भारतीय मानक ब्यूरो
(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)
BUREAU OF INDIAN STANDARDS
(Ministry of Consumer Affairs, Food & Public Distribution, Govt. of India)

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व्यापक परिचालन मसौदा

हमारा संदर्भ : सीईडी 15/ टी-17 **24 सितम्बर 2024**

तकनीकी समिति :बिल्डर हार्डवेयर अनुभागीय समिति, सीईडी 15

प्राप्तकर्ता :

1. **सिविल अभियांत्रिकी विभाग परिषद, सीईडीसी के सभी सदस्य**
2. **बिल्डर हार्डवेयर अनुभागीय समिति, सीईडी 15 के सभी सदस्य**
3. **रुचि रखने वाले अन्य निकाय।**

महोदय/महोदया,

निम्नलिखित मानक का मसौदा संलग्न है:

प्रलेख संख्या	शीर्षक
सीईडी 15(26621)WC	**द्रवचालित डोर क्लोजर - विशिष्टि** **(आईएस 3564 का पांचवां पुनरीक्षण)** (आई एस 14912 का सम्मिश्रण) (आई सी एस संख्या: 91.190)

कृपया इस मसौदे का अवलोकन करें और अपनी सम्मतियाँ यह बताते हुए भेजे कि यह मसौदा प्रकाशित हो तो इन पर अमल करने में आपको व्यवसाय अथवा कारोबार में क्या कठिनाइयां आ सकती हैं।

सम्मतियाँ भेजने की अंतिम तिथि: 24 अक्टूबर 2024

सम्मति यदि कोई हो तो कृपया अधोहस्ताक्षरी को ई-मेल द्वारा ced15@bis.gov.in पर या उपरलिखित पते पर, संलग्न फोर्मेट में भेजें। सम्मतियाँ बीआईएस ई-गवर्नेंस पोर्टल, www.manakonline.in के माध्यम से ऑनलाइन भी भेजी जा सकती हैं।

यदि कोई सम्मति प्राप्त नहीं होती है अथवा सम्मति में केवल भाषा संबंधी त्रुटि हुई तो उपरोक्त प्रालेख को यथावत अंतिम रूप दे दिया जाएगा। यदि सम्मति तकनीकी प्रकृति की हुई तो विषय समिति के अध्यक्ष के परामर्श से अथवा उनकी इच्छा पर आगे की कार्यवाही के लिए विषय समिति को भेजे जाने के बाद प्रालेख को अंतिम रूप दे दिया जाएगा।

यह प्रालेख भारतीय मानक ब्यूरो की वेबसाइट www.bis.gov.in पर भी उपलब्ध हैं।

धन्यवाद।

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वैज्ञानिक ई एवं प्रमुख
सिविल अभियांत्रिकी विभाग

संलग्न: उपरलिखित

भारतीय मानक ब्यूरो

(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)

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WIDE CIRCULATION DRAFT

Our Reference: CED 15/T-17 **24 September 2024**

TECHNICAL COMMITTEE: BUILDER'S HARDWARE SECTIONAL COMMITTEE, CED 15

ADDRESSED TO:

1. All Members of Civil Engineering Division Council, CEDC
2. All Members of Builder's Hardware Sectional Committee, CED 15
3. All others interested.

Dear Sir/Madam,

Please find enclosed the following draft:

Doc No.	Title
CED 15(26621)WC	**Hydraulically Regulated Door Closers - Specification (Fifth Revision of IS 3564)** (Amalgamating IS 14912) (ICS 91.190)

Kindly examine the attached draft and forward your views stating any difficulties which you are likely to experience in your business or profession, if this is finally adopted as National Standard.

Last Date for comments: 24th October 2024

Comments if any, may please be made in the enclosed format and emailed at ced15@bis.gov.in or sent at the above address. Additionally, comments may be sent online through the BIS e-governance portal, www.manakonline.in.

In case no comments are received or comments received are of editorial nature, kindly permit us to presume your approval for the above document as finalized. However, in case comments, technical in nature are received, then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action if so desired by the Chairman, Sectional Committee.

The document is also hosted on BIS website www.bis.gov.in.

Thanking you,

Yours faithfully,
Sd/-
Dwaipayan Bhadra
Scientist 'E' & Head
Civil Engineering Department

Encl: As above

FORMAT FOR SENDING COMMENTS ON THE DOCUMENT

[Please use A4 size sheet of paper only and type within fields indicated. Comments on each clause/sub-clause/ table/figure, etc, be stated on a fresh row. Information/comments should include reasons for comments, technical references and suggestions for modified wordings of the clause. Comments through e-mail to **ced15@bis.gov.in** shall be appreciated.]

