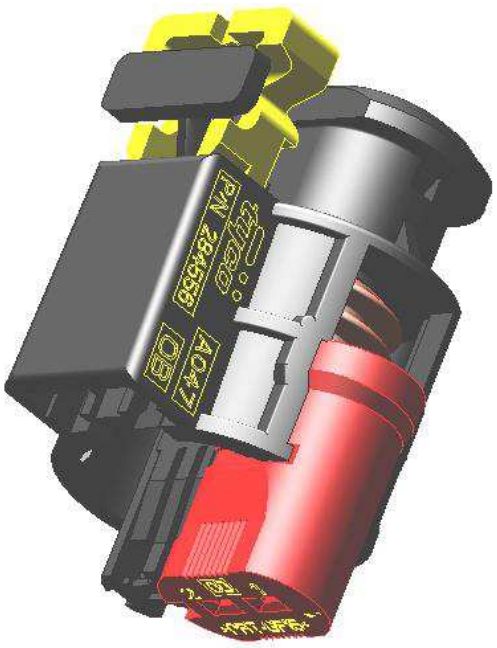
Description

2 & 3 POSITIONS SEALED CONNECTORS FOR SPARK COIL



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0.1 CONTENTS

This specification covers the requirements for product performance, test methods and quality assurance provision for the 2 & 3 POSITION SEALED CONNECTORS FOR SPARK COIL, composed by the parts listed in the following table:

P/N	DESCRIPTION
284556-X	2 POSITION SEALED CONNECTOR
284425-X	3 POSITION SEALED CONNECTOR
929027-1	SENSOR FLAT CONTACT, 1.5 mm SERIES GOLD VERSION
929025-1	SENSOR FLAT CONTACT, 1.5 mm SERIES GOLD VERSION

0.2 APPLICABLE DOCUMENTS

Product drawings have to be considered part of this specification. In case of conflicts between specification and referenced documents, this specification shall take precedence.

0.3 TE SPECIFICATIONS

A. 109-1 Test Specification, General Requirements for Test Methods

0.4 COMMERCIAL STANDARD SPECIFICATIONS

A. Low Voltage Stranded Cables for Automobiles acc. to FIAT Norm. Table N° 91107/15 (T3 Class Lead-Free) and N° 91107/06 (T4 Class).

B. FIAT General Specification for Connectors 9.91320/02

0.5 DESIGN AND CONSTRUCTION

Product shall comply with design, construction and physical dimensions specified in the applicable product drawing

0.6 RATINGS

A. CURRENT RATING:

SENSOR FLAT CONTACT: 11 A max. with 1.5mm^2 wire
10 A max. with 1.0mm^2 wire
9 A max. with 0.75mm^2 wire

B. TEMPERATURE RATING:

-40°C TO +140°C (including the temperature increase due to working current flow) using wire according to FIAT Spec. 91107/06 (T4 Class).

-40°C TO +125°C (including the temperature increase due to working current flow) using wire according to FIAT Spec. 91107/15 (T3 Class).

C: MAXIMUM OPERATING VOLTAGE:

24 Vd.c.; for application at higher voltage please contact TE

0.7 MATERIALS

Component	Material	Finish, for contacts only
Housing	PA 4.6 Glass fiber filled, UL 94HB *(PA 4.6 caricato fibra vetro, UL 94HB)* or PBT Glass fiber filled, UL 94HB *(PBT caricato fibra vetro, UL 94HB)*	
C.P.A.	PA66 Glass fiber filled	
Secondary Lock	PA66 Glass fiber filled	
Polarizator	PA66 Glass fiber filled	
Family seal	Liquid Silicone Rubber (LSR) bi-component	
Coupling seal	Liquid Silicone Rubber (LSR) bi-component	
Contact	Copper alloy	Gold plated in contact area

D. SEALING PERFORMANCES: according to IEC 529, IP54

WARNING!
MINIMUM ACCEPTABLE CABLE INSULATION DIAMETER: 1.7mm, corresponding to 0,75mm^2 min. wire section acc. to FIAT Spec. 91107/15 and 91107/06

0.8 QUALITY ASSURANCE PROVISION

A. Sample preparation

The test samples to be used for the test shall be prepared by random selection from the current production and the contact shall be crimped in accordance with the Appl. Spec. 114-18254-1 and additional Appl. Spec. 114-20116.
No sample shall be reused, unless otherwise specified.

