

Australian Standard[®]

Locksets and hardware for doors and windows

Part 5: Controlled door closing devices (EN 1154:1996, MOD)

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 - Australian Industry Group
 - Australian New Zealand Locksmiths Association
 - Australian Window Association
 - Certification Interests (Australia)
 - Insurance Council of Australia
 - NSW Police Force
 - Security Construction & Equipment Committee
 - University of Western Sydney
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Part 5: Controlled door closing devices (EN 1154:1996, MOD)

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PREFACE

This Standard was prepared by the Standards Australia Committee CS-082, Lockets and Hardware.

This Standard incorporates Amendment No. 1 (September 2013). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this Standard is to specify requirements for controlled door closing devices for swing doors, such as devices being mounted on or in the frame, on or in the door, or in the floor.

A1 | This Standard is an adoption with national modifications and has been reproduced from EN 1154:1996, *Building hardware—Controlled door closing devices—Requirements and test methods* and has been varied as indicated to take account of Australian conditions. The Australian variations are listed in Appendix ZZ at the end of the source text. Additional requirements on backcheck angle measurement are given in Appendix ZA.

As this Standard is reproduced from a European Standard, the following applies:

- (a) Its number appears on the cover and title page.
- (b) In the source text ‘this European Standard’ should read ‘this Australian Standard’.
- (c) A full point substitutes for a comma when referring to a decimal marker.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the annex or appendix to which they apply. A ‘normative’ annex or appendix is an integral part of a Standard, whereas an ‘informative’ annex or appendix is only for information and guidance.

CONTENTS

1	Scope	1
2	Normative references	1
3	Definitions	1
4	Classification	3
5	Requirements	5
6	Test apparatus	6
7	Test methods	8
8	Marking	12
9	Evaluation of conformity	13
	Annex A (normative) Additional requirements for door closing devices intended for use on fire/smoke door assemblies	14
	Annex B (normative) Flow chart of test procedure	15
	Annex C (informative) Door closer and door types	16
	Annex D (informative) Overload performance test apparatus	19
	Annex E (informative) Bibliography	21
	Annex ZA (informative) Clauses of this European Standard addressing the provisions of the EU Construction Products Directive (89/106/EEC)	22

AUSTRALIAN STANDARD

Locksets and hardware for doors and windows**Part 5:****A1 | Controlled door closing devices (EN 1154:1996, MOD)****1 Scope**

This standard specifies requirements for controlled door closing devices for swing doors, such devices being mounted on or in the frame, on or in the door, or in the floor.

The scope is limited to manually operated door closing devices where the energy for closing is generated by the user upon opening the door, such that when the door is released, it returns to a closed position, in a controlled manner.

Devices such as spring hinges, which do not exert a checking control during door closing, are outside the scope of this standard.

Door closing devices (door closers) manufactured in accordance with this standard are recommended for use wherever there is a requirement for reliable closing control of a door.

Door closers for use on fire/smoke doors need additional attributes in order to contribute actively to meeting the essential safety requirements in case of fire, either independently or as part of a complete door assembly.

These additional requirements for door closers for use on a fire/smoke door assembly are specified in normative Annex A.

Door closers incorporating electrically powered hold-open mechanisms, for use on fire/smoke door assemblies, are covered by **A1** EN 1155. **A1**

A1 Door closers incorporating door coordinator devices (with or without electrically powered hold-open devices) are covered by EN 1158. **A1**

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

A1 EN 1155 **A1**, *Building hardware — Electrically powered hold-open devices for swing doors — Requirements and test methods.*

A1 EN 1670:1998 **A1**, *Building hardware — Corrosion resistance of hardware for doors, windows, shutters and curtain walling — Requirements and test methods.*

A1 EN 1634-1, *Fire resistance tests for door and shutter assemblies — Part 1: Fire doors and shutters.* **A1**

A1 EN 1634-3, *Fire resistance tests for door and shutter assemblies — Part 3: Smoke control doors and shutters.* **A1**

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1**controlled door closing device (door closer)**

any manually operated door closing mechanism where the energy for closing is generated by the user upon opening the door, and when released, returns the door to the closed position, in a controlled manner. The term includes all arms, brackets, shoes, top centres, floor pivots and other parts supplied with the device and necessary for its installation and operation

