

Conveyor and elevator belting —

Part 11: Methods of test for safety —

Section 11.2 Low energy and high energy propane gallery tests

Committees responsible for this British Standard

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- British Coal Corporation
- British Rubber Manufacturers' Association
- British Steel plc
- Chief and Assistant Chief Fire Officers' Association
- Electricity Supply Industry in United Kingdom
- Engineering Equipment and Materials Users' Association
- Health and Safety Executive
- Loughborough University of Technology
- Malaysian Rubber Producers' Research Association
- Man-made Fibres Producers' Committee
- Mechanical Handling Engineers' Association
- Plastics and Rubber Institute

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Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
1 Scope	1
2 Apparatus	1
3 Method A. Low energy test	1
4 Method B. High energy test	2
5 Termination of tests	4
6 Measurement of damage to test pieces	5
7 Calculation and expression of results	7
8 Test report	7
Figure 1 — Propane burner trestle showing positions of burner and test piece	3
Figure 2 — Burner	4
Figure 3 — Arrangement of 25 thermocouples in vertical plane	5
Figure 4 — Location of thermocouple for measuring the temperature of incoming air and indication of length of gallery	6
Figure 5 — Measurement of length of undamaged belting	7
Publications referred to	Inside back cover

Foreword

This Section of BS 490 has been prepared under the direction of the Plastics and Rubber Standards Policy Committee.

The methods are intended to provide a realistic indication of the reaction of a conveyor belt to a fire. However, in assessing the overall flammability characteristics of conveyor belting for specific installations, it is not sufficient to rely solely on this or any other single method of test. It is essential that consideration be given to the individual site location, and reference should be made to DD 180 *“Guide to the assessment of toxic hazards in fire in buildings and transport”* and to ISO/TR 3814 *“The development of tests for measuring “reaction to fire” of building materials”*.

Attention is drawn to the Health and Safety at Work etc. Act 1974, and the need to ensure that the methods of test specified in this standard are carried out under suitable environmental conditions to provide adequate protection to personnel against the risk of fire and inhalation of smoke and/or toxic products of combustion.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, 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.

1 Scope

This Section of BS 490 describes two methods, using different levels of heat energy, for measuring the effect on a conveyor belt of being subjected to a simulated fire.

Method A is a short duration, low energy test.

Method B is a longer duration, high energy test.

The damage suffered by the conveyor belt is measured as well as its tendency to support combustion.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Apparatus

2.1 Gallery, of square section $2\text{ m} \times 2\text{ m}$, through which air is drawn by a fan. The gallery shall have a concrete floor and shall be not less than 16.0 m long measured from the gallery entrance.

2.2 Trestles (see Figure 1), each consisting of a framework 2.2 m long $\times$ 1.25 m wide and constructed of steel tubing complying with BS 1387, having a bore designation of DN 15 heavy series. The upper sides of the trestle frame are fitted with rod retainers in order to position and retain 15 steel bars manufactured from an austenitic chrome/nickel steel of an appropriate quality, such as 302S31 complying with BS 970-1 and resistant to rust, acid and heat. The bars are 10 mm diameter $\times$ 1.4 m long and form the frame on which the belting rests. The upper surface of the bars is 350 mm from the floor.

NOTE One trestle is required for method A and two for method B.

2.3 Burner, constructed in accordance with Figure 2 and consisting of a $450 \pm 9\text{ mm}$ square having an overall height of $220 \pm 5\text{ mm}$. The burner is made of welded steel tubing complying with BS 1387 having a bore designation DN 15 heavy series. The tubing shall have 52 holes, each $1.5 \pm 0.1\text{ mm}$ in diameter, at 50 mm intervals.

2.4 Bottled propane gas, complying with BS 4250-1, which is fed to the burner through a pressure reducing valve, a non-return valve and an orifice plate 1.7 mm thick and with a 2.5 mm diameter hole, using high pressure hose complying with type 2 of BS 3212 having a minimum internal diameter of 6.3 mm . Before and during the test, the gas cylinder shall be immersed to approximately two-thirds of its height in a bath of water at a temperature of $25 \pm 3\text{ }^{\circ}\text{C}$. Ensure that the gas cylinder is not emptied at the end of a test by more than 90 % of its gas weight capacity.

NOTE The rate of gas consumption may be regulated by controlling the gas pressure at the high pressure side of the orifice plate to approximately 0.20 MPa for the high energy test and 0.16 MPa for the low energy test. The pressure reducing valve, the non-return valve and the orifice plate should be positioned as close to each other as possible. A sensitive precision pressure gauge should be used to monitor the pressure at the high pressure side of the orifice plate.

Alternatively the orifice plate and sensitive pressure gauge may be replaced by a flowmeter, calibrated to ensure that the correct weight of gas is consumed, inserted into the gas supply line after the non-return valve.

2.5 Flowmeter, or other means of measuring the air velocity in the gallery (see 2.1).

2.6 Nickel-chromium/nickel-aluminium thermocouples (required for method B only), mineral insulated, stainless steel sheathed, having a nominal outside diameter of 2 mm , complying with BS 4937-4¹⁾ (see clause 4.2). Thermocouples shall be located at the 25 points illustrated in Figure 3, in a vertical plane normal to the longitudinal axis of the gallery and 6 m behind the leading edge of the test piece. A further thermocouple, shall be placed 300 mm from the entrance to the gallery in the position shown in Figure 4, to measure the temperature of the incoming air. It shall be shielded from any local heat sources.

2.7 Weighing instrument (required for method B only), of capacity not less than 120 kg , graduated in 0.5 kg intervals, to weigh the belting samples.

3 Method A. Low energy test

3.1 Preparation of test pieces

Cut two test pieces, if the conveyor belt covers are of equal thickness or three test pieces if the conveyor belt covers are of unequal thickness. Test pieces shall be 2 m long $\times$ 900 mm wide or of full width if the conveyor belt is less than 900 mm wide. Lay the test pieces out for 24 h in dry conditions at any ambient temperature above $0\text{ }^{\circ}\text{C}$ immediately prior to testing to remove residual curvature.

3.2 Temperature at commencement of test

The ambient temperature at the commencement of the test shall be between $0\text{ }^{\circ}\text{C}$ and $30\text{ }^{\circ}\text{C}$.

3.3 Number of tests

For belting with top and bottom covers that are identical, test two test pieces with the top cover uppermost.

For belting with top and bottom covers that are of unequal thickness, conduct three tests as follows:

- test one test piece with the top cover uppermost;
- test one test piece with the top cover face downwards;

¹⁾ BS 4937-4 implements CENELEC HD 446.1.