

Products : PIDG stratotherm terminals AWG 24-22, 20, 18-16, 14-12, 10

Part numbers : 1577620, 1577623, 1577632, 1577639, 1577649

Scope: Qualification tests according to Tyco specification of PIDG stratotherm terminals insulated with PEEK and crimped on nickel plated copper wire.

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Conclusion: Test results are in accordance with specification excepted :

- Discoloration and shrinkage of the sleeve during strong heat tests (> 100°C).
- During the current cycling test one sample of AWG 10 doesn't meet specification requirements in terms of voltage drop. However, stabilization is recorded after 750 cycles.
- AWG 24 failed during the current cycling test. The wire (copper allied) could not withstand the current cycling but terminals remained intact.
- AWG 10 and AWG 12-14 don't comply with requirements for the sleeve strength test before crimping but will be modified for production.

Specification : 108-15356 rev. 1

Internal Distribution :

Codes tests: (CEI 512) :

1a, 2b, 4a, 6d, 9e, 11d, 11f, 11i, 16d, 19a, 20a

1 Eng : M. Furio
2.Eng. G. Robert

Requested by : G . Robert

Performed by : J. Cordonnier

Visa : P.LAVIEC

Restricted to : All

Samples definitions

terminals P/N	AWG	wires	crimping tools P/N
1577620-1	24	DK 24	576778
	22	DK 22	
1577623-1	20	DK 20	576779
1577632-1	18	DK 18	576780
	16	DK 16	576781
1577639-1	14	DK 14	576782
	12	DK 12	576783
1577649-1	10	DK 10	576784

Specimens have been prepared according to the information given by the application specification of PIDG stratotherm terminals (114-15102).

Validation plan

Ageing tests	Groups									
	1	2	3	4	5	6	7	8	9	10
Visual inspection	1-4	1	1	1-3	1	2	1	1	1	1
Voltage drop under specified current	2-5	2-4					2-4		2-4	
Salt spray	3									
Rapid change of temperature		3								
Termination tensile strength after ageing	6									
Termination tensile strength			2							
Fluid resistance				2						
Endurance at temperature					2					
Low temperature crimp						1				
Dielectric withstanding					3	3				
Ageing by temperature and current cycling							3			
Flammability								2		
Vibrations									3	
Sleeve strength										2
Number of specimens	4	4	4	1/f	4	6	4	2	4	4

Equipments used

- Salt spray : MPC salt spray (PBS type)
- Rapid change of temperature :
 - MPC dry temperature oven (50°C/200°C)
 - Climat temperature humidity chamber (-65°C/125°C)
- Tensile strength : MTS 2/M Tensile compression tester (10kN)
- Endurance at temperature : MPC dry temperature oven (50°C/200°C)
- Low temperature crimp : Heraeus HT4004 temperature chamber (-40°C/180°C)
- Dielectric withstanding : Sefelec PR12NN dielectric strength tests meter
- Ageing by current cycling :

equipments type	Name	Characteristics
power supply controled with Labview	HP 6031A	20VDC/120A
	HP 6032A	60VDC/50A
Multiple channels measurements	AOIP SA120	120 ways
Digital thermometer	Fluke 2176A	-

- Vibrations : LDS 726/SI1215/PA2000 (< 26g (Random & sinus))

Comments

- Negative results during voltage drop measurement show that voltage drops for crimping are lower than voltage drops for an equivalent wire length.
- Measure of the voltage drop under specified current for the AWG 10 was performed under 51 A instead of 55 A as requested in the specification. This is due to the max rating current of the power supply used.

Group 1 : Salt mist

Visual examination :

No apparent defect observed.

Salt mist test:

The samples are coupled in series and clamped at the nominal value:

- 1.5 Nm for M4
- 8 Nm for M8

The samples undergo the salt mist test for 48h at 35°C, according to EN 2591-307.

Voltage drop before and after salt mist:

Voltage drop under specified current according with EN 2591-217.

AWG	10		12		14		16		18		20		22		24	
	ini.	fin.	ini.	fin.	ini.	fin.	ini.	fin.	ini.	fin.	ini.	fin.	ini.	fin.	ini.	fin.
I meas (A)	51		41		32		22		16		11		9		4,5	
Voltage drop (mV)	-0,8	0,7	-0,8	0,0	-2,1	-1,5	-0,9	0,0	0,1	0,1	-1,4	-1,1	-1,9	-1,9	-1,9	-1,9
	-0,5	0,6	-1,1	-0,4	-2,0	-1,1	-1,1	-0,9	-0,1	0,4	-1,5	-1,1	-2,0	-2,1	-1,7	-2,1
	-0,7	1,1	-1,0	0,4	-1,8	-1,6	-0,8	-0,7	0,2	0,1	-1,4	-1,2	-2,1	-1,8	-1,9	-1,8
	-0,8	1,7	-0,7	0,0	-1,9	-1,4	-1,0	-0,8	-0,2	0,6	-1,6	-1,5	-2,4	-2,1	-1,8	-2,0

min.	-0,8	0,6	-1,1	-0,4	-2,1	-1,6	-1,1	-0,9	-0,2	0,1	-1,6	-1,5	-2,4	-2,1	-1,9	-2,1
max.	-0,5	1,7	-0,7	0,4	-1,8	-1,1	-0,8	0,0	0,2	0,6	-1,4	-1,1	-1,9	-1,8	-1,7	-1,8
average	-0,7	1,0	-0,9	0,0	-2,0	-1,4	-1,0	-0,6	0,0	0,3	-1,5	-1,2	-2,1	-2,0	-1,8	-2,0
requirements	11	19,5	13	19,5	15	22,5	15	22,5	15	22,5	15	22,5	16	24	16	24

Visual examination after salt mist:

No apparent defect observed.

Tensile strength :

according to EN 2591-417

F (N)	10	12	14	16	18	20	22	24
1	1039,0	706	413,1	320,2	209,2	179	100,8	80,4
2	1033,0	732	400,9	323,8	222,3	193	92,9	93,9
3	975,0	711	388,0	315,7	218,1	183	101,3	91,1
4	1038,0	733	401,0	323,7	181,2	186	100,7	82,9

mini.	975,0	706,0	388,0	315,7	181,2	179,0	92,9	80,4
maxi.	1039,0	733,0	413,1	323,8	222,3	193,0	101,3	93,9
average	1021,3	720,5	400,8	320,9	207,7	185,3	98,9	87,1
requirements	700	450	300	180	150	90	60	55

Test speed : 50mm/min

Results : Samples meet requirements.

Group 2 : Rapid change of temperature (RCT)
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Visual examination :

No apparent defect observed.

Rapid change of temperature test: 10 cycles according to EN 2591-305

Each cycle consists of :
 30 min at -65°C
 30 min at 275°C

Voltage drop before and after rapid change of temperature:

Voltage drop under specified current according to *EN 2591-217*.

