WSD 1776 Issue 3

Automotive 150°C Rated ACW7219-2.00 and AWC7219-8.00 Wire Specification

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TE connectivity AUTOMOTIVE

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1 SCOPE

This specification covers the requirements for 150°C rated Automotive Composite Wire (ACW). The detailed 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. This specification has been based on the Ford specification WSK-1A348-A4.

2 RELATED DOCUMENTS

Reference is made in this document to the following specifications:

Ford WSK-1A348-A4 03/06/03	Primary Low Tension Cable 150°C
ISO 6722:2002(E) First edition 2002-04-15	Road vehicles – 60V and 600V single core cables – Dimensions test methods and requirements

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 Conductors

4.1.1 Copper Conductors

Strands shall be clean, bright and free from surface irregularities. Constructions shall show no kinks, joints or other irregularities in the completed conductor. They shall comply with section 5 and the SCD.

4.2 Wire Insulation

The insulation system shall meet the requirements of section 5 of this specification. It shall be extruded to cover the conductor uniformly and be homogeneous, smooth and free from flaws. The insulation shall not be loose, but be capable of stripping cleanly without damage to the conductor.

4.2.1 Wire Marking

The insulation shall be capable of identification by application of marks onto the standard base colours. The marks shall be as specified on the SCD. The colours shall be defined as in Table 1.

Table 1

Reference Number	Colour	Reference Number	Colour
1	Brown	7	Violet
2	Red	8	Grey
2L	Pink	9	White
3	Orange	0	Black
4	Yellow		
5	Green		
6	Blue		

5 TESTS AND TEST METHODS

5.1 Tests Taken From WSK-1A348-A4

Clause	Frequency	Method	Definition	Test Requirements
5.1.1	Lot	-	Wall thickness	See SCD
5.1.2	Lot	-	Wire diameter	See SCD
5.1.3	Lot	-	Conductor diameter	See SCD
5.1.4	Lot	WSK-1A348-A4 clause 3.10.1	Conductor resistance	See SCD
5.1.5	100%	WSK-1A348-A4 clause 3.10.4	Spark testing	No breakdown
5.1.6	Q	WSK-1A348-A4 clause 3.10.2	30 Minute withstand voltage	No breakdown
5.1.7	Q	WSK-1A348-A4 clause 3.10.5	Insulation volume resistivity	$>10^9$ Ωmm
5.1.8	Q	WSK-1A348-A4 clause 3.11.1	Pressure at high temperature	No breakdown
5.1.9	Q	WSK-1A348-A4 clause 3.11.2	Low temperature winding (–40°C)	No cracks, No breakdown
5.1.10	Q	WSK-1A348-A4 clause 3.11.3	Low temperature impact	No cracks, No breakdown
5.1.11	Q	WSK-1A348-A4 clause 3.11.4	Abrasion resistance ≤6mm² (Representative)	As per Table 2
5.1.12	Q	WSK-1A348-A4 clause 3.11.5	Short term heat ageing (Any colour)	No cracks, No breakdown
5.1.13	Q	WSK-1A348-A4 clause 3.11.6	Long term heat ageing (Any colour)	No cracks, No breakdown
5.1.14	Q	WSK-1A348-A4 clause 3.11.7	Thermal overload (Any colour)	No cracks, No breakdown
5.1.15	Q	WSK-1A348-A4 clause 3.11.8	Shrinkage by heat	<2 mm either end

Clause	Frequency	Method	Definition	Test Requirements
5.1.16	Q	WSK-1A348-A4 clause 3.11.10b	Flexibility >3.0mm²	As per Table 3
5.1.17	Q	WSK-1A348-A4 clause 3.11.11	Dynamic cold bend 6.0mm² (Representative)	Max. Resistance as per SCD, No cracks, No breakdown
5.1.18	Q	WSK-1A348-A4 clause 3.11.12	Notching resistance ≤6.0mm² (Representative)	As per Table 4
5.1.19	Q	WSK-1A348-A4 clause 3.11.13	Resistance to flame propagation	Self extinguish within 70s, >50mm unburnt at top
5.1.20	Q	WSK-1A348-A4 clause 3.11.15	Hydrolysis test	$>10^9$ Ωmm, No cracks, No breakdown
5.1.21	Q	WSK-1A348-A4 clause 3.12	Compatibility tests 4.0mm² (Representative)	No cracks, No breakdown
5.1.22	Q	WSK-1A348-A4 clause 3.13	PVC Compatibility test 4.0mm² (Representative)	No cracks, No breakdown
5.1.23	Q	WSK-1A348-A4 clause 3.14	Environmental cycling 4.0mm² (Representative)	No cracks, No breakdown
5.1.24	Q	WSK-1A348-A4 clause 3.15	Resistance to ozone 0.75mm² (Representative)	No cracks
5.1.25	Q	WSK-1A348-A4 clause 3.16	Mycological 0.75mm² (Representative)	No mould growth, No cracks

5.2 Additional Tests

Clause	Frequency	Method	Definition	Test Requirements
5.2.1	Lot	-	Bond test	Cut a 25 mm (minimum) strip in the insulation and check for any delamination of the core and PJ layers by trying to peel the layers apart. There shall be no delamination of the layers.
5.2.2	Lot	-	1x mandrel wrap	A length of finished wire shall be wound around a mandrel having a diameter equal to the diameter of the wire for a minimum of 5 turns. The winding shall be performed at a rate of approximately 1 wrap per second and tension applied by hand sufficient to ensure contact with the mandrel. Each successive wrap shall be touching the previous wrap. The sample shall then be removed from the mandrel and placed in a dye indicator (Acetone + 0.1% Methyl Violet), then examined for cracks and pinholes in the PJ without the aid of magnification. The core shall not be exposed through the PJ.

Table 2

Wire Size (mm²)	Number of Cycles (minimum)	Applied Vertical Loads (N)
2.00	1500	7
8.00	1500	7

Table 3

Wire Size (mm²)	Flexibility maximum (N)
2.00	13.00

Table 4

Wire Size (mm²)	Flexibility maximum	
	Against reel set (N)	With reel set (N)
4.00	6.00	4.00
6.00	8.00	6.00
8.00	15.00	13.00
10.00	20.00	18.00

Table 5

Wire size	2.00	6.00 mm²
Notching force (min.)	60N	120N

6 REVISION HISTORY

Issue No.	Amendment No.	CR No.	Date	Incorporated By
1	-	CR05-DP-241	May 2005	Guy Mundy
2	-	CR12-DP-040	November 2012	Keith Carter
3	-	CR15-DP-170	December 2015	Colin May

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Electronic Sign Off – No Signatures will appear

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