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FLOOR GRILLE SPECIFICATION

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FOREWORD

There are many types of floor mounted air terminal devices such as domestic, industrial and computer room units, used for both supply and extract of treated air to a space. It is both practical and important to understand the different types of units available and be able to compare each type of unit under standard test conditions for structural integrity. This laboratory test standard sets out commercially available units with a method of grading for each particular type.

Requirements for electrical continuity of raised floor systems and their components have been excluded and are not dealt with in this standard.

The requirements are aerodynamic and acoustic testing of air terminal devices are covered in relevant CEN standards.

The standard does not deal with any simulations relating to the wear characteristic of ATD's.

1.0 SCOPE

This document specifies different classifications for floor mounted Air Terminal Devices (ATD's) and the following related structural test methods:

Static

Impact

Dynamic

The classes are as follows.

CLASSES	POSSIBLE APPLICATIONS
EXTRA LIGHT	General residential premises i,e. houses, private office accommodation.
LIGHT	General office accommodation without heavy equipment, homes for the elderly
MEDIUM	General office accommodation where it is expected that heavy equipment such as drafting tables will be used typically: Data preparation areas Educational accommodation Public areas
HEAVY	Computer rooms, telephone exchanges, public areas, control rooms.
EXTRA HEAVY	Computer rooms with heavy equipment and other special applications.

2.0 NORMATIVE REFERENCES

There are no existing normative references for the tests described in this standard

3.0 DEFINITIONS AND SYMBOLS

3.1 For the purposes of this standard, the definitions given in EN XXXX apply.

4.0 INSTRUMENTATION

4.1 Load Measurement

4.1.1 Load shall be measured with either a pressure transducer or a pressure gauge.

4.1.2 Load measuring instrument shall have accuracies of at least $\pm$ 1% over the full range.

4.1.3 Load measuring instrument shall be calibrated before use and re-calibrated at intervals not greater than 12 months.

4.2 Deflection Measurement

4.2.1 Deflection shall be measured with either a deflection transducer or a dial deflection gauge.

4.2.2 Deflection measuring instruments shall have accuracies of $\pm$ 1% over the full range.

4.2.3 Deflection measuring instruments shall be calibrated before use and re-calibrated at intervals not greater than 12 months.

5.0 TEST PROGRAMMES

This section gives a guide to the respective tests to be carried out on the various Terminal Devices and section numbers.

Table 5.1

6.0	Static concentrated load
Class	Load
Extra Light	0,75kN over 25 x 25 mm area
Light	1,5 kN over 25 x 25 mm area
Medium	3,0 kN over 25 x 25 mm area
Heavy	4,5 kN over 25 x 25 mm area
Extra heavy {	4,5 kN over 25 x 25 mm area
and {	11 kN over 4off 25 x 25 mm areas

Table 5.2

7.0 Impact load	
Class	Load
ATD's of all classes having dimensions of nominal minimum dimensions of 600 x 600 mm	40 kg mass

Table 5.3

8.0 Dynamic test; Rolling load		
Class	Test	Load
Extra Light	Not Applicable	
	Deflection	2 kN
Light/Medium	Stability	3 kN
	Deflection	3 kN
Heavy/Extra heavy	Stability	4,5 kN

6.0 STATIC CONCENTRATED LOAD TESTS

6.1 **Test measurements** (applicable to all classes of Devices)

Test Measurements shall be carried out to establish the classifying of floor mounted air terminal devices under point loading conditions, for small devices it may only be necessary to test at the centre position or any other position which is considered to be the point of weakness.

The following parameters shall be determined from the tests :

Deflection
Stability
Safety loading (Integrity)
Permanent deflection (deformation)
Structural grade

6.2 **Test Installation**

6.2.1 Different devices shall be used for each of the loading positions as shown on Fig.2.

6.2.2 The concentrated load tests shall be carried out using an indentor consisting of a steel cube 25 x 25 x 25 mm with its corners radiused to a minimum of 2 mm. The indentor shall be positioned on the air terminal device to be tested using an installation similar to Fig.1.

6.2.3 The means of support for the ATD shall be as recommended by the manufacturer, ATD's intended for use with raised floors shall be supported on steel blocks or floor jacks.

6.3 Test Procedure

6.3.1 Pre test loading (Bedding-in load)

6.3.1.1 Before starting the test proper for each ATD, half of the test load as stated in Table 5.1 shall be applied for a period of 2 minutes and then released, a further 5 minutes shall elapse before the test proper commences.

6.3.2 The deflection measurement gauge shall be set to zero.

6.3.3 The test load as stated in Table 5.1 shall be applied at position a) of Fig.2 and maintained for a period of 60 minutes and the deflection measured to an accuracy of 0,1 mm directly beneath the indentor at the following time periods:

i immediately after applying the load
ii 30 minutes after applying the load
iii removing the load (at 60 minutes after commencing the tests)
iv 30 minutes after removing the load

6.3.4 The procedures of 6.3.1. to 6.3.3 shall be repeated at each of the the loading points as in Fig.2 where applicable using a different ATD for each of the tests.