AWG	10		12		14		16		18		20		22		24	
	ini.	fin.	ini.	fin.	ini.	fin.	ini.	fin.	ini.	fin.	ini.	fin.	ini.	fin.	ini.	fin.
I meas (A)	51		41		32		22		16		11		9		4,5	
mV	-0,8	-0,8	-1,0	-0,7	-2,1	-2,0	-0,9	-0,7	-0,1	-0,4	-1,4	-1,3	-1,9	-2,1	-1,7	-1,8
	-0,6	-0,4	-1,1	-1,0	-2,5	-2,2	-0,8	-0,8	-0,3	-0,7	-1,6	-1,5	-2,0	-1,9	-1,9	-1,3
	-1,0	-0,9	-0,7	-0,7	-2,5	-2,4	-1,1	-1,0	-0,7	-0,9	-1,4	-1,4	-2,3	-2,2	-1,7	-1,6
	-0,8	-0,7	-0,9	-0,8	-1,9	-2,1	-1,0	-1,0	-0,6	-0,8	-1,7	-1,6	-2,1	-2,0	-1,6	-1,5

mini	-1,0	-0,9	-1,1	-1,0	-2,5	-2,4	-1,1	-1,0	-0,7	-0,9	-1,7	-1,6	-2,3	-2,2	-1,9	-1,8
maxi	-0,6	-0,4	-0,7	-0,7	-1,9	-2,0	-0,8	-0,7	-0,1	-0,4	-1,4	-1,3	-1,9	-1,9	-1,6	-1,3
average	-0,8	-0,7	-0,9	-0,8	-2,3	-2,2	-1,0	-0,9	-0,4	-0,7	-1,5	-1,5	-2,1	-2,1	-1,7	-1,6
requirements	11	19,5	13	19,5	15	22,5	15	22,5	15	22,5	15	22,5	15	22,5	15	22,5

Visual examination after RCT:

After the rapid change of temperature a displacement and shrinkage of the sleeve color are observed.



Results : Samples meet requirements.

Group 3 : Tensile strength

Visual examination :

No apparent defect observed.

Tensile strength test :

Test performed with the tensile compression tester at a speed of 50mm/min according to EN 2591-417

10	F(N)
1	1008,3
2	1067,8
3	1191,5
4	1065,2
min.	1008,3
max.	1191,5
average	1083,2
Requirement F > 700N	

12	F(N)
1	785,6
2	756,4
3	758,6
4	760,2
min.	756,4
max.	785,6
average	765,2
Requirement F > 450N	

14	F(N)
1	427
2	421,6
3	422
4	423
min.	421,6
max.	427
average	423,4
Requirement F > 300N	

16	F(N)
1	334,3
2	325
3	355
4	371
min.	325
max.	371
average	346,3
Requirement F > 180N	

18	F(N)
1	226
2	223
3	230
4	227
min.	223
max.	230
average	226,5
Requirement F > 150N	

20	F(N)
1	131,8
2	121,3
3	113,8
4	112,2
min.	112,2
max.	131,8
average	119,8
Requirement F > 90N	

22	F(N)
1	101,7
2	95,7
3	108
4	101,5
min.	95,7
max.	108
average	101,7
Requirement F > 60N	

24	F(N)
1	90,2
2	93,7
3	85,7
4	93,8
min.	85,7
max.	93,8
average	91,1
Requirement F > 55N	

Results : Samples meet requirements.

Group 4 : Fluid resistanceVisual examination :

No apparent defect observed.

Fluid resistance tests :

Fluids list :

- Grease G354
- Kerosene F34
- Synthetic oil skydrol 500LD4
- Mineral oil H515
- Lubricant 0156
- Cleaning S752
- de-icing S742
- Liquid of extinction FP70
- Cooling liquid S759

See Emitech report N° RQ-06-60390/A in annexe 1 page 20.

Visual examination after fluid resistance tests:

Terminals tested with the liquid of extinction FP70 blackened at the transition. Excepted this case no defect are observed.



Group 5 : endurance at temperatureVisual examination :

No apparent defect observed.

Endurance at temperature test :

The samples remained at 275°C during 120h according to the method B of EN 2591-301.

Dielectric withstanding :

All samples withstood a minimum voltage strength of 1500V. (Method according to EN 2591-219).
The final visual examination revealed a displacement and shrinkage of the sleeve color.



Results : Samples meet requirements

Group 6 : crimping at low temperatureLow temperature crimp test procedure :

All the components (cable, terminal lugs and crimping tools) are kept at a temperature of $-15 \pm 2^{\circ}\text{C}$ for 1 hour then crimp at that temperature.

The specimens are kept at a temperature of $-65 \pm 2^{\circ}\text{C}$ for 1 hour before recover at $20 \pm 2^{\circ}\text{C}$ for 1 hour.

The test of voltage strength is performed according to EN 2591-219.

Visual examination after crimping at low temperature :

The visual examination revealed no apparent defect.

Dielectric withstanding :

The samples resisted at voltage strength of 1500V.

Results : Samples meet requirements.

Group 7 : current cycling

Visual examination :

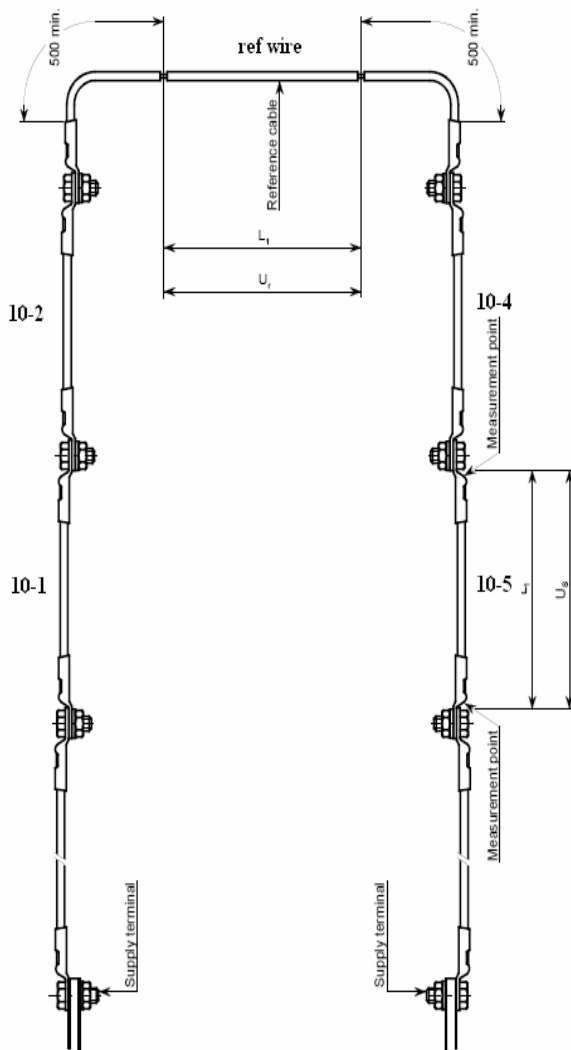
No apparent defect observed.

Current cycling test definitions :

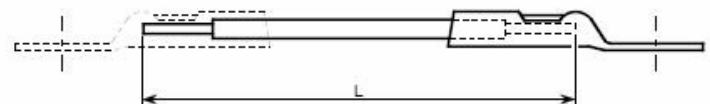
The cycling current is adjusted in order to reach 260°C in the core of the wire.

