



EN 61386-22
Conduit systems for electrical installations
Part 22: Particular requirements for pliable conduit systems

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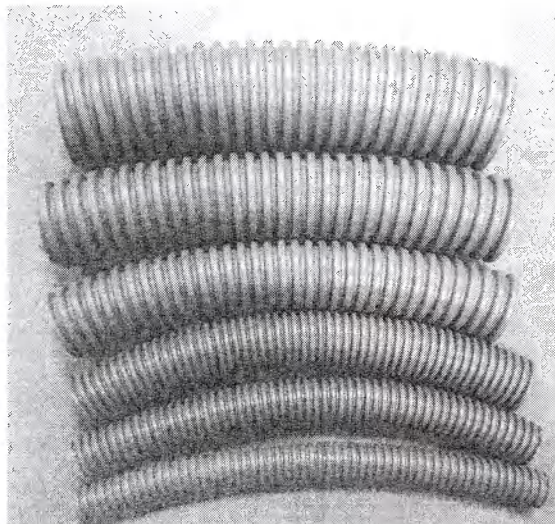
Applicant's name..... : IBOTEC – Industria de Tubagens, S.A.
Address..... : Apartado 2037
 3701-906 CESAR

Manufacture..... : IBOTEC – Industria de Tubagens, S.A.
Address..... : Apartado 2037
 3701-906 CESAR

Standard..... : IEC 61386-1: 2008
 EN 61386-1:2008
 IEC 61386-22: 2002
 EN 61386-22: 2004 + A11: 2010

Tested appliance..... : Pliable conduits
Trade Mark..... : IBOTEC
Model/Type reference..... : One Shoe 16 - 50
Ratings..... : Ø 16-50, classification 232122670010

General aspect of product



Possible test case verdicts:

- The case does not apply to the test object : N/A
- Test object does meet the requirement : P
- Test object does not meet the requirement : F

General remarks:

The test results presented in this report relate only to the object tested.
 This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
 "(See appended table)" refers to a table appended to the report.
 "(See remark #)" refers to a remark appended to the report.
 "(See note #)" refers to a note appended to the report.
 "(See Annex #)" refers to an annex appended to the report.
 "(#####)" refers to the internal code of testing equipment.

Testing

Date of receipt of test item.....: 2017-12-21
 Date of begin of test item.....: 2018-01-03
 Date of end of test item.....: 2018-01-19

Summary of testing:

According to OSM/IN 227 document.

General product information:

Pliable conduits for electrical installations.

Particulars: test item vs. test requirements:

Type of conduit (1).....:	Non-metallic	Resistance to bending.....:	Pliable
Type of conduit (2).....:	Classification 232122670010	Tensile strength.....:	None
Type of conduit (3).....:	Corrugated	Suspended load capacity.....:	None
Fittings – quantity.....:	---	Lower temperature range.....:	Classification 2 (-5°C)
Fittings – type.....:	---	Upper temperature range.....:	Classification 1 (+60°C)
Fittings – colour.....:	---	Electrical characteristics.....:	With electrical insulating
Method of connection.....:	Non-threadable	Resistance to external influences:	IP 67
Resistance to compression :	Light	Resistance against corrosion.....:	---
Resistance to impact.....:	Medium	Resistance to flame propagation...:	Non-flame propagation

Copy of marking plate:

IBOTEC ONE SHOE CE

EN 61386-22 ICTA 2321

OSH CE CNZ RL S/G 50MM X 50MT

Diam.	50 mm	Comp.	50 mts
Data	14-12-2017	O.P.	10-11333
Operário	60096		

Em caso de exposição prolongada o tubo deve ser protegido dos raios solares intensivos

IBOTEC ONE SHOE CE

EN 61386-22 ICTA 2321

OSH CE CNZ RL S/G 40MM X 50MT

Diam.	40 mm	Comp.	50 mts
Data	05-12-2017	O.P.	10-11303
Operário	60096		

Em caso de exposição prolongada o tubo deve ser protegido dos raios solares intensivos

IBOTEC ONE SHOE CE

EN 61386-22 ICTA 2321

OSH CE CNZ RL S/G 32MM X 50MT

Diam.	32 mm	Comp.	50 mts
Data	15-09-2017	O.P.	10-11029
Operário	60205		

Em caso de exposição prolongada o tubo deve ser protegido dos raios solares intensivos

