*भारतीय मानक*
***Indian Standard***

**IS 17633 : 2022**

( *Superseding* IS 3498 : 1993, IS 5823 : 1986, IS 6188 : 1988 *and* IS 11679 : 1986 )

# टेबल्स और डेस्क्स — विशिष्टि

# Tables and Desks — Specification

ICS 97.140



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Furniture Sectional Committee, CED 35

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Furniture Sectional Committee had been approved by the Civil Engineering Division Council.

The Indian Standards on different type of tables and desk were published/revised as IS 3498 : 1993 'Metal table (office type) — Specification' (*third revision*), IS 5823 : 1986 'Specification for dinning tables' (*first revision*), IS 6188 : 1988 'Specification for wooden bedside table (*first revision*)' and IS 11679 : 1986 'Specification for wooden tables for office use'. In view in the diversification in the use of different materials and finishing system in the furniture industry, this standard has been brought out and supersedes IS 3498 : 1993, IS 5823 : 1986, IS 6188 : 1988 and IS 11679 : 1986. In this version the requirements related to the performance and safety of tables and desks have been specified, designed for tables undertaken in a seated, a sit-stand or standing position, used by adults, including those with glass in their construction, used by adults, including those with glass in their construction.

This standard applies to completely manufactured/fabricated tables and desks. It also applies to ready-to-assemble units; in that case the requirements of this standard shall apply to the assembled units.

The tests consist of requirements for office as well as domestic applications, simulating normal functional use, as well as misuse that can reasonably be expected to occur.

Tests carried out according to this standard are intended to demonstrate the ability of the item to give satisfactory service in its intended environment. It is necessary to understand that such tests do not ensure that structural failure will not eventually occur as a result of habitual misuse or after an excessively long period of service.

This standard does not contain test methods for storage elements. Assessment of ageing and degradation is also not included in this standard.

The figures given in the Indian Standard are typical and the test procedures shall be followed. If the product is part of a range of multiple sizes in same model, worst case(s) shall be determined which represents the whole range for testing.

In the formulation of this standard, considerable assistance has been taken from ISO 21016: 2007 'Office furniture — Tables and desks test methods for the determination of stability, strength and durability', ISO 7172 : 1988 'Furniture tables — Determination of stability' and EN 12521 : 2015 'Furniture, strength, durability and safety for domestic tables'.

The composition of the Committee responsible for the formulation of this standard is given in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values ( *revised* )'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# *Indian Standard*

# TABLES AND DESKS — SPECIFICATION

## 1 SCOPE

**1.1** This standard covers the requirements relating to the performance and safety that is, strength, stability and durability of tables and desks to be used for in a seated and/or standing positions, used by adults.

**1.2** This standard applies to completely manufactured/ fabricated tables and desks. It also applies to ready-to-assemble units; in that case the requirements of this standard shall apply to the assembled units.

## 2 REFERENCES

The following Indian standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in below:

| *IS No.* | *Title* |
|---|---|
| 3663 : 2018 | Dimensions of tables and chairs for office purposes (*third revision*) |
| 2553 (Part 1) : 2018 | Safety glass — Specification: Part 1 Architectural, building and general uses (*fourth revision*) |
| 3400 (Part 2) : 2014/ISO 48 : 2010 | Methods of test for vulcanized rubber: Part 2 rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD) (*fourth revision*) |
| 7888 : 1976 | Methods of test for flexible polyurethane foam |
| 16774 : 2018 | Flexible cellular polymeric materials — Determination of hardness (Indentation technique) |
| 17004 : 2018 | Testing methods for processed glass |
| 17637 : 2021 | Performance requirements of surface finishes for furniture applications |

## 3 TERMINOLOGY

For the purposes of this standard, the definitions given in IS 3663 and the following shall apply.

**3.1 Clear Height —** Distance between the top surface of the extension element bottom panel and the lower edge of the extension element above, or the structure of the unit.

**3.2 Durability Tests** — Tests simulating the repeated movement of components occurring during long-term use and assessing the strength of the furniture under such conditions.

**3.3 Duty Cycle** — For height-adjustable tables, the time taken by drive system operated without impairing its useful life.

NOTE — The duty cycle includes the operated time of the drive system and the time to allow the drive system to cool sufficiently before it is activated again. The drive system shall not be operated during the cooling mechanism.

**3.4 Stability Tests** — Tests for the ability to withstand load in all normal use conditions without the product toppling or creating unsafe use case like injury to user or inability to perform task the product is meant for.

**3.5 Strength Tests** — Tests for the capacity of the product to withstand force or pressure as specified in the standard considering the occasional heavy use conditions for a limited frequency of use.

**3.5.1** *Static Tests* — Tests consisting of heavy loads being applied a few times to ensure that the furniture has sufficient strength to perform its function under the highest levels of loading that might reasonably be expected to occur.

**3.5.2** *Impact Tests* — Tests to assess the strength of the furniture under the rapid rates of loading that occasionally occur.

**3.6 Surface Finish Tests** — Tests for surfaces of finished furniture to assess the resistance against given external conditions.

**3.7 Tables and Desks** — The tables and desks shall be categorized as mentioned below:

| Performance Category | Recommended Uses |
|---|---|
| a) Office tables | Office work areas, meeting tables, pantry tables, etc. |
| b) Domestic tables | Use for bedroom, living room, study uses and other domestic uses, etc. |

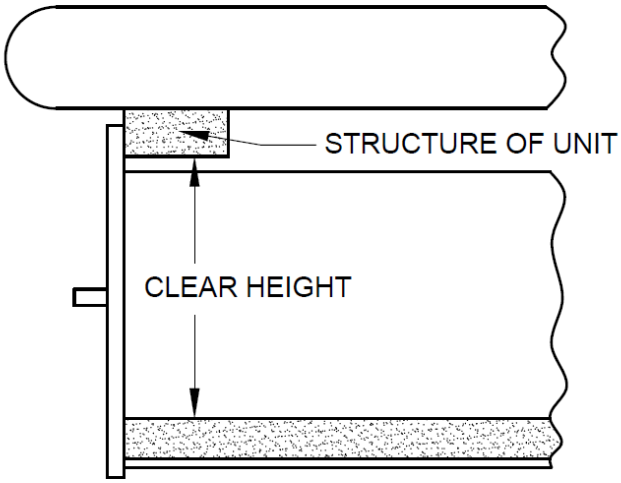



FIG. 1 CLEAR HEIGHT

## 4 DESIGN AND WORKMANSHIP

**4.1** Design/model shall be as declared by the manufacturer.

**4.2** The exposed surfaces, edges and protruding parts shall be free from burrs, sharp edges and any stain. There shall be no exposed open-ended tube, unfinished open edges and surfaces on exposed parts.

## 5 DIMENSIONS

The dimensions of tables shall be as per IS 3663.

NOTE — Any other dimensions for tables and desks as agreed between the manufacturer and the purchaser or as per the design requirements may also be used.

## 6 SURFACE PERFORMANCE REQUIRMENTS

The test sample rigid surfaces shall be tested for the following tests and shall qualify the minimum performance ratings specified in IS 17637.

a) Resistance to mechanical damage;
b) Pencil hardness;
c) Resistance to wet heat;
d) Resistance to dry heat;
e) Resistance to marking by cold liquids;
f) Resistance to marking by cold oils and fats; and
g) Adhesive performance.

## 7 SAFETY REQUIREMENTS

**7.1** The general test conditions and test apparatus requirements for the safety tests (includes stability, strength and durability tests) shall be as given in Annex A and Annex B respectively.

### 7.2 Stability Test

**7.2.1** *Stability Under Vertical Load*

Place the table on the floor surface (*see* **B-2**). The test shall be carried out with the storage components unloaded and closed.

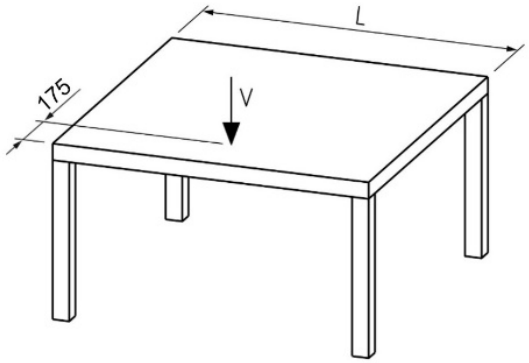
According to the height, the table shall be tested for **7.2.1.1** or **7.2.1.2**. For the height adjusted tables that can be set to heights both above and below 950 mm shall be tested to both **7.2.1.1** and **7.2.1.2**.

Tables with extension elements shall be tested both in the extended and un-extended configurations. A table extension added in the centre of the table shall be tested as the main surface. A part of the main surface in the un-extended configuration can become an ancillary surface in the extended configuration. For reference (*see* Fig. 2).

**7.2.1.1** *Test for tables that can be set to a height of 950 mm or less*

The table shall be set to the height most likely to overturn the table, but not more than 950 mm.

The vertical force as given in Table 1 or Table 2 shall be applied to the table top through the loading pad (*see* **B-4.1**), 175 mm from the edge at the point most likely to overturn the table. If the position most likely to cause overturning is not apparent, it shall be necessary to carry out this test with the vertical force at additional locations on the table top. For tables smaller than 350 mm in both length and breadth or diameter, the position most likely to cause overturning shall be determined by identifying additional locations 100 mm from the edge applied to the table top through a loading pad (*see* **B-4.2**). The table shall not overturn.




