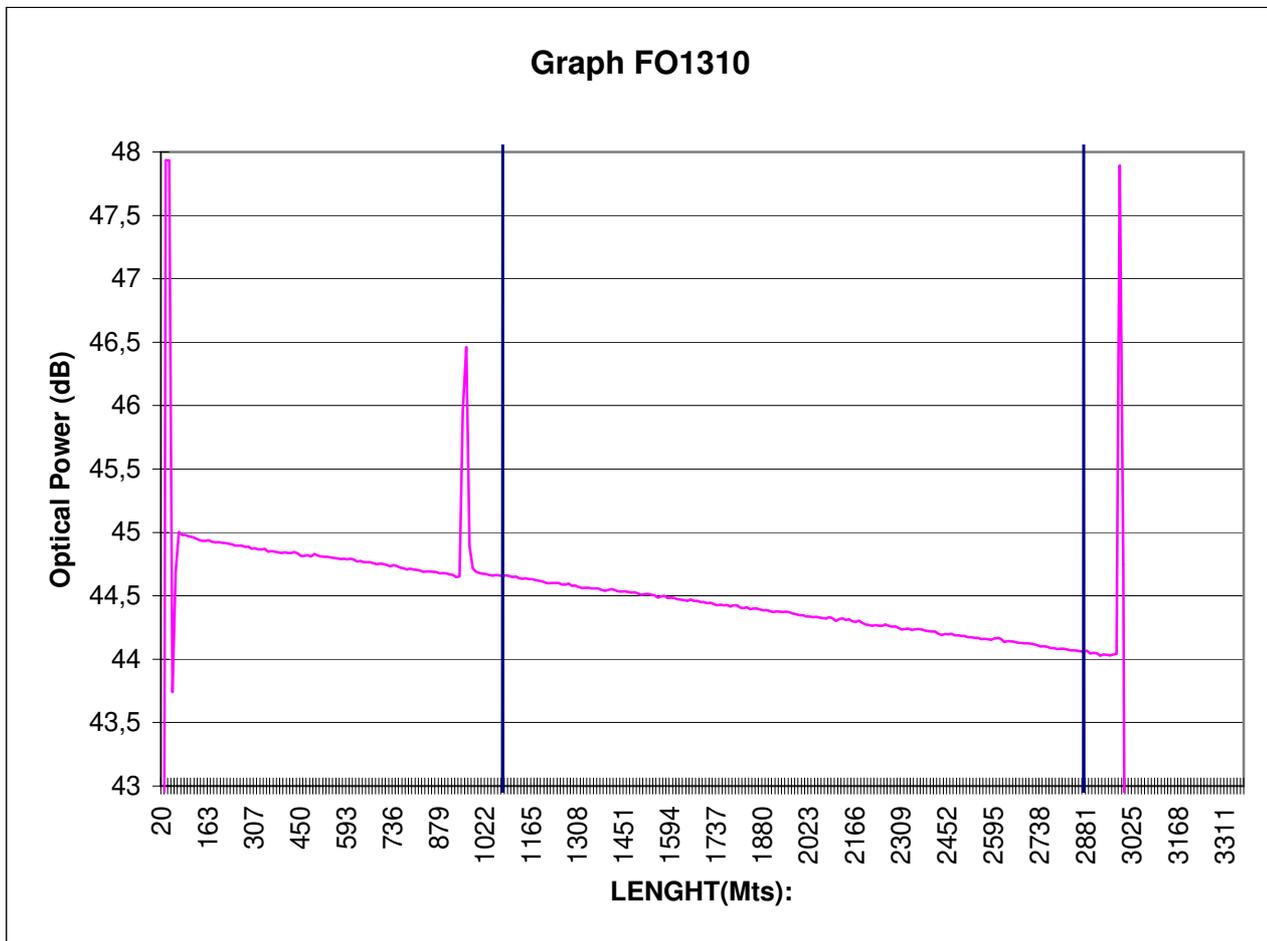
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:AQUA 1**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.330

Attenuation between markers (dB): 0.593  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

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**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

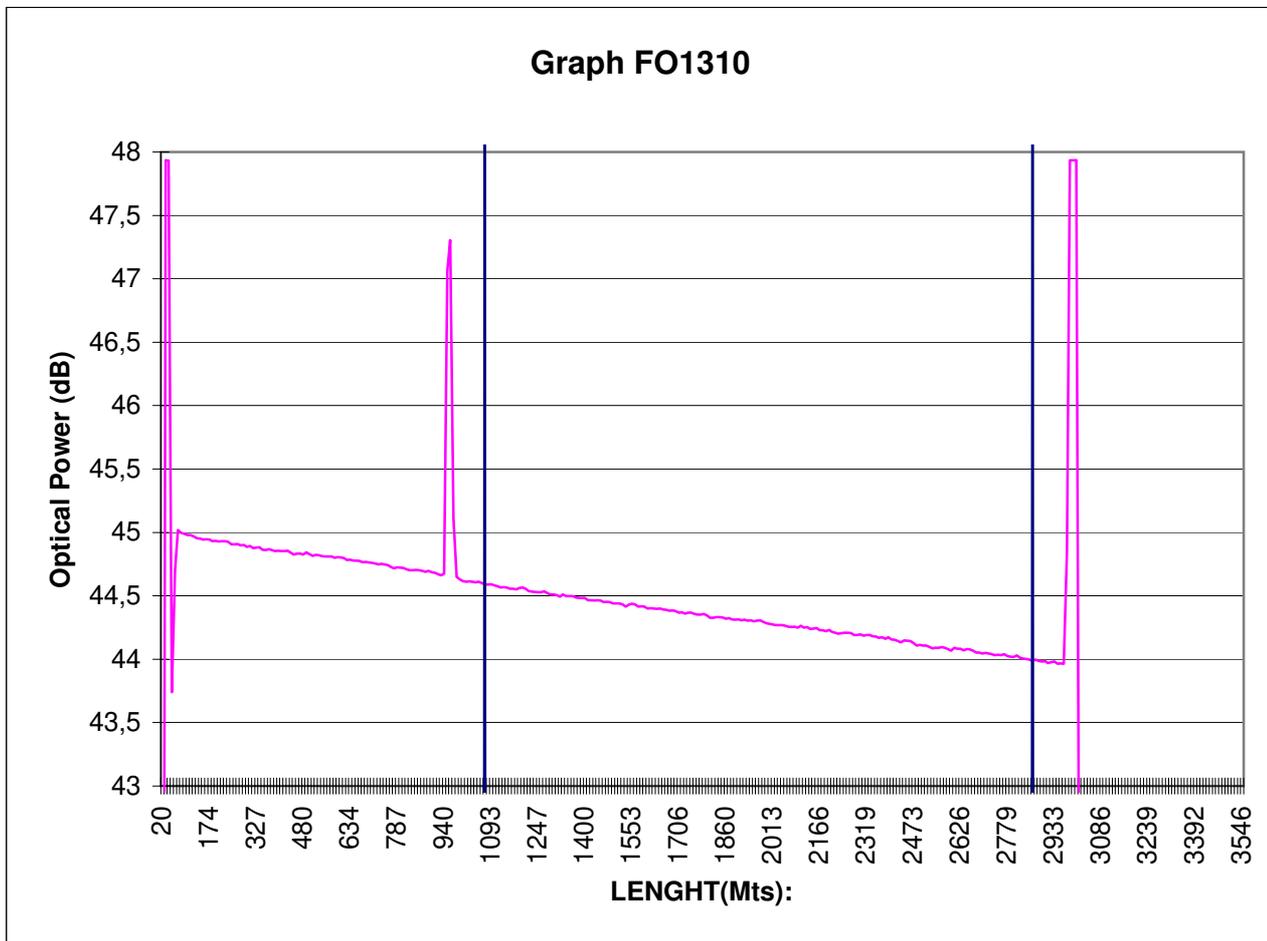
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:AQUA 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.326

Attenuation between markers (dB): 0.583  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

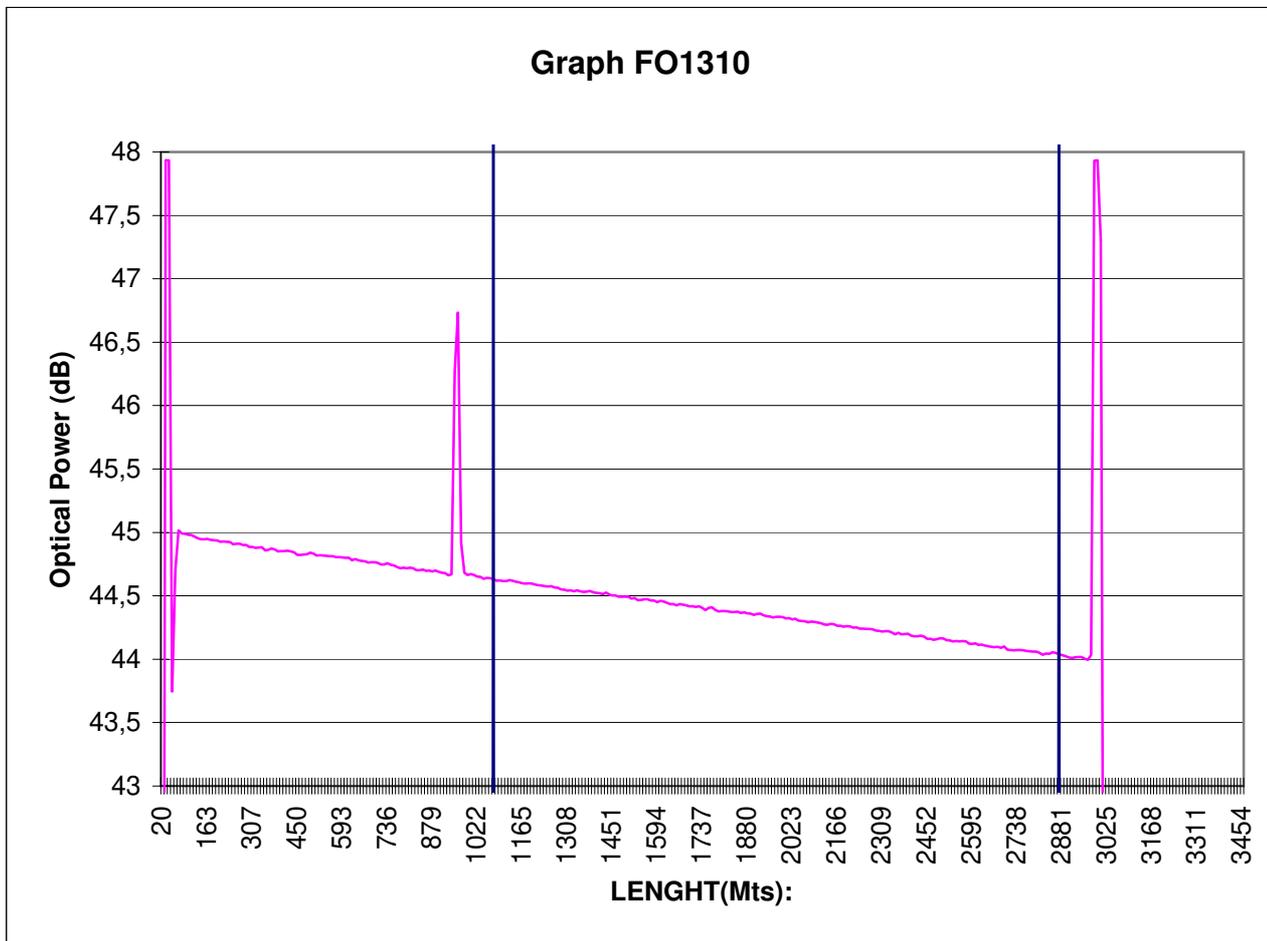
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:AQUA 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.331

Attenuation between markers (dB): 0.595  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

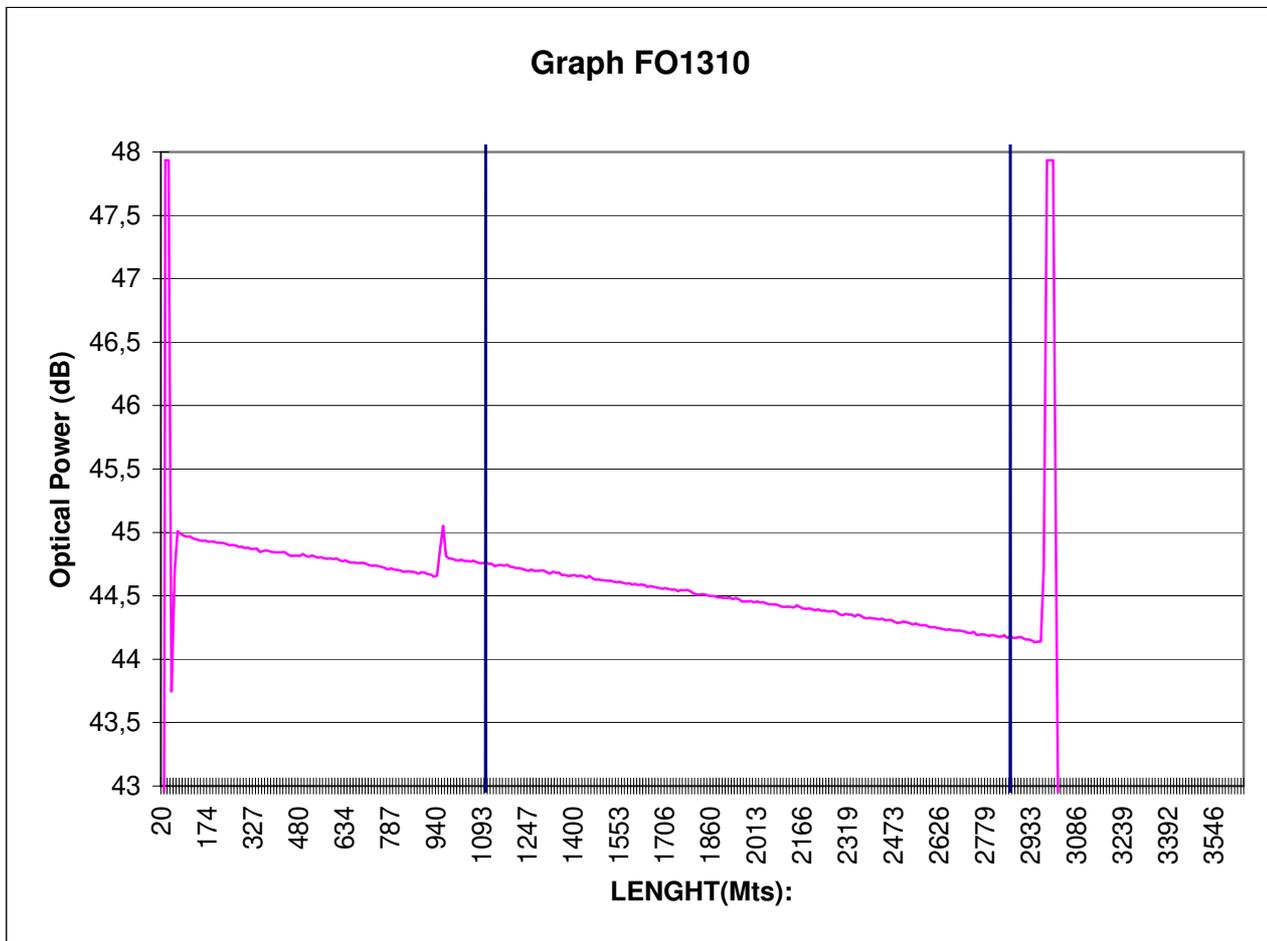
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BLACK**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.334

Attenuation between markers (dB): 0.590  
Length between markers (m): 1767



**Marker A:**

1104

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

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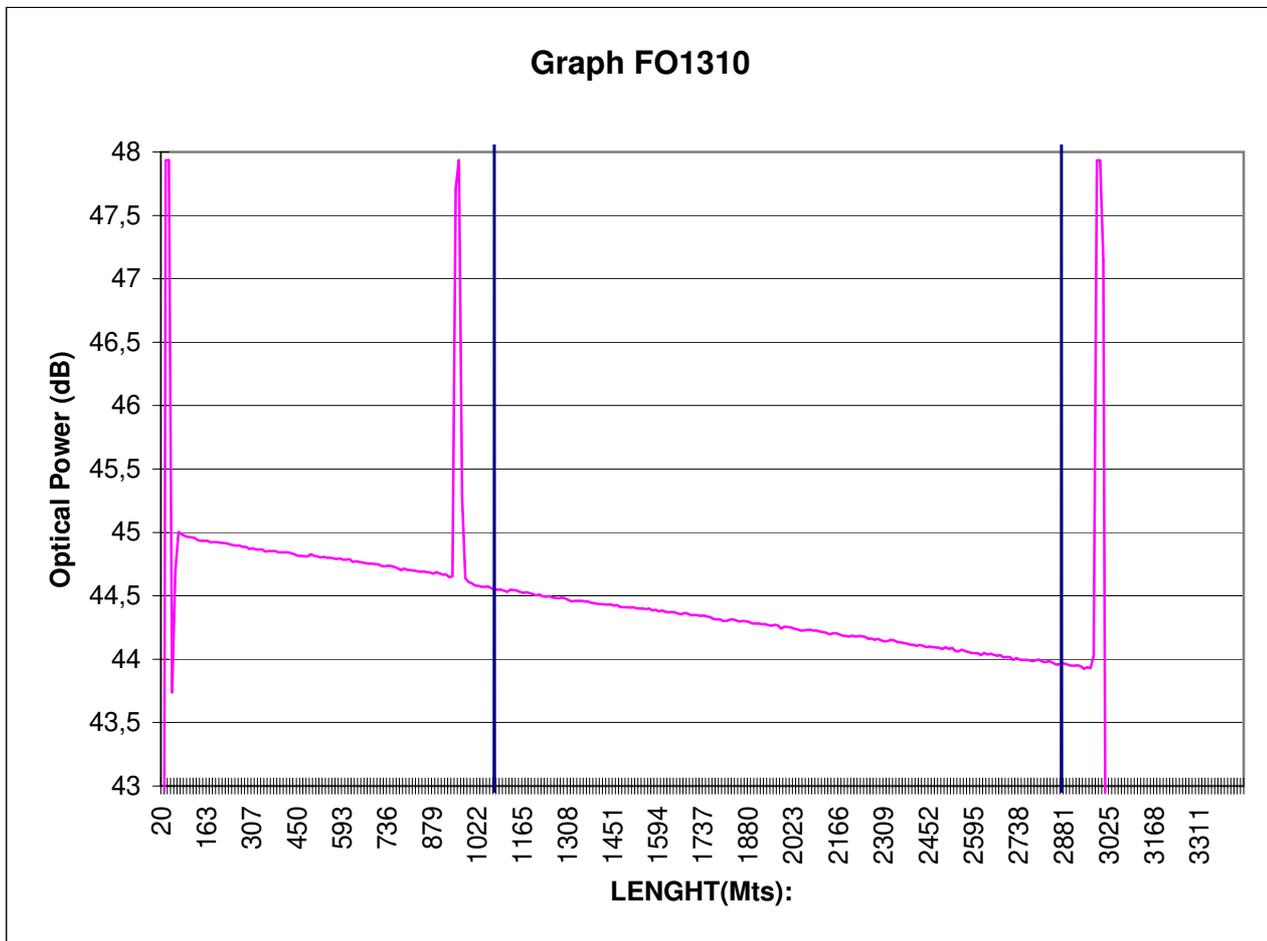
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BLUE**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.327

Attenuation between markers (dB): 0.588  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)



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**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

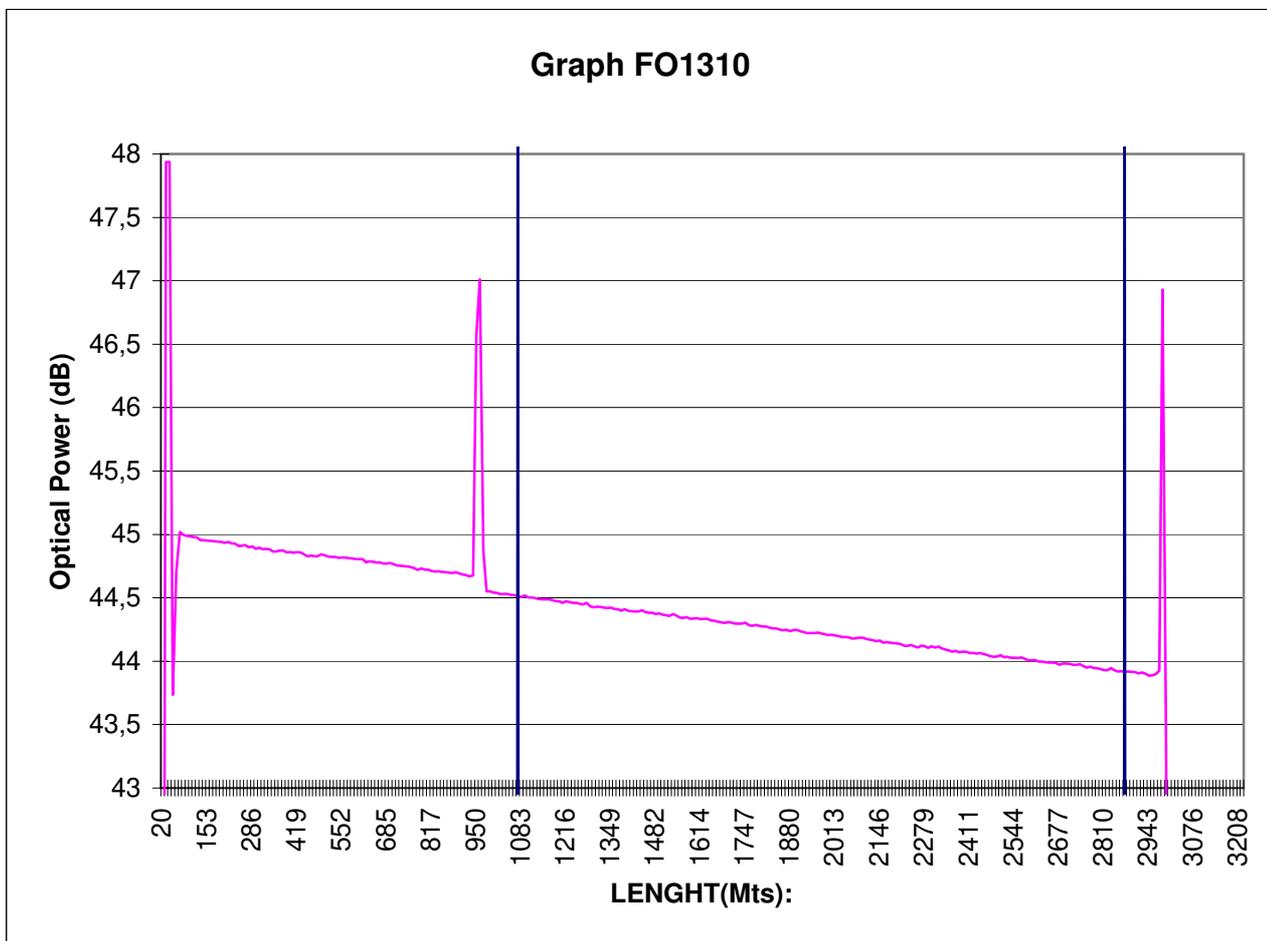
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**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BLUE 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.330

Attenuation between markers (dB): 0.593  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

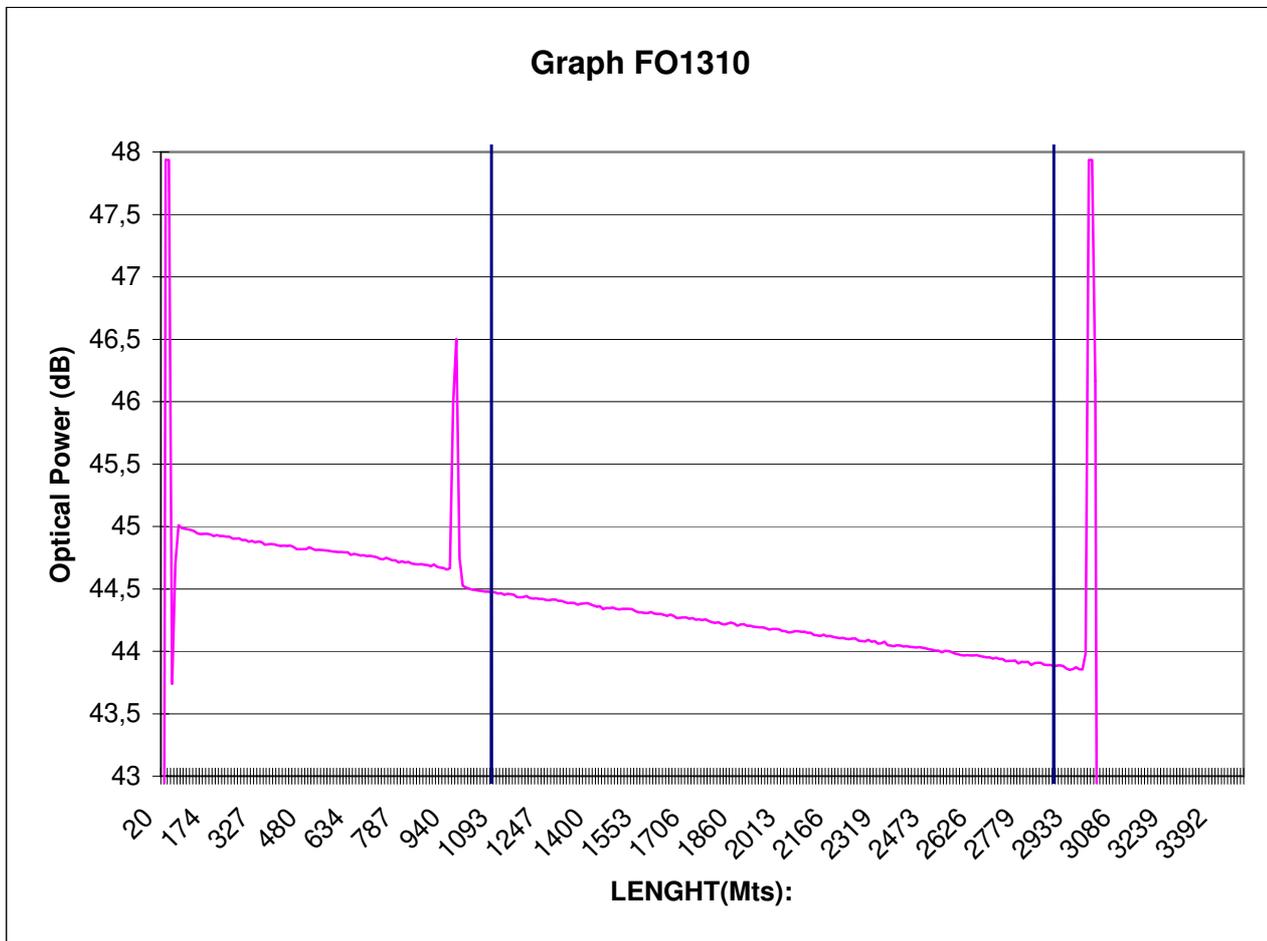
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BLUE 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.327

Attenuation between markers (dB): 0.588  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

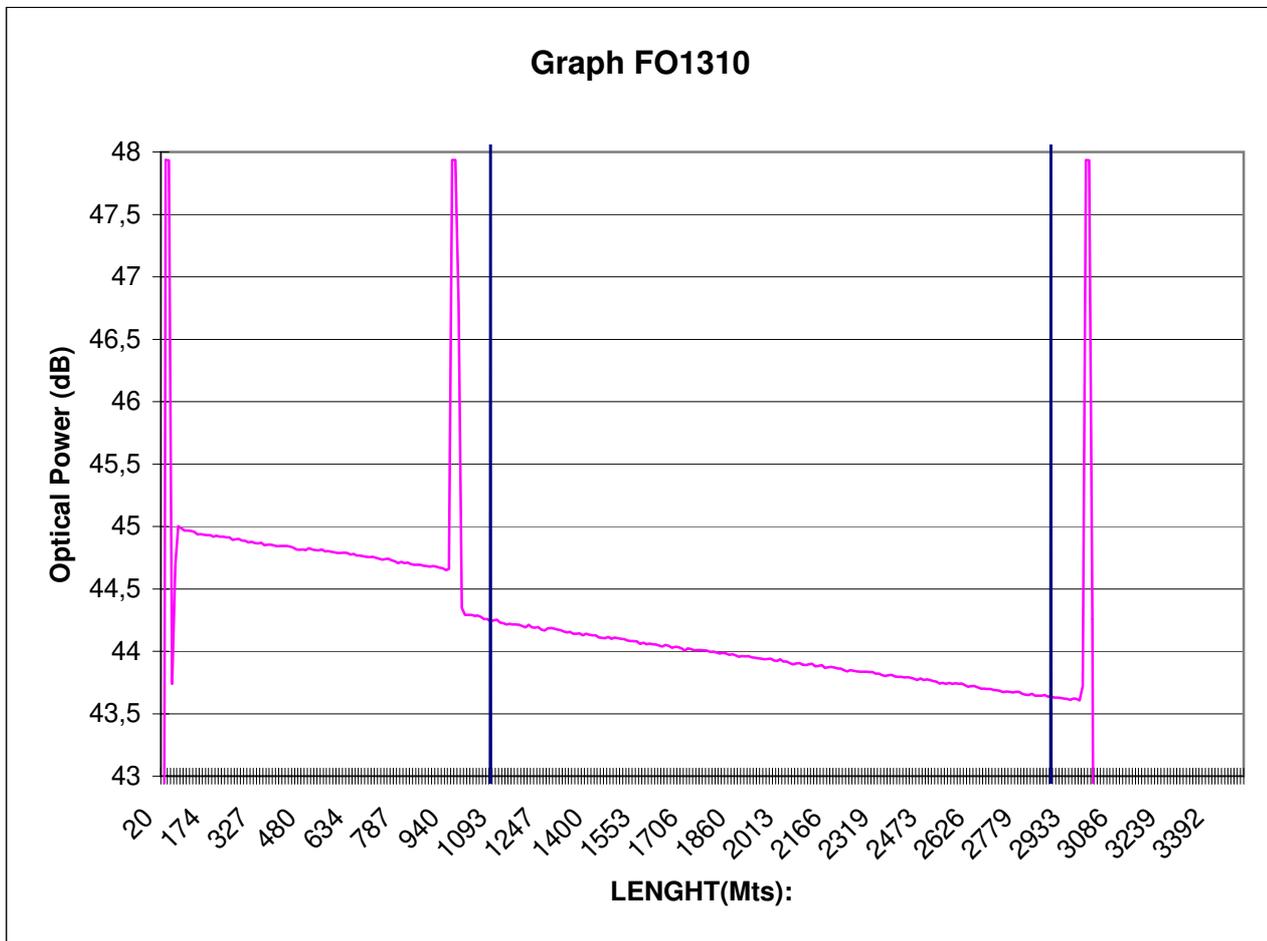
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BROWN**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.335

Attenuation between markers (dB): 0.602  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

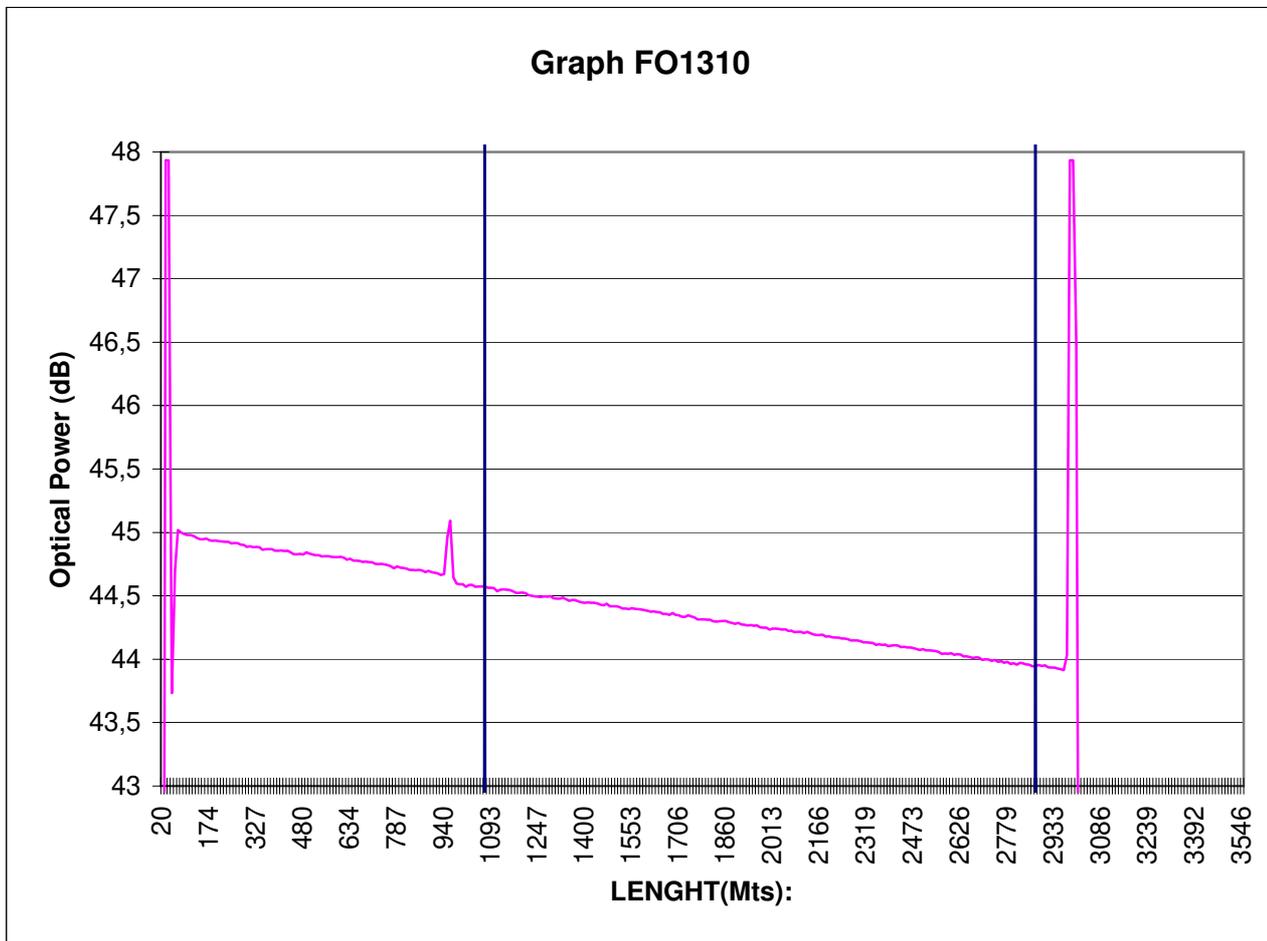
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BROWN 1**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.341

Attenuation between markers (dB): 0.613  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

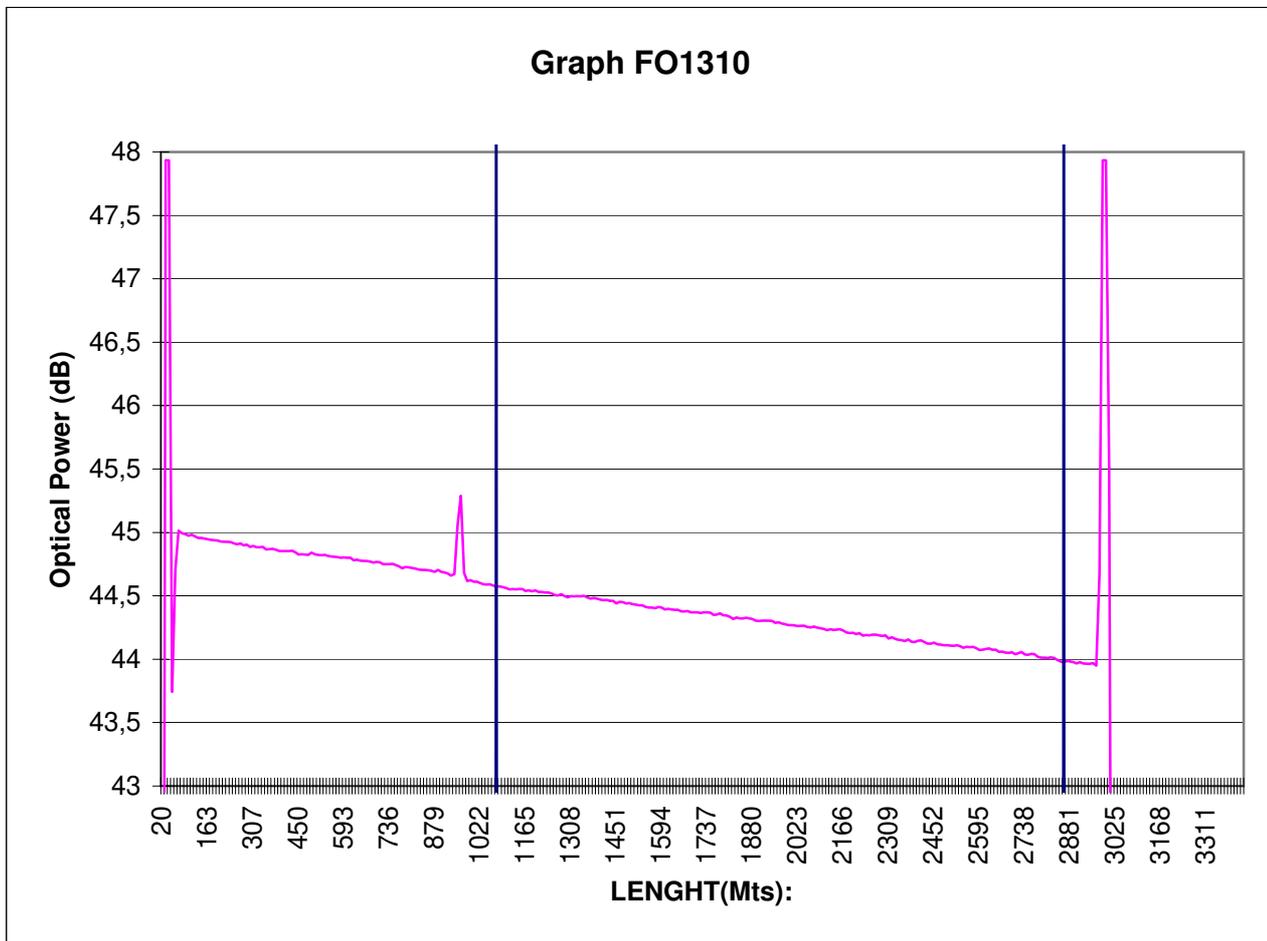
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BROWN 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.324

Attenuation between markers (dB): 0.579  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

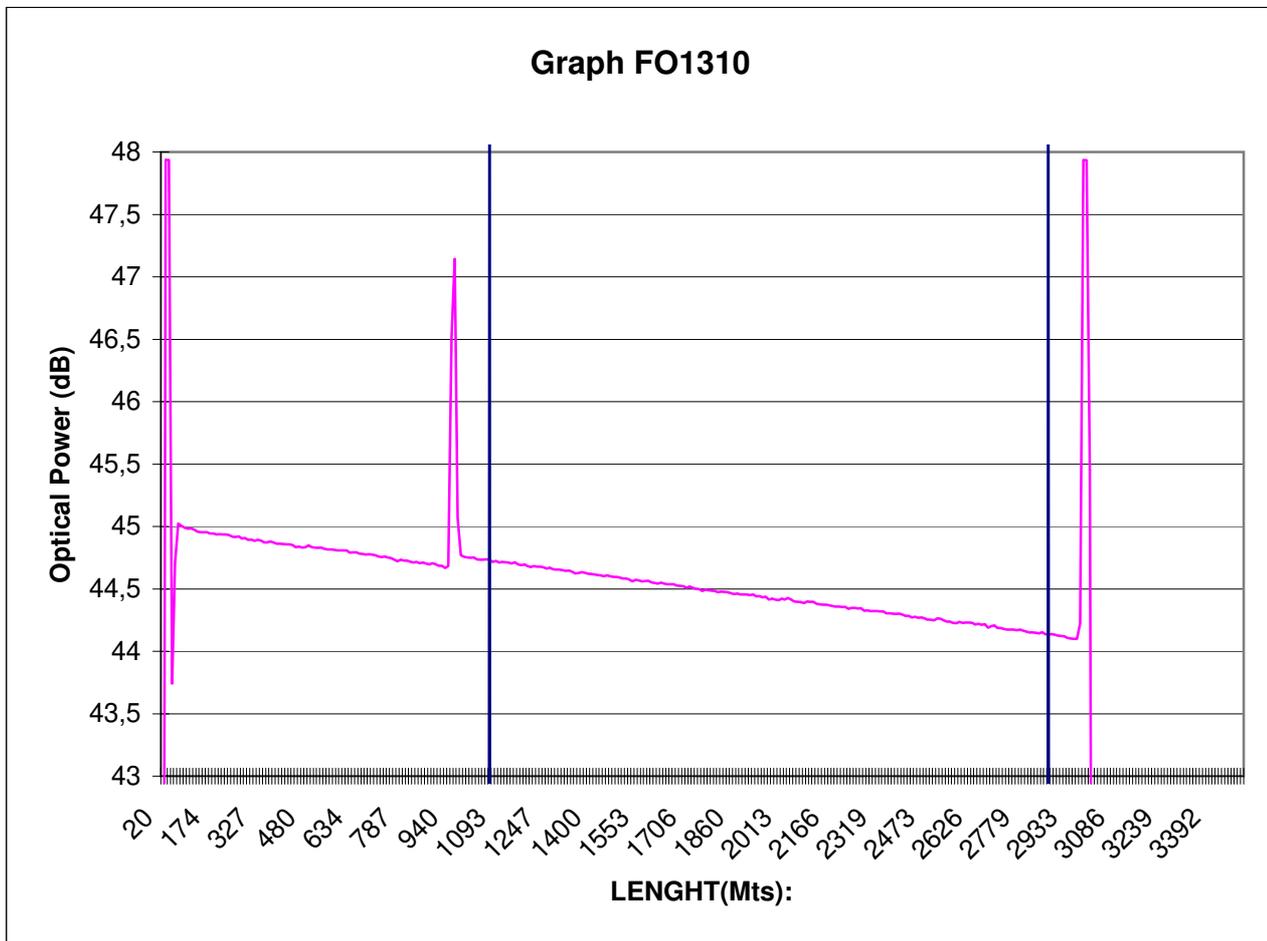
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BROWN 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.326

Attenuation between markers (dB): 0.586  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment    9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

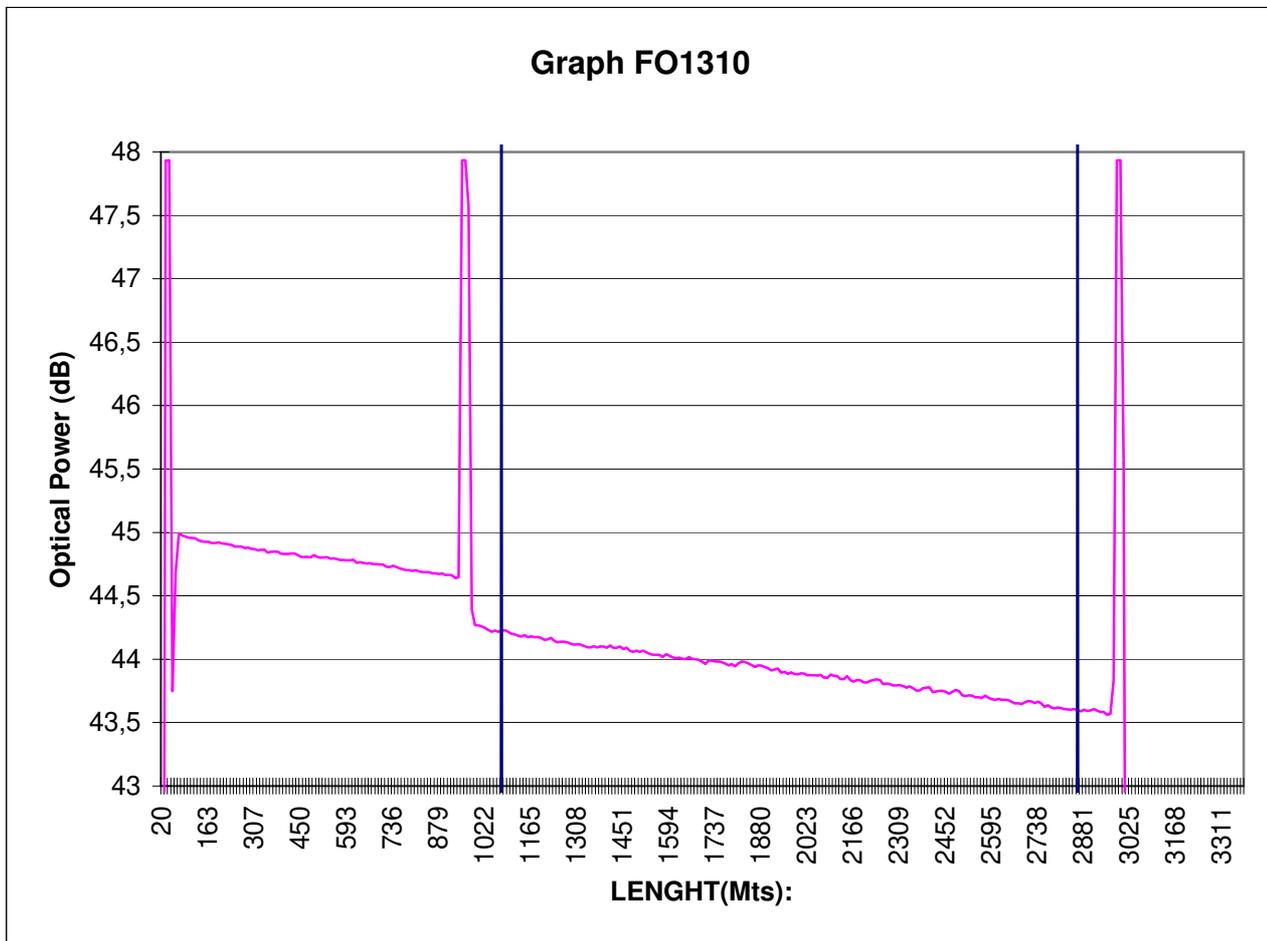
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:GREEN**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.335