IBOTEC ONE SHOE CE

EN 61386-22 ICTA 2321

OSH CE CNZ RL S/G 25MM X 30MT

Diam.	25 mm	Comp.	30 mts
Data	13-09-2017	O.P.	10-11002
Operário	60096		

Em caso de exposição prolongada o tubo deve ser protegido dos raios solares intensivos

IBOTEC ONE SHOE CE

EN 61386-22 ICTA 2321

OSH CE CNZ RL S/G 20MM X 100MT

Diam.	20 mm	Comp.	100 mts
Data	19-07-2017	O.P.	10-10872
Operário	60190		

Em caso de exposição prolongada o tubo deve ser protegido dos raios solares intensivos

IBOTEC ONE SHOE CE

EN 61386-22 ICTA 2321

OSH CE CNZ RL S/G 16MM X 100MT

Diam.	16 mm	Comp.	100 mts
Data	01-09-2017	O.P.	10-10977
Operário	60096		

Em caso de exposição prolongada o tubo deve ser protegido dos raios solares intensivos

EN 61386-22			
Clause	Requirement + Test	Result - Remark	Verdict
7	MARKING		
7.1	a) Name or trademark of the manufacturer	IBOTEC	P
	b) A product identification mark	One Shoe $\varnothing 16 - \varnothing 50$	P
7.1.1	Classification	2321	P
7.1.2	The compatibility of parts within a conduit system indicated		N/A
7.1.3	Classification and necessary literature		P
7.1.101	Marking shall be repeated at regular intervals from 1 to 3 m (EN 61386-22)		N/A
	Where this is technically impractical, the mark shall be on a label attached to the product at each end (EN 61386-22)		P
7.1.102	All information in the literature necessary for the system the minimum inside diameter and the classification (EN 61386-22)		P
7.2	Marking on fittings shall be in accordance with 7.1	Marked on a label.	P
7.3	Flame propagating material shall be in orange colour, unless		N/A
	clearly marked on the product, the non-flame propagating material may be any colour except yellow, orange or red	Grey.	P
7.4	Marking on earthing shall be in accordance with HD 243 S10, symbol 417 IEC- 5019a		N/A
7.5	Resistance of the marking shall be checked by inspection and by rubbing the marking with water and with petroleum spirit (EN 61386-1)	n-Hexane - EMSURE® Batch: K45339274 508 (A11/004)	P
8	DIMENSIONS		
8.1	Threads and outside diameters of non-metallic conduits shall comply with EN 60 423 (EN 61386-22)	(see appended table)	P
8.2	Threadable conduits and threadable conduit fittings according to Table 101:		
	size	---	N/A
	external thread; minimum length (mm)	---	N/A
	internal thread; minimum length (mm)	---	N/A
	Non-threadable conduits and non-threadable conduit fittings according to Table 102:		
	size	---	N/A
	maximum entry diameter (mm)	---	N/A
	minimum entry length (mm)	---	N/A
	minimum inside diameter of the conduit system (mm)	---	N/A
9	CONSTRUCTION		
9.1	Inside and outside surfaces shall be free from sharp edges, burrs or surface projections; no damaging of conductors or cables		P
9.2	Screws, if any, shall not cause damage to cable insulation	Conduits have no screws.	N/A
	ISO metric threads		N/A
	No thread cutting screws		N/A
9.3	Screws with performed threads for screws in engagement with a thread of non-metallic material shall be tightened and loosened 10 times, and		N/A
	5 times in all other cases		N/A
	Torque (Nm)	---	N/A