All dimensions in millimetres

FIG. 2 STABILITY UNDER VERTICAL LOAD

**Table 1 Stability of Office Tables**

( *Clauses* 7.2.1.1, 7.2.1.2, 7.2.2 *and* 7.2.3.1 )

| Sl No. | Test | Forces | |
|---|---|---|---|
| | | Work Tables[a)] | Other Tables[b)] |
| (1) | (2) | (3) | (4) |
| i) | Stability under vertical load, N | 570 | 400 |
| ii) | Stability under vertical load with extension elements open, N | 200 | 200 |
| iii) | Static load for stability under horizontal load, N | 100 | 100 |
| iv) | Stability under horizontal force, N | 50 | 50 |

a) Work tables include tables used for seated and/or standing office tasks, for example, desks and panel/screen system supported tables, meeting and conference tables, discussion tables, pantry tables.

b) Other tables excluding the work tables mentioned above.

**Table 2 Stability of Domestic Tables**

( *Clauses* 7.2.1.1, 7.2.1.2, 7.2.2 *and* 7.2.3.1 )

| Sl No. | Test | Forces | | |
|---|---|---|---|---|
| | | Tables with Tops with a Surface Area ≤ 0.15 $m^2$ [c)] | Tables ≤ 600 mm in Height, or Tables with Tops with a Surface Area > 0.15 $m^2$ and ≤ 0.25 $m^2$ [a)] | All Other Domestic Tables [b)] |
| (1) | (2) | (3) | (4) | (5) |
| i) | Stability under vertical load (*see* Note) | | | |
| | a) Main surface, N | 200 | 200 to 570 (*see* Note) | 200 to 570 (*see* Note) |
| | b) Ancillary surface, N | – | – | 100 to 200 (*see* Note) |
| ii) | Stability under vertical load with extension elements open, N | – | – | 100 |
| iii) | Static load for stability under horizontal load, N | 40 | 40 | 100 |
| iv) | Stability under horizontal force, N | 50 | 50 | 50 |

NOTE — *See* Table 3 for reference

a) Tables may include side tables, coffee tables, center tables, etc.

b) All other tables for domestic use can be considered like dining table, study table, etc.

c) Small tables for decorative and/or light duty applications.

**Table 3 Determination of Vertical Load**

( *Table* 2 )

| Sl No. | Longest Dimension, L, of the Table Top in the Overturning Direction | Vertical Load, V |
|---|---|---|
| (1) | (2) | (3) |
| i) | 0 to < 800 mm | $V_1$ |
| ii) | From 800 mm upto 1 600 mm | $V_2 - (V_2 - V_1) \times \frac{(1\,600 - L)}{800}$ |
| iii) | ≥ 1 600 mm | $V_2$ |

NOTES

1 $V_1$ = 200 N and $V_2$ = 570 N for tables ≤ 600 mm in height, or tables with tops with a surface area ≤ 0.25 $m^2$ and all other domestic tables.

2 $V_1$ = 100 N and $V_2$ = 200 N for ancillary surface.

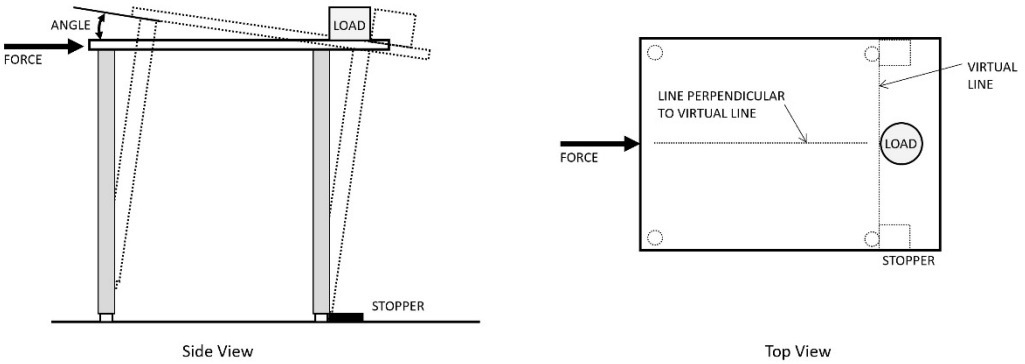



FIG. 3 HORIZONTAL STABILITY TEST

**7.2.1.2** *Test for Tables that can be set to a height greater than 950 mm*

The table shall be set to the height most likely to cause overturning, but greater than 950 mm.

Apply 50 percent of the specified vertical force as given in Table 1 or Table 2 as the case may be, to the table top through the loading pad (*see* **B-4.1**), 175 mm from the edge at the point most likely to overturn the table. If the position most likely to cause overturning is not apparent, it shall be necessary to carry out this test with the vertical force at additional locations on the table top. The table shall not overturn.

**7.2.2** *Stability with Extension Elements Open*

Place the table on the floor surface (*see* **B-2**).

Load each extension element with the load given in **A-6**. Open the two extension elements with the largest loads without overriding the interlock. If an interlock device prevents any two of the extension elements from being opened simultaneously, open the extension element with the largest load.

Apply the vertical force as given in Table 1 or Table 2 through the loading pad (*see* **B-4.1**) 100 mm from the front edge of the table at the point most likely to overturn the table. The table shall not overturn.

**7.2.3** *Stability Under Horizontal Load*

Place the table on the floor surface (*see* **B-2**). The test shall be carried out with the storage components unloaded and closed.

**7.2.3.1** *Test for tables that can be set to a height of 950 mm or less.*

The table shall be set to the height most likely to overturn the table, but not more than 950 mm. *See* Fig. 3.

Apply a static load as specified in Table 1 or Table 2 through loading pad (*see* **B-4.2**) centred at 100 mm from the edge of the top at a point most likely to cause overturn.

The legs that largely support the static load shall be restrained by stops placed to prevent sliding but not restrict the table from tilting. If tables have castors it shall be turned in the least stable position.

Apply a gradual horizontal force through loading pad (*see* **B-4.2**) as given in Table 1 or Table 2 perpendicular to the line most likely to cause overturn not lower than 12 mm below the top surface and totally opposite to the static load. If the shape of the top does not allow a gradual horizontal force application the same may be modified to accommodate accurate perpendicular application of load. The load shall be applied up to the specified horizontal load is reached, or the table tilts by 10 degrees minimum, whichever occurs earliest.

If the condition most likely to cause overturning is not apparent, it shall be necessary to carry out this test with the horizontal force at additional locations on the table top as per the set up. The table shall not overturn.

**7.2.3.2** *Test for tables with height greater than 950 mm*

The table shall be set to the height most likely to cause overturning, but greater than 950 mm. Test is also applicable for fixed height tables greater than 950 mm. The test procedure and load values shall be taken as per **7.2.3.1**.

The test also applies to tables with affixed screens or storages that weigh more than 5 kg and are more than 950 mm in height. The test does not apply to screen or storages mounted between a double-sided benching system table product.

The legs shall be restrained by stops placed to prevent sliding but not restrict the table from tilting. If tables have castors it shall be turned in the least stable position. Doors and extension elements in the table shall be closed and in unlock condition.

The forces shall be applied one at a time to the following locations in the sequence given located 1 350 mm from the floor or 100 mm from the top edge, whichever is lower. If the location for the forces comes to be in an open space, shift the location to the closest horizontal rigid location on the unit.

*See* Fig. 4 for description of the force locations.

| | |
|---|---|
| Location a: | Apply force to the front of the product at its left side. |
| Location b: | Apply force to the front of the product at its right side. |
| Location c: | Apply force to the back of the product at its left side. |
| Location d: | Apply force to the back of the product at its right side. |

Apply a gradual horizontal force through loading pad (*see* **B-4.2**) up to 175 N is reached, such that the table tilts by 10 degrees minimum as measured at the lower part of the table or the horizontal movement at the point of application is 150 mm whichever occurs earliest. The table shall not overturn. Assembly of the table product shall not disengage.

### 7.3 Strength Tests

**7.3.1** *Strength under Vertical Static Force*

Place the table on the floor surface (*see* **B-2**). Height-adjustable tables shall be set to their highest position, but not higher than 950 mm.

Load all extension elements as specified in **A-6**. Close the extension elements and keep the extension elements closed throughout the test. Carry out the test at the point(s) along the edge where most likely to cause failure. If the point most likely to cause failure is not evident, repeat the test at up to four different loading positions.

The forces shall be applied 175 mm inside from the edge(s).

**7.3.1.1** *Stated load*

Load, number and time of the cycle as specified in Table 5 and Table 6 shall be applied on the table surface by means of the loading pad (*see* **B-4.1**).

Measure and record the deflection at a point 50 mm inside along the working edge where deflection is greatest of the surface with reference to a straight edge placed along and extending the entire length of the table top. The deflection of the table top shall not be more than 4 mm/m of length after removal of the load.

Record and assess defects in accordance with **8.4**.

**7.3.1.2** *For occasional heavy loads*

Load, number and time of the cycle as specified in Table 5 shall be applied on the table surface by means of the loading pad (*see* **B-4.1**).