Attenuation between markers (dB): 0.599  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)



**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

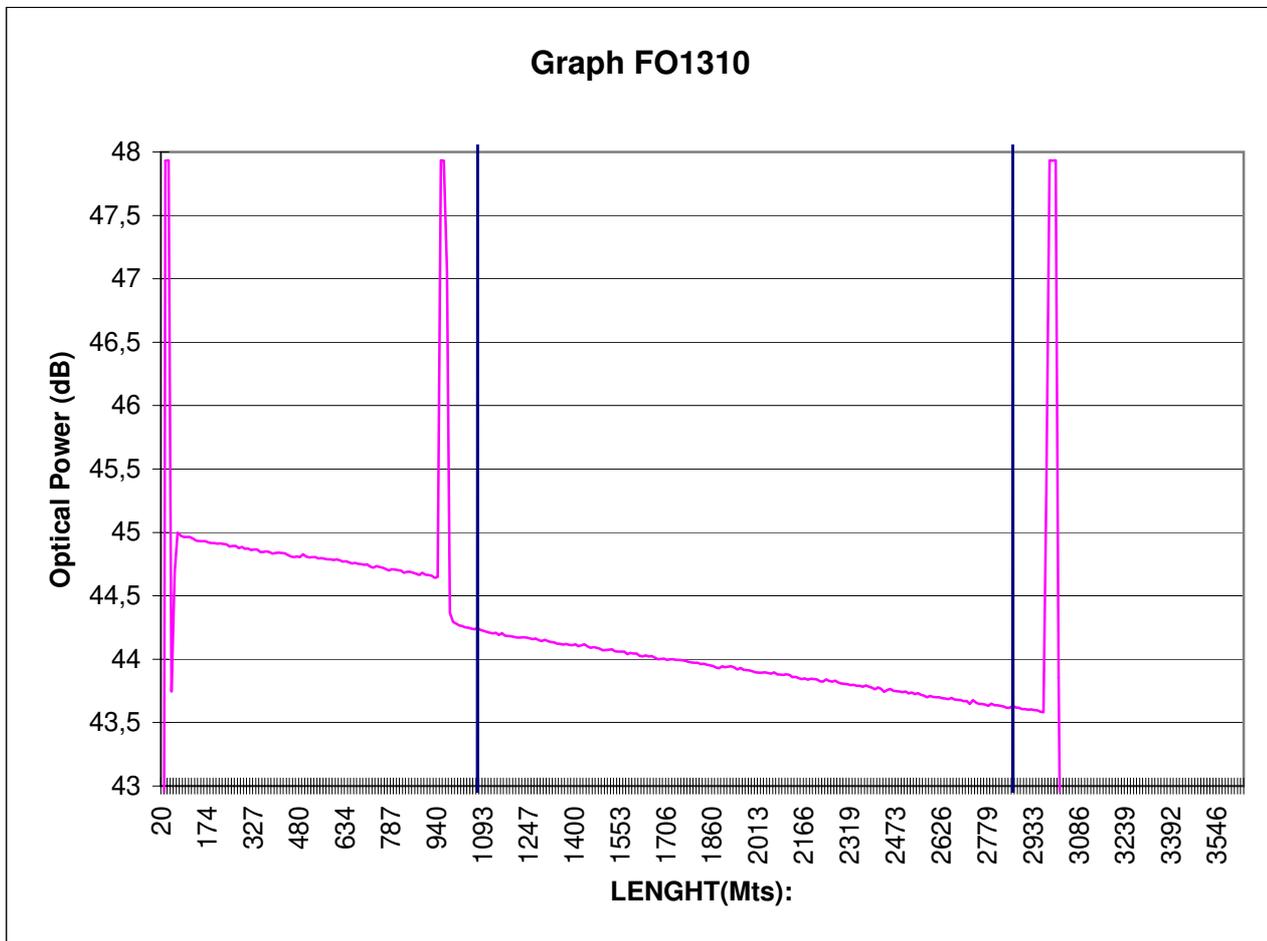
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:GREEN 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.335

Attenuation between markers (dB): 0.599  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

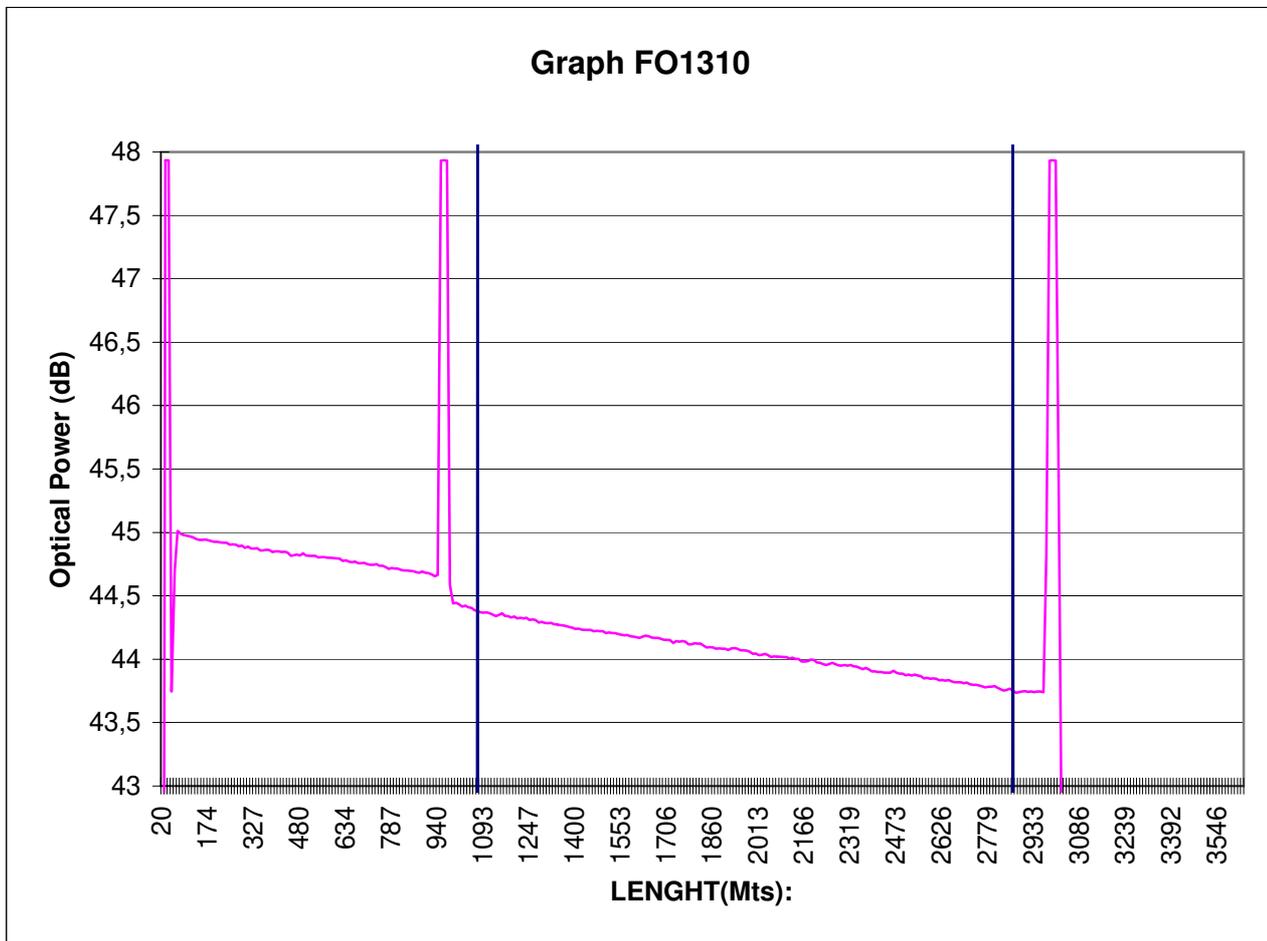
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:GREEN 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.342

Attenuation between markers (dB): 0.611  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

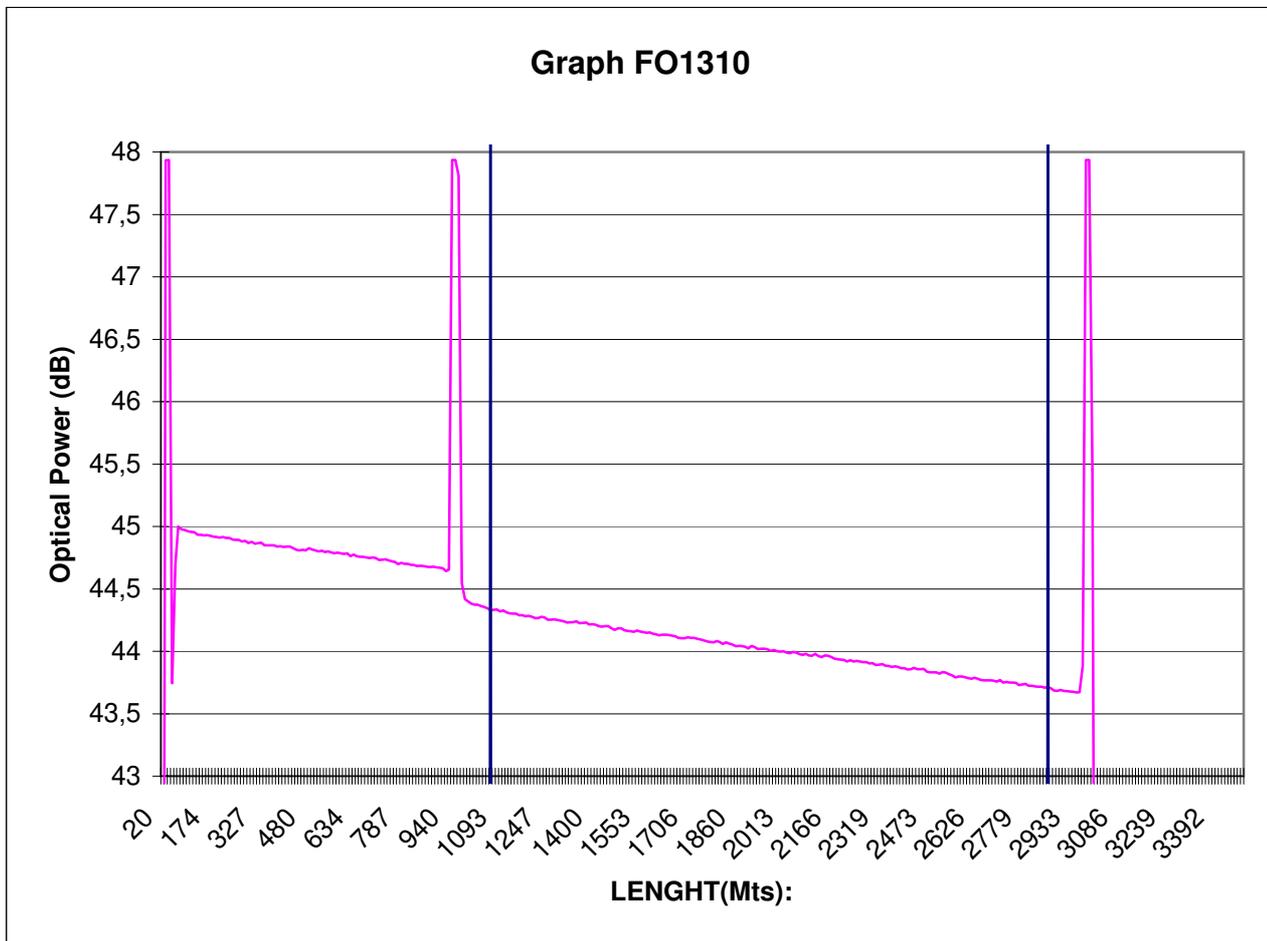
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:NATURAL 1**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.345

Attenuation between markers (dB): 0.617  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

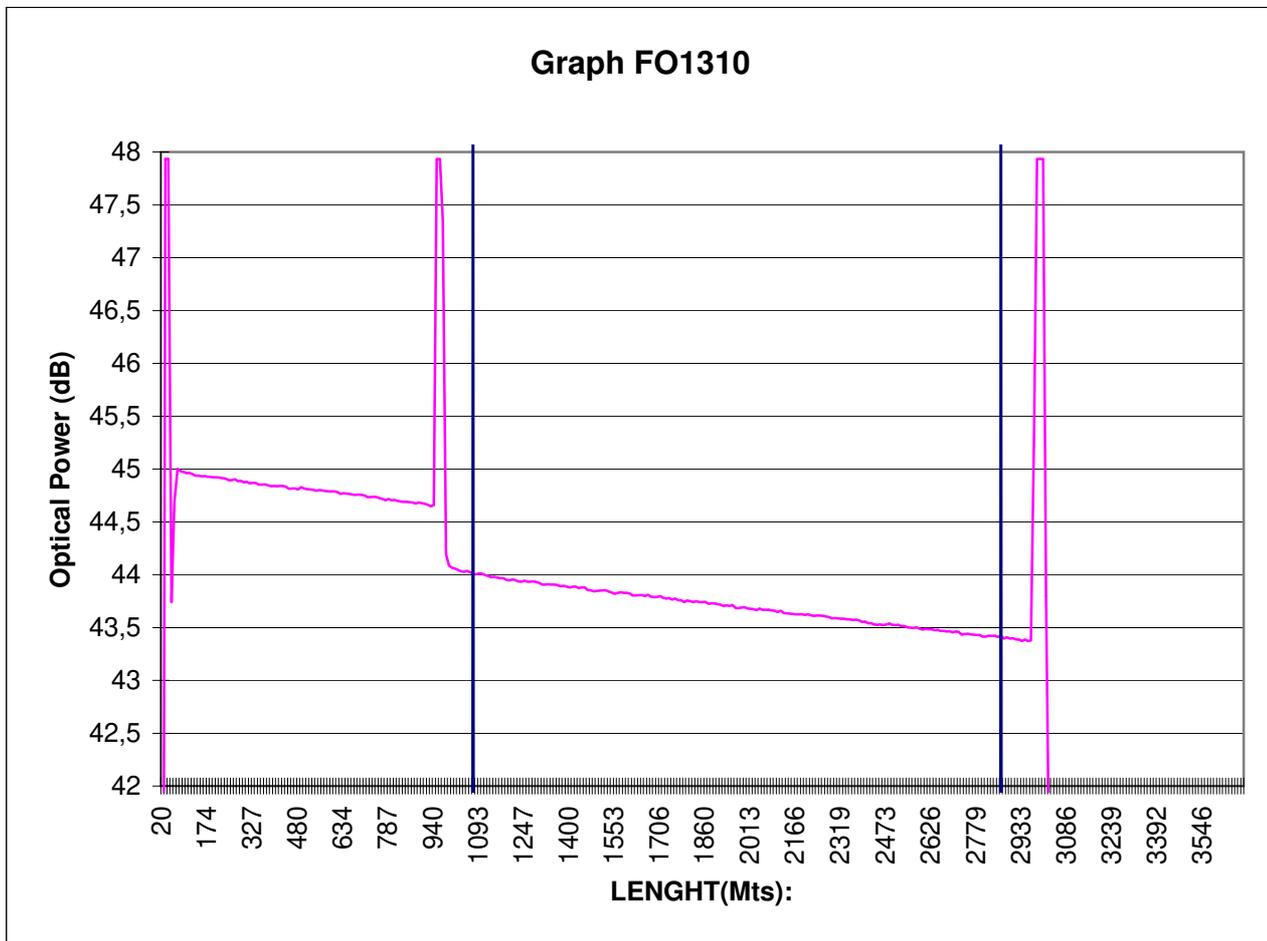
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:NATURAL 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.330

Attenuation between markers (dB): 0.590  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

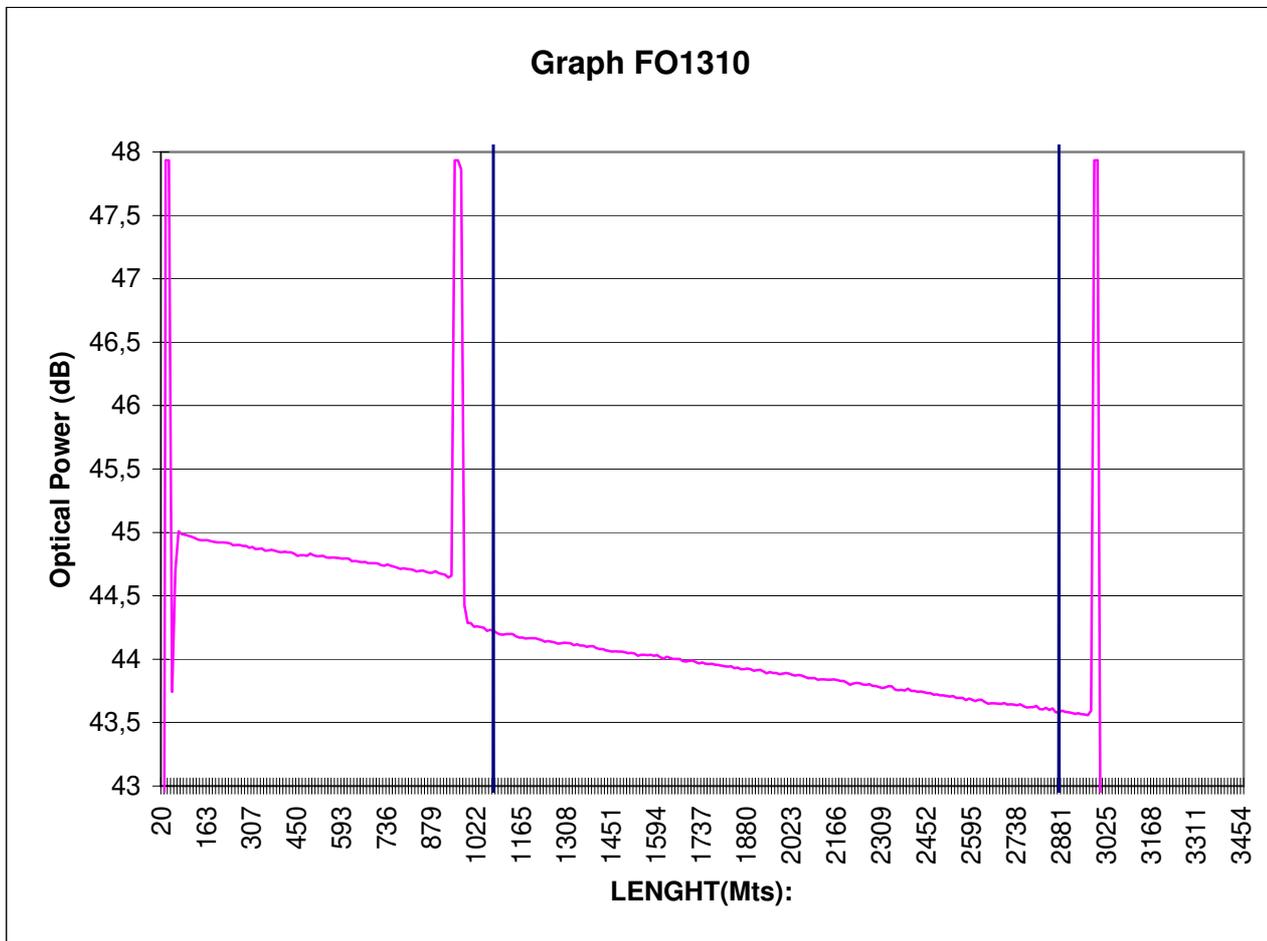
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:NATURAL 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.338

Attenuation between markers (dB): 0.608  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

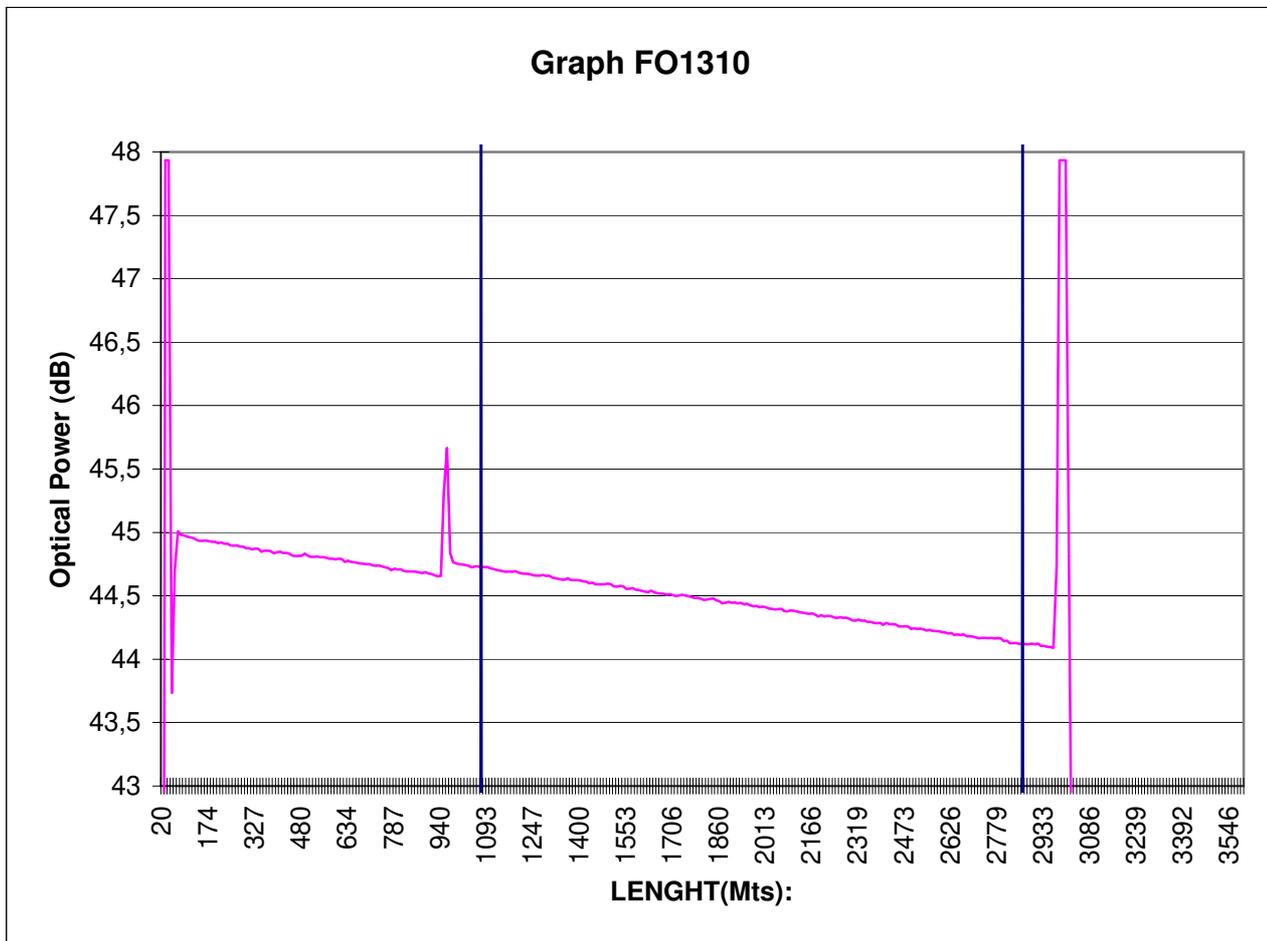
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:ORANGE**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.334

Attenuation between markers (dB): 0.597  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

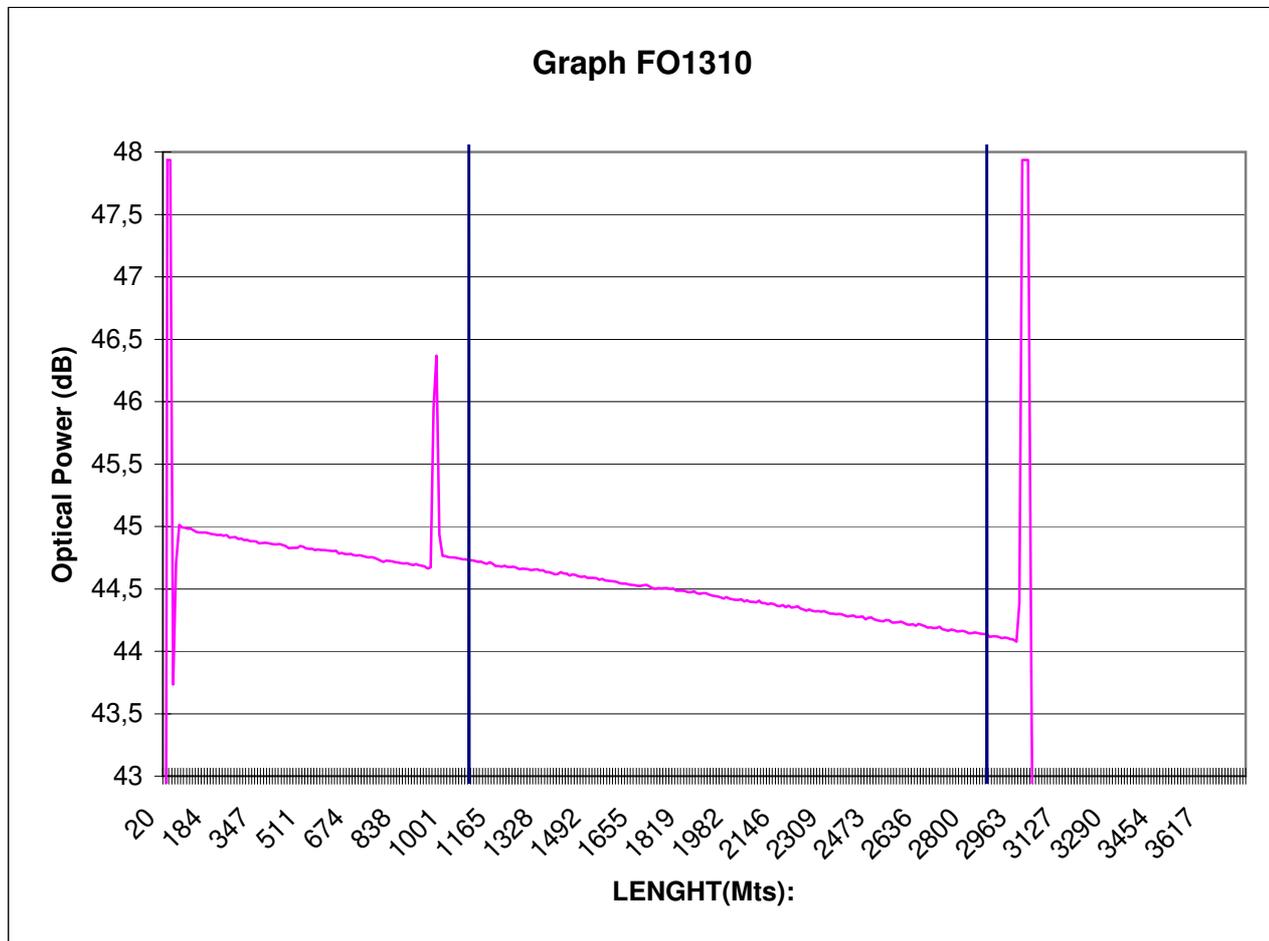
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:ORANGE 1**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.333

Attenuation between markers (dB): 0.595  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

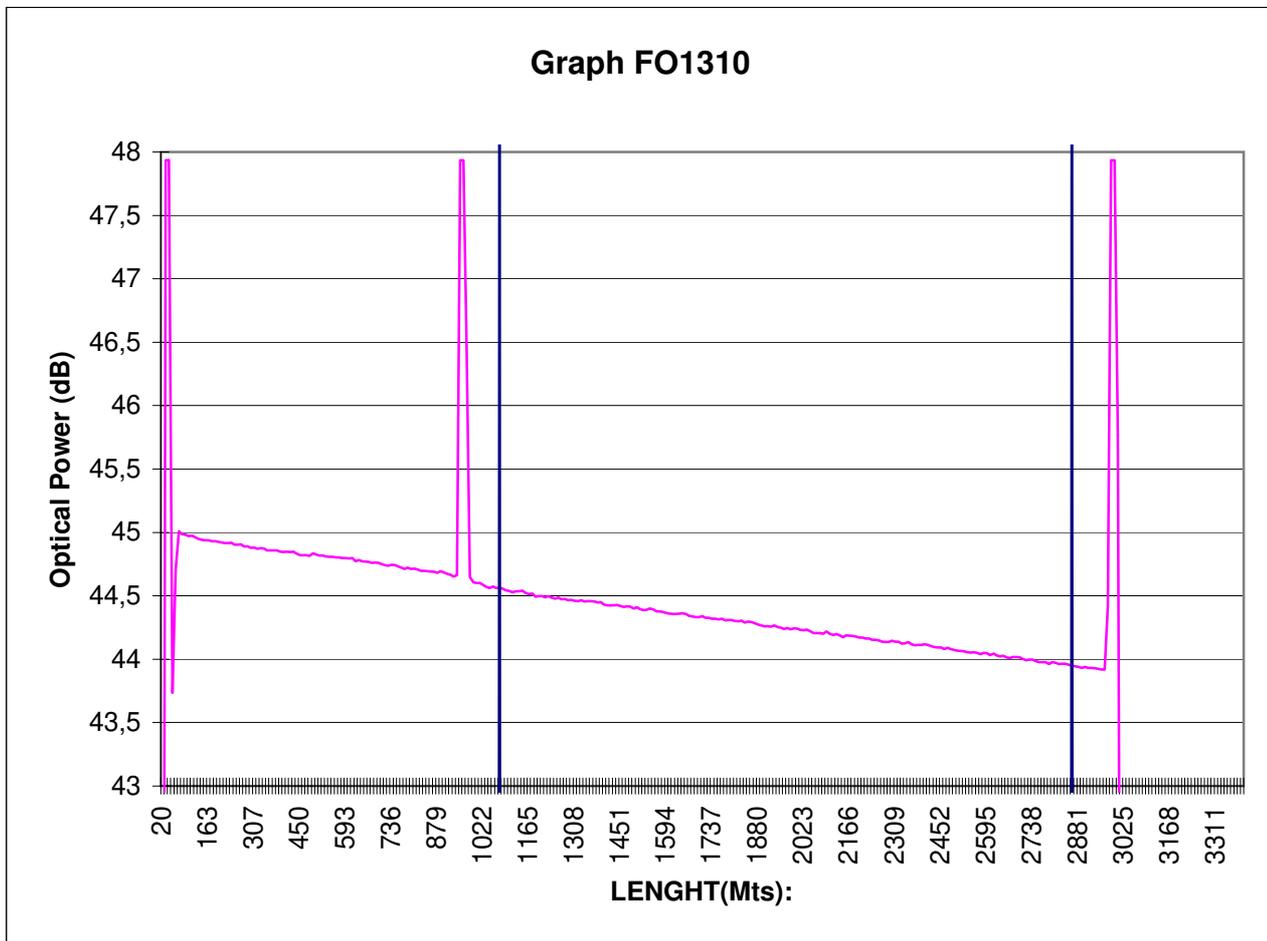
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:ORANGE 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.331

Attenuation between markers (dB): 0.592  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

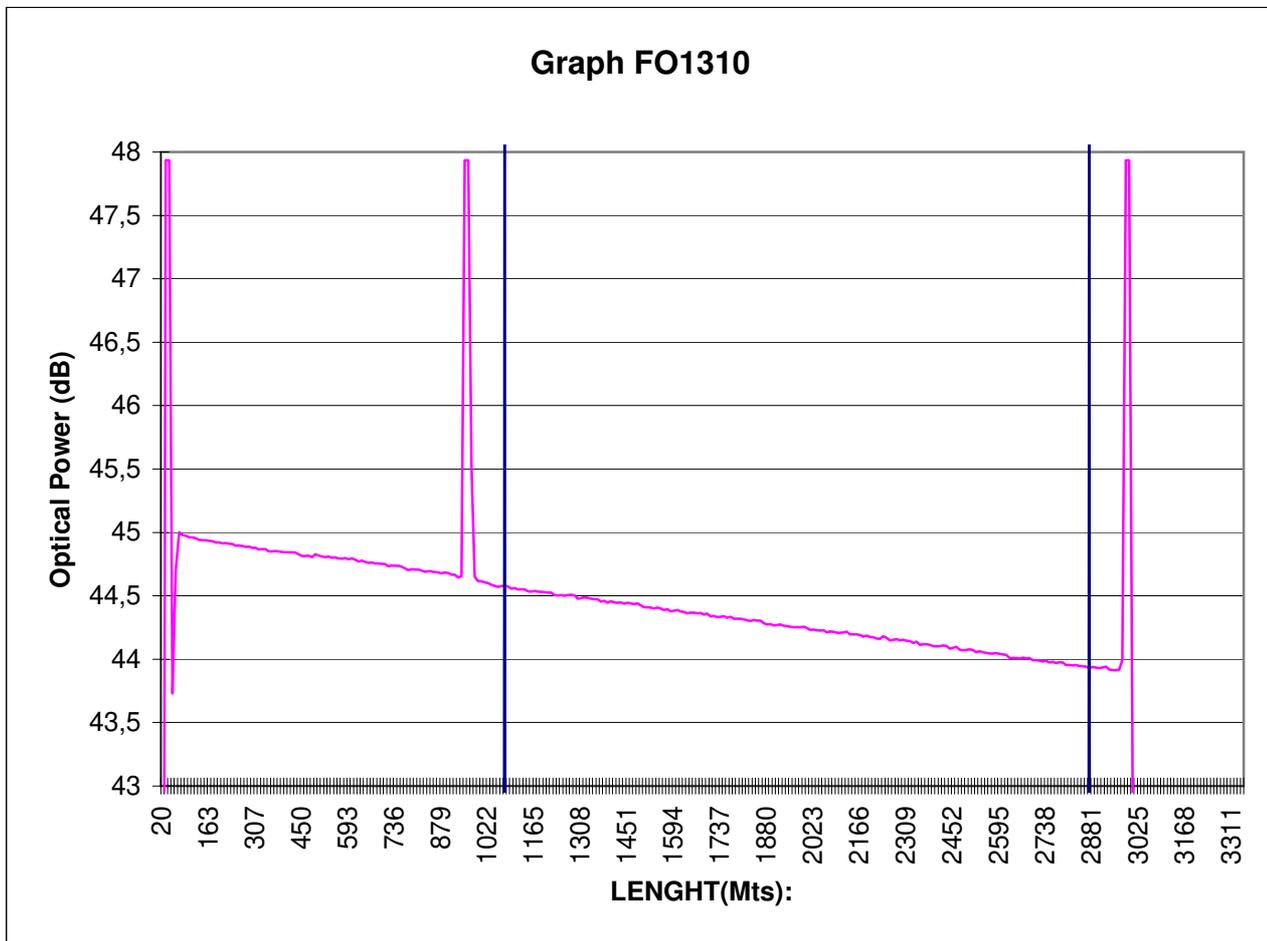
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:ORANGE 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.349

Attenuation between markers (dB): 0.628  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

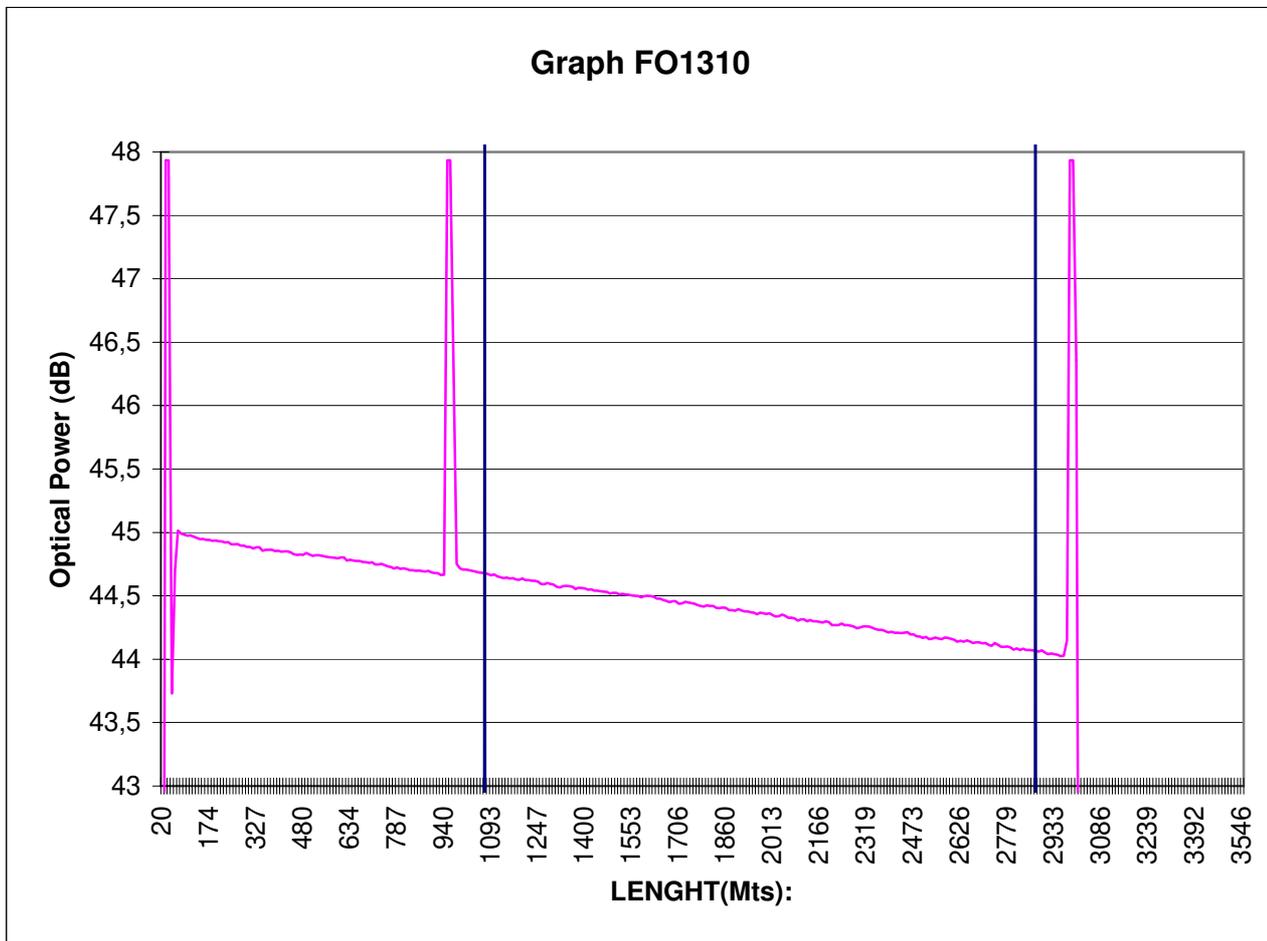
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:PINK**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.334

Attenuation between markers (dB): 0.601  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

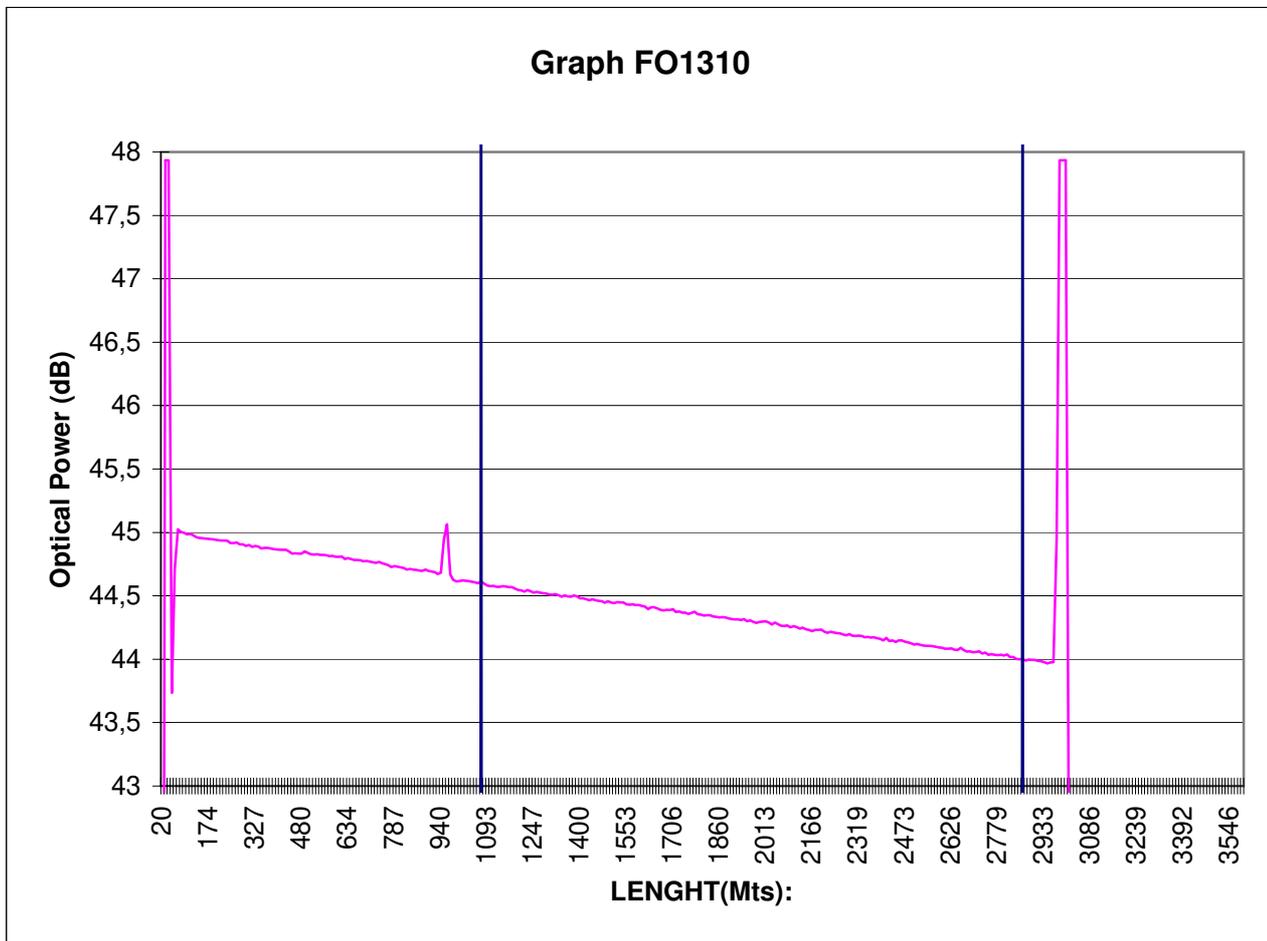
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:PINK 1**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.325

Attenuation between markers (dB): 0.581  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