Doc. No.: CED 15(26621)WC

BIS Letter Ref: CED 15/T-17

Title: Hydraulically Regulated Door Closers - Specification (*Fifth Revision* of IS 3564 & Amalgamating IS 14912)

Last date of comments: 24th October 2024

Name of the Commentator/ Organization:

_____

Sl No.	Clause/ Para/ Table/ Figure No. commented	Type of Comment (General/ Technical/ Editorial)	Comments/ Modified Wordings	Justification of Proposed Change

NOTE- Kindly insert more rows as necessary for each clause/table, etc

BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENTS ONLY

Draft Indian Standard

HYDRAULICALLY REGULATED DOOR CLOSERS - SPECIFICATION

(*Fifth Revision* of IS 3564)

(Amalgamating IS 14942)

(ICS 91.190)

Builder's Hardware Sectional Committee, CED 15 **Last Date of Comments** 24th October 2024

FOREWORD

*(Formal clauses shall be added late*r)

Hydraulic door closers are being increasingly used at present in buildings. They are particularly needed in air-conditioned buildings, restaurants, hospitals, and other public buildings where doors are frequently used and keeping them in closed position after usage is considered essential to reduce outside noise, to maintain inside temperature condition and privacy. In addition, door closer is a must solution for fire rated doors in egress areas.

Door closers are made in several designs and types; some are made to be fixed in concealed positions while others are made to function in exposed positions; some work only on spring action while others use hydraulic oil flow properties to control the door closing motion to avoid banging of the door. This standard covers the surface mounted and concealed hydraulic door closers which are being widely used and lays down the requirements for their manufacture and performance.

This Standard was first published in 1966 and subsequently revised in 1970, 1975, 1986 and 1995. The present revision has been taken up with a view to incorporating the modifications found necessary based on experience gained in the use of this standard and variety of features available in door closers, suitability to higher door mass and door leaf widths. The Indian Standards that is, IS 3564 and IS 14912 have been merged under single Indian Standards IS 3564. The major changes in the revision include:

a) Scope of scope to include door closers up to 160 kg.
b) Combining of surface mounted and concealed door closers and making it performance-based standard.
c) Grading based on durability, corrosion resistance and other parameters.
d) Marking clause has been modified.

e) The classification code is included to harmonize the product marking and selection for easy understanding of the user.

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.

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.

Draft Indian Standard

HYDRAULICALLY REGULATED DOOR CLOSERS – SPECIFICATION

(*Fifth Revision*)

1 SCOPE

1.1 This standard covers fire rated and non -fire rated hydraulically regulated and mechanically operated vertical hinge type doors opening on one side or both sides and door weight up to 160 kg.

1.2 This standard does not cover the requirement of pneumatically regulated, transom closers, floor springs and electrically operated door closers.

2 REFERENCES

The standards listed in Annex A 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 Annex A.

3 TERMINOLOGY

3.1 Door Closer – A mechanical device that regulates the closing of a door by means of hydraulic force. The basic function of a door closer is to provide a smooth, controlled closing action for the door after the door has been opened manually and released. There are several variations of door closers for a variety of different applications.

3.2 Surface Mounted Door Closer – Most common type of door closer and easy to install. These are fitted on to the door frame either on pull or push side of the door, nearer to the hinge side. The arm of the closer retracts to closed position as the door closes.

3.3 Concealed Door Closer – A spring and hydraulic door closing device that is mounted overhead in the frame's transom and the door closer body is not visible to the user from the floor.

3.4 Arm Assembly – The accessories provided with the door closer assembly to transmit the regulated motion from the door closer to the door.

3.4.1 *Standard Arm / Regular Arm* - In this configuration, the main arm is attached to the door closer, and the extension arm is attached to the frame through the pivoted clamp, main arm and adjustment arm form a pivoted pair. When the door is in the closed position, the arms project out from the surface of the door. (see Fig. 3A)

3.4.2 *Hold Open Arm* – In this mechanism with which both the regular arm and slide arm door closer can be adjusted to stay open at a particular angle. Hold open arms comes with pivot screw or hold open unit in the arm and can be set at an angle. Once the door is opened to the position of the set angle it remains open it is again manually

released by a gentle push. Used mostly in high traffic and material movement area. (see Fig. 3B)

3.4.3 *Parallel Arm* - In this configuration, the main arm is attached to the door closer, and the extension arm is attached to a parallel arm bracket or soffit plate on the underside of the frame header; the two arms are connected to form a pivot joint. When the door is in the closed position, the arms are tucked underneath the frame header and do not project out like the standard arms. (see Fig. 3C)

3.4.4 *Slide Arm / Track Arm* – Slide arm door closers come with a slide channel and a slide arm so when the door is in closed position the arm is parallel to the door closer. Slide arm door closers have limitation of opening angle. (see Fig. 3D)

3.5 Regulating Valves

3.5.1 *Closing Speed Valve* – An in-built valve, conveniently located on the end of the door closer to control the closing speed. For reference see 3.9.

3.5.2 *Latching Speed Valve (Optional)* – A separate in-built adjustment valve to accelerate or decelerate the door to ensure positive latching. For reference see 3.10.

3.5.3 *Power Regulating Valves (Optional*) – An in-built valve to adjust the power or the strength of the door closer. For reference see 3.12 and 3.13.

3.6 Delayed Closing Action (*Optional*) – A door closer 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 door closer, in addition to the speed and power regulating valves.