B. Test condition:
All the test shall be performed under any combination of the following test condition, unless otherwise specified:

- Room temperature: 23±5°C
- Relative humidity: 45÷70%
- Atmospheric pressure: 860÷1060 mbar

0.9 TEST REQUIREMENTS AND PROCEDURES

Test Description	Requirements	Procedure
1. PRODUCT EXAMINATION		
1.1 Confirmation of product	-Product shall confirm the requirements of applicable product drawing and application specification	Visually, dimensionally and functionally inspection per applicable quality inspection plan
1.2 Visual examination	-Any visible damage, cracking or defect when the product is new and even after environmental, mechanical and electrical test.	Visual inspection

2. MECHANICAL		
2.1 Single contact engaging force	Ist insertion: ≤12.0N	Operation speed: 50mm/min.
2.2 Single contact separating force	Ist extraction: ≤8.0N Xth extraction: ≥ 4.0N	Operation speed: 50mm/min.
2.3 Connector mating force	2 ways: ≤40N 3 ways: ≤50N	With corresponding counterpart (assembled) with an operating speed of 50mm/min.
2.4. Connector unmating force	2 ways: ≤40N 3 ways: ≤50N	With corresponding counterpart (assembled) with an operating speed of 50mm/min.
2.5 Contact insertion force in housing (crimp contacts)	20N max	Insert contact into the cavity with an operating speed of 25 mm/min. The housing has to be mounted on a self aligning platform.
2.6 Contact extraction force from housing (crimp contacts)	-With primary locking: 70N min. -With secondary locking included: 100N min.	Pulling wires axially with an operating speed of 50mm/min. max.
2.8 Front seal retention force	- Retention force ≥ 30N	Pull front gasket with proper fixture at a speed of 25 to 100mm/min

2.9 Mechanical retention of the connector.	. No connector disengagement (total or partial) - No contact extraction - No electrical discontinuity - No damage to the retention device	Connector fully loaded mated with the corresponding header counterpart (wire bundle fixed to the shell. by a tie) Operating speed: 50 mm/min. Apply an axial pull-off load of 100N to the cable bundle in all directions of a 90° cone.
2.10 Polarization effectiveness	- No electrical contact - No mechanical engagement with a force > 100N	Assembled connectors must withstand without mating the counterpart with the incorrect orientation
2.11 Retention of secondary lock	- No detachment from housing with a pulling force ≥ 20N	Pull secondary lock applying a force parallel to its operating direction
2.12A Operating force of secondary lock (all contacts properly inserted) 2.12B Operating force of secondary lock (one or more contacts not properly inserted)	- Operating force ≤ 30N - Operating force ≥ 70N	Apply increasing load parallel to the operating direction and measure force to actuate
2.13 Retention of CPA	- No detachment from housing with pulling force ≤ 30N - No movement or breaking from pre-locking position with pushing force ≤ 40N	Pull CPA applying a force parallel to its operating direction
2.14 Operating force of CPA 2.14A Operating force of CPA with mated connector 2.14B Operating force to open CPA with mated connector	 - Operating force < 30N - Operating force < 20N	 Apply increasing load parallel to the operating direction and measure force to actuate
2.15 Mating load with secondary lock not properly closed	- Operating force > 100N	Apply increasing force in the closing direction and measure the closing force
2.16 Durability	- As requested by the Table 1	10 mating / unmating operations
2.17 Vibration test (vibration under temperature-engine compartment)	- No electrical discontinuity (Rc> 100Ω) greater than 1µs shall occur during the vibration - Voltage drop within 50% increase of limits specified for new contacts - No breakages, damages, deformations.	Contacts crimped on cable acc. to FIAT Spec. 91107/06 (T4 Class) Vibration(sinus): 70Hz…296Hz ➔0.17mm 296Hz…1000Hz ➔ 30mm 1000Hz… 2000Hz ➔ 20mm Diagram see figure 1 Recourse to 3 directions Duration: 100h for each direction Overlay of temperature: 50% at room temperature and 50% at 120°C. Wire bundle fixed at a distance of 100mm from connectors.

