भारतीय मानक

Indian Standard

IS 6315 : 2025

द्रवचालित फ्लोर स्प्रिंग — विशिष्टि

(तीसरा पुनरीक्षण)

Hydraulically Regulated Floor Springs — Specification

(Third Revision)

ICS 91.190

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

November 2025 **Price Group 8**

Builder's Hardware Sectional Committee, CED 15

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Builder's Hardware Sectional Committee had been approved by the Civil Engineering Division Council.

Automatic door closing devices are becoming a necessity for homes, offices and commercial establishments like malls, hotels, hospitals, especially in air-conditioned rooms/areas, for the prevention of temperature losses, reduction of outside noise, ensuring privacy, and restricting movement of people. A floor spring is installed within the floor and flushes with the surface. Doors are mounted on floor springs along with accessories to support the load of the door and decide the direction of opening and closing.

It is also essential that the device should be compact in shape and size and at the same time easy to mount. The heavy entrance doors used in public buildings need special attention. At the same time devices fixed thereto also cater for long service periods to which these are subjected.

This standard was first published in 1971 and subsequently revised in 1986 and 1992. This standard covers the fire rated and non-fire rated hydraulically regulated floor or frame mounted concealed floor springs which are widely used, and it lays down the requirements for their manufacture and performance. In this revision, the following major changes have been incorporated:

a) Scope has been extended to specify the requirements for floor springs, both fire rated and non-fire rated, and for doors weighing up to 160 kg,

b) Based on durability, corrosion resistance and other performance parameters, classification codes have been added to harmonize the product marking and selection for easy understanding of the user; and

c) Marking clause has been modified.

While formulating this standard, considerable assistance has been derived from EN 1154 : 1997 'Building hardware — Controlled door closing devices — Requirements and test methods' with some modifications to suit Indian conditions.

The composition of the Committee responsible for the revision of this standard is given in Annex D.

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 : 2022 'Rules for rounding off numerical values (*second revision*)'. 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

HYDRAULICALLY REGULATED FLOOR SPRINGS — SPECIFICATION

(Third Revision)

1 SCOPE

This standard specifies the requirements of fire rated and non-fire rated hydraulically regulated floor or frame mounted concealed floor springs for all types of doors weighing up to 160 kg.

2 REFERENCES

The standards given below 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 edition of these standards.

IS No.	*Title*
IS 3614 : 2021	Fire doors and doorsets — Specification (*first revision*)
IS 4905 : 2015/ ISO 24153 : 2009	Random sampling and randomization procedures (*first revision*)
IS 5528 : 2024/ ISO 9227 : 2022	Corrosion tests in artificial atmospheres — Salt spray tests (*second revision*)

3 TERMINOLOGY

3.1 Floor Spring — A mechanical device installed within the floor, flush with the surface, designed to regulate the closing of a door by means of hydraulic force. It supports the load of the door through suitable accessories, determines the direction of opening and closing, and provides a smooth, controlled closing action after the door is opened manually and released. Floor springs are available in various designs for different applications. A typical floor spring sketch is shown in Fig. 1.

3.2 Single Action Floor Spring — A floor spring used to close automatically in one direction only.

3.3 Double Action Floor Spring — A floor spring used to close automatically in both the directions.

3.4 Right-Handed Floor Spring — A door which when viewed from the top, rotates in the anticlockwise direction about its hinges while opening, is right hand door and the floor spring suitable for such door is right-handed floor spring.

3.5 Left-Handed Floor Spring — A door which when viewed from the top, rotates in a clockwise direction about its hinges while opening, is left hand door and the floor spring suitable for such door is left-handed floor spring.

3.6 Angle of Closing — The maximum angle from fully closed position to which the floor spring can complete the closing action.

3.7 Single Action Accessories — All floor springs by their design can be used for closing of doors in either direction. However, by use of specific accessories which are handed the opening and closing sequence can be regulated in a single direction. Single action accessories are used to define the direction of opening of door in a single direction.

3.8 Double Action Accessories — All floor springs by their design can be used for closing of doors in either direction. Double action accessories allow for opening and closing of doors in both directions.

3.9 Regulating Valves

3.9.1 *Closing Speed Valve* — An in-built valve to control the closing speed.

3.9.2 *Latching Speed Valve* (*Optional*) — A separate in-built adjustment valve to accelerate or decelerate the door to ensure positive latching.

3.9.3 *Power Regulating Valve* (*Optional*) — An in-built valve to adjust the power or the strength of the floor spring.

3.10 Closing Speed — The speed at which a floor spring closes the door after being released, adjustable through closing speed valves.

3.11 Latching Speed (Optional) — The speed at which a floor spring controls the final few degrees of door closing, adjustable through latching speed valves.

3.12 Delayed Closing Action (Optional) — A floor spring equipped with a delayed action feature that allows the door to remain open for a certain period of time before closing at the adjusted speed. This is accomplished by the addition of a delayed action adjustment valve on the floor spring, in addition to the speed and power regulating valves.

3.13 Back Check (Optional) — It is an adjustable feature available on many floor springs that provides 'resistance' to prevent the door from being thrown open (by people or the wind) and causing personal injury or damage to the door, door handles or walls.

3.14 Power Size — It is a measure of the closing moment exerted by a door closer (*see* Table 1).

3.15 Hold Open — It is a function in floor spring which allows doors to be held in open position at 90° angle or may be more in case of field selectable hold open mechanism. It requires manual release and is not suitable for fire doors.

3.16 Closing Force — The force exerted by a door closer to move the door into the closed position, determined by the spring strength of the closer .

3.17 Power Adjustment by Spring — The closers power can be adjusted after it is fitted by adjusting the spring tension of the unit to suit door size (width) and site conditions.

3.18 Door Coordinator — A device used on a pair of doors to ensure that the inactive leaf is permitted to close before the active leaf. Necessary when an overlapping astragal is present and exit devices, automatic or self-latching bolts are used with closers on both door leaves.

3.19 Bottom Pivot — Accessory used for mounting of door on to the floor spring. These accessories vary for various types of doors like steel, aluminium, wood and glass.

3.20 Top Centre Pivot — A device used for supporting the door from top, usually mounted on to the frame profile or lintel. Available both as adjustable and fixed.

3.21 Spindle — It is the rotating cam connected to the floor spring which takes the entire load of door. All bottom accessories fit on the spindle.

3.22 Shoe — It is a device fixed to the bottom of the door leaf to hoist it to the floor spring.

3.23 Closing Moment — The torque generated by the door closing device which acts upon the door leaf during the closing operation.

3.24 Opening Moment — The torque generated by the user which acts upon the door leaf during the opening operation.

3.25 Efficiency — A ratio of the opening force applied to the door by the user, and the force available for closing the door, expressed as a percentage.

3.26 Test Cycle — A cycle includes all operations of the test door, from the closed position, to opening to the required position and to closing back to the closed position.

