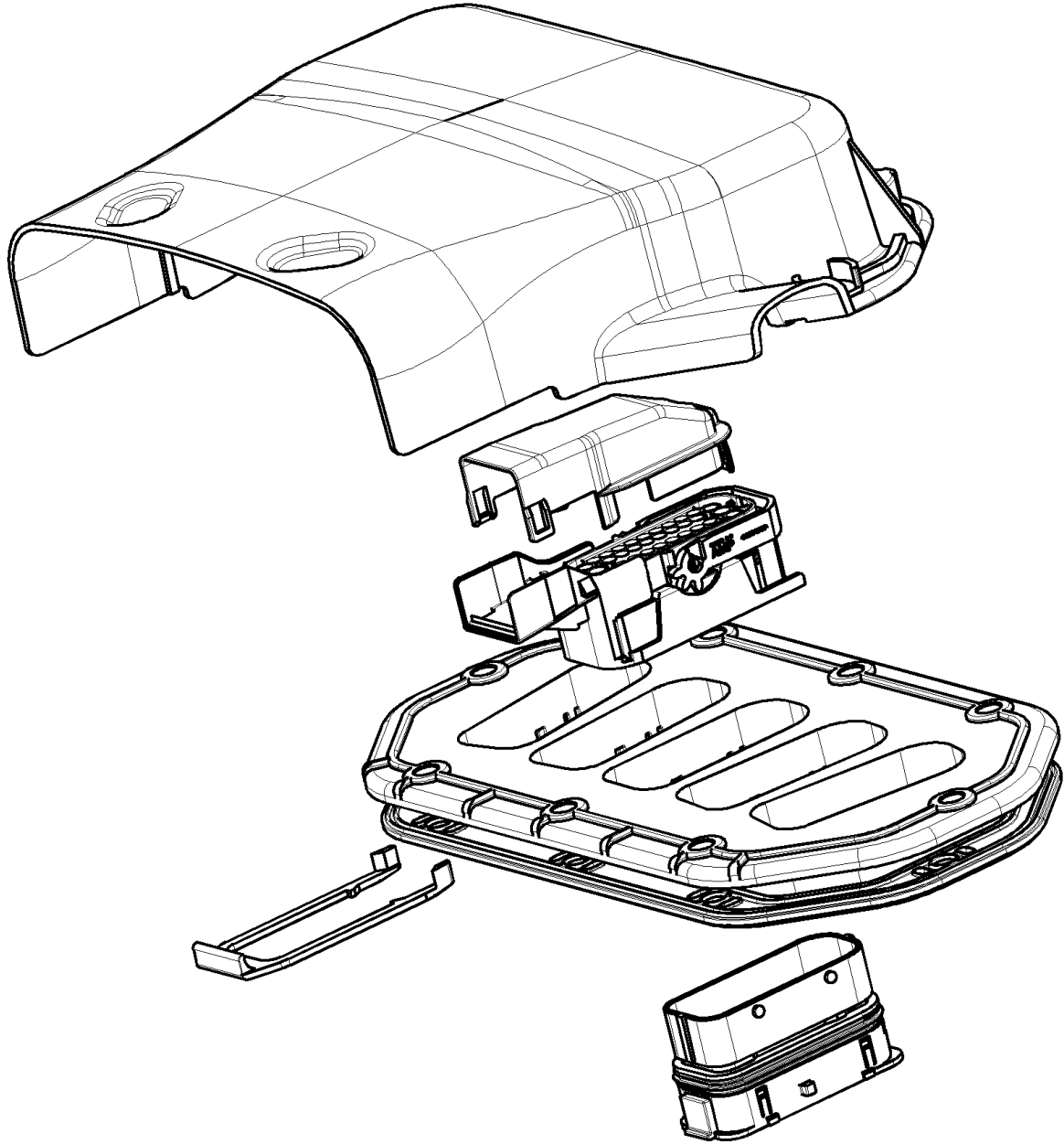


**NEW BULKHEAD CONN. FOR TRUCKS
(HEAVY CLASS)**



Rev. A3	Updated terminal P/N in table	V. NAIK	K T. GOPI	18MAR2019
Rev. A2	Updated P/N's table	M. POLIZZI	O. CANUTO	6APR2005
Rev. A1	Released for Prod.(et00-266-01)	C. PIA	O. CANUTO	26NOV2001
Rev. A0	DRAFT	O. CANUTO	A. GENTA	JUNE 00