3.7 Back Check (*Optional*) – It is an adjustable feature available on many door closers 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.

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

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

3.10 Drop Plate – It is used to mount a door closer where the top rail on the door is too narrow or the face of the frame header is too narrow to accept a door closer. The drop plate is fastened to the rail or header and the closer is mounted on the drop plate. This is a very common application for closers being installed on aluminium storefront doors.

3.11 Closing Speed – Door closers are equipped with adjustable closing speed valves which enable adjustment of the speed at which the door closes after being released.

3.12 Latching Speed (*Optional*) – Door closers with adjustable latching speed valves enable adjustment of the last few degrees of closing. This is an especially helpful feature to prevent the door from slamming into the frame. Most door closers are equipped with dual-valve adjustment that is both closing speed and latching speed adjustment valves to ensure a smooth (and quiet) closing operation.

3.13 Closing Force – The power which the closer exerts on the door to move it into the closed position. Usually measured in power sizes from 1 to 7 (*see* Table 1) which then refer to door sizes and weights.

3.14 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.

3.15 Power Adjustable by Template – The door closers power can be changed by altering the position of the door closer on the door in accordance with a template provided by the manufacturer.

3.16 Power Adjustment by Spring – The door closers power can be adjusted after it is fitted by adjusting the spring tension of the unit to suit door size & site conditions.

3.17 Rack & Pinion Mechanism – A rack and pinion door closer is one of the most widely used type of door closer mechanism and is so called because it uses a rack and pinion mechanism with a spring(s) to provide power to close the door, and hydraulics to regulate the speed of the door closer.

3.18 Cam Action Mechanism – It uses a cam and follower mechanism with a spring(s) to provide power to close the door, and hydraulics to regulate the closing speed of the door closer.

3.19 Single Action Door Closer – A door closer for use on doors which can open only in one direction, and which close against fixed stop only.

3.20 Double Action Door Closer – A door closer for use on doors which can open in both directions that is inside and outside.

3.21 Right-Handed Door Closer – A door which when viewed from above, rotates in an anticlockwise direction about its hinges while opening is right hand door and the door closer suitable for such door is right-handed door closer.

3.22 Left-Handed Door Closer – A door which when viewed from above, rotates in a clockwise direction about its hinges while opening is left hand door and the door closer suitable for such door is left-handed door closer.

3.23 Universal Door Closer – The door closer which is suitable for both left and right handed doors without any changes is called Universal door closer.

3.24 Angle of Closing – The maximum angle from fully closed position from which the door closer can complete the closing action.

3.25 Power Size – It is a measure of closing moment exerted by a door closer (see Table 1).

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.

4 TYPES OF HYDRAULIC DOOR CLOSERS

A door closer is a spring-loaded hydraulically regulated device that closes a door automatically. The most common being the rack and pinion door closer and the cam action door closer. Door closer are classified based on mounting, construction, mechanism used, door closer mounting arms and functional controls.

4.1 Door Closer – Mounting and Form

Based on mounting and form, the door closers are classified as surface mounted door closer and concealed door closers (concealed inside the door leaf) as follows:

4.1.1. *Surface Mounted Door Closers*

Surface mounted door closers are further classified in to two sub-types as follows:

4.1.1.1 Bottle Type Door Closer (for guidance, *see* Fig. 1A)
4.1.1.2 Tubular Type Door Closer (for guidance, *see* Fig. 1B)

4.1.2 *Concealed Door Closer* (for guidance, *see* Fig. 1C)

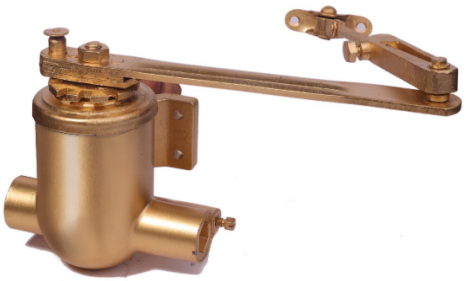


FIG. 1A SURFACE MOUNTED - BOTTLE TYPE

FIG. 1A SURFACE MOUNTED - TUBULAR TYPE

FIG. 1C CONCEALED DOOR CLOSERS

FIG. 1 TYPES OF DOOR CLOSERS – MOUNTING & FORM

4.2 Hydraulic Door Closer Mechanism

Based on closer mechanism, door closers are classified as follows:

