



SPECIFICATION 108-120044

Formerly Raychem RW-2059 CGPT SLEEVING

CGPT is a flexible, general purpose, heat shrinkable, flame-retarded sleeving.

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1. SCOPE

This specification establishes the quality standard for CGPT sleeving. CGPT is a flexible, general purpose, polyolefin-based, heat shrinkable, flame-retarded sleeving and is available in either 2:1 or 3:1 expansion ratio format.

Continuous operating temperature: -40 °C to + 135°C.

2. REVISION HISTORY

As RW-2059

Revision number	Change request	Date	Incorporated By
0	Formerly RK6085 (rev. 6)		
1	CRF T1020 CR98-DM0078	27 August 1997 3 July 1998	C. Woosnam L. Abrams
2	CR02-DM-0156	1 August 2002	L. Abrams
3	Via DMTEC	10 March 2014	C. Diss

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A	Via PDM link	May 2019	M. Bakare
B	Via PDM link	April 2020	M. Bakare

3. RELATED DOCUMENTS

This specification takes precedence over documents referenced herein. Unless otherwise specified, the latest issue of referenced documents applies. The following documents form a part of this specification to the extent specified herein.

ASTM D2671	Standard Test Methods for Heat Shrinkable Sleeving for Electrical Use
IEC 60212	Standard Conditions for Use Prior to and During Testing of Solid Electrical Insulating Materials
IEC 60243-1	Methods of Test for Electric Strength of Solid Insulating Materials part1 Tests at Power Frequencies
ISO 37	Rubber, vulcanized or thermoplastic – Determination of Tensile Stress-Strain Properties
ISO 62	Determination of Water Absorption
ISO 188	Rubber, vulcanized – Accelerated Ageing or Heat Resistance Tests
ISO 1183	Methods for determining the density and relative density of non-cellular plastics
ISO 1817	Rubber, vulcanized – Determination of the effect of liquids



4. REQUIREMENTS

4.1 Composition, Appearance and Colour

The sleeving shall be fabricated from thermally stabilised, modified polyolefin jacket and be crosslinked by irradiation. It shall be homogeneous and essentially free from flaws, defects, pinholes, bubbles, seams, cracks, and contaminants. The jacket shall be black.

4.2 Dimensions

SIZE	MINIMUM INSIDE DIAMETER AS SUPPLIED (MM)	MAXIMUM INSIDE DIAMETER AFTER RECOVERY (MM)	WALL THICKNESS AFTER RECOVERY (MM)
2:1 sizes			
1.2/0.6	1.2	0.6	0.45 ± 0.12
1.6/0.8	1.6	0.8	0.45 ± 0.12
2.4/1.2	2.4	1.2	0.50 ± 0.12
3.2/1.6	3.2	1.6	0.50 ± 0.12
4.8/2.4	4.8	2.4	0.50 ± 0.12
6.4/3.2	6.4	3.2	0.65 ± 0.15
9.5/4.8	9.5	4.8	0.65 ± 0.15
12.7/6.4	12.7	6.4	0.65 ± 0.15
19/9.5	19.0	9.5	0.75 ± 0.15
25.4/12.7	25.4	12.7	0.90 ± 0.20
32/16	32.0	16.0	0.95 ± 0.20
38/19	38.0	19.0	1.00 ± 0.20
51/26	51.0	26.0	1.15 ± 0.25
76/38	76.0	38.0	1.25 ± 0.25
102/51	102.0	51.0	1.40 ± 0.30



SIZE	MINIMUM INSIDE DIAMETER AS SUPPLIED (MM)	MAXIMUM INSIDE DIAMETER AFTER RECOVERY (MM)	WALL THICKNESS AFTER RECOVERY (MM)
3:1 sizes			
1.5/0.5	1.5	0.5	0.45 ± 0.12
3/1	3.0	1.0	0.55 ± 0.12
6/2	6.0	2.0	0.65 ± 0.12
9/3	9.0	3.0	0.75 ± 0.15
12/4	12.0	4.0	0.75 ± 0.15
18/6	18.0	6.0	0.85 ± 0.15
24/8	24.0	8.0	1.00 ± 0.20
39/13	39.0	13.0	1.15 ± 0.25
Striped Products			
3.2/1.6	3.2	1.6	0.50 ± 0.10
6.4/3.2	6.4	3.2	0.60 ± 0.10
9.5/4.8	9.5	4.8	0.65 ± 0.10
12.7/6.4	12.7	6.4	0.65 ± 0.10
19.0/9.5	19.0	9.5	0.75 ± 0.15
25.4/12.7	25.4	12.7	0.90 ± 0.15
38/19	38.0	19.0	1.00 ± 0.20

Sleeving of special expanded or recovered dimensions may be supplied as specified in the contract or order.

4.3 Properties

The sleeving shall meet the requirements of Table 1.



5. QUALITY ASSURANCE PROVISIONS

5.1 Classification of Tests

Tests shall be carried out on a sample taken at random from each batch of finished sleeving. A batch of sleeving is defined as that quantity of sleeving extruded at any one time.

Testing frequency shall be Qualification or Production routine as detailed below:

5.1.1 Qualification tests (frequency in accordance with the Design Authority)

Qualification tests are those performed on sleeving submitted for qualification as a satisfactory product and shall consist of all tests listed in this specification.

5.1.2 Production routine tests (every batch)

Visual examination
Dimensions
Longitudinal change

6. TEST METHODS

6.0 Preparation of Test Specimens

Unless otherwise specified, tests shall be carried out on specimens of sleeving recovered by conditioning in a fan-assisted, air-circulating oven at $200 \pm 5^\circ\text{C}$ for 6 ± 1 minutes 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. 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.