A cycle consists of :

- Increasing the current up to the ageing temperature(260°C), see following table;
- Maintaining the temperature for 15 min;
- Dropping the voltage down in order to reduce the temperature below 30°C;
- Maintaining the temperature for 5 min.



AWG	I cycling (A)	I measure (A)
24	11,5	4,5
22	19,7	9
20	29	11
18	39,8	16
16	51	22
14	57,3	32
12	81	41
10	111	55



AWG ^a	Terminal lug L (mm)
24 to 12	300
10	600

figure 1

- 10-1 : Sample 1 of AWG 10
- 10-2 : Sample 2 of AWG 10
- Ref wire : reference wire
- 10-4 : Sample 4 of AWG 10
- 10-5 : Sample 5 of AWG 10

Figure 2 : Assembly for measuring the voltage drop in terminal lugs in accordance with EN 2591-217

Voltage drop under specified current :

Measurements are performed on the following cycles: 50, 100, 150, 300, 500, 750, 1000, 1200, 1300, 1400 and 1500.

For results see pages 12 at 17.

Requirement:

- The voltage drop in each crimp measured shall not exceed the values specified in the technical specification.
- D max. lower than 20% of the value measured at 1000 cycles.

Note : D.max is defined in EN 2591-218 (12/2002) § 6.1

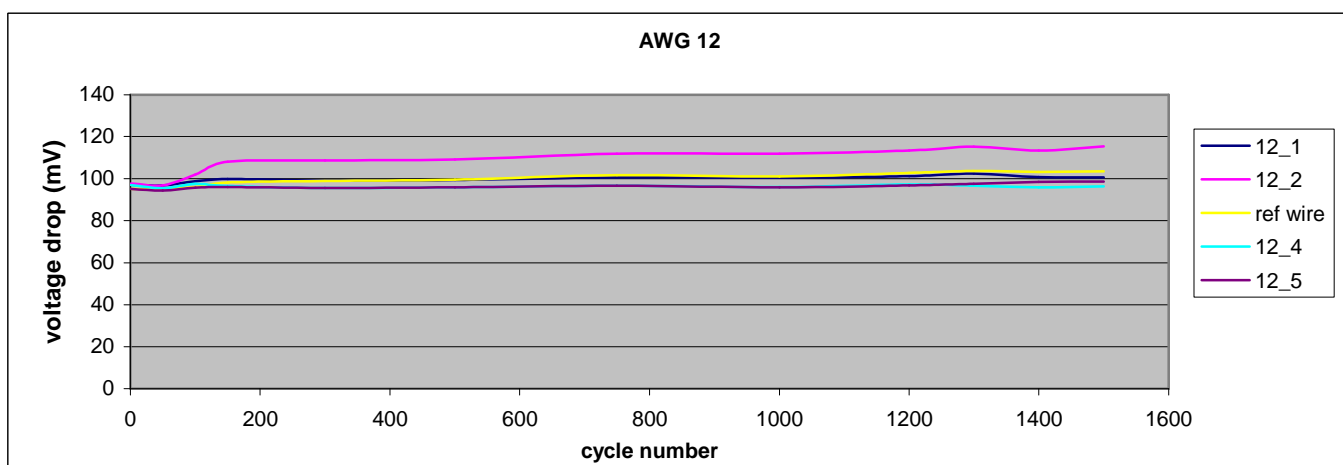
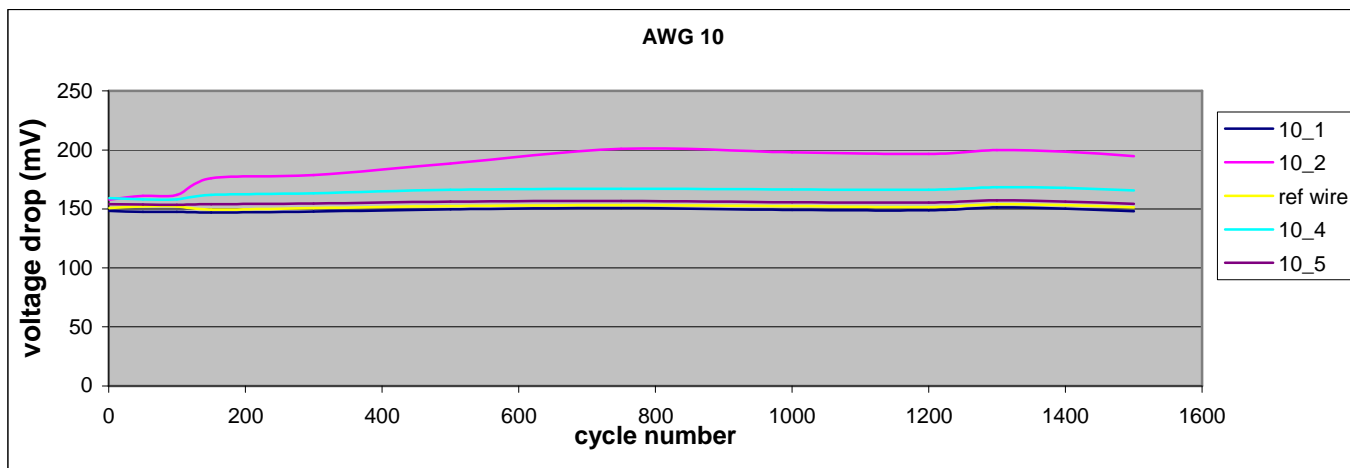
The values below do not take into account the deduction of the wire voltage drop.

cycle	10_1	10_2	ref wire	10_4	10_5
1	148,5	157,9	150,9	159,3	154,0
50	147,5	161,3	152,2	158,3	153,8
100	147,5	161,9	152,2	158,3	153,6
150	147,0	176,0	149,5	162,1	154,1
300	148,0	178,8	150,8	163,4	154,7
500	149,7	188,6	152,6	166,4	156,2
750	150,8	201,0	153,2	167,1	156,9
1000	149,4	198,1	152,4	166,5	155,7
1200	148,8	196,7	151,8	166,2	155,3
1300	151,5	199,8	154,0	168,5	157,4
1400	150,2	198,5	153,4	167,8	156,3
1500	148,2	194,7	151,4	165,8	154,3

12_1	12_2	ref wire	12_4	12_5
97,2	97,7	95,2	96,9	95,2
96,7	96,9	95,1	95,5	94,4
98,8	102,0	96,0	97,6	95,7
99,8	108,0	98,2	96,5	96,0
99,0	108,6	98,9	95,6	95,5
99,4	109,1	99,5	95,8	95,8
100,6	111,8	101,6	96,6	96,6
100,5	111,8	101,0	96,0	95,9
101,2	113,3	102,7	97,2	96,8
102,4	115,2	103,7	96,6	97,5
100,7	113,3	103,1	95,9	98,5
100,6	115,3	103,5	96,4	98,6

Dmax equals to 1,7% of the value measured at 1000 cycles.

Dmax equals to 3% of the value measured at 1000 cycles.