3. ELECTRICAL		
3.1 Voltage drop	- ≤4mV/A - wire size: 2.5mm^2 - new contacts - after ten insertion/extraction	Between a point of the wire at 1cm from the conn. edge, both sides, at the nominal current for each wire size. (Termination resistance is obtained after subtraction of the resistance of wire used for termination). For the wire current rating see § 0.6-A
3.2 Dielectric strength	Neither creeping discharge nor flashover shall occur	≥ 1000Vac for 1 minute. Test between adjacent circuits of mated connectors
3.3 Insulation resistance	10 MΩ min.	Applied voltage: 500Vdc between one contact and the others short circuited.
3.4 High temperature resistance with current load	-Temperature increase: ≤ 45°C after first cycle -Temperature increase: ≤ 50°C after 5 cycles (Thermocouple placed on transition between contact body and wire barrel) -Voltage drop within limits indicated for new contacts -No damaging	Rated current applied to all 3 conn. posit. 5 temperature cycles composed of: -5 hours in oven at 80 +/- 2°C without air ventilation, with rated current according to wire size -2 hours in freezing cell at - 30°C, without current
3.5 Current overload	Temperature rise increase: ≤ 70°C (thermocouple placed on transition between contact body and wire barrel) -Voltage drop within 50% increase of limits indicated for new contacts - No damaging	On one pair of mated contacts without housing: Test current 1.5 times nominal current (see par. 0.6) -Duration 500 cycles composed of: 45 min current ON 15 min current OFF