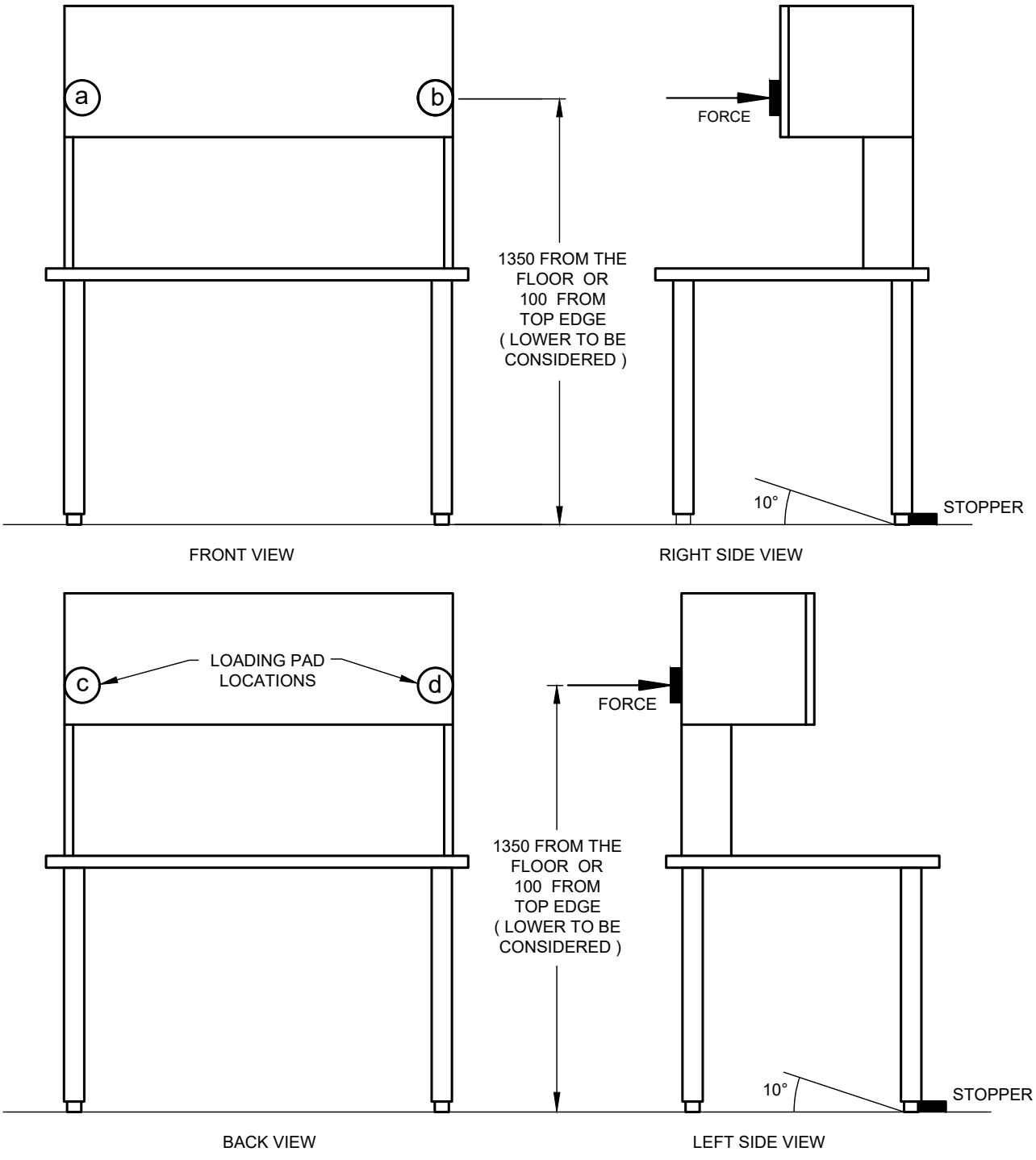
Record and assess defects in accordance with **8.4**.

**7.3.2** *Strength under horizontal static force*

Place the table on the floor surface (*see* **B-2**). Height-adjustable tables shall be set to their highest position.

Restrain the legs/supports of the table by stops placed around each leg/support at the end opposite that at which the horizontal test force is first applied.

Leave the stops in position for all applications of the horizontal test force. Apply a mass of 50 kg to the approximate centre of the table top through a loading pad (*see* **B-4.2**). Apply force as specified in Table 5 and Table 6 at the table top level in a direction perpendicular to a line joining the two legs/supports and midway between the legs/supports. *See* Fig. 5 and Fig. 7.




All dimensions in millimetres

FIG. 4 HORIZONTAL STABILITY TEST FOR TABLES WITH HEIGHT GREATER THAN 950 mm

If the table top is not secured to the under-structure and the top moves when the specified force is applied, reduce the force sufficiently to just prevent movement. Record the force applied. The applied force shall not be reduced below the minimum specified force given in Table 5 and Table 6. If the unrestrained base lifts when the specified force is applied, reduce the force sufficiently to just prevent lifting. Record the force applied. The applied force shall not be reduced below the minimum specified force given in Table 5 and Table 6. If unrestrained base lifts at this force, the specified mass applied to the table top shall be increased gradually until this tendency ceases. Leaving the stops in position, use the same procedure to determine the force to be applied in the opposite direction.

One application of the force in each direction represents one cycle. Carry out for 10 cycles.

Apply the specified horizontal force at the table top level along the line joining the two legs/supports through a loading pad (*see* **B-4.2**) (*see* Fig. 6 and Fig. 8). Apply the specified force given in Table 5 and Table 6 in the opposite direction. One application of the force in each direction represents one cycle. Carry out for 10 cycles.

Repeat this procedure with the force applications until each unique leg design/construction has been tested in each of four quadrants.

Record and assess defects in accordance with **8.4**.

### 7.4 Durability Tests

**7.4.1** *Durability under Vertical Force*

Place the table on the floor surface (*see* **B-2**).

Height-adjustable tables shall be set to their highest position. If necessary, the legs/supports may be stopped to prevent sliding but the stops shall not inhibit deformation.

Load all extension elements as specified in **A-6**. Close the extension elements and keep the extension elements closed throughout the test. Using the loading pad (*see* **B-4.1**), apply a vertical force as specified in Table 5 and Table 6, at 100 mm from the edge of the table top and at the point most likely to cause failure. If the table tends to tilt when the specified force is applied, move the force towards the centre of the table just enough to prevent tilting.