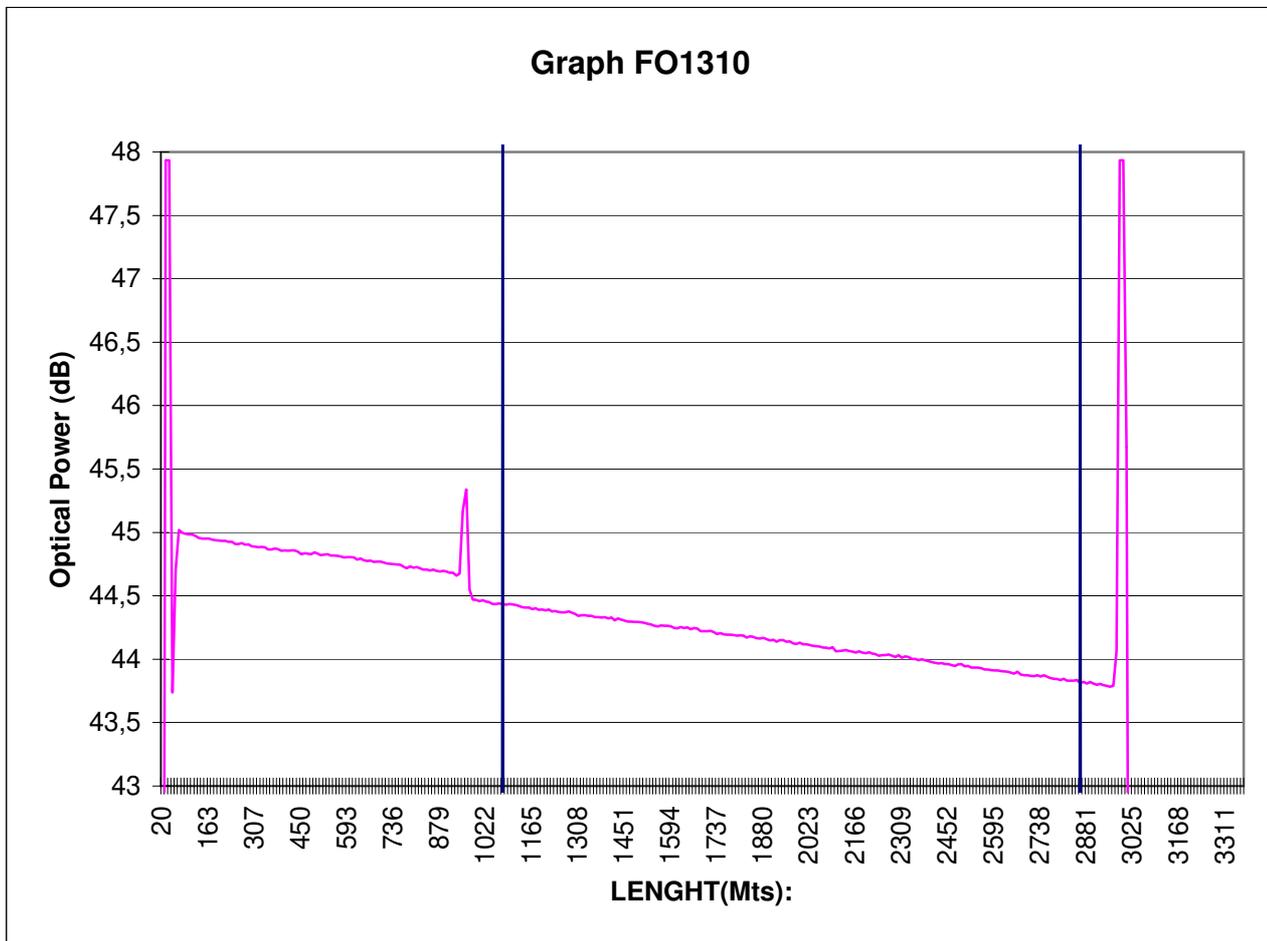
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:PINK 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.341

Attenuation between markers (dB): 0.610  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

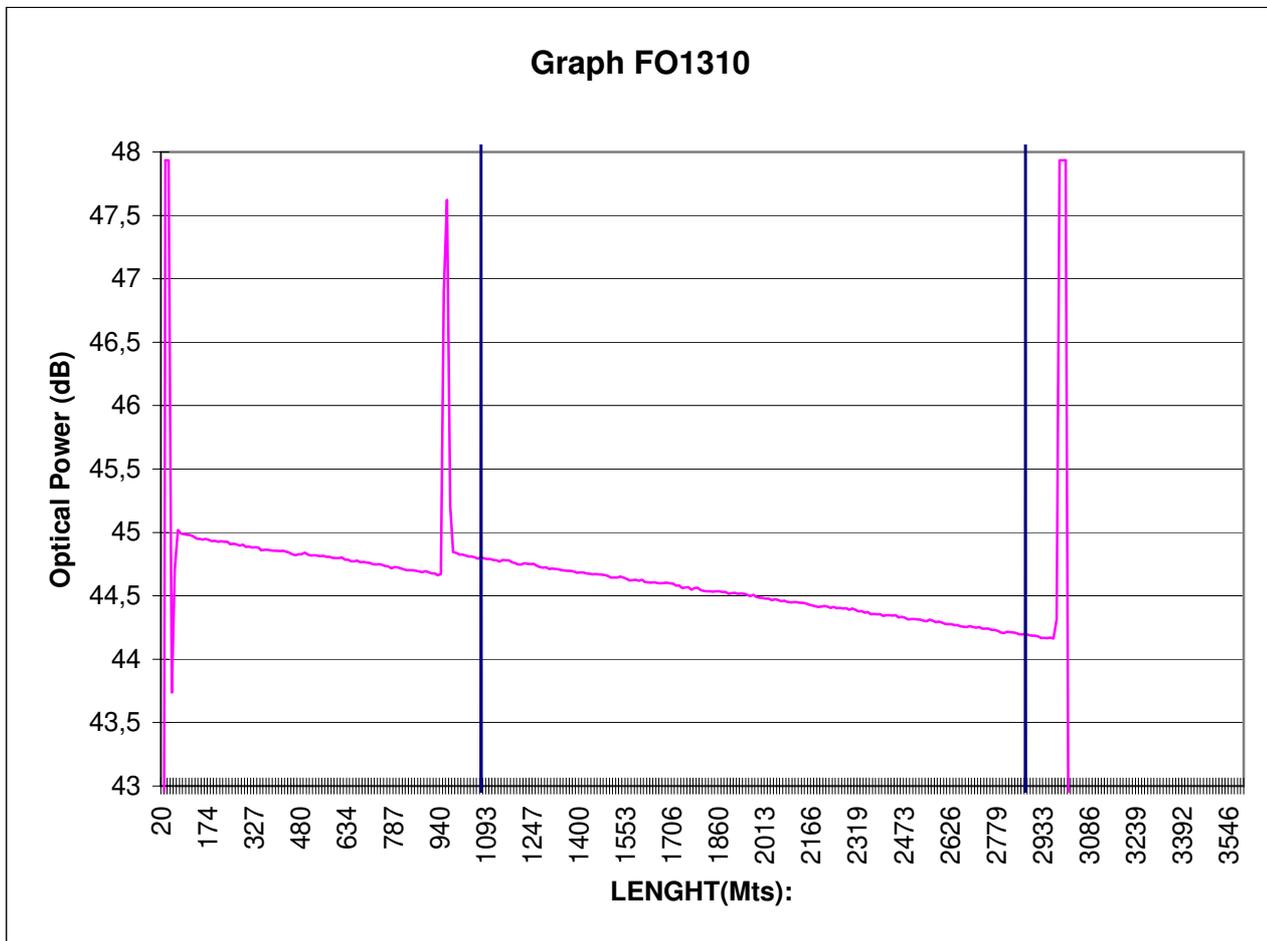
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:PINK 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.335

Attenuation between markers (dB): 0.602  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

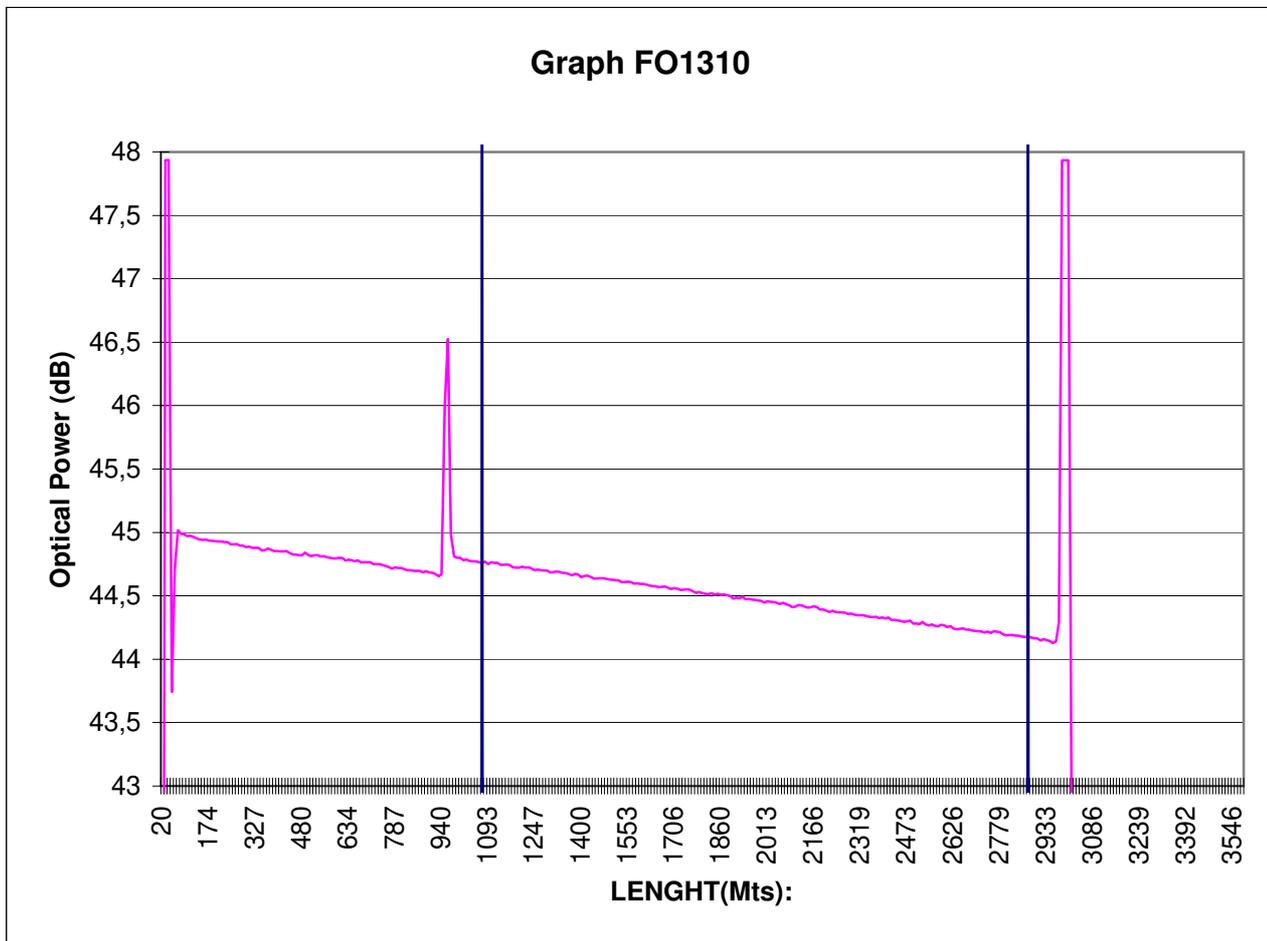
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:RED**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.332

Attenuation between markers (dB): 0.597  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

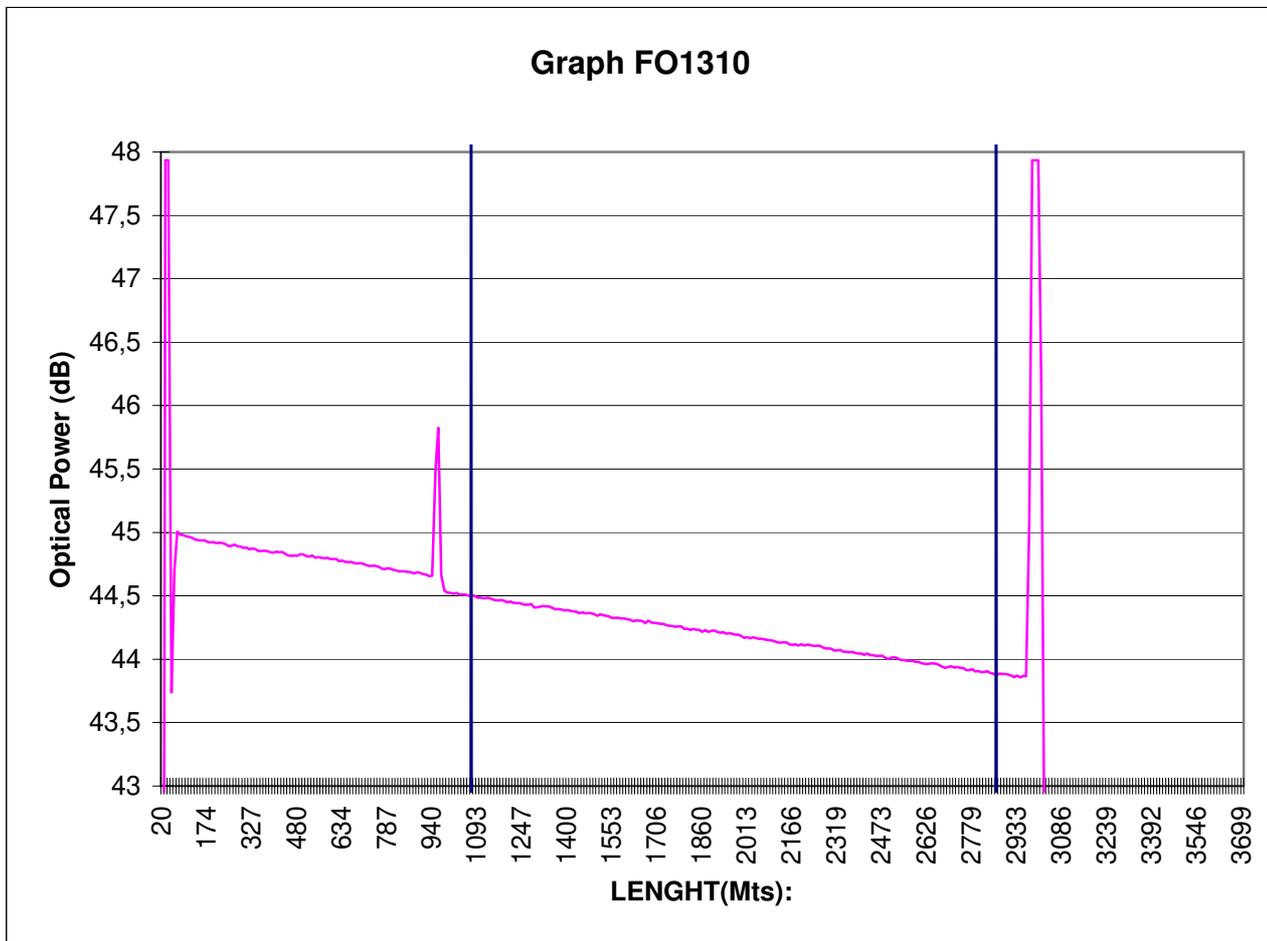
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:RED 1**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.340

Attenuation between markers (dB): 0.608  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

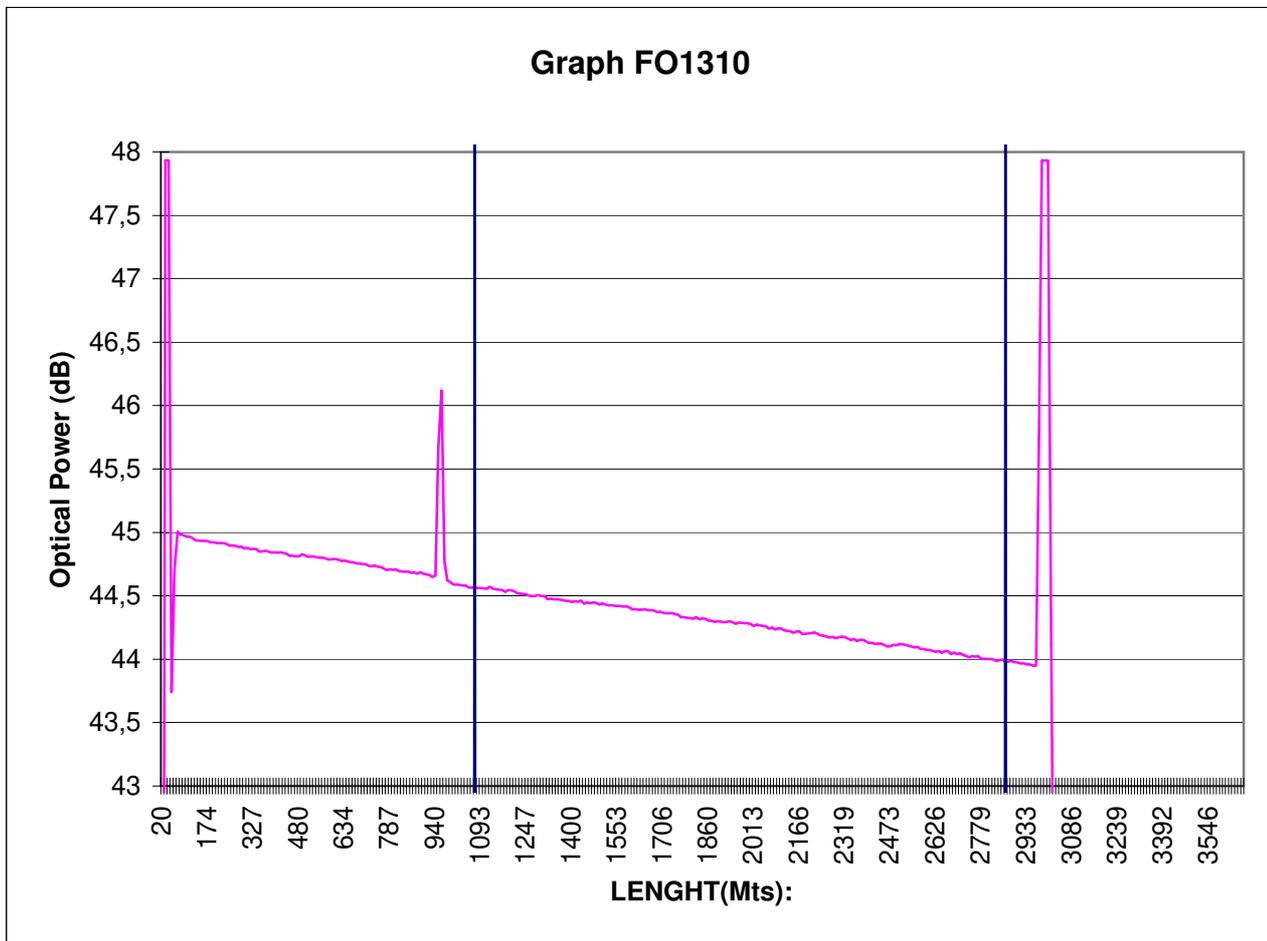
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:RED 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.325

Attenuation between markers (dB): 0.581  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

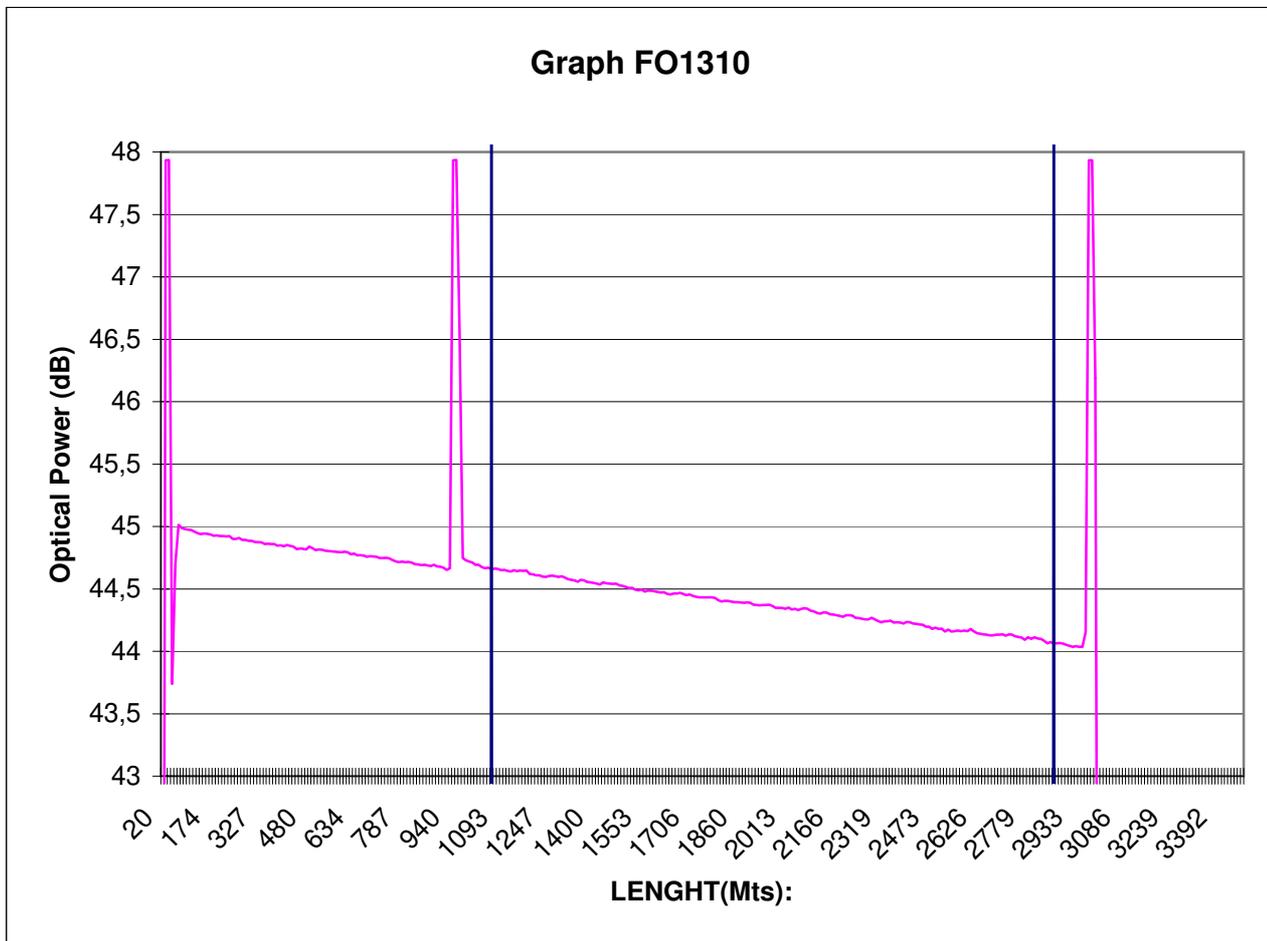
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:RED 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.327

Attenuation between markers (dB): 0.588  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

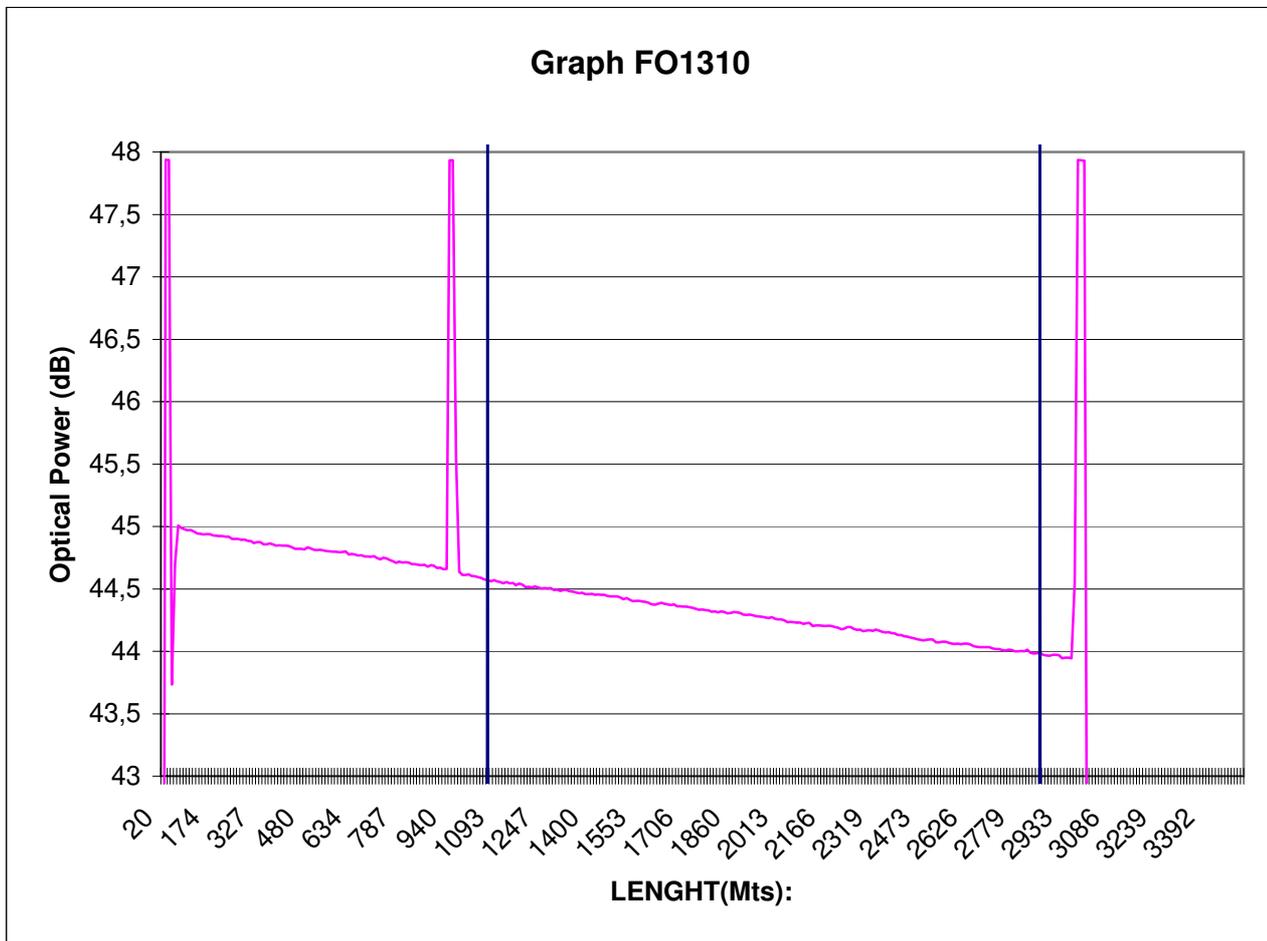
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:SLATE**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.329

Attenuation between markers (dB): 0.588  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

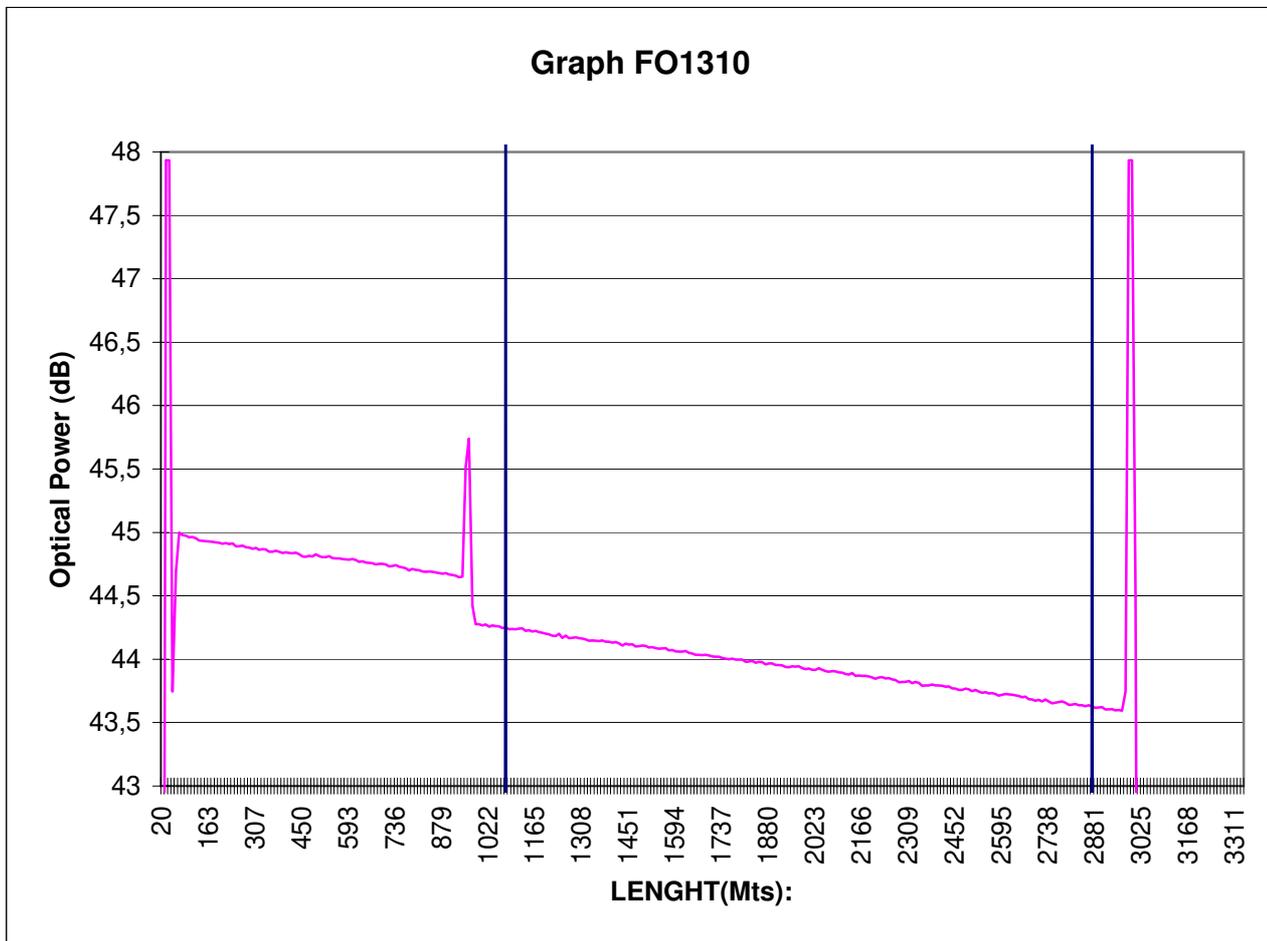
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:SLATE 1**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.343

Attenuation between markers (dB): 0.617  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

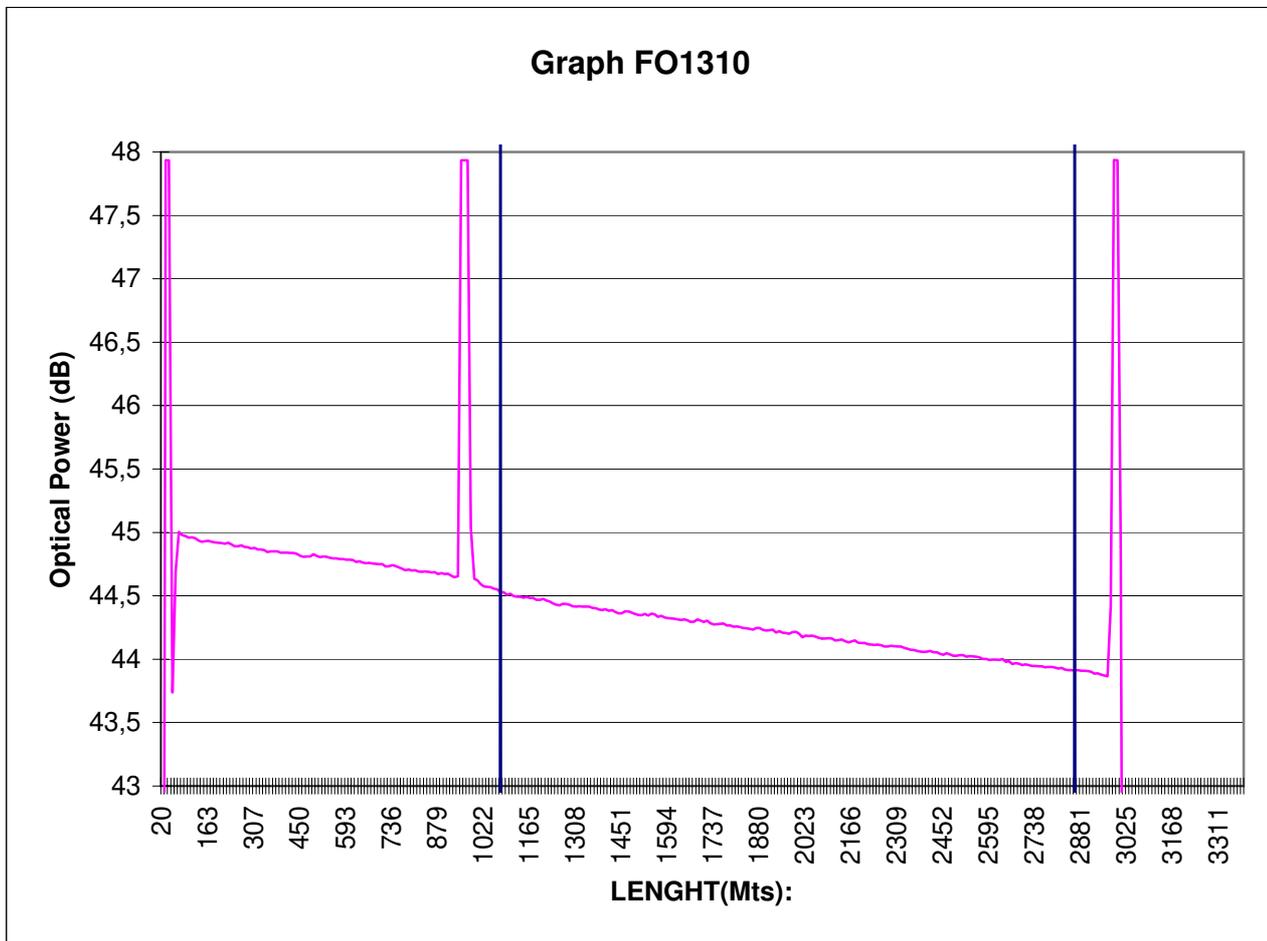
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:SLATE 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.330

Attenuation between markers (dB): 0.590  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

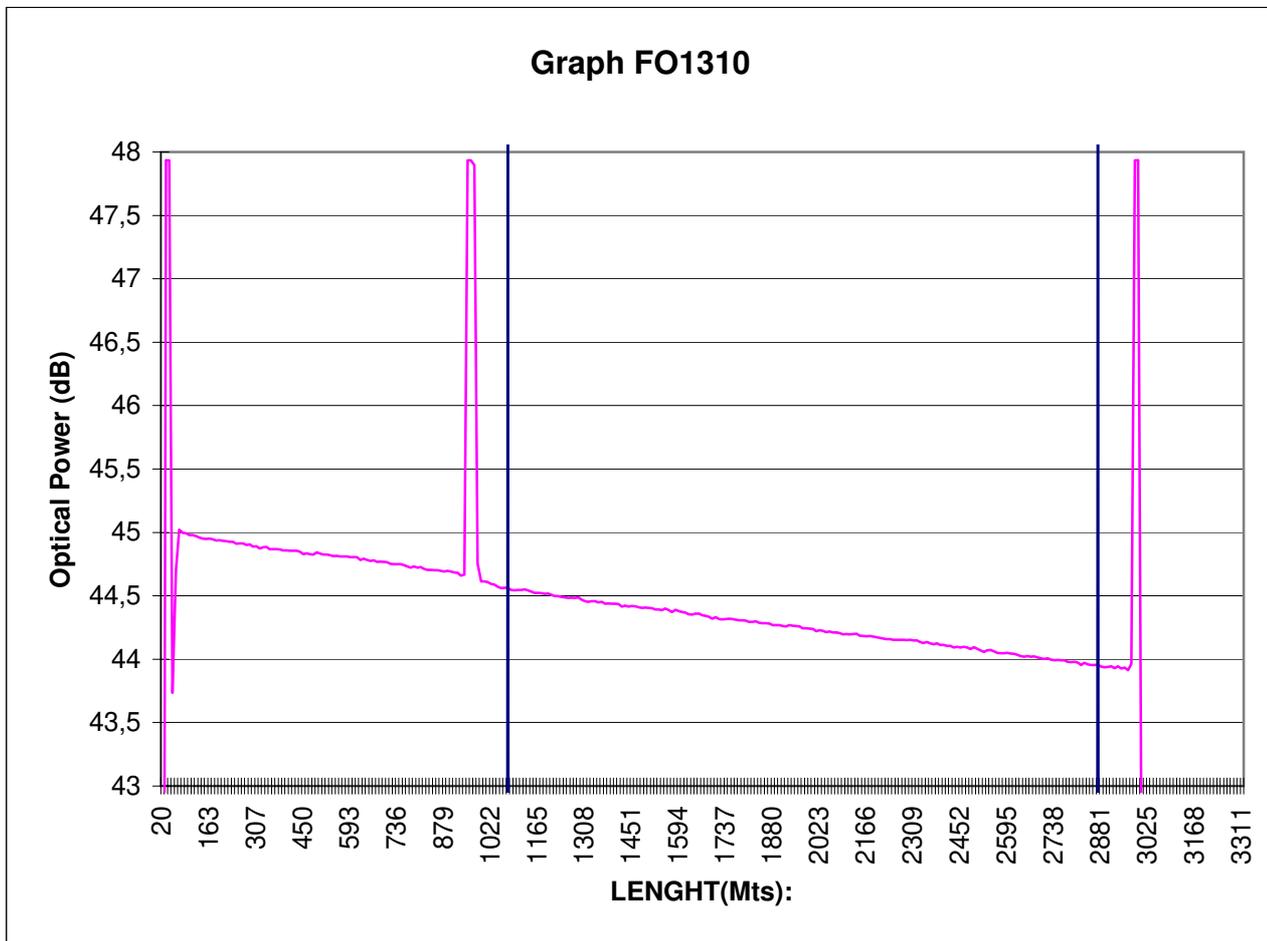
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:SLATE 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.329

Attenuation between markers (dB): 0.592  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

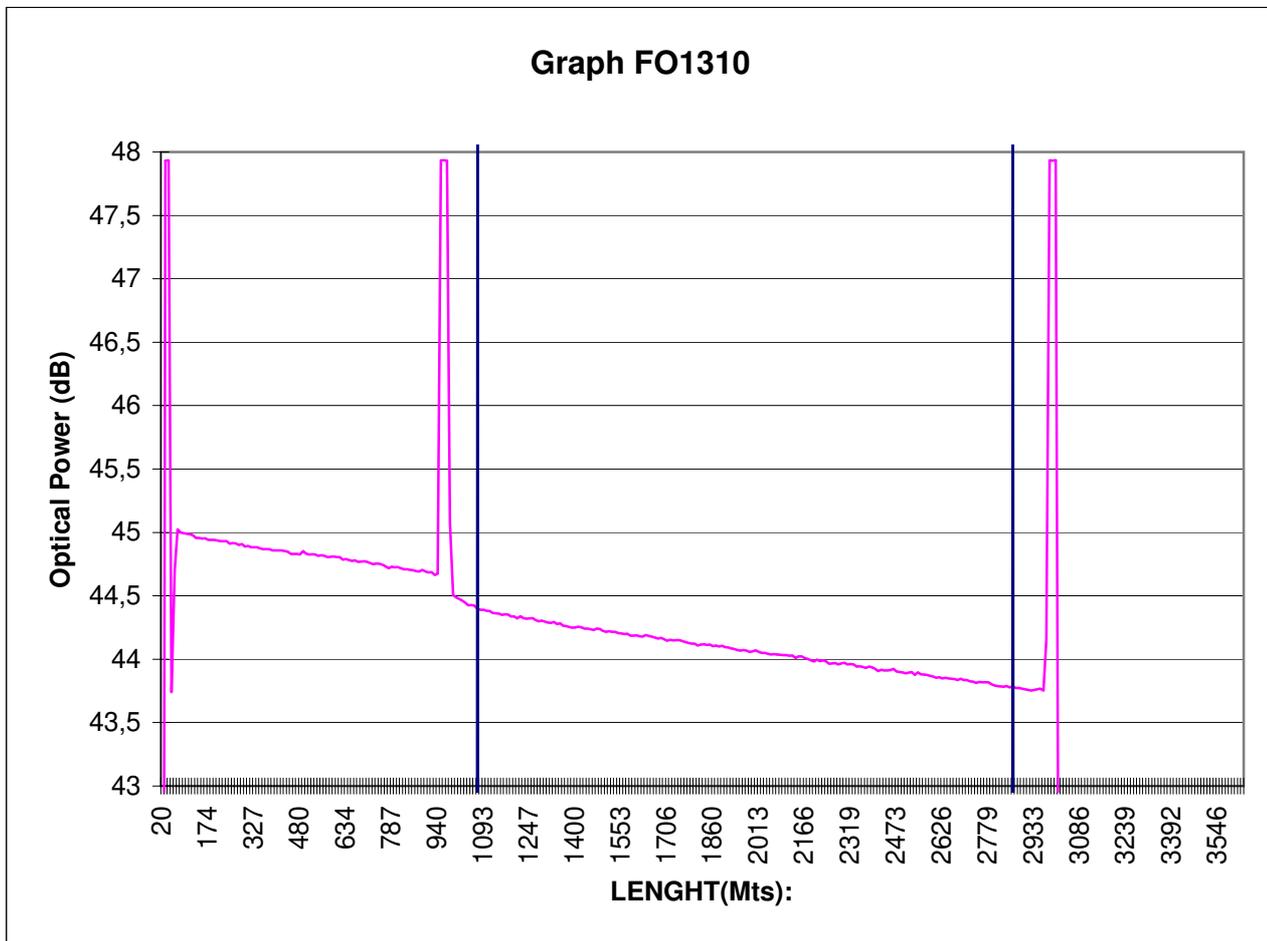
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:VIOLET**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.331

Attenuation between markers (dB): 0.592  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

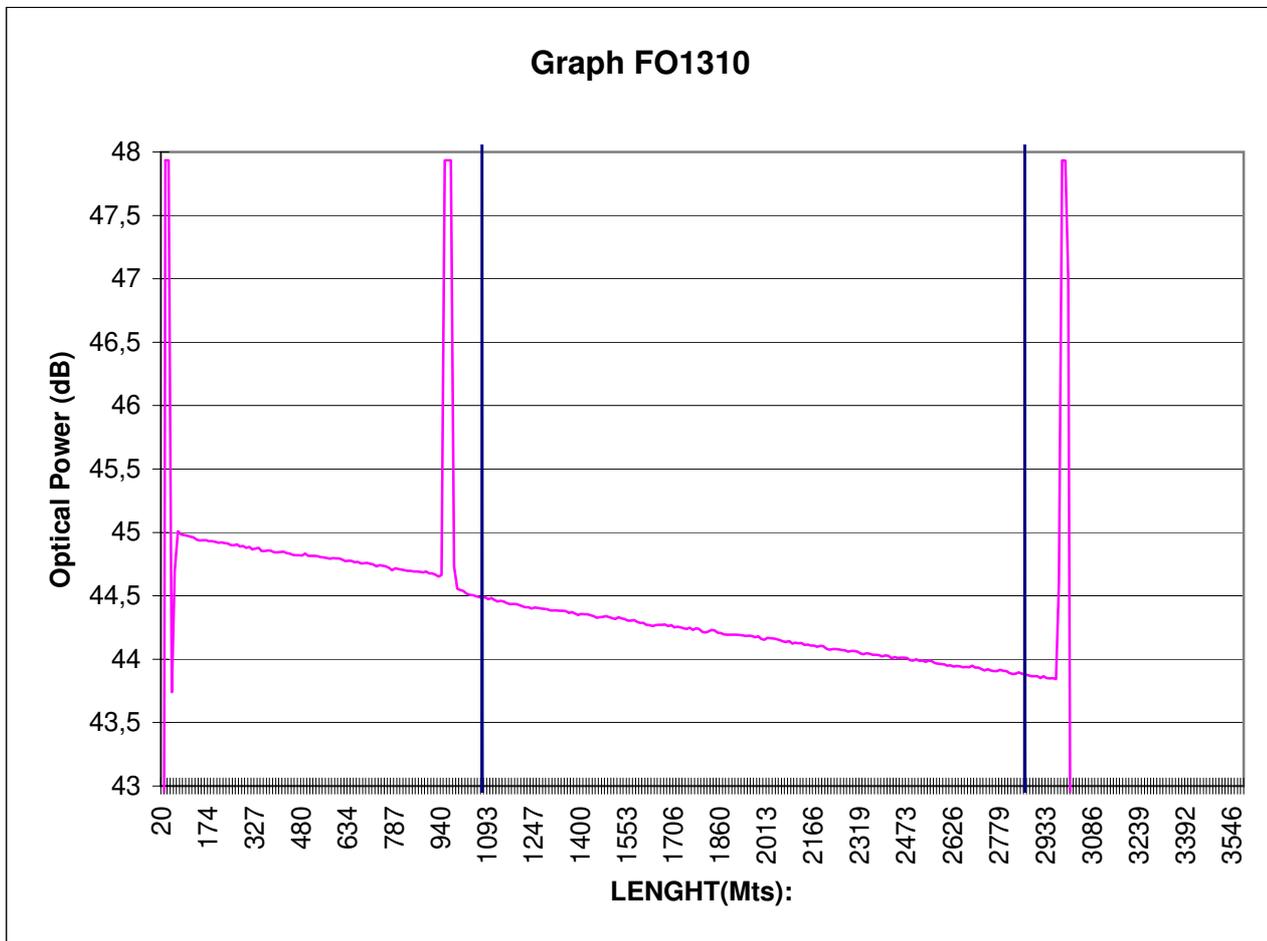
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:VIOLET 1**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.329