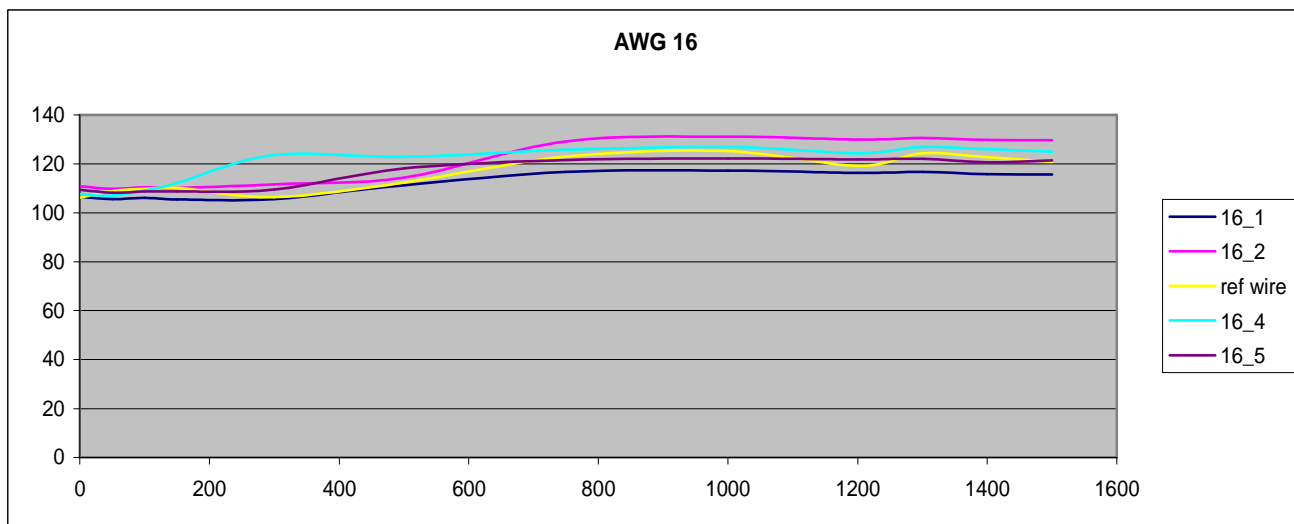
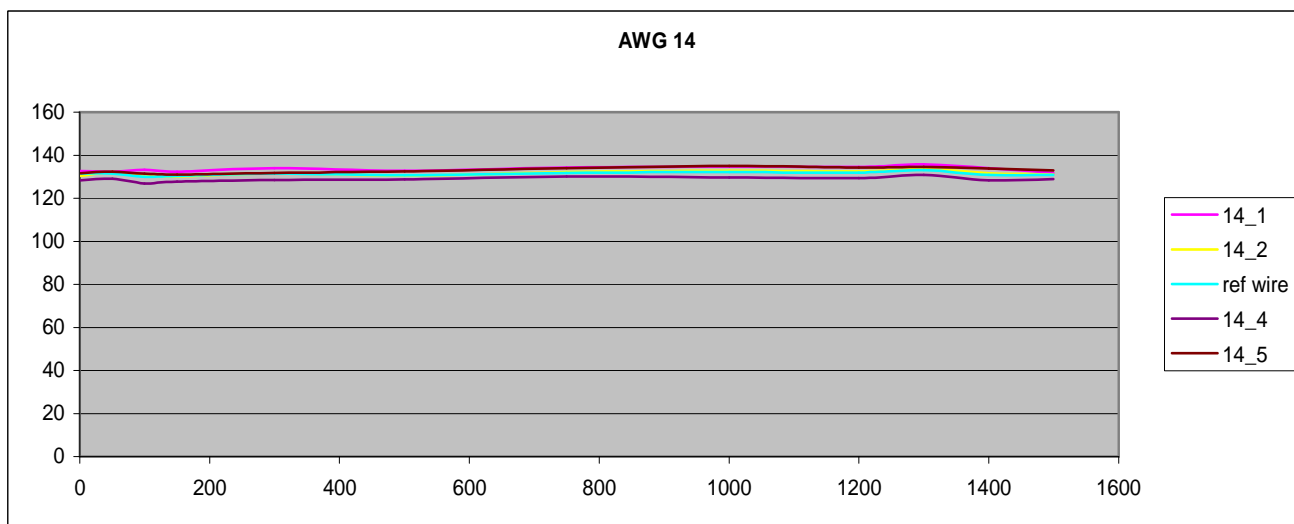


cycle	14_1	14_2	ref wire	14_4	14_5
1	132,6	130,5	131,5	128,2	131,7
50	132,2	132,1	131,4	129,0	132,2
100	133,1	130,8	130,0	126,9	131,5
150	132,2	130,1	130,4	127,7	131,1
300	133,9	131,7	131,5	128,4	131,9
500	132,7	130,6	130,7	128,7	132,4
750	134,3	132,2	131,8	130,1	134,0
1000	134,8	132,7	132,2	129,7	135,0
1200	134,6	132,5	132,0	129,3	134,2
1300	135,9	133,4	133,0	130,8	134,6
1400	133,9	131,7	130,9	128,3	133,8
1500	131,8	131,1	130,9	128,8	132,9

Dmax is lower than 1% of the value measured at 1000 cycles.

16_1	16_2	ref wire	16_4	16_5
106,6	110,9	106,3	107,5	109,3
105,6	109,8	108,9	107,1	108,1
106,2	110,5	109,8	109,2	108,7
105,5	110,2	110,3	112,2	108,7
105,7	111,7	106,4	123,7	109,5
111,3	114,3	112,4	122,9	118,2
116,7	129,2	123,0	125,7	121,6
117,3	131,2	125,2	126,9	122,2
116,2	130,0	119,2	124,4	121,7
116,6	130,5	124,3	126,9	122,1
115,8	129,8	122,7	125,9	120,6
115,7	129,7	120,8	124,9	121,4