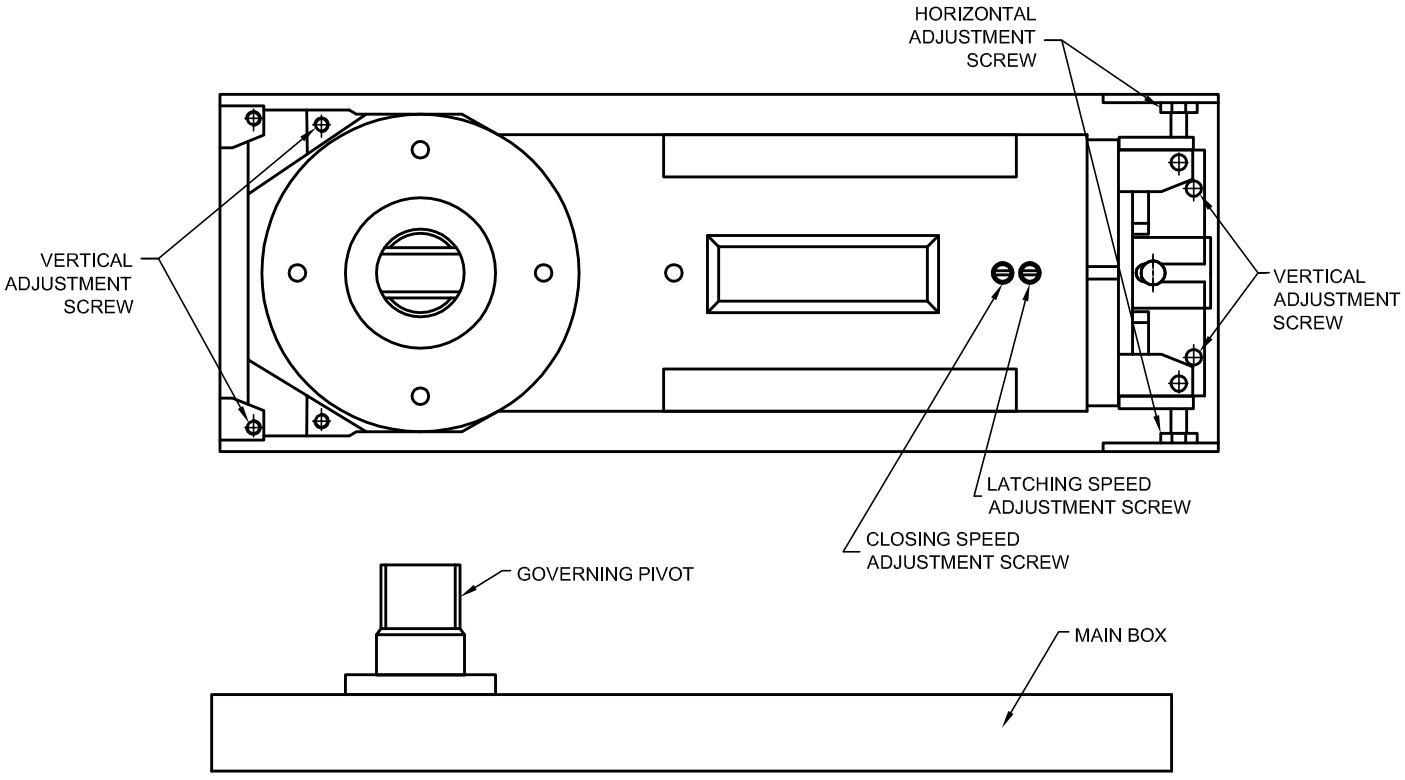


FIG. 1 TYPICAL ILLUSTRATIONS OF FLOOR SPRING (COVER REMOVED)

4 TYPES OF HYDRAULIC FLOOR SPRINGS

Based on the functions, the floor springs are classified into two types as follows:

4.1.1 *With Hold Open*

It is an in-built function that allows the door to remain at either a pre-set or chosen angle until manually released. The standard hold-open point is predominantly 90° and may goes up to 120°. Floor springs can have a fixed hold open angle or a field selectable degree of hold-open starting from 70° to 120° or more. A floor spring may also have on/off feature of hold-open function.

4.1.2 *Without Hold Open*

Floor springs under this category may not have any in-built hold-open function and come with a self-closing mechanism from any opening angle.

5 CONSTRUCTION OF FLOOR SPRING AND ACCESSORIES

5.1 A floor spring can have a single cylinder or a double cylinder to achieve the required spring size as mentioned in Table 1. All floor springs shall satisfy the requirement of spring strength, which may be fixed or variable. For example, a fixed spring of size 3 is suitable for door widths up to 950 mm and weights up to 60 kg. If it is variable or adjustable, like spring size 2 to 4 it means the floor spring can be used on door widths from 850 mm to 1 100 mm and weights from 40 kg to 80 kg.

5.2 The cylinders are cased in a body with springs and filled with hydraulic oil for controlled closing of doors. Floor springs with field-selectable hold-open, closing speed, back check or delayed closing shall have separate valves in the body of the closer with marking of their function.

5.3 Suitable oil seals may be provided to assure oil will not leak either from the spring side or from the valves.

5.4 The floor spring body shall be provided with the foundation box to protect it from corrosion and shall include a provision for aligning the floor spring body once the box is cemented. Dimensions of the box and tolerances for adjustments may vary as per construction requirements. The overall dimensions of the foundation box and the tolerances thereon shall be declared by the manufacturer.

5.5 Fixed spindle(s) or removable spindle(s) may be provided for mounting the door along with accessories (*see* Fig. 2). The spindle material shall be made of hardened steel or stainless steel and the relevant Indian Standard and grade of the material shall be declared by the manufacturer.

5.6 Floor spring, by design can be used for both-side swing (double swing) or for opening in one direction (single swing). The opening and closing sequence of the floor spring may vary based on the accessories used for mounting the door on the spindle. Single action accessories will allow doors to open in one direction. Double action accessories are used when the door needs to swing open in both directions.

5.7 Floor spring shall be provided with a protective cover made of either stainless steel or brass and the relevant Indian Standard and grade of the material shall be declared by the manufacturer. The finish of these covers can be polished and may vary based on the manufacturer declaration. Floor springs with single action accessories are mounted in an offset, which requires a cover plate with a split plate (*see* Fig. 3).

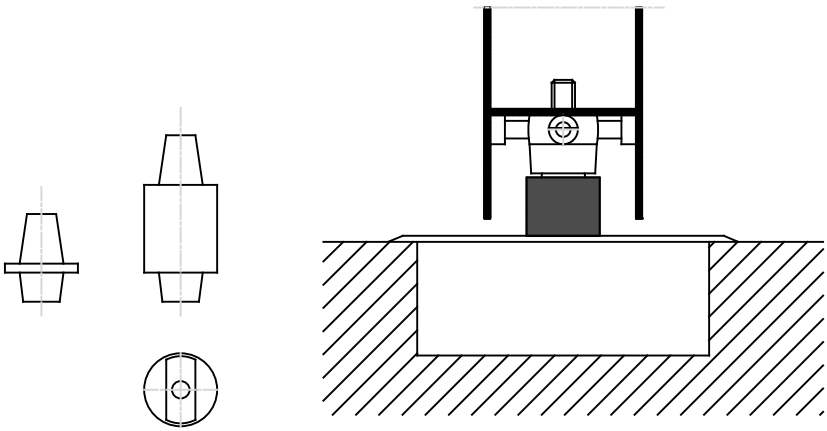


FIG. 2 TYPICAL SKETCHES OF SPINDLES FOR FLOOR SPRING

5.8 Accessories for Double Action Floor Spring

Double action accessories are used when the door swings open in both directions. The floor spring is placed centrally aligned to the frame at the time of installation as per the manufacturer instructions. The following additional accessories are required to mount solid doors. In case of glass doors, the glass fittings work as a bottom shoe or bottom pivot or top pivot. Also, suitable glass fixtures can be used as mounting elements.