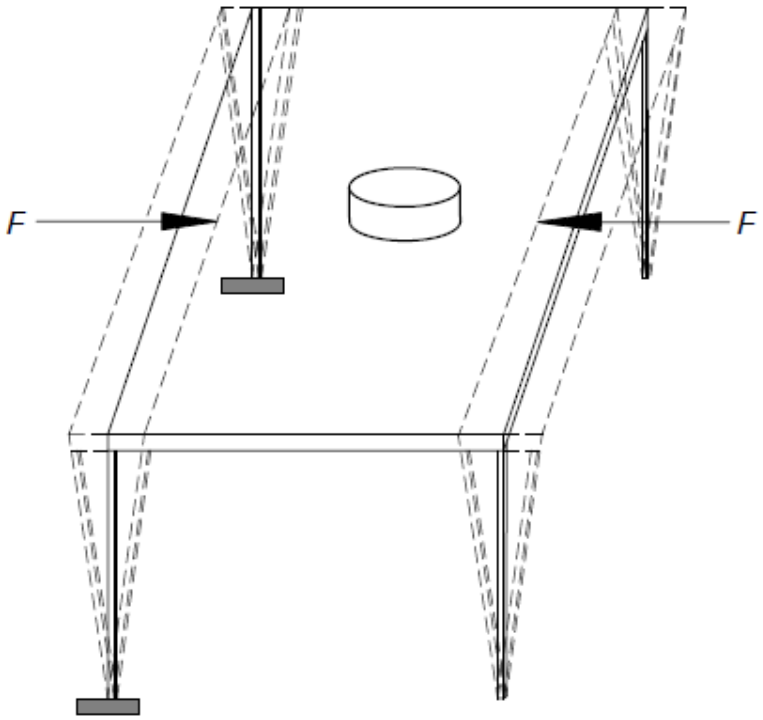



FIG. 5 STRENGTH UNDER HORIZONTAL STATIC FORCE TEST – RECTANGULAR TABLE-FIRST AND SECOND DIRECTION

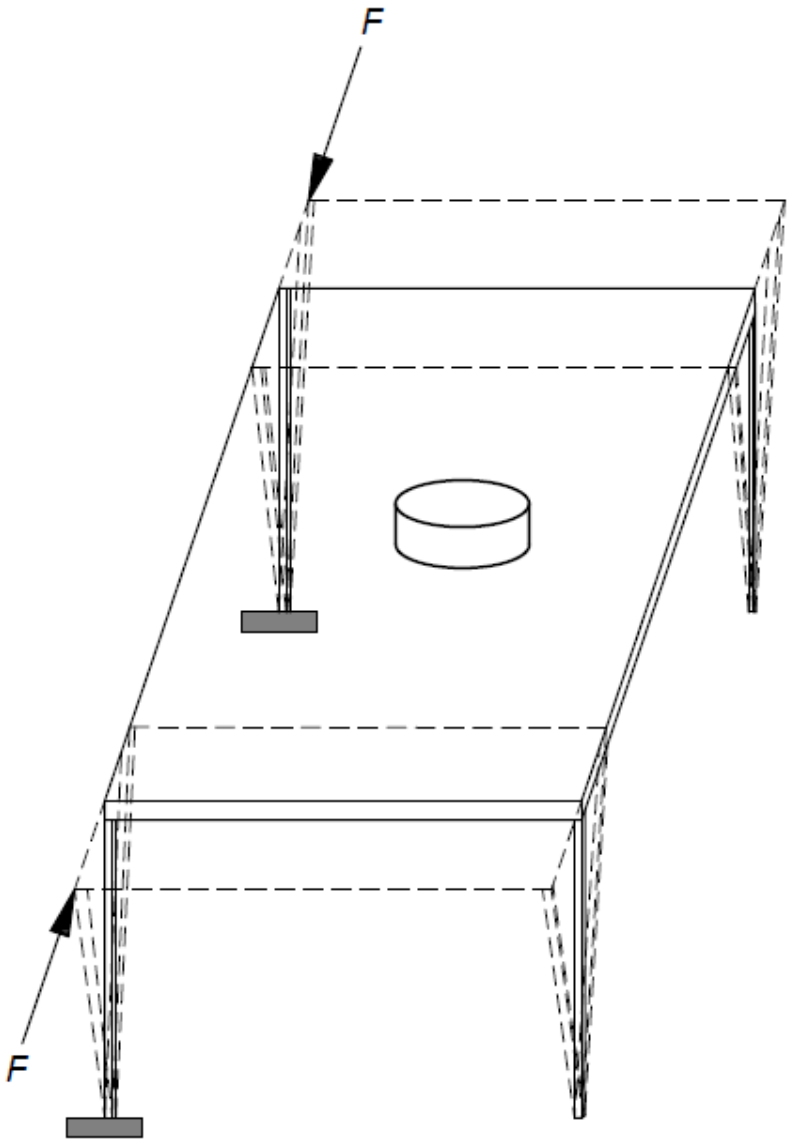



FIG. 6 STRENGTH UNDER HORIZONTAL STATIC FORCE TEST – RECTANGULAR TABLE – THIRD AND FOURTH DIRECTIONS

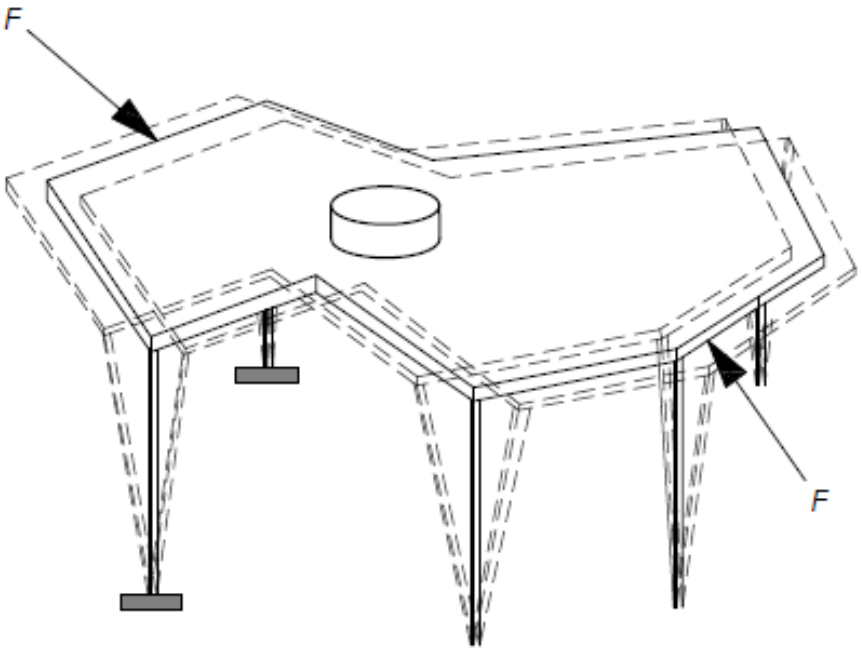



FIG. 7 STRENGTH UNDER HORIZONTAL STATIC FORCE TEST – IRREGULARLY SHAPED TABLE – FIRST AND SECOND DIRECTIONS

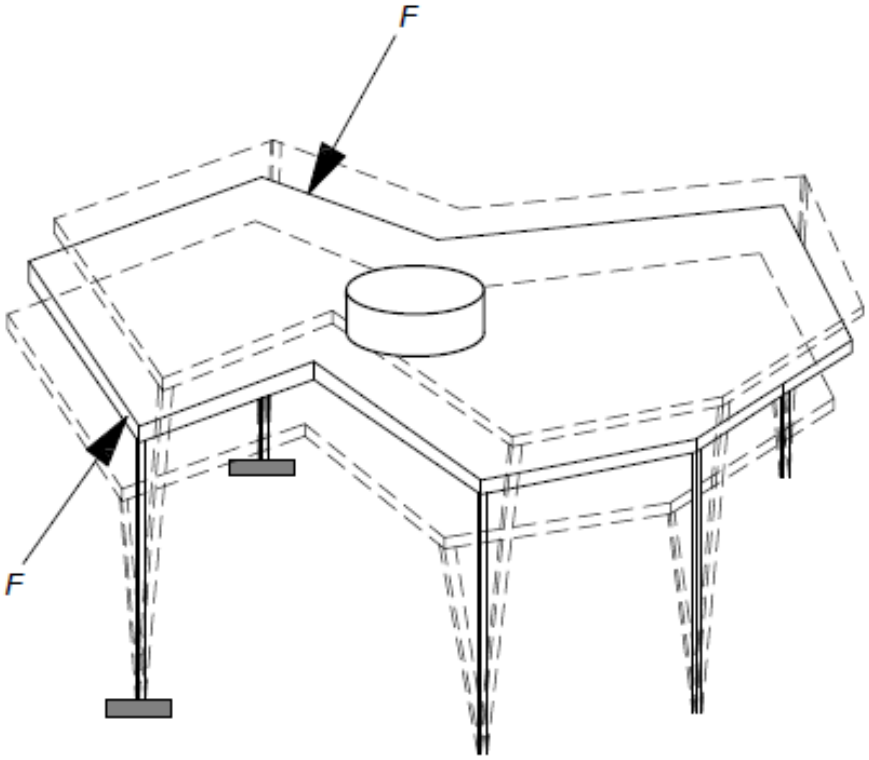



FIG. 8 STRENGTH UNDER HORIZONTAL STATIC FORCE TEST – IRREGULARLY SHAPED TABLE – THIRD AND FOURTH DIRECTIONS

One application of the force followed by removal of the force shall represent one complete cycle. Carry out the test for number of cycles as specified in Table 5 and Table 6 with a frequency of not more than 10 cycles per minute.

Record and assess defects in accordance with **8.4**.

**7.4.2** *Durability of the Height Adjustment Mechanism*

Place the table on the floor surface (*see* **B-2**). Load the table top with mass/load as specified in Table 5 and Table 6 on the centre of a line 300 mm in from the rear edge of the surface and at the side to side locations noted below. Load the extension elements according to Table 7.

Cycle the table, including any latches or activation mechanisms for the specified (*see* Table 5 and Table 6) cycles as described below. The test device shall apply only those forces necessary to achieve the required motion and shall not add mass to the table. The latching and/or activating mechanisms may be cycled concurrently or independently for the complete test as follows (*see* Fig. 9):

a) *First 25 percent of the cycles*: The table shall be cycled its total vertical travel. Position the centre of the load 300 mm inside from the left edge of the surface.

b) *Next 50 percent of cycles*: The table shall be cycled its total vertical travel. Position the centre of the load in the middle of the surface.

c) *Last 25 percent of cycles*: The table shall be cycled its total vertical travel. Position the centre of the load 300 mm inside from the right edge of the surface.

One cycle shall be comprised of travel from the lowest position to the highest position and return. The cycle rate shall not exceed 6 cycles per minute.

The cycle rate for electrically driven tables shall be as recommended by the manufacturer. When a duty cycle is not recommended by the manufacturer, the duty cycle shall be three cycles on and then off for the equivalent time it takes to run 15 cycles. The duty cycle may be increased when temperature control mechanism is as recommended by the manufacturer.

Record and assess defects in accordance with **8.4**.

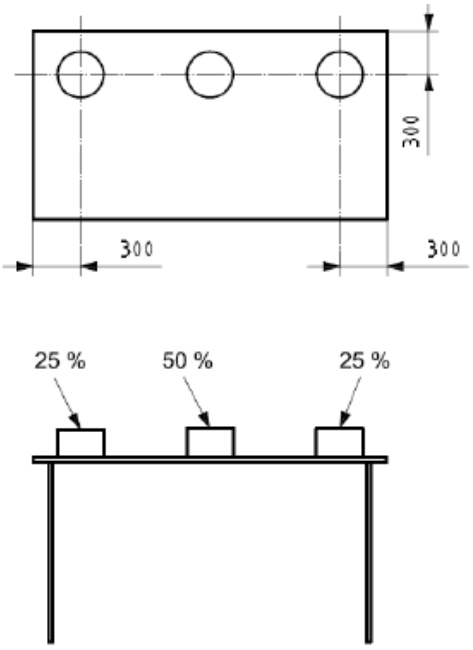
**7.5 Durability and Stiffness Under Horizontal Force**

**7.5.1** *General*

Place the table on the floor surface (*see* **B-2**). If the table is height-adjustable, it shall be set to their highest position, but not higher than 950 mm. Restrain the legs/supports of the table by placing stops (*see* **B-3**) around each leg/support. Apply a mass of 50 kg to the approximate centre of the table top.

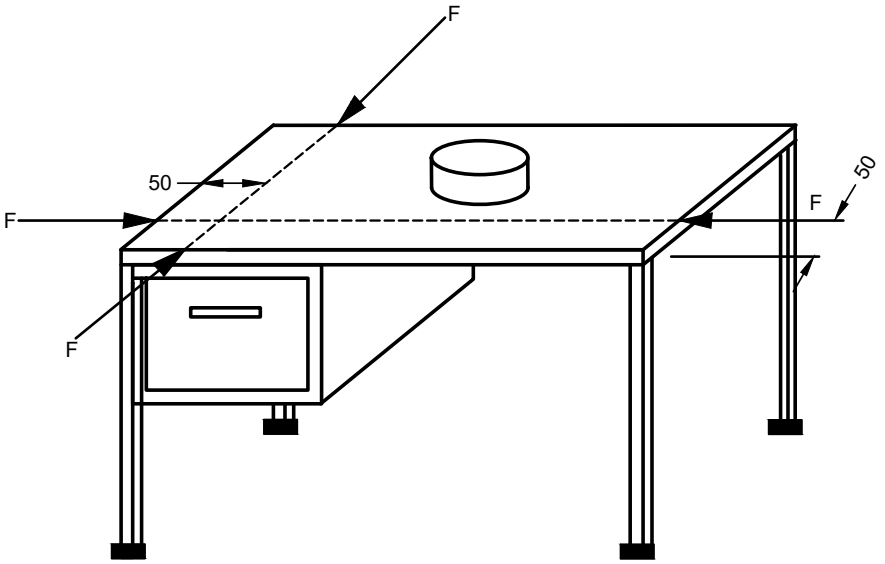
**7.5.2** *Durability under Horizontal Force*

Apply the horizontal force as specified in Table 5 and Table 6, in a lateral direction, at the table top level, parallel to the table's longitudinal centreline and 50 mm inside from and perpendicular to an edge through a loading pad (*see* **B-4.2**), towards the opposite side of the table; then reverse the force direction [*see* Fig. 10A]. For table tops attached to another table top at one end, for force directions shall be as per Fig 10B).



