

Australian/New Zealand Standard™

Methods of test for determining combustion propagation characteristics of plastics

Method 2: Determination of minimum oxygen concentration for flame propagation following top surface ignition of vertically oriented specimens

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee BD/18, Fire Safety, to supersede AS 2122, *Combustion propagation characteristics of plastics, Part 2: Determination of minimum oxygen concentrations for flame propagation following top surface ignition of vertically oriented specimens*.

This test explores the minimum oxygen concentration necessary to just support flame propagation in test conditions of varying mixtures of oxygen and nitrogen. The test does not indicate the combustion propagation characteristics of the material at other oxygen concentrations or with the application of external heat energy.

The test has been found useful for quality control of materials, particularly in relation to the proof of the incorporation of flame retardants in the material under test. It has also been found useful in the research and development area. Guidance on the manner in which the results of this test method may be applied is given in Appendix B.

The combustion propagation characteristics of a material are complex and a series of tests would be required to specify all combustion characteristics of a material (e.g. ignitability, flame propagation, heat release, smoke release, toxicity and dripping behaviour). This test may be used to compare aspects of this particular combustion propagation characteristic of a series of plastics materials.

It must be stressed that this combustion propagation characteristics test will not indicate the fire hazard of a material in actual use. It is the manner in which the material is installed and the modification and/or fabrication which it undergoes in the production of the final product which determines the fire hazard of the material. This test may be used to specify a combustion propagation characteristic of a raw material in a product Standard.

This Method is based on ASTM D2863, *Standard method for test flammability of plastics using the oxygen index methods*; however, modifications have been incorporated as a result of work carried out by CSIRO, Division of Building Research*.

This Standard is technically similar to ISO 4589 *Plastics—Determination of burning behaviour by oxygen index*. Both methods yield, within experimental error, similar results.

* Information on the development of this method may be found in CSIRO, Division of Building Research, *Special Report 1977*, by G.C Ramsay and A.N. Souprounovich, *The Oxygen Index Test—Part 1*. See also SAA HB 37.0: *Handbook of Australian fire standards, Part 0: Fire test standards—Preparation, application and format*, for background information on firetests.

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 METHOD
1 SCOPE

This Standard specifies a test method for determining the minimum oxygen concentration for flame propagation for small specimens of plastics materials in a vertical configuration at the ambient temperature of the testing laboratory, when ignited at the top by surface ignition.

The method is suitable for testing various forms of plastics including film, fabric and cellular plastics. It is also suitable for testing certain non-plastics materials, e.g. fabrics made from natural fibres. Guidance on the manner in which the results of this method may be applied is given in Appendix B.

2 PRINCIPLE

The minimum concentration of oxygen in an upward flowing mixture of oxygen and nitrogen that will just support flame propagation is measured under equilibrium conditions. The balance between the heat from combustion of the specimen and the heat lost to the surroundings establishes the equilibrium. This point is approached from both sides of the critical oxygen concentration and a statistical method is used in its determination.

3 REFERENCED DOCUMENT

The following document is referred to in this Standard:

AS

1327 Standard environment for conditioning and testing plastics materials

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