The manufacturer shall provide suitable double action accessories to mount various types of doors like wood, steel and aluminium. The accessories shall include bottom strap and top pivot with receiver plate for doors (*see* Fig. 4 and Fig. 5).

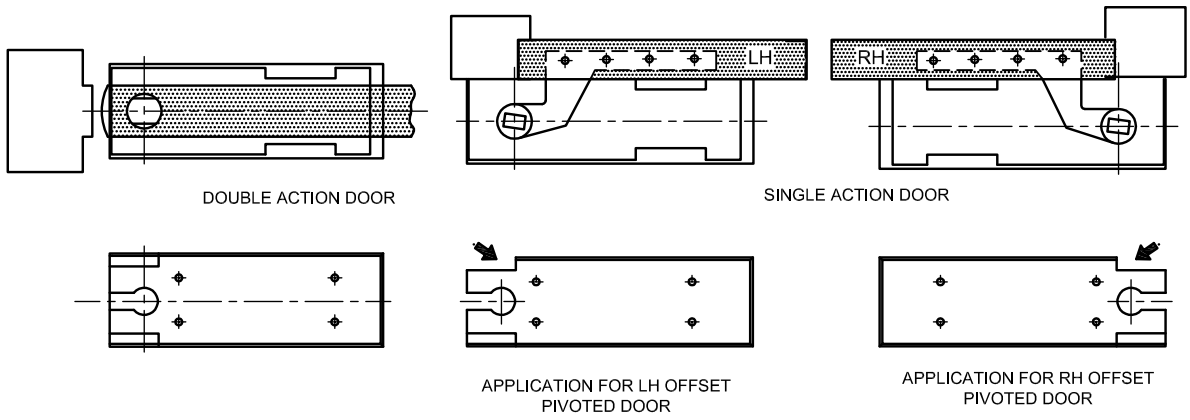


FIG. 3 TYPICAL SKETCHES OF DIFFERENT TYPES OF COVER PLATES FOR FLOOR SPRINGS

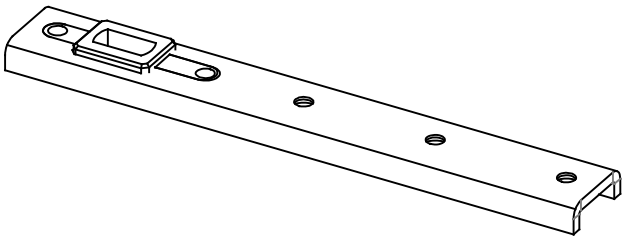


FIG. 4(A) BOTTOM STRAP

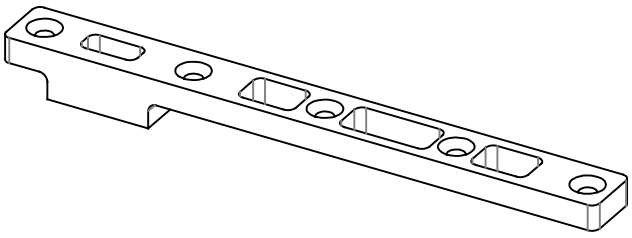


FIG. 4(B) BOTTOM STRAP

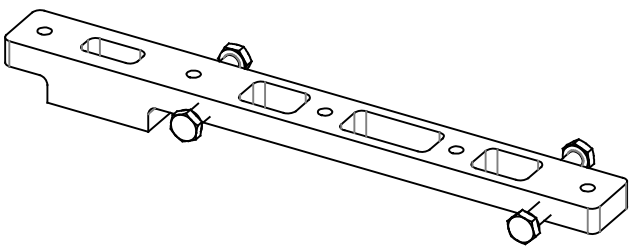


FIG. 4(C) UNIVERSAL BOTTOM STRAP

FIG. 4 TYPICAL SKETCHES OF DOUBLE ACTION ACCESSORIES — BOTTOM STRAPS FOR VARIOUS TYPES OF DOORS APPLICATIONS

5.9 Accessories for Single Action Floor Spring

Single action accessories are used in applications where the swing of the door is restricted to one direction, also known as single swing door. The floor spring is placed in an offset and aligned with the rebated frame at the time of installation as per the manufacturer's instructions. Additional accessories will be required to mount solid doors. In the case of glass doors, the glass fittings work as a bottom shoe or bottom pivot or top pivot. Also, suitable glass fixtures can be used as mounting elements.

The manufacturer shall provide suitable single action accessories, as part of package or as additional accessories to mount various types of doors like wood, steel and aluminium. The accessories shall include a bottom strap and a set of top straps for the frame and shutter for doors (for reference, *see* Fig. 6). In addition, protective covers may be required to cover the straps projecting out of the door and these covers may be handed for the top and bottom straps.