6.1 Dimensional and Longitudinal Change

The test method shall be as specified in ASTM D2671. The length and inside diameter of three 150mm long specimens of expanded sleeving shall be measured. The specimen shall be recovered in a fan-assisted, air-circulating oven and the length and inside diameter of each shall be measured. The longitudinal change shall be expressed as a percentage of the original length. The minimum and maximum recovered wall thickness shall be determined.



6.2 Tensile Strength and Ultimate Elongation

Five specimens shall be tested in accordance with ISO 37. For sleeving of recovered bore greater than 6mm, five tubular type 2 dumb-bell specimens shall be tested. For sleeving of recovered bore less than or equal to 6mm, five tubular specimen 125mm long shall be tested. Initial jaw separation shall be 50mm and rate of jaw separation shall be 100 ± 5 mm per minute. The test shall be carried out at a temperature of $23 \pm 2^\circ\text{C}$.

6.3 Specific Gravity

The test shall be carried out in accordance with Method A of ISO 1183.

6.4 Heat Shock

The test shall be as specified in ASTM D2671. The specimens shall be conditioned in a fan-assisted, air-circulating oven as specified in Table 1.

6.5 Heat Ageing

The test method shall be as specified in ISO 188 and ISO 37. For sleeving of recovered bore greater than 6mm, five strip specimens 75mm x 6mm shall be tested. For sleeving of recovered bore less than or equal to 6mm, five tubular specimens 75mm long shall be tested. The specimens shall be conditioned in a fan-assisted, air-circulating oven as specified in Table 1.

6.6 Low Temperature Flexibility

The test method shall be as specified in Procedure C of ASTM D2671. For sleeving of recovered bore 6mm or less, apply the test to whole sections of recovered sleeving. For sleeving of recovered bore greater than 6mm, apply the test to strips 6mm wide, cut from the recovered sleeving, with their lengths parallel to the extruded axis. Mandrel diameter shall be $20 \times$ specimen thickness $\pm 10\%$. For tubular specimens the thickness is the outside diameter. The specimens and mandrel shall be conditioned as specified in Table 1.

6.7 Flammability

The test method shall be as specified in Procedure B of ASTM D2671. The test shall be carried out on size CGPT 16/4.

6.8 Electric Strength

The test shall be carried out essentially in conformance with IEC 60243-1 (short term test). Five 150mm lengths of tubing shall be shrunk onto mandrels having a diameter equal to the maximum recovered inside diameter of the tubing. This shall be conducted in a fan-assisted, air-circulating oven at $200^\circ\text{C} \pm 5^\circ\text{C}$ for 3 minutes. Only sizes 51/26 and above shall be tested as a piece between two electrodes.



6.9 Copper Mirror Corrosion

Three specimens shall be recovered per Clause 6.0 and tested according to the specified method in ASTM D2671.

6.10 Water Absorption

The test method shall be as specified in Method 1 of ISO 62. For sleeving of recovered bore greater than 8mm, three disc specimens of diameter 25 ± 1 mm shall be cut from the sleeving. For sleeving of recovered bore less than or equal to 8mm, three tubular specimens 50mm long shall be cut from the sleeving.

6.11 Fluid Resistance

The test method shall be as specified in ISO 1817. Five tensile test specimens prepared as in Clause 6.2 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 $1\text{h} \pm 15$ mins. The Tensile Strength and Ultimate Elongation of each specimen shall be tested in accordance with Clause 6.2. The test shall be repeated on the remaining specified fluids.

7. PACKAGING

Packaging shall be in accordance with good commercial practice. Each package shall bear an identification label showing material quantity, description, size, colour and batch number. Additional information shall be supplied as specified in the contract or order.



TABLE 1
Requirements

PROPERTY	TEST METHOD	REQUIREMENT
Visual examination		As per Clause 4.1
Dimensions	ASTM D2671	As per Clause 4.2
Longitudinal Change	ASTM D2671	+5 to -10%
Tensile Strength	ISO 37	10MPa minimum
Ultimate Elongation	ISO 37	200% minimum
Specific Gravity	ISO 1183	1.4 maximum
Coloured sleeving		1.0 maximum
Clear sleeving		
Heat Shock (4h ± 15m at 200 ± 5°C)	ASTM D2671	No dripping, cracking or flowing
Heat Ageing (168 ± 2h at 150 ± 3°C)	ISO 188	No dripping, cracking or flowing
- Ultimate Elongation	ISO 37	150% minimum
Low Temperature Flexibility (4h ± 15m at -40 ± 2°C)	ASTM D2671	No cracking
Flammability (except clear)	ASTM D2671	Duration of burning 60s maximum No burning or charring of indicator
Electric strength	IEC 60243-1	
Sizes 25.4/12.7 and below		20MV/m minimum
Sizes above 25.4/12.7		10MV/m minimum



PROPERTY	TEST METHOD	REQUIREMENT
Copper Mirror Corrosion (16h ± 2h at 150 ± 3°C)	ASTM D2671	No corrosion of mirrors
Water Absorption (24 ± 2h at 23 ± 2°C)	ISO 62	0.5% maximum
Fluid Resistance 24 ± 2h immersion at 23 ± 2°C • Gasoline fuel to ISO 1817 Test liquid B • Hydraulic Fluid (phosphate ester-based) to ISO 1817 Test liquid 103 • Lubricating oil to ISO 1817 Test liquid 101 - Tensile strength - Ultimate Elongation	ISO 1817 ISO 37	 5MPa minimum 175% minimum