Attenuation between markers (dB): 0.588  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

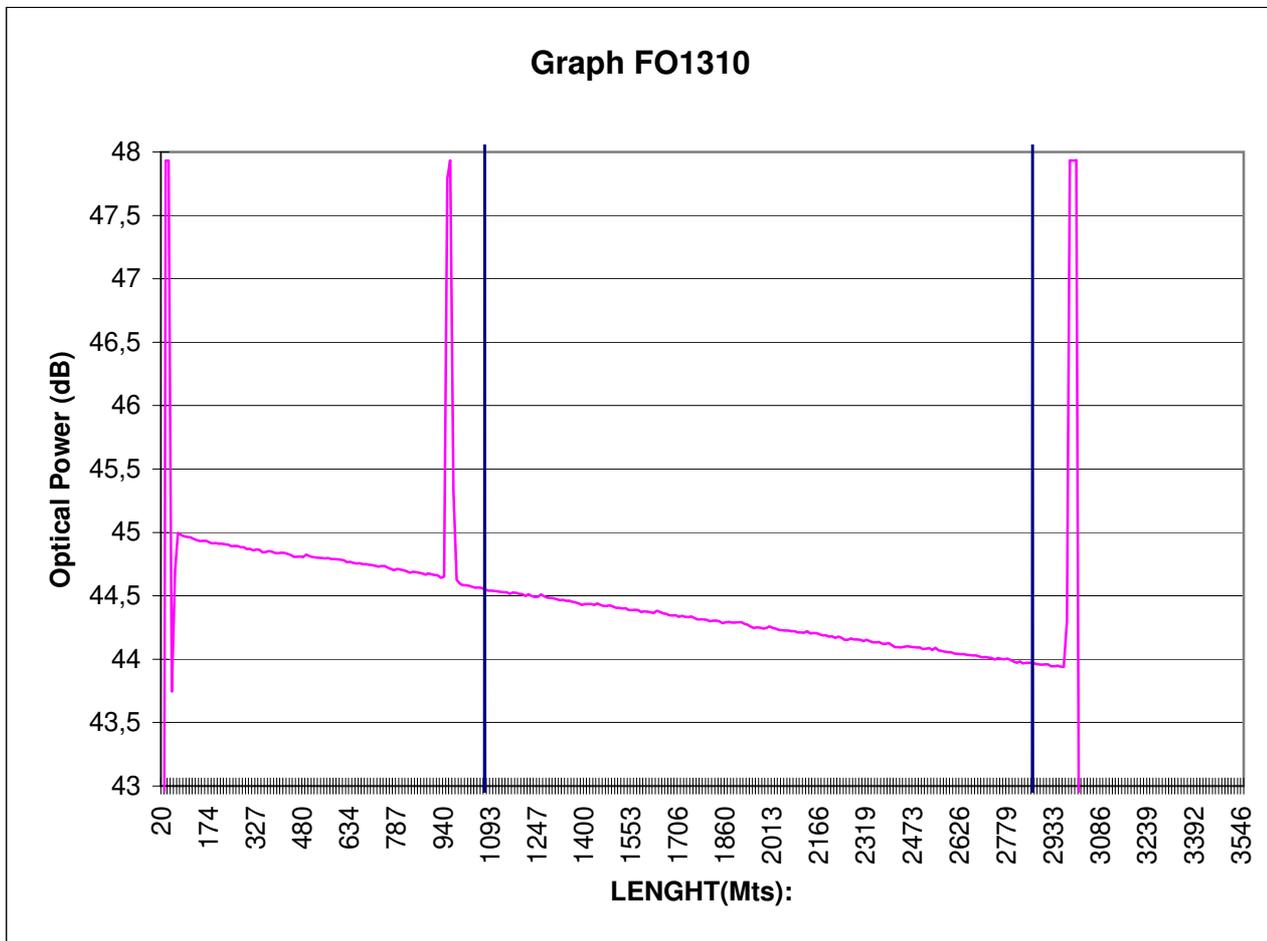
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:VIOLET 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.325

Attenuation between markers (dB): 0.581  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

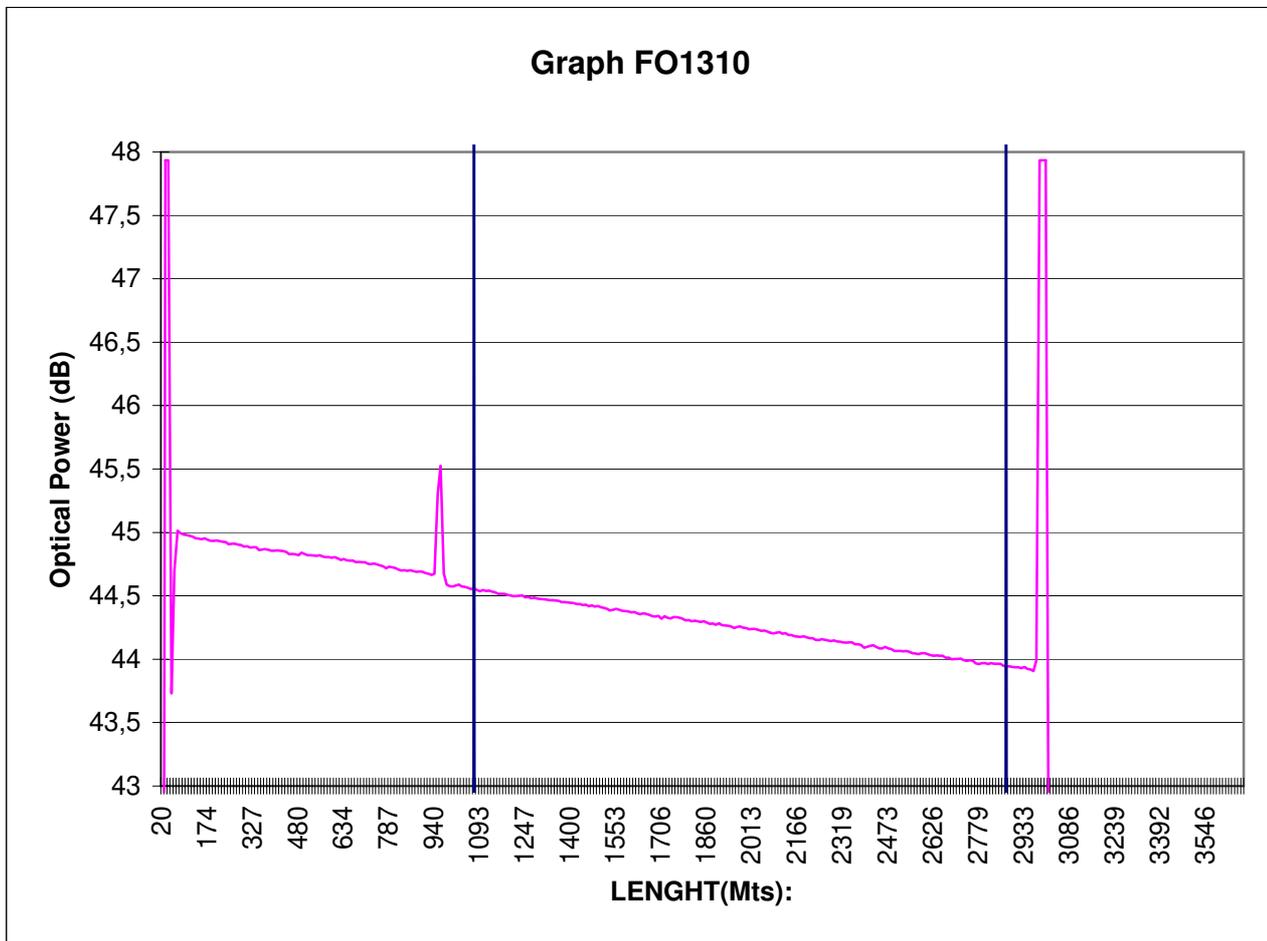
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:VIOLET 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.335

Attenuation between markers (dB): 0.602  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

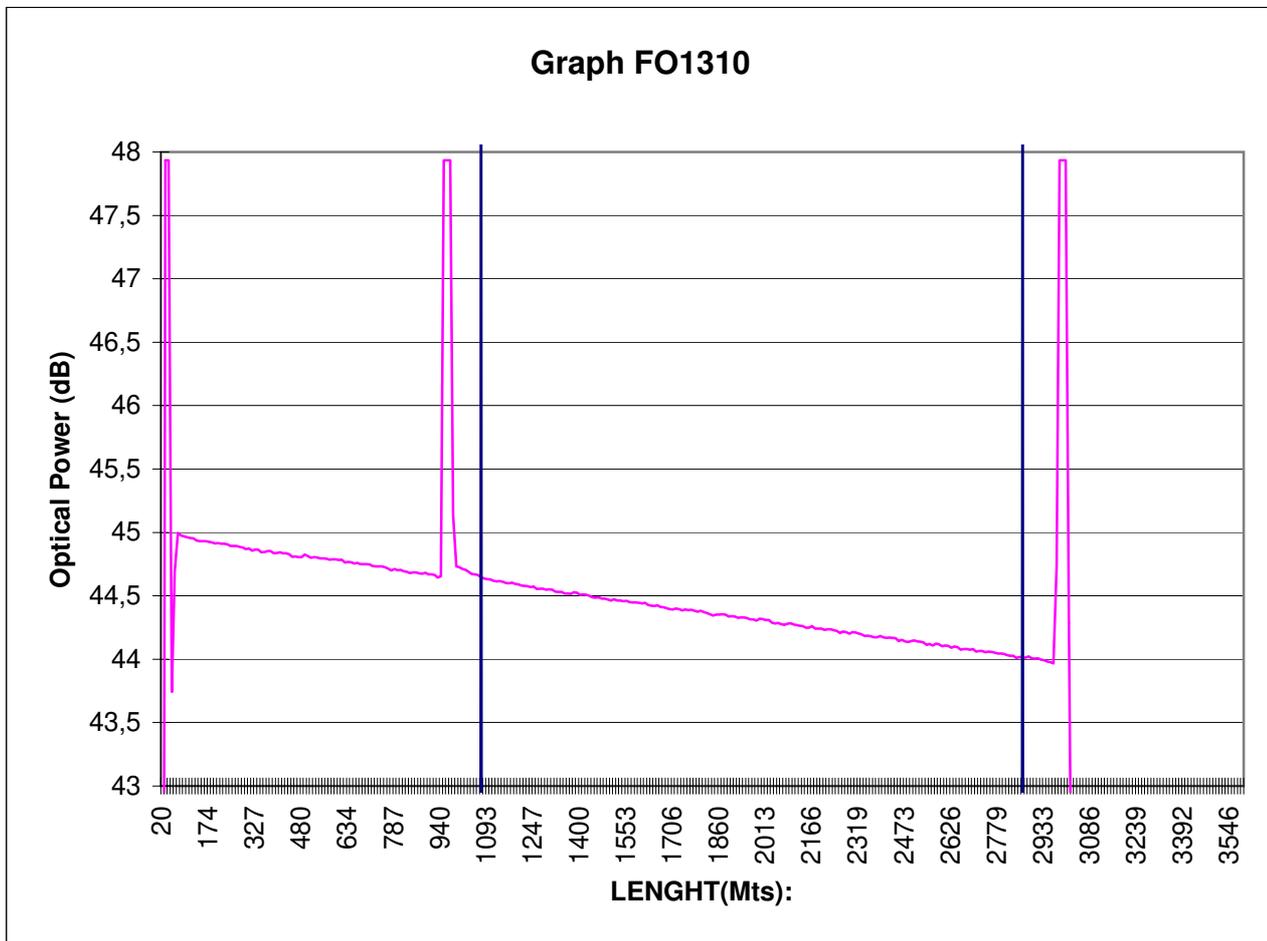
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:WHITE**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.338

Attenuation between markers (dB): 0.604  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

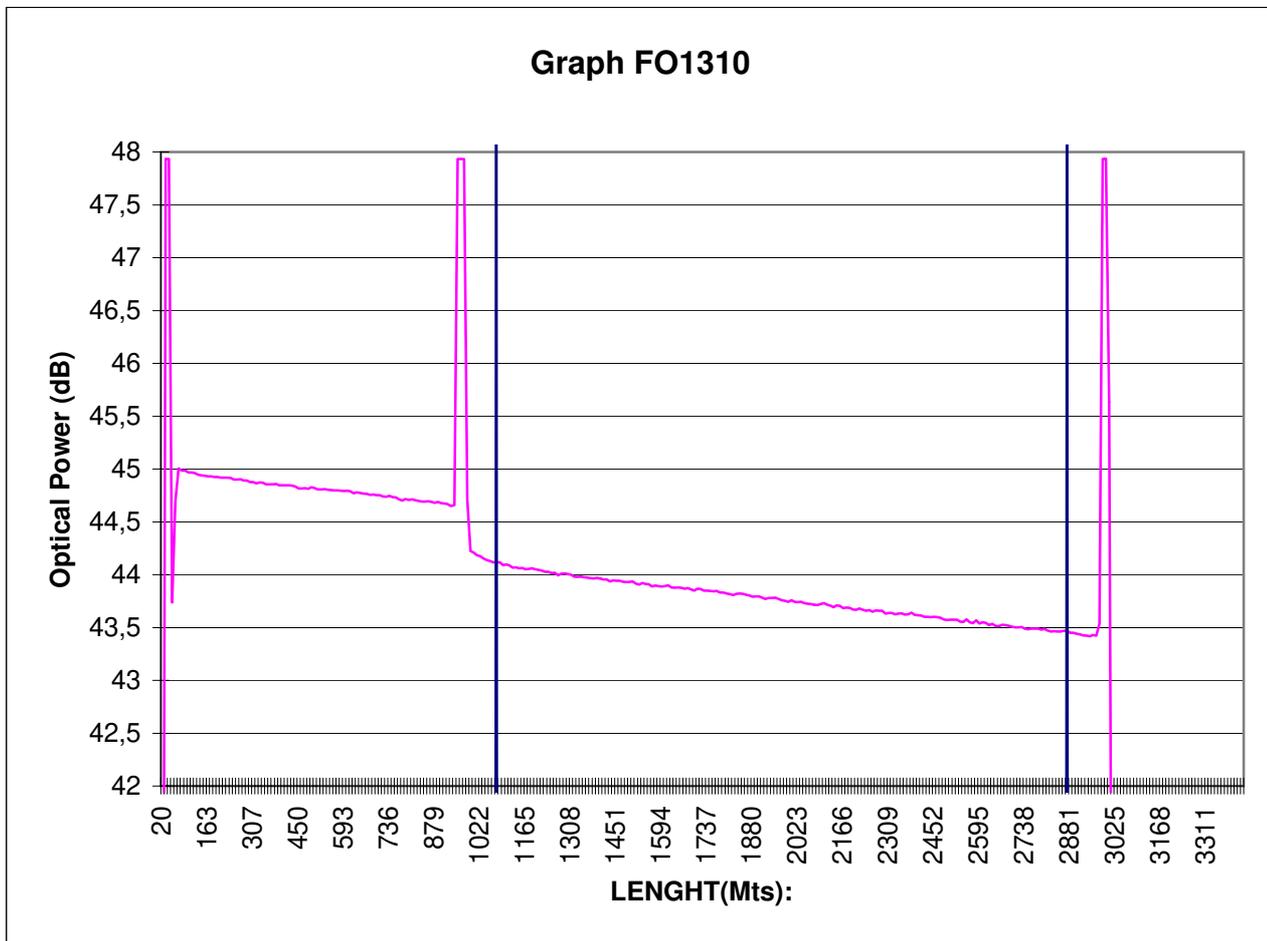
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:WHITE 1**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.350

Attenuation between markers (dB): 0.629  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

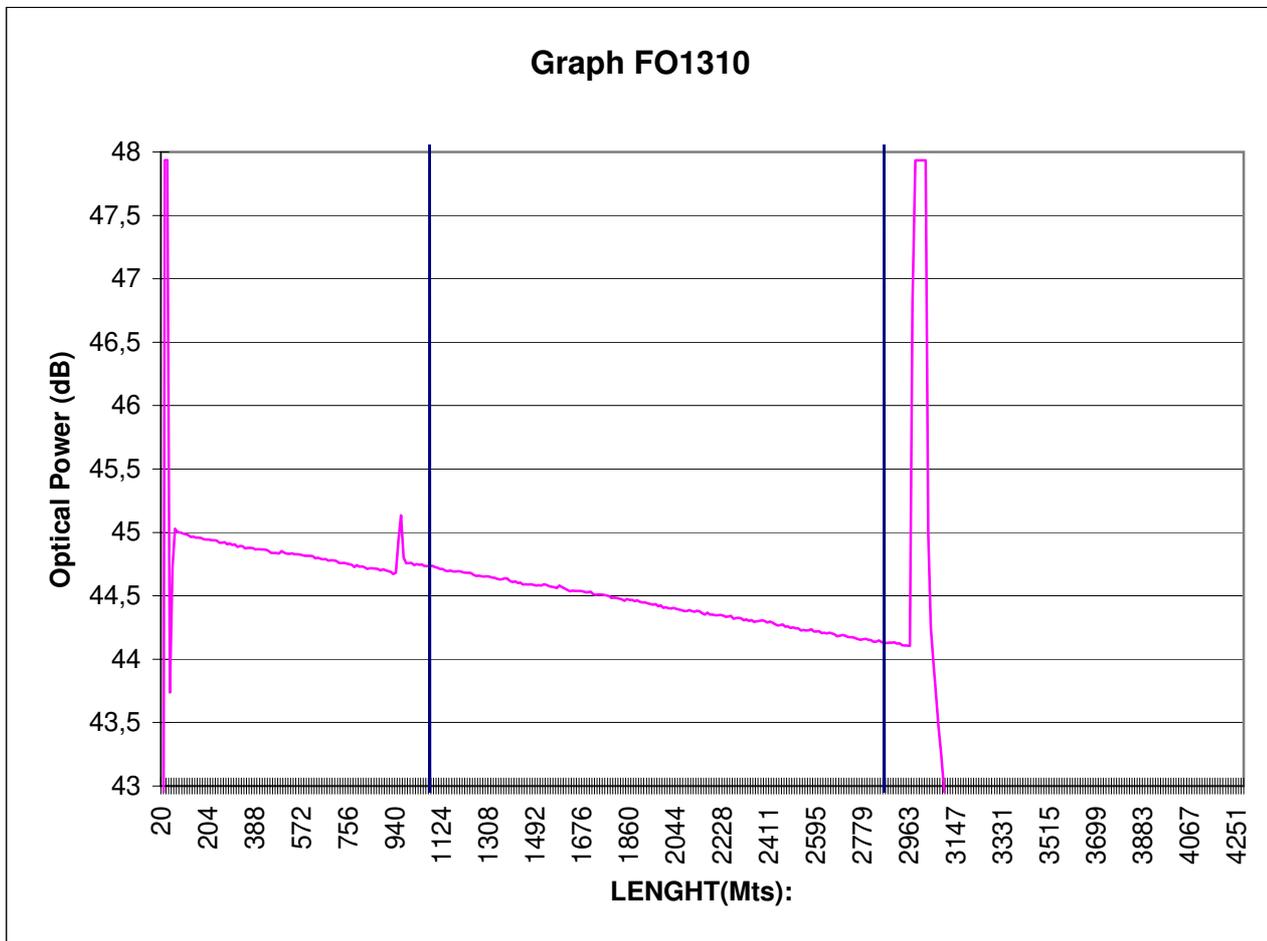
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:WHITE 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.333

Attenuation between markers (dB): 0.595  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

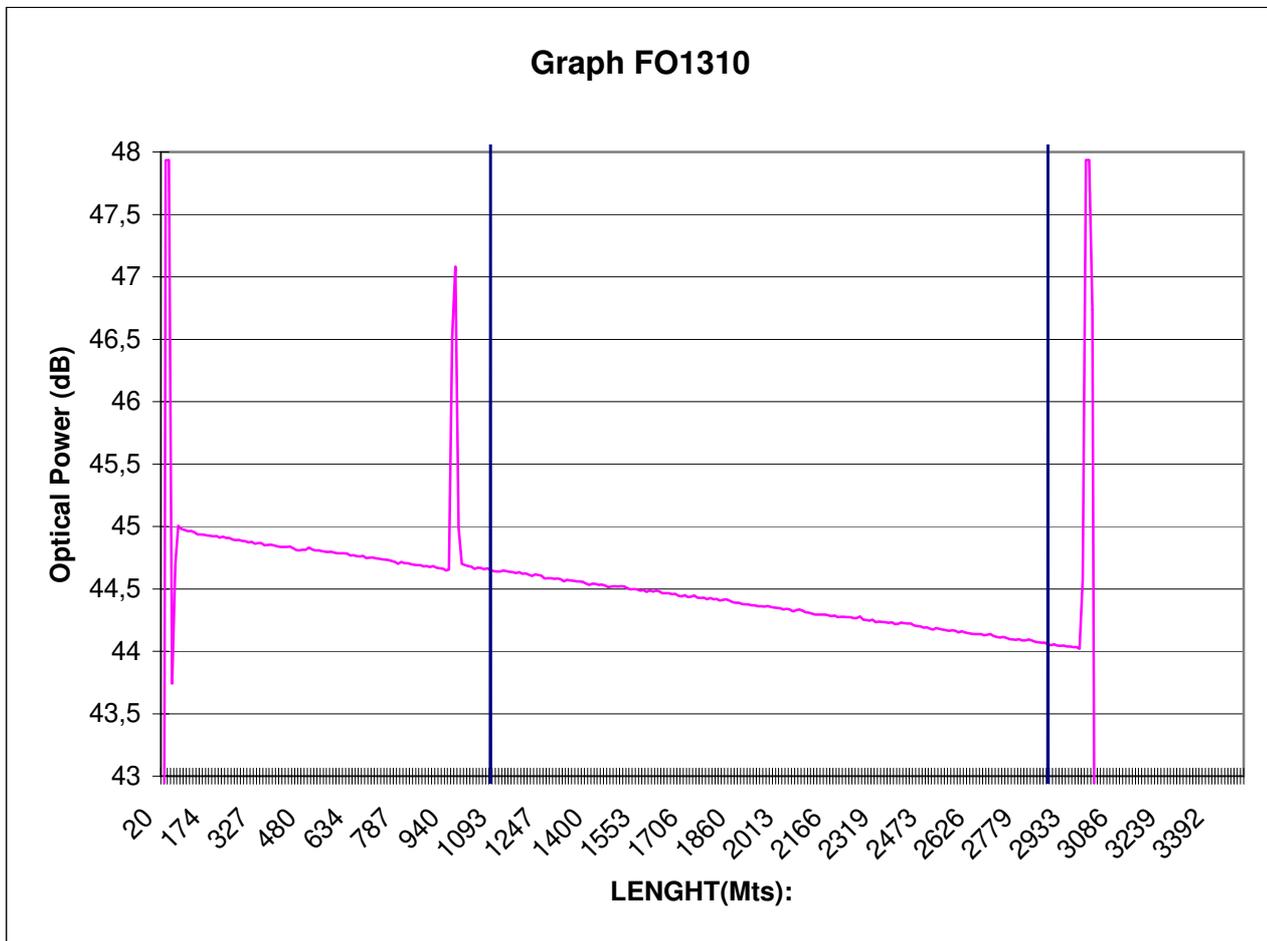
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:WHITE 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.329

Attenuation between markers (dB): 0.588  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

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**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

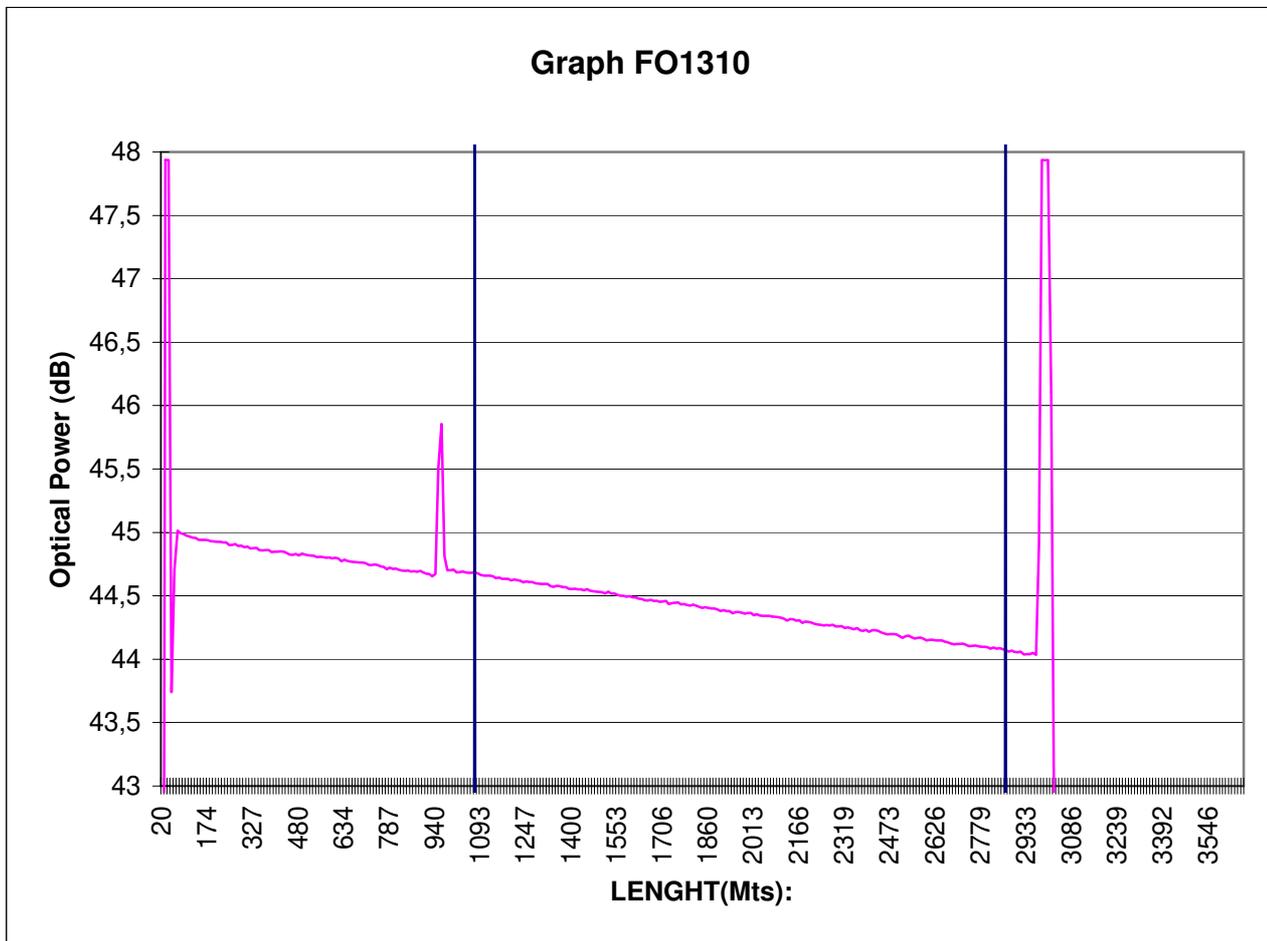
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:YELLOW**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.334

Attenuation between markers (dB): 0.597  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

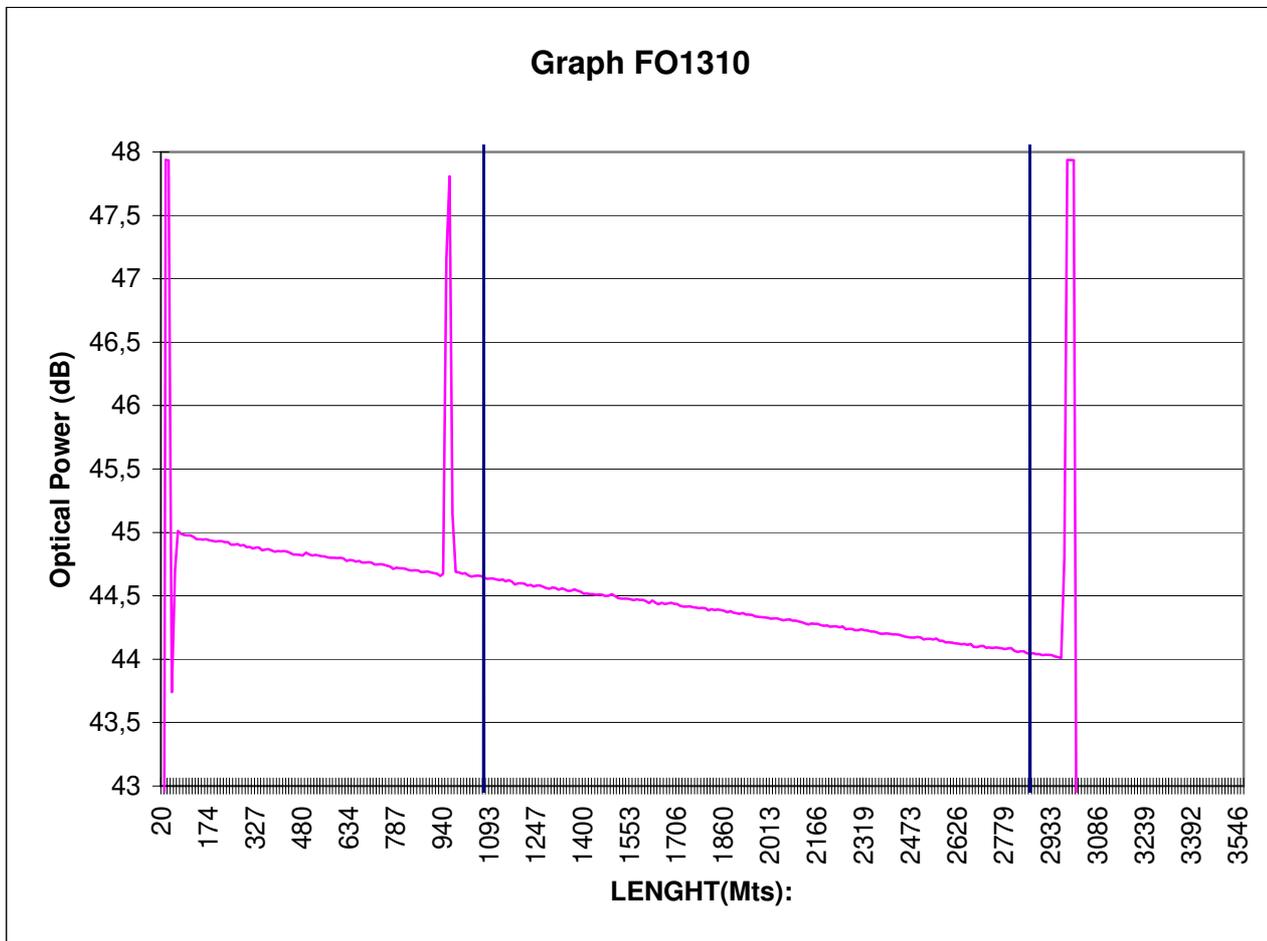
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:YELLOW 1**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.327

Attenuation between markers (dB): 0.585  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

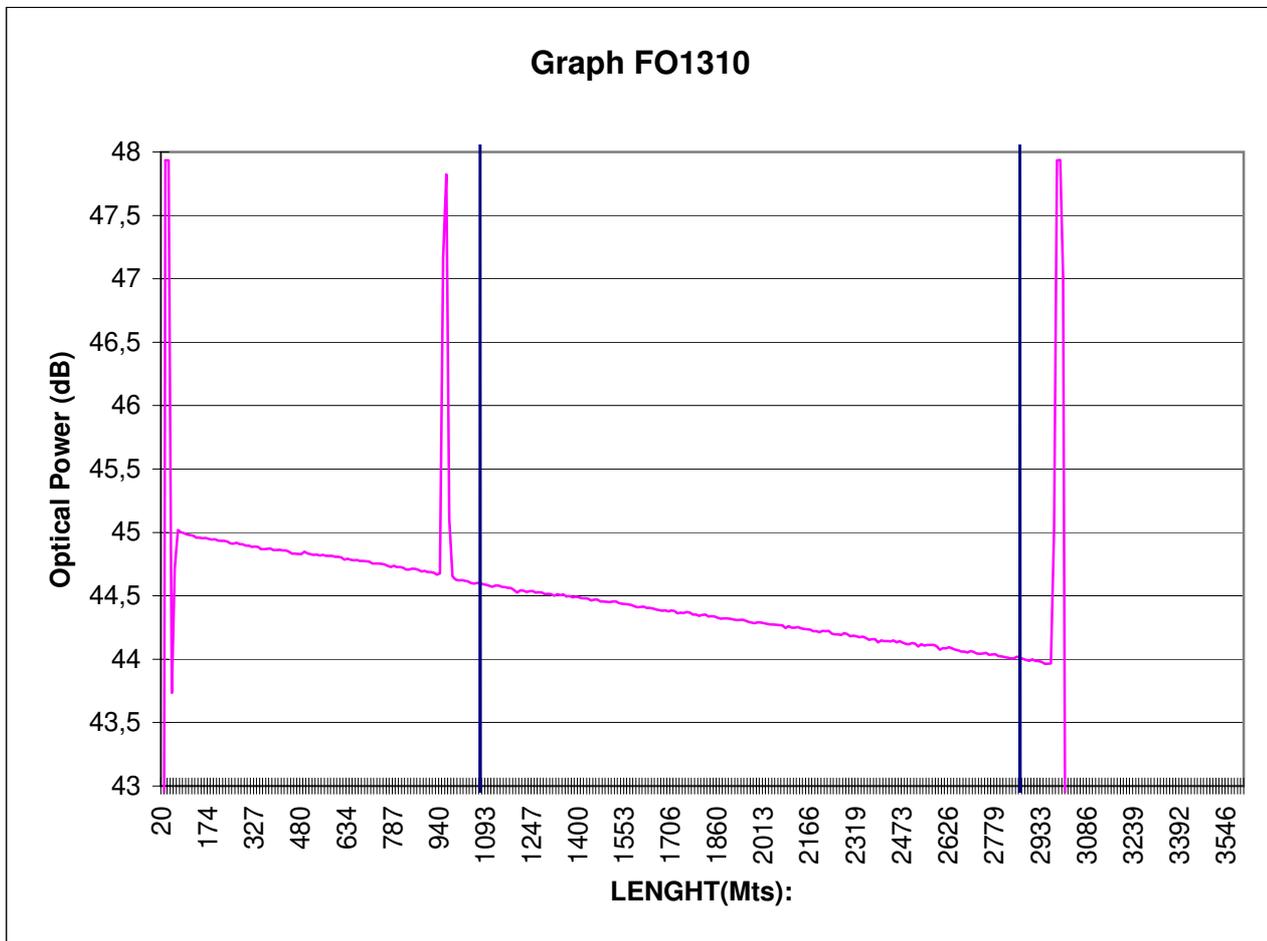
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:YELLOW 2**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.326

Attenuation between markers (dB): 0.583  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

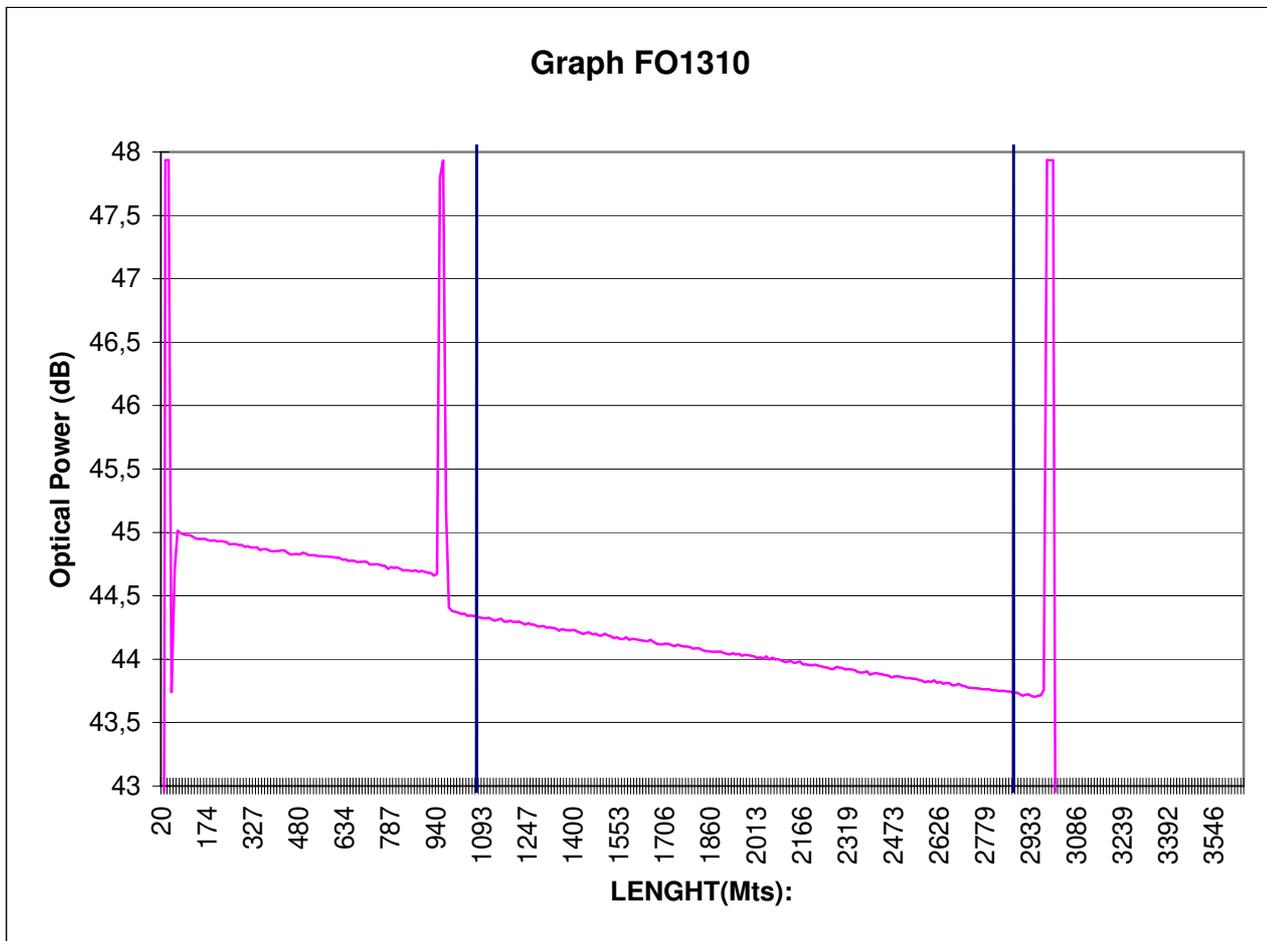
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:YELLOW 3**

Wavelength (nm) : 1310 Attenuation (dB/Km):0.332

Attenuation between markers (dB): 0.597  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale(m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.467

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

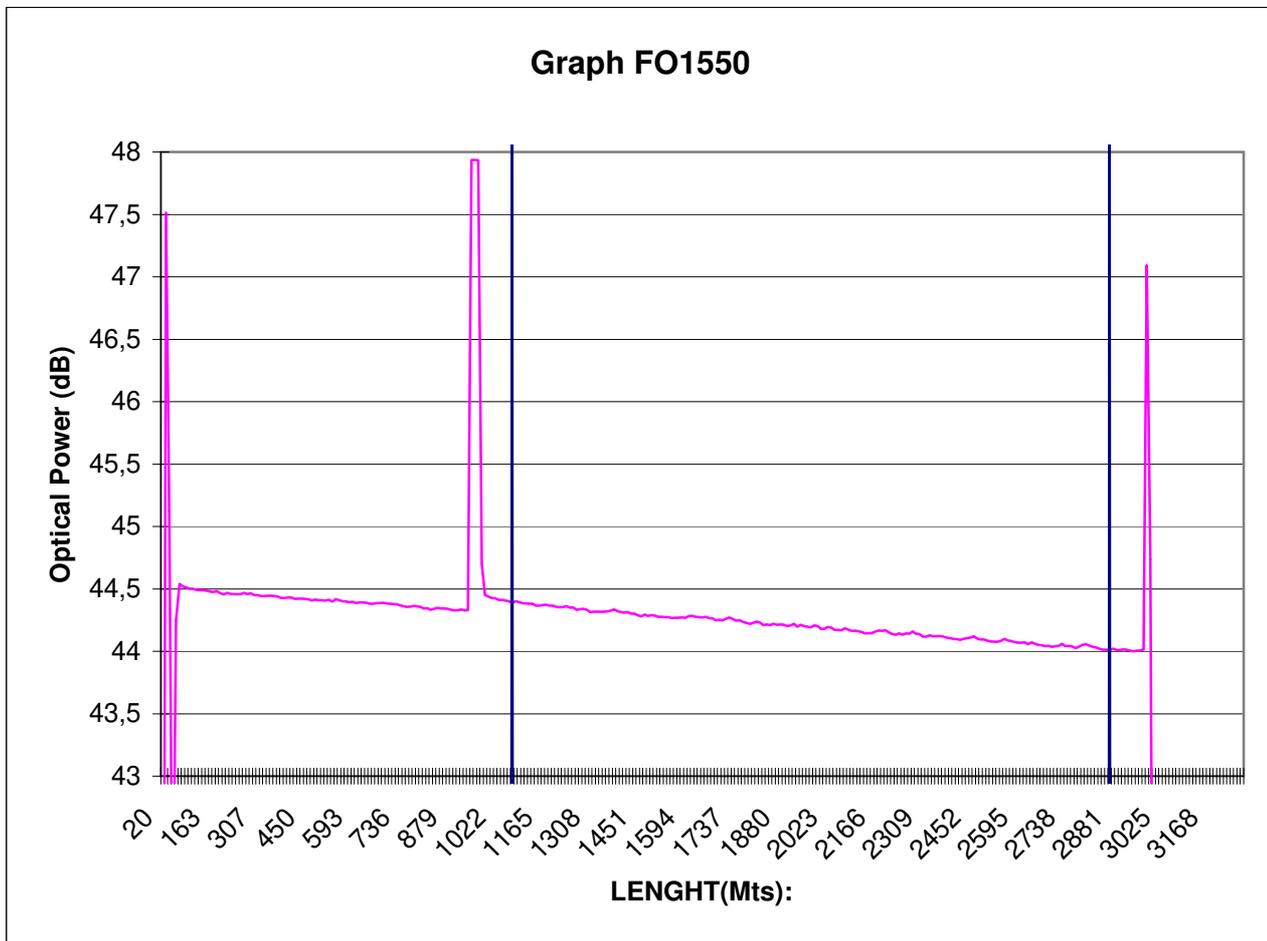
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:AQUA**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.202

Attenuation between markers (dB): 0.363  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

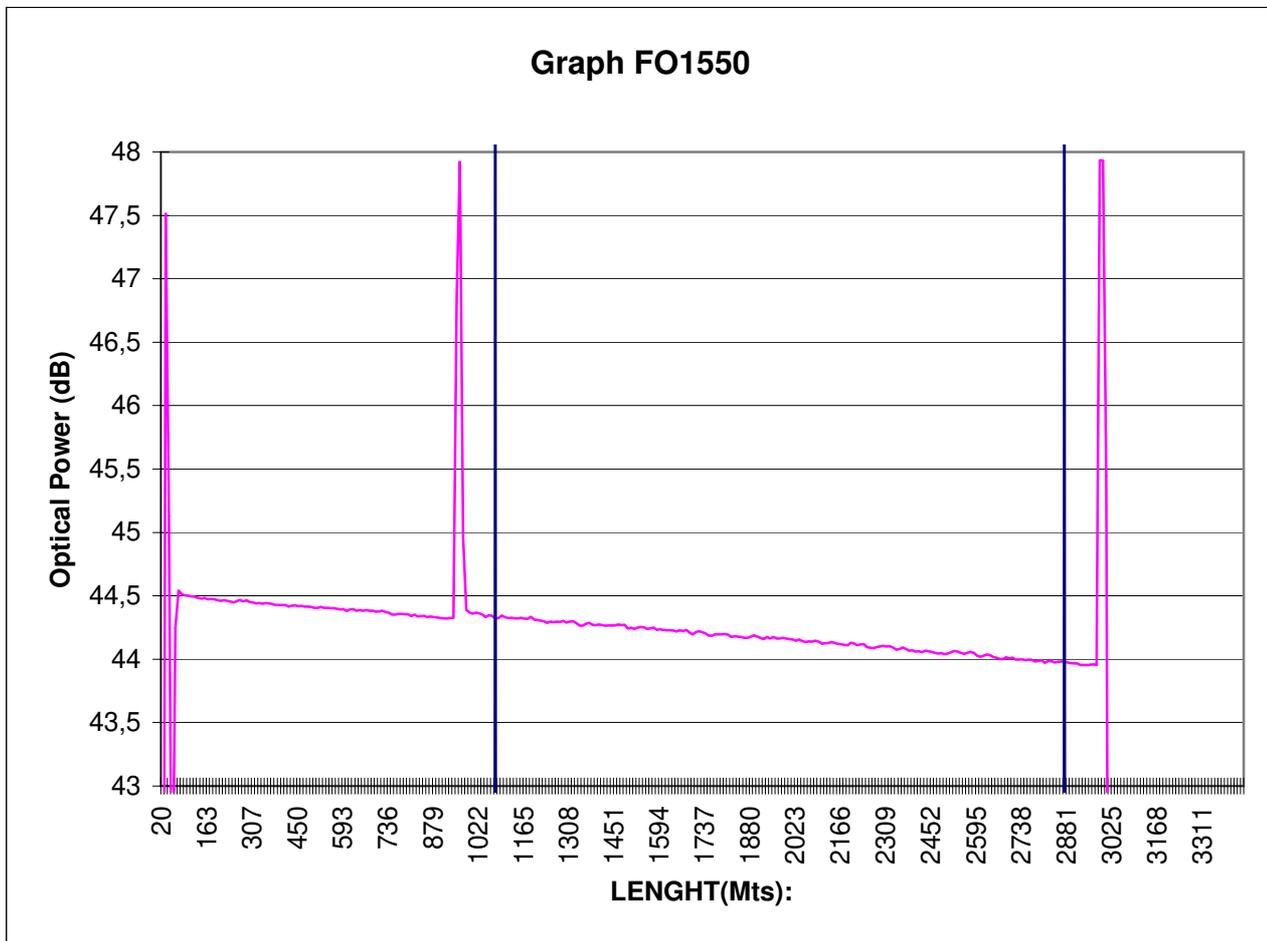
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:AQUA 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.200

