

WSD 2339 Issue 1 Revision B
Automotive 200°C T6 Rated 55E0219
Wire Specification
July 2021



AUTOMOTIVE

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1 SCOPE

This specification covers the requirements for the 55E0219 range of wire using a radiation crosslinked, extruded, modified fluoropolymer insulation system, designed using the Ford ES-AU5T-1A348-AA and Volkswagen/Audi VW 603 06 specifications 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 SCD. Where a difference occurs between this document and the SCD, the SCD shall take precedence.

2 DEFINITIONS

The following terms are used within this specification:

SCD	Tyco Electronics Specification Control Drawing
MS	Manufacturing Specification

3 RELATED DOCUMENTS

Unless otherwise stated the documents referenced below are to the issue in effect.

ES-AU5T-1A348-AA Rev. D	Ford Global Wire specification
Tyco Electronics 55A	Wire and Cable, Electric, Radiation Crosslinked, Extruded, Modified, Fluoropolymer Insulated Copper or Copper Alloy Specification
BS 3G 230	Specification for general requirements for aircraft electrical cables (second series)
ISO 6722 First Edition 2002-04-15	Road vehicles – 60V and 600V single core cables – Dimensions, test methods and requirements
ISO 6722-1 Fourth Edition 2011-10-15	Road vehicles – 60V and 600V single core cables – Dimensions, test methods and requirements
Mil Std 681	Identification Coding and Application of Hook-up and Lead Wire

4 CONSTRUCTION

4.1 General

The wires shall meet the requirements of the SCD and the additional requirements of this specification.

4.2 Conductors

The conductor shall comply with the requirements of the SCD and the type of conductor used for each product defined on the MS.

4.3 Wire Insulation

The insulation system shall meet the requirements of section 6 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.

4.3.1 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: Colour numbering system

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 QUALITY ASSURANCE PROVISIONS

The tests detailed in section 6 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.

5.1 Routine Tests (100%)

Performed on 100% of the production length.

5.2 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.

5.3 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.

5.4 Vendor Approved (V)

Tests on bought-in components which are performed by an approved vendor.

6 TESTS

6.1 Conductor tests

Clause	Frequency	Method	Definition	Test Requirements
6.1.1	V	-	Construction	See SCD
6.1.2	V	ISO 6722-1 clause 5.3	Diameter	See SCD

6.2 Process verification

Clause	Frequency	Method	Definition	Test Requirements
6.2.1	100%	Specification 55A	Insulation flaws, impulse dielectric test	8 kV peak
6.2.2	Lot	Specification 55A	Accelerated ageing	300± 3°C, 1 hour, weights and mandrels as per Table 2. Voltage test: 2.5 kV for 5 mins. No breakdown.

Table 2: Weights and mandrels for ageing test

Conductor size (mm²)	Mandrel Diameter (mm ± 3%)	Weight (kg ± 3%)
1.50	19.0	0.34
1.00	13.0	0.23
0.75	13.0	0.23
0.50	13.0	0.23

6.3 Finished wire tests

Clause	Frequency	Method	Definition	Test Requirements
6.3.1	Lot	ISO 6722-1 clause 5.4	Conductor resistance	See SCD
6.3.2	Lot	ISO 6722-1 clause 5.2	Insulation thickness	See SCD
6.3.3	Lot	ISO 6722-1 clause 5.1	Outside cable diameter	See SCD
6.3.4	Lot	BS 3G230 test 5	Concentricity	70% minimum
6.3.5	Lot	BS 3G230 test 44	Insulation tensile strength/elongation at break (50 mm/min)	TS 30 MPa minimum, EB 50% minimum

6.4 Qualification tests

Clause	Frequency	Method	Definition	Test Requirements
6.4.1	Q	ISO 6722-1 clause 5.7	Insulation volume resistivity	$\geq 10^9 \Omega\text{mm}$
6.4.2	Q	ISO 6722-1 clause 5.5 (5.5.3.2)	Withstand voltage, 30 minutes	30 mins at 1 kV then ramp up to 5 kV, No breakdown.
6.4.3	Q	ISO 6722-1 clause 5.20	Resistance to hot water	Insulation volume resistivity $\geq 10^9 \Omega\text{mm}$. No cracks. No breakdown
6.4.4	Q	ISO 6722-1 clause 5.10	Low temperature winding	No breakdown
6.4.5	Q	ISO 6722-1 clause 5.11	Low temperature impact	No conductor visible. No breakdown
6.4.6	Q	ISO 6722-1 clause 5.12 (5.12.4.1)	Sandpaper abrasion resistance	Minimum requirements in ISO 6722, table 10.
6.4.7	Q	ISO 6722-1 clause 5.8	Pressure test at high temperature. Test to be conducted on 0.50 & 1.50mm ²	No breakdown
6.4.8	Q	ISO 6722-1 clause 5.14	Short term heat ageing, 240 hr	No conductor visible. No breakdown.
6.4.9	Q	ISO 6722-1 clause 5.13	Long term heat ageing 3000 hr	No conductor visible. No breakdown.
6.4.10	Q	ISO 6722-1 clause 5.15	Thermal overload	No conductor visible. No breakdown.
6.4.11	Q	ISO 6722-1 clause 5.16	Shrinkage by heat (230°C/1hr, length 100 mm)	2mm either end.
6.4.12	Q	ES-AU5T-1A348-AA clause 3.11.11	Notching resistance	Notching force minimum 0.50mm ² = 40N 0.75mm ² = 50N 1.00mm ² = 50N 1.50mm ² = 60N
6.4.13	Q	ES-AU5T-1A348-AA clause 3.11.10	Column strength	0.50 mm ² minimum force 15 N
6.4.14	Q	ISO 6722-1 clause 5.22	Resistance to flame propagation	Self extinguish within 70s, >50mm unburnt at top

Clause	Frequency	Method	Definition	Test Requirements
6.4.15	Q	ES-AU5T-1A348-AA Rev D, clause 3.12	Resistance to chemicals	Notch resistance should be >20% of values taken of comparable virgin samples.
6.4.16	Q	ISO 6722-1 clause 5.21	Temperature and humidity cycling	No conductor visible. No breakdown.
6.4.17	Q	ISO 6722 (2002) clause 11.3	Resistance to ozone	No cracks
6.4.18	Q	-	Individual stripe width	10% of circumference minimum
6.4.19	Q	-	Total stripe area coverage	30% maximum (addition of both stripes)

7 REVISION HISTORY

Issue No.	Amendment No.	CR No.	Date	Incorporated By
1	-	-	January 2013	Keith Carter
2	-	CR21-DP-040	July 2021	Steve Camburn

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