6.3.5 After removal of the load, the indentation shall be measured.

6.4 Safety Loading

6.4.1 A different ATD shall be subjected to three times the test load as stated in Table 5.1 at point a) of Fig 2 or at the weakest point of the ATD if different to point a). the procedure shall be as 6.2.2 to 6.3.3 with deflection measurement made after removal of the load.

6.5 Classification Parameters

Class	Maximum allowable deflection	Maximum stability deflection
All classes tested	≤ 0,004 x shortest span between supports or 2,5 mm whichever is the greater	0,2 mm difference measured at 30 and 60 minutes after applying the load
	Maximum permanent deflection	**Safety loading**
	0,7 mm measured 30 minutes after removal of the load	Shall not collapse

6.6 Test Report

The test report shall include the following information

a The full specification of the ATD

b A drawing to show the positions of the applied loads and the method of supporting the ATD

c The achieved structural class of the ATD

d The deflection or deformation at 30 minutes after applying the load

e The deflection or deformation at 60 minutes after applying the load

f The stability of the ATD (the difference in deflection between 30 and 60 minutes after applying the load

g The permanent deflection (the deflection measured at 30 minutes after removal of the test load)

h Any damage to the ATD as recorded under 6.4

6.7 Test Measurements for Extra Heavy Class Only.

6.7.1 The procedures as described in 6.2 to 6.5 shall be carried out on 2 different extra heavy class ATD's with the following differences:

a) the static load of 11kN shall be applied through an indentor consisting of 4 steel cubes as described in 6.2 each mounted at the corner of a 200 x 200 mm square steel plate at least 12 mm thick, using an installation similar to Fig 1A.

b) the test positions shall be as described in Fig.3.

c) the safety loading test shall be at 22 kN applied through the indentor plate. at point a) of Fig.3 or at the weakest point of the ATD if different to point a).

7.0 IMPACT LOAD TEST

7.1 Test Measurements (applicable to ATD's having nominal minimum dimensions of 600 x 600 mm)

Test measurements shall be made to determine the resistance to an impact load, the following parameters shall be determined from the tests;

Stability
Permanent deflection (deformation)

7.2 Test Installation.

7.2.1 The test installation shall consist of a flexible fabric bag having a base diameter of 300 mm and containing 40 kg of dry sand, the bag shall be suspended on a quick release system such that the base of the bag is at 1m above the top surface of the ATD to be tested. (See Fig.)

7.2.2 The means of support for the ATD shall be as recommended by the manufacturer, ATD's intended for use with raised floors shall be supported on steel blocks or floor jacks.

7.3 Test Procedure

7.3.1 The deflection measurement gauge shall be set to zero.

7.3.2 The bag shall be released and allowed to freely drop on to the centre of the ATD.

7.3.3 Immediately after the impact the ATD shall be examined to establish whether or not it has collapsed,

7.3.4 30 minutes after the impact the deformation shall be measured

7.4 Classification Parameters

Class	Maximum permanent deflection	Stability
All classes tested	1,0mm	Shall not collapse

7.5 Test Report

The test report shall include the following information

a The full specification of the ATD

b A drawing to show the method of supporting the ATD

c The structural class of the ATD

8.0 DYNAMIC TESTING ~ ROLLING LOAD TEST

8.1 Test measurements (Not applicable to the Extra Light Classification)

Test measurements shall be made to determine the ability of an ATD to sustain rolling loads across its surface area.

The following parameters shall be determined from the tests:-

Permanent deflection (deformation)
Stability

8.2 Test Installation

8.2.2 The means of support for the ATD shall be as recommended by the manufacturer, ATD's intended for use with raised floors shall be supported on steel blocks or floor jacks.

8.2.3 The installation shall be typically as described in Fig.6 and consist of means of applying a load directly to a nylon wheel 150 mm in diameter and 40 mm wide, there shall be a facility to traverse the loaded wheel at a velocity of 0,33 m/s in a linear plane across both the full surface of the ATD and the extended surfaces on each side of the ATD.

8.3 Test Procedure

8.3.1 The deflection measurement gauge shall be set to zero.

8.3.2 The load as described in Table 5.4 shall be applied to the wheel when in contact with the ATD.

8.3.3 The wheel shall be traversed 25 times across the ATD and on to the extended surface on the axis of Test 1 in Fig. 4 or Fig. 5 whichever is appropriate.

8.3.4 On completion of the 25 traverses the maximum deflection on the axis of traverse shall be measured for both vertical and horizontal deflection.

8.3.5 The same procedures as 8.3.1 to 8.3.4 shall be repeated on the axis of Test 2.

8.4 Classification Parameters

Class	Maximum allowable Permanent deflection		Stability
	Vertical	Horizontal	
Light/Medium	Test 1 = 4,00 mm Test 2 = 4,00 mm	1,00 mm 1,00 mm	Shall not collapse Shall not collapse
Heavy/Extra Heavy	Test 1 = 4,00 mm Test 2 = 4,00 mm	1,00 mm 1,00 mm	Shall not collapse Shall not collapse

8.5 Test Report

8.5.1 The test report shall include the following information

a A full specification of the ATD

b The structural grade achieved by the ATD under test

c Description or drawing of the test apparatus.

d The extent and position of each of the traverses of the wheel.

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