

This specification defines the general characteristics, the electrical and mechanical performances of the power line protection device on battery leads between the alternator and starter motor.

## 1. PRESENTATION OF PRODUCT

### 1.1. Description

The main function of this product is to ensure power supply and protection against accidental short circuits for the alternator and starter motor power cable.

The fuse terminal consists of three assembled components:

- an insulation frame (support) ensures the rigidity of the fuse,
- a protective housing of the fuse terminal which is integral with the frame and non-removable,
- a conductive part equipped with a fuse area with a low melting point, clamped onto the frame.

This subassembly is at one side crimped onto a wire of battery lead and on the other side attached to battery terminal device by means of 8.5 mm diameter hole (11 mm for the pn 1379907-3 and 1801391-3).

### 1.2. Part numbers

Description	Tyco part number	Type	Components				
			Holder		Cover		Conductive part
			Material	Color	Material	Color	Material
Square elbow	953134-1	Cal1	PPS-GF40-MD25	Brown	PPS-GF40-MD25	Brown	CuZn15, SnPb 40
Straight elbow	953133-1						
Straight elbow barrel bending at -20°	953133-2						
In line bending at +75°	953673-1						
In line bending at -90°	1379570-1						
In line	1379570-2						
In line bending at +90°	1379570-3						
In line bending at -10°	1379570-4						
Square elbow	1379008-1	Cal2	PPS-GF40-MD25	Black	PPS-GF40-MD25	Black	CuZn15,SnPb 40
Straight elbow	953988-1						
Straight elbow barrel bending at -30°	953988-2						
In line bending at +75°	953989-1						
In line bending at +10°	953815-1						
In line bending at +10°	953815-2						
In line bending at -90°	1379442-1						
In line	1379442-2						
In line bending at +90°	1379442-3						
In line bending at -10°	1379442-4						
In line bending at -10° elbow barrel	1379723-1	Cal3	PPS-GF40-MD25	Black	PPS-GF40-MD25	Brown	CuZn15,SnCu 0.7
In line bending at -10°	1801029-1						
In line	1801029-2						
In line bending at +90° battery diameter 11mm	1379907-3						
Straight elbow	1801143-1						
Straight elbow barrel bending at -20°	1801143-2						
In line bending at -24° allow barrel	1801458-2	Cal4	PPS-GF40-MD25	Brown	PPS-GF40-MD25	Black	CuZn15, SnCu 0.7
Dual bolt	1801147-1						
In line bending at +90° battery diameter 11mm	1801391-3	Cal5	PPS-GF40-MD25	Brown	PPS-GF40-MD25	Black	CuSn 0,15 SnCu 0.7

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## 2. SPECIFICATIONS

### 2.1. Specifications for crimping of the fuse terminal subassembly

- Defined in Customer drawing.

### 2.2. Instruction sheet (AMP)

- 411-15598

## 3. GENERAL REQUIREMENTS

### 3.1. Characteristics of crimping wires

The contact can be used with the following conductors :

16 - 25 - 35 - 40 16+10 - 16+25 mm <sup>2</sup>	reduced insulation, class 3	Powerfuse type Cal1
25 - 35 - 40 16+10 - 16+25 mm <sup>2</sup>	reduced insulation, class 3	Powerfuse type Cal2
35 - 40 16+25 mm <sup>2</sup>	reduced insulation, class 3	Powerfuse type Cal3
40 -16+25 mm <sup>2</sup>	reduced insulation, class 3	Powerfuse type Cal4 Cal5

### 3.2. Operating voltage

32 V max.

### 3.3. Rated current (I<sub>r</sub>)

150 A at 23 °C.

### 3.4. Ambient temperature

- -30 °C to +70 °C for Cal1 or Cal2.
- -40 °C to +95 °C for Cal3, Cal 4, Cal 5.

### 3.5. Storage temperature

The storage temperature must be between 5 and 35 °C and the relative humidity must be between 45% and 85%.

## 4. REFERENCE DOCUMENTS

None.