3.2**overhead door closer surface mounted**

a door closer mounted at or near the door head, on the surface of the door or its transom
(**A1** see Figure C.1.1 **A1**)

3.3**overhead concealed door closer door mounted**

a door closer, mounted within the thickness of the door (**A1** see Figure C.1.2 **A1**)

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3.4**overhead concealed door closer transom mounted**

a door closer mounted within the thickness of the transom (A1) see Figure C.1.3 (A1)

3.5**floor concealed door closer — floor spring**

a door closer mounted within the floor (A1) see Figure C.1.4 (A1)

3.6**double action door closer**

a door closer which allows operation of a door in both directions (A1) see Figure C.2.1 (A1)

3.7**single action door closer**

a door closer for use on doors which can open in one direction only and which close against a fixed stop (A1) see Figure C.2.2 (A1)

3.8**door width**

the width of the door leaf including any rebated door edges (A1) see Figure C.2.3 (A1)

3.9**closing moment**

(A1) the torque generated (A1) by the door closing device which acts upon the door leaf during the closing operation

3.10**opening moment**

(A1) the torque generated (A1) by the user which acts upon the door leaf during the opening operation

3.11**backcheck**

an inbuilt buffer which helps to prevent a door leaf being flung wide open

3.12**delayed closing**

an inbuilt function that allows the door closing action to be (A1) retarded (A1) for an adjustable period of time before resuming controlled closing

3.13**door closer power size**

a measure of the closing moment exerted by a door closer

3.14**hold-open**

an inbuilt function that allows a door fitted with a door closer to remain open at either a preset or chosen angle until manually released

3.15**electrically powered hold-open**

an inbuilt function that allows a door fitted with a door closer to remain open at either a preset or chosen angle until electrically released (see (A1) EN 1155 (A1))

3.16**adjustable closing force**

an inbuilt function that allows the closing moment of a door closer to be adjusted over a range of power sizes

3.17**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 (see 7.3.4.2)

3.18**speed control**

the adjustability of the closing speed of the door (see 5.2.6)

3.19**latch control**

a speed control operable only during the last few degrees of door closing (see 5.2.12)

3.20**test cycle**

a test 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

A1 3.21**standard installation**

normal fitting position stated by the manufacturer, e.g. door closer suitable for fitting to the door face on the “pull” side of the door A1

4 Classification**4.1 A1 Coding System A1**

For the purposes of this standard, door closers shall be classified according to the following six digit coding system:

--	--	--	--	--	--

4.2 Category of use (first digit)

For all internal and external doors for use by the public, and others with little incentive to take care, i.e. where there is some chance of misuse of the door:

- grade 3: For closing doors from at least 105° open;
- grade 4: For closing doors from 180° open.

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

NOTE 2 For applications subject to extremes of abuse, or for particular limitations of opening angle, door closers incorporating a backcheck function or provision of a separate door stop should be considered (see 5.2.13).

4.3 A1 Durability (second digit) A1

Only one test duration is identified for door closers manufactured to this standard:

- grade 8: 500 000 test cycles (see 5.2.2).

4.4 A1 Door Closer power size (third digit) A1

A1 Seven door closer power sizes are identified according to Table 1 of this European Standard. A1

Where a door closer provides a range of power sizes both the minimum and the maximum sizes shall be identified.

A1 *Text deleted* A1

4.5 **Suitability for use on fire/smoke doors (fourth character)**

Two grades of suitability for use on fire/smoke doors (fourth character) are identified for door closing devices manufactured to this standard:

- grade 0: Not suitable for use on fire/smoke door assemblies;
- grade 1: Suitable for use on fire/smoke door assemblies, subject to satisfactory assessment of the contribution of the door closer to the fire resistance of specified fire/smoke door assemblies. Such assessment is outside the scope of this European Standard (see prEN 1634-1).

Annex A indicates additional requirements for door closers manufactured to grade 1.

4.6 Safety (fifth digit)

All door closers are required to satisfy the Essential Requirement of safety in use. Therefore only grade 1 is identified.