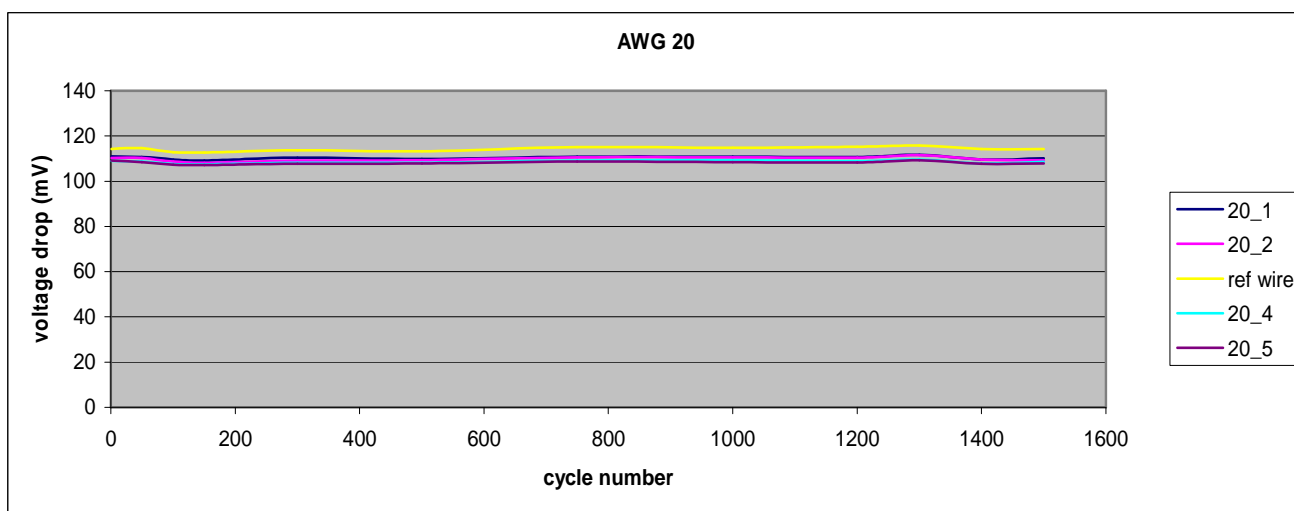
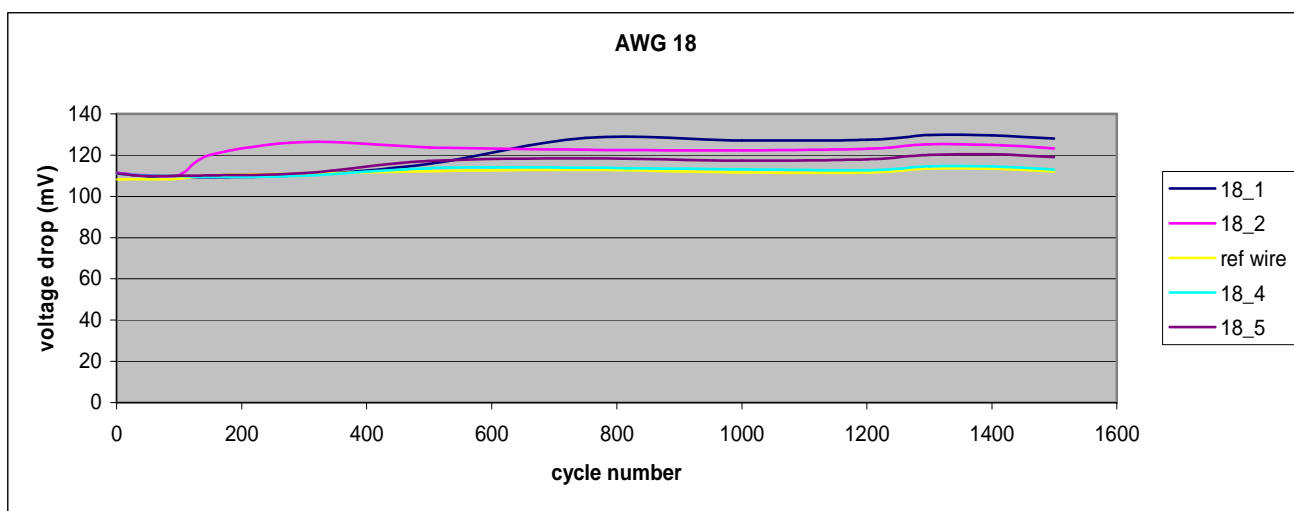
D max is equal to the value measured at 1000 cycles.



cycle	18_1	18_2	ref wire	18_4	18_5	20_1	20_2	ref wire	20_4	20_5
1	111,2	111,5	108,3	111,1	111,2	111,0	110,3	114,4	109,1	109,2
50	109,7	110,3	108,4	110,1	109,8	110,6	110,2	114,5	108,8	108,4
100	109,7	110,3	108,6	109,9	110,0	109,6	108,7	112,8	107,6	107,3
150	109,2	120,2	110,2	109,4	110,2	109,2	108,2	112,7	107,5	107,2
300	110,3	126,4	111,0	110,1	111,4	110,3	109,2	113,8	108,2	107,8
500	115,9	123,7	112,3	113,7	117,3	109,8	109,4	113,3	108,1	107,8
750	128,4	122,8	113,0	113,9	118,6	110,9	110,5	115,1	109,2	108,7
1000	127,2	122,3	111,7	113,2	117,5	110,8	110,5	114,8	109,3	108,4
1200	127,4	123,1	111,6	112,7	118,1	110,6	110,3	115,2	108,9	108,3
1300	129,8	125,3	113,6	114,6	120,1	111,6	111,5	115,8	109,6	109,3
1400	129,6	124,9	113,5	114,6	120,5	109,7	109,6	114,3	107,9	107,8
1500	128,1	123,3	112,1	113,1	119,0	110,1	109,4	114,3	108,7	107,9

Dmax equals to 2,5 % of the value measured at 1000 cycles.

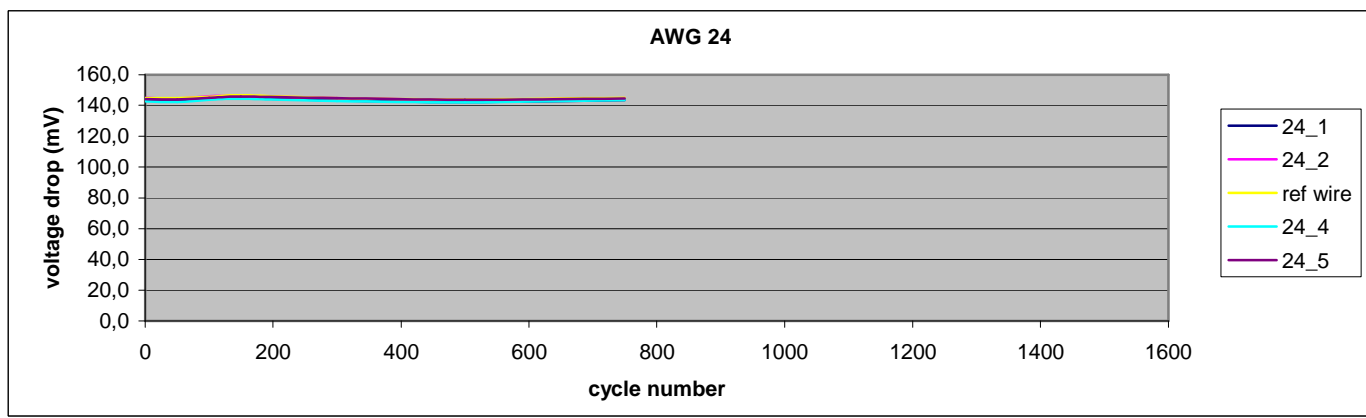
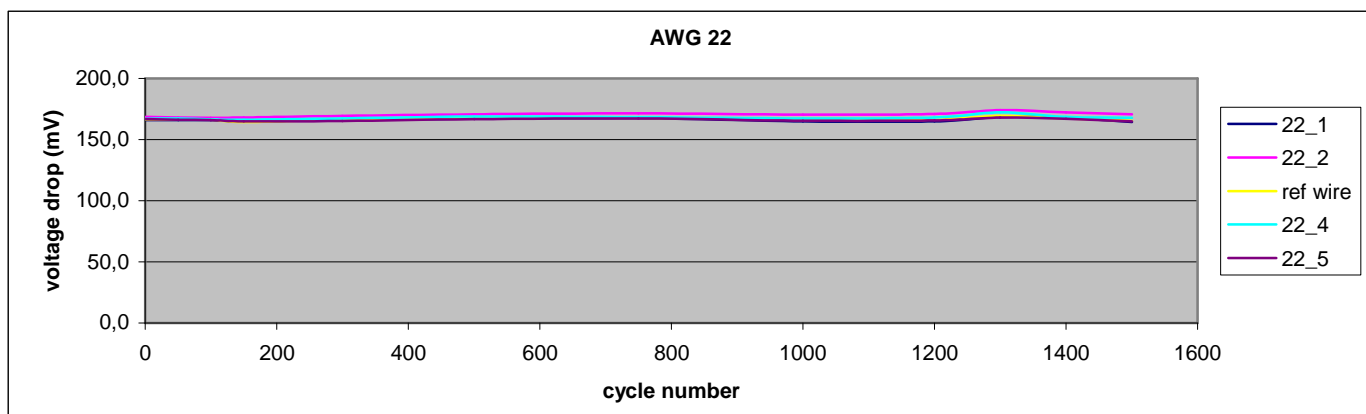
Dmax is lower than 1% of the value measured at 1000 cycles.