## 5. DEFINITION OF TESTS

All tests are to be conducted using one (1) meter long battery cable with following cross section :

- 25 mm<sup>2</sup> for caliber 1 and caliber 2
- 35 mm<sup>2</sup> for caliber 3
- 40 mm<sup>2</sup> for caliber 4 and caliber 5

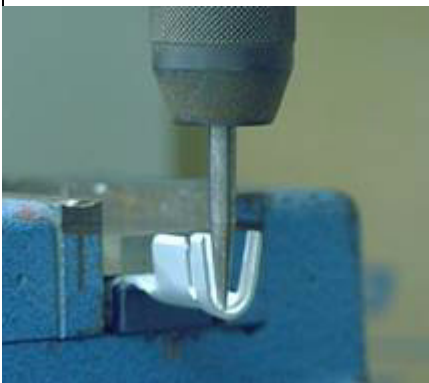
The performance of this product (specially rated current and operating time) is dependent of the test fixture and cable size used.

Special care should be taken that crimped parameters may have a large importance on the product characteristics.

GENERAL EXAMINATION - 5.1			
TESTS	REF.	PROCEDURE	APPROVAL
VISUAL EXAMINATION	5.1	Examination with the naked eye	Aspect : No defect affecting correct operation
ELECTRICAL TESTS - 5.2			
TESTS	REF.	PROCEDURE	APPROVAL
ELECTRICAL RESISTANCE	5.2.1	Measurement of resistance between battery terminal and crimped output at -20°C at +20°C	0.35 mΩ 0.4 mΩ
TIME CURRENT BLOWING CHARACTERISTICS AT 23 °C	5.2.2	Apply the following current and measure the open time	Operating time (in seconds) <u>Powerfuse type Cal1</u> 200% I <sub>r</sub> , 140s<t<335s 350% I <sub>r</sub> , 13s<t<32s 600% I <sub>r</sub> , 1s<t<3,5s 800% I <sub>r</sub> , 0,4s<t<1,1 s <u>Powerfuse type Cal2</u> 200% I <sub>r</sub> , 190s<t<460s 350% I <sub>r</sub> , 21s<t<52s 600% I <sub>r</sub> , 2,6s<t<8s 800% I <sub>r</sub> , 0,8s<t<2,3s <u>Powerfuse type Cal3</u> 200% I <sub>r</sub> , 530s<t<846s 350% I <sub>r</sub> , 35s<t<109s 600% I <sub>r</sub> , 4s<t<11s 800% I <sub>r</sub> , 1,5s<t<4,5 s <u>Powerfuse type Cal4</u> 200% I <sub>r</sub> , 408s<t 350% I <sub>r</sub> , 55,7s<t<150,7s 600% I <sub>r</sub> , 6,5s<t<15s 800% I <sub>r</sub> , 3,5s<t<6s <u>Powerfuse type Cal5</u> 200% I <sub>r</sub> , 2000s<t 350% I <sub>r</sub> , 78s<t<388s 600% I <sub>r</sub> , 15s<t<65s 800% I <sub>r</sub> , 5,5s<t<14,5s

<b>(...) ELECTRICAL TESTS - 5.2</b>			
<b>TESTS</b>	<b>REF.</b>	<b>PROCEDURE</b>	<b>APPROVAL</b>
<b>TIME CURRENT BLOWING CHARACTERISTICS AT 85 °C</b>	5.2.3.1	Apply the following current and measure the open time	Operating time (in seconds) <u>Powerfuse type Cal1</u> 200% Ir, 64s<t<143s 350% Ir, 5s<t<11,4s 600% Ir, 0,5s<t<1,2s 800% Ir, 0,2s<t<0,5s <u>Powerfuse type Cal2</u> 200% Ir, 85s<t<165s 350% Ir, 8s<t<22s 600% Ir, 1s<t<3,5s 800% Ir, 0,4s<t<1,1s
<b>TIME CURRENT BLOWING CHARACTERISTICS AT 115 °C</b>	5.2.3.2	Apply the following current and measure the open time	Operating time (in seconds) <u>Powerfuse type Cal3</u> 200% Ir, 165s<t<435s 350% Ir, 15s<t<31s 600% Ir, 1,2s<t<4,3s 800% Ir, 0,5s<t<1,5 s <u>Powerfuse type Cal4</u> 200% Ir, 250s<t<650s 350% Ir, 19s<t<47s 600% Ir, 4,1s<t<7,3s 800% Ir, 1,2s<t<3,7s <u>Powerfuse type Cal5</u> 200% Ir, 350s<t<750s 350% Ir, 55s<t<115s 600% Ir, 8,5s<t<18,5s 800% Ir, 3,5s<t<6s
<b>CURRENT CYCLING</b>	5.2.4	50.000 cycles as defined below : - Powerfuse type Cal1 with 25 mm <sup>2</sup> wire 351 A for 15 s 0 A for 60 s - Powerfuse type Cal2 with 25 mm <sup>2</sup> wire 401 A for 15 s 0 A for 60 s - Powerfuse type Cal3 with 35 mm <sup>2</sup> wire 450 A for 15 s 0 A for 60 s - Powerfuse type Cal4 with 40 mm <sup>2</sup> wire 470 A for 15 s 0 A for 60 s - Powerfuse type Cal5 with 40 mm <sup>2</sup> wire 500 A for 15 s 0 A for 60 s	No blowing. The electrical resistance and opening time must remain in compliance with § 5.2.1 et 5.2.2