Attenuation between markers (dB): 0.360  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

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**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

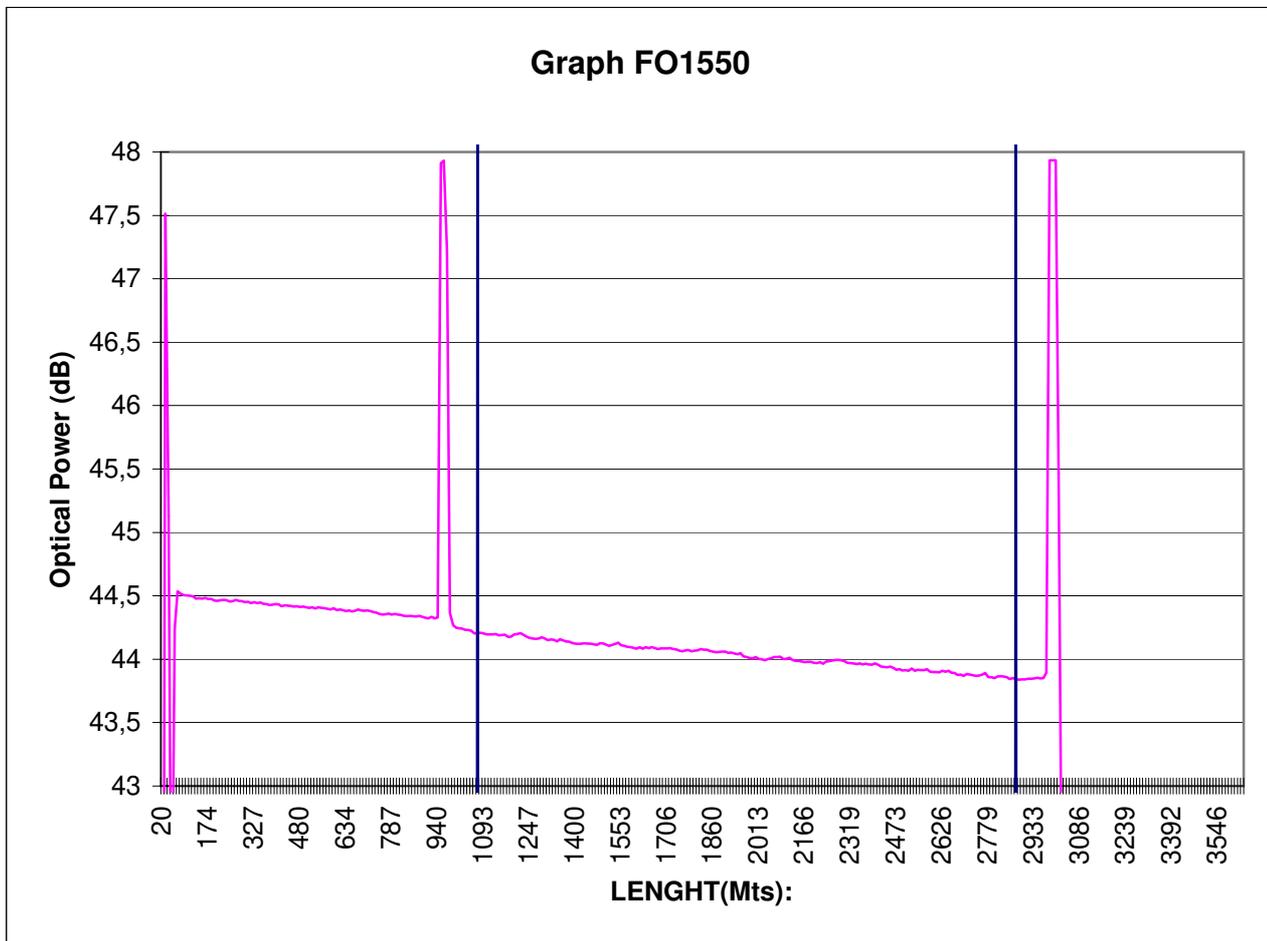
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:AQUA 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.196

Attenuation between markers (dB): 0.352  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

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**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

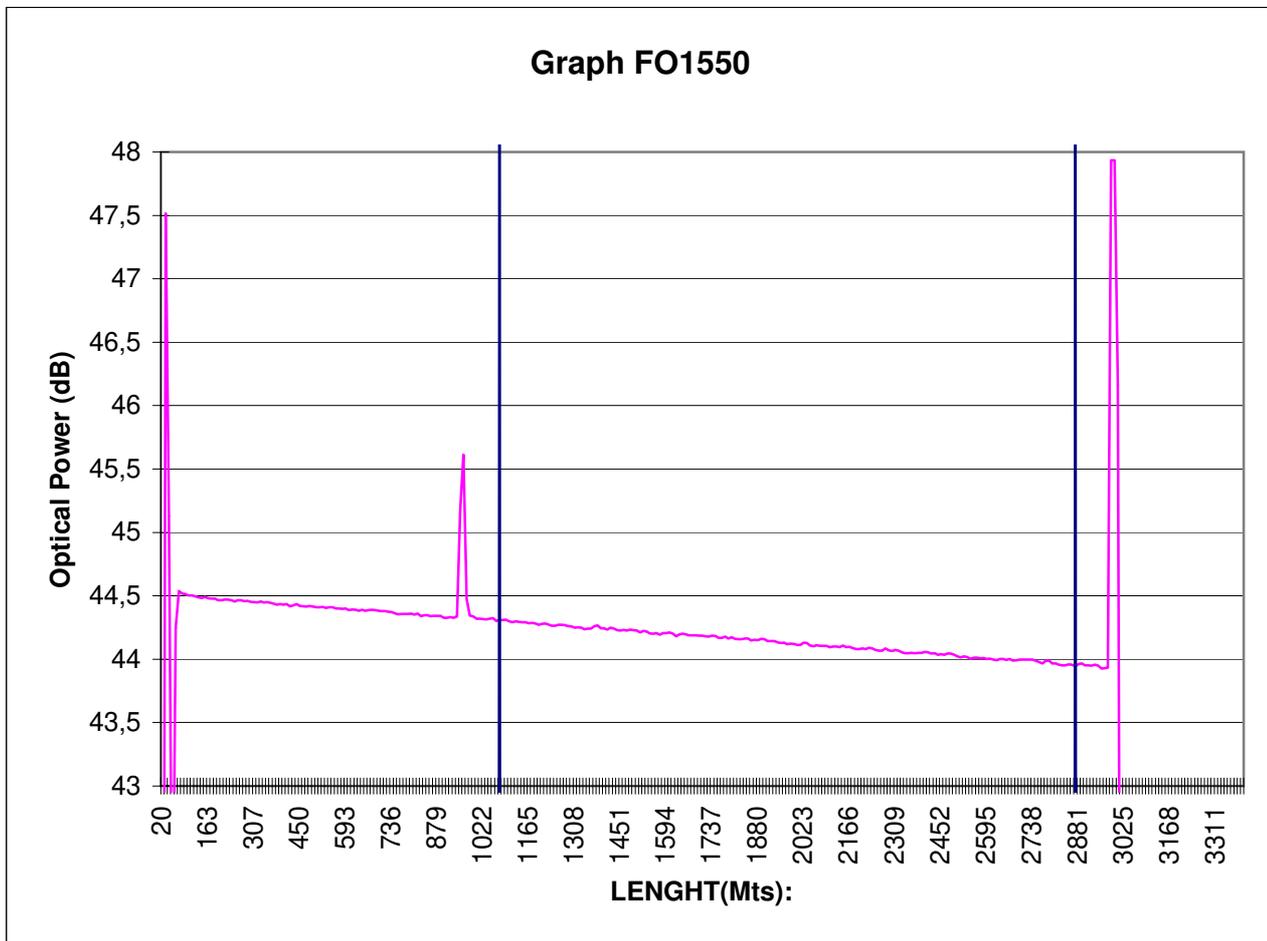
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:AQUA 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.193

Attenuation between markers (dB): 0.347  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

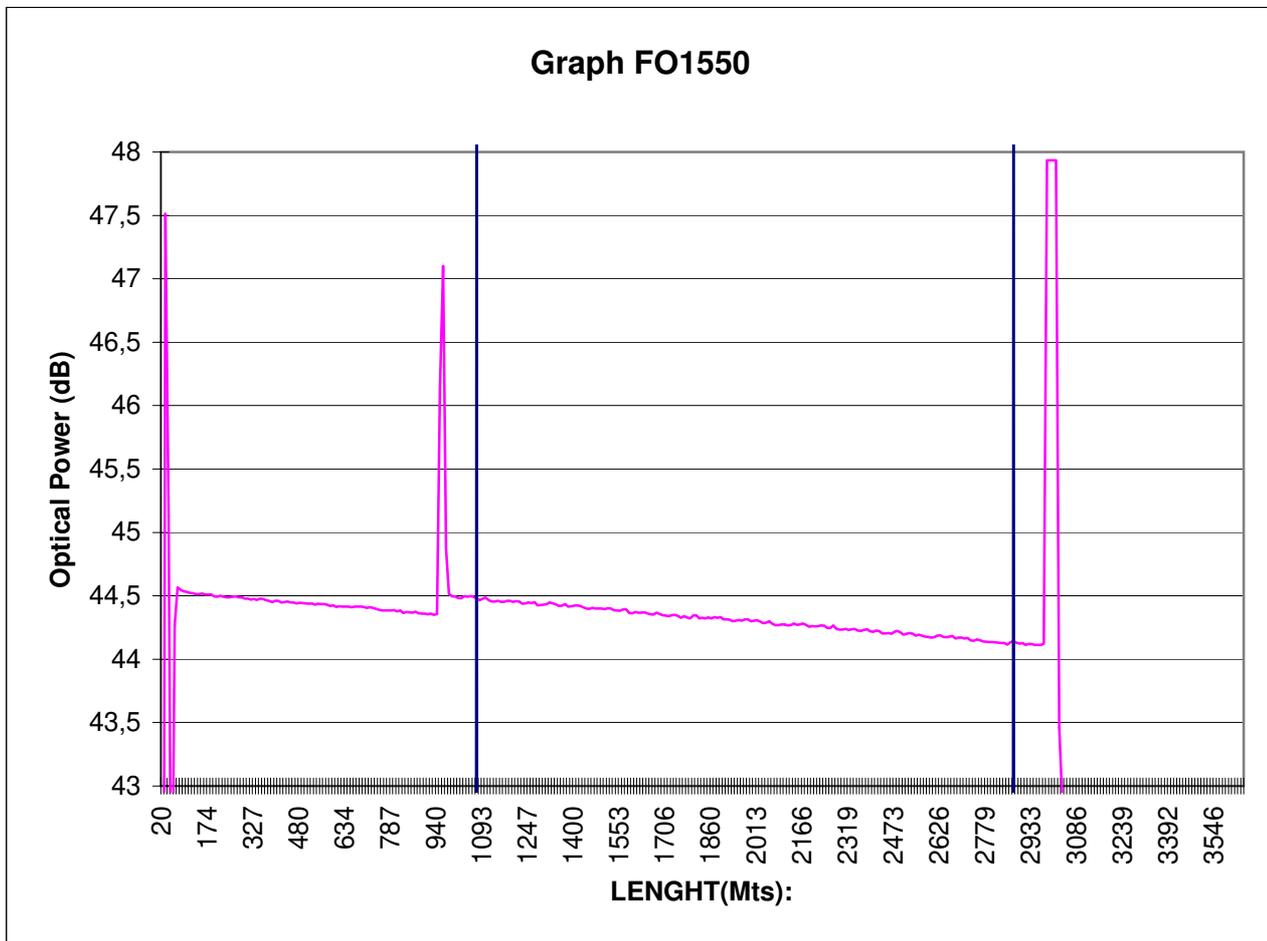
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BLACK**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.192

Attenuation between markers (dB): 0.345  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

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**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

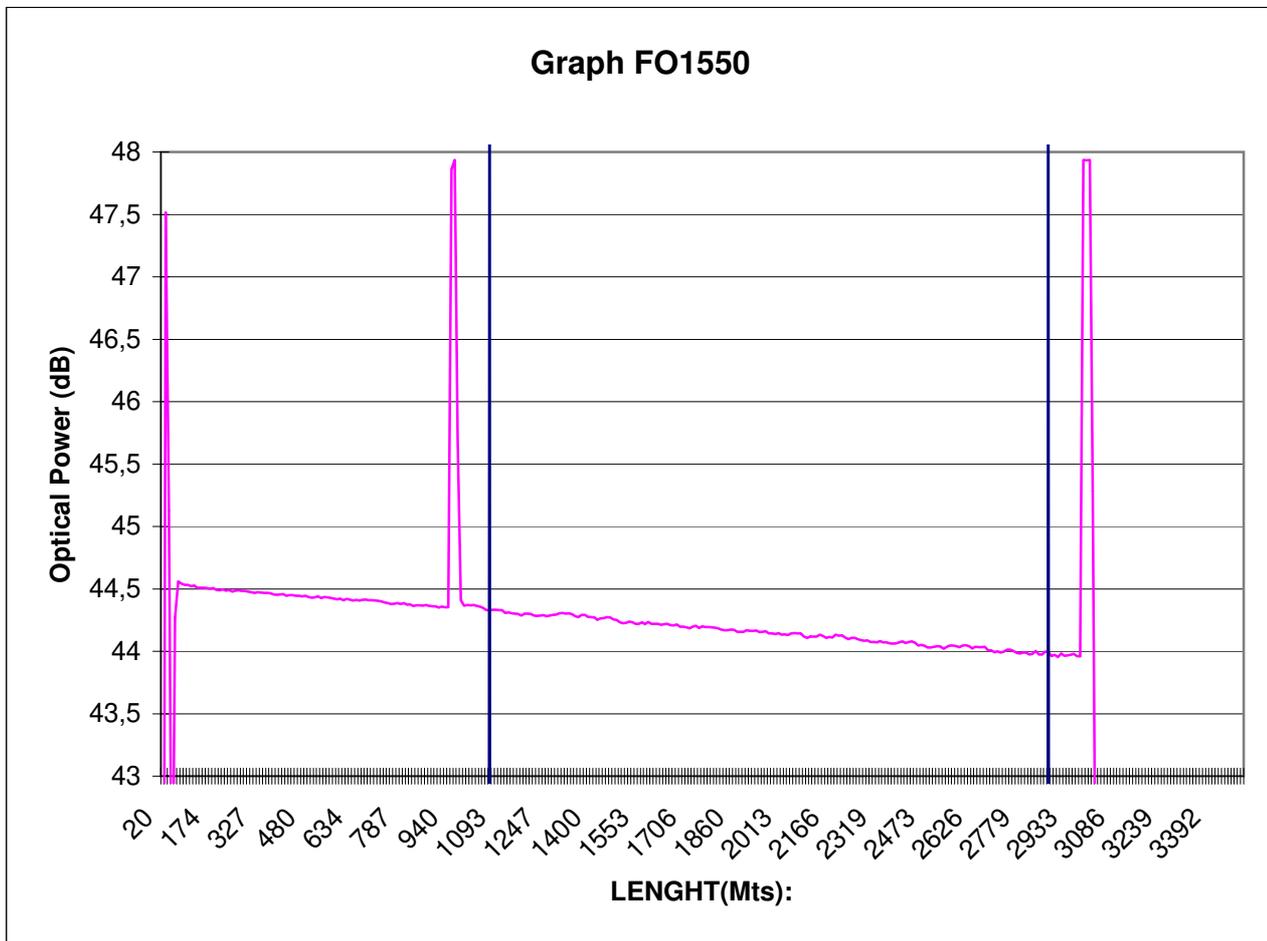
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BLUE**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.195

Attenuation between markers (dB): 0.351  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

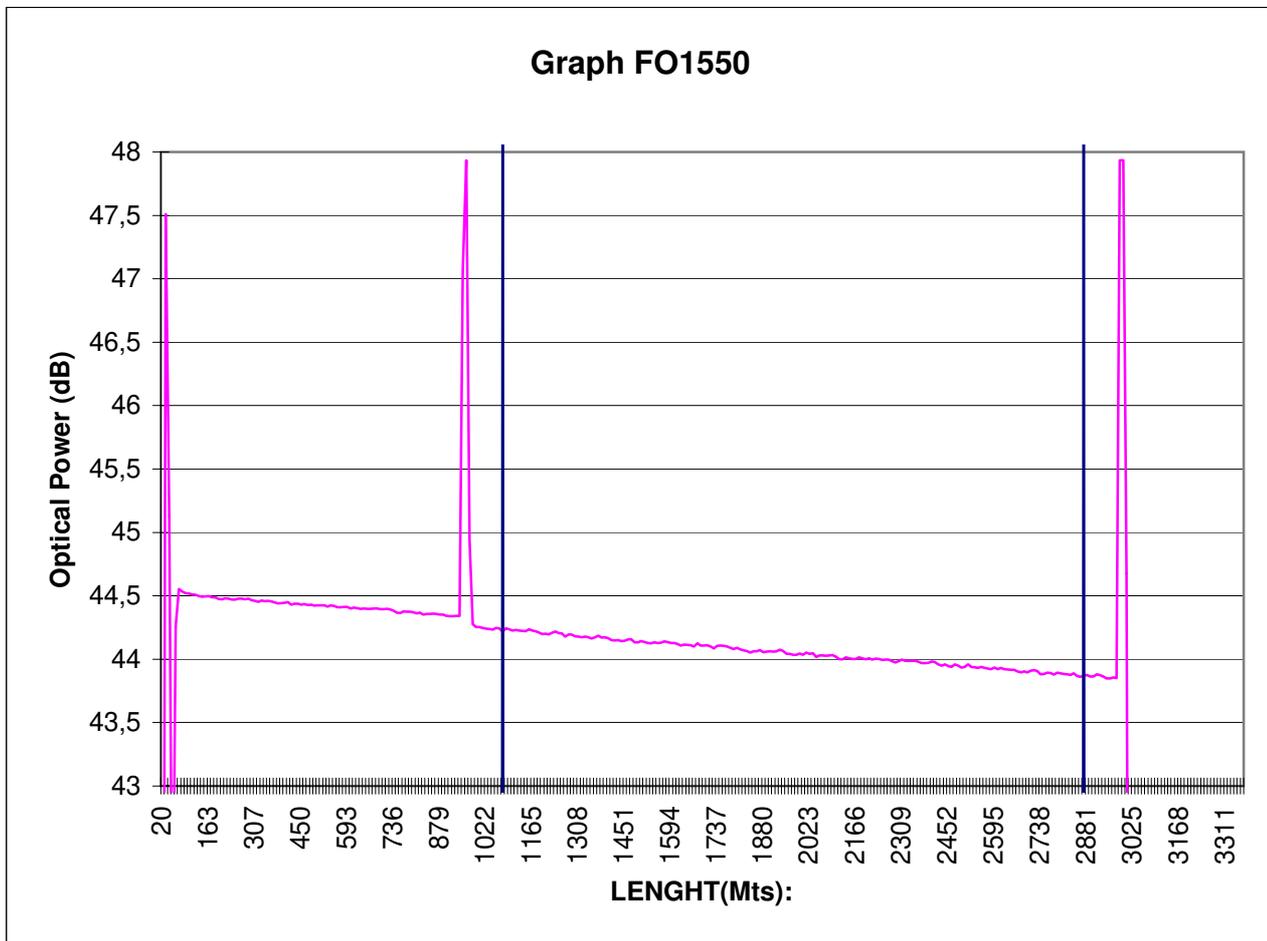
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BLUE 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.200

Attenuation between markers (dB): 0.360  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

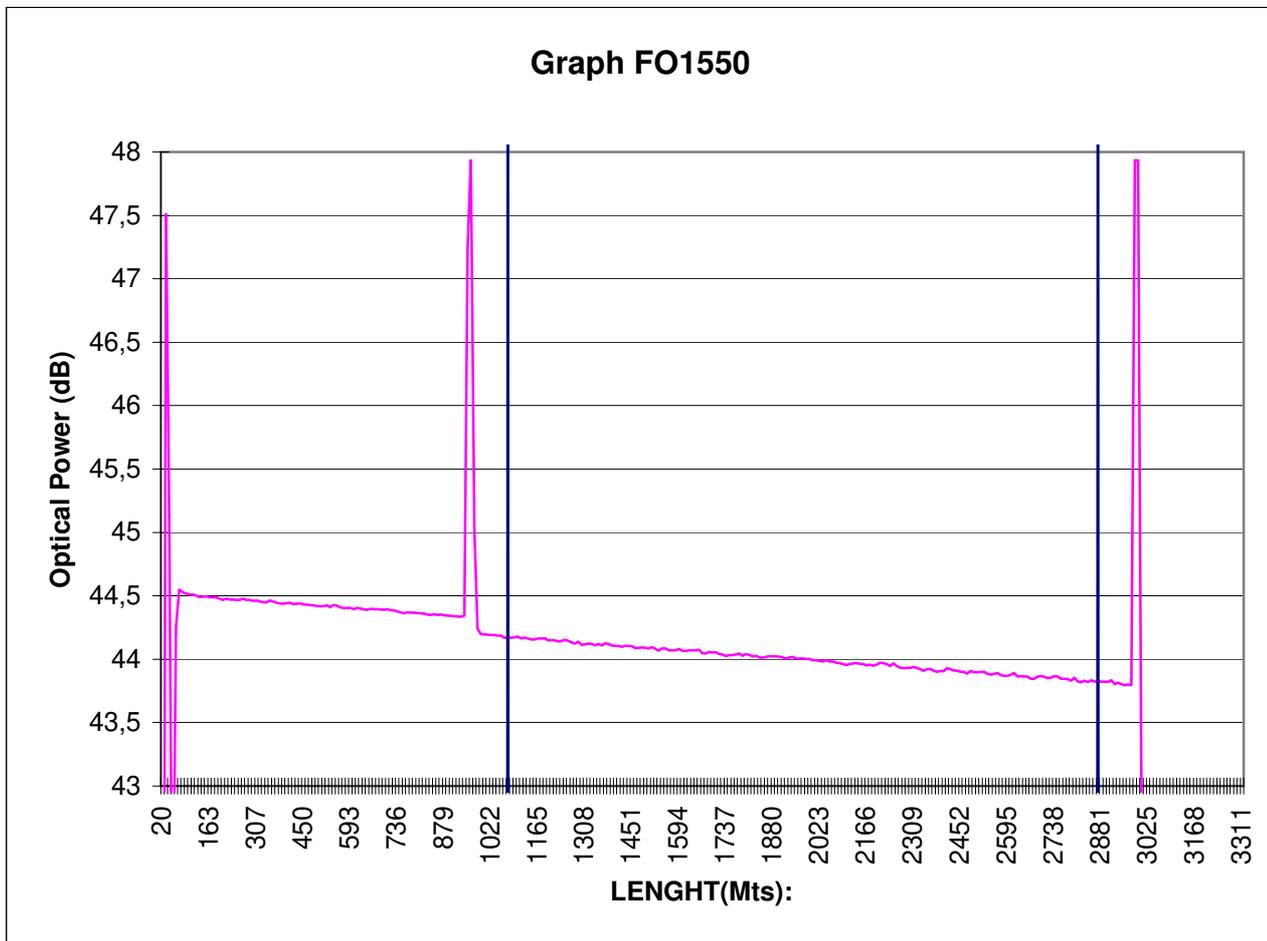
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BLUE 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.194

Attenuation between markers (dB): 0.349  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

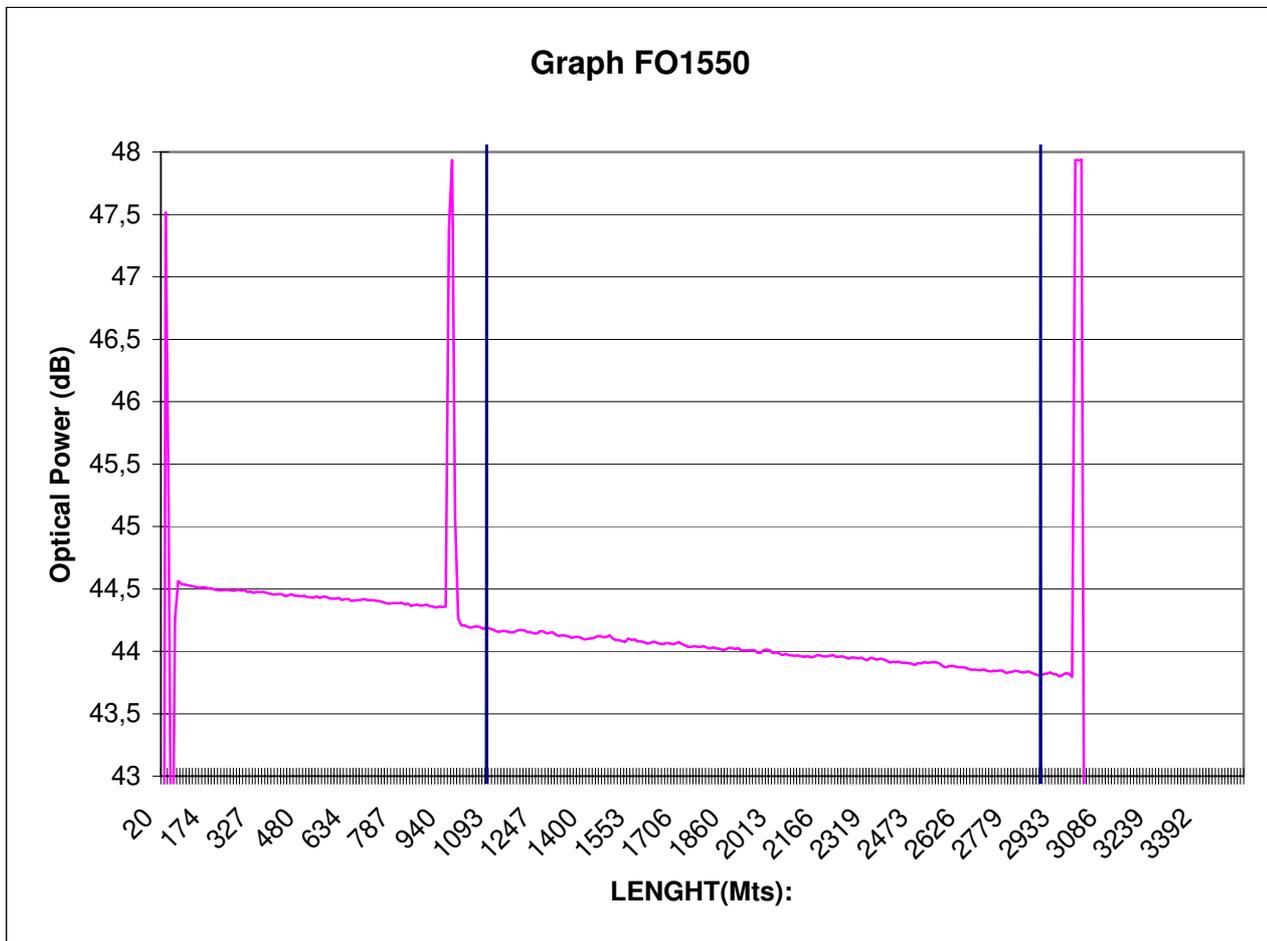
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BLUE 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.198

Attenuation between markers (dB): 0.356  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

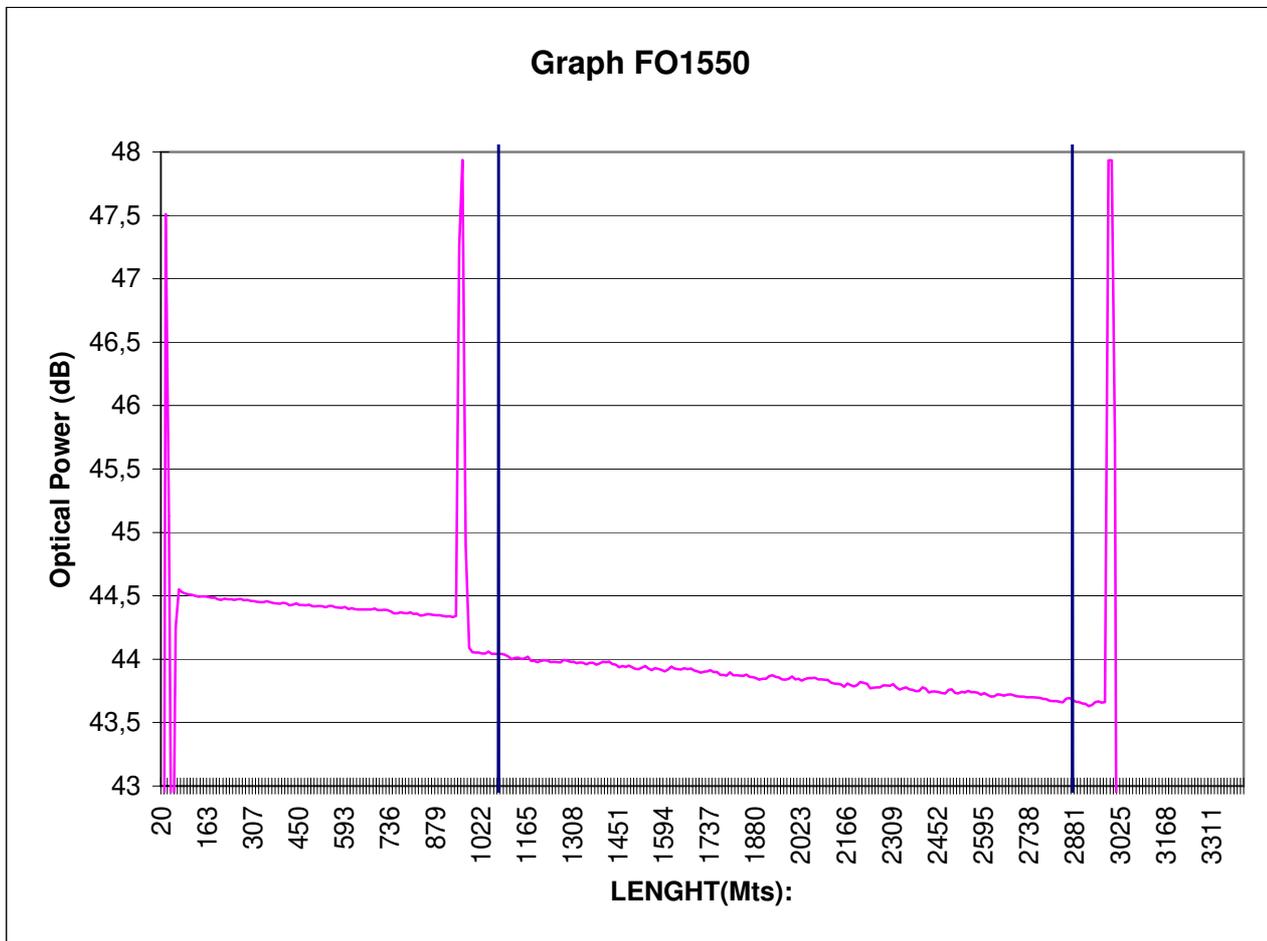
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BROWN**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.195

Attenuation between markers (dB): 0.351  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

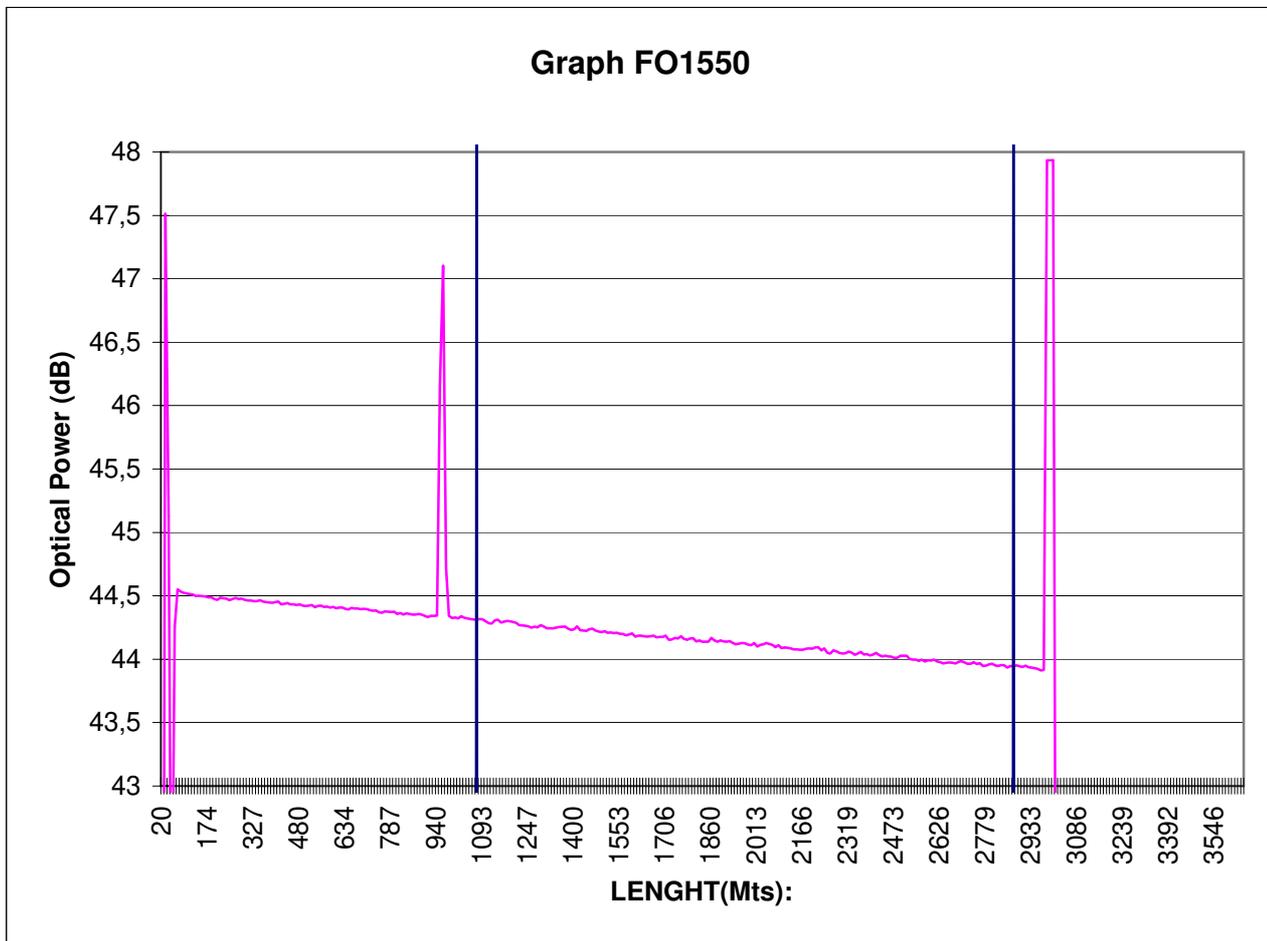
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BROWN 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.202

Attenuation between markers (dB): 0.363  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

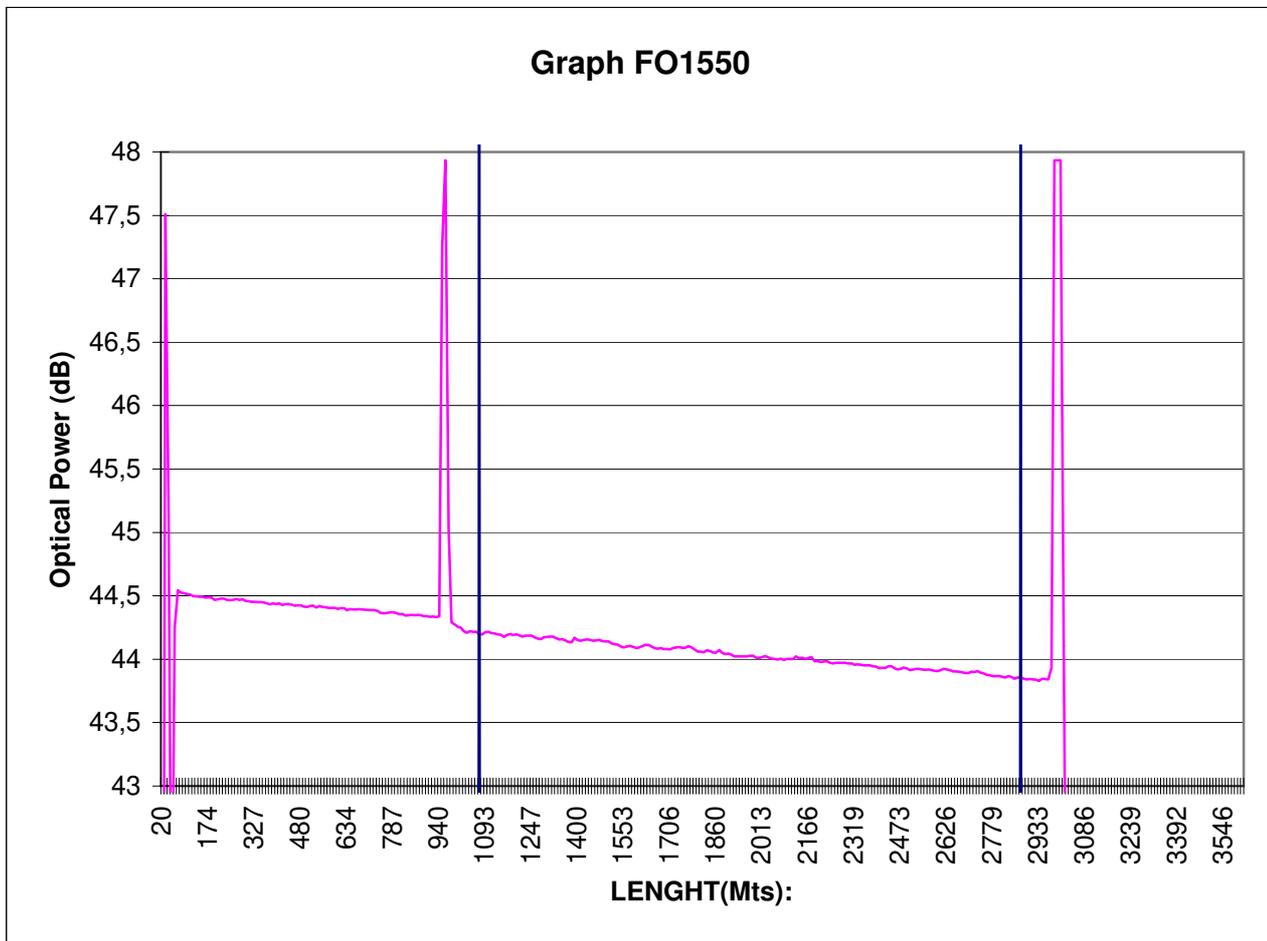
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BROWN 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.199

Attenuation between markers (dB): 0.358  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

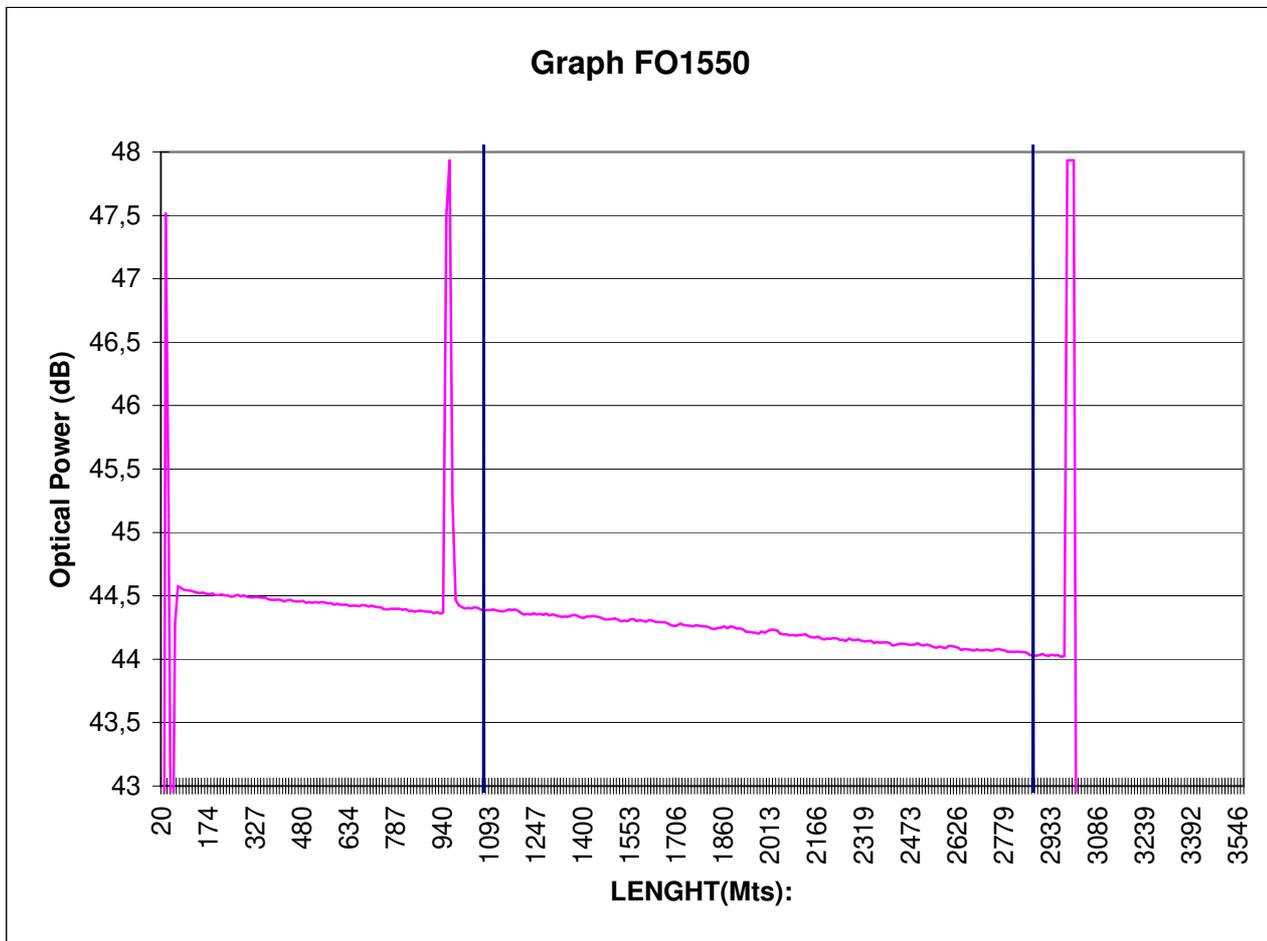
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:BROWN 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.200

Attenuation between markers (dB): 0.360  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