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0.1 CONTENTS

This specification covers the requirements for product performance, test methods and quality assurance provision for the New Bulk-head connectors for Heavy Class Truck version, composed by the parts listed in the following table:

PN's	DESCRIPTION
284366-1 to -5	40 Pos. male connector assembly
284259-1	Blanking device for empty Plate cavities
284362-1 to -5	40 Pos. female connect. Assembly
1745047-1	Blanking device for male connector
284581-1	Support Plate with gasket
284371-1	Cover for support Plate
284352-1	Retainer
929963-1	2.5 dia male contact, unsealed, 0.5-1.0 mm²
929964-1	2.5 dia male contact, unsealed, >1.0-2.5 mm²
929965-1	2.5 dia male contact, unsealed, >2.5 -4.0 mm²
929974-1	2.5 dia socket contact (wire seal) 0.5-1.0 mm²
929975-1	2.5 dia socket contact (wire seal) >1.0-2.5 mm²
281934-2-3-4	Single wire seal
282081-1	Cavity plug
929993-2	2.5 dia socket cont (wire seal) >2.5-4.0 mm²
828985-1	Single wire seal
828986-1	Cavity plug

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. 109-5000 Test Specification, General Requirements for Test Methods

0.4 COMMERCIAL STANDARD SPECIFICATIONS

- A. Low Voltage Stranded Cables for Automobiles acc. to FIAT Normation Table N° 91107/03
- 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 RATINGS:

- 2.5 DIA SYSTEM: 28 A max with 4.0mm² wire (on 6 adjacent contacts max)
- 14 A max. with 1.5mm² wire
- 11 A max. with 1.0mm² wire
- 6 A max. with 0.75mm² wire
- 5 A max. with 0.5mm² wire

Current rating per wire section a.m. are according to Fiat spec. 91107/03

- B. TEMPERATURE RATING: -40°C TO +125°C (including the temperature increasing due to working current flow)

- B. MAXIMUM OPERATING VOLTAGE: 24Vd.c. For application at higher voltage please contact TE

0.7 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 Application Spec. #114-18020.

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: $23\pm 5^{\circ}\text{C}$

Relative humidity: $45\div 70\%$

Atmospheric pressure: $860\div 1060\text{mbar}$

0.8 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 REQUIREMENTS		
2.1 Connector mating force	40 ways: $\leq 120\text{N}$	With corresponding counterpart (assembled), moving the lever with an operation speed of 50mm/min.
2.2. Connector unmating force	40 ways: $\leq 80\text{N}$	With corresponding counterpart, all assembled, moving the lever with an operation speed of 50mm/min.
2.3 Contact insertion force in housing (crimp contacts)	15N max	Insert contact into the cavity with operating speed 25mm/min. The housing has to be mounted on a self aligning platform.
2.4 Contact extraction force from housing (crimp contacts)	-With primary locking: 70N min. -With secondary locking included: 90N min.	Pulling wires axially with an operating speed of 25-50mm/min
2.5 Kojiri test.	-Housing completely loaded - No electrical interruption	Apply a load to the cable bundle of 100N in every direction of a cone over the connector wire exit plane. Clamp on the counterpart. Operation speed: 25-50mm/min.
2.6 Polarization effectiveness	200N min. per 60s	Assembled connectors must withstand the specified axial load without mating the counterpart with the incorrect polarization.
2.7A Operating force of secondary lock (all contacts properly inserted)	- Operating force $\leq 60\text{N}$	Apply increasing load parallel to the operating direction and measure force to actuate
2.7B Operating force of secondary lock (one or more contacts not properly inserted)	- Operating force $\geq 120\text{N}$	

2.8 Durability	- As requested by Table 1	10 mating /unmating operations
Test Description	Requirements	Procedure
2.9 Random vibration test	-No electrical discontinuity greater than 1 micro sec. shall occur -Voltage drop within limits indicated for new contacts	Duration: 30h on the direction of mating axis. Wires bundle fixed at 20cm Test current: 1mA Acceleration: 2g (x, y axis) 3g (z axis) Frequency: 10-80-10Hz Displacement: 3mm On mated connector with the counterpart
3. ELECTRICAL REQUIREMENTS		
3.1 Voltage drop	$\leq 4\text{mV/A}$	Between a point of the wire at 1cm from the conn. edge, both sides (see Fig.2), at the nominal current for each wire size. (Termination resistance is obtained after subtraction of the resistance of wire used for termination). Wire current rating: see Para. 0.6
3.2 Dielectric strength	Neither creeping discharge nor flashover shall occur	$\geq 1000\text{Vac}$ for 1 minute. Test between adjacent circuits of mated connectors
3.3 Insulation resistance	10M Ω min.	Applied voltage: 500Vdc between one contact and the others short circuited.
3.4 High temperature resistance with current load	-Temperature increase: $\leq 45^{\circ}\text{C}$ after first cycle -Temperature increase: $\leq 50^{\circ}\text{C}$ after 8 cycles (Thermocouple placed on transition between contact body and wire barrel) -Voltage drop within limits indicated for new contacts -No damaging	Test performed on n.2 pairs of mated connectors inserted in position A and C of Support Plate. Connector cavities load and test current shown in Table 2. Duration: 8 cycles as shown in Figure 1.