nb de cycles	22_1	22_2	ref wire	22_4	22_5	24_1	24_2	ref wire	24_4	24_5
1	166,1	168,7	166,5	167,0	166,8	143,6	144,8	144,5	142,6	144,1
50	166,1	168,0	166,5	167,2	166,2	143,3	144,5	144,6	142,2	143,8
100	165,9	168,0	166,3	166,6	166,1	144,8	145,9	145,5	143,7	144,9
150	165,1	168,1	164,5	166,2	164,9	144,6	146,1	146,5	144,2	145,7
300	165,9	169,3	166,3	167,3	165,3	143,2	144,6	144,6	142,8	144,6
500	167,0	170,8	168,1	168,8	166,9	142,2	143,7	143,9	141,9	143,7
750	167,6	171,6	167,8	168,3	167,4	143,5	144,7	144,8	143,3	144,4
1000	165,1	170,5	166,2	167,4	165,6					
1200	165,0	170,9	166,3	168,1	165,8					
1300	168,4	174,2	169,5	172,3	168,2					
1400	167,9	172,4	167,4	168,7	166,9					
1500	164,4	170,7	165,5	167,7	164,8					

Dmax equals to 3 % of the value measured at 1000 cycles.

Dmax equals to 1 % of the value measured at 500 cycles.



The test performed on the AWG 24 had to be interrupted because the loop took fire at the 750th cycle. Terminals remained intact but the wire (copper allied) did not carry the density of current which was of 69A/mm² in order to have 260°C in the middle of the cable.

The values below take into account of the deduction of the reference wire voltage drop.

Negatives values means that the voltage drop on the terminal is better than the voltage drop on an equivalent wire.

cycle	10_1	10_2	ref wire	10_4	10_5
1	-2,35	7,01	0,00	8,43	3,14
50	-4,66	9,05	0,00	6,06	1,54
100	-4,71	9,70	0,00	6,06	1,34
150	-2,55	26,49	0,00	12,55	4,53
300	-2,79	27,97	0,00	12,60	3,95
500	-2,92	35,98	0,00	13,77	3,57
750	-2,40	47,72	0,00	13,85	3,71
1000	-3,00	45,69	0,00	14,08	3,34
1200	-2,94	44,91	0,00	14,40	3,56
1300	-2,56	45,76	0,00	14,48	3,37
1400	-3,16	45,11	0,00	14,40	2,92
1500	-3,26	43,24	0,00	14,38	2,91

12_1	12_2	ref wire	12_4	12_5
2,0	2,5	0,0	1,7	0,0
1,6	1,7	0,0	0,3	-0,7
2,8	6,0	0,0	1,6	-0,3
1,6	9,8	0,0	-1,7	-2,2
0,1	9,7	0,0	-3,3	-3,4
-0,1	9,6	0,0	-3,7	-3,7
-1,0	10,2	0,0	-5,0	-5,0
-0,5	10,8	0,0	-5,0	-5,1
-1,5	10,6	0,0	-5,5	-5,9
-1,3	11,5	0,0	-7,1	-6,2
-2,4	10,2	0,0	-7,2	-4,6
-2,9	11,8	0,0	-7,1	-4,9

min.	-4,71	7,01	0,00	6,06	1,34
max	-2,35	47,72	0,00	14,48	4,53
average	-3,11	32,39	0,00	12,09	3,16
requirements	33 mV				

-2,90	1,73	0,00	-7,20	-6,20
2,80	11,80	0,00	1,71	-0,02
-0,14	8,70	0,00	-3,50	-3,51
39 mV				

cycle	14_1	14_2	ref wire	14_4	14_5
1	1,1	-1,0	0,0	-3,3	0,2
50	0,8	0,7	0,0	-2,5	0,8
100	3,1	0,8	0,0	-3,1	1,5
150	1,8	-0,3	0,0	-2,8	0,7
300	2,4	0,2	0,0	-3,1	0,4
500	2,0	-0,1	0,0	-2,0	1,7
750	2,5	0,3	0,0	-1,7	2,2
1000	2,6	0,5	0,0	-2,5	2,8
1200	2,6	0,5	0,0	-2,7	2,2
1300	2,8	0,4	0,0	-2,2	1,6
1400	3,0	0,8	0,0	-2,6	2,9
1500	0,9	0,2	0,0	-2,0	2,0

16_1	16_2	16_3	16_4	16_5
0,3	4,7	0,0	1,2	3,1
-3,2	0,9	0,0	-1,7	-0,7
-3,7	0,6	0,0	-0,7	-1,1
-4,8	-0,1	0,0	2,0	-1,6
-0,7	5,4	0,0	17,3	3,1
-1,1	2,0	0,0	10,5	5,8
-6,3	6,2	0,0	2,7	-1,4
-7,9	6,0	0,0	1,8	-2,9
-3,0	10,8	0,0	5,2	2,5
-7,7	6,2	0,0	2,6	-2,2
-6,9	7,1	0,0	3,2	-2,2
-5,0	8,9	0,0	4,1	0,6

min.	0,8	-1,0	0,0	-3,3	0,2
max.	3,1	0,8	0,0	-1,7	2,9
average	2,1	0,2	0,0	-2,5	1,6
requirements	45 mV				

-7,9	-0,1	0,0	-1,7	-2,9
0,3	10,8	0,0	17,3	5,8
-4,2	4,9	0,0	4,0	0,2
45 mV				

Negatives values means that the voltage drop on the terminal is better than the voltage drop on an equivalent wire.