EN 61386-22			
Clause	Requirement + Test	Result - Remark	Verdict
	After the test no damage		N/A
9.4	Thread-forming screws with a thread of insulating material shall be tightened and loosened 10 times, and	Conduits have no thread-forming screws.	N/A
	5 times in all other cases		N/A
	Torque (Nm)	---	N/A
	After the test no damage		N/A
9.5	Level of resistance to the external influence on the joint shall be checked as Cl. 14	---	N/A
9.6	For conduits systems assembled by means other than threads, compliance is checked by inspection and by manual test		N/A
10	MECHANICAL PROPERTIES		
10.1	Mechanical strength		
10.1.1	Conduits system shall have adequate mechanical strength		P
10.1.2	Conduits, according to their classification, when bent or compressed or exposed to impact or extreme temperature shall not crack and deformed		P
10.1.3	Conduits system intended as a mounting for the other equipment, shall be strength to support such equipment		N/A
10.2	Compression test:		
10.2.1	3 samples shall be (200 ± 5) mm long	(A15/002)	P
10.2.2	Before the test, record outside diameter.....	(see appended table)	P
10.2.3	Samples positioned according fig. 1		P
10.2.4	Compression force (N) within 30 s	320	P
10.2.5	After the force has been applied for (60 ± 2) s measured diameter without removing the force (mm) :	(see appended table)	P
10.2.6	The difference between initial diameter and flattened diameter shall be ≤ 25% of the outside diameter measured in 10.2.2; measured diameter (mm)	(see appended table)	P
10.2.7	60 s after removing the force, the difference between initial diameter and flattened diameter shall be ≤ 10% of the outside diameter measured in 10.2.2; measured diameter (mm)	(see appended table)	P
10.2.8	After the test no cracks visible	---	N/A
10.2.101	For self-recovering conduits: samples shall be (200 ± 5) mm long (EN 61386-22)	---	N/A
	Before the test the outside diameters (mm) of the samples shall be measured (EN 61386-22)	---	N/A
	Compression force (N) to flatten the outside diameter between 25% and 50% of its initial diameter within 30 s (EN 61386-22)	---	N/A
	15 min after removing the force, the outside diameter shall be measured again; diameter (mm) (EN 61386-22)	---	N/A
	After the test, the difference between the initial outside diameter and the outside diameter of the flattened sample measured; diameter (mm) (EN 61386-22)	---	N/A
	After the test no cracks visible		N/A
10.3	Impact test:		
	12 samples of conduit or conduit fittings shall be (200 ± 5) mm long	(A15/002)	P

EN 61386-22			
Clause	Requirement + Test	Result - Remark	Verdict
	test temperature (°C)	-5	P
	mass of hammer (kg)	2,0	P
	Height (mm)	100	P
	After the test for 9 samples or more no cracks visible	(see appended table)	P
10.4	Bending test (EN 61386-22):		
10.4.101	The test as specified in EN 61386-22 is made with an apparatus in accordance with fig. 101	(see appended table)	P
10.4.102	The 6 samples shall have a length as following (EN 61386-22).....	(see appended table)	P
	plain conduits: 30 times the outside diameter (EN 61386-22)		N/A
	corrugated conduits: 12 times the outside diameter (EN 61386-22)		P
	3 samples at the ambient temperature shall be slowly bent by hand as specified in EN 61386-22	22 °C	P
	3 samples at the declared transport, permanent application and installation temperature (°C) shall be conditioned for 2 h in a cold chamber (EN 61386-22)	-5 °C (A02/009)	P
10.4.103	After the test no cracks visible (EN 61386-22)		P
	Pass an appropriate gauge through the sample in accordance with fig. 102 (EN 61386-22)	(A01/011)	P
10.5	Flexing test	Not applicable	
10.6	Collapse test	Not applicable	
10.7	Tensile strength: a sample and two terminating fittings are assembled in accordance with the manufacturer's instructions so that the overall length is 300 mm	Tensile strength not declared.	N/A
	Tensile force (N) over a period of 30 s to 40 s; force (N) (+2/-0%) ..	---	N/A
	After 2 min ± 10 s the force is removed		N/A
	After the test no damage visible and correct assembling		N/A
10.8	Suspended load test: test in accordance with manufacturer's instructions	Not suitable for suspended loads.	N/A
	Suspended load; load (N) (+2/-0%)	---	N/A
	Duration 48 h	---	N/A
	For non-metallic and composite conduit fittings: temperature (°C) of the heating cabinet (± 2 °C) (see Table 2)	---	N/A
	After the test no cracks visible, no deformation		N/A
11	ELECTRICAL PROPERTIES		
11.2	Bonding test		
	Bonding test: a sample of conduit and terminating fitting shall be coupled together in accordance with the manufacturer's instructions and fig. 103 (EN 61386-22)		N/A
	Applied during (60 ± 2) s to a current of 25 A with a frequency of 50 Hz to 60 Hz		N/A
	The measured voltage (V) drop	---	N/A
	The measured resistance shall not exceed 0,1 Ω	---	N/A
11.3	Electrical insulating strength and resistance		

