

WSD 2366 Issue 1

# Automotive 150°C Rated ACW4 Series Sensor Cable Specification

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## 1 Scope

This specification covers the requirements for a range of 150°C rated cables using a radiation crosslinked, extruded, modified polymer insulation system, designed using the ISO 14572 Specification as a basis with additional requirements for process verification defined herein.

The detail requirements of the individual products within the range are defined on the Specification Control Drawing (SCD). Where a difference occurs between this document and the SCD, the SCD shall take precedence.

## 2 Related Documents

Reference is made in this document to the following specification:

ISO 6722-1:2011(E) Fourth Edition 2011-10-01	Road vehicles – 60V and 600V single core cables – Dimensions, test methods and requirements.
ISO 14572:2011(E) Third Edition 2011-10-01	Road vehicles – Round, screened and unscreened 60 V and 600 V multi-core sheathed cables – Test methods and requirements for basic and high-performance cables.

## 3 Quality Assurance Provisions

The tests detailed in section 5 are to be carried out at the frequencies described below. Where appropriate, individual test frequencies may be modified through the use of statistically derived data.

### 3.1 Quality Assurance

The supplier shall provide reasonable access to facilities for quality audit and control purposes on customer request.

### 3.2 Test Frequency

Tests are divided into three frequency categories. These are routine, lot/batch, and qualification tests.

#### 3.2.1 Routine Tests (100%)

Performed on 100% of the production length.

#### 3.2.2 Lot/Batch Tests (Lot)

Performed on each production batch. A batch is any quantity of material manufactured on a substantially continuous basis, under conditions that are presumed uniform.

#### 3.2.3 Qualification Tests (Q)

These are performed:

- i) Prior to first shipment of a new product.
- ii) Whenever any significant change is made to the materials or manufacturing process.

## 4 Cable Constructions and Materials

### 4.1 General

The material defined by this specification is a low tension stranded cable, insulated conductor for dedicated service temperature. The cable shall meet the requirements of section 5 & 6 of this specification.

### 4.2 Component Wires

The cables use component wires that meet the requirements of the SCD.

### 4.3 Wrap

For cable constructions using a wrapped component bundle, the tape shall be as specified on the SCD.

### 4.4 Jacket Insulation

The cable is jacketed using a material that meets the requirements defined in this specification and the SCD.

## 5 Tests and Test Methods

### 5.1 Cable Dimensions (Lot)

The maximum outside diameter of the cable shall be determined by taking measurements at three points along the length separated by at least 100 mm and recording the greatest overall diameter at each point. The single measured values shall be within the minimum and maximum specified values on the SCD.

### 5.2 Circularity (Lot)

Method: per SCD.  
Requirement: per SCD.

### 5.3 Beam Verification (Lot)

Verification will be achieved by a Quality Control check of the beam stamp on the MS and then endorsing this by stamping the appropriate acceptance box on the Quality Control test report.

### 5.4 Jacket Strip Force (Lot)

Method: ISO 6722 clause 5.8 (Except using a pull speed of 50mm/min).  
Requirement: per SCD.

### 5.5 Insulation Fault Testing (100%)

All cables and component wires shall be tested along 100% of their length, to ensure the electrical integrity of the insulation.

Test Voltage for component against component - 1.5kV<sub>eff</sub> for 5 seconds.

### 5.6 Long Term Heat Ageing - 3000 Hours @ 150 °C (Q)

Method: ISO 14572 clause 5.13.  
Requirement: There shall be no cracks and no voltage breakdown.

**5.7 Accelerated Heat Ageing - 500 Hours @ 175°C (Q)**

Method: ISO 14572 clause 5.13. (Except 500hours @ 175°C).

Requirement: There shall be no cracks and no voltage breakdown.

**5.8 Short Term Heat Ageing - 240 Hours @ 175°C (Q)**

Method: ISO 14572 clause 5.14.

Requirement: There shall be no cracks and no voltage breakdown.

**5.9 Cold Bend (Q)**

Method: ISO 14572 clause 5.10.

Requirement: There shall be no cracks and no voltage breakdown.

**5.10 Resistance To Flame Propagation (Q)**

Method: ISO 14572 clause 5.21.

Requirement: The afterburn time shall not exceed 70 seconds.

**5.11 Scrape Abrasion (Q)**

Method: ISO 6722:2011(E) clause 5.12. (Except sample preparation should be as follows – Take a 1m length of cable sample. Remove 100mm of sheath from each end of the cable and 25mm of insulation from each core. Twist stripped ends of the cores together).

Requirement: Total number of cycles to abrade through the insulation shall exceed 1000 cycles.

### 5.12 Fluid Resistance (Q)

Method: ISO 6722:2011(E) clause 5.17.3.

The test shall consist of two different fluid groups in accordance with table 15 of ISO 6722-1:2011(E), Group 1 with a heat ageing period of 1000h at the actual cable class temperature (150°C) and group 2 with a heat ageing period of 240h at actual class temperature (150°C). Individual test samples, 600mm long with 25mm of the insulation removed from each end are to be immersed in the fluids listed below for a 10 second period. Following immersion the samples are removed and allowed to drain for 3 minutes before being stored in an oven. For group 1 fluids the immersing in the respective fluid shall be repeated at 240, 480 and 720 hours of the 1000 hour test.

Requirement: After winding, no conductor shall be visible. During the withstand voltage test, breakdown shall not occur.

Group	Test Fluid	Specification
1	Engine coolant	50 % ethylene glycol + 50 % distilled water
	Engine oil	ISO 1817, Oil No 2
	Salt water (road)	5 % NaCl , 95 % water (mass %)
	Windscreen washer fluid	50 % Iso-propanol, 50 % water
2	Gasoline	ISO 1817, liquid C
	Diesel	90 % ISO 1817, Oil No 3 + 10 % p-xylene
	Ethanol	85 % Ethanol + 15 % ISO 1817 liquid C
	Power steering fluid	ISO 1817, Oil No 3
	Auto. Transmission fluid	Dexron VI
	Brake fluid	SAE RM-66-06
	Battery acid	25 % H <sub>2</sub> SO <sub>4</sub> and 75 % H <sub>2</sub> O, density 1.28

### 5.13 Voltage Withstand (Q)

Method: ISO 14572:2011(E) Clause 5.5.

Requirement: Breakdown shall not occur between cores.

### 5.14 Thermal Overload (Q)

Method: ISO 14572:2011(E) Clause 5.15.

Requirement: Breakdown shall not occur between cores.

## Revision History

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