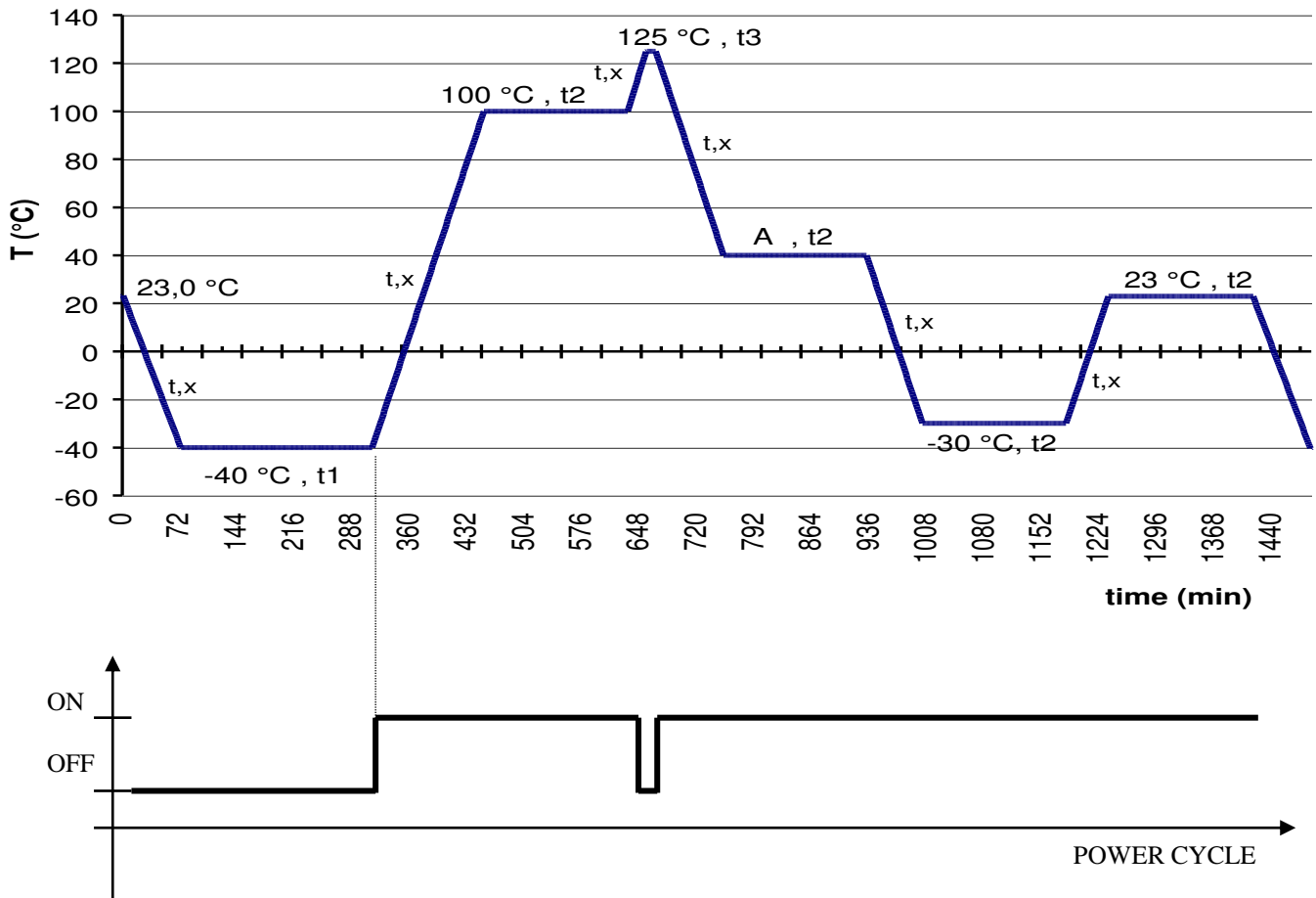
3.5 Current overload	<p>Temperature rise increase: $\leq 70^{\circ}\text{C}$ (thermocouple placed on transition between contact body and wire barrel)</p> <p>-Voltage drop within 50% increase of limits indicated for new contacts -No damaging</p>	<p>On one pair of mated contacts without housing: Test current 1.5 times nominal current (see par. 0.6)</p> <p>-Duration 500 cycles composed of: 45min current ON 15min current OFF</p>
Test Description	Requirements	Procedure
4.0 ENVIRONMENTAL REQUIREMENTS		
4.1 Accelerated ageing	<p>-No deformation or cracking of the plastic parts (color change allowed) -Voltage drop: \leqspecified limits for new contacts increased of 50% -Insulation resistance and dielectric strength within indicated limits</p> <p>-Perform additional cumulative tests as specified in Table 1 -Mechanical performances within limits specified for new parts with 50% max acceptable variation</p>	<p>On mated connectors submitted to the following cumulative tests: A- 5 cycles composed of: -2 hrs at $125^{\circ}\text{C} \pm 2^{\circ}\text{C}$ -2 hrs $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ B- 5 cycles composed of: -2 hrs at $125^{\circ}\text{C} \pm 2^{\circ}\text{C}$ -2 hrs at $+40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and 90-95% r.h. -2 hrs $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ C- 200 hrs at 125°C</p>
4.2 Resistance to rain test	<p>- Insulation resistance and Dielectric strength must be according to the specified limits. - No presence of water must be detected inside the connectors, after unmating.</p>	<p>According to IEC 529 (IP X4), test condition 8.4. Test performed on support plate fully loaded with mated connectors and without support plate cover. Test duration: 20min.</p>
4.3 Resistance to water spray	<p>- Insulation resistance and Dielectric strength must be according to the specified limits. - No presence of water must be detected inside the connectors, after unmating.</p>	<p>According to IEC 529 (IP X5), test condition 8.5. Test performed on support plate fully loaded with mated connectors. The cover for support plate shall be mounted. Test characteristics: -Nozzle internal diameter 6.3mm -Capacity $12.5 \text{ dm}^3/\text{min} \pm 5\%$ -Water pressure on the nozzle $30 \times 10^3 \text{ Pa}$ -Test duration 30 min -Nozzle to sample distance: 3m</p>
4.4 Resistance to dynamic immersion	<p>- Insulation resistance and Dielectric strength must be according to the specified limits. - No presence of water must be detected inside the connectors, after unmating.</p>	<p>Test according to IEC 529 Samples (mated connectors) must be immersed and maintained under 10cm of water. During immersion pull cables with 1.5-2.5N load for 100,000 lateral movements at max frequency of 50 cycles /min, as shown in Fig.3</p>
4.5 Resistance to low temperature	<p>- No breakage of parts detected</p>	<p>Keep mated sample to -40°C for 2 hours, move to 0°C in a time of 3 min max and let stabilize, then unmate and remate the connectors 1 time.</p>

