SCT
Safety Credit test

TEST REPORT
EN 1154
Building hardware —Controlled door closing devices —Requirements and test methods

Report Reference No. ..... :	08.09.13.0167.01
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Date of issue ..... :	2014-01-08
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Applicant's name..... :	SISO A/S
Address ..... :	Mileparken 11, 2740 Skovlunde, Denmark
Test specification:	
Standard..... :	EN 1154:1996 + A1:2002
Test procedure ..... :	SCT
Non-standard test method..... :	N/A
Test Report Form No. ..... :	EN 1154:1996 + A1:2002
Test Report Form(s) Originator..... :	SCT
Master TRF ..... :	2014-01
Test item description ..... :	FLOOR SPRING
Trade Mark..... :	N/A
Manufacturer ..... :	SISO A/S
Address ..... :	Mileparken 11, 2740 Skovlunde, Denmark
Factory ..... :	SISO A/S
Address ..... :	Mileparken 11, 2740 Skovlunde, Denmark
Model/Type reference ..... :	17.87.200-0, 17.87.201-0, 17.87.203-0, 17.87.204-0, 17.87.205-0
Ratings ..... :	4 8 5 0 1 2 1

Copy of marking plate:

SISO A/S

FLOOR SPRING

Model: 17.87.200-0

4	8	5 1	0	1	2

2014-01

EN 1154:1996 + A1:2002

Mileparken 11, 2740 Skovlunde, Denmark

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

Summary of testing:

The submitted sample was complied with EN 1154:1996 + A1:2002

Possible test case verdicts:

- test case does not apply to the test object .....: N/A
- test object does meet the requirement .....: P(Pass)
- test object does not meet the requirement .....: F(Fail)

Testing .....:

Date of receipt of test item .....: 2013-12-08

Date (s) of performance of tests .....: 2013-12-08 to 2014-01-08

EN 1154:1996 + A1:2002			
Clause	Requirement + Test	Result - Remark	Verdict

3	**Definitions**		—
	For the purposes of this standard, the following definitions apply:		P
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		P
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		N/A
3.3	**overhead concealed door closer door mounted** a door closer, mounted within the thickness of the door		N/A
3.4	**overhead concealed door closer transom mounted** a door closer mounted within the thickness of the transom		N/A
3.5	**floor concealed door closer — floor spring** a door closer mounted within the floor		P
3.6	**double action door closer** a door closer which allows operation of a door in both directions		P
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		P
3.8	**door width** the width of the door leaf including any rebated door edges		P
3.9	**closing moment** the torque generated by the door closing device which acts upon the door leaf during the closing operation		P
3.10	**opening moment** the torque generated by the user which acts upon the door leaf during the opening operation		P
3.11	**Back check** an inbuilt buffer which helps to prevent a door leaf being flung wide open		P
3.12	**delayed closing** an inbuilt function that allows the door closing action to be retarded for an adjustable period of time before resuming controlled closing		N/A
3.13	**door closer power size** a measure of the closing moment exerted by a door closer		P

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Clause	Requirement + Test	Result - Remark	Verdict
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		P
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		N/A
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		P
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**)		P
3.18	**speed control** the adjustability of the closing speed of the door (see **5.2.6**)		P
3.19	**latch control** a speed control operable only during the last few degrees of door closing (see **5.2.12**)		P
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		P
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		P
4	**Classification**		—
4.1	**Coding System**		P
	For the purposes of this standard, door closers shall be classified according to the following six digit coding system		P
4.2	**Category of use (first digit)**		P
	For all internal and external doors for use by the public, and others with little incentive to take care, i.e.		P
	where there is some chance of misuse of the door:		P
	grade 3: For closing doors from at least 105^{o} open; grade 4: For closing doors from 180^{o} 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**).	grade 4	P
4.3	**Durability (second digit)**		P

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Clause	Requirement + Test	Result - Remark	Verdict