4.2.1 Rack and Pinion Type (see Fig. 2A)
4.2.2 Cam Type (see Fig. 2B)

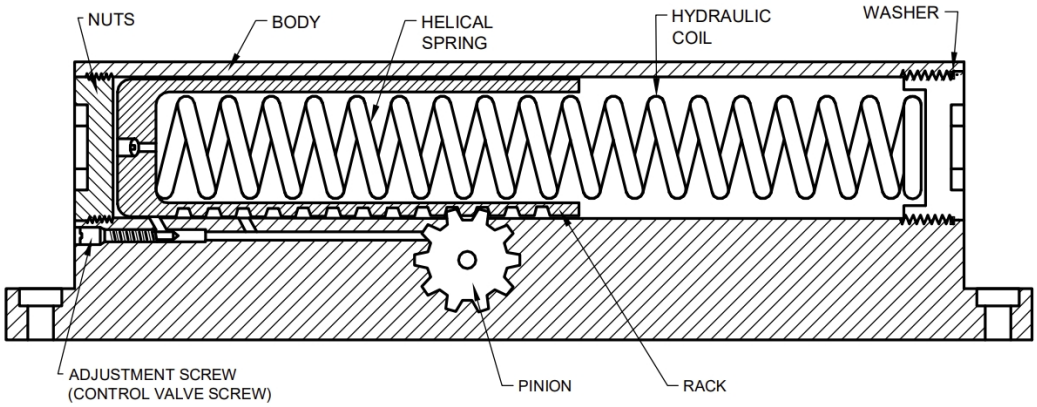


FIG. 2A TYPICAL SKETCH OF MECHANISM OF RACK & PINION TUBULAR TYPE HYDRAULIC DOOR CLOSER

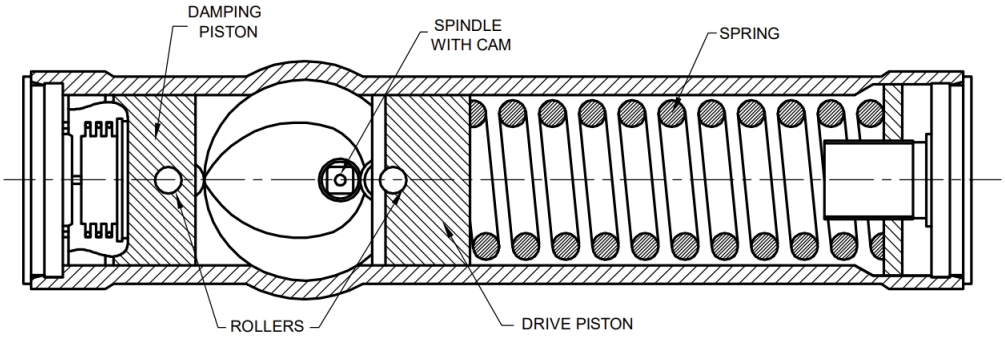


FIG. 2B TYPICAL SKETCH OF MECHANISM OF CAM ACTION TUBULAR TYPE HYDRAULIC DOOR CLOSER

4.3 Door Closer Mounting Arms

Based on mounting arms, door closers are classified as follows:

4.3.1 *Regular arm / Link arm* – Most common application, for fixing of door closer on the pull side or the hinge side. The arms are connected to a link and projecting perpendicular to the door. The positioning of the door closer gives maximum closing strength. For guidance, *see* Fig. 3A.

4.3.2 *Hold Open Arm* – Used when the door is required to be momentarily kept open for man or material movement after it is released. These door closer arms have additional cam or hexagonal screw which will stop the door from closing. Usually, they work by friction. Opening the door to a certain degree tightens a nut which causes the

arm to stick at a point, holding the door open. Hold open functions can be set at various door opening angle and varies from manufacturer to manufacturer. For guidance, *see* Fig. 3B. Hold-open arms are shall not be used for fire and smoke check doors.

4.3.3 *Parallel Arm* – Used along with bracket known as parallel arm bracket for fixing of door closer on the push side. Some manufacturers provide dedicated parallel arm as an assembly with link arm instead of a bracket. Use of parallel arm bracket leads to loss of strength for the door closer. It is recommended to use higher power size if it is parallel arm application. For guidance, *see* Fig. 3C.

4.3.4 *Slide arm* – Slide arm door closers come with a slide channel and a slide arm so when the door is in closed position the arm is parallel to the door closer. Slide arm door closers have limitation of opening angle. Maximum opening angle will be an issue and need to be confirmed by the manufacturer templates. For guidance, *see* Fig. 3D.