4.6 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)
Test Description	Requirements	Procedure
4.7 Kesternich corrosion	-Voltage drop: ≤ of specified limit 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)
4.8 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 - Break 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
4.9 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. Test characteristics: - Duration 30 min. - Ambient temperature from 15 to 35° C - Density of dust 2 Kg / m ³ (4,5Kg of Portland cement)

TABLE I
PRODUCT QUALIFICATION TEST SEQUENCE
TEST GROUPS

ITEM	DESCRIPTION	A	B	C	D	E	F	G	H	I	L	M	N	O
1	Visual examination	1,7	1,7	1,5	1.5	1.5	1, 6, 17	1, 3	1, 11	1,5	1,5	1,9	1, 7	1,7
2.1	Connector mating force		2				11					2,6		
2.2	Connector unmating force		3				12					3,7		
2.3	Contact ins. force (in hsg)	2	4				13							
2.4	Cont. ext. force (from hsg)	6	5				14					4,8		
2.5	Kojiri test	4												
2.6	Polarization effectiveness						15							
2.7	Oper. force of sec lock		6				16							
2.8	Durability						10							
2.9	Random vibration test			3										
3.1	Voltage drop	3,5		2,4	2.4	2.4	2,7			2,4	2,4		2.5	
3.2	Dielectric strength						3,8		2,6, 9					2,5
3.3	Insulation resistance						4,9		3,7, 10				3,6	3,6
3.4	High temp.resist. (in oven)				3									
3.5	Current over-load					3								
4.1	Accelerated ageing						5		4					
4.2	Resistance to rain test								5					
4.3	Resistance to water spray								8					
4.4	Dynamic immersion													4
4.5	Resist. to low temperature							2						
4.6	Salt spray corrosion									3				
4.7	Kesternich corrosion										3			
4.8	Resistance to fluids											5		
4.9	Resistance to dust												4	

