



Designation: D202 – 23

Standard Test Methods for Sampling and Testing Untreated Paper Used for Electrical Insulation¹

This standard is issued under the fixed designation D202; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 These test methods cover procedures for sampling and testing untreated paper to be used as an electrical insulator or as a constituent of a composite material used for electrical insulating purposes.

1.1.1 Untreated papers are thin, fibrous sheets normally laid down from a water suspension of pulped fibers (usually cellulosic) with or without various amounts of nonfibrous ingredients, and which are calendared, if required, to obtain desired thickness and density. Nevertheless, these test methods are applicable, generally although not invariably, to papers formed by other means, to papers modified (during or after formation) by additions, and to papers given subsequent mechanical treatments such as creping.

1.1.2 As an electrical insulating and dielectric material, paper is considered “untreated” until it is subjected to a manufacturing process such as drying, impregnation, or varnish treatment.

1.1.3 The test methods given herein were developed specifically for papers having a thickness of 0.75 mm (0.030 in.) or less. A number of these test methods are also suitable for use on other materials such as pulps or boards. Refer to Test Methods [D3376](#) or [D3394](#) to determine which tests are applicable to pulps or electrical insulating boards. In the paper industry, some products in thicknesses of less than 0.75 mm are termed “paperboard”. Such products are included within the scope of these methods.

1.1.4 These test methods are applicable to flexible fibrous-mat materials formed from suspensions of fiber in fluids other than water. Thicknesses of these mats approach 2 mm, and the fibers contained are possibly natural, synthetic, organic, or inorganic; fillers that are natural, synthetic, organic, or inorganic; and flexible polymeric binder materials.

1.2 The procedures appear in the following sections:

¹ These test methods are under the jurisdiction of ASTM Committee [D09](#) on Electrical and Electronic Insulating Materials and are the direct responsibility of Subcommittee [D09.01](#) on Electrical Insulating Products.

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Procedure	Sections	ASTM or TAPPI Reference (Modified)
Absorption (Rise of Water)	78 to 83	...
Acidity-Alkalinity-pH	45 to 54	E70
Air Resistance	98 to 101	D726
Aqueous Extract Conductivity	55 to 64	...
Ash Content	40 to 44	D586
Bursting Strength	102 to 107	D774/D774M
Chlorides (Water-Extractable)	165 to 183	...
Conditioning	15	D6054
Conducting Paths	138 to 151	...
Density, Apparent	29 to 33	...
Dielectric Strength	152 to 157	D149
Dimensions of Sheet, Rolls and Cores	16 to 24	D374
Dissipation Factor and Permittivity	158 to 164	D150
Edge-Tearing Resistance	126 to 130	D827
Fiber Analysis	74 to 77	D1030
Folding Endurance	108 to 110	T 423 and D2176
Grammage	25 to 28	D646
Permittivity	158 to 164	D150
Heat Stability in Air	131 to 137	D827
Impregnation Time	84 to 91	...
Internal-Tearing Resistance	121 to 125	D689 or T 414
Moisture Content	34 to 39	D644 and D3277
Particulate Copper	193 to 202	...
Particulate Iron	184 to 192	...
Reagents	4	D1193
Reports	14	E29
Sampling	6 to 13	D3636
Silver Tarnishing by Paper and Paperboard	203 to 206	T 444
Solvent-Soluble Matter	65 to 73	...
Surface Friction	92 to 97	D528 and T 455
Tensile Properties	111 to 120	D76, E4
Thickness (see Dimensions)	16 to 24	D374

1.3 The tests for Holes and Felt Hair Inclusions and the Stain Test for Fine Pores, have been removed from this compilation of test methods. These test methods were specific to grades of capacitor paper formerly covered by Specification D1930, which has been withdrawn.

NOTE 1—This compilation of test methods is closely related to IEC Publication 60554-2. Not all of the individual methods included herein are included in IEC 60554-2, nor are all of the methods in IEC 60554-2 included in this standard. The individual procedures as described in the two standards are in general sufficiently close to each other that it is reasonable to expect that test results obtained by most of the procedures specified in either standard will not differ significantly. However, before assuming that a procedure in these test methods is exactly equivalent to an IEC 60554-2 procedure, the written procedures must be compared closely, and if it seems advisable, test results by the two procedures are compared.

*A Summary of Changes section appears at the end of this standard