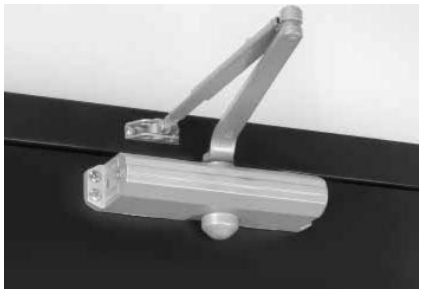


FIG. 3A REGULAR ARM

FIG. 3B HOLD OPEN ARM

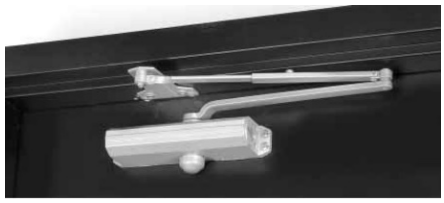


FIG. 3C PARALLEL ARM

FIG. 3D SLIDE ARM

FIG. 3 DOOR CLOSER MOUNTING ARM TYPES

5 FUNCTIONAL CONTROLS OF DOOR CLOSERS

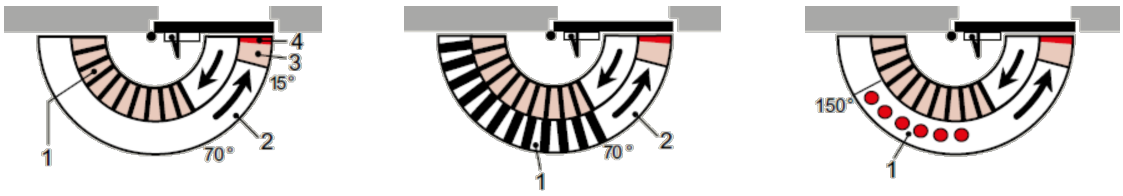
5.1 Closing Force – It is the actual spring strength of the door closer. Door closer selection is based on the door width and weight and the spring strength will define what kind of door closer is suitable for the opening. Manufacturers offer door closers with fixed power size e.g. (2 / 3 / 4) or with adjustable power size e.g. 2 to 4 or 3 to 6. All adjustable closing force door closer shall have adjusting valve for increasing or decreasing the closing force. (See Fig 4)

5.2 Closing Speed – Door closer closing speed may vary based on type of door closer and its respective power size. Installation of door closer on the push side will also have a direct bearing on the performance of the closing speed. The closing speed shall be operated by single adjustable valve from 180° to 0°. Alternatively, door closers can have multiple adjustable valves from 180° to 15° and 15° to 0°. (See Fig 4)

5.3 Latching Speed – This is the end closing speed which will create an additional push for overcoming the latching force and closing the door. This is mostly adjustable by door closer arm shoe. (See Fig 4)

5.4 Back Check – A function of creating resistance to additional pressure applied on the door while opening, so that the door does not go and hit the adjacent wall furniture. Mostly, recommended for areas where there is high chances of abuse and doors opening against walls. Some door closers come with a regulating back check which is inbuilt, or it is adjusted by valve. (See Fig 4)

5.5 Delayed Closing – Door closers with delayed closing shall have an additional valve to control the hold open delay before closing the door. This is an optional feature and may be used on door closers meant to delay the closing of door to allow material or man movement. (See Fig 4)



i) Self-regulating back check
ii) Infinitely variable closing speed in the range 180° – 15°
iii) Infinitely variable closing speed in the range 15° – 0°
iv) Adjustable latch range (by arm)

i) Adjustable delayed action
ii) Fully controlled closing with adjustable speed

i) Hold-Open range

Note: Hold-open arms are shall not be used for fire and smoke check doors.

NOTE – The above values and range are indicative only.

FIG. 4 TYPICAL ILLUSTRATION OF DOOR CLOSER SPEED CONTROL AND VARIOUS FUNCTIONS.

6 NOMINAL SIZES

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

7 MATERIAL, FINISH & WORKSMANSHIP

7.1 The components of door closers shall be manufactured from suitable materials and plated or coated accordingly to meet the performance and corrosion resistance requirements.

7.2 The door closer, along with its accessories shall be free from sharp edges, burrs, flashes, dents, nicks etc. The sub assembly and necessary accessories shall show no signs of oil leakage, rust, scales, grease, scratches, dents.

TABLE 1 POWER SIZE

(*Clause* 3.13, 3.25, 6, 8.3, 9.3, C-3.1, D-3.1, D-3.5 and D-4.1)

Sl No.	Power Size	Recommended Door Leaf Width (mm), Max.	Test Door Weight (kg)	Door Closer Efficiency Between 0° and 4° (%), Min.
(1)	(2)	(3)	(4)	(5)
i)	1	750	20	50
ii)	2	850	40	50
iii)	3	950	60	55
iv)	4	1 100	80	60
v)	5	1 250	100	65
vi)	6	1 400	120	65
vii)	7	1 600	160	65

NOTE -Test door masses shown are only related to door closer power size for the purpose of the test procedure.

8 CLASSIFICATION CODE

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

8.1 Digit 1 - Category of Use

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

i) Grade 3: For closing doors from at least 105º;
ii) 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, door closers incorporating a back check function or provision of a separate door-stopper should be considered.

8.2 Digit 2 – Durability

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

i) Grade 5: 50 000 test cycles
ii) Grade 6: 1 00 000 test cycles
iii) Grade 7: 2 00 000 test cycles
iv) Grade 8: 5 00 000 test cycles

8.3 Digit 3 – Test Door Mass and Door Closer Power Size

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

8.4 Digit 4 – Fire Resistance

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

Grade 0: Not suitable for use on fire / smoke check doors;
Grade 1: Minimum fire resistance capacity 30 minutes;
Grade 2: Minimum fire resistance capacity 60 minutes;
Grade 3: Minimum fire resistance capacity 90 minutes; and
Grade 4: Minimum fire resistance capacity 120 minutes.

NOTE - Door closer with spring size of 1 and 2 are not recommended for use on fire and smoke check doors because of their low closing moments.

8.6 Digit 5 – Safety

All door closers are required to satisfy the essential requirements of safety in use. Therefore, only grade 1 is identified. In this grade 1, there shall be no sharp corners which will hurt during installation and usage and also shall meet the surface requirements given in **7.2**.

