



**RK-6716 Revision 3**

**Raychem brand Moulded Components  
Semi-Rigid Polyolefin (-15)**

**SCOPE**

**This Quality Assurance Specification establishes the quality standard for moulded components manufactured from cross-linked, electrically-insulating, semi-rigid polyolefin material whose dimensions will reduce to a predetermined size upon the application of heat.**

**Approved Signatories\***

**Tyco Electronics :**

**Approved electronically via DMTech**

**\* This document is electronically reviewed and approved - therefore no signatures will appear.**

## 1. REVISION HISTORY

Revision Number	Change Request	Date	Incorporated By
2	CR08-DM-015	February 2008	Paul Dixon
3	CR10-DM-009	3 August 2010	Paul Dixon

## 2. REQUIREMENTS

### 2.1 Composition, Appearance and Colour

The moulded components shall be homogeneous and essentially free from pinholes, bubbles, flaws, cracks and inclusions. The colour shall be black.

### 2.2 Dimensions

Dimensions shall be as specified in the relevant SCD.

### 2.3 Test Requirements

The moulded components and material from which they are made shall meet the requirements contained in Table 1.

## 3. TEST METHODS

### 3.1 Preparation of Test Specimens

Unless otherwise specified, tests shall be carried out on a moulded test sheet of the material 150 mm x 150 mm x  $2.0 \pm 0.3$  mm or on a moulded component of suitable size. For tests on the recovered moulded component, the component shall be recovered by conditioning in an oven at  $150 \pm 3^\circ\text{C}$  for 10 mins and allowed to cool in air to ambient temperature. No pre-conditioning period is required prior to testing. Unless otherwise specified, all tests shall be made under standard ambient conditions according to IEC 60212 (1971). In cases of dispute the tests shall be carried out at a temperature of  $23 \pm 2^\circ\text{C}$  and at  $50 \pm 5\%$  relative humidity.

### 3.2 Tensile Strength and Ultimate Elongation

The test method shall be as specified in ISO 37  
Five Type 2 dumb-bell specimens cut from the moulded test sheet shall be tested.  
Initial jaw separation shall be 50 mm and rate of jaw separation shall be  $100 \pm 10$  mm per minute. The test shall be carried out at a temperature of  $23 \pm 2^\circ$ .

### 3.3 Secant Modulus at 2% Strain

The test method shall be as specified in Method A of ASTM D882.  
Five strip specimens 20 mm x 150 mm cut from the moulded test sheet shall be tested. Initial jaw separation shall be 100 mm and rate of jaw separation  $10 \pm 1$  mm per minute.  
The test shall be carried out at a temperature of  $23 \pm 2^\circ\text{C}$ .

**TEST METHODS (Cont'd)****3.4 Specific Gravity**

The test method shall be as specified in Method A of ISO 1183.

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**3.5 Heat Shock**

The test method shall be as specified in ASTM D2671.

Five strip specimens 6 mm x 150 mm cut from the moulded test sheet shall be tested. The specimens shall be conditioned in a fan assisted air circulating oven as specified in Table 1.

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**3.6 Low Temperature Flexibility**

The test method shall be as specified in ASTM D2671.

The ends of five strip specimens 6 mm x 150 mm cut from the moulded test sheet shall be inserted 25 mm into the grips of a bending device (comprising two parallel grips 65 mm apart) securely holding the specimens in a loop position. The specimens and bending device shall be conditioned as specified in Table 1. While still at the low temperature, the grips shall be moved to a position 25 mm apart in less than two seconds.

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**3.7 Electric Strength**

The test method shall be as specified in IEC 60243 (Short time test).

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**3.8 Water Absorption**

The test method shall be as specified in Method 1 of ISO 62.

Three disc specimens of diameter  $25 \pm 1$  mm shall be tested.

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**3.9 Fluid Resistance**

The test method shall be as specified in ISO 1817.

Five tensile test specimens prepared as in Clause 3.2 shall be completely immersed in each of the fluids for the times and temperatures specified in Table 1. The volume of the fluid shall not be less than 20 times that of the specimen. After immersion, lightly wipe the specimens and allow to air dry at  $23 \pm 2^\circ\text{C}$  for  $1\text{h} \pm 15\text{m}$ . The Tensile Strength and Ultimate Elongation of each specimen shall be tested according to Clause 3.2. The test shall be repeated on the remaining specified fluids.

**4. RELATED STANDARDS & issue (cont)**

ASTM D882-10	Standard Test Methods for Tensile Properties of Thin Plastic Sheeting
ASTM D2671-09	Standard Test Methods for Heat-Shrinkable Tubing for Electrical Use
IEC 60212: 1971	Standard Conditions for Use Prior to and During Testing of Solid Electrical Insulating Materials
IEC 60243-1: 1998	Electrical Strength Of Insulating Materials - Test Methods - Tests At Power Frequencies
ISO 37: 2005	Rubber, vulcanized or thermoplastic - Determination of Tensile Stress-Strain Properties
ISO 62: 2008	Determination of Water Absorption
ISO 188: 2007	Rubber, vulcanized - Accelerated Ageing or Heat Resistance Tests.
ISO 1183-1: 2004	Plastics - Methods For Determining The Density Of Non-Cellular Plastics - Part 1: Immersion Method, Liquid Pyknometer Method And Titration Method
ISO 1817: 2005	Rubber, vulcanized - Determination of the effect of liquids

**Subsequent amendments to, or revisions of, any of the above publications apply to this standard only when incorporated in it by updating or revision.**

**5. SAMPLING**

Tests shall be carried out on a sample of material taken at random from each batch of moulding compound. A batch of moulding compound is defined as that quantity of moulding compound manufactured at any one time. Testing frequency shall be Production Routine or Qualification. Production Routine tests consisting of Visual Examination, Dimensions, Tensile Strength and Ultimate Elongation, shall be carried out on every batch of moulding compound. Qualification tests shall be carried out to the requirements of the Design Authority.

**6. PACKAGING**

Packaging shall be in accordance with good commercial practice. Each package shall bear an identification label showing quantity, part number and batch number.

TABLE 1 Test Requirements

Test	Test Method	Test Requirements
Visual Examination	-	As per Clause 2.1
Dimensions	ASTM D2671	As per -15 SCD
Tensile Strength	ISO 37	10 MPa minimum
Ultimate Elongation	ISO 37	250 % minimum
Secant Modulus at 2% Strain	ASTM D882	70 - 170 MPa
Specific Gravity	ISO 1183	1.4 maximum
Heat Shock (4h ± 15m at 150 ± 5°C)	ASTM D2671	No dripping, cracking or flowing
Heat Ageing (A) (168 ± 2h at 120 ± 3°C)	ISO 188	
- Tensile Strength	ISO 37	8 MPa minimum
- Ultimate Elongation		200 % minimum
Low Temperature Flexibility (4h ± 15m at -40 ± 2°C)	ASTM D2671	No cracking
Electric Strength	IEC 60243-1	8 MV/m minimum
Water Absorption (24 ± 2h immersion at 23 ± 2°C)	ISO 62	0.5 % maximum
Fluid Resistance (24 ± 2h immersion at 23 ± 2°C)	ISO 1817	
• ISO1817 liquid B		
• Water		
- Tensile Strength		8 MPa minimum
- Ultimate Elongation	ISO 37	200% minimum

**In line with a policy of continual product development, Tyco reserves the right to make changes in construction, materials and dimensions without further notice. You are advised, therefore, to contact Tyco Electronics, should it be necessary to ensure that this document is the latest issue.**