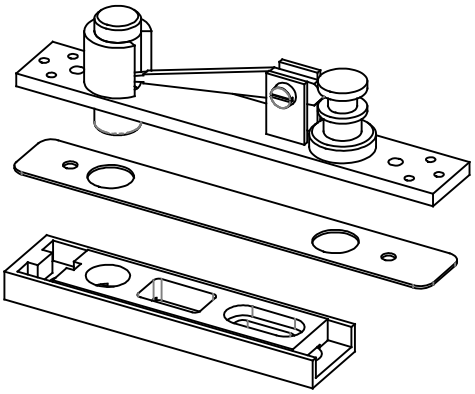


FIG. 5 TYPICAL SKETCH OF DOUBLE ACTION ACCESSORIES — TOP CENTRE PIVOT FOR VARIOUS TYPES OF DOORS APPLICATIONS

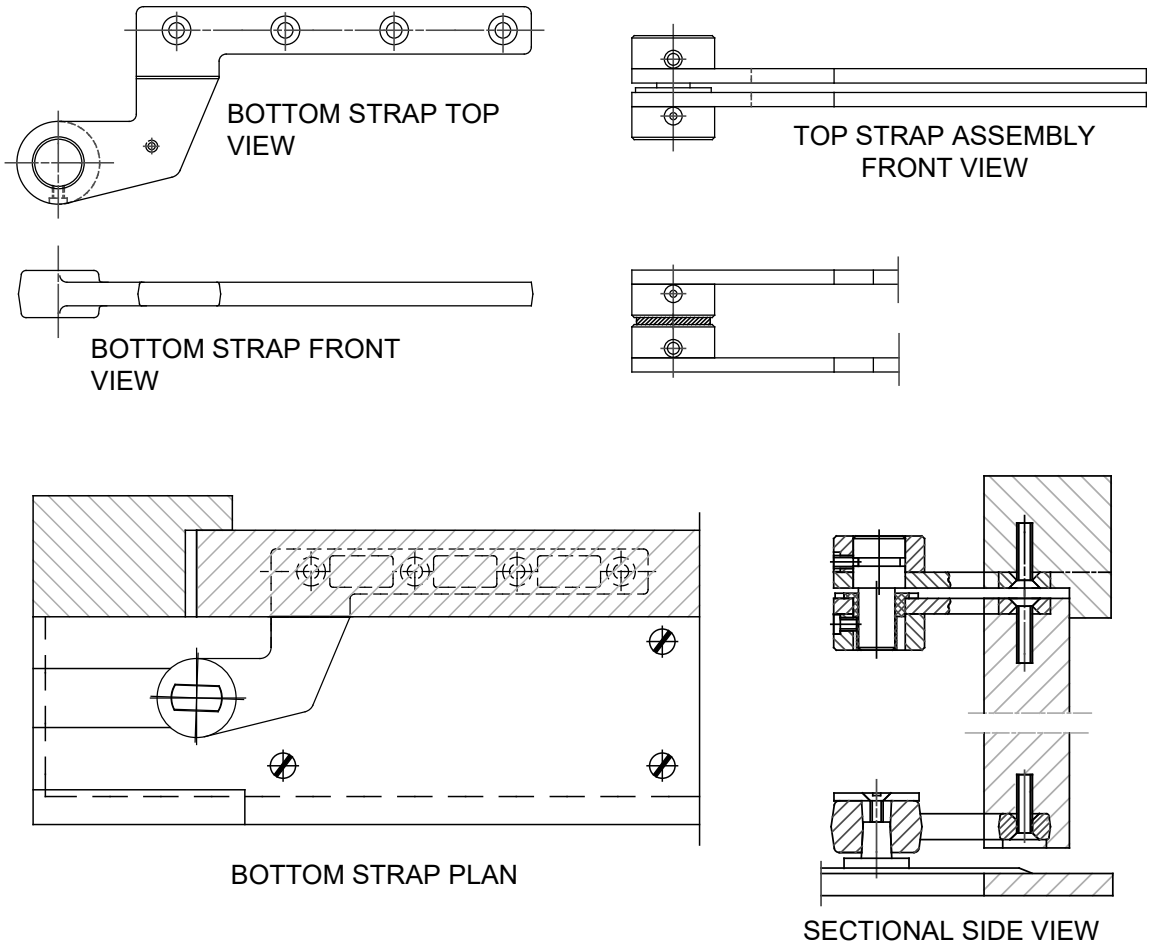


FIG. 6 ILLUSTRATIONS OF SINGLE ACTION ACCESSORIES — TOP AND BOTTOM STRAP FOR VARIOUS TYPES OF DOORS APPLICATIONS

6 FUNCTIONAL CONTROLS OF FLOOR SPRINGS

6.1 Closing Force (*see* 3.16) — Floor springs are classified into power sizes from 1 to 7 (*see* Table 1), corresponding to door width and weight. Manufacturer supply floor spring with either fixed power size (for example, 2, 3, or 4) or adjustable power size (for example, 2 to 4 or 3 to 6). Adjustable closing force floor spring shall be provided with an adjusting valve to increase or decrease the closing force.

6.2 Closing Speed (*see* 3.10) — Floor spring closing speed may vary based on type of floor spring and its power size. The closing speed shall be operated by single adjustable valve from 180° to 0° in case of double action and 90° to 0° in case of single action floor spring. Any other angle may also be agreed between the manufacturer and the purchaser. Alternatively, floor spring can have multiple adjustable valves to control the closing speed — from 180° to 15° in the case of double-action, from 90° to 15° in the case of single-action, and from 15° to 0° for the final closing operation. For typical illustration, *see* Fig 7.

6.3 Latching Speed — *See* 3.11 and for typical illustrations, *see* Fig 7.

6.4 Back Check — *See* 3.13 and for typical illustrations, *see* Fig 7.

6.5 Delayed Closing — *See* 3.12 and for typical illustrations, *see* Fig 7.

7 NOMINAL SIZES

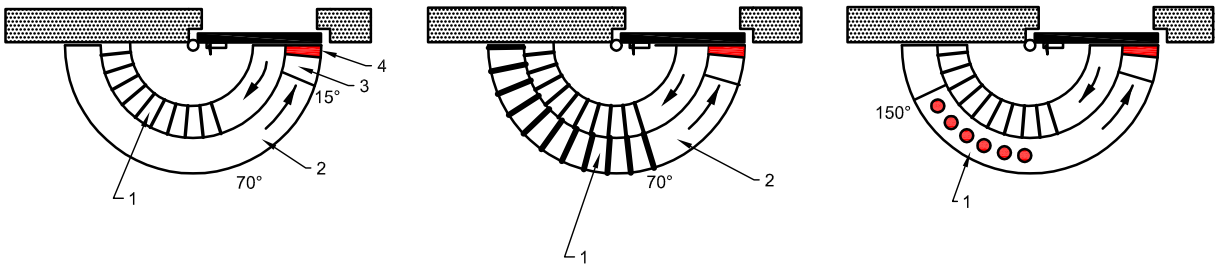
The floor springs shall be classified by power sizes based on suitability for the weight and width of the door leaf, as per Table 1. Where a floor spring provides a range of power sizes, both the minimum and maximum shall be defined, for example size 2 - 4.

NOTE — For floor springs of higher power sizes and for door weights more than 160 kg, the performance requirements shall be as agreed between the manufacturer and the purchaser.

8 MATERIALS, FINISH AND WORKSMANSHIP

8.1 The components of a floor spring shall be manufactured from suitable materials and plated or coated to meet the performance and corrosion resistance requirements given in this standard.

8.2 The floor spring, along with its accessories shall be free from burrs, flashes, dents, nicks etc. The sub assembly and necessary accessories shall not show any signs of oil leakage, rust, scales, grease, scratches or dents.



KEYS
1 SELF - REGULATING BACK CHECK
2 INFINITELY VARIABLE CLOSING SPEED IN THE RANGE 180° - 15°
3 INFINITELY VARIABLE CLOSING SPEED IN THE RANGE 15° - 0°
4 ADJUSTABLE LATCH RANGE (BY ARM)

KEYS
1 ADJUSTABLE DELAYED ACTION
2 FULLY CONTROLLED CLOSING WITH ADJUSTABLE SPEED

KEYS
1 HOLD OPEN RANGE

NOTE THE ABOVE VALUES AND RANGE ARE INDICATIVE ONLY

FIG. 7 TYPICAL ILLUSTRATIONS OF FLOOR SPRING SPEED CONTROLS AND VARIOUS FUNCTIONS

Table 1 Power Size

(*Clauses* 3.14, 6.1, 7, 9.3, 10.4.1, 10.4.2, C-3.8, C-3.9 *and* C-4.1)

Sl No.	Power Size	Recommended Door Leaf Width, mm	Test Door Weight, *kg*	Closing Moment, Nm			Opening Moment Between 0° to 60° Nm	Floor Spring Efficiency Between 0° and 4°, percent
				Between 0° to 4°	Between 88° to 92°	Any Other Angle of Opening		
		Max		*Min*	*Max*	*Min*	*Min*	*Max*	*Min*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	1	750	20	9	13	3	2	26	50
ii)	2	850	40	13	18	4	3	36	50
iii)	3	950	60	18	26	6	4	47	55
iv)	4	1 100	80	26	37	9	6	62	60
v)	5	1 250	100	37	54	12	8	83	65
vi)	6	1 400	120	54	87	18	11	134	65
vii)	7	1 600	160	87	140	29	18	215	65

NOTE — Test door masses shown are only related to floor spring power size for the purpose of the test procedure.

