

# Cellulosic papers for electrical purposes —

## Part 3: Specifications for individual materials —

### Section 3.5 Special papers

# Committees responsible for this British Standard

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- BEAMA Capacitor Manufacturers' Association
- Covered Conductors Association
- Diamond Fibre Co. Limited
- ERA Technology Ltd.
- Paper Federation of Great Britain
- Royal Society of Chemistry

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# National foreword

This British Standard has been prepared by Subcommittee GEL/15/3/9. It is identical with IEC 554-3-5:1984 *Specification for cellulosic papers for electrical purposes — Part 3: Specifications for individual materials Sheet 5. Special papers*, published by the International Electrotechnical Commission (IEC).

**Cross-references**

| International Standard | Corresponding British Standard                                                                                      |
|------------------------|---------------------------------------------------------------------------------------------------------------------|
| IEC 554-1:1977         | BS 5626 <i>Cellulosic papers for electrical purposes</i><br>Part 1:1979 <i>Definitions and general requirements</i> |
| IEC 554-2:1977         | Part 2:1979 <i>Methods of test</i>                                                                                  |
| IEC 554-3-1:1979       | Part 3 <i>Specifications for individual materials</i><br>Section 3.1:1981 <i>General purpose paper</i>              |
| ISO 186:1994           | BS 3430:1995 <i>Method for sampling to determine the average quality of paper and board</i>                         |

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**Summary of pages**

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

## Introduction

This standard is one of a series which deals with insulating cellulosic papers.

The series consists of three parts:

- *Part 1: Definitions and General Requirements (IEC Publication 554-1);*
- *Part 2: Methods of Test (IEC Publication 554-2);*
- *Part 3: Specifications for Individual Materials.*

Sheet 1: General Purpose Electrical Paper, Sheet 2: Capacitor Paper, Sheet 3: Crêpe Paper, and Sheet 4: Electrolytic Capacitor Paper, have already been published.

## Sheet 5. Class 5: Special papers

### 1 Scope

This sheet contains the requirements for special papers such as, for example, those that may be used for cables, transformers and conductor wrapping. These papers are particular papers of Class 1 of IEC Publication 554-3-1, Part 3: Specifications for Individual Materials, Sheet 1: General Purpose Electrical Paper, with requirements for specific applications.

**NOTE** The examples of use given above indicate three main applications for these papers but do not in any way imply a restriction to such uses. Papers of any other class may be employed for such applications when appropriate.

### 2 Designation

Different types of special paper covered by this sheet are designated by the addition of type designating letters, A, B, C, etc., to the class designation, for example 5A.

These special papers are further subdivided to take account of differing densities, purities, and air permeabilities, in a manner similar to that used for Class 1. The details are contained in Table 5A.1, Table 5B.1, Table 5C.1 and Table 5D.1.

### 3 Requirements

#### 3.1 General

The paper shall comply with the general requirements given in IEC Publication 554-1, Part 1: Definitions and General Requirements.

#### 3.2 Sampling

The sampling procedures shall be as given in ISO Standard 186: Paper and Board — Sampling for Testing

#### 3.3 Testing

When tested by the methods stipulated, listed in Table 5A.2, Table 5B.2, Table 5C.2 and Table 5D.2 as appropriate, the paper shall comply with the relevant requirements.

**3.4** Any dyes used for colouring shall remain discernible after drying and/or impregnating and shall be compatible with the impregnant.

### 4 Description of types

#### *Type 5A*

The 5A paper is a Class 1 kraft paper for users requiring a particularly high purity. Compared with the requirements of Sheet 1, intervals and air permeability values are more closely defined, the tensile strength increased and the heat stability defined more precisely.

#### *Type 5B*

The 5B paper is a Class 1 paper for users requiring high purity; compared with Sheet 1, intervals and air permeability values are more closely defined, the tensile strength increased and the heat stability defined more precisely.

#### *Type 5C*

The 5C paper is a Class 1 paper for users requiring normal purity and medium or high air permeability and restricted water absorption.

*Type 5D*

The 5D paper is a Class 1 paper for users requiring a medium purity with increased machine direction orientation of the fibres.

**5 Special paper Class 5A**

The descriptions are given in Table 5A.1, the requirements in Table 5A.2.

**Table 5A.1 — Descriptions for Class 5A papers**

| Class | Type | Description                                                                       | Further description                       |             |                                                   |                          |
|-------|------|-----------------------------------------------------------------------------------|-------------------------------------------|-------------|---------------------------------------------------|--------------------------|
|       |      |                                                                                   | Conductivity of aqueous extract<br>(mS/m) |             | Air permeability<br>( $\mu\text{m}/\text{Pa s}$ ) |                          |
|       |      |                                                                                   | Symbol                                    | Description | Symbol                                            | Description              |
| 5A    | 5A1  | Kraft insulating paper of apparent density $\leq 0.75 \text{ g/cm}^3$             | }                                         | $\leq 4$    | L1                                                | $\leq 0.005$             |
|       | 5A2  | Kraft insulating paper of apparent density $> 0.75$ to $\leq 0.85 \text{ g/cm}^3$ |                                           |             | L2                                                | $> 0.005$ to $\leq 0.01$ |
|       | 5A3  | Kraft insulating paper of apparent density $> 0.85$ to $\leq 0.95 \text{ g/cm}^3$ |                                           |             | L3                                                | $> 0.01$ to $\leq 0.02$  |
|       | 5A4  | Kraft insulating paper of apparent density $> 0.95 \text{ g/cm}^3$                |                                           |             | L4                                                | $> 0.02$ to $\leq 0.05$  |
|       |      |                                                                                   |                                           |             | M1                                                | $> 0.05$ to $\leq 0.1$   |
|       |      |                                                                                   |                                           |             | M2                                                | $> 0.1$ to $\leq 0.2$    |
|       |      |                                                                                   |                                           |             | M3                                                | $> 0.2$ to $\leq 0.5$    |
|       |      |                                                                                   |                                           |             | H1                                                | $> 0.5$ to $\leq 1.0$    |
|       |      |                                                                                   |                                           |             | H2                                                | $> 1.0$ to $\leq 2.0$    |
|       |      |                                                                                   |                                           |             | H3                                                | $> 2.0$ to $\leq 5.0$    |
|       |      |                                                                                   |                                           |             | H4                                                | $> 5.0$ to $\leq 8.0$    |
|       |      |                                                                                   |                                           |             | H5                                                | $> 8.0$                  |

Example: 5A1-1L3 signifies: a paper of nominal apparent density  $\leq 0.75 \text{ g/cm}^3$ , conductivity  $\leq 4 \text{ mS/m}$  and nominal air permeability  $> 0.01$  to  $\leq 0.02 \mu\text{m}/\text{Pa.s}$ .