EN 61386-22			
Clause	Requirement + Test	Result - Remark	Verdict
11.3.1	Conduits: 3 samples are immersed over a length of 1 m ± 10 mm in accordance with the fig. 4 in a salt water solution at (23 ± 2) °C, with a length of 100 mm kept above the level of the solution	(A15/002; A94/027)	P
	After 24 h ± 15 min, a voltage is applied, gradually being increased from 1000 V to 2000 V with a frequency of 50 Hz to 60 Hz, the 2000 V is maintained for 15 min +5/-0 s	(see appended table)	P
	The electrical insulating is adequate if a 100 mA trip device, incorporated into the circuit does not trip during the 15 min test	(see appended table)	P
	Immediately after the insulating test, a direct voltage of 500 V shall be applied during (60 ± 2) s		P
	The electrical insulation resistance shall exceed 100 MΩ	(see appended table)	P
11.3.2	Conduit fittings: samples shall be immersed for 24 h ± 15 min in water at (23 ± 2) °C, and then dried at room temperature		N/A
	The samples shall be assembled in accordance with the manufacturer's instructions and as specified in 11.3.2.2		N/A
	Samples tested within one hour of removal from the water: a voltage is applied, gradually being increased from 1000 V to 2000 V with a frequency of 50 Hz to 60 Hz, the 2000 V is maintained for 15 min +5/-0 s	---	N/A
	The electrical insulating strength is adequate if a 100 mA trip device, incorporated into the circuit does not trip during the 15 min test		N/A
11.3.2.4	Immediately after the insulating test, a direct voltage of 500 V shall be applied during (60 ± 2) s		N/A
11.3.2.5	The electrical insulation resistance shall exceed 5 MΩ		N/A
12	THERMAL PROPERTIES		
12.1	Resistance to heat		P
12.2	Samples with a (100 ± 5) mm, the test is made in accordance with fig. 8	(A15/002)	P
	The samples shall be kept for 4 h ± 5 min in a heating cabinet with temperature (°C)	60 (A11/004)	P
	After this period: each sample is loaded for 24 h ± 15 min, in an apparatus as shown in fig. 8; load (kg)	(see appended table)	P
	The sample, under load, cooled to room temperature		P
12.3	The load is then removed and immediately after this it shall be possible, as specified in EN 61386-22 to pass the appropriate gauge through the conduit in accordance with fig. 102; diameter (mm)	(see appended table)	P
13	FIRE HAZARD		
13.1	Reaction to fire		P
13.1.3	Spread of fire		P
	Non-flame propagating conduits and fittings shall have adequate resistance to flame propagation		P
13.1.3.1	Conduit fittings: for glow-wire test: 3 samples of fittings, temperature of 750 °C, test as specified in IEC 695-2-1: if sample burns, it shall be deemed to have failed the test if combustion is still in progress 30 s after removal of the glow-wire	No fittings.	N/A
	combustion time (s)	---	N/A
13.1.3.2	Non-metallic and composite conduit checked by applying a 1kW flame, according to EN 60695-2-4/1		P

EN 61386-22			
Clause	Requirement + Test	Result - Remark	Verdict
	Conduits: for flame test: 3 samples of conduits having a length of (675 ± 10) mm: if sample burns, it shall be deemed to have failed the test if combustion is still in progress 30 s after removal of the flame, or	(see appended table)	P
	if there is no evidence of burning within 50 mm of clamp and if the tissue paper ignites	(see appended table)	P
	combustion time (s)	(see appended table)	P
	flame application time (s) (+1/-0) s	(see appended table)	P
14	EXTERNAL INFLUENCES		
14.1	Degree of protection provided by enclosure, minimum requirement: IP30	IP 67	P
14.1.1	Ingress of foreign solid objects; condition of test according to EN 60 529, but for first numeral 5 or 6, the assembly shall be tested as a category 2 enclosure	(A91/186)	P
14.1.2	Ingress of water; condition of test according to EN 60 529, but for first numeral 3 or 4, the assembly shall be tested using the oscillating tube		P
14.2	Resistance against corrosion		
	Metallic and composite conduit systems, excluding screw threads, shall have adequate resistance against corrosion, both inside and outside, in accordance with Table 10		N/A
	Compliance is checked by the test specified in 14.2.2.1, 14.2.2.2 or 14.4.2.3		N/A
15	ELECTROMAGNETIC COMPATIBILITY		
	Products in normal use are passive against electromagnetic influences		P