9 CLASSIFICATION CODE

For the purpose of this standard, floor spring shall be classified according to following 6-digit coding system.

9.1 Digit 1 — Category of Use

For use on all internal and external doors, the grades for classification are as follows:

a) Grade 3 — For closing doors from at least 105º;

b) Grade 4 — For closing doors from 180º open.

NOTES

1 Grade 4 classification assumes standard installation according to the manufacturer's instructions.

2 For applications subject to extreme abuse, or for a particular limitation of opening angle, floor spring incorporating a back check function or provision of a separate door-stopper should be considered.

9.2 Digit 2 — Durability

Based on the durability aspects, four grades are specified as follows:

a) Grade 5 — 50 000 test cycles;

b) Grade 6 — 1 00 000 test cycles;

c) Grade 7 — 2 00 000 test cycles; and

d) Grade 8 — 5 00 000 test cycles.

9.3 Digit 3 — Test Door Mass and Floor Spring Power Size

Seven test door mass grades and related floor spring power sizes are classified in Table 1. Where the floor spring provides a range of power sizes, both the minimum and the maximum sizes shall be mentioned.

9.4 Digit 4 — Fire Resistance

Five grades are classified for the requirement of use of floor spring on fire door assemblies are as follows:

a) Grade 0 — Not suitable for use on fire/smoke check doors;

b) Grade 1 — Minimum fire resistance capacity 30 min;

c) Grade 2 — Minimum fire resistance capacity 60 min;

d) Grade 3 — Minimum fire resistance capacity 90 min; and

e) Grade 4 — Minimum fire resistance capacity 120 min.

NOTE — Floor spring with power size of 1 and 2 are not recommended to use on fire/smoke check doors because of their low closing moments.

9.5 Digit 5 — Safety

All floor springs are required to satisfy the essential requirements of safety in use. Therefore, only

Grade 1 is identified.

9.6 Digit 6 — Corrosion Resistance

Corrosion resistance are categorized in five grades based on following duration when tested for neutral salt spray test as per IS 5528.

a) Grade 1 — Mild corrosion resistance, up to 24 h (recommended for dry interiors);

b) Grade 2 — Moderate corrosion resistance, up to 48 h (recommended for interiors subject to condensation);

c) Grade 3 — High corrosion resistance, up to 96 h (recommended for damp interior and exterior); and

d) Grade 4 — Very high corrosion resistance, up to 240 h (recommended for industrial /coastal exterior)

9.7 Examples of Classification

Floor spring with fixed power size, can close the door from at least 105° open position, and has been tested for 50 000 cycles of operation, is suitable for door widths up to 950 mm and weight up to 60 kg, is not suitable for fire/ smoke doors, meets the safety requirements and has a moderate corrosion resistance.

Digit 1	Digit 2	Digit 3	Digit 4	Digit 5	Digit 6
3	5	3	0	1	2

Floor spring with variable power sizes, can close the door from at least 180° open position, and has been tested for 2 00 000 cycles of operation, is suitable for door widths starting from 850 mm up to 1100 mm and weight from 40 kg up to 80 kg, is suitable for up to 60 min fire/smoke resistance when installed with an equivalent fire rated door along with recommended accessories, meets the safety requirements and has high corrosion resistance.

Digit 1	Digit 2	Digit 3	Digit 4	Digit 5	Digit 6
4	7	2 4	2	1	3

10 PERFORMANCE REQUIREMENTS

10.1 General

10.1.1 The general test conditions and tolerances on testing parameters shall be as given in Annex A.

10.1.2 When tested as per this standard, the floor springs shall meet the performance requirements given in 10.2 to 10.8 as per the declared classification code (*see* **9**) of the floor spring.

10.2 Angle of Operation

The floor spring, when installed as per the manufacturer's installation template and installation instructions, shall permit the floor spring to open as per declared classification code (*see* **9.1**), and on closing, shall control the door from a minimum angle of 70º, down to the closed position.

10.3 Durability

10.3.1 The floor spring shall be able to close the test door complying with the requirements mentioned in **B-3** from opening angle of 90º. The floor spring sample shall be subjected to durability cycles as per declared classification code (*see* **9.2**), with the maximum load specified by the power size of floor spring. For double action floor spring, the direction of closing to be alternated between clockwise and anticlockwise directions after every 5 000 cycles.

10.3.2 At the end of the test, the floor spring shall not show any signs of oil leakage, damage to the floor spring that will adversely affect its performance. After the test, verify the functioning of the floor spring for hold open and delayed closing action features (if available) in accordance with **C-2.2** and **C-2.5** respectively. The test set-up and method for floor spring testing are given at Annex B and Annex C respectively.

10.4 Power Size and Efficiency

10.4.1 The floor spring manufactured in any of seven power sizes, shall confirm to the requirements of efficiency given in Table 1 in accordance with the direction of opening of the door either clockwise or anticlockwise. After 5 000 test cycles and after completion of the test and tested as per the method given in measured floor spring efficiency between 0° and 4° of the sample shall not be less than the values mentioned in Table 1 for the particular power size.

10.4.2 For Grade 5 floor spring under classification digit 2 (*see* **9.2**), that is durability, conformity to the requirements of closing moment, opening moment and floor spring efficiency given in Table 1 is not required.

NOTE — In case of **10.4.2**, values of the closing moment and opening moment shall be recorded for the corrosion resistance test (*see* **10.7** and **B-4**)

10.5 Fire Resistance

10.5.1 This requirement is based on the evaluation of the product on test door assemblies as per IS 3614. The manufacturer shall indicate the method of fixing which will be used, together with the details of any additional material necessary to achieve the required performance under this test. The product shall conform to the classification given in **9.4**.

10.5.2 For fire rated floor spring, additional requirements are as follows:

10.5.2.1 The floor spring, when installed as per manufacturer installation instructions, shall be capable of closing the test door from any angle to which it may be opened. Floor springs with adjustable closing force shall be capable of adjustment at least to power size 3.

NOTE — For floor spring with adjustable closing force, the installation instructions shall include precise instructions to the installer to ensure that the floor spring power is adjusted on the site to size 3 or more, to overcome resistance of any seals or latches fitted.

10.5.2.2 Hold open units shall not be allowed on fire rated doors.

10.5.2.3 Control regulators shall be either concealed or operable by only tools.

10.5.2.4 The floor spring shall be designed in a manner that it is not possible to inhibit the closing action in anyway without the help of the tools.

10.5.2.5 Any delayed action function shall be capable of adjustment to less than 25 s, from the door closing angles of 120º to the end of the delay zone.

10.5.2.6 Where the floor spring is intended to be used with other significantly different assemblies, which may be supplied separately, that combination shall also be tested and conforms to the requirements given in **10**.