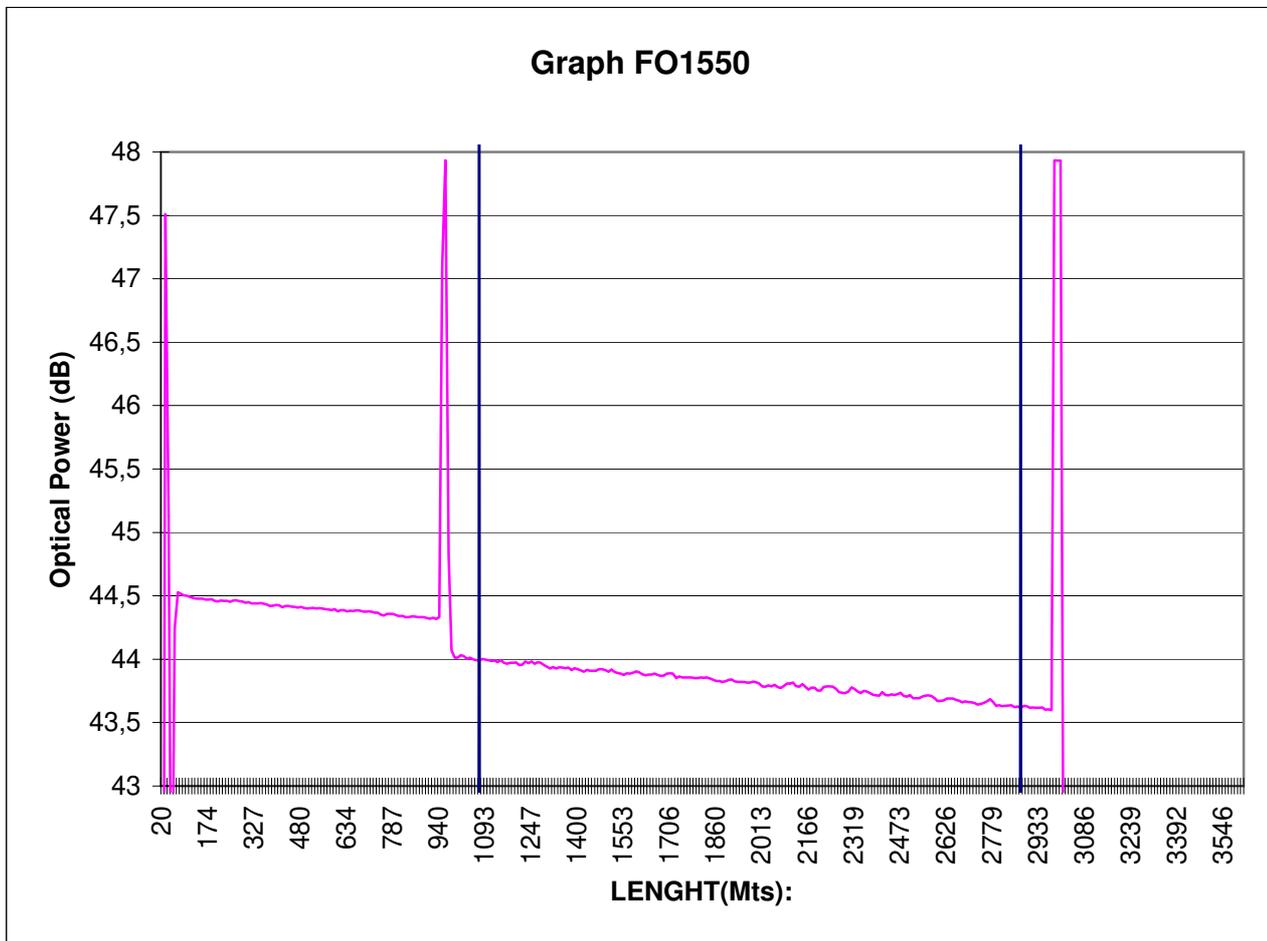
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:GREEN**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.200

Attenuation between markers (dB): 0.360  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

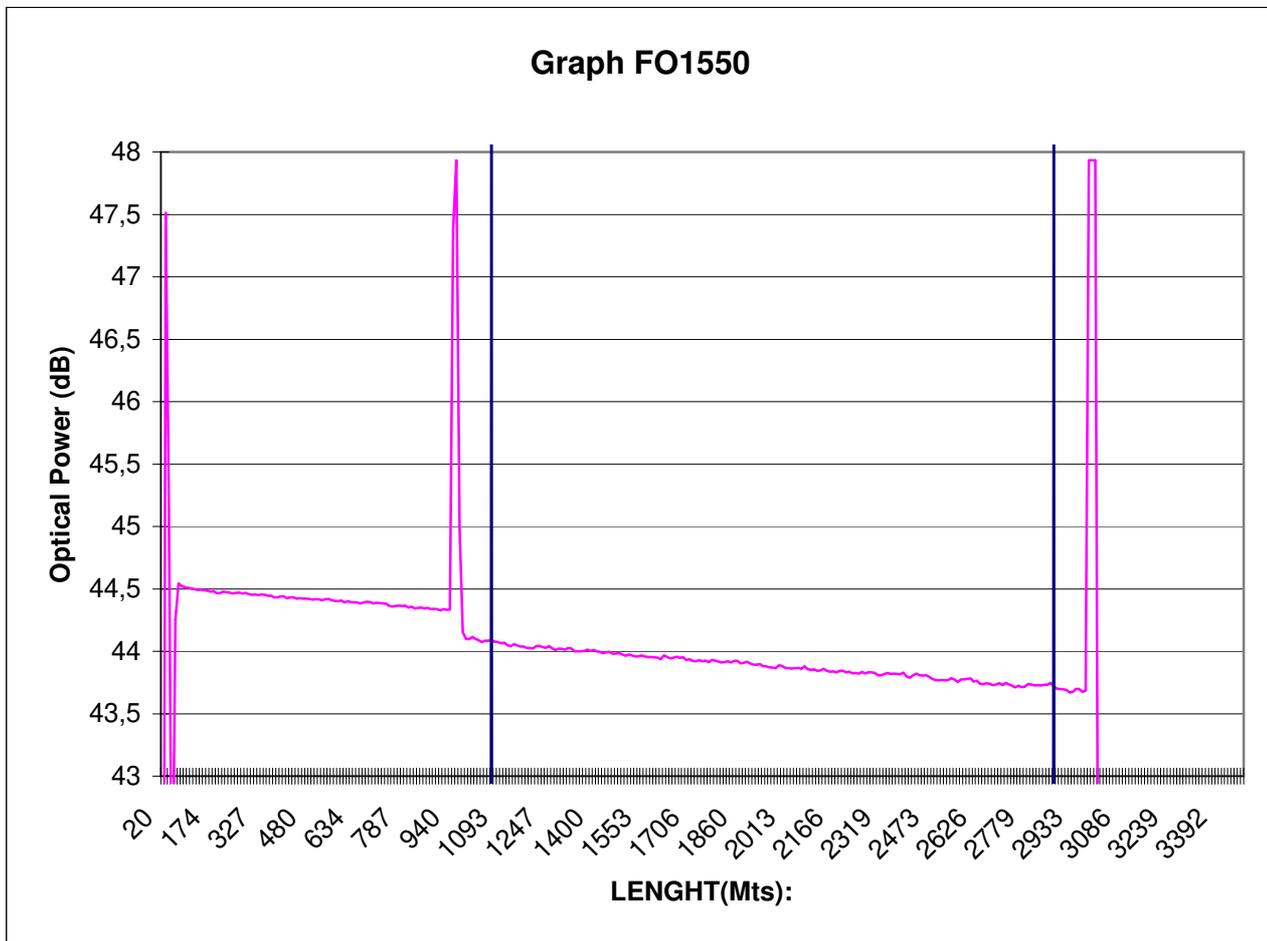
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:GREEN 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.194

Attenuation between markers (dB): 0.349  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

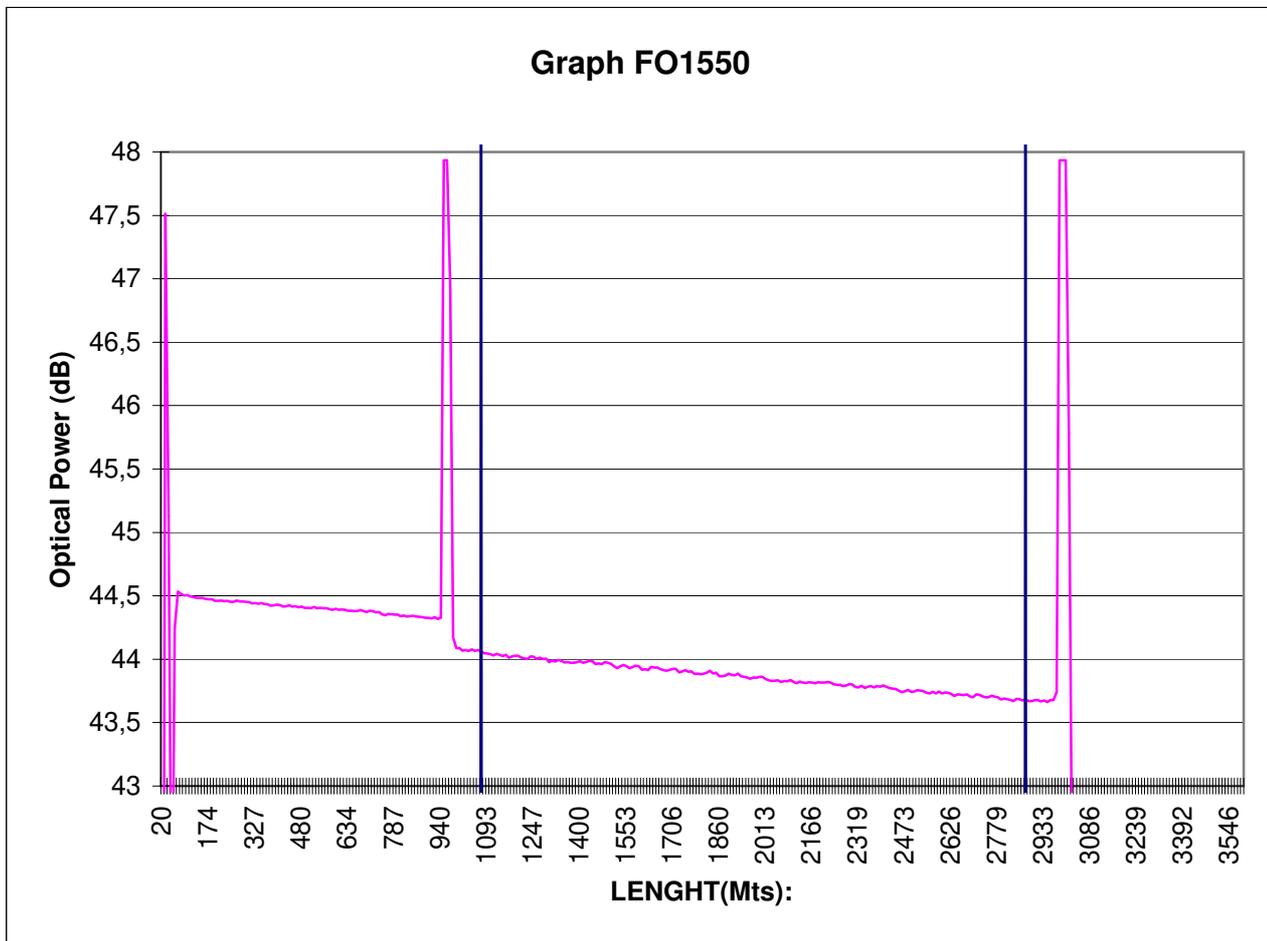
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:GREEN 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.203

Attenuation between markers (dB): 0.365  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

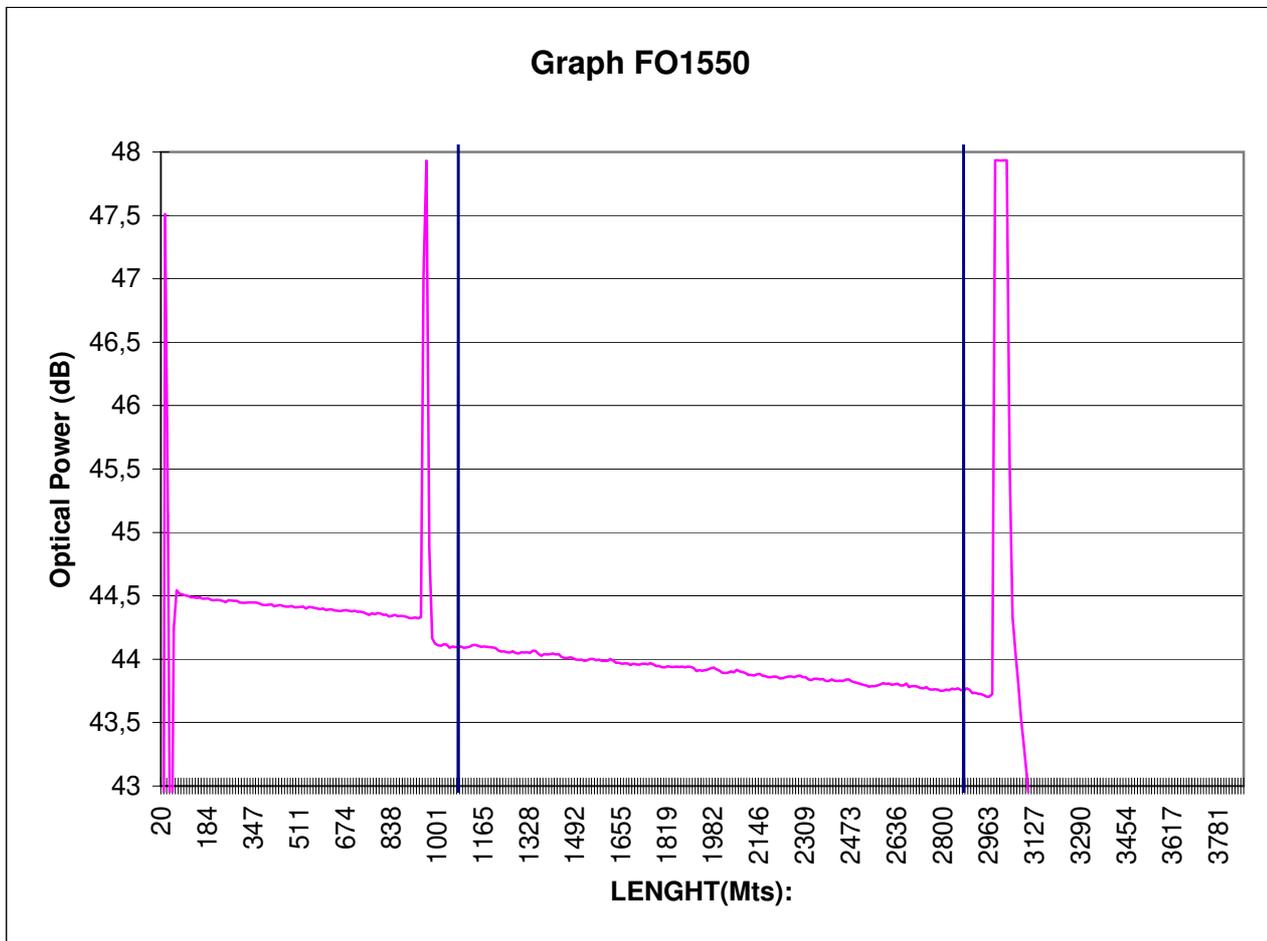
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:GREEN 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.195

Attenuation between markers (dB): 0.351  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

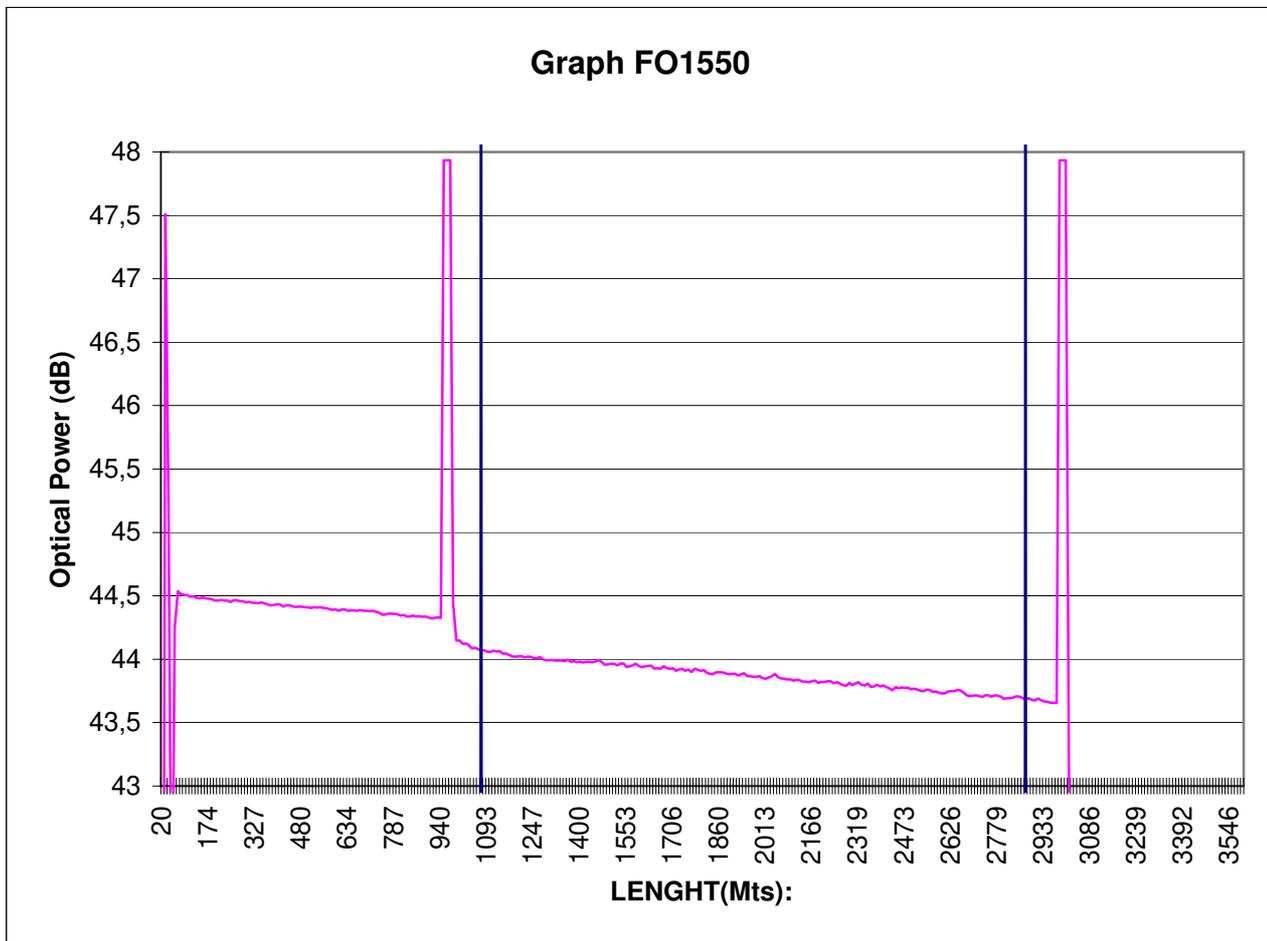
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:NATURAL 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.201

Attenuation between markers (dB): 0.361  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

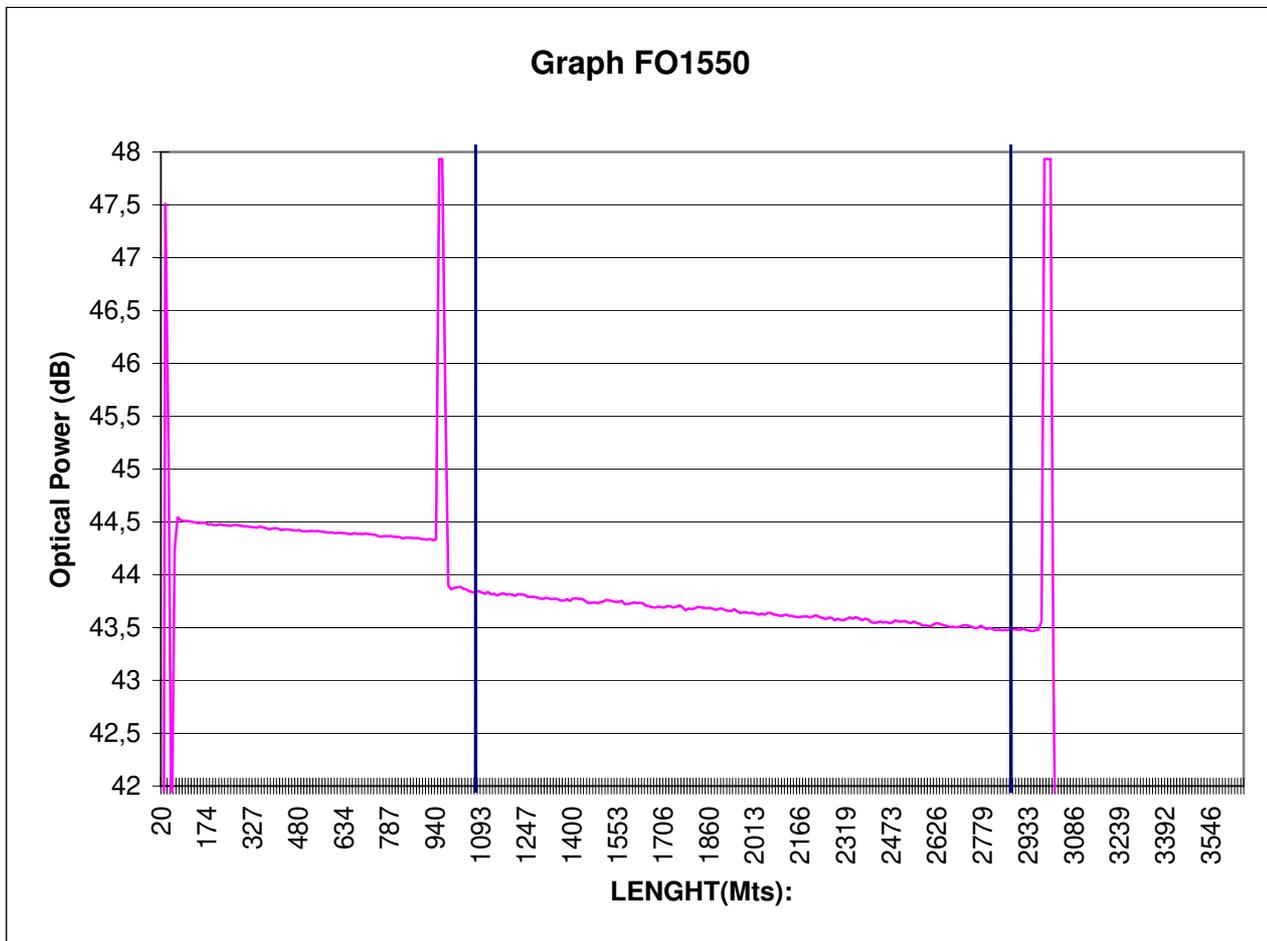
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:NATURAL 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.195

Attenuation between markers (dB): 0.351  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

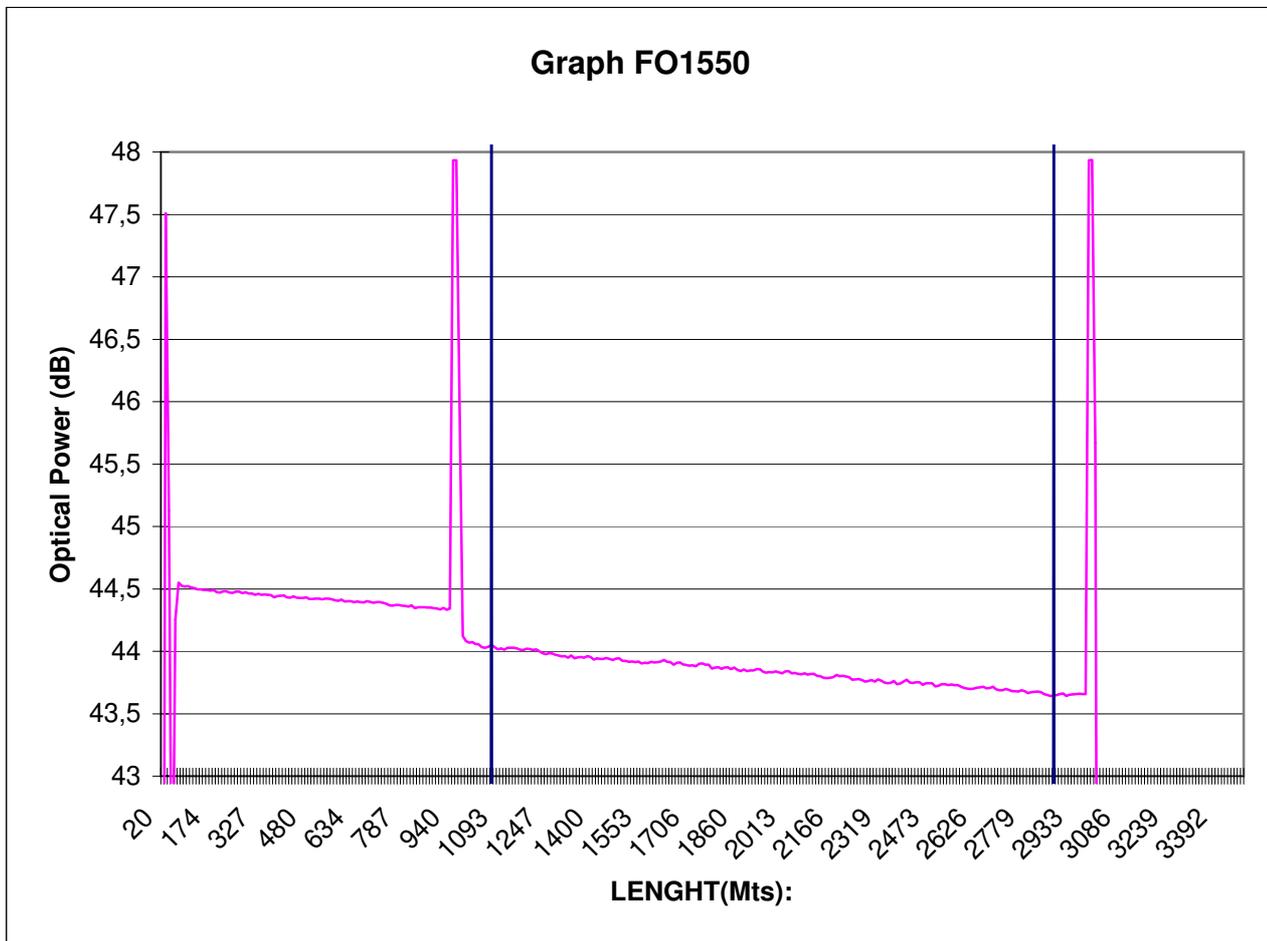
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:NATURAL 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.201

Attenuation between markers (dB): 0.361  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

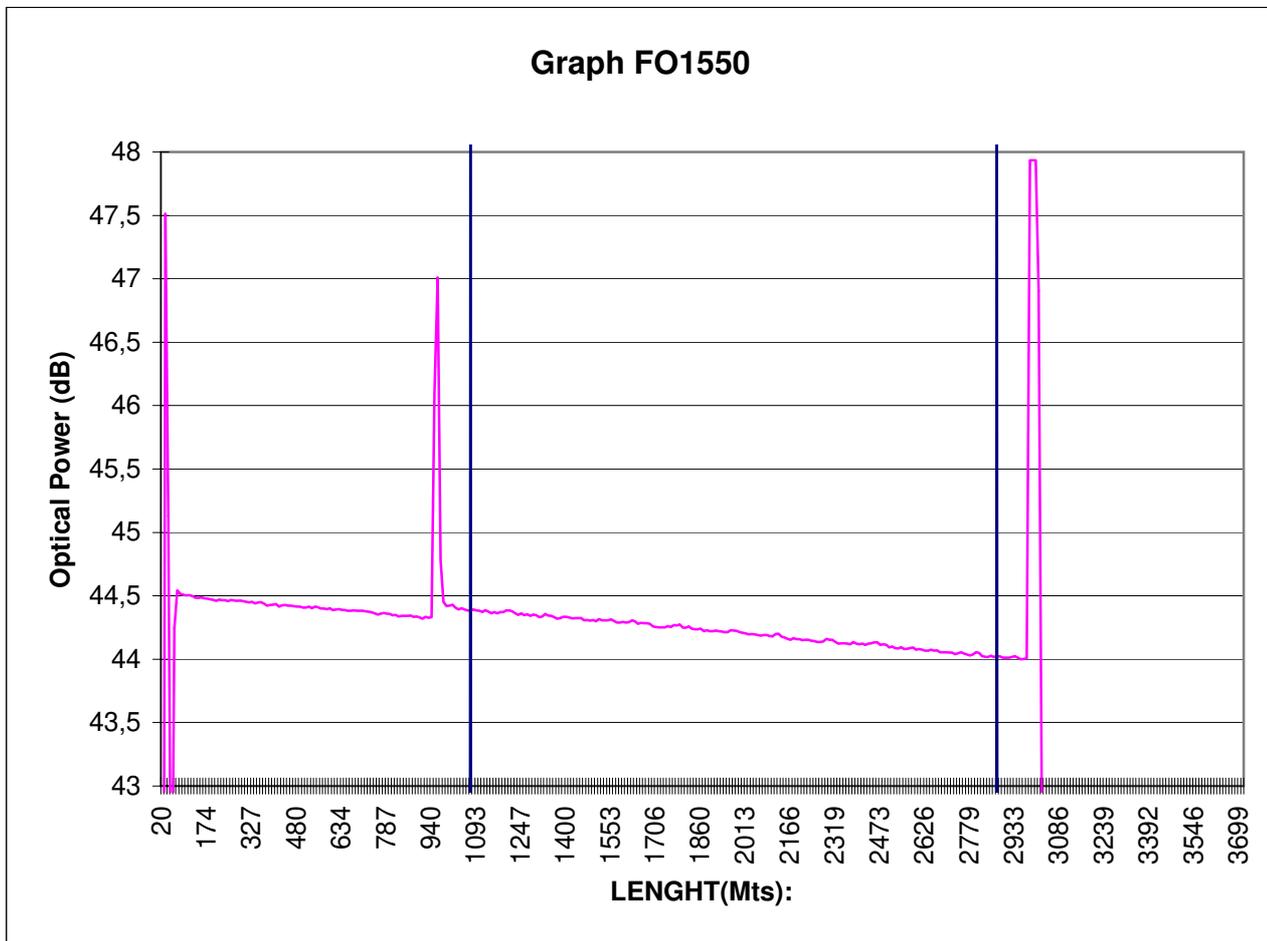
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:ORANGE**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.207

Attenuation between markers (dB): 0.372  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

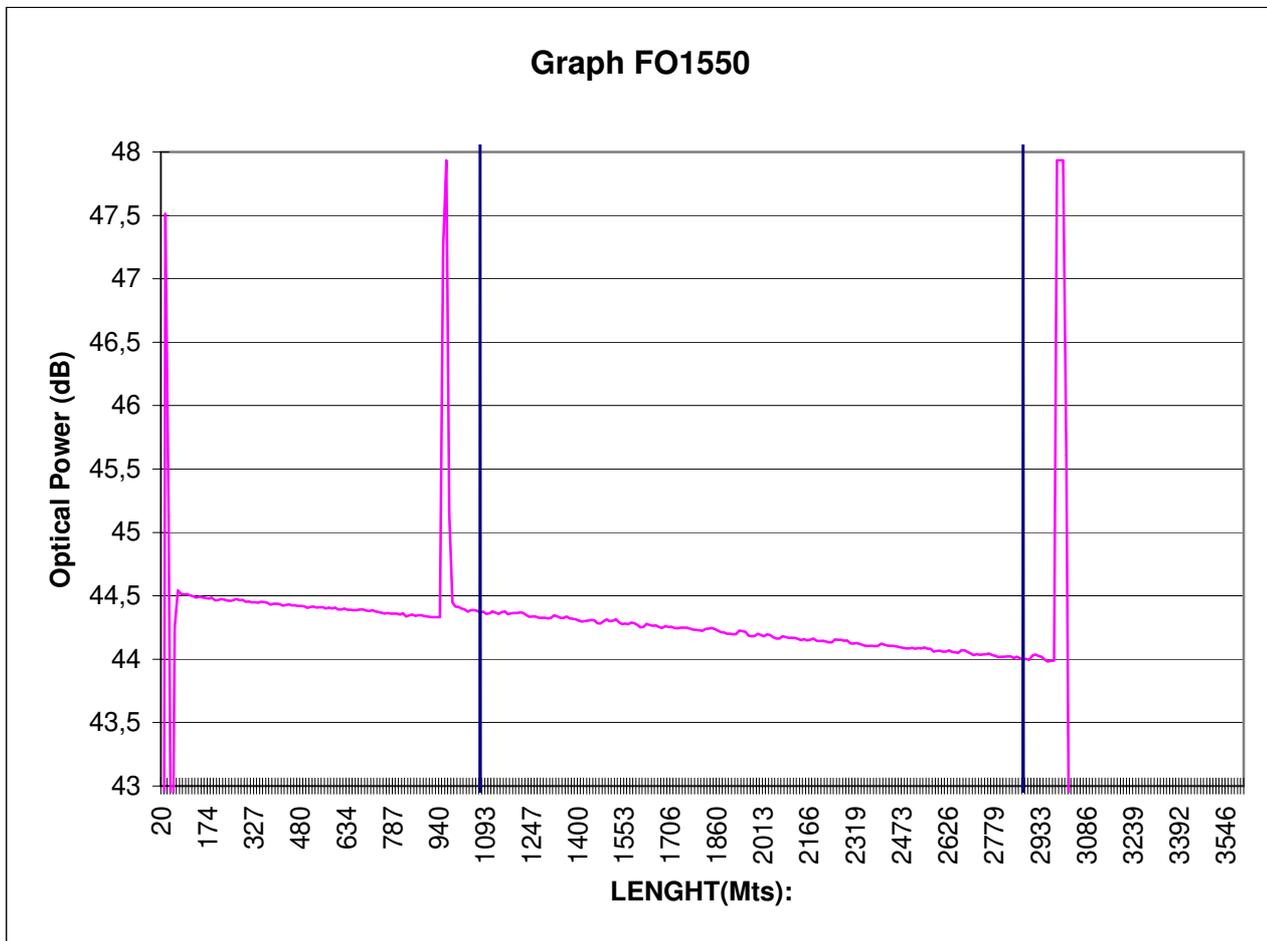
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:ORANGE 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.205

Attenuation between markers (dB): 0.369  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

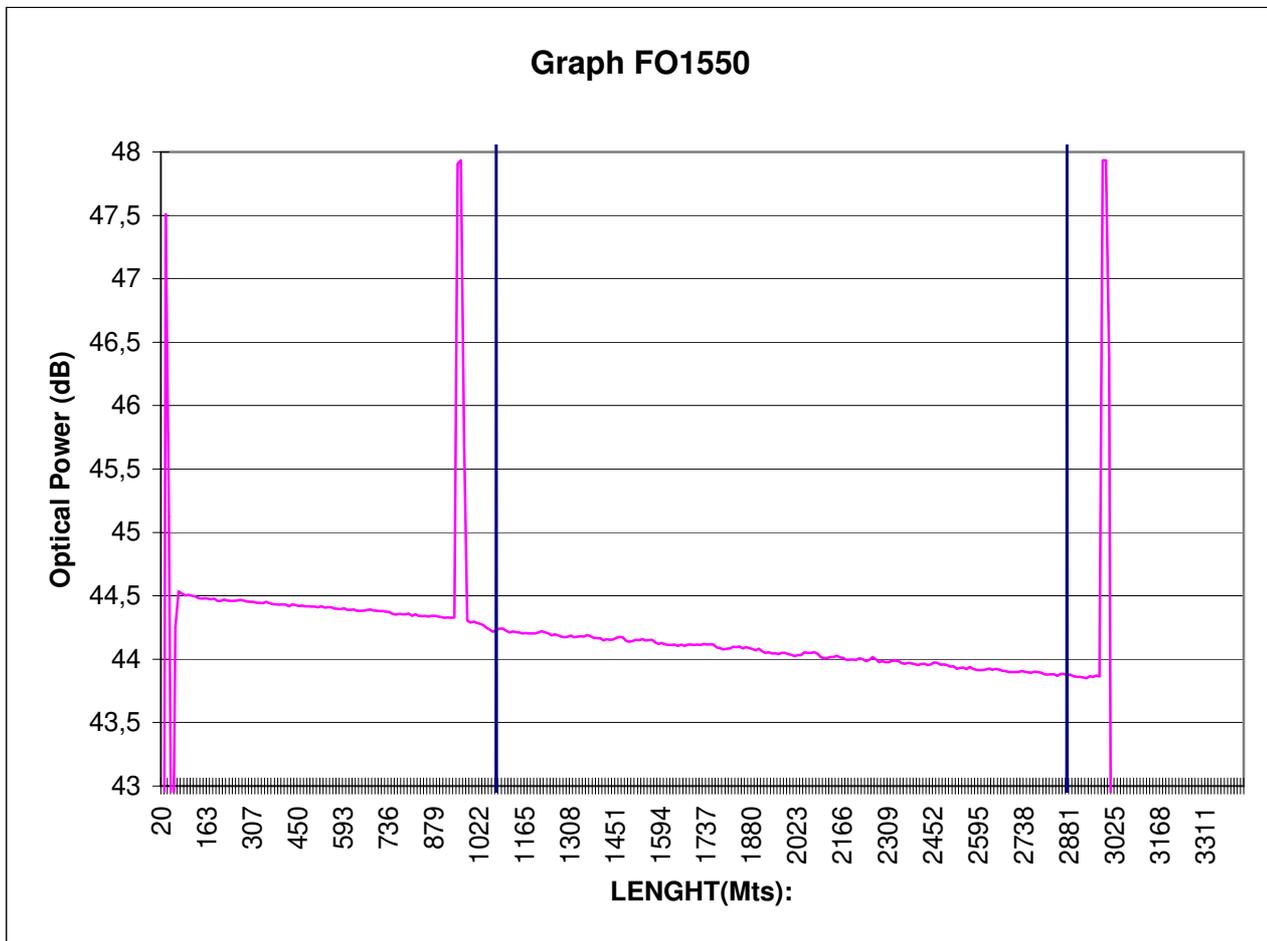
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:ORANGE 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.200

Attenuation between markers (dB): 0.360  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

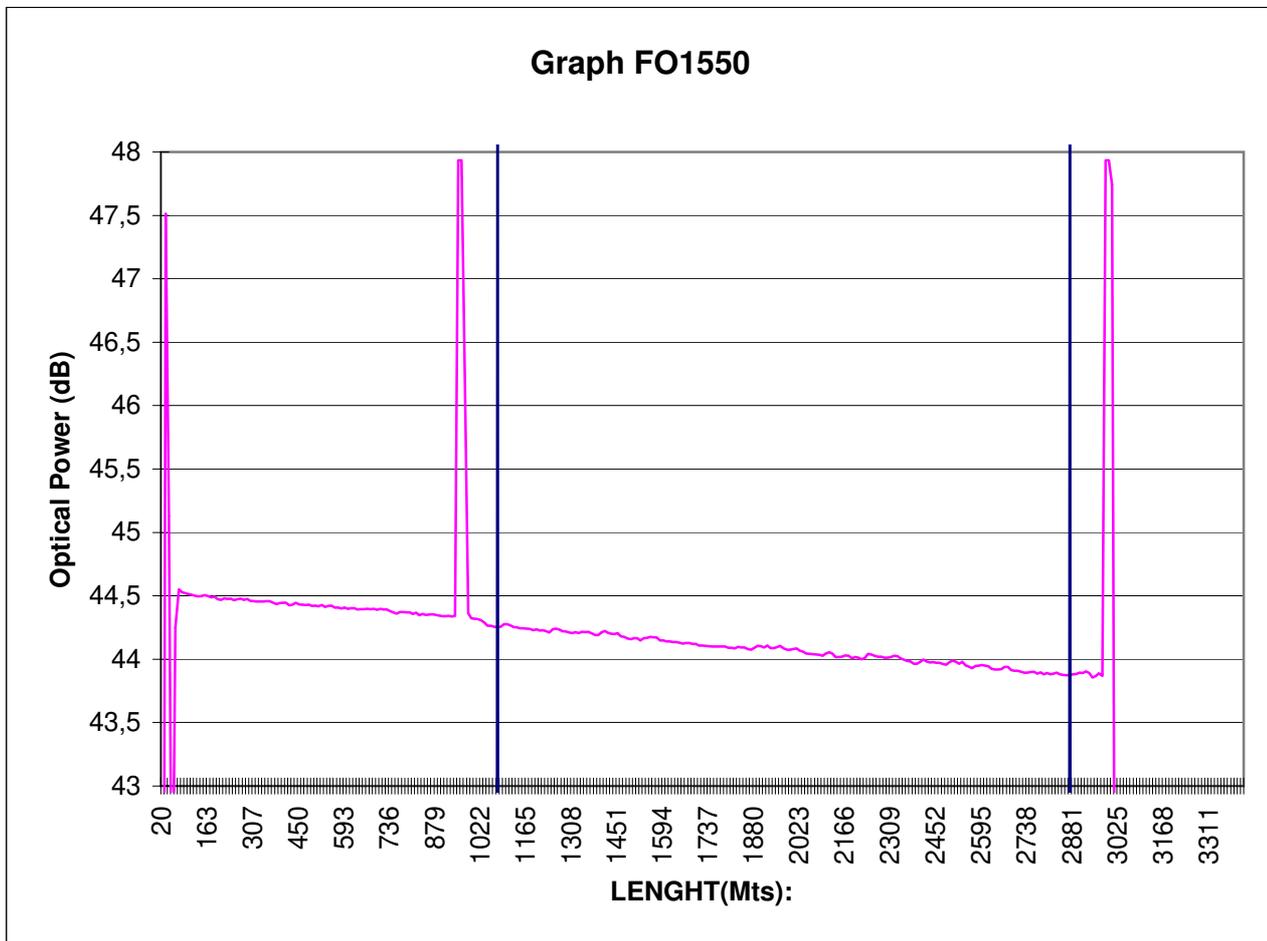
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:ORANGE 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.212

Attenuation between markers (dB): 0.381  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

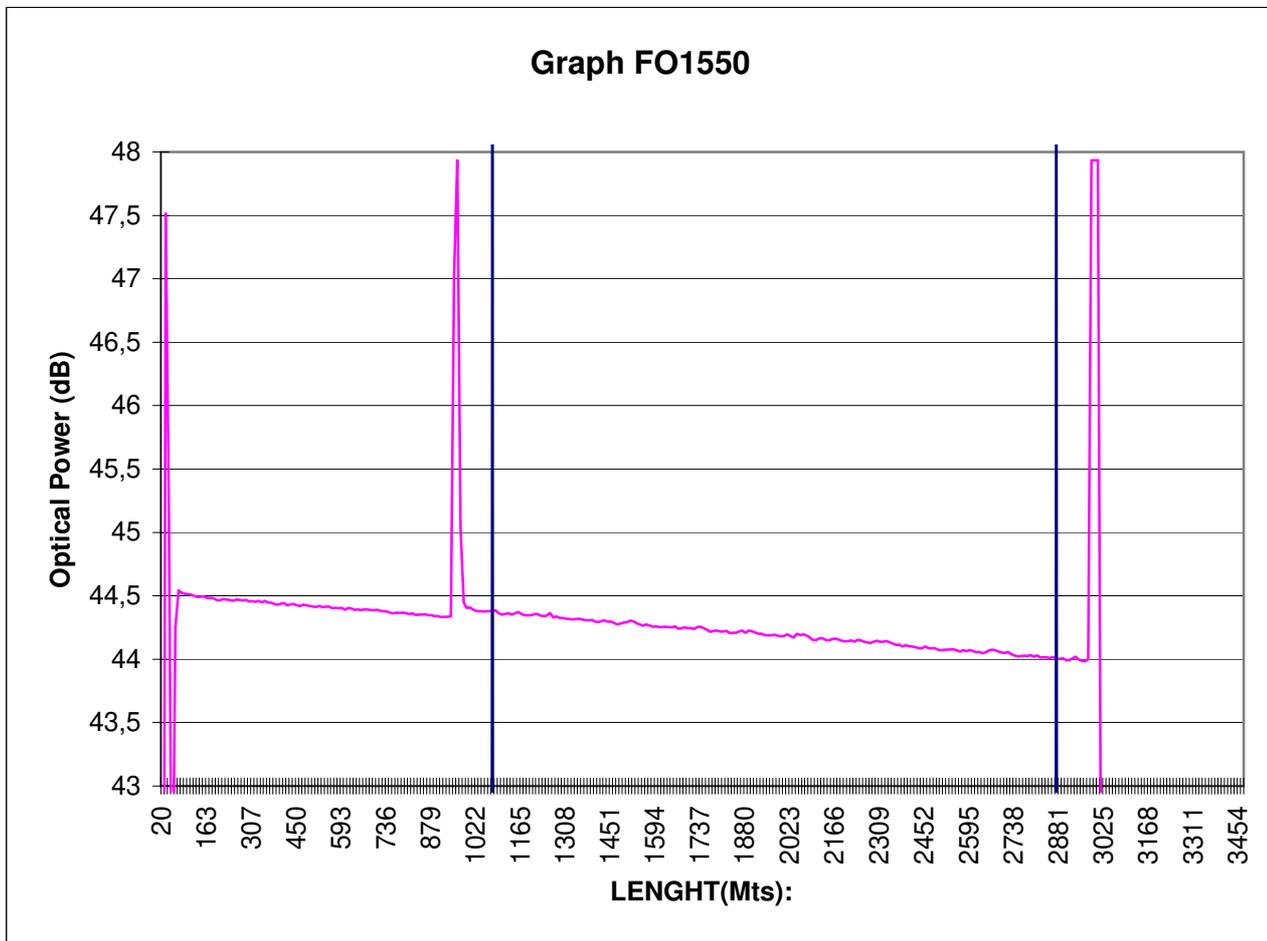
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:PINK**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.200