8.7 Digit 6 – Corrosion Resistance

Capability of corrosion resistance are categorized in five grades based on following duration when tested as per IS 9844.

i) Grade 1: Mild resistance, up to 24 h (recommended for dry interiors);
ii) Grade 2: Moderate resistance, up to 48 h (recommended for interiors subject to condensation);
iii) Grade 3: High resistance, up to 96 h (recommended for damp interior and exterior); and
iv) Grade 4: Very High resistance, up to 240 h (recommended for polluted exterior – industrial / coastal)

8.8 Examples of Classification

Door closer 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

Door closer 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 750 mm up to 1100 mm and weight from 40 kg up to 80 kg, is suitable for up to 60 minutes 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

9 PERFORMANCE REQUIREMENTS

9.1 General

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

9.1.2 When tested as per this standard, the door closers shall meet the performance requirements given from **8.1** to **8.7** and **9.2** to **9.6** as per the declared classification code of the door closer.

9.2 Durability

9.2.1 The door closer shall be able to close the test door complying with the requirements mentioned in **D-3** from opening angle of 90º. The door closer sample shall be subjected to cycles as mentioned in **8.2**, with the maximum load specified by the power size of door closer for a minimum of 50 000 cycles and maximum of 500 000 cycles as per the grading.

9.2.2 At the end of the test, the door closer shall not show any sign of oil leakage or damage to the door closer or arm which will adversely affect its performance. After the test, verify for functioning of the door closer for hold open & delayed closing action features (if available) in accordance with **D-2.2** and **D-2.3** respectively. The test set-up and method for door closer testing are given at Annex C and Annex D respectively.

9.3 Power Size and Efficiency

The door closer manufactured in any of seven power sizes, and 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 the completion of the test and tested as per method given in measured door closer

efficiency between 0° and 4° of the sample shall not be less than the values mentioned in Table 1 for the particular power size.

9.4 Fire Resistance

9.4.1 This requirement is based on the evaluation of product on test door assemblies as per IS 3614 or other individual test for use on fire rated door. 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 **8.4**.

9.4.2 For fire rated door closers, additional requirements are as follows:

9.4.2.1 The door closer, when installed as per manufacturer installation instructions shall be capable of closing the test door from any angle to which it may be opened. Door closers with adjustable closing force shall be capable of adjustment at least to power size 3.

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

9.4.2.2 Hold open units are not allowed on test door closer unless it is electrically operated.

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

9.4.2.4 The door closer shall be designed in a manner it is not possible to inhibit the closing action in anyway without the help of the tools.

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

9.4.2.6 Where the door closer is intended to be used with other significantly different arm assemblies like slide arm, which may be supplied separately, that combination shall also be tested according to **9**.

9.5 Corrosion Resistance

9.5.1 Door closer sample shall be tested as per IS 9844 for the duration given in **8.7** as per the grade specified by the manufacturer. At the end of the test, remove the door closer 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.

9.5.2 Post rinsing, when measured as per **D-3.4**, the closing moment of the door closer shall not be less than 80 percent of the closing moment measured prior to the corrosion resistance test.

9.6 Operation at Extremes Temperature

Before setting and verifying the door closer at the temperature extremes the door closer shall be conditioned in the temperature-controlled chamber for minimum 3 h at the temperatures mentioned below. Mount the door closer in accordance with manufacturer's installation instructions on test door set-up (see Annex C), and the requirements shall be checked within 15 minutes of conditioning. The mounted door closer shall be verified for smooth closing action and average of three readings of closing time shall not decrease to less than 5 s or increase to more than 20 s. It also shall not show any signs of oil leakage.

a) Ambient Temperature: (25 ± 5) ºC;
b) Low temperature: (-10 ± 2) ºC; and
c) High temperature Test: (40 ± 2) ºC

10 LOT, SAMPLING AND CRITERIA OF CONFORMITY

10.1 Lot - All door closers of the same power size, shape, design, and features and manufactured under relatively similar conditions of production from shall be considered as one lot.

10.2 Sampling

10.2.1 For third party, the number of door closers may be selected from a lot as per sampling procedure given in IS 2500 Part 1.

10.2.2 The door closers shall be selected at random from the lot, for reference see IS 4905. The minimum quantity of door closers to be taken for the testing of samples shall be as follows:

i) One door closer for general requirements (workmanship, finish and safety), functional check and operation at extreme temperatures;
ii) One door closer for durability (including power size and efficiency);
iii) One door closer for corrosion resistance; and
iv) One door closer for fire resistance, on test door assemblies as per IS 3614.

NOTE – In case the door closer has adjustable power sizes, in case of i) and ii), two door closers to be drawn from the lot. One door closer to be set to minimum power size and other to maximum power size and the tested as per this standard. For corrosion test, only one door closer set to minimum power size to be tested.

10.3 The samples of door closer selected for testing for conformity, shall meet the requirements as given in this standard.