4.7 Corrosion resistance (sixth digit)

Five grades of corrosion resistance are identified according to EN 1670:

- grade 0: No defined corrosion resistance;
- grade 1: Mild resistance;
- grade 2: Moderate resistance;
- grade 3: High resistance;
- grade 4: Very high resistance.

4.8 Example of classification

The following example denotes a door closer capable of closing doors from at least 105° open, with durability grade 8, with a power size range from size 2 to size 5, not suitable for use on fire/smoke door assemblies, with safety grade 1 and with moderate resistance to corrosion.

3	8	5	0	1	2
		2			

Table 1

1	2	3	4	5	6	7	8	9
Door closer power size	Recommended door leaf width	Test door mass	Closing moment				Opening moment between 0° and 60°	Door closer efficiency between 0° and 4°
			between 0° and 4°		between 88° and 92°	any other angle of opening		
			mm max.	kg	Nm min.	Nm max.	Nm min.	Nm min.
1	<750	20	9	<13	3	2	26	50
2	850	40	13	<18	4	3	36	50
3	950	60	18	<26	6	4	47	55
4	1 100	80	26	<37	9	6	62	60
5	1 250	100	37	<54	12	8	83	65
6	1 400	120	54	<87	18	11	134	65
7	1 600	160	87	<140	29	18	215	65

NOTE 1 The door widths given are for standard installations. In the case of unusually high or heavy doors, windy or draughty conditions, or special installations, a larger power size of door closer should be used.

NOTE 2 The test door masses shown are only related to door closer power sizes for the purpose of the test procedure. These test door masses are not intended to indicate maximum values for actual use.

5 Requirements

5.1 **[A1]** Product information **[A1]**

5.1.1 A door closer manufactured to this standard shall be supplied with clear, detailed instructions for its installation, regulation and maintenance, which shall include any limitations of opening angle.

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

5.2 **[A1]** Performance **[A1]**

5.2.1 *General*

When tested in accordance with Clauses 6 and 7, the door closer shall satisfy the **[A1]** relevant **[A1]** performance requirements of 5.2.2 to 5.2.11, and 5.2.12 to 5.2.18 as appropriate.

5.2.2 *Durability*

The door closer shall be able to close a test door conforming to 6.1.1 and 6.2 from an opening angle of 90°, for a minimum of 500 000 test cycles.

Double-action door closers shall be able to close a test door conforming to 6.1.2 and 6.2 from opening angles of 90°, for a minimum of 250 000 test cycles in each direction.

5.2.3 *Closing moment*

After 5 000 test cycles and after 500 000 test cycles the measured closing moments shall be not less than the values stated in Table 1, for the particular power size of closer being tested.

5.2.4 *Opening moment*

After 5 000 test cycles the maximum measured opening moment shall be not more than the value stated in Table 1 for the particular power size of closer being tested.

5.2.5 *Efficiency*

After 5 000 test cycles and after 500 000 test cycles the measured efficiency shall be not less than the values stated in Table 1, for the **[A1]** particular power size of the door closer being tested. **[A1]**

5.2.6 *Closing time*

After 5 000 test cycles and after 500 000 test cycles, the closing time, from a door opening angle of 90°, shall be capable of adjustment to 3 s or less, and 20 s or more.

After 500 000 test cycles, the closing time set at 5 000 test cycles shall not have increased by more than 100 %, or decreased by more than 30 %.

5.2.7 *Angles of operation*

The door closer, when installed according to the manufacturer's standard installation instructions, shall permit the test door to open according to its grade under 4.2, and on closing, shall control the door from a minimum angle of 70°, down to the closed position.

5.2.8 *Overload performance*

The door closer shall be capable of withstanding the closing overload tests of 7.3.4.4 and 7.3.6.4 and where relevant 7.3.4.5.

5.2.9 *Temperature dependence*

A set closing time (from a 90° open position) of 5 s at an ambient temperature of 20 °C, shall not increase to more than 25 s or decrease to less than 3 s when tested at -15 °C and 40 °C (see 7.2.1 and 7.2.2).

5.2.10 *Fluid leakage*

Throughout the test programme there shall be no leakage of fluid from the door closer.