nb de cycles
1
50
100
150
300
500
750
1000
1200
1300
1400
1500

18_1	18_2	ref wire	18_4	18_5
2,9	3,3	0,0	2,8	2,9
1,3	1,9	0,0	1,7	1,4
1,1	1,7	0,0	1,2	1,4
-1,0	10,0	0,0	-0,7	0,0
-0,7	15,4	0,0	-1,0	0,3
3,6	11,4	0,0	1,3	5,0
15,5	9,8	0,0	0,9	5,6
15,6	10,7	0,0	1,6	5,8
15,8	11,5	0,0	1,1	6,5
16,2	11,7	0,0	1,0	6,5
16,1	11,4	0,0	1,1	7,0
16,0	11,2	0,0	1,0	6,8

20_1	20_2	ref wire	20_4	20_5
-3,3	-4,1	0,0	-5,2	-5,2
-3,9	-4,3	0,0	-5,8	-6,1
-3,2	-4,1	0,0	-5,3	-5,5
-3,5	-4,5	0,0	-5,2	-5,5
-3,4	-4,6	0,0	-5,6	-6,0
-3,5	-3,9	0,0	-5,2	-5,5
-4,2	-4,6	0,0	-5,9	-6,4
-4,0	-4,2	0,0	-5,5	-6,3
-4,5	-4,8	0,0	-6,3	-6,9
-4,2	-4,3	0,0	-6,2	-6,5
-4,6	-4,7	0,0	-6,4	-6,5
-4,2	-4,9	0,0	-5,6	-6,4

min.
max.
average
requirements

-1,0	1,7	0,0	-1,0	0,0
16,2	15,4	0,0	2,8	7,0
8,5	9,2	0,0	1,0	4,1
45 mV				

-4,6	-4,9	0,0	-6,4	-6,9
-3,2	-3,9	0,0	-5,2	-5,2
-3,9	-4,4	0,0	-5,7	-6,1
45 mV				

nb de cycles
1
50
100
150
300
500
750
1000
1200
1300
1400
1500

22_1	22_2	ref wire	22_4	22_5
-0,4	2,2	0,0	0,5	0,3
-0,3	1,6	0,0	0,8	-0,3
-0,4	1,6	0,0	0,3	-0,3
0,6	3,7	0,0	1,7	0,5
-0,4	3,0	0,0	1,0	-1,0
-1,1	2,7	0,0	0,7	-1,2
-0,3	3,8	0,0	0,5	-0,4
-1,1	4,3	0,0	1,2	-0,6
-1,3	4,5	0,0	1,7	-0,5
-1,1	4,7	0,0	2,8	-1,3
0,5	5,0	0,0	1,3	-0,5
-1,1	5,2	0,0	2,2	-0,7

24_1	24_2	ref wire	24_4	24_5
-1,0	0,2	0,0	-1,9	-0,4
-1,3	-0,2	0,0	-2,4	-0,8
-0,7	0,4	0,0	-1,8	-0,6
-1,9	-0,4	0,0	-2,3	-0,8
-1,4	0,0	0,0	-1,8	0,0
-1,7	-0,2	0,0	-2,0	-0,2
-1,3	-0,1	0,0	-1,5	-0,4

min.
max.
average
requirements

-1,3	1,6	0,0	0,3	-1,3
0,6	5,2	0,0	2,8	0,5
-0,5	3,5	0,0	1,2	-0,5
48 mV				

-1,9	-0,4	0,0	-2,4	-0,8
-0,7	0,4	0,0	-1,5	0,0
-1,3	0,0	0,0	-2,0	-0,5
48 mV				

Results : The 10-2 sample didn't meet requirements but remained stable after the 750th cycle.

Group 8 : FlammabilityVisual examination :

No apparent defect observed.

Flammability test :

Flammability test according to EN 3373-001 §5-2-4.

The end of the 25 mm blue flame produced by the Bunsen burner is applied for 20 s to half the length of the specimen insulation. The flame dies out automatically in 2 to 3 seconds. There is no flame after 5 s.



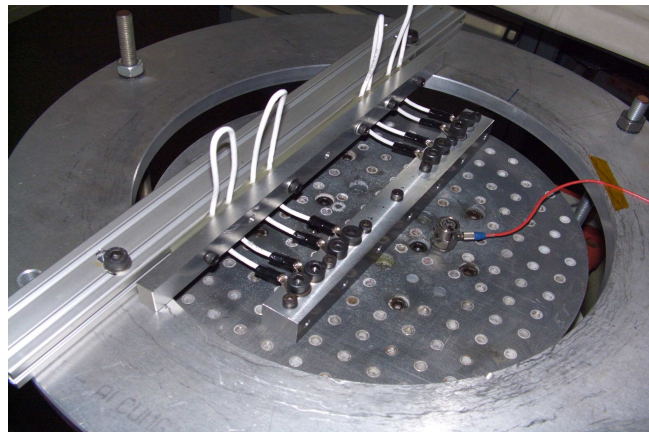
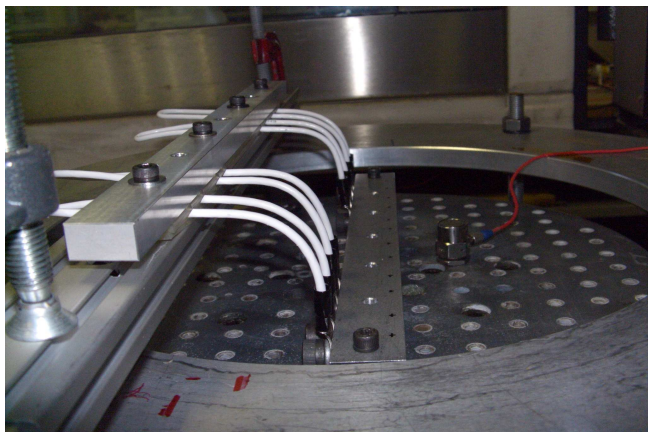
Results : Samples meet requirements.

Group 9 : Vibration

Visual examination : No apparent defect observed.

Vibrations Test definitions : according to EN 2591-403

± 0.35 mm, 10Hz-2500Hz (10g)
3 axes, 120 cycles = 2h/axes



Negatives values means that the voltage drop on the terminal is better than the voltage drop on an equivalent wire.

Before vibrations	After vibrations	requirements
AWG 10 (mV)		33 mV
-3,4	-1,4	
-2,4	11,6	
-1,4	7,6	
-1,4	1,6	
AWG 12 (mV)		39 mV
-1,2	0,0	
-2,2	1,2	
-1,2	-1,9	
-5,2	-4,5	
AWG 14 (mV)		45 mV
-11,5	-11,5	
-10,5	-5,5	
-8,5	-9,5	
-11,5	-10,5	
AWG 16 (mV)		45 mV
-1,3	6,7	
-2,3	2,7	
-2,3	20,7	
2,7	14,7	

Before vibrations	After vibrations	requirements
AWG 18 (mV)		45 mV
-0,3	3,7	
-0,3	12,7	
3,7	18,7	
6,7	29,7	
AWG 20 (mV)		45 mV
-6,4	-3,4	
-5,4	-4,4	
-5,4	-5,4	
-7,4	-4,4	
AWG 22 (mV)		48 mV
-18,8	-3,5	
-13,5	3,5	
-14,4	-0,5	
-14,0	-1,5	
AWG 24 (mV)		48 mV
-2,8	1,5	
-0,9	-0,5	
-1,0	-1,5	
-2,3	-0,5	

Visual examination after vibrations: No sign of fracture.