10.6 Safety

There shall be no sharp edges that may cause injury during installation and usage. The floor spring shall also meet the requirements given in **8.2**.

10.7 Corrosion Resistance

10.7.1 Floor spring sample shall be tested for neutral salt spray test as per IS 5528 for the duration as per classification code (*see* **9.6**) as per the grade declared by the manufacturer. At the end of the test, remove the floor spring from the salt spray cabinet. After half an hour, carefully remove residues of the spray solution from their surfaces. A suitable method is to rinse or dip the specimens gently in clean running water at a temperature not exceeding 40 °C and then to dry them immediately in a stream of compressed air at a pressure not exceeding 200 kPa, at a distance of approximately 300 mm.

10.7.2 Post rinsing, when measured as per **C-3.4**, the closing moment of the floor spring shall not be less than 80 percent of the closing moment measured prior to the corrosion resistance test.

10.8 Operation at Extremes Temperature

10.8.1 Before setting and before each measurement at the temperature extremes, the floor spring shall be conditioned in the temperature-controlled chamber for a minimum of 3 h at the relevant temperatures mentioned in **10.8.2**, **10.8.3** and **10.8.4**. Mount the floor spring in accordance with the manufacturer's installation instructions on test door set-up (*see* Annex B), and the requirements (*see* **10.8.5**) shall be checked within 15 minutes of each conditioning.

10.8.2 With the floor spring temperature stabilised at 25 °C ± 5 °C for a minimum of 3 h, adjust the floor spring to provide a smooth closing action from 90° open to fully closed, in a time of 10 s ± 5 s. Take the average of three readings.

10.8.3 Stablise the floor spring temperature at -10 °C ± 2 °C for a minimum of 3 h, open the door slowly to 90° open in a time of not less than 4 s and measure the time taken to return to the fully closed position. Take the average of three readings.

10.8.4 Without readjusting the regulator(s), stabilize the floor spring temperature at 40 °C ± 2 °C for a minimum of 3 h and again, measure the closing time from the 90° open position to fully closed. Take the average of three readings.

10.8.5 Verify that the average closing time from 90° open to full closed position, at each temperature extreme, shall not be decreased to less than 5 s or increased to more than 20 s. It also shall not show any signs of oil leakage.

11 LOT, SAMPLING AND CRITERIA OF CONFORMITY

11.1 Lot

All floor spring of the same power size, functions, construction and manufactured under relatively similar conditions of production shall be considered as one lot.

11.2 Sampling

11.2.1 The floor springs may be selected at random from the lot, for reference see IS 4905.

11.2.2 The minimum quantity of floor springs to be taken for the testing of samples shall be as follows:

a) One floor spring for general requirements (workmanship, finish and safety), functional check and operation at extreme temperatures;

b) One floor spring for durability (including power size and efficiency);

c) One floor spring for corrosion resistance; and

d) One floor spring for fire resistance, on test door assemblies as per IS 3614.

NOTE — In case the floor spring has adjustable power sizes, in case of a) and b), two floor springs to be drawn from the lot. One floor spring to be set to minimum power size and other to maximum power size and tested as per this standard. For corrosion test, only one floor spring set to minimum power size to be tested.

11.3 The samples of floor spring selected for testing for conformity, shall meet the requirements as given in this standard.

12 MARKING

12.1 Each floor spring body shall be legibly and indelibly marked with the following information:

a) Manufacturer's logo or brand name or trademark;

b) Marking of control valves; and

c) Classification code (*see* 9).

12.2 The following information shall be legibly marked on the packing:

a) Manufacturer's name or trademark or other means of manufacturer identification;

b) Handing of floor spring (if applicable) — L, R or U of floor spring;

c) Classification code of the floor spring (*see* 9);

d) Maximum opening angle;

e) Quantity and contents in the package;

f) Batch number.; and

g) Month and year of manufacture.

12.3 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 the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder and the product may be marked with the Standard Mark.

13 PACKING

13.1 The floor spring shall be packed in individual packs. Additionally, it may be suitably reinforced to prevent damage to the packed contents. Packing shall be of such type and quality as to protects the contents from moisture and physical damage during storage and transportation.

13.2 Each floor spring shall be supplied with a list of accessories along with instructions for its installation, regulation, use and maintenance.

13.3 Manufacturer shall provide the information on maximum opening angle possible with the floor spring in the product literature and the product packing for easy understanding.

13.4 Where the floor spring is recommended for fitting in other than standard application, these instructions shall clearly define the floor spring power size for each application of fitting position stated.

13.5 Installation Template

13.5.1 The manufacturer shall provide clear, detailed instructions for its installation, regulation and maintenance which shall include any limitation of opening angle.

13.5.2 Installation templates shall be provided with all types of floor springs and shall contain at least the following instructions for users.

a) Floor spring power size (or maximum door weight and maximum door leaf width);

b) Floor spring mounting position and installation template;

c) Fixing screws;

d) Recommended drill bit for making holes on doors;

e) Instruction on spring adjustment (for adjustable power size floor spring;)

f) Instructions on closing speed adjustment; and

g) Any additional information suitable for making proper adjustments and maintenance of floor springs.

ANNEX A

(*Clause* 10.1.1)

GENERAL TOLERANCES IN THE TESTING PARAMETERS

A-1 TOLERANCES

Throughout this standard, the following tolerances shall apply, unless otherwise stated;

a) Mass in kilograms or grams (kg or g) : ± 2 percent

b) Length in millimetres (mm) : ± 2 percent

c) Force in kilo Newton or Newton (kN or N) : ± 2 percent

d) Torque/moment in Newton-metre (Nm) : ± 2 percent

e) Time in seconds (s) : ± 5 s

f) Temperature in celsius (ºC) : ± 2 ºC

g) Angular position expressed in degrees : ± 2 percent

A-2 The ambient atmospheric temperature of the test environment shall be controlled throughout the tests in between (25 ± 5) ºC.

ANNEX B

(*Clauses* 10.3.1 *and* 10.8.1)

TEST SET-UP FOR FLOOR SPRING TESTING

B-1 Single Action Floor Spring

The test apparatus shall consist of a test door mounted in a frame, capable of opening to angles above the maximum opening angle of floor spring or maximum up to 180º with automatic actuating means to enable the required opening angle.

B-2 Double Action Floor Springs

The test apparatus shall consist of test door mounted in a frame, capable of opening to at least 120º in each direction with automatic actuating means to enable the required opening angle in alternate directions.

B-3 Test Door

B-3.1 The test door shall be minimum of 2 000 mm high, and of any width between 750 mm and 1 200 mm. The test door shall be mounted vertically on hinges or bearings to ensure a consistent, smooth opening with actuating mechanism, and proper closing of the door under the action of the floor spring. It shall have means of attaching weights so that the door mass can be adjusted to suit the power size of the floor spring under test in accordance with Table 1. The test door and frame shall be of sufficient rigidity such that no visible distortion occurs during the entire test process.

B-3.2 The centre of gravity shall be approximately at the mid-height position of the test door leaf, and 500 mm from the vertical axis of the hinges or pivots. The test door shall be mounted vertically on hinges or bearings, or, in the case of floor spring with a pivoting, on the unit under test (*see* Fig 8).