AGEING AND ENDURANCE TESTS - 5.3			
TESTS	REF.	PROCEDURE	APPROVAL
<b>FLUID COMPATIBILITY TEST</b>  - ENGINE OIL (15W40) - OIL FOR MANUAL GEARBOX (80W90) - OIL FOR AUTOMATIC GEARBOX (DEXTRON II D) - POWER STEERING FLUID COOLANT - BRAKE FLUID (RENAULT DOT 4) - ZINC CHLORIDE (50% ZNCL <sub>2</sub> IN WATER) - FUEL TYPE N 45% ISOCTANE, 45% TOLUENE, 7% ETHANOL, 3% METHANOL) - WINDSCREEN WASHER FLUID FOR COLD WEATHER (-20°C) - BATTERY FLUID (35% SULPHURIC ACID)	5.3.1	- 15 s immersion then 24 h at 100°C - 15 s immersion then 24 h at 100°C - 15 s immersion then 24 h at 100°C - 24 h immersion at 118°C - 15 s immersion then 24 h at 23°C - 15 s immersion then 24 h at 23°C - 7 days immersion at 23°C - 24 h immersion at 70°C - 2 h of vapour at 70°C on the two plastic parts, then 240 h at 85°C	No deformation or cracking must be noted.
<b>ENVIRONMENTAL EXPOSURE</b>	5.3.2	5 cycles defined as follows : <b>a/</b> Hold at 23 ± 5°C for 4 h and 60% ± 15% relative humidity. <b>b/</b> Raise the temperature in the chamber to 70 ± 2°C in 0.5 h at relative humidity of 97% ± 2%. <b>c/</b> Hold at 70 ± 2°C for 10 h and relative humidity of 97% ± 2%. <b>d/</b> Decrease the temperature in the chamber to -30 ± 2°C in 2.5 h. <b>e/</b> Hold at -30 ± 2°C for 2 h. <b>f/</b> Raise the temperature in the chamber to 85 ± 5°C in 1.5 h. <b>g/</b> Hold at 85 ± 5°C for 2 h. <b>h/</b> Decrease the temperature in the chamber to 23 ± 5°C in 1.5 h. During periods d to h, the relative humidity is not checked.	No deformation or cracking must be noted. The electrical resistance and opening times must remain in compliance with the specifications.

SPECIFIC TESTS - 5.4			
TESTS	REF.	PROCEDURE	APPROVAL
Vibration	5.4.1	<p>The tests are carried with samples crimped on battery cable 25 mm<sup>2</sup> cross-section and 800 mm long with the other end is attached fixed to a fixed point.</p> <p>The characteristics of the vibrations are as follows:</p> <ul style="list-style-type: none"> <li>-de 10 à 55 Hz <math>\pm 1.5</math>mm</li> <li>-de 55 à 500 Hz acceleration 20 g</li> </ul> <p>Duration: 2 hours on each axis</p>	No deformation or cracking must be noted.
Resistance to incandescent wire test	5.4.2	<p>On 3 cover and 3 holder:</p> <p>Wire temperature of <math>750 \pm 10^{\circ}\text{C}</math></p> <p>Duration of application of wire: 30 s <math>\pm 1</math> s</p>	<p>No flame presence</p> <p>30 seconds after moving the wire away.</p>
MECHANICAL TESTS - 5.5			
TESTS	REF.	PROCEDURE	APPROVAL
Bending strength test on crimping area	5.5.1	<p>Apply a force of 65 N at the end of the crimping barrel and perpendicularly to it.</p> 	No plastic deformation must be noted.