Results : Samples meet requirements

Group 10 : sleeve strengthVisual examination:

No apparent defect observed.

Sleeve strength test:

The black and white sleeves do not support 35N when they are not crimped. However, all the sleeves hold when they are crimped.
For black and white sleeves the clamping will be improved in the future.

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EQUIPMENTS UNDER TEST: 9 SETS OF 7 CONNECTORS INDUSTRIES**MANUFACTURER:** TYCO ELECTRONICS**CUSTOMER AND NAME ADDRESS:**

Company: TYCO ELECTRONICS
Address: 29 Chaussée Jules César
95301 CERGY PONTOISE
Contact: Mr LAVIEC

TEST DATES: From June, the 5th to June the 19th, 2006**TEST LOCATION:** EMITECH Laboratory at Versailles Satory (France)**TESTER :** C. FAUCHEUR

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1. INTRODUCTION

This report presents the fluids test results, realized 9 sets of 7 Connectors Industries manufactured by TYCO ELECTRONICS company.

2. REFERENCE DOCUMENT

According to the standard : NF EN 2591-315 (September, 1998).

3. EQUIPMENT UNDER TEST DESCRIPTION

The test is realized on the following equipment :

- 9 sets of 7 Connectors Industries without reference.

4. CONCLUSION

It was noted a deposit more or less significant of the fluid concerned on each Connectors Industries.

Remark: The equipment was returned not cleaned so that the customer carries out functional controls.

5. FLUIDS SUSCEPTIBILITY TEST

- **Purpose of test**

The test determines whether the materials used in the construction of the equipment can withstand the deleterious effects of fluid contaminants.

- **Test procedure**

The equipment is not operating during the test and shall be at room ambient.

The equipment is submitted to the cycle described follow with each fluid contaminant :

Fluid reference	CYCLE			Cycles number
	Fluid temperature + time of immersion	Duration of drying at ambient temperature	Temperature of drying (during 16 hours)	
F34	25 °C during 5 minutes	7H	85°C	7
H515	85°C during 15 minutes	7H	100°C	5
LD04	85°C during 15 minutes	7H	100°C	5
O156	120°C during 15 minutes	7H	125°C	5
S742	50°C during 15 minutes	7H	100°C	5
S752	25°C during 15 minutes	7H	25°C	5
FP70	15°C during 15 minutes	7H	25°C	5
G354	70°C during 15 minutes	7H	100°C	5
S759	50°C during 15 minutes	7H	100°C	5

- **Test apparatus**

Meter	Emitech Nr	Category	Mark	Type
2118	07/068	Climatic enclosure	MPC	CD65
2591	07/097	Climatic enclosure	Weiss	300SB
3050	07/118	Climatic enclosure	Climats	264 VRT 65
3720	07/146	Climatic enclosure	SCS	CH

- **Test result**

It was noted a deposit more or less significant of the fluid concerned on each Connectors Industries (see photographs of the appendices).

***** End of report, 9 appendices to be forwarded *****

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APPENDICES 1 TO 9

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Photography of the equipment during tests F34



Photography of the equipment after tests F34

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Photography of the equipment during tests H515



Photography of the equipment after tests H515

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Photography of the equipment during tests LD04



Photography of the equipment after tests LD04

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Photography of the equipment during tests O156



Photography of the equipment after tests O156

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Photography of the equipment during tests S742

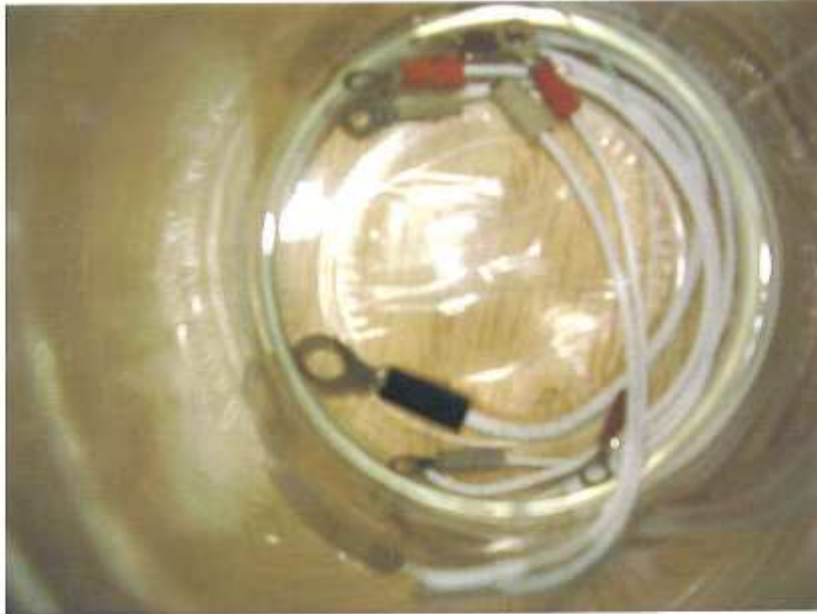


Photography of the equipment after tests S742

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Photography of the equipment during tests S752



Photography of the equipment after tests S752

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Photography of the equipment during tests FP70

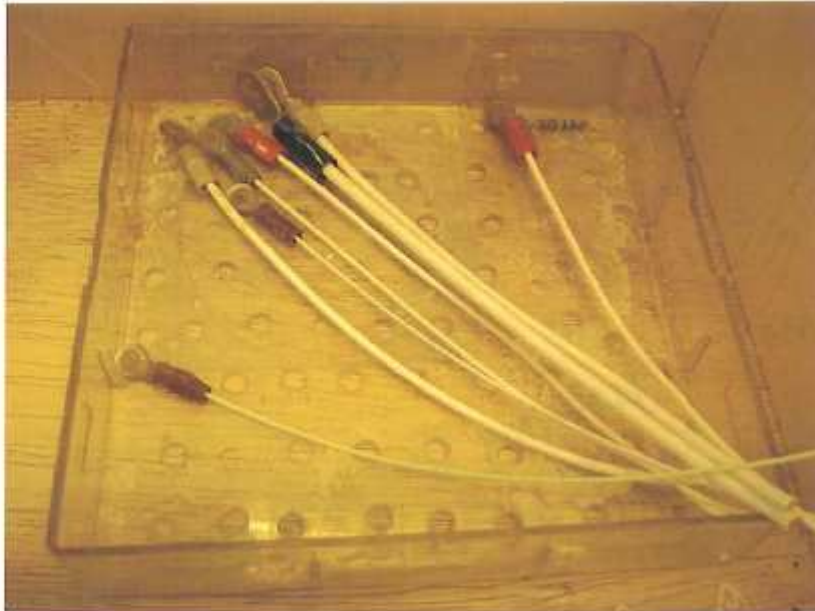


Photography of the equipment after tests FP70

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Photography of the equipment during tests G354



Photography of the equipment after tests G354

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Photography of the equipment during tests S759



Photography of the equipment after tests S759