Attenuation between markers (dB): 0.360  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

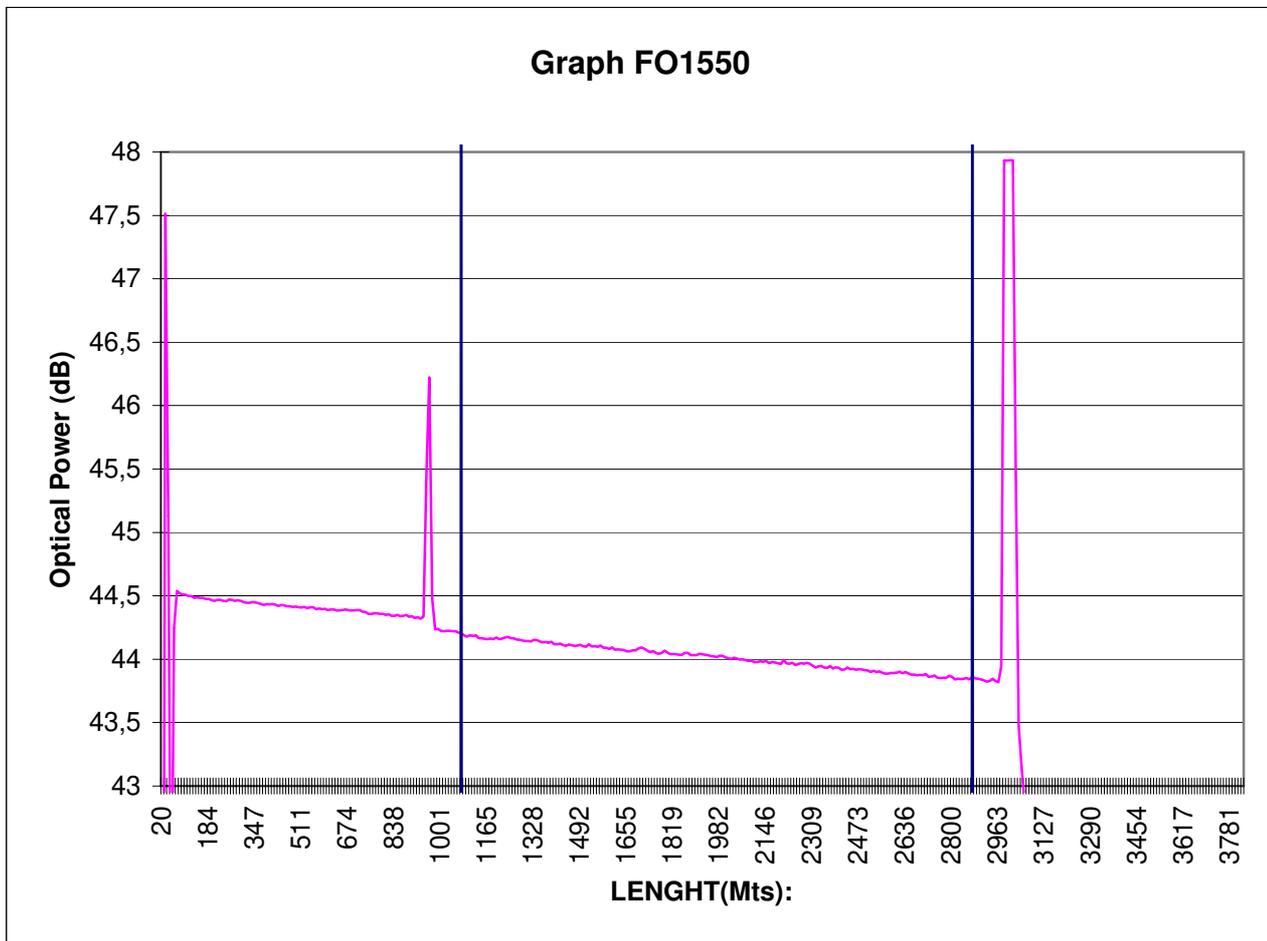
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:PINK 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.194

Attenuation between markers (dB): 0.349  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

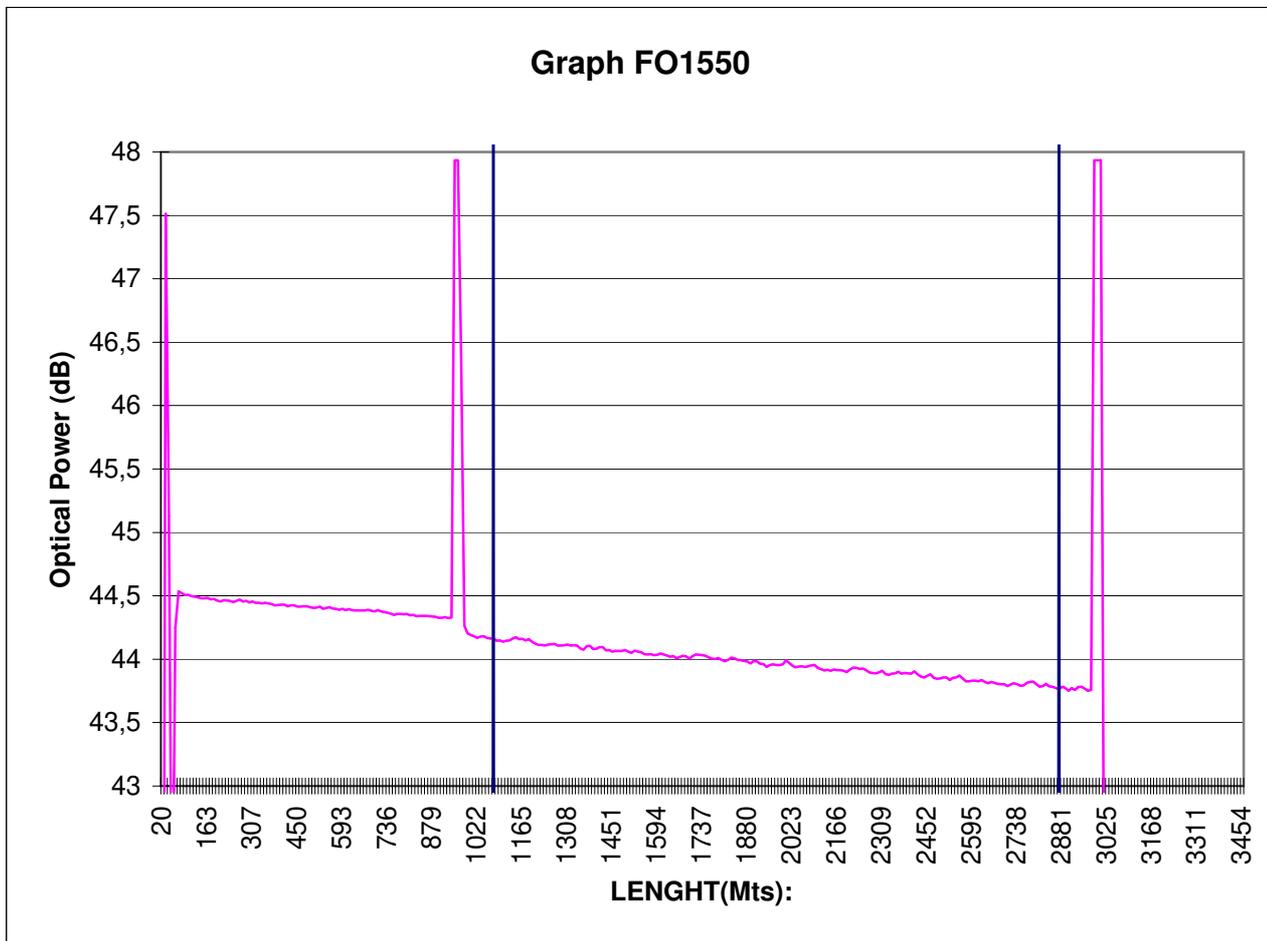
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:PINK 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.211

Attenuation between markers (dB): 0.379  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

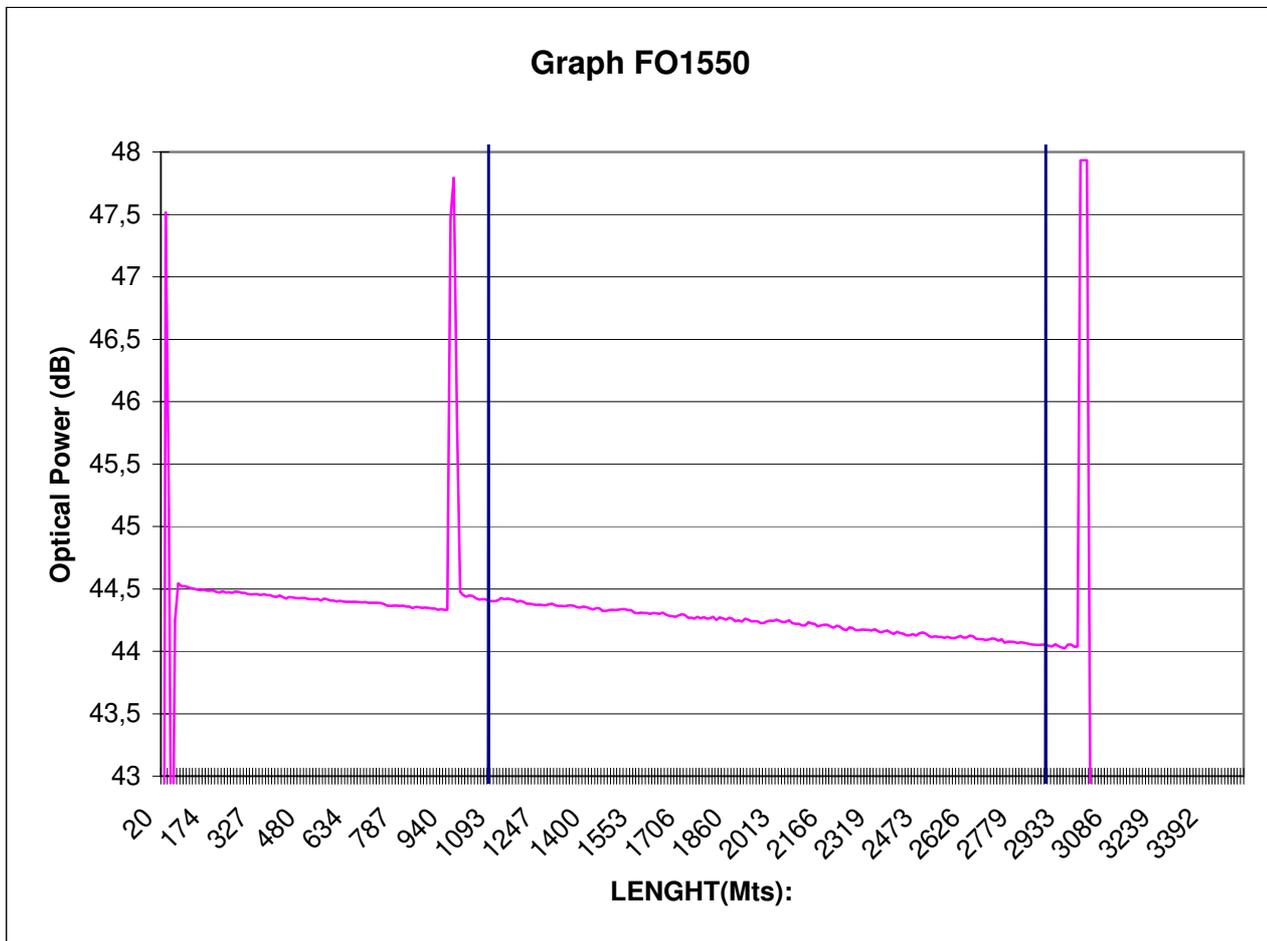
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:PINK 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.200

Attenuation between markers (dB): 0.360  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

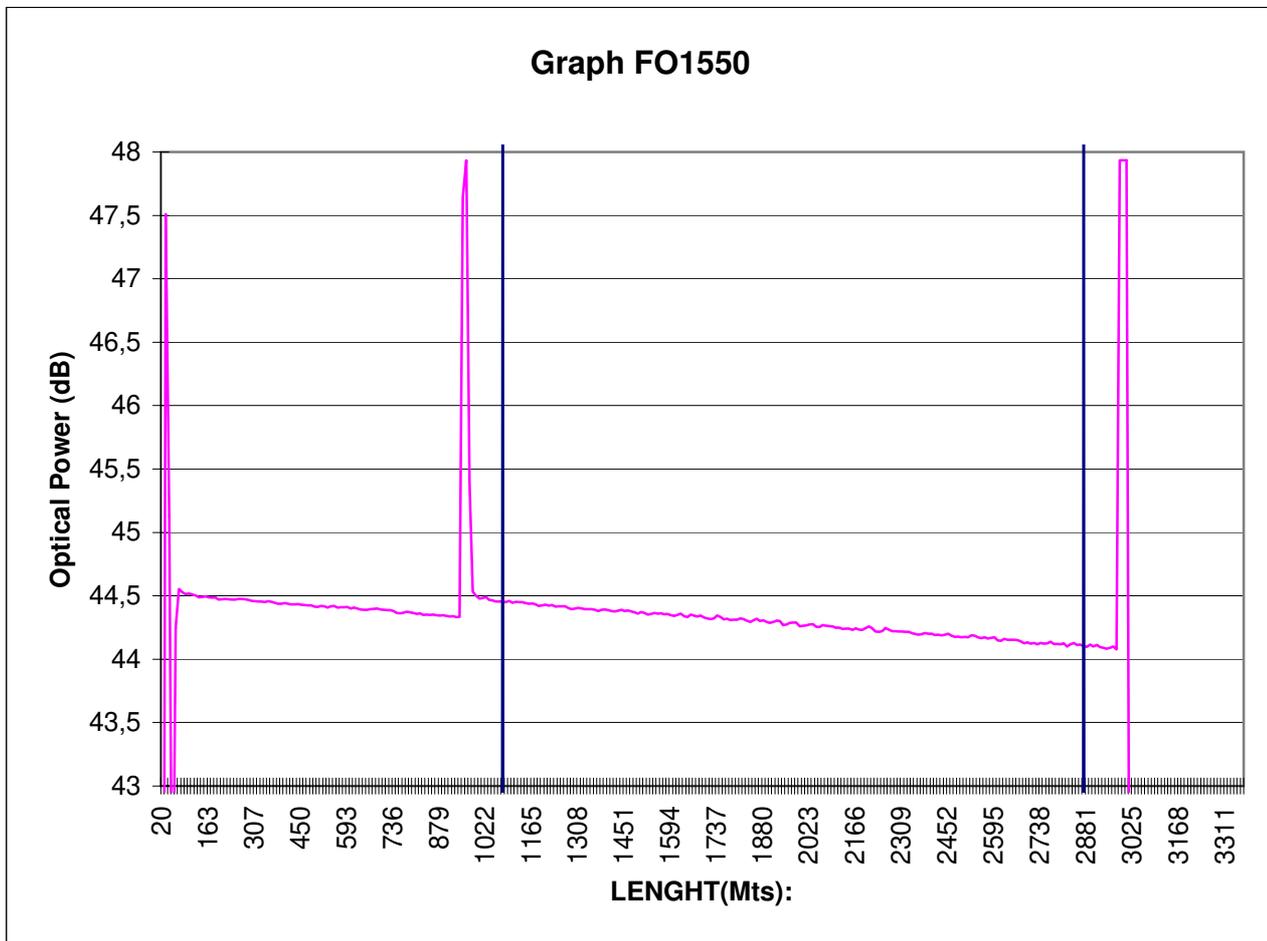
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:RED**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.190

Attenuation between markers (dB): 0.342  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

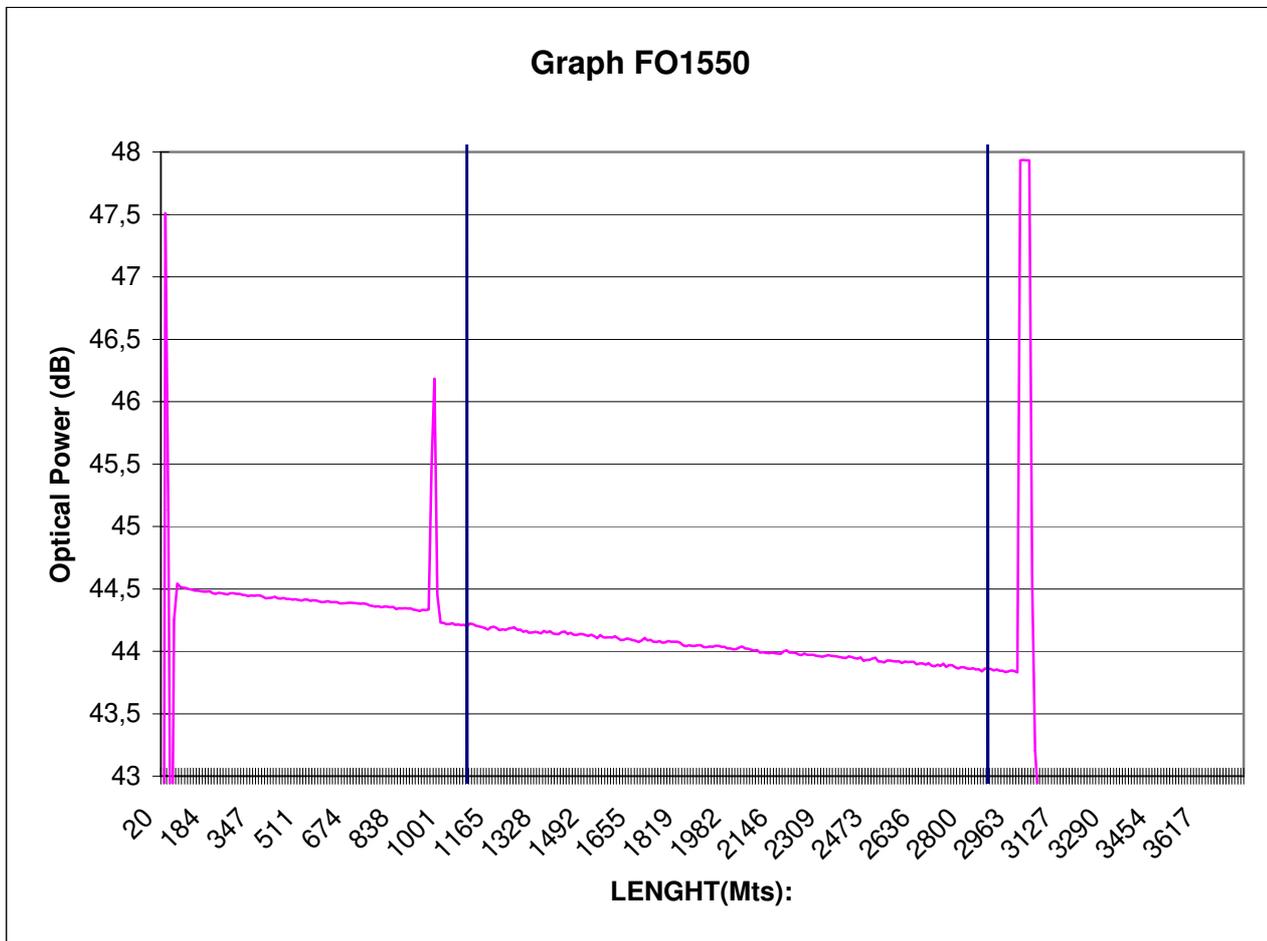
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:RED 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.195

Attenuation between markers (dB): 0.351  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

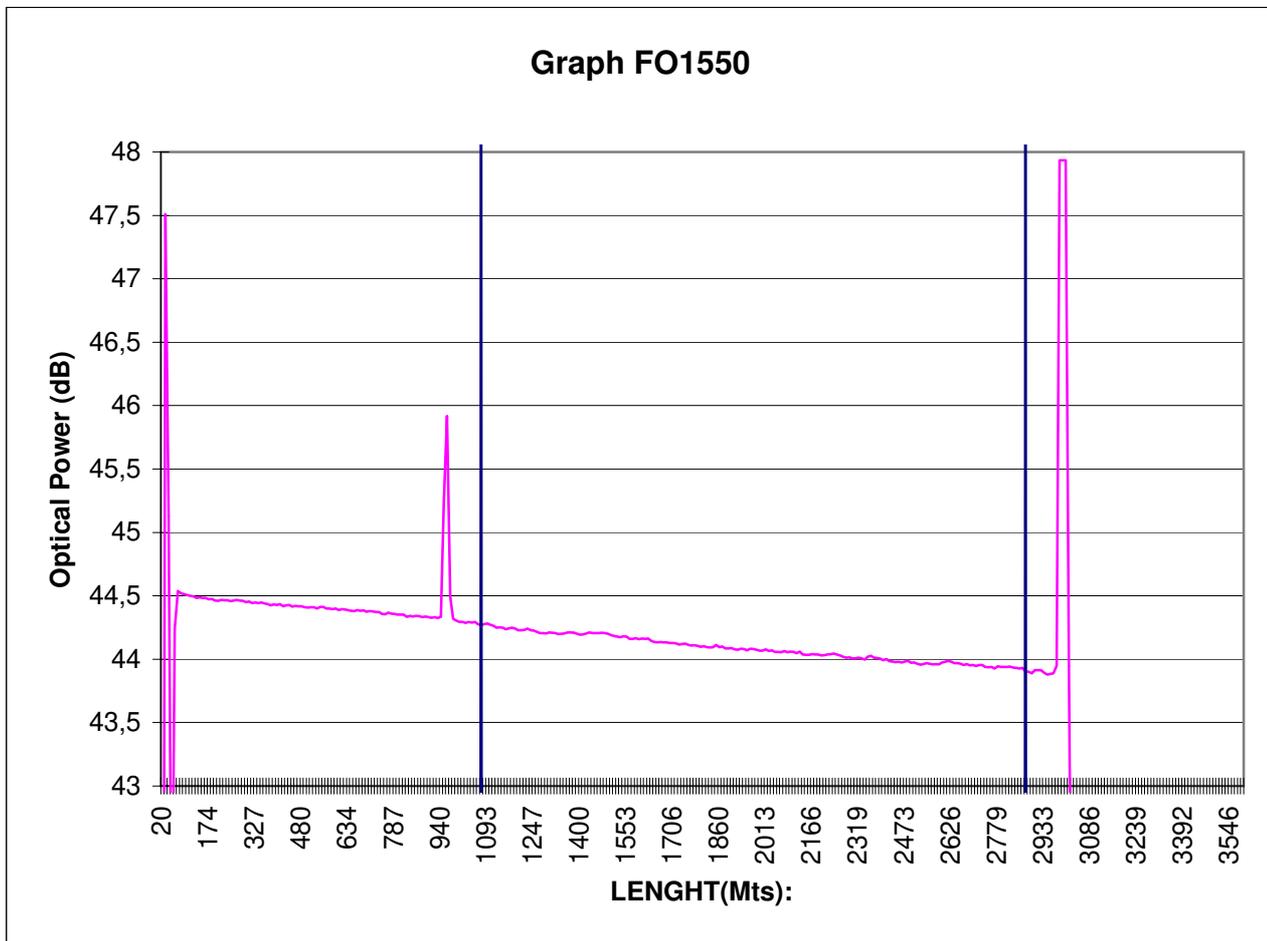
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:RED 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.192

Attenuation between markers (dB): 0.345  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

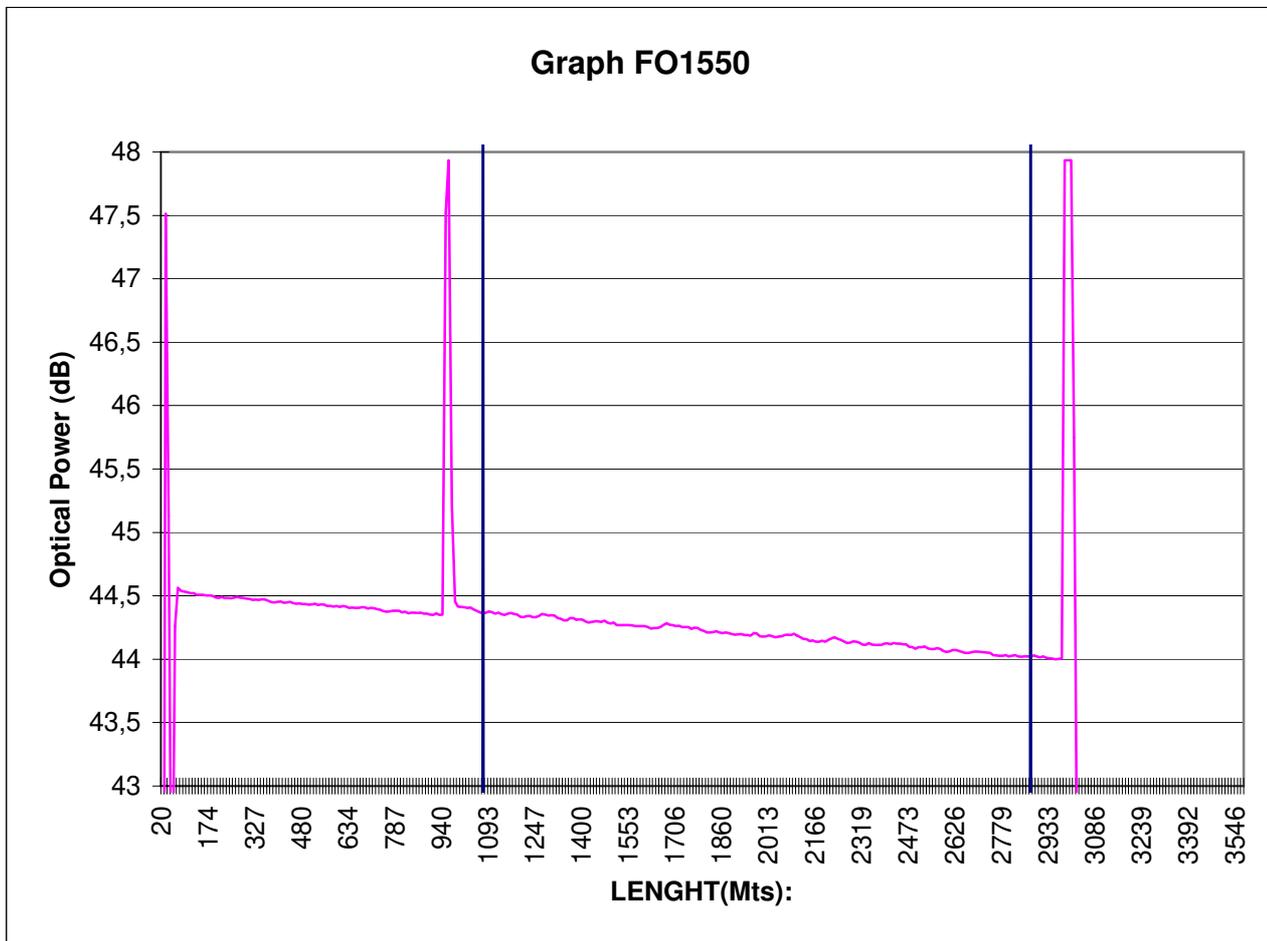
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:RED 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.195

Attenuation between markers (dB): 0.351  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

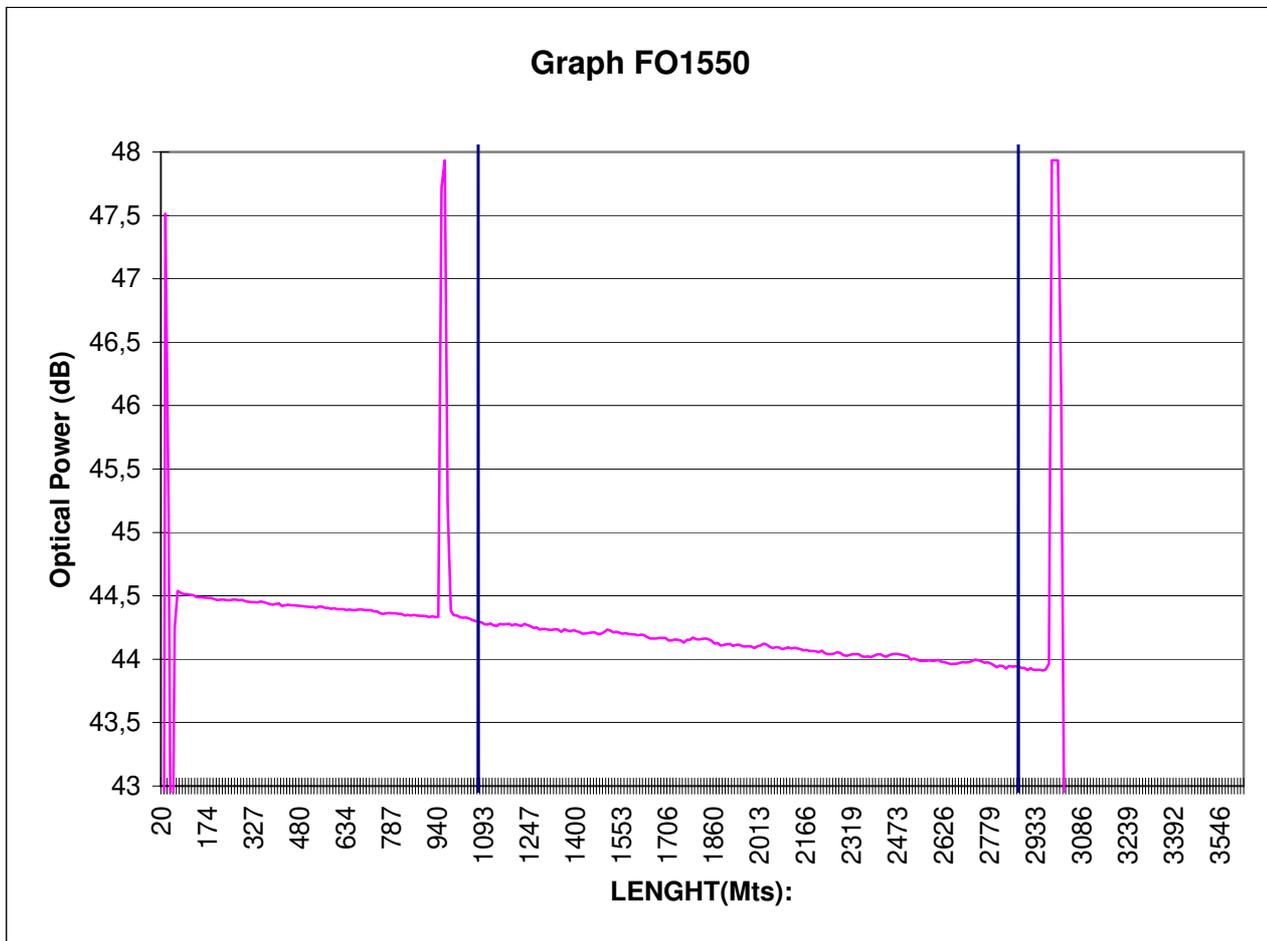
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:SLATE**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.194

Attenuation between markers (dB): 0.349  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

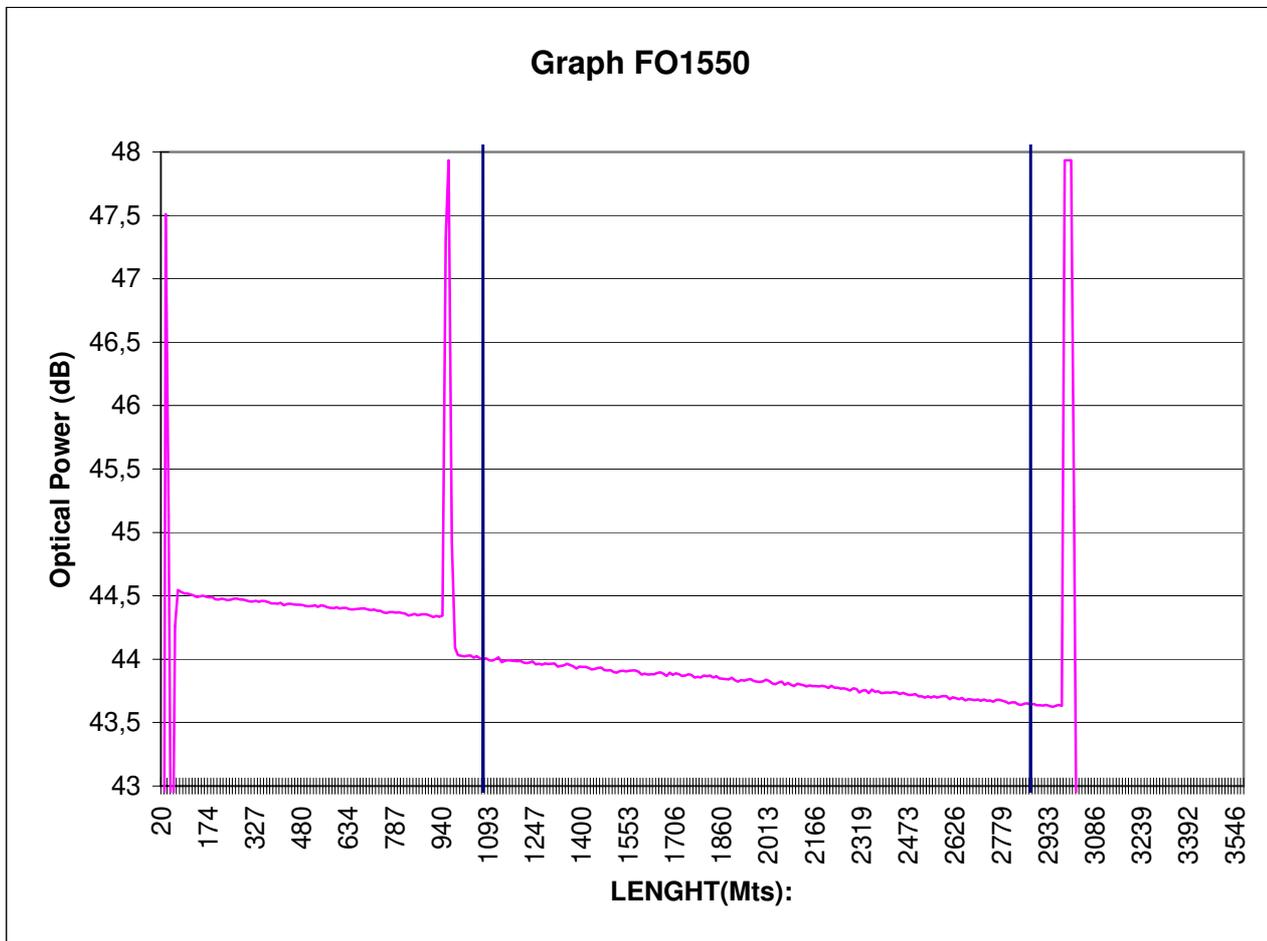
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:SLATE 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.200

Attenuation between markers (dB): 0.360  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

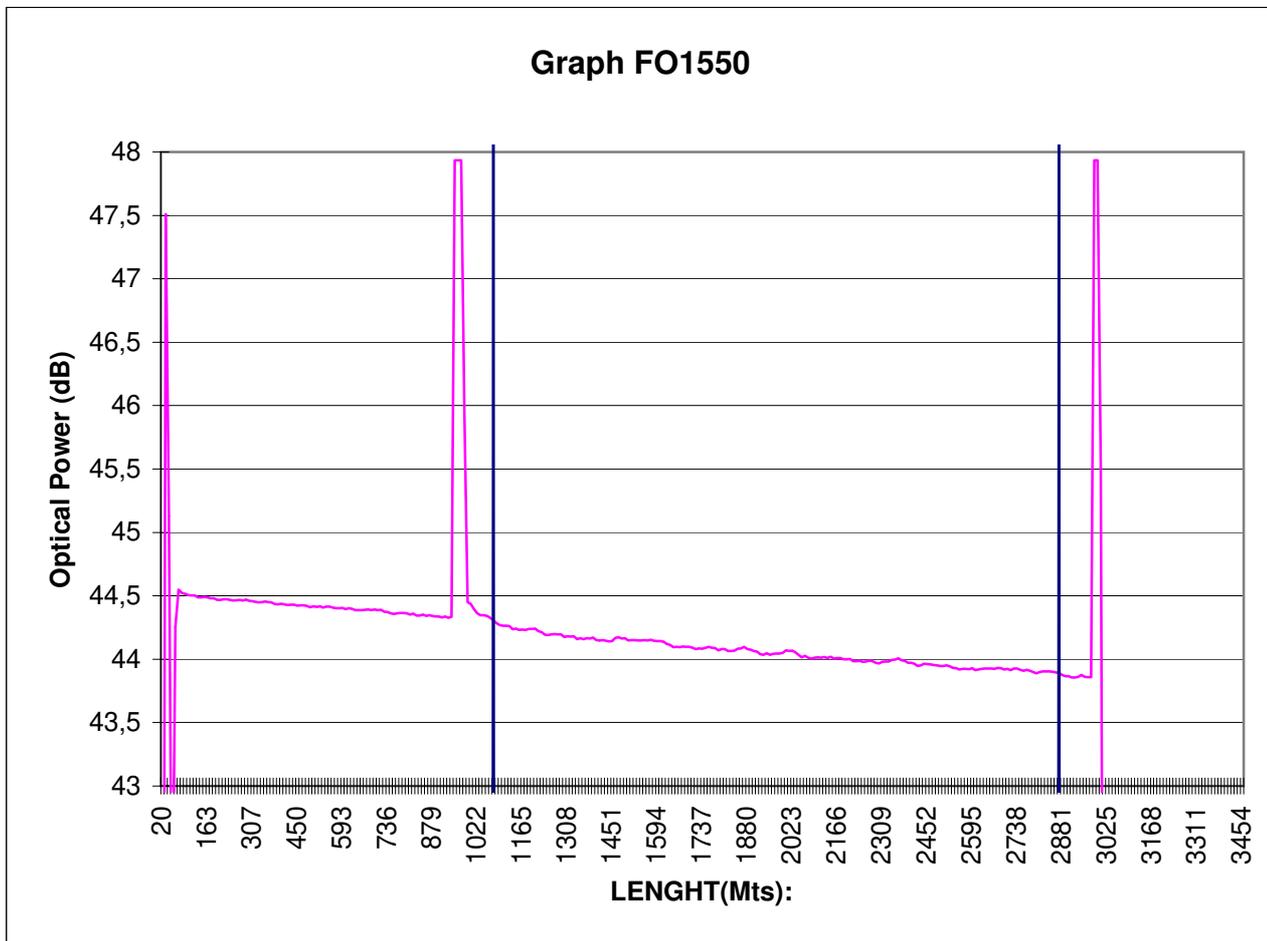
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:SLATE 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.198

Attenuation between markers (dB): 0.356  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

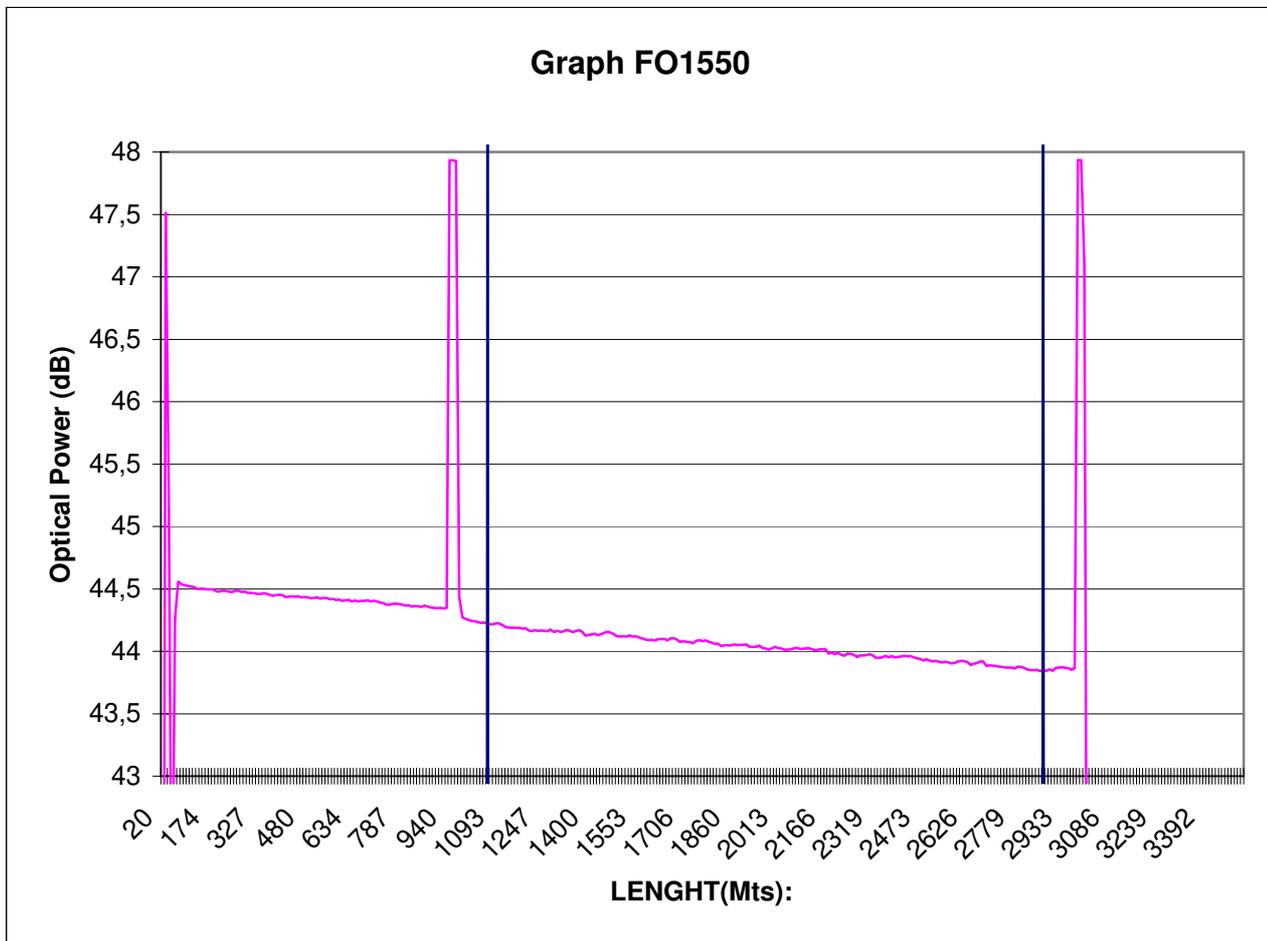
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:SLATE 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.195

Attenuation between markers (dB): 0.351  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

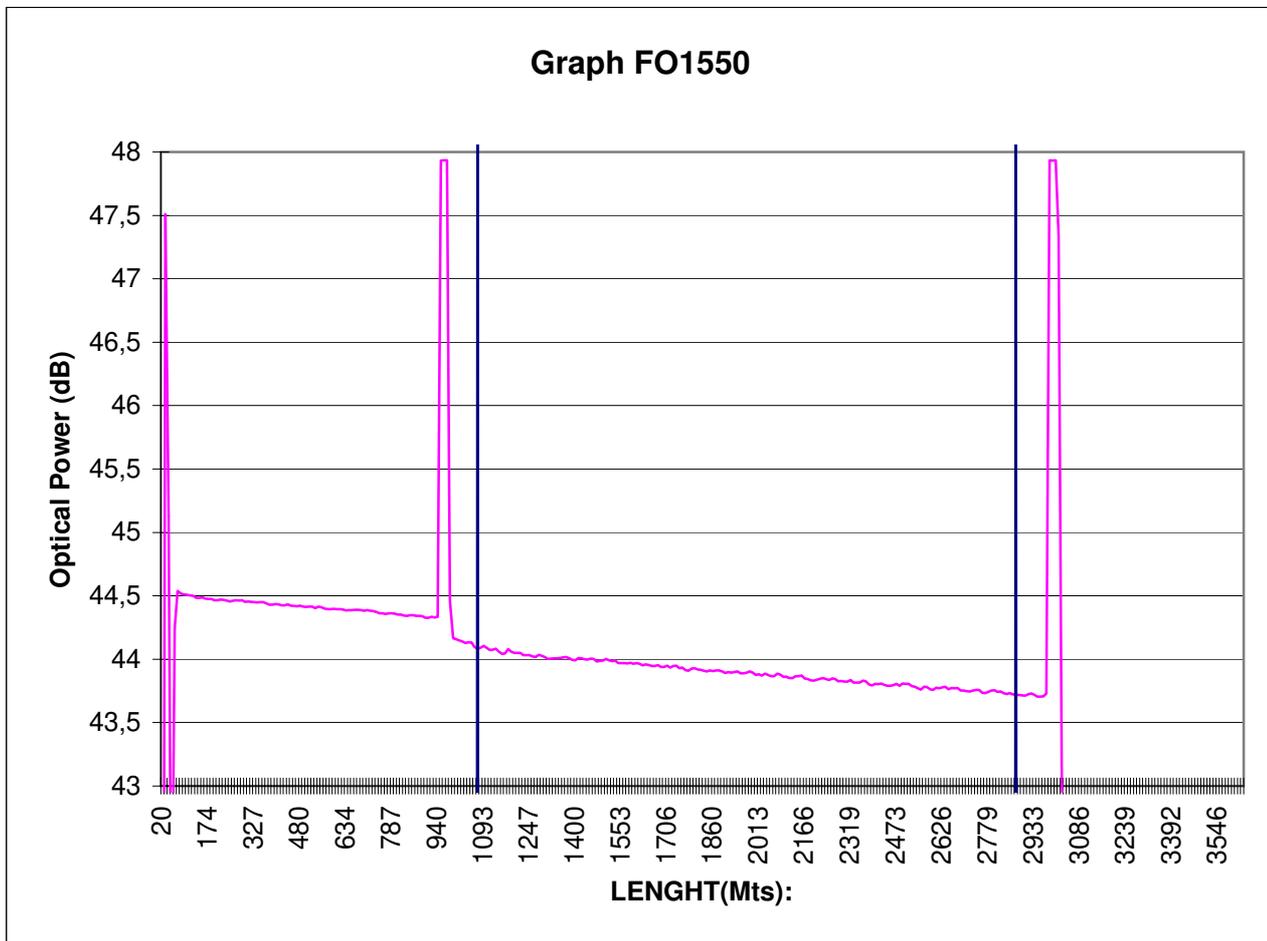
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:VIOLET**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.192