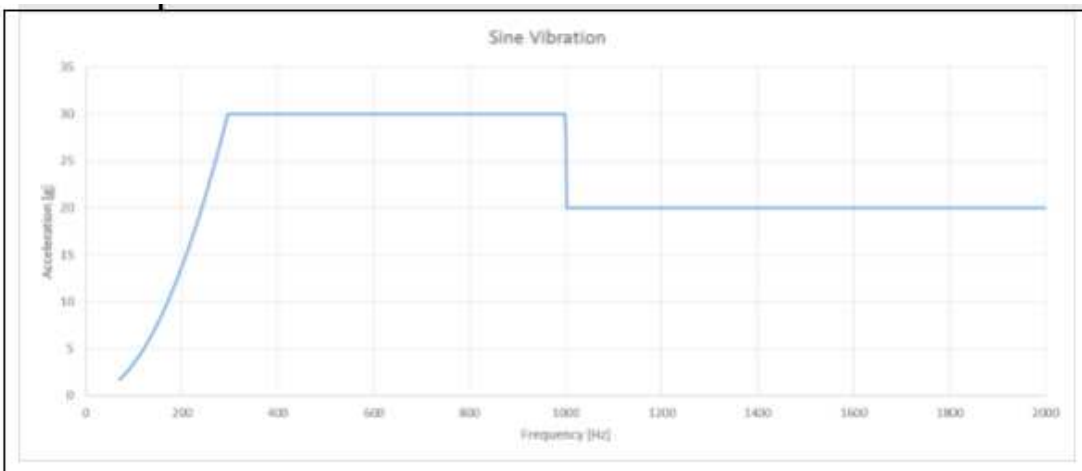
4.0 ENVIRONMENTAL		
4.1 Accelerated ageing	-No deformation or cracking of the plastic parts (color change allowed) -Voltage drop: ≤specified limits for new contacts increased of 50% -Insulation resistance and dielectric strength within indicated limits -Perform additional cumulative tests as specified in Table 1 -Mechanical performances within limits specified for new parts with 50% max. acceptable variation	On mated connectors submitted to the following cumulative tests: A- 5 cycles (with therm. shock) composed of: -2 hrs at 140°C ± 2°C -2 hrs –40°C± 2°C B- 5 cycles (without shock, gradient ≤ 5°C) composed of: -2 hrs at 140°C ± 2°C -2 hrs at +40°C ± 2°C and 90-95% r.h. -2 hrs –40°C± 2°C C- 200 hrs at 140°C Contacts crimped on cable acc. to FIAT Spec. 91107/06 (T4 Class)
4.2 Resistance to splashing water	- Insulation resistance and Dielectric strength must be according to the specified limits. - No presence of water must be detected inside the connectors, after unmating.	Test according to IEC 529 Samples (mated connectors) conditioned at ageing temperature (par 4.1) must be tested using equipment as shown in fig. 2 Duration: 4hrs
4.3 Resistance to low temperature	- No breakage of parts detected	Keep mated sample to -40°C for 2 hours, move to 0°C in a time of 3 minutes max and let stabilize, then unmate and re-mate the connectors 1 time.
4.4 Salt spray corrosion test	-Voltage drop: ≤ specified limits for new contacts increased of 100%	-150 hours of salt mist at 35°C± 2°C, 5% of NaCl, pH 6.5-7.2 class 2 (mated connectors)
4.5 Kesternich corrosion	-Voltage drop: ≤ specified limits for new contacts increased of 100%	4 cycles composed of: -8 hrs of exposure to an atmosphere with 0.66% of SO_2 at +40°C ± 2°C (method acc. to DIN 50118) -16 hours in free air (mated connectors)
4.6 Resistance to fluids	- No damages, deformations, cracks, breakages found on the parts. - Contact retention in housing, connector mating / unmating forces according to the specified limits.	Test complete, mated connectors with 3 min. of immersion in the following fluids (not cumulative test, use different samples for each fluid): - Gasoline at 23° +/- 5°C - Cleaning agent at 23° +/- 5°C - Brake fluid at 50° +/- 5°C - Anti-freeze mixture at 23° +/- 5°C - ASTM1 oil/engine oil at 100° +/- 3°C - Leadless engine fuel at 23° +/- 5°C - Transmission fluid at 100° +/- 3°C
4.7 Resistance to dust (according to IEC 529, level 5)	- Voltage drop and insulation resistance according to the specified limits. - Minor traces of dust allowed inside the connectors after unmating.	Test the mated connectors, assembled and Mounted. Test characteristics: - Duration 30 min. - Ambient temperature from 15 to 35°C - Density of dust 2 Kg/m^3 (4,5 Kg of Portland cement)

TABLE I

PRODUCT QUALIFICATION TEST SEQUENCE

TEST GROUPS

ITEM	DESCRIPTION	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Visual examination	1 7	1 9	1 5	1 4	1 5	1 5	1 5	1 8	1 10	1 5	1 3	1 5	1 6	1 7	1 5
2.1	Single contact insert force	2														
2.2	Single contact sep. Force	4 6														
2.3	Connector mating force		4							5				3		
2.4	Connector unmating force		6							7				4		
2.5	Contact ins. force (in hsg)		2							3						
2.6	Cont. ext. force (from hsg)		8							9				5		
2.8	Retention of front seal			3												
2.9	Retention of connector				3						4					
2.10	Polarization effectiveness			4												
2.11	Retention of sec. Lock		7							8						
2.12	Oper. force of sec lock		3							4						
2.13	Retention of C.P.A.			2												
2.14	Operating force of C.P.A.		5							6						
2.15	Mating load w. SL not properly closed				2						3					
2.16	Durability	5														
2.17	Vibration test					3										
3.1	Voltage drop	3				2 4	2 4	2 4					2 4		2 5	2 4
3.2	Dielectric strength								2 6							
3.3	Insulation resistance								3 7						3 6	
3.4	High temp. resist. (in oven)						3									
3.5	Current over-load							3								
4.1	Accelerated ageing								4	2	2					
4.2	Splashing water								5							
4.3	Resist. to low temperature											2				
4.4	Salt spray corrosion												3			
4.5	Kesternick corrosion															3
4.6	Resistance to fluids													2		
4.7	Resistance to dust														4	

