

## A.10. FLAMMABILITY (SOLIDS)

### 1. METHOD

#### 1.1. INTRODUCTION

It is useful to have preliminary information on potentially explosive properties of the substance before performing this test.

This test should only be applied to powdery, granular or paste-like substances.

In order not to include all substances which can be ignited but only those which burn rapidly or those whose burning behaviour is in any way especially dangerous, only substances whose burning velocity exceeds a certain limiting value are considered to be highly flammable.

It can be especially dangerous if incandescence propagates through a metal powder because of the difficulties in extinguishing a fire. Metal powders should be considered highly flammable if they support spread of incandescence throughout the mass within a specified time.

#### 1.2. DEFINITION AND UNITS

Burning time expressed in seconds.

#### 1.3. REFERENCE SUBSTANCES

Not specified.

#### 1.4. PRINCIPLE OF THE METHOD

The substance is formed into an unbroken strip or powder train about 250 mm long and a preliminary screening test performed to determine if, on ignition by a gas flame, propagation by burning with flame or smouldering occurs. If propagation over 200 mm of the train occurs within a specified time then a full test programme to determine the burning rate is carried out.

#### 1.5. QUALITY CRITERIA

Not stated.

#### 1.6. DESCRIPTION OF METHOD

##### 1.6.1. Preliminary screening test

The substance is formed into an unbroken strip or powder train about 250 mm long by 20 mm wide by 10 mm high on a non-combustible, non-porous and low heat-conducting base plate.

A hot flame from a gas burner (minimum diameter 5 mm) is applied to one end of the powder train until the powder ignites or for a maximum of 2 minutes (5 minutes for powders of metals or metal-alloys). It should be noted whether combustion propagates along 200 mm of the train within the 4 minutes test period (or 40 minutes for metal powders). If the substance does not ignite and propagate combustion either by burning with flame or smouldering along 200 mm of the powder train within the 4 minutes (or 40 minutes) test period, then the substance should not be considered as highly flammable and no further testing is required. If the substance propagates burning of a 200 mm length of the powder train in less than 4 minutes, or less than 40 minutes for metal powders, the procedure described below (point 1.6.2. and following) should be carried out.

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This method can be found in Dir 92/69/EEC (O.J. L383 A)

A complete list of Annex V Testing Methods and the corresponding OJ can be downloaded from a previous page in this site.

## 1.6.2. Burning rate test

### 1.6.2.1. Preparation

Powdery or granular substances are loosely filled into a mould 250 mm long with a triangular cross-section of inner height 10 mm and width 20 mm. On both sides of the mould in a longitudinal direction two metal plates are mounted as lateral limitations which project 2 mm beyond the upper edge of the triangular cross section (figure). The mould is then dropped three times from a height of 2 cm onto a solid surface. If necessary the mould is then filled up again. The lateral limitations are then removed and the excess substance scraped off. A non-combustible, non-porous and low heat-conducting base plate is placed on top of the mould, the apparatus inverted and the mould removed.

Paste-like substances are spread on a non-combustible, non-porous and low heat-conducting base plate in the form of a rope 250 mm in length with a cross section of about 1 cm<sup>2</sup>.

### 1.6.2.2. Test conditions

In the case a moisture-sensitive substance, the test should be carried out as quickly as possible after its removal from the container.

### 1.6.2.3. Performance of the test

Arrange the pile across the draught in a fume cupboard.

The air-speed should be sufficient to prevent fumes escaping into the laboratory and should not be varied during the test. A draught screen should be erected around the apparatus.

A hot flame from a gas burner (minimum diameter of 5 mm) is used to ignite the pile at one end. When the pile has burned a distance of 80 mm, the rate of burning over the next 100 mm is measured. The test is performed six times, using a clean cool plate each time, unless a positive result is observed earlier.

## 2. DATA

The burning time from the preliminary screening test (1.6.1.) and the shortest burning time in up to six tests (1.6.2.3.) are relevant for evaluation.

## 3. REPORTING

### 3.1. TEST REPORT

The test report shall, if possible, include the following information:

- the precise specification of the substance (identification and impurities),
- a description of the substance to be tested, its physical state including moisture content,
- results from the preliminary screening test and from the burning rate test if performed,
- all additional remarks relevant to the interpretation of results.

### 3.2. INTERPRETATION OF THE RESULT

Powdery, granular or paste-like substances are to be considered as highly flammable when the time of burning in any tests carried out according to the test procedure described in 1.6.2 is less than 45 seconds. Powders of metals or metal-alloys are considered to be highly flammable when they can be ignited and the flame or the zone of reaction spreads over the whole sample in 10 minutes or less.

## 4. REFERENCES

- (1) NF T 20-042 (SEPT 85). Chemical products for industrial use. Determination of the flammability of solids.

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Appendix

Figure

Mould and accessories for the preparation of the pile

(All dimensions in millimetres)