11 MARKING

11.1 Each door closer 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.

11.2 The following information shall be legibly marked on packing:

a) Manufacturer's name or trademark or other means of manufacturer identification;
b) Model number;
c) Handing of door closer (if applicable) – L, R or U of door closer;
d) Quantity and content in the package;
e) Month and Year of manufacture; and
f) Classification code of the product

11.3 BIS Certification Marking

The product 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.

12 PACKING

12.1 The door closer shall be packed in individual packs. Additionally, it may be reinforced with boards or straw to prevent damage to the packed content. Packing shall be of such type and quality that it protects the content from moisture and physical damage during storage and transportation.

12.2 Each door closer shall be supplied with a list of accessories along with instructions for its installation, regulation, use and maintenance.

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

12.4 Installation Template

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

12.4.2 Installation templates shall be provided with all types of door closers and shall contain minimum following instructions for users.

a) Door closer power size (or max. door weight & max. door leaf width)
b) Door closer 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 door closer)
f) Instruction on closing speed adjustment
g) Any additional information suitable for making proper adjustments and maintenance of door closers.

Annex A
(*Clause* 2)

LIST OF REFERRED INDIAN STADNDARDS

IS. No.	*Title*
IS 9844: 1981	Methods of testing corrosion resistance of electroplated and anodized aluminium coatings by neutral salt spray test
IS 2500: 2000 Part 1	Sampling Schemes indexed by Acceptance Quality Level (AQL) for Lot by lot Inspection
IS 3614: 2021	Fire Doors and Door sets - Specification (*first revision*)
IS 4905: 2015	Random sampling and randomization procedures (*first revision*)

Annex B
(*Clause* 9.1.1)

GENERAL TOLERANCES IN THE TESTING PARAMETERS

B-1 TOLERANCES

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

a) Mass in kilograms or grams (kg or gm) - ± 2 %
b) Length in milli-meters (mm) - ± 2 %
c) Force in kilo Newton or Newton (kN or N) - ± 2 %
d) Torque in Newton-meter (Nm) - ± 2 %
e) Time in seconds (s) - ± 5s
f) Temperature in Celsius (ºC) - ± 2 ºC
g) Angular position expressed in degrees - ± 2 %

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

Annex C
(*Clause* 9.2.2 and 9.6)

TEST SET UP FOR DOOR CLOSER TESTING

C-1 Single Action Door Closers

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

C-2 Test Door

C-2.1 The test door shall be minimum 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 have a consistent smooth opening with actuating mechanism and closing of the door under the action of the door closer. It shall have means of attaching weights so that the door mass can be adjusted to suit the power size of door closer under test in accordance with Table 1. The test door and frame shall be of sufficient rigidity such that no visible distortion takes place during the entire test process.

C-2.2 The position of the centre of gravity shall be nominally 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 door closers that pivot the door, on the unit under test. *See* Fig 5.

C-2.3 The apparatus must have provision to record the number of operating cycles of the test door has successfully completed. The equipment should ensure that the test door has returned fully to the closed position before initiating the next operation.

C-3 Force Measurement

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

C-4 Actuating Mechanism

The actuating mechanism shall not impede the return of the test door to a fully closed position, under the action of the door closer 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.

