

Specification for

**Insulating and sheathing
materials for cables —**

Part 2: Cross-linked elastomeric sheathing compounds —

Section 2.1: Harmonized types



IMPORTANT NOTE This section of BS 7655 is to be read in conjunction with BS 7655-0.

ICS 29.035.20

Committees responsible for this British Standard

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Association of Consulting Engineers
 British Approvals Service for Cables
 British Cables Association
 British Plastics Federation
 British Rubber Manufacturers' Association Ltd.
 Department of Trade and Industry (Consumer Safety Unit, CA Division)
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 ERA Technology Ltd.
 GAMBICA (BEAMA Ltd.)
 Institute of Fire Prevention Officers
 London Underground Ltd.
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Foreword

This section of BS 7655 has been prepared by Subcommittee GEL/20/3. It supersedes BS 7655-2.1:1997 which is withdrawn. It specifies the requirements for harmonized cross-linked elastomeric sheathing compounds.

This revision brings this section of BS 7655 fully into line with BS 7655-0:1997, including amendment 1:2000, and HD 22.1 S3:1997. It also introduces type EM 9, as specified in HD 22.3 S3, amendment A1.

Test methods are specified in this section of BS 7655 by reference to the latest edition of standards in which they appear. A dated reference to the most recent edition of the relevant standard for each test method is given in BS 7655-0, which is to be read in conjunction with this section.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 5 and a back cover.

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1 Scope

This section of BS 7655 specifies the requirements for the harmonized cross-linked elastomeric sheathing compounds listed in Table 1. The relevant test methods are given in BS EN 60811 and BS 6469.

This section is to be read in conjunction with BS 7655-0, which contains essential provisions for the application of this section of BS 7655.

Table 1 — Types of harmonized elastomeric sheath

Type	Maximum material operating temperature °C	General application
EM 1	60	Ordinary duty
EM 2	60	Ordinary duty oil-resisting and flame retardant
EM 3	60	Ordinary duty
EM 4	110	Ordinary duty vulcanized EVA or equivalent synthetic elastomer
EM 6	90	Ordinary duty EPR or equivalent synthetic elastomer
EM 7	90	Ordinary duty CSP or equivalent synthetic elastomer
EM 9	180	Heat resisting silicone rubber or equivalent

2 Normative references

For the purposes of this section of BS 7655, the requirements of BS 7655-0, **2.1** apply with regard to normative references.

The latest editions of the standards giving test methods are listed in the most recent edition of BS 7655-0.

3 Definitions

For the purposes of this section of BS 7655 the definitions given in BS 7655-0, clause **3** apply.

4 Requirements

The requirements specified for the compounds listed in Table 2 shall be met when the compound is tested using the test methods listed against each particular requirement.

NOTE For cross-references to the latest editions of the test method standards see BS 7655-0, Table 2.

Table 2 — Test requirements

Test	Test method in accordance with BS EN 60811 unless otherwise stated		Requirements for compound type						
	Section	Clause	EM 1	EM 2	EM 3	EM 4	EM 6	EM 7	EM 9
Properties in the state as manufactured	1-1	9.2							
Minimum tensile strength (N/mm ²)			7	10	7	6.5	7	10	5
Minimum elongation at break (%)			300	300	250	200	250	250	150
Properties after ageing in air oven	1-2	8.1.3.1							
Temperature (°C)			70 ± 2	70 ± 2	80 ± 2	150 ± 2	120 ± 2	120 ± 2	200 ± 3
Duration (h)			10 × 24	10 × 24	10 × 24	10 × 24	3 × 24	7 × 24	10 × 24
Minimum tensile strength (N/mm ²)			—	—	—	—	7	—	4
Maximum variation (%)			20	15 ¹⁾	30	30	—	30	—
Minimum elongation at break (%)			250	250	—	—	200	—	120
Maximum variation (%)			30	25 ¹⁾	30	30	—	40	—
Continued ageing conditions									
Temperature (°C)			—	—	—	—	120 ± 2	—	—
Total duration of treatment (h)			—	—	—	—	10 × 24	—	—
Maximum variation for tensile strength (%)			—	—	—	—	20 ²⁾	—	—
Maximum variation for elongation at break (%)			—	—	—	—	30 ²⁾	—	—
Properties after ageing in air bomb	1-2	8.2							
Temperature (°C)			—	—	—	150 ± 2	—	—	—
Duration (h)			—	—	—	7 × 24	—	—	—
Minimum tensile strength (N/mm ²)			—	—	—	6	—	—	—
Maximum variation (%)			—	—	—	—	—	—	—
Maximum variation for elongation at break (%)			—	—	—	30 ¹⁾	—	—	—
Bending test at low temperature	1-4	8.2							
Temperature (°C)			—	-35 ± 2	-35 ± 2	-15 ± 2	-35 ± 2	-30 ± 2	—
Requirement			—	no cracks					—
Elongation test at low temperature	1-4	8.4							
Temperature (°C)			—	-35 ± 2	-35 ± 2	-15 ± 2	-35 ± 2	-30 ± 2	—
Minimum elongation without break (%)			—	30	30	30	30	30	—
Ozone resistance test	2-1	8.1							
Temperature (°C)			—	—	25 ± 2	—	25 ± 2	25 ± 2	—
Duration (h)			—	—	24	—	24	24	—
Ozone concentration (ppm)			—	—	250 to 300	—	250 to 300	250 to 300	—
Requirement			—	—	no cracks	—	no cracks	—	—

Table 2 — Test requirements (concluded)

Test	Test method in accordance with BS EN 60811 unless otherwise stated		Requirements for compound type						
	Section	Clause	EM 1	EM 2	EM 3	EM 4	EM 6	EM 7	EM 9
Alternative ozone resistance test (low concentration)	BS 6469-99.1, clause 13								
Temperature (°C)			—	—	40 ± 2	—	40 ± 2	40 ± 2	—
Duration (h)			—	—	72	—	72	72	—
Ozone concentration (pphm)			—	—	200 ± 50	—	200 ± 50	200 ± 50	—
Requirement			—	—	no cracks	—	no cracks	—	—
Hot set test	2-1	9							
Temperature (°C)			200 ± 3	200 ± 3	200 ± 3	250 ± 3	250 ± 3	200 ± 3	250 ± 3
Duration (min)			15	15	15	15	15	15	15
Mechanical stress (N/mm ²)			0.2	0.2	0.2	0.2	0.2	0.2	0.2
Requirements									
Maximum elongation under load (%)			100	100	100	100	100	100	100
Maximum elongation after unloading (%)			25	25	25	25	25	25	25
Mineral oil immersion test	2-1	10							
Temperature (°C)			—	100 ± 2	—	—	—	100 ± 2	—
Duration (h)			—	24	—	—	—	24	—
Maximum variation from unaged sample for the tensile strength (%)			—	40	—	—	—	40	—
Maximum variation from unaged sample for the elongation at break (%)			—	40	—	—	—	40	—
Pressure test at high temperature	3-1	8.2							
Temperature (°C)			—	—	—	150 ± 2	—	—	—
Duration (h)			—	—	—	0.5	—	—	—
k value			—	—	—	1.0	—	—	—
Requirement									
Maximum penetration (%)			—	—	—	50	—	—	—
Carbon black content³⁾ (min. %)	4-1	11	—	—	2	—	2	—	—

¹⁾ Only a reduction in values is subject to verification.

²⁾ Variation in this case is the difference between the median value after ageing for 10 days and the median value after ageing for three days expressed as a percentage of the latter.

³⁾ Only applicable when called up in the relevant cable standard.

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