5.2.11 *Damage*

Throughout the test programme there shall be no damage to the door closer or its arms that would adversely affect its performance to this standard.

5.2.12 Latch control (optional)

A door closer manufactured to this standard can include a separate control during the final stage of door closing, e.g. to enable accelerated closing to overcome the resistance of a latch bolt. If incorporated, it shall be effective over a maximum range of 15° from the closed position, and shall be adjustable.

5.2.13 Backcheck (optional)

If provided with a backcheck function, the door closer shall be capable of arresting the test door before the 90° open position, when tested in accordance with 7.3.5.2.

5.2.14 ^{A1} Delayed closing

5.2.14.1 Delayed closing (optional)

If provided with a delayed closing function the door closer shall be capable of adjustment, by means of a separate regulator, such that the closing time from 90° to the end of the delay zone, at an ambient temperature of 20 °C, is not less than 20 s. The delay zone shall not extend below the 65° open position. The moment required to override manually the delay action shall not exceed 150 N·m when tested in accordance with 7.3.4.5.

5.2.14.2 Durability of delayed closing

When tested in accordance with 7.3.4.5, the delay time at the conclusion of 500 test cycles shall be between 10 s and 30 s. ^{A1}

5.2.15 Adjustable closing force (optional)

If provided with an adjustable closing force function, the door closer shall comply with the performance requirements of Clause 5, at both the minimum and maximum power settings claimed by the manufacturer.

5.2.16 ^{A1} Zero position (for double action door closers only) ^{A1}

The amount of free play at the zero position of a new door closer shall not exceed 3 mm, and after 500 000 test cycles shall not exceed 6 mm, when tested in accordance with 7.2.3 and 7.3.6.6.

5.2.17 Corrosion resistance

5.2.17.1 The requirements of 5.6 of ^{A1} EN 1670:1998 ^{A1} shall be met, according to its classification (see 4.7).

5.2.17.2 After being subjected to the relevant salt spray test, the closing moment of the door closer shall be not less than 80 % of the closing moment measured prior to the test (see 7.4).

^{A1} 5.2.17.3 The acceptance conditions defined in 5.7 of EN 1670:1998 shall be met for all surfaces of the door closer which are visible when the door closer is fitted in service. ^{A1}

5.2.18 ^{A1} Fire/smoke door suitability ^{A1}

A door closer for use on a fire/smoke door assembly shall meet the necessary requirements of Annex A.

6 Test apparatus

6.1 General

6.1.1 Single action door closers

The test apparatus shall consist of a test door mounted in a frame, capable of manual opening to 180° and with automatic actuating means to enable the required opening angle in accordance with 7.3.3.1 and 7.3.5.2.

6.1.2 Double action door closers

The test apparatus shall consist of a test door mounted in a frame, capable of manual opening to at least 120° in each direction and with automatic actuating means to enable the required opening angle in alternate directions, according to 7.3.3.2.

6.2 Test door

6.2.1 The test door shall be 2 000 mm high, and of any width between 750 mm and 1 200 mm, except that, for door closers which do not carry the mass of the door or act as a door pivot, the test door may be between 400 mm and 2 000 mm high. 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 2. The test door and frame shall be of sufficient rigidity such that no visible distortion takes place during the test sequence.

6.2.2 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.

6.2.3 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.

Supporting hinges or bearings forming a part of the test apparatus shall be such that the moment to overcome friction shall not exceed the values stated in Table 2.

The moment shall be determined by measuring the maximum force in newtons required to slowly (not faster than 1°/s) open and close the test door fully, the force being applied perpendicular to the door face. The frictional moment is expressed as the product of the measured force and its distance in metres from the vertical axis of rotation.

6.2.4 Means shall be provided for recording the number of operating cycles of the test door.

6.3 Force measurement

A force gauge or comparable device, with an accuracy of 1,5 % $\sqrt{A_1}$ of reading, $\sqrt{A_1}$ or better shall be provided for determining the opening and closing moments in accordance with this test method.

6.4 Actuating means

The actuating means shall not impede the return of the test door to the fully closed position, under the action of the door closer being tested.

The automatic actuating means shall apply the opening force at a distance of between 500 mm and 700 mm from the vertical axis of rotation of the door.