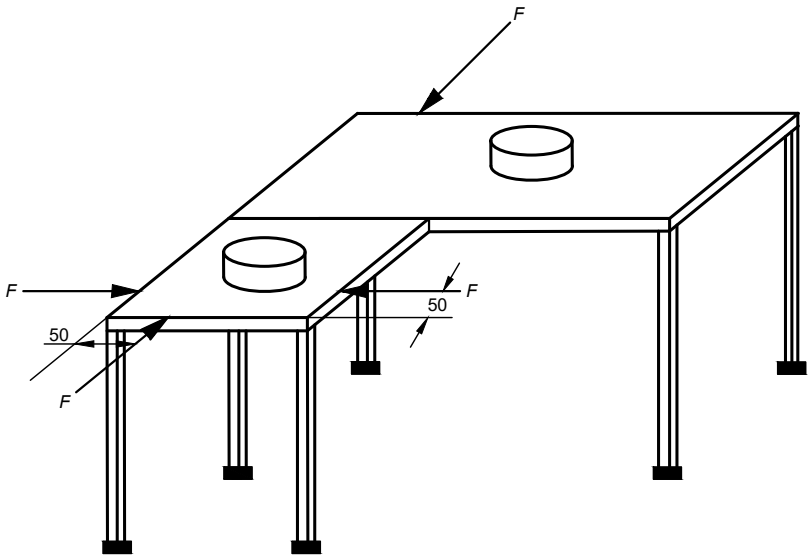

All dimensions in millimetres

FIG. 9 DURABILITY OF THE HEIGHT ADJUSTMENT MECHANISM




All dimensions in millimetres

10A Rectangular Shape Table




All dimensions in millimetres

10B Table with Additional Tops

Fig. 10 Durability Under Horizontal Force

If the table tends to tilt when the specified force is applied, reduce the force sufficiently to just prevent tilting. Record the force applied.

One application of the force in each direction represents one cycle. Carry out the specified number of cycles with a frequency of not more than 10 cycles per minute.

Repeat the test in the other directions.

If the force(s) applied is/are reduced, record the force applied. Record and assess defects in accordance with **8.4**.

**7.5.3** *Stiffness of the Structure Under Horizontal Force*

The test force shall be applied at the table-top level in a direction perpendicular to a line joining two legs/supports and midway between the legs/supports, or midway between the outermost legs for a table with more than two legs in a straight line.

Apply a horizontal force of 300 N at the table-surface level and along its longitudinal centreline, towards the centre of the table through a loading pad (*see* **B-4.2**). Maintain the force for 2 s and record the position of a point *D* on the length of the table. Remove the force and repeat it in the opposite direction and record the distance of the horizontal travel of the point. The total distance point *D* moves, from its location when the force is applied in one direction to its location when the force is applied in the other direction, is $D_1$ [*see* Fig. 11A] Calculate and record $D_1$.

Repeat the procedure using horizontal forces along the transverse centreline. The total distance point *D* moves, from its location when the force is applied in one direction to its location when the force is applied in the other direction, is $D_2$ [*see* Fig. 11B] Calculate and record $D_2$.

The table shall meet the stiffness requirements as specified in Table 5 and Table 6 also, record and assess defects in accordance with **8.4**.

Gained values when applying the forces (examples):

Case A – Longitudinal direction:

When applying $F_a$: 5 mm

$$D_1 = F_a + F_b = 5\ mm + 4\ mm = 9\ mm$$

When applying $F_b$: 4 mm

Upper height of table top: 743 mm = 0,743 m

$$\frac{9\ mm}{0,743\ m} = 12,11\ mm / m$$

Case B – Transverse direction:

When applying $F_c$: 4 mm When applying $F_d$: 3 mm

$$D_2 = F_c + F_d = 4\ mm + 3\ mm = 7\ mm$$

Upper height of table top: 743 mm = 0.743 m

$$\frac{7\ mm}{0.743\ m} = 9.42\ mm / m$$

### 7.6 Vertical Impact Test

**7.6.1** *General*

Position the table on the test surface, in its normal position of use.

Tables with extensions inserted in the centre shall be tested in the extended configuration.

All other tables shall be tested without extending ancillary surfaces.

**7.6.2** *Vertical Impact Test for Glass Table Tops*

Place the unit on the floor surface (*see* **B-2**), or on the wall surface (a rigid, vertical and flat surface). The impact point on glass surface shall be in the horizontal plan. If necessary, the unit shall be tilted.

Place a piece of polyurethane foam (*see* **B-6.2**) on the glass surface. The height of drop shall be measured from the position where the impactor is resting on the surface of that layer of foam. Let the impactor (*see* **B-7**) fall freely through the height and for number of cycles as specified in Table 5 and Table 6. The positions of impact onto the foam surface of the glass table tops shall be as follows:

a) As close as possible to one point of support of the top but not less than 100 mm from any edge;

b) 100 mm from the edge of the top as far away from the supports as possible; and

c) 100 mm from the edges at one corner.

Before each impact, check that there shall not be any glass splinters in the polyurethane foam or in the striking surface of the impactor.

Carry out inspection and assessment and the glass table top shall meet the requirements mentioned below:

a) No damage to the glass; and

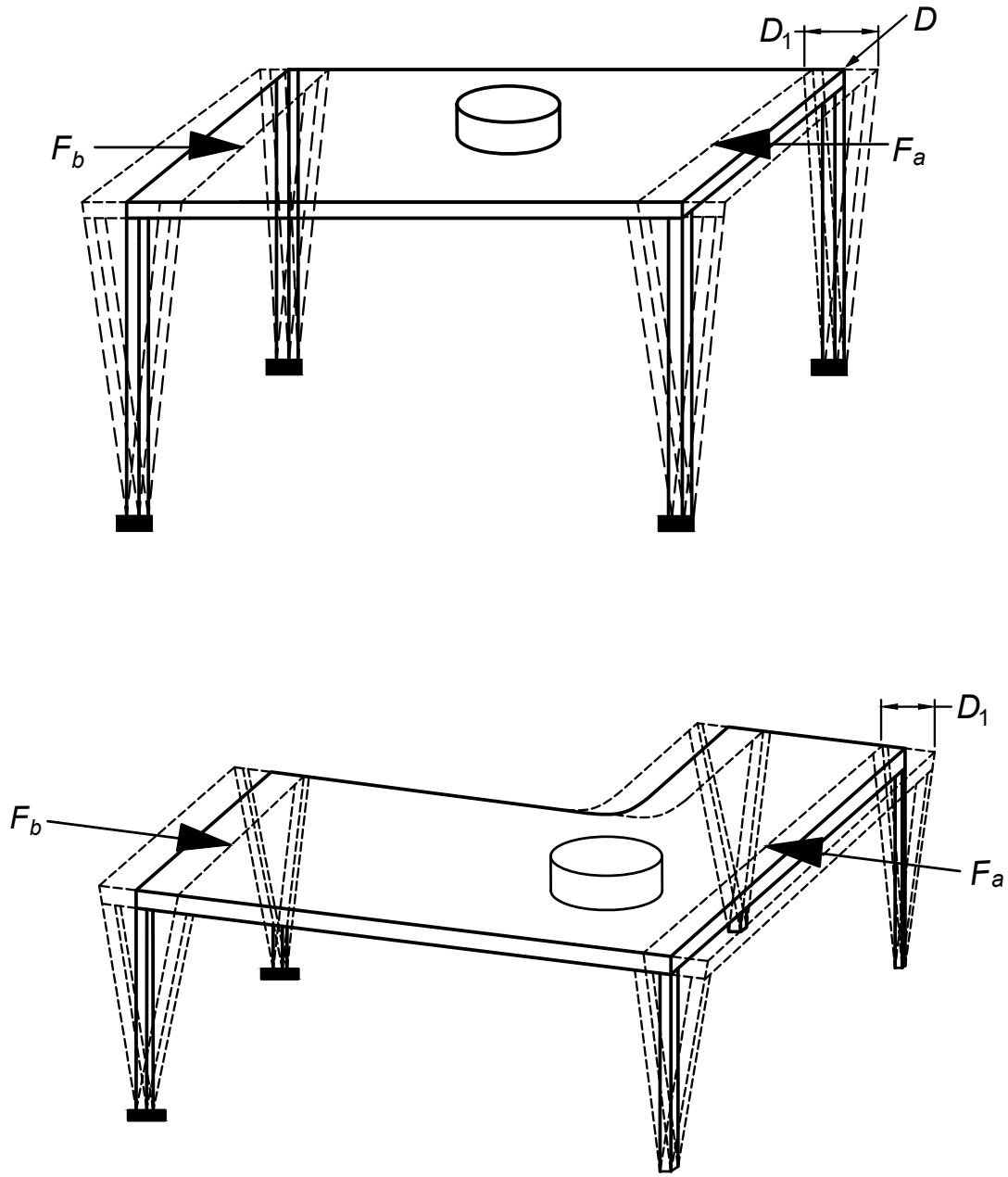
b) No completely dislodgement of the glass.