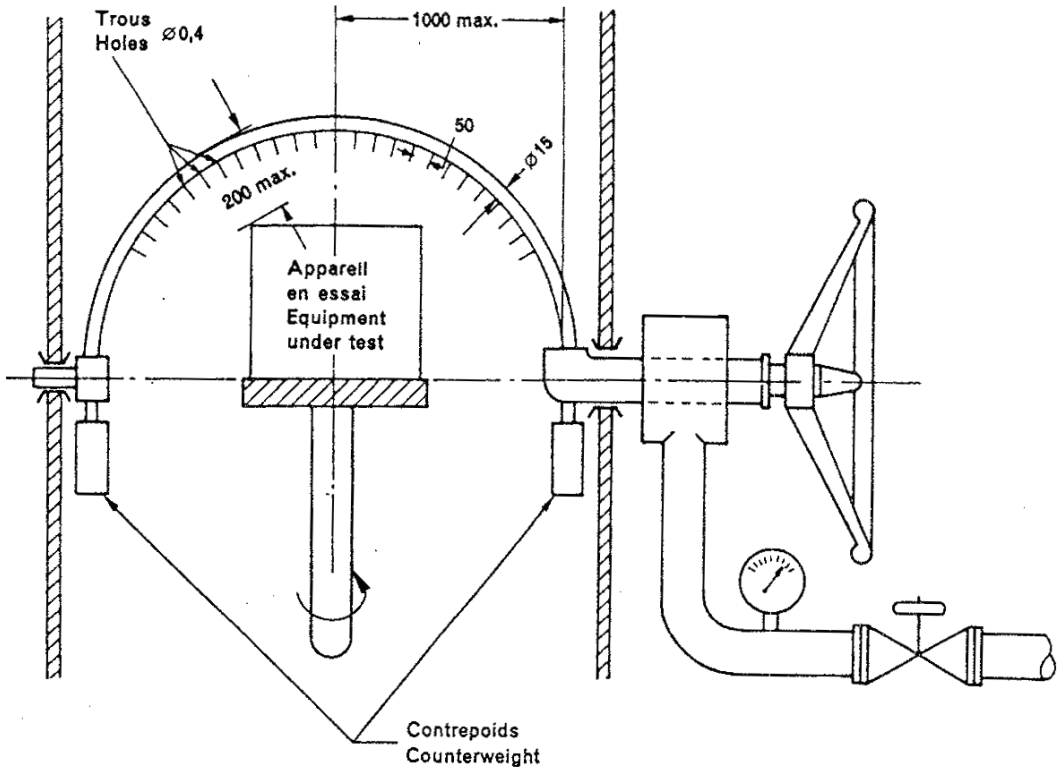


[Hz]	[mm]
70	0,17
296	0,17
[Hz]	[m/s2]
296	30
1000	30
1000	20
2000	20

1 oct/ min 100hrs for axis

Temperature cycle
50 hrs at +25°C and 50 hrs at +120°C

Fig. 1 – Vibration test diagram



Dimensions en millimètres *Dimensions in millimetres*

Appareil pour la vérification de la protection contre l'eau tombant en pluie et contre les projections d'eau.
Equipment to prove protection against spraying and splashing water.

Fig. 2 – Splashing water equipment