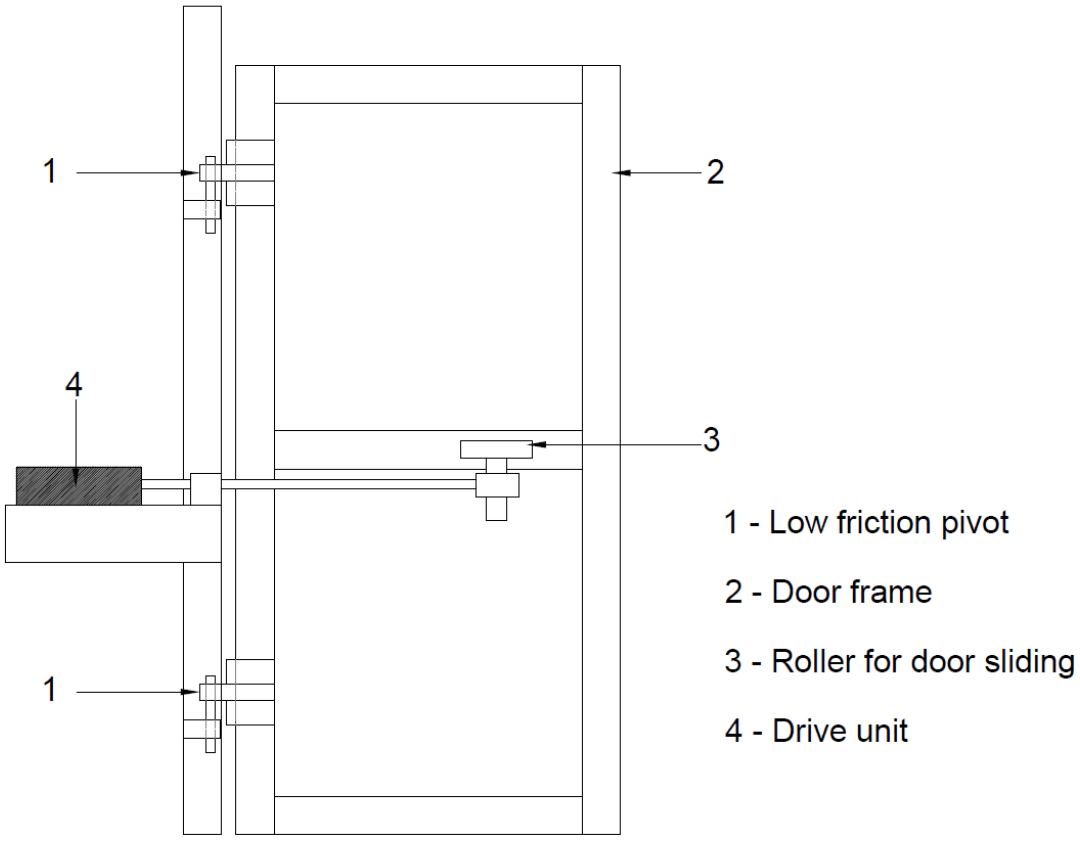


FIG 5 – TYPICAL DOOR TEST APPARATUS FOR CYCLE TEST

Annex D
(*Clause* 9.2.2)

TEST METHODS FOR DOOR CLOSER TESTING

D-1 General

Verify the product information given by the manufacturer used in testing of door closer including the classification code.

D-2 Functional Check

Before performance testing on the door closer, the functional check shall be done as follows:

D-2.1 After being fitted in its position, when the door or fixture is opened through 90º, the same shall swing back to an angle of 10º ± 5º with set closing speed but thereafter the speed shall get automatically retarded and in case of doors with latches, it shall be regulated so that in its final position the door smoothly negotiates with the latch. The closing time shall be easily adjustable between 3 secs to 25 secs.

D-2.2 Mount the door closer on test apparatus or fixture and verify for hold open feature (only if feature is available in door closer model) at the preset angle for 5 times for period of one minute well each time.

D-2.3 Mount the door closer on test apparatus or fixture and verify for delayed action closing feature (only if feature is available in door closer model) for 5 times.

D-2.4 Latch Control (Optional)

A door closer manufacturer can 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.

D-2.5 Back-Check (Optional)

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

D-2.6 Delayed Closing (Optional)

If delayed closing is provided in the door closer the same shall be adjustable with a separate regulator such that the closing time from 90º to the end of the delay zone at an ambient temperature of (25 ± 5) ºC is not less than 20 s. the delay zone shall not extend below 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.

D 2.7 Adjustable Closing Force (Optional)

Door closers with adjustable closing force function the door closer shall comply with the performance requirement of **D-3** at both the minimum and maximum power settings declared by the manufacturer.

D-3 Durability, Power Size and Efficiency

D-3.1 Apply the weights to the test door so that the mass and centre of gravity are in accordance with Table 1 for the particular power size of door closer being tested.

D-3.2 Mount the door closer on the test apparatus according to manufacturer's installation template and installation instruction. Open the door to the maximum angle specified by the manufacturer and verify if the door closer closes it completely from a minimum angle of 70º to closed position in a regulated manner. The door closer control valves shall be such adjusted that the test door closes smoothly from 90º to fully closed within a time of 3 s to 7 s. If the door closer has additional valve for latch control, adjust it to provide 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 door closer being tested. Make

sure the door has returned fully to the closed position before initiating the next opening cycle.

D-3.3 One opening and closing shall constitute one cycle. Continue cycling test for a total of 5 000 test cycles. Record the ambient temperature. Allow the door closer body surface to cool to within 2 ^{o}C of ambient temperature.

D-3.4 Adjust the closer to a fully open position and measure both the opening and closing forces of the door closer. The forces are measured slowly (not faster than 1 ^{o}/s) opening and closing the test door using the force gauge positioned perpendicular to the door face when the door is in an open position form 0^{o} to 4^{o}. The maximum value is to be noted, take the average of three readings.

D-3.5 Allow the door to close from its maximum opening angle permitted by the door closer under test to 2^{o} and note the minimum force obtained during its travel. Take the average of three readings.

D-3.6 After 5 000 test cycles and after the completion of the test, the measured efficiency shall not be less than the values mentioned in Table 1 for the particular power size.

$$\text{Efficiency of the door closer} = \frac{\text{Average of max. closing force between } 0^{o} \text{ and } 4^{o} \times 100}{\text{Average of max. opening force between } 0^{o} \text{ and } 4^{o}}$$

D-3.7 Reset the door closer parameters set at **D-3.2**, and continue the cycle test for its declared performance for the maximum number of cycles as given in **8.2**, and the regulators remain unlatered till the completion of test. Efficiency shall also be calculated at the end of the test of overall cycles and see that it is not less than the values mentioned in the Table 1.

D-4 Corrosion Resistance

D-4.1 Apply the weights to the test door so that the mass and centre of gravity are in accordance with Table 1 for the particular power size of door closer being tested.

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

D-4.3 After removal of the door closer from salt spray test apparatus and post rinsing, the opening and closing force shall be again measured as given in **D-3.4**.

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