**7.6.3** *Vertical Impact Test for All Other Table Tops*

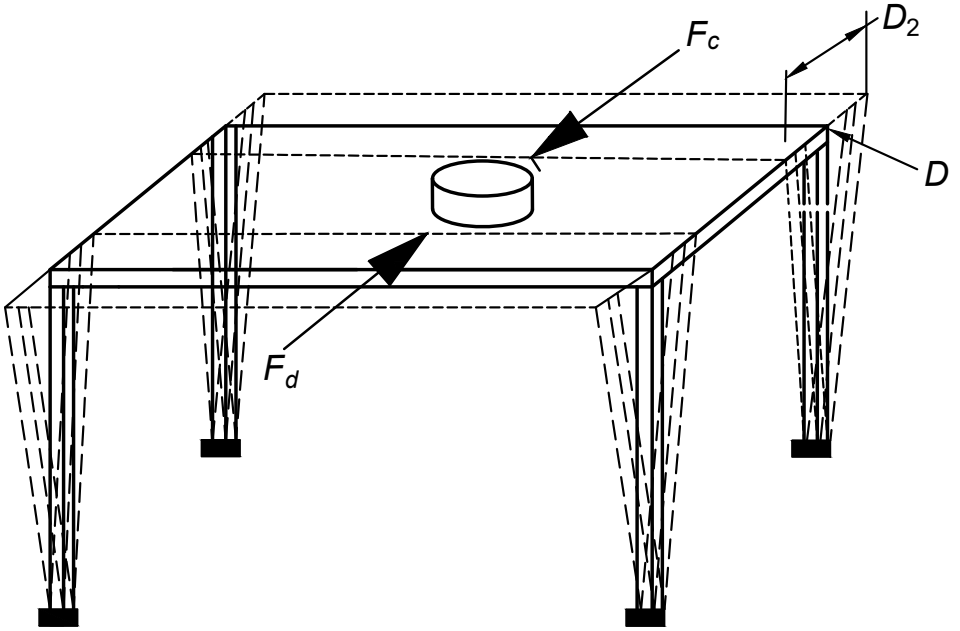
Place one layer of foam (*see* **B-6.1**) on the table top. The height of drop shall be measured from the position where the impactor is resting on the surface of that layer of foam. Place a second layer of foam (*see* **B-6.1**) between the striking surface and the table top.

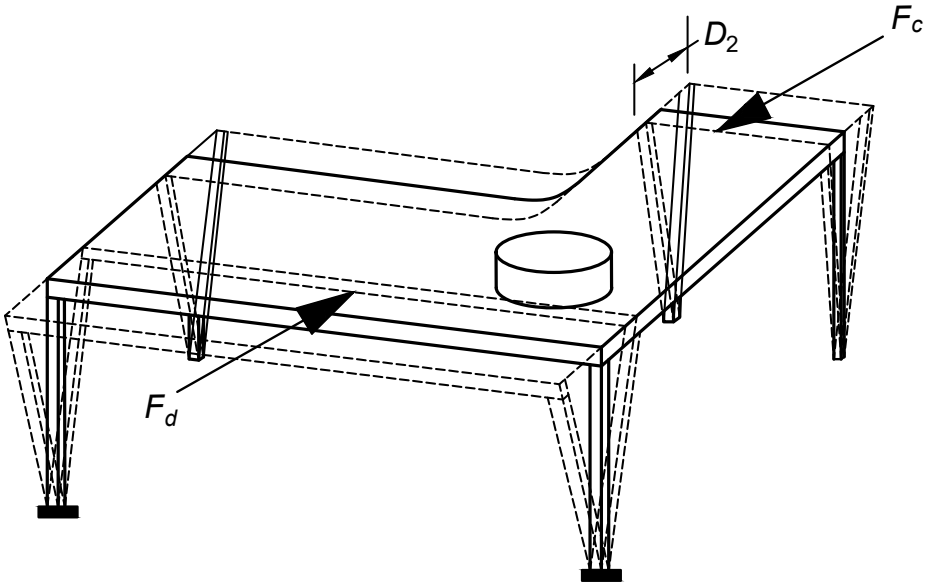
Let the impactor (*see* **B-7**) fall freely through the height and for number of cycles as specified in Table 5 and Table 6. The positions of impact onto the foam surface of the glass table tops are as given in **7.6.2**.

Record and assess defects in accordance with **8.4**.




11A Longitudinal Directions For Different Shapes of Tables, $F_A$ (RHS), $F_B$ (LHS)




11B Transverse Direction For Different Shapes of Tables, $F_c$ (RHS), $F_D$ (LHS)

Fig. 11 Stiffness of the Structure

### 7.7 Deflection of Table Tops

Testing of the deflection of table tops shall be carried out in a relative humidity as specified in **A-1** (for table tops made of metal, glass and stone the test need not be carried in a relative humidity conditions). The greatest deflection shall be measured and recorded with reference to a straight line to an accuracy of ± 0.1 mm.

Place the table being tested on the floor surface (*see* **B-2**). Load the table top uniformly with the load specified of 60 kg/m$^2$ for office tables and 30 kg/m$^2$ for domestic tables, apply for a period as mentioned below:

a) 1 h for table tops made of glass and stone, and

b) 1 week for all other table tops.

With the load remaining on the top, measure and record the deflection at a point 50 mm inside along the working edge where deflection is greatest of the surface with reference to a straight edge placed along and extending the entire length of the table top.

The table shall meet the deflection requirements as specified in Table 5 and Table 6. Record and assess defects in accordance with **8.4**.

### 7.8 Durability of Tables with Castors

Place the table unloaded on the floor surface (*see* **B-2**). This test is only applicable to tables that have castors fitted to all legs/supports.

The operating force shall be applied no lower than 50 mm from the top surface of the table. Apply a load as specified in Table 5 and Table 6 centred on the table. The castors shall be free to rotate and swivel.

Move the table (600 ± 20) mm back and forth, at least one castor shall be run over obstacles at a rate of (10 ± 2) cycles per minute for the specified number of cycles (*see* Table 5 and Table 6). This cycle shall be repeated until the castors have been running for 2 min. There shall be a cooling period of 2 min before the next 2 min test run is started. One cycle consists of a forward and a backward stroke.

Record and assess defects in accordance with **8.4**.

### 7.9 Drop Test

Place the table unloaded on the floor surface (*see* **B-2**) in its normal position of use without ancillary surfaces inserted or extended, but with ancillary surfaces in their normal stored position. Height adjustable tables shall be set to their lowest position.

Determine the drop height (*see* Fig. 12) as a percentage of the specified nominal drop height in accordance with the criteria listed in Table 4.

**Table 4 Determination of the Drop Height for the Drop Test**

( *Clause* 7.9 )

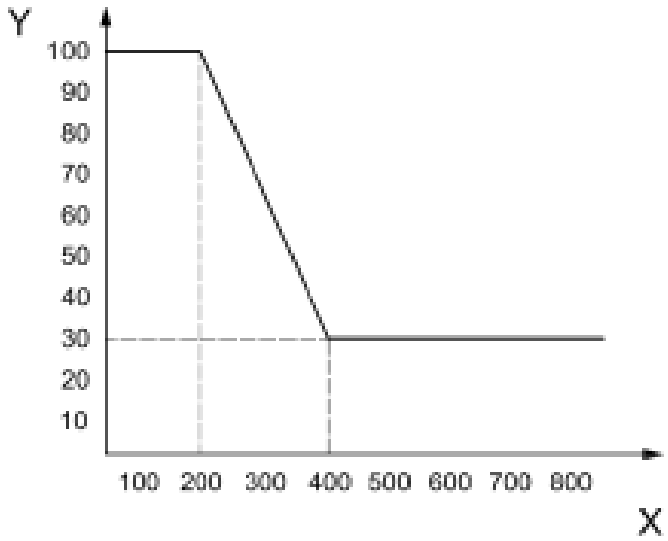
| Sl No. | Force to Lift One End of the Table N | Percent of Specified Nominal Drop Height |
|---|---|---|
| (1) | (2) | (3) |
| i) | 0 to < 200 | 100 |
| ii) | 200 to 400 | 100 – [70 (force to lift one end of unit – 200)/200] |
| iii) | > 400 | 30 |

Determine and record the most likely lifting point(s). The vertical force is determined as the lowest upwards vertical force to lift at least one leg/support off the floor (10 ± 5) mm off the floor.

For tables that have a single leg/support the vertical force is determined as the lowest upwards vertical force to lift the edge of the support (10 ± 5) mm off the floor. Lift one end of the table to the drop height and let it drop freely onto the floor surface (*see* **B-2**) (*see* Fig. 13).

Carry out the test six times. Height-adjustable tables shall be tested three times at the lowest position and three times at the highest position. Determine the drop height for the opposite end of the table and repeat the test on that end.

Record and assess defects in accordance with **8.4**.




