WSD1254 Issue 4 Revision B

# Automotive 200°C T6 Rated 55E0119/0111/0211 Wire Specification

July 2021

AUTOMOTIVE

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## 1 SCOPE

This specification covers the requirements for a range of wire using a radiation crosslinked, extruded, modified fluoropolymer insulation system, designed using the Volkswagen/Audi Specification VW 603 06 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.

| | |
|---|---|
| VW 603 06<br>Issue 09/1990 | Volkswagen/Audi, Single core, unscreened low voltage Insulated Cable |
| 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) |
| Tyco Electronics 55PC | Process Controlled Wire and Cable, Radiation Crosslinked, Extruded, Modified ETFE Insulated Specification |
| ISO 6722:2006(E) Second Edition 2006-08-01 | 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 Insulation

The insulation shall consist of an extruded, modified irradiated fluoropolymer meeting the requirements of this specification. The type of insulation material used shall be defined on the MS.

## 4.4 Colour Coding

The colour coding of the wire may be single coloured or bi-coloured by striping as defined by the customer order.

# 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.

For Qualification Approval, 0.5, 1.0 and 6.0 mm² products will be tested as representative of the whole product range as specified on the SCD.

## 5.4 Vendor Approved (V)

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

# 6 TESTS

US manufactured 55E products will be Lot tested to Tyco Electronics Specification 55PC.

## 6.1 Conductor tests

| Clause | Frequency | Method | Definition | Test Requirements |
|---|---|---|---|---|
| 6.1.1 | V | - | Construction | See SCD |
| 6.1.2 | V | - | 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 1. Voltage test: 2.5 kV for 5 mins. No breakdown. |

**Weights and mandrels for ageing test**

| Conductor size ($mm^2$) | Mandrel Diameters (mm ± 3%) | Weight (kg ± 3%) |
|---|---|---|
| 6.00 | 51.0 | 0.68 |
| 4.00 | 51.0 | 0.68 |
| 3.00 | 38.1 | 0.68 |
| 2.50 | 38.1 | 0.68 |
| 2.00 | 25.4 | 0.45 |
| 1.50 | 19.0 | 0.34 |
| 1.00 | 13.0 | 0.23 |
| 0.75 | 13.0 | 0.23 |
| 0.60 | 13.0 | 0.23 |
| 0.50 | 13.0 | 0.23 |
| 0.35 | 13.0 | 0.17 |

**Table 1**

### 6.3 Finished wire tests

| Clause | Frequency | Method | Definition | Test Requirements |
|---|---|---|---|---|
| 6.3.1 | Lot | BS 3G230 test 12 | Conductor resistance | See SCD |
| 6.3.2 | Lot | BS 3G230 test 5 | Wall thickness | See SCD |
| 6.3.3 | Lot | BS 3G230 test 6 | 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 | 30 MPa minimum at 50 mm/min |
| 6.3.6 | Lot | BS 3G230 test 44 | Insulation Elongation | 50% minimum at 50 mm/min |

### 6.4 Qualification tests

| Clause | Frequency | Method | Definition | Test Requirements |
|---|---|---|---|---|
| 6.4.1 | Q | BS 3G230 test 17 | Insulation resistance at 20 ±2°C | 500 MΩ for 1km minimum |
| 6.4.2 | Q | ISO 6722 cl. 6.2 | Voltage Withstand | 30 mins at 1 kV then ramp up to 5 kV, No breakdown. |
| 6.4.3 | Q | ISO 6722 cl. 10.4 | Shrinkage at 230°C for 1 hour | 4% maximum, length 30 cm |
| 6.4.4 | Q | ISO 6722 cl. 12 | Flammability | 30 seconds flame exposure time or until conductor becomes visible <5 seconds afterburn |
| 6.4.5 | Q | VW 60306 sec. 4.6 | Thermal Overload at 255°C for 48 hours | 2kV, 1 minute, No breakdown |
| 6.4.6 | Q | VW 60306 sec. 4.7 | Cold Winding, -40°C after ageing at 255°C for 48 hours | 2kV, 1 minute, No breakdown |
| 6.4.7 | Q | VW 60306 sec. 4.10 | Resistance to Operating Fluids | 4% maximum swell: 2 kV, 5 minutes, No breakdown |
| 6.4.8 | Q | VW 60306 sec. 1.4.1 | Individual stripe width | 10% of circumference minimum |
| 6.4.9 | Q | VW 60306 sec. 1.4.1 | Total stripe area coverage | 30% maximum (addition of both stripes) |

# 7 REVISION HISTORY

| Issue No. | Amendment No. | CR No. | Date | Incorporated By |
|---|---|---|---|---|
| 1 | - | - | October 1999 | Guy Mundy |
| 2 | - | CR00-DP-0292 | June 2000 | Guy Mundy |
| 3 | - | CR08-DP-097 | March 2008 | Guy Mundy |
| 4 | - | CR12-DP-040 | January 2013 | Keith Carter |
| 4B | - | CR21-DP-040 | July 2021 | Steve Camburn |

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Electronic Sign Off – No Signatures will appear

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