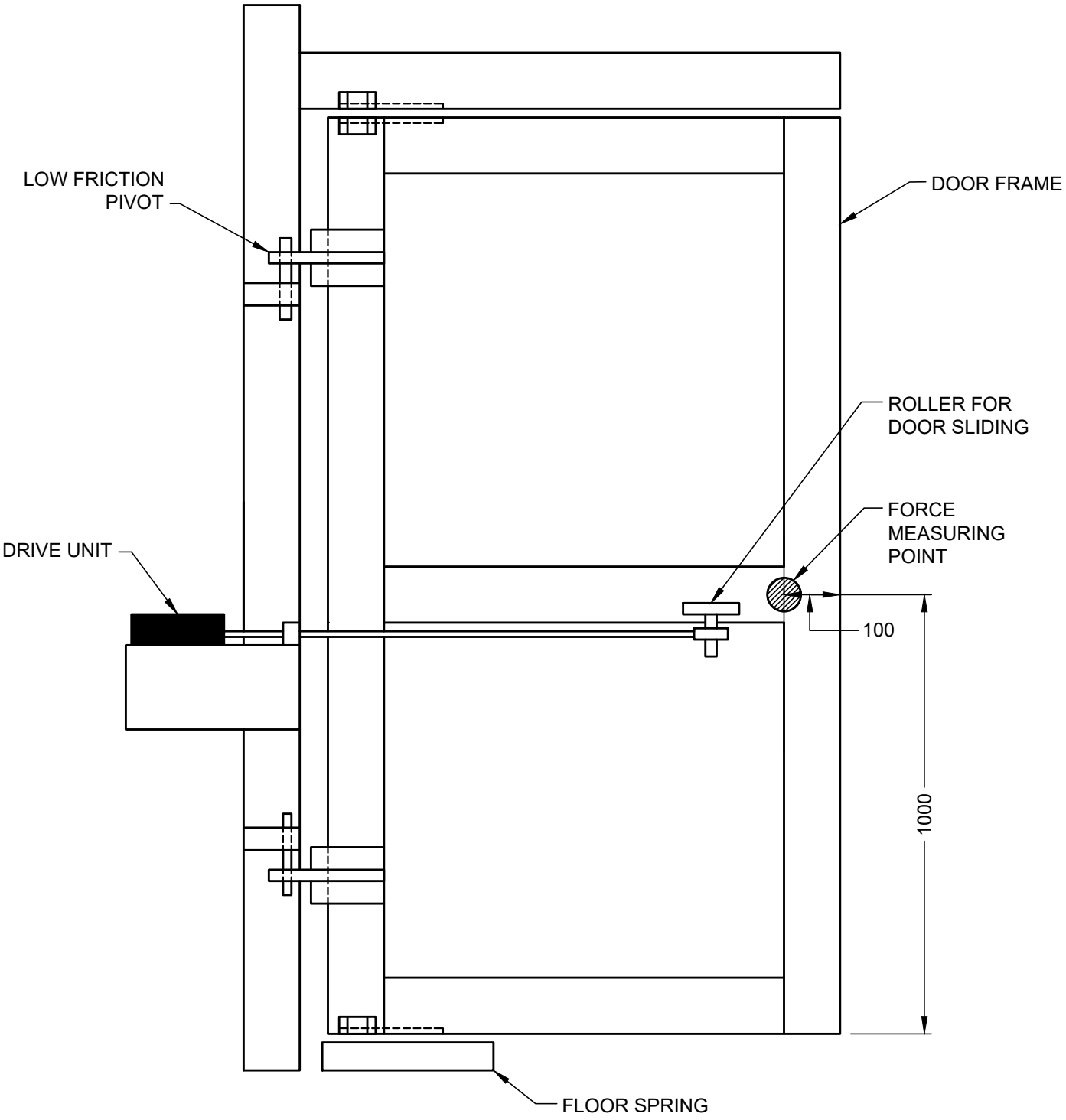
B-3.3 The apparatus must have provision to record the number of operating cycles of the test door. The equipment should ensure that the test door has fully returned to the closed position before initiating the next operation.

B-4 Force Measurement

A force gauge or other suitable device with a minimum accuracy of 1.5 percent of the reading shall be provided for determining the opening and closing moments in accordance with this test.

B-5 Actuating Mechanism

The actuating mechanism shall not impede the return of the test door to the fully closed position, under the action of the floor spring being tested. The automatic actuating mechanism shall apply the opening force at a distance between 500 mm to 700 mm from the vertical axis of the rotation of the door.



All dimensions in millimetres.

FIG. 8 TYPICAL TEST SET-UP FOR FLOOR SPRING CYCLIC TEST

ANNEX C

(*Clause* 10.3.2)

TEST METHODS FOR FLOOR SPRING TESTING

C-1 General

Verify the product information given by the manufacturer used for testing of the floor spring including the classification code.

C-2 Functional Check

Before performance testing on the floor spring, the functional check shall be done as follows:

C-2.1 After being fitted in its position, when the door or fixture is opened through 90º, it shall swing back to an angle of 10º ± 5º at set closing speed but thereafter the speed shall automatically reduce and in case of doors with latches, it shall be regulated so that in its final position the door smoothly engages with the latch. The closing time shall be easily adjustable between 5 s to 20 s.

C-2.2 Mount the floor spring on test apparatus or fixture and verify for hold open feature (only if feature is available in the floor spring model) at the preset angle for 5 minutes.

C-2.3 Latch Control (*Optional*)

A floor spring manufacturer may include separate latch control to the door closing to overcome the resistance of a latch. If incorporated it shall be effective over a maximum range of 15º from the closed position and shall be adjustable.

C-2.4 Back-Check (*Optional*)

If provided with a back-check function the floor spring shall be capable of stopping the test door before the 90º open position when tested.

C-2.5 Delayed Closing (*Optional*)

If delayed closing is provided in the floor spring, verify the delayed action closing feature for 5 times. Floor spring shall be adjustable with a separate regulator such that the closing time from 90º to the end of the delay zone at an ambient atmospheric temperature of (25 ± 5) ºC is not less than 20 s. The delay zone shall not extend beyond the 65º open position. The moment required to override manually the delay action shall not exceed 150 Nm when tested. After 500 test cycles the delayed time shall be between 10 s and 30 s.

C 2.6 Adjustable Closing Force (*Optional*)

Floor spring with adjustable closing force function the floor spring shall comply with the performance requirements of **C-3** at both the minimum and maximum power settings declared by the manufacturer.

C-3 Durability, Power Size and Efficiency

C-3.1 Apply the weights to the test door as per Table 1 for the particular power size of floor spring being tested, so that the mass and centre of gravity are in accordance with **B-3.2**.

C-3.2 Mount the floor spring on the test apparatus according to the manufacturer's installation template and installation instruction. Open the door to the maximum angle as per declared classification code and verify if the floor spring closes it completely from a minimum angle of 70º to closed position in a regulated manner. The floor spring control valves shall be adjusted that the test door closes smoothly from 90º to fully closed within a time of 3 s to 7 s. If the floor spring has additional valve for latch control, adjust it to ensure a smooth transition from closing to latching speed to provide a positive closing, but not slamming action. Disable hold open and delayed action feature prior to starting the test or set them to minimum effect. Adjust the test door actuation mechanism to open the test door smoothly to 90º in time between 3 s to 4 s and then allowing the test door to close under the action of the floor spring being tested. Make sure the door has returned fully to the closed position before initiating the next opening cycle.