Key

X force to lift one end of the table, expressed in newtons

Y percentage of nominal drop height

FIG. 12 GRAPHICAL REPRESENTATION OF THE EQUATION FOR DROP HEIGHT

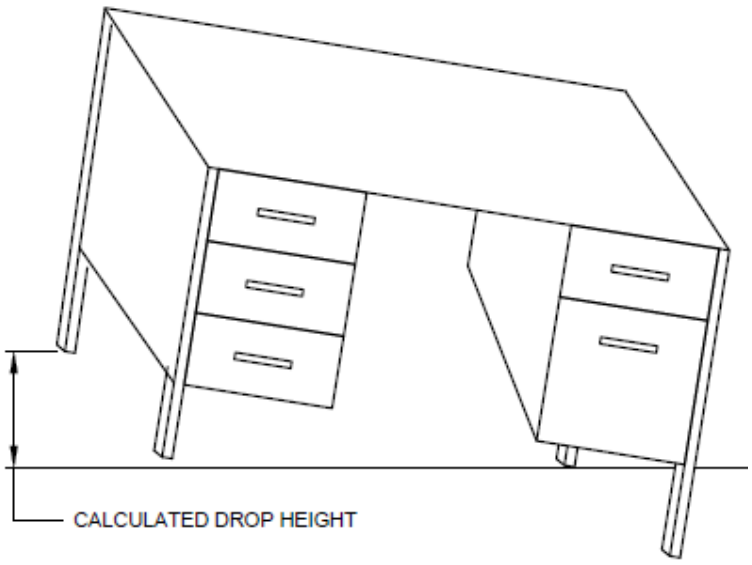



FIG. 13 DROP TEST

**Table 5 Tests for Office Tables**

( *Clauses* 7.3.1.1, 7.3.1.2, 7.3.2, 7.4, 7.4.1, 7.4.2, 7.5.2, 7.5.3, 7.6.2, 7.7, 7.8 *and* 7.9 )

| Sl No. | Test | Magnitude | | Cycles | |
|---|---|---|---|---|---|
| | | Work Tables [a] | Other [b] | Work Tables [a] | Other [b] |
| (1) | (2) | (3) | (4) | (5) | (6) |
| i) | Strength under vertical static forces, N | 1 000 | | 1 cycle for 60 min. | 1 cycle for 60 min |
| ii) | Strength under vertical static forces (occasional heavy loads test), N | 1 360 | | 1 cycle for 15 min. | 1 cycle for 15 min |
| iii) | Strength under horizontal static forces | | | | |
| | a) Test force, N | 450 | | 10 | 10 |
| | b) Minimum horizontal force, N | 300 | | | |
| iv) | Durability under vertical forces, N | 900 | | 10 000 | 5 000 |
| v) | Durability under horizontal forces | | | | |
| | a) Test force, N | 300 | | 5 000 | 2 500 |
| vi) | Stiffness of the structure under horizontal force, mm/m of height, Max | 34 | | – | – |
| vii) | Durability of the height adjustment mechanism, kg | 45 | | 5 000 (total) | 2 500 (total) |
| viii) | Vertical impact test for tables with glass in their construction (Drop height), mm (*see* Note 1) | | | | |
| | a) Safety glass (*see* Note 2) | 180 | 140 | 10 | 10 |
| | b) Other glass | 240 | 180 | | |
| ix) | Deflection of table tops, mm/m of length, *Max* | 4 | | | |
| x) | Durability of tables with castors, kg | 40 | | 2 000 | 2 000 |
| xi) | Drop test, Nominal drop height, mm | 100 | | – | – |
| | | 50 (for glass tables) | | | |

NOTES

**1** Impact the table top in accordance with the positions defined in **7.6.2**.

**2** Glass is considered to be safety glass if the glass fulfils the requirements of fragmentation as specified in IS 17004 and IS 2553 (Part 1).

**3** [a] Work tables include tables used for seated and/or standing office tasks, for example, desks and panel/screen system supported tables, meeting and conference tables, discussion tables, pantry tables.

[b] Other tables excluding the work tables mentioned above.

**Table 6 Tests for Domestic Tables**

( *Clauses* 7.3.1.1, 7.3.2, 7.4.1, 7.4.2, 7.5.2, 7.5.3, 7.6.2, 7.6.3, 7.7, 7.8 *and* 7.9 )

| Sl No. | Test | Magnitude | | | Cycles | | |
|---|---|---|---|---|---|---|---|
| | | Tables with Tops with a Surface Area ≤ 0.15 $m^2$ [c] | Tables ≤ 600 mm in Height, or Tables with Tops with a Surface Area > 0.15 $m^2$ and ≤ 0.25 $m^2$ [a] | All Other Domestic Tables [b] | Tables with Tops with a Surface Area ≤ 0.15 $m^2$ [c] | Tables ≤ 600 mm in Height, or Tables with Tops with a Surface Area > 0.15 $m^2$ and ≤ 0.25 $m^2$ [a] | All Other Domestic Tables [b] |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| i) | Strength under vertical static force, N | | | | | | |
| | Main surface for tables with height less than or equal to 600 mm | NA | 1 000 | – | NA | 1 cycle for 60 min. | 1 cycle for 60 min. |
| | Main surface for tables with height greater than 600 mm | | 250 | 1 000 | | | |
| | Ancillary surface | | – | 200 | | | |
| ii) | Strength under horizontal static forces | | | | | | |
| | Test force, N | NA | 200 | 400 | NA | 10 | 10 |
| | Minimum horizontal force, N | | 100 | 200 | | | |
| iii) | Durability under vertical forces, N | 200 | 300 | 300 | 5000 | 5 000 | 10 000 |
| iv) | Durability under horizontal forces | | | | | | |
| | a) Test Force, N | NA | 150 | 300 | NA | 5 000 | 10 000 |
| | b) Minimum horizontal force, N | | 75 | 150 | | | |
| v) | Stiffness of the structure under horizontal force, (mm/m of height), Max. | -- | 34 | 34 | -- | -- | -- |
| vi) | Durability of the height adjustment mechanism (kg) | 0 | 10 | 45 | -- | 5 000 (total) | 5 000 (total) |
| vii) | Vertical impact test for tables with glass in their construction (Drop height), mm (*see* Note 1) | | | | | | |
| | Safety glass (*see* Note 2) | 140 | 140 | 180 | 10 | 10 | 10 |
| | Other glass | 180 | 180 | 240 | 10 | 10 | 10 |
| viii) | Vertical impact test for all other table tops (Drop height), mm (*see* Note 1) | NA | 140 | 180 | 10 | 10 | 10 |
| ix) | Deflection of table tops (max), mm/m of length | 8 | 4 | 4 | – | – | – |
| x) | Durability of Tables with castors (kg) | 10 | 10 | 40 | 2 000 | 2 000 | 2 000 |
| xi) | Drop Test, Nominal drop height, mm | – | – | 100<br>50 (for glass tables) | – | – | – |

NOTES

**1** Impact the table top in accordance with the positions defined in **7.6.2**.

**2** Glass is considered to be safety glass if the glass fulfils the requirements of fragmentation as specified in IS 17004 and IS 2553 (Part 1).

**3** [a] Tables include side tables, coffee tables, center tables, etc.

[b] All other tables for domestic use can be considered like dining table, study table, etc.

[c] Small tables for decorative and/or light duty applications.

## 8 SAMPLING AND CRITERIA OF CONFORMITY

**8.1** All tables of same model/design and manufactured from same raw materials offered for inspection shall constitute a lot.

NOTE — Products made in different colours are considered to be the same lot.

**8.2** The required number of tables shall be selected at random and depend upon the size of the lot.

**8.3** The sample selected as per **8.2** shall subject to the tests as per **4**, **5**, **6** and **7** as applicable. The lot shall be declared as conforming to the requirements of this standard, if the sample meets the requirements of all the tests mentioned therein.

**8.4** The criteria of the conformity for the tests as per **6** shall be same as specified therein. However, for the tests as per **7**, the criteria of conformity shall be as follows:

a) No fracture of any component or joint;
b) No loosening of any joint intended to be rigid, that can be demonstrated by hand pressure;
c) No deformation or wear of any part or component such that its functioning is impaired; (does not apply to Table 4, clause **7.3.1.2**);
d) No loosening of any means of attachment; and
e) No or deformation of a component that can affect its stability.

## 9 MARKING

**9.1** Each table shall be indelibly and legibly marked with the following particulars:

a) Manufacturer's name, brand name or his recognized trade mark, if any;
b) Date of manufacture;
c) Design/model number (as declared by the manufacturer); and
d) Batch/lot number.

**9.2** Each table meant to be assembled by the customer shall have the instruction for assembly provided as a leaflet and/or available in digital document file.

### 9.3 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of *Bureau of Indian Standards Act,* 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

# ANNEX A

( *Clauses* 7.1, 7.2.2, 7.3.1, 7.4.1 *and* 7.7 )

## GENERAL TEST CONDITIONS

### A-1 PRELIMINARY PREPARATION

The furniture unit shall be tested as delivered or it shall be assembled according to the instructions supplied with it. If the furniture can be assembled or combined in different ways, the most adverse configuration intended for use shall be used for each test. If mounting or assembly instructions are not supplied, the assembly method shall be recorded in the test report. Fittings shall be tightened before testing and shall not be retightened unless specifically required by the manufacturer.

All the safety tests shall be carried out on the same sample. The tests shall be carried out in indoor ambient conditions in the range of 15 °C to 35 °C. For furniture products including hygroscopic materials it needs to be to conditioned to ambient environment's relative humidity prior to testing.

Levelling devices shall be opened to their midpoint of adjustment, but not more than 10 mm. During testing, the unit shall be placed on the floor and levelled, unless otherwise specified.

Before beginning the testing, visually inspect the unit thoroughly.

Record any defects so that they are not assumed to have been caused by the tests.

### A-2 APPLICATION OF FORCES

The test forces in the static load tests shall be applied slowly enough to ensure that negligible dynamic force is applied. Unless otherwise indicated, each force shall be maintained for (10 ± 2) s.

The test forces in durability tests shall be applied at a rate such that excessive heating does not occur. Unless otherwise specified, each test force shall be maintained for (2 ± 1) s.

The forces may be replaced by masses. The relationship, 10 N = 1 kg shall be used.

### A-3 TOLERANCES

The following tolerances are applicable:

a) *Forces* : ± 5 percent of the nominal force;
b) *Velocity* : ± 5 percent of the nominal velocity;
c) *Masses* : ± 1 percent of the nominal mass;
d) *Dimensions* : ± 1.5 mm of the nominal dimension; and
e) Angles : ± 2° of the nominal angle.

The accuracy for the position of loading pads and impactor shall be ± 5 mm.

### A-4 SEQUENCE OF TESTING

All applicable tests as mentioned in **7** shall be carried out on the same sample and in the sequence as the clauses as numbered in this standard. All tests if specified for a particular component shall be carried out on the same sample.

### A-5 PREVENTION OF MOVEMENT DURING TEST

If a unit tends to slide or roll during the tests specified in clause **7**, the unit shall be restrained by stops (*see* **B-3**).