6.5 Closing overload performance test apparatus

The apparatus shall comprise a cable/pulley/mass system as illustrated in $\sqrt{A_1}$ Figure D.1 $\sqrt{A_1}$, weighted in accordance with Table 2 for the particular power size of closer under test.

The cable shall be of steel, shall have a diameter of between 4 mm and 6 mm, and shall be attached as shown in $\sqrt{A_1}$ Figure D.2 $\sqrt{A_1}$. The pulleys shall have a minimum diameter of 150 mm and shall be fitted with free-spinning ball or needle roller bearings.

The angle between the cable and the face of the test door when it is opened at $90^\circ \pm 5^\circ$ shall be $30^\circ \pm 5^\circ$, and when the door is in the closed position, shall be $90^\circ \pm 5^\circ$.

Means shall be provided by which the test door can be suddenly released from an open position of 90° .

Means shall be provided for arresting the falling weights when the test door reaches 15° from the closed position in such a manner that further closing of the test door is not impeded by the weight or the pulling cable.

An energy absorbing stop may be fitted to the test apparatus at 5° open position to arrest the test door at the closed position.

Table 2

Door closer power size	Test door mass kg	Overload test weight kg	Test door friction N·m max.
1	20	15	0,1
2	40	18	0,2
3	60	21	0,3
4	80	24	0,4
5	100	27	0,5
6	120	30	0,6
7	160	33	0,8

7 Test methods

7.1 General

7.1.1 Tolerances

Throughout this test method the following tolerances shall apply, unless otherwise stated:

— $\overline{A_1}$ mass expressed in kilograms	(kg)	$\pm 2 \%$;
— length expressed in millimetres	(mm)	$\pm 2 \%$;
— angular position expressed in degrees	(°)	$\pm 2^\circ$;
— force expressed in newtons	(N)	$\pm 2 \%$;
— time expressed in seconds	(s)	$\pm 5 \%$;
— temperature expressed in degrees Celsius	(°C)	$\pm 2 \text{ }^\circ\text{C}$;
— moment expressed in Newtons-metres	(Nm)	$\pm 2 \%$. $\overline{A_1}$

The ambient temperature of the test environment shall be controlled throughout the tests to between 15 °C and 30 °C.

7.1.2 Sampling

Three test samples shall be used for performance verification to this European Standard (see flow chart Annex B):

- test sample A for general requirements and operation at extremes of temperature;
- test sample B for mechanical performance and durability;
- test sample C for corrosion resistance.

For door closers incorporating an adjustable closing force facility, samples A and B shall each consist of two units, one adjusted to the minimum, and the other adjusted to the maximum power size claimed by the manufacturer. Sample C shall be adjusted to its minimum power size.

$\overline{A_1}$ In each case, the door closer shall be adjusted so that its minimum closing moment between 0° and 4° are as near as possible to the values specified in Table 1.

On door closers with a “hold-open” facility, render that facility inoperable. If this is not possible, an equivalent model without a “hold-open” facility shall be tested. $\overline{A_1}$

7.2 Test procedure — Sample A — General requirements and operation at extremes of temperature

The tests shall be carried out in the order as detailed in 7.2.1 to 7.2.3.

7.2.1 General

Verify that the requirements of 5.1 and Clause 8, and where relevant, 5.2.12 and 5.2.18 are met.

The door closer shall be mounted on a test door according to 6.2 in accordance with the manufacturer's standard installation instructions.

7.2.2 Test of temperature dependence

Before setting and before each measurement at the temperature extremes the door closer shall be conditioned in the temperature controlled chamber for a minimum of 8 h at the relevant temperature.

With the door closer temperature stabilized at 20 °C $\pm$ 1 °C, adjust the closer to provide a smooth closing action from 90° open to fully closed, in a time of 5 s. Take the average of three readings.

Stabilize the door closer temperature at -15 °C $\pm$ 1 °C, 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.

Without readjusting the regulator(s), stabilize the door closer temperature at 40 °C $\pm$ 1 °C and again, measure the closing time from the 90° open position. Take the average of three readings.

Verify that the averaged closing time from 90°, at each temperature extreme, does not decrease to less than 3 s or increase to more than 25 s.