C-3.3 One opening and closing shall constitute one cycle (*see* **3.2.6**). Continue the cycling test for a total of 5 000 test cycles. Record the ambient atmospheric temperature. Allow the floor spring body surface to cool to within 2º C of ambient temperature.

C-3.4 Adjust the closer to a fully open position and measure both the opening and closing forces of the floor spring. The forces are measured slowly (not f aster than 1 º/s) while opening and closing the test door using the force gauge positioned perpendicular to the door face when the door is in an open position from 0º to 4º and 88º to 92º. The maximum value is to be noted. Take the average of three readings.

C-3.5 Use the same method to open the door to 60° opening. Note the maximum opening force obtained during this procedure. Take the average of three readings.

C-3.6 Allow the door to close from its maximum opening angle permitted by the floor spring under test to 2° and note the minimum closing force obtained during its travel. Take the average of three readings.

C-3.7 Calculate the opening and closing moments in each case as the product of these average gauge readings and the distance of the force gauge in metres from the vertical axis of the hinges or pivots.

NOTE — This procedure does not preclude the use of automatic measuring and recording equipment.

C-3.8 After 5 000 test cycles, the measured efficiency shall not be less than the values mentioned in Table 1 for the particular power size.

$$\text{Efficiency of the floor spring} = \frac{\text{Average of maximium closing force between } 0° \text{ and } 4° \times 100}{\text{Average of maximium opening force between } 0° \text{ and } 4°}$$

C-3.9 Reset the floor spring parameters set at **C-3.2**, and continue the cycle test for its declared performance for the maximum number of cycles as given in **9.2**, and the regulators remain unaltered until the completion of test. Efficiency shall also be calculated at the end of the test of overall cycles and shall not be less than the values mentioned in the Table 1. For double action floor spring, the direction of closing to be alternated between clockwise and anticlockwise directions after every 5 000 cycles.

C-4 Corrosion Resistance

C-4.1 Apply the weights to the test door as per Table 1 for the particular power size of floor spring being tested, so that the mass and centre of gravity are in accordance with **B-3.2**.

C-4.2 Mount the floor spring on the test apparatus according to the manufacturer's installation template and installation instruction. The closing force shall be measured as given in **C-3.4**.

C-4.3 After removal of the floor spring from salt spray test apparatus and post rinsing, the closing force shall be again measured as given in **C-3.4**.

ANNEX D

(*Foreword*)

COMMITTEE COMPOSITION

Builder's Hardware Sectional Committee, CED 15

Organization	*Representative(s)*
In Personal Capacity (*1421 Sector A, Pocket B&C, Vasant Kunj, New Delhi* - 110070)	SHRI B. MAJUMDAR **(*Chairperson*)**
Allied Anodisers, Kolkata	SHRI SUSHIL TAWAR
AOS Door Controls LLP, Chennai	SHRI SYED MOHAMED
Argent Industries, New Delhi	SHRI ANIL CHADHA SHRI VANITA CHADHA (*Alternate*)
Central Public Works Department, New Delhi	SHRI DINESH K. UJJANIA
CSIR - Central Building Research Institute, Roorkee	SHRI S. K. NEGI SHRI KISHORE KULKARNI (*Alternate* I) SHRI V. CHAKRADHAR (*Alternate* II)
D. P. Garg & Company Pvt Ltd, Noida	SHRI SANDEEP GARG SHRI K. S. ARYA (*Alternate*)
Dormakaba India Pvt Ltd, New Delhi	SHRI HANISH ARORA SHRI SATHIYARAJ ASAITHAMBI (*Alternate* I) SHRI NAVEEN G. (*Alternate* II)
Engineers India Limited, New Delhi	SHRI ANISH KUNDU
Godrej & Boyce Mfg Co Limited, Mumbai	SHRI DEODATTA JOSHI SHRI KSHITIJ R. GAIKAR (*Alternate*)
Hindalco Industries Limited, Mumbai	SHRI SIDDHARTH SHETTY SHRI JITENDRA GOEL (*Alternate*)
Hettich India Pvt Ltd, Mumbai	SHRI VIRENDRA KUMAR SHRI AMITABH ANAND (*Alternate* I) SHRI CHIRAG THAKOR (*Alternate* II)
Indian Institute of Technology, Delhi	SHRI N. M. ANOOP KRISHNAN SHRI SAHIL BANSAL (*Alternate*)
Intertek India Private Limited, Gurugram	SHRI SACHCHIDANAND MISHRA
Kich Architectural Products Private Limited, Rajkot	SHRI BHARAT HAPANI SHRI ANIL VANJANI(*Alternate* I) SHRI ANJAY MISHRA (*Alternate* II)
L&T Construction, Chennai	SHRI G. V. SRIVINAS SHRIMATI MEGHA CHANDRATRE (*Alternate*)
MECH (India) Industries, Delhi	SHRI SUDHIR BATRA SHRI SAMEER ARORA (*Alternate* I) SHRI ISHAN BATRA (*Alternate* II)
Military Engineer Services, New Delhi	SHRI MAYANK SRIVASTAVA SHRI AMAN GARG (*Alternate*)

Organization	*Representative(s)*
NBCC (India) Limited, New Delhi	SHRI APURVA AGARWAL
Shakti Hormann Pvt Ltd, Telangana	SHRI VUPPALA VIVEK SHRI MAHESH SINGH (*Alternate* I) SHRI K. PARAMESWARA REDDY (*Alternate* II)
South India Agencies, Bengaluru	SHRI MUKESH PURSHOTAMDAS SHRI ROHITH MUKESH (*Alternate*)
Winwall Technology Indian Private Limited, Chennai	SHRI P. JOTHI RAMALINGAM SHRI SHARANRAJ A. (*Alternate*)
BIS Directorate General	SHRI DWAIPAYAN BHADRA, SCIENTIST 'E'/DIRECTOR AND HEAD (CIVIL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI PRADEEP SINGH SHEKHAWAT
SCIENTIST 'E'/DIRECTOR
(CIVIL ENGINEERING), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: CED 15 (26622).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices: *Telephones*

Central : 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002 { 2323 7617

Eastern : 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091 { 2367 0012 2320 9474

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 2254 1216

Western : 5th Floor/MTNL CETTM, Technology Street, Hiranandani Gardens, Powai Mumbai 400076 { 25700030 25702715

Branches : AHMEDABAD, BENGALURU, BHOPAL, BHUBANESHWAR, CHANDIGARH, CHENNAI, COIMBATORE, DEHRADUN, DELHI, FARIDABAD, GHAZIABAD, GUWAHATI, HARYANA (CHANDIGARH), HUBLI, HYDERABAD, JAIPUR, JAMMU, JAMSHEDPUR, KOCHI, KOLKATA, LUCKNOW, MUMBAI, NAGPUR, NOIDA, PARWANOO, PATNA, PUNE, RAIPUR, RAJKOT, SURAT, VIJAYAWADA.

Published by BIS, New Delhi