### A-6 LOADS IN STORAGE COMPONENTS

All components, including extension elements, intended for storage purposes shall be uniformly loaded according to Table 7. The volume of extension elements shall be calculated as the internal area of the extension element bottom multiplied by the clear height above it.

**Table 7 Loads in Storage Components**

( *Clauses* 7.4.2 *and* A-6 )

| Sl No. | Part | Load for Office Tables | Load for Domestic Tables |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| i) | Shelves | 100 kg/m$^2$ | 150 kg/m$^2$ |
| ii) | Storage components for suspended filing only | 20 kg/m | 30 kg/m |
| iii) | All other storage components* | 200 kg/m$^3$ | 350 kg/m$^3$ |

* The clear space will not exceed 0.46 m for drawers with bottom panel

# ANNEX B

( *Clauses* 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8 *and* 7.9 )

## TEST APPARATUS

### B-1 GENERAL

The equipment shall not inhibit deformation nor cause unnatural deformation of the unit/component, it shall be able to move such that it can follow the deformation of the unit/component during testing.

All loading pads shall be capable of pivoting in all directions. The pivot point shall be as close as practically possible to the load surface.

### B-2 FLOOR SURFACE

The floor surface shall be a rigid, horizontal and flat.

For the strength under horizontal static force test (*see* **7.3.2**), the surface shall be a smooth decorative thermosetting synthetic resin bonded laminated sheets or equivalent steel surface. For the durability of tables with castors (*see* **7.8**), the test shall be carried out on a smooth steel surface.

Obstacles for castor durability tests, steel strips 50 mm wide and 2 mm thickness with the top edges having a radius of 2 mm, 500 mm apart and parallel on the floor surface and perpendicular to the test direction.

For the drop test (*see* **7.9**), the floor shall be faced with a 3 mm thick layer of rubber with a hardness of (85 ± 10) IRHD in accordance with IS 3400 (Part 2).

### B-3 STOPS

Devices shall be used to prevent the table from sliding or rolling but not tilting. These shall not be higher than 12 mm except in cases where the design of the table necessitates the use of higher stops, in which case the lowest that prevents the table from moving shall be used.

### B-4 LOADING PAD

**B-4.1** The loading pad is a rigid disc, 305 ± 5 mm with a flat face. Loading pads should have enough blend radius to avoid sharp edge.

**B-4.2** The loading pad is a rigid disc, 100 ± 5 mm with a flat face. Loading pads should have enough blend radius to avoid sharp edge.

### B-5 MASSES

Masses shall be designed so that they do not reinforce the structure or redistribute the stresses.

### B-6 POLYURETHANE FOAM

**B-6.1** Flexible foam of approximately 25 mm thick with a bulk density of (120 ± 25) kg/m$^3$ when tested as per IS 7888.

**B-6.2** The polyurethane foam sheet shall have a thickness of 100 mm, a bulk density of (30 ± 2) kg/m$^3$ and an indentation hardness index of (170 – 20) N when tested as per IS 16774, with dimensions approximately 200 mm more than the diameter of the impactor (**B-7**).

### B-7 VERTICAL IMPACTOR

As shown in Fig. 12 and comprised of the following:

**B-7.1** Circular body, 200 mm in diameter separated from the striking surface by helical compression springs and free to move relative to it on a line perpendicular to the plane of the central area of the striking surface. The body and associated parts minus the springs shall have a mass of (17 ± 0.1) kg and the whole apparatus, including mass, springs and striking surface, shall have a mass of (25 ± 0.1) kg.

**B-7.2** Springs, which shall be such that the nominal spring rate of the combined spring system is (7 ± 2) N/mm and the total friction resistance of the moving parts is less than 1 N. The spring system shall be compressed to an initial load of (1 040 ± 5) N (measured statically) and the amount of spring compression movement available from the initial compression point to the point where the springs become fully closed shall be not less than 60 mm.

**B-7.3** Striking surface, which shall be a rigid circular object, 200 mm in diameter, the face of which has a convex spherical curvature of 300 mm radius with a 12 mm front edge radius.

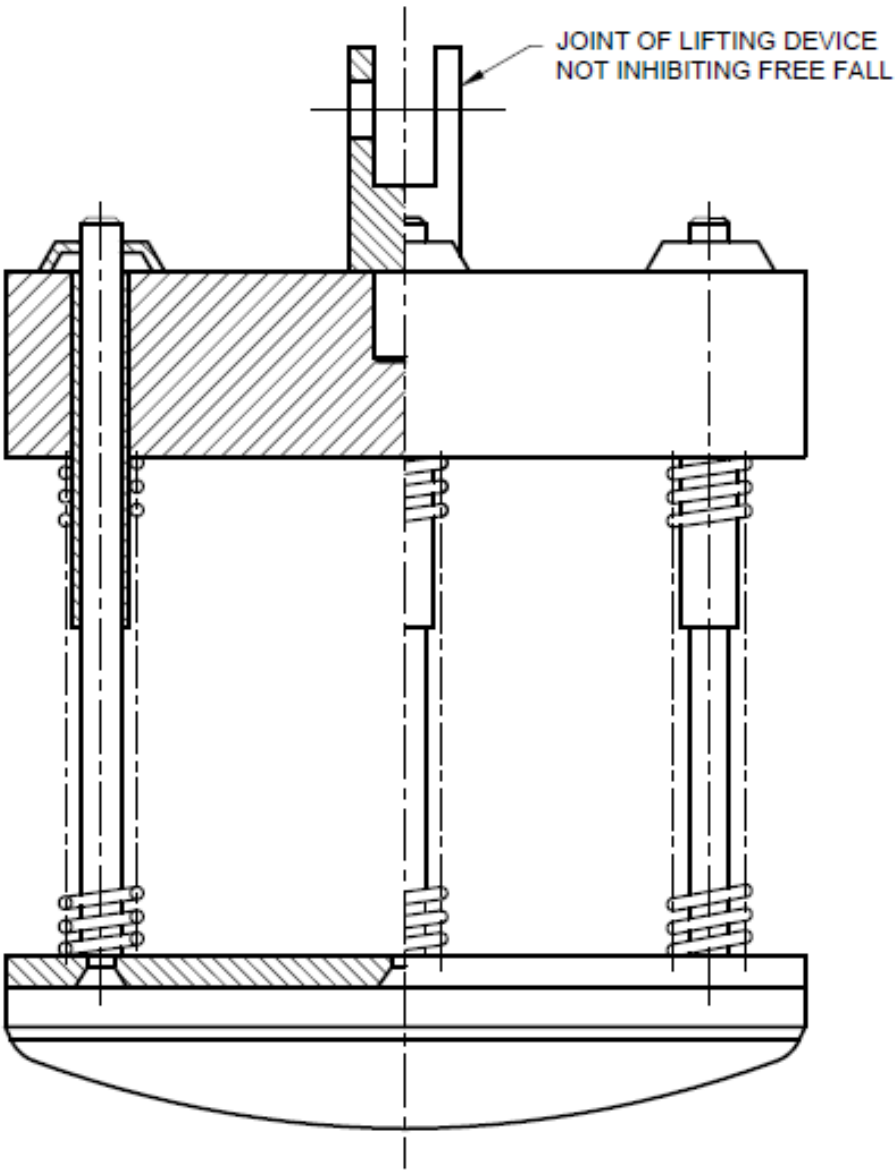



FIG. 14 VERTICAL IMPACTOR

# ANNEX C

( *Foreword* )

## COMMITTEE COMPOSITION

Furniture Sectional Committee, CED 35

| *Organization* | *Representative(s)* |
|---|---|
| In Personal Capacity (*II A, K-11, Ground Floor, Kailash Colony, New Delhi 110048*) | Shri Balbir Verma (***Chairman***) |
| Association of Furniture Manufacturers and Traders (I), Mumbai | Representative |
| Blowplast (BP) Ergonomics Ltd, Mumbai | Dr Nitin Sudame<br>Dr Gita Piramal (*Alternate*) |
| Central Public Works Department, New Delhi | Shri A. K. Sharma<br>Shrimati Nandni Mukopadhyay (*Alternate*) |
| Centre for Environmental Planning and Technology (CEPT) University, Ahmedabad | Prof Shrutie Tamboli<br>Prof Snehal Nagarsheth (*Alternate*) |
| CSIR-Central Building Research Institute, Roorkee | Shri S. K. Negi<br>Shri Ashok Kumar (*Alternate*) |
| Directorate of Education, Govt of NCT of Delhi, Delhi | Representative |
| Forest Research Institute, Dehradun | Dr Sadhna Tripathi<br>Dr Kishan Kumar (*Alternate*) |
| Godrej & Boyce Mfg Co Ltd, Mumbai | Shri Ega Venkateshwarlu<br>Shri Nirav Shah (*Alternate* I)<br>Shri Lalitesh Mandrekar (*Alternate* II) |
| Government e-Marketplace, New Delhi | Representative |
| Indian Furniture Products Ltd (Zuari), Tiruvallur | Shri C. M. Satheesh Kumar<br>Shri S. Saravanan (*Alternate*) |
| Institute of Indian Interior Designers, Mumbai | Shrimati Chirashree Thakkar |
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| School of Planning & Architecture, New Delhi | Prof Manoj Mathur<br>Prof Aruna Ramani Grover (*Alternate*) |
| The Indian Institute of Architects, Mumbai | Ar Vikramray Pramodray Pandya |

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*Member Secretary*

Shri Pradeep Singh Shekhawat
Scientist 'D' (Civil Engineering), BIS

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This Indian Standard has been developed from Doc No.: CED 35 (16971).

## Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
|---|---|---|
| | | |
| | | |
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| Northern | : Plot No. 4-A, Sector 27-B, Madhya Marg Chandigarh 160019 | 265 9930 |
| Southern | : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113 | 2254 1442<br>2254 1216 |
| Western | : Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093 | 2821 8093 |

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