**FIGURE 1
1 CYCLE**



Parameters:

A= 40°C with 90-95% of Relative Humidity.

t 1 = 3 h

t 2 = 3 h

t 3 = 10 min

t,x = 1°C/min of temperature increment

Test current:

Table 1	
Test current (A)	Connector ways no.
16	39 – 40
6	12 - 28 – 29 – 30 – 31 – 32 – 33
1	ALL OTHER WAYS

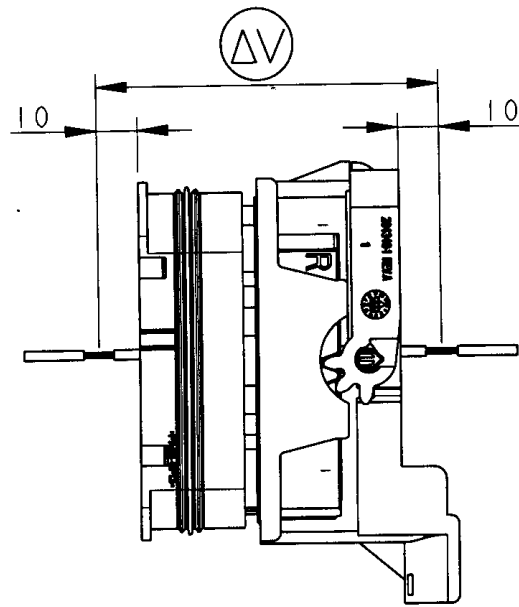


Fig. 2 -Voltage drop measuring points

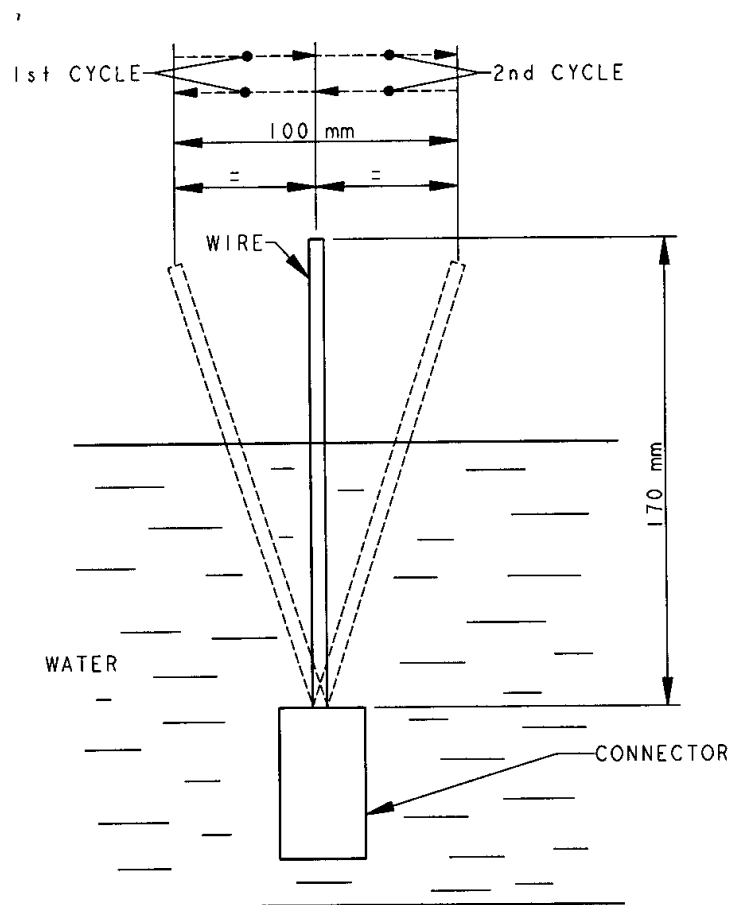


Fig. 3- Dynamic immersion test