8.1 Outside diameters:				
Size	Minimum outside diameters (mm)	Verdict	Maximum outside diameters (mm)	Verdict
16	15,7	P	16,0	P
20	19,7	P	20,0	P
25	24,6	P	25,0	P
32	31,6	P	32,0	P
40	39,6	P	40,0	P
50	49,5	P	50,0	P

Supplementary information: A00/007; I01/12

10.2 Compression test:									
Size	Outside diameters before test (mm)			Outside diameters of test (mm)			Outside diameters after test 60 s (mm)		
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
16	15,85	15,85	15,87	13,30	13,30	13,22	15,2	15,18	15,18
20	19,57	19,63	19,58	17,02	16,98	17,03	18,98	18,9	18,96
25	24,6	24,63	24,63	19,55	19,48	19,58	23,12	23,26	23,25
32	31,69	31,64	31,59	26,09	25,59	25,94	30,11	29,93	30
40	39,68	39,66	39,7	34,18	35,26	34,80	38,5	38,52	38,41
50	49,87	49,92	49,86	41,37	41,52	41,86	47,43	47,72	47,55
				Compression (%) (< 25 %)			Compression (%) (Max 10%)		
16		---		16,1%	16,1%	16,7%	4,1%	4,2%	4,3%
20		---		13,0%	13,5%	13,0%	3,0%	3,7%	3,2%
25		---		20,5%	20,9%	20,5%	6,0%	5,6%	5,6%
32		---		17,7%	19,1%	17,9%	5,0%	5,4%	5,0%
40		---		13,9%	11,1%	12,3%	3,0%	2,9%	3,2%
50		---		17,0%	16,8%	16,0%	4,9%	4,4%	4,6%
				Load (N) to compression 30% min (320N)			Compression (%) (Max 10%)		
16		---		---	---	---	---	---	---
20		---		---	---	---	---	---	---
25		---		---	---	---	---	---	---
32		---		---	---	---	---	---	---
40		---		---	---	---	---	---	---
50		---		---	---	---	---	---	---

Supplementary information: A91/251; A09/001; I01/12

10.3		Impact test:												
Size	Mass of hammer (kg)	Fall height (mm)	Sample											
			1	2	3	4	5	6	7	8	9	10	11	12
16	2,0	100	P	P	P	P	P	P	P	P	P	P	P	P
20	2,0	100	P	P	P	P	P	P	P	P	P	P	P	P
25	2,0	100	P	P	P	P	P	P	P	P	P	P	P	P
32	2,0	100	P	P	P	P	P	P	P	P	P	P	P	P
40	2,0	100	P	P	P	P	P	P	P	P	P	P	P	P
50	2,0	100	P	P	P	P	P	P	P	P	P	P	P	P

Supplementary information: A02/009; A91/146; I01/12; A01/011

10.4		Bending test:							
Size	Lenght (mm)	Average internal (mm)	Minimum inside diameter 80 % (mm)	Test at ambient temperature			Test at declared temperature		
				Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6
16	192	11,2	9,0	P	P	P	P	P	P
20	240	13,7	11,0	P	P	P	P	P	P
40	480	31,1	25,0	P	P	P	P	P	P
50	600	39,8	31,8	P	P	P	P	P	P

Supplementary information: A15/002; A91/149; A94/059; A09/001

11.3		Electrical Properties				
Conduits:						
Size	Dielectric strenght			Insulation resistance (MΩ)		
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
16	P	P	P	> 999	> 999	> 999
32	P	P	P	> 999	> 999	> 999
50	P	P	P	> 999	> 999	> 999
Conduit fittings:						
Size	Dielectric strenght			Insulation resistance (MΩ)		
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
---	---	---	---	---	---	---

Supplementary information: A02/011; A05/007

12	Thermal Properties			
Size	Mass (kg)	Average internal (mm)	Minimum inside diameter (mm)	Verdict
16	1,0	11,2	9,0	P
20	1,0	13,7	11,0	P
25	1,0	18,7	15,0	P
32	1,0	24,8	19,8	P
40	1,0	31,1	25,0	P
50	1,0	39,8	31,8	P
Supplementary information: A91/150; A01/011; A03/001; A09/001				

13.1.3.2	Fire Hazard				
Size	Mean material thickness (mm)	Flame application time (s)	Sample 1	Sample 2	Sample 3
16	0,56	20	P	P	P
50	0,63	20	P	P	P
Supplementary information: A15/002; A99/007; A00/010; A00/011; A09/001; I01/12					

Remarks

Notes