Attenuation between markers (dB): 0.345  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

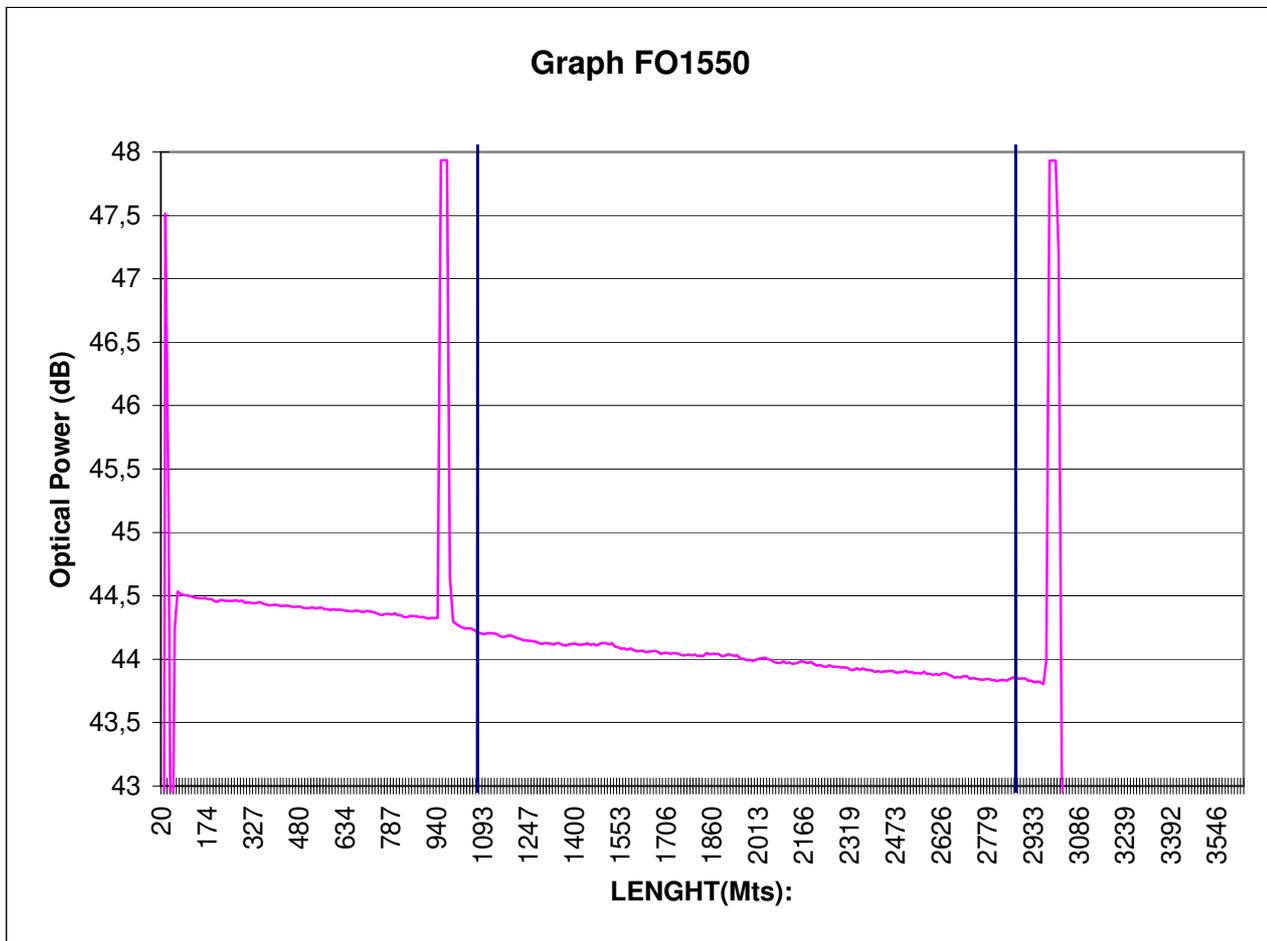
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:VIOLET 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.200

Attenuation between markers (dB): 0.360  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

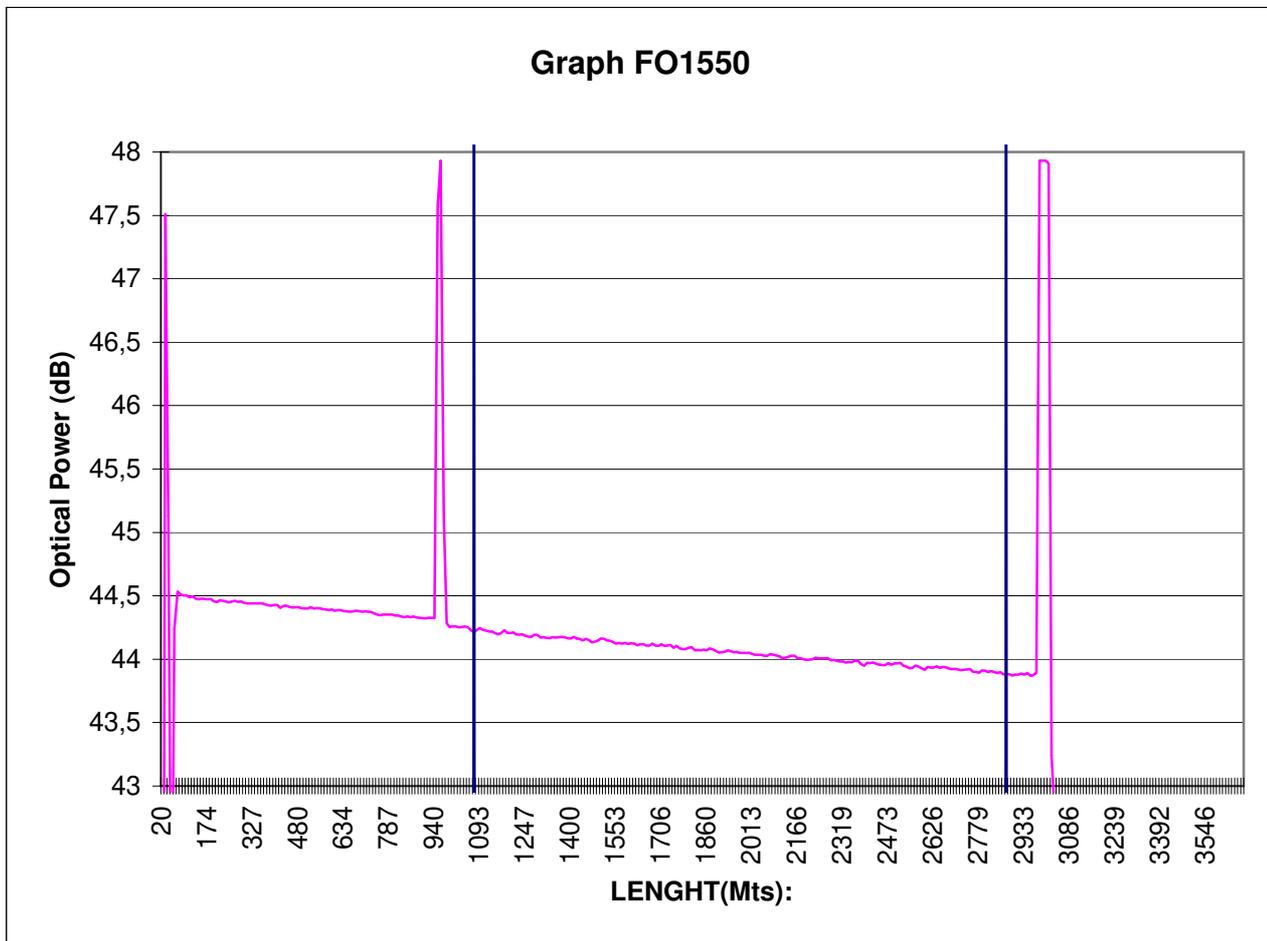
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:VIOLET 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.188

Attenuation between markers (dB): 0.338  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

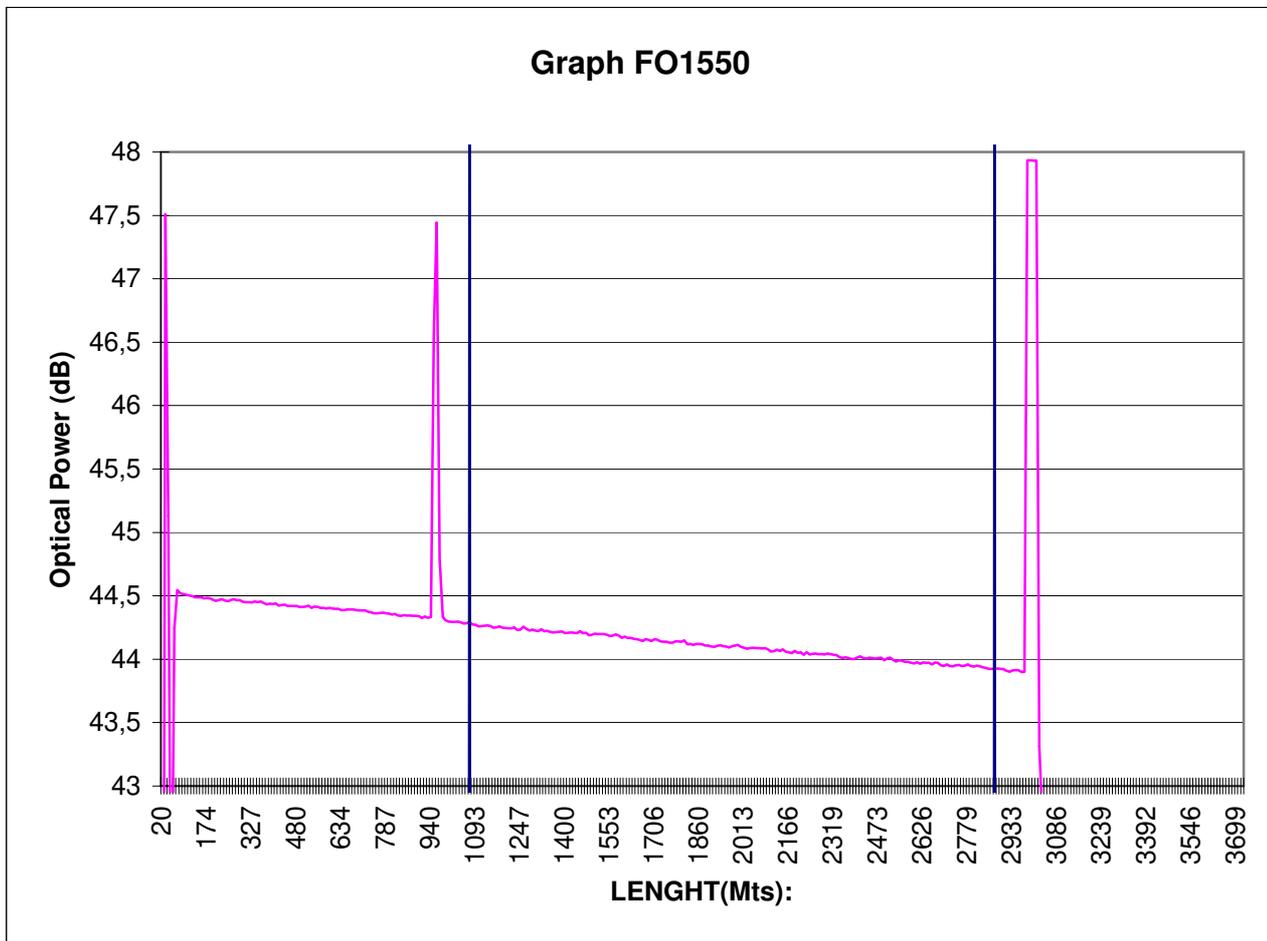
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:VIOLET 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.194

Attenuation between markers (dB): 0.349  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

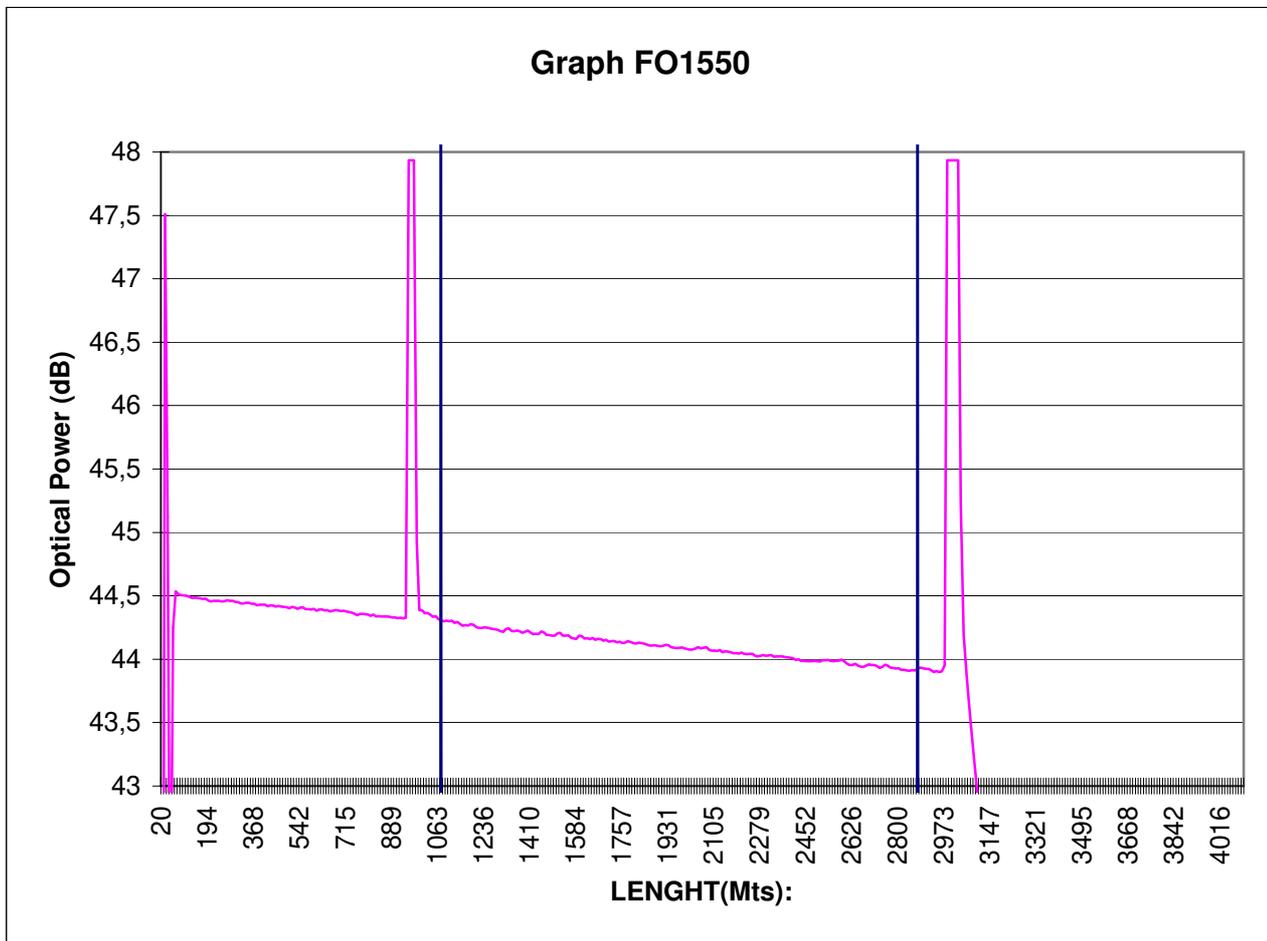
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:WHITE**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.204

Attenuation between markers (dB): 0.367  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

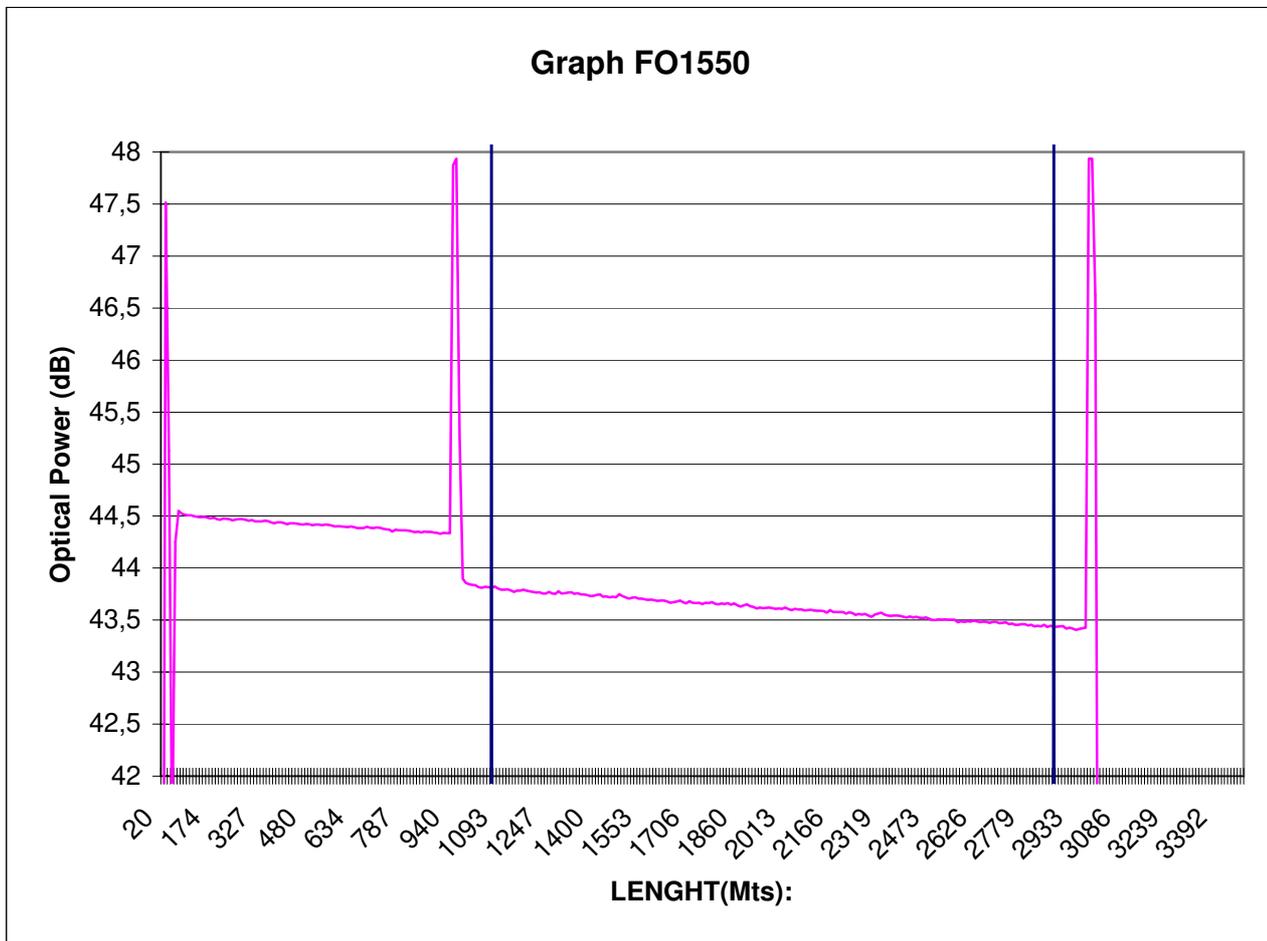
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:WHITE 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.204

Attenuation between markers (dB): 0.367  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

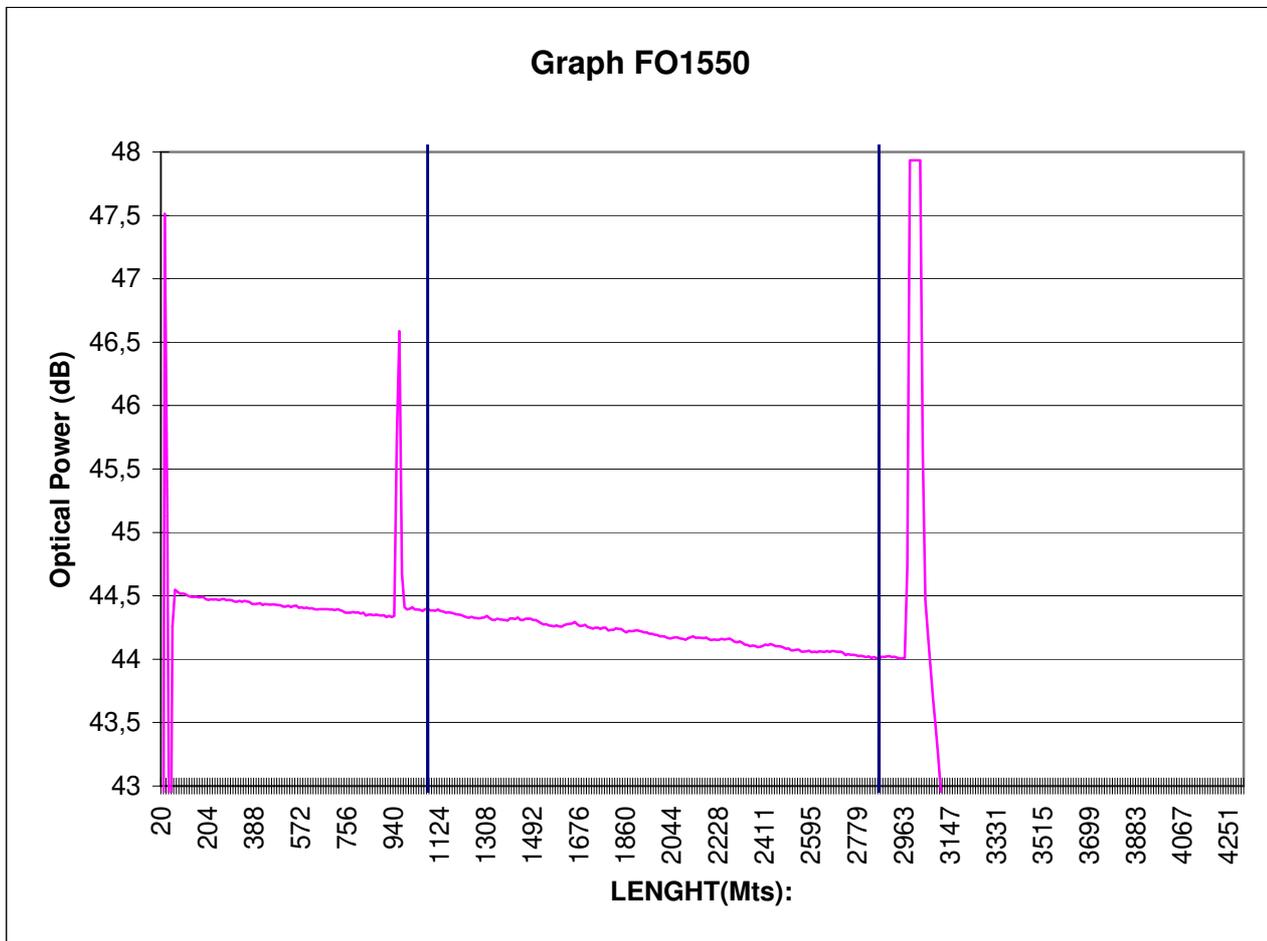
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:WHITE 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.204

Attenuation between markers (dB): 0.365  
Length between markers (m): 1788



**Marker A:**

1083

**Marker B:**

2871

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

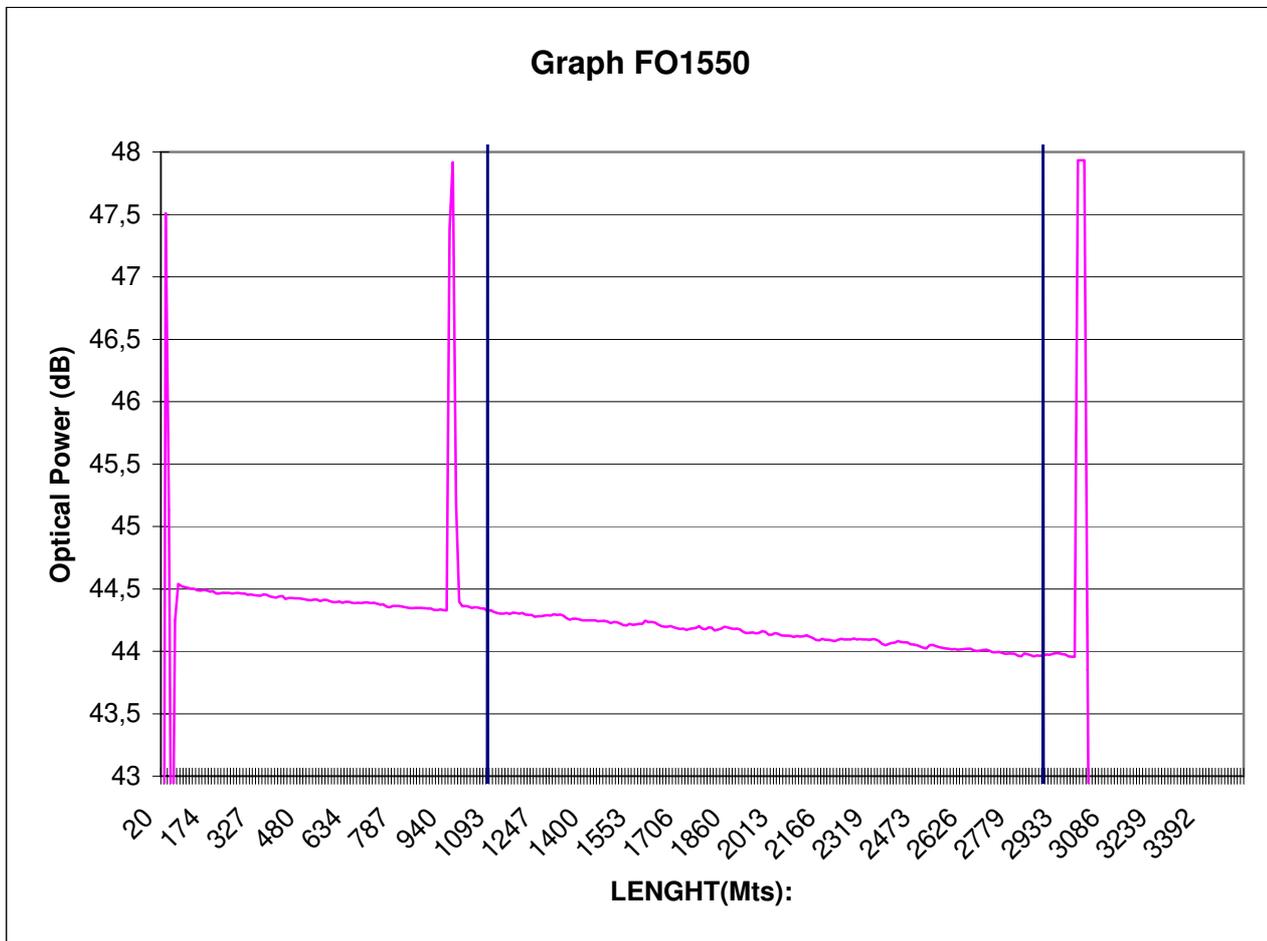
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:WHITE 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.195

Attenuation between markers (dB): 0.351  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

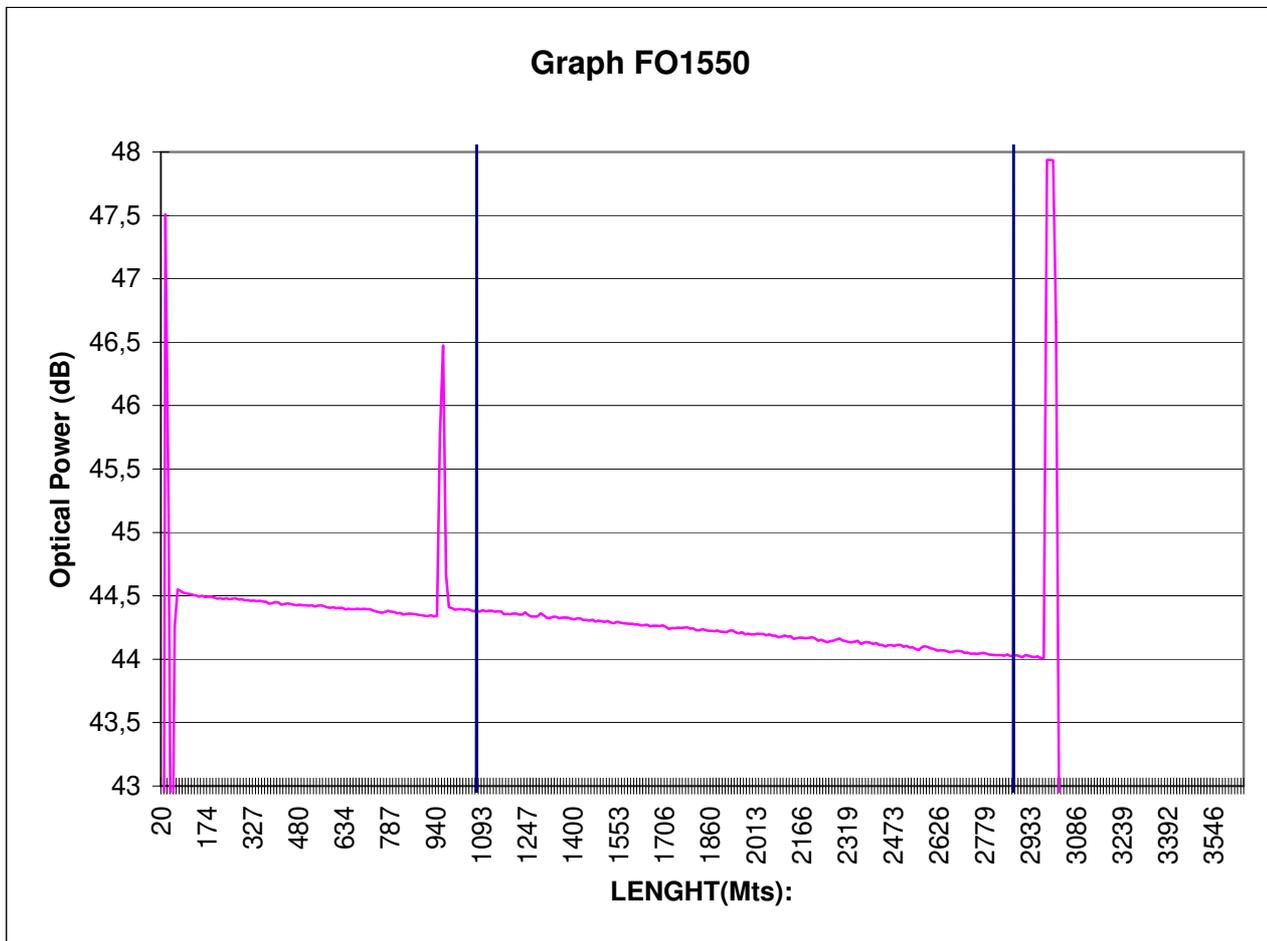
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:YELLOW**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.198

Attenuation between markers (dB): 0.356  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

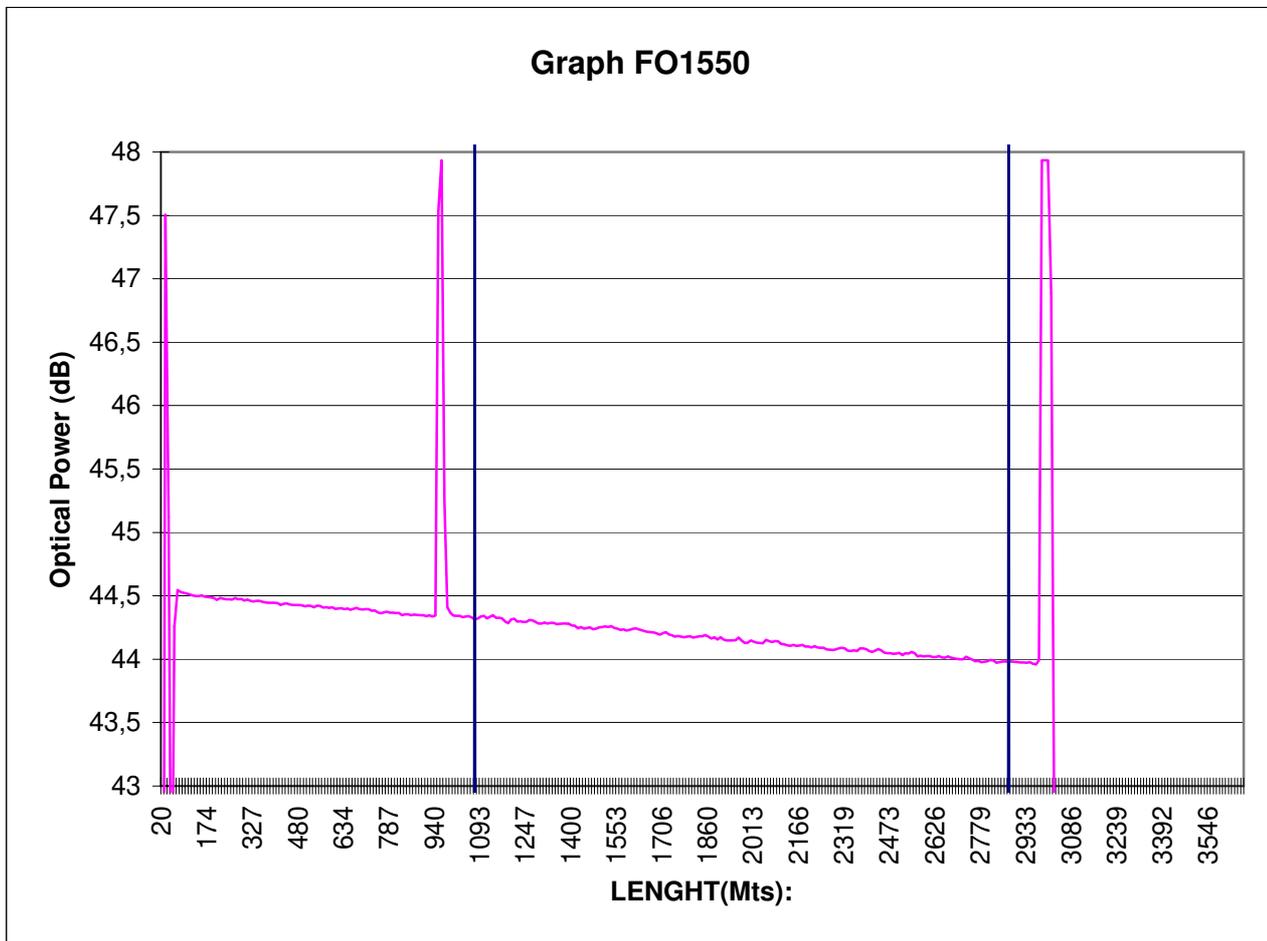
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:YELLOW 1**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.200

Attenuation between markers (dB): 0.360  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

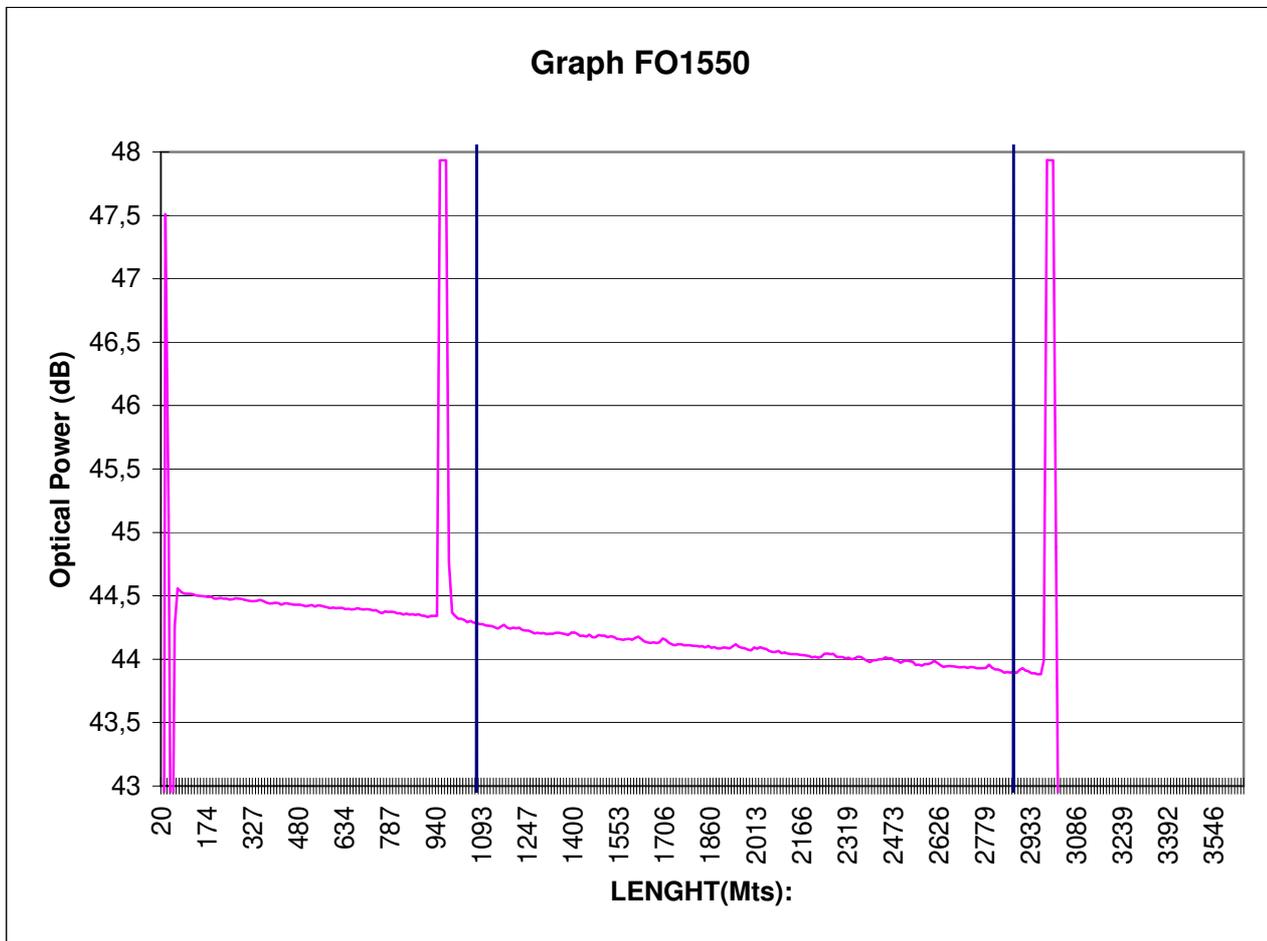
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:YELLOW 2**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.196

Attenuation between markers (dB): 0.352  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)

**QUALITY CONTROL**  
OPTICAL FIBER LABORATORY

**Prysmian Telecom Cables y Sistemas España S.L.**

**CUSTOMER:** PRYSMIAN CAVI E SISTEMI TELECOM

**INTERNAL JOB:** 30004805/020    **Nº ANALYSIS:** 40060000

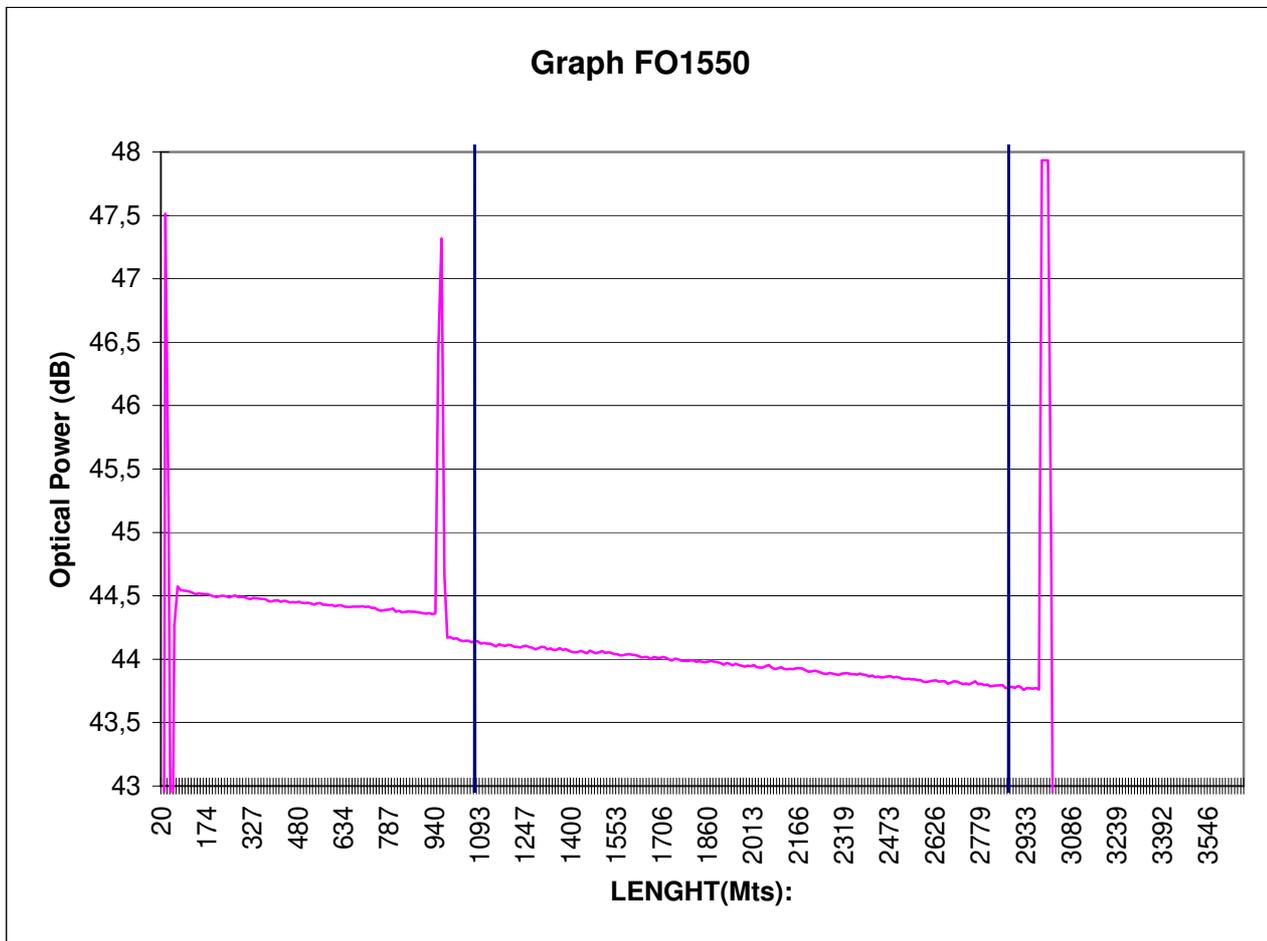
**CABLE TYPE:** OPGW 25B49Z-48M

**DATE:** 27.11.2007    **PHASE:ARMOURED**    **LENGHT(Mts):**2004

**DRUM:** W06347W    **TypeFiber** M    **Cor:1 Tub:BLUE 1 Fib:YELLOW 3**

Wavelength(nm) : 1550 Attenuation (dB/Km):0.194

Attenuation between markers (dB): 0.349  
Length between markers (m): 1798



**Marker A:**

1083

**Marker B:**

2881

Equipment 9060A  
Horizontal Scale (m/div): 500  
Vertical Scale (dB/div): .500

IOR: 1.468

Pulse(ns): 100  
ATT.:6.25(dB)