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Fire Research Note

No. 800

SPECIFICATION OF TESTS FOR FIRE HAZARD
ASSOCIATED WITH PORTABLE ELECTROSTATIC
SPRAY PAINTING EQUIPMENT

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SPECIFICATION OF TESTS FOR FIRE HAZARD ASSOCIATED WITH
PORTABLE ELECTROSTATIC SPRAY PAINTING EQUIPMENT

SUMMARY

This specification describes requirements and tests which must be passed in order that the equipment can be considered for inclusion in the list of approved portable electrostatic spray equipment prepared by the Fire Offices' Committee in connection with the Precautions to be adopted in the use of Portable Electrostatic Spray Painting Equipment.

KEY WORDS: Paint, Spraying (paint), Electrostatic, Equipment, Specification, Tests.

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MINISTRY OF TECHNOLOGY AND FIRE OFFICES' COMMITTEE
JOINT FIRE RESEARCH ORGANIZATION

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SPECIFICATION OF TESTS FOR FIRE HAZARD ASSOCIATED WITH
PORTABLE ELECTROSTATIC SPRAY PAINTING EQUIPMENT

REQUIREMENTS AND TESTS

1. Conditions of acceptance for test.

The manufacturer of the equipment shall submit all required documentation, including a complete set of drawings and specifications of components. This applies to the spraying equipment and associated power sources, the leads, etc. The documents shall be retained by the Testing Authority.

Permission shall be given by the manufacturer for a copy of the test report and documents referred to above to be sent to the Fire Offices' Committee, but not before the report has been sent to the manufacturer.

Note: Requirements and tests Nos. 2-7 must be passed in order that the equipment can be considered for inclusion in the list of approved portable electrostatic spray equipment prepared by the Fire Offices' Committee in connection with the Precautions to be adopted in the use of Portable Electrostatic Spray Painting Equipment.

2. Preliminary examination.

The Testing Authority shall note any uncovered ignition sources, such as arcing contactors, or open switches, or any other potentially dangerous junctions which may produce incendive charges. The Approving Authority may ask for modifications aiming at reduction or removal of any such hazard.

3. Construction.

(a) The power pack should be housed in a sturdy metal container which should be sealed or otherwise protected from ingress of vapours, for example by air purging. The container should be provided with a distinctly marked, substantial earth connection.

(b) The cable connecting the spray gun with the power pack should have provision for elimination of any spurious charges on the gun and the cable.

4. Marking.

The following information shall be permanently and prominently displayed on the power pack container.

(a) Power pack must always be earthed.

- (b) Operator must wear conducting footwear.
- (c) The equipment must not be used on high resistance floors (linoleum, PVC, rubber, etc.).
- (d) All articles being coated and conducting objects within the spray area must be earthed.
- (e) The above information shall also be quoted in the instruction book. The book shall also state that the power pack shall be located outside the spray area, and that only recommended paints and cleaning solvents for the gun should be used.

5. Electrical overload test.

All power packs, high voltage guns, and cable shall be designed to withstand, for 1 minute, a voltage 1.25 times the rated supply voltage.

6. Discharge to earth

This test will normally be undertaken with a dry gun and with the paint supply disconnected.

The gun shall be placed in a container of volume not less than 0.08 m^3 (3 ft^3). The container shall be filled with a 1.5 stoichiometric mixture of propane or butane in air; these mixtures contain respectively 6.0 per cent and 4.17 per cent by volume of flammable gas in air.

An arc shall be drawn between the electrode supplying the charge to the spray and an earthed wire of not more than 1 mm (0.04 in) diameter. Before the test this wire should touch the electrode and then be moved away up to a distance equal to the breakdown distance in air for the voltage of the gun. The electrode shall then be returned to the original position. The time for one cycle should be not less than 2 seconds and not more than 20 seconds. The procedure shall be repeated 20 times. The flammable mixture within the container shall be changed after 30 arcs have been drawn or the total duration of the test exceeds 30 minutes, whichever is the shorter.

The appliance is deemed to have passed this test if no ignition occurs.

7. The test in 6. above shall also be carried out at the rated voltage with the limiting resistor(s) in the power pack, or other components fulfilling the same function, shorted out.

The appliance is deemed to have passed this test if no ignition occurs.

8. Supplementary tests

- (a) The tests described in 6. shall be repeated in a stoichiometric (6.5 per cent by volume) ethylene-air mixture.
- (b) The Testing Authority shall carry out and report any further tests they consider necessary.

NOTES

The significance of the proposed tests lies in ensuring that the equipment does not produce hazardous conditions while in use. The parts of the specification dealing with performance aim at prevention of dangerous discharges due to faults or inadequate safety margins caused by improper design of construction.

The supplementary test in 8(a) estimates the existing safety margin, and compliance with this test is desirable but not essential. The test indicates to the Approving Authority how much extra electrical energy is required to ignite the paint solvent.

The safety of such equipment depends very much on how it is used and Test No. 4 deals, to some extent, with this aspect. The use of such equipment is also covered by regulations and Fire Offices' Committee requirements applying to paint spraying operations other than electrostatic.

