IS 9000-12 (1981): Basic environmental testing procedures for electronic and electrical items, Part 12: Dust test [LITD 1: Environmental Testing Procedure]

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Indian Standard

BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTRONIC AND ELECTRICAL ITEMS

PART XII DUST TEST

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTRONIC AND ELECTRICAL ITEMS

PART XII DUST TEST

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BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTRONIC AND ELECTRICAL ITEMS

PART XII DUST TEST

0. FOREWORD

0.1 This Indian Standard (Part XII) was adopted by the Indian Standards Institution on 24 July 1981, after the draft finalized by the Environmental Testing Procedures Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 The differences in environmental testing procedures for component type items and equipment type items are fast disappearing in the context of technological developments. It is, therefore, felt necessary to have uniform testing procedures wherever possible. This series of standards on environmental testing procedures (IS : 9000) has been prepared with this objective. This is also in line with the principle adopted by IEC/TC 50 ' Environmental testing ' in developing unified series of standards on environmental testing procedures by International Electrotechnical Commission.

0.2.1 It is proposed to withdraw the existing Indian Standards, namely, IS : 589-1961* and IS : 2106† series dealing with environmental tests for electronic components and equipment respectively, as soon as the tests mentioned therein are covered in the new series (IS : 9000).

0.3 While preparing this standard, assistance has been derived from JSS-55555 ' Environmental test methods for electronic and electrical equipment ' issued by the Directorate of Standardization, Ministry of Defence, India.

0.4 In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960‡.

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*Basic climatic and mechanical durability tests for components for electronic and electrical equipment (*revised*).

†Environmental tests for electronic and electrical equipment.

‡Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part XII) provides test procedure for carrying out dust test on electronic and electrical items as a part of the basic environmental testing procedures.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions and explanation of terms given in IS : 9000 (Part I)-1977* shall apply.

3. OBJECT

3.1 The object of this test is to determine the suitability of electronic and electrical items for use and/or storage under dust laden atmosphere.

4. DESCRIPTION OF TEST APPARATUS

4.1 Dust Chamber — A dust chamber meeting the requirements of **4.1.1** and **4.1.2** shall be used for this test [for detailed requirements of the dust chamber, *see* IS : 9002 (Part VIII)-1977†].

4.1.1 The dust chamber shall be capable of circulating dust in the working space in such a manner as to produce a dust concentration sufficient to deposit 25 ± 5 g of dust in the dust measuring device specified in **4.2.**

NOTE — Figure 1 indicates a suggested layout for this chamber.

4.1.2 The chamber shall also be capable of maintaining its working space at a temperature of 40 ± 3°C with a relative humidity not exceeding 50 percent. In all other respects, the chamber shall satisfy the requirements specified for the dry heat test chamber [*see* IS : 9002 (Part II)-1977‡].

4.2 Dust Measuring Device — A dust measuring device is shown in Fig. 2. The device shall be kept at any place within the dust chamber. The air shall be circulated for 5 minutes and the dust shall be allowed to settle down. The amount of dust collected in the device shall be 25 ± 5 g.

5. CHARACTERISTICS OF DUST

5.1 The dust used for this test shall be dry. It shall be heated to 40 ± 3°C before the agitation of the dust in the chamber is commenced.

*Basic environmental testing procedures for electronic and electrical items: Part I General.

†Specification for equipment for environmental tests for electronic and electrical items: Part VIII Dust chamber.

‡Specification for equipment for environmental tests for electronic and electrical items: Part II Chamber for dry heat test.

A sufficient quantity of dust shall be available in the chamber originally, in order to give the specified dust concentration throughout the chamber.

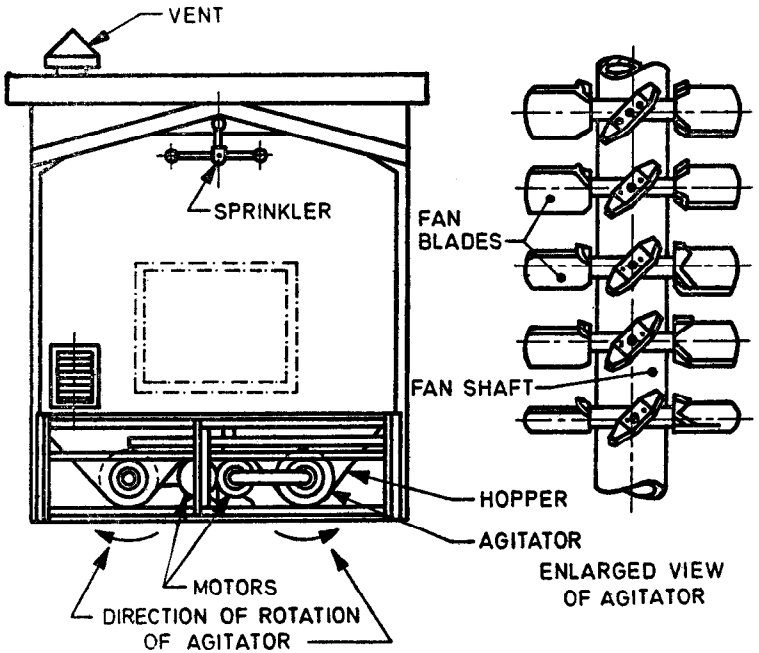


FIG. 1 DUST CHAMBER

5.2 The dust shall conform to the following requirements:

5.2.1 *Physical Characteristics* — The physical characteristics of the dust shall be as given below:

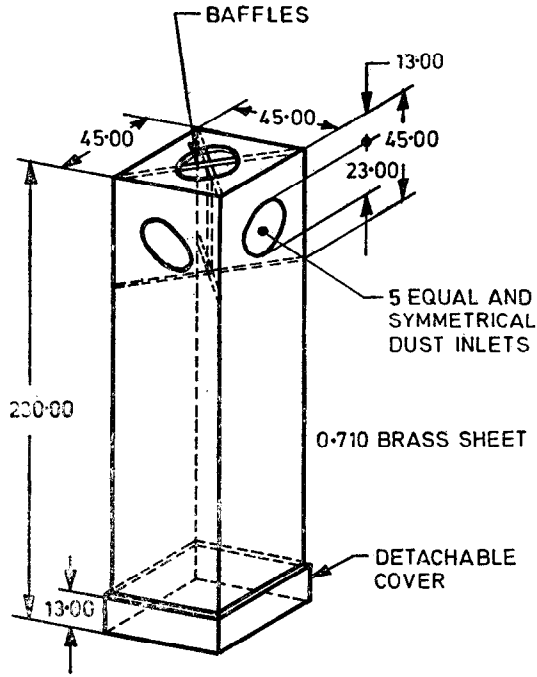
a) 100 percent dust shall pass through 150 micron IS Sieve*.

b) 98 ± 2 percent dust shall pass through 106 micron IS Sieve*.

c) 90 ± 2 percent dust shall pass through 75 micron IS Sieve*.

d) 75 ± 2 percent dust shall pass through 45 micron IS Sieve*.

*IS : 460 (Part I)-1978 Specification for test sieves: Part I Wire cloth test sieves (*second revision*).



All dimensions in millimetres.

FIG. 2 DUST MEASURING DEVICE

5.2.2 *Chemical Composition* — The chemical composition of the dust shall be as given in Table 1.

TABLE 1 CHEMICAL COMPOSITION OF DUST

SUBSTANCE	PERCENTAGE BY WEIGHT
SiO_2	97 to 99
Fe_2O_3	0 to 2
Al_2O_3	0 to 1
TiO	0 to 2
MgO	0 to 1
Ignition losses	0 to 1

6. PRECONDITIONING

6.1 The relevant specification may call for a preconditioning.

7. INITIAL MEASUREMENTS

7.1 The item shall be visually inspected, and electrically and mechanically checked, as required by the relevant specification.

8. CONDITIONING

8.1 The item shall be subjected to the test in its ' unpacked ' and ' switched-off ' condition.

8.2 The item under test, while being under the laboratory atmospheric conditions shall be introduced into the chamber, the latter also being under the same conditions. Sufficient quantity of dust shall also be introduced into the chamber.

8.3 The temperature of the chamber shall then be raised to a value of 40 $\pm$ 3°C. The relative humidity shall be maintained at a value not exceeding 50 percent.

8.4 After temperature stability has been attained, the test item shall then be subjected to a stream of dust laden air for a period of 1 hour. During this period the dust concentration shall be maintained as in **4.1.1.**

8.5 If required, items shall be switched on and a performance check shall be carried out at any time during the period specified in **8.4.**

8.6 The circulation of dust shall then be discontinued and the temperature of the chamber shall be restored to the laboratory atmospheric conditions.

9. RECOVERY

9.1 The item shall be removed from the chamber and allowed to remain under standard recovery conditions for a period of 2 to 4 hours.

10. FINAL MEASUREMENTS

10.1 The item shall be visually inspected as specified and any local accumulation of dust shall be noted. If required, the item shall then be electrically and mechanically checked.

NOTE — The accumulated dust shall be removed before electrical and mechanical checks are made. The dust shall be removed by brushing, wiping or shaking. Under no circumstances shall the dust be removed by an air blast or by vacuum cleaning.

11. INFORMATION TO BE GIVEN IN THE RELEVANT SPECIFICATION

11.1 When this test is included in the relevant specification, the following details shall be given as far as they are applicable:

	Clause Ref
a) Preconditioning	**6**
b) Initial measurements	**7**
c) Performance checks required	**8.5**
d) Final measurements	**10**
e) Any deviation from the normal test procedure	—