	Only one test duration is identified for door closers manufactured to this standard:		P
	grade 8: 500 000 test cycles (see **5.2.2**).	grade 8	P
4.4	**Door Closer power size (third digit)**		P
	Seven door closer power sizes are identified according to Table 1 of this European Standard.	grade 1 to grade 5	P
	Where a door closer provides a range of power sizes both the minimum and the maximum sizes shall be identified.		P
4.5	**Suitability for use on fire/smoke doors (fourth character)**		P
	Two grades of suitability for use on fire/smoke doors (fourth character) are identified for door closing devices manufactured to this standard: Annex A indicates additional requirements for door closers manufactured to grade 1	grade 0	P
4.6	**Safety (fifth digit)**		P
	All door closers are required to satisfy the Essential Requirement of safety in use. Therefore only grade 1is identified.	grade 1	P
4.7	**Corrosion resistance (sixth digit)**		P
	Five grades of corrosion resistance are identified according to EN 1670		P
	grade 0: No defined corrosion resistance;		N/A
	grade 1: Mild resistance;		N/A
	grade 2: Moderate resistance;	grade 2	P
	grade 3: High resistance;		N/A
	grade 4: Very high resistance.		N/A
4.8	**Example of classification**		P
	The following example denotes a door closer capable of closing doors from at least 105^0 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.		P
			P

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.	Nm max.	% 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. A1

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Clause	Requirement + Test	Result - Remark	Verdict

5	**Requirements**		—
5.1	**Product information**		P
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.		P
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.		N/A
5.2	**Performance**		P
5.2.1	***General***		P
	When tested in accordance with Clauses **6** and **7**, the door closer shall satisfy the relevant performance requirements of **5.2.2** to **5.2.11**, and **5.2.12** to **5.2.18** as appropriate.		P
5.2.2	***Durability***		P
	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.		P
	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.		P
5.2.3	***Closing moment***		P
	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.		P
5.2.4	***Opening moment***		P
	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.		P
5.2.5	***Efficiency***		P
	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 particular power size of the door closer being tested		P
5.2.6	***Closing time***		P
	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 %.		P
5.2.7	***Angles of operation***		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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		P
5.2.8	***Overload performance***		P
	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**.		P
5.2.9	***Temperature dependence***		P
	A set closing time (from a 90^0 open position) of 5 s at an ambient temperature of 20℃ shall not increase to more than 25s or decrease to less than 3 s when tested at 15℃ and 40℃ (see **7.2.1** and **7.2.2**).		P
5.2.10	***Fluid leakage***		P
	Throughout the test programme there shall be no leakage of fluid from the door closer.		P
5.2.11	***Damage***		P
	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.		P
5.2.12	***Latch control (optional)***		P
	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 15^0 from the closed position, and shall be adjustable.		P
5.2.13	***Backcheck (optional)***		P
	If provided with a backcheck function, the door closer shall be capable of arresting the test door before the 90^0 open position, when tested in accordance with **7.3.5.2**.		P
5.2.14	***Delayed closing***		N/A
5.2.14.1	*Delayed closing (optional)*		N/A
	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 90^0 to the end of the delay zone, at an ambient temperature of 20℃, is not less than 20 s. The delay zone shall not extend below the 65^0 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**.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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		N/A
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		P
5.2.16	***Zero position (for double action door closers only)***		P
	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**.		P
5.2.17	***Corrosion resistance***		P
5.2.17.1	The requirements of **5.6** of EN 1670:1998 shall be met, according to its classification (see **4.7**).		P
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**).		P
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.		P
5.2.18	***Fire/smoke door suitability***		N/A
	A door closer for use on a fire/smoke door assembly shall meet the necessary requirements of Annex A.		N/A
6	**Test apparatus**		—
6.1	**General**		P
6.1.1	***Single action door closers***		P
	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**.		P
6.1.2	***Double action door closers***		P
	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**.		P
6.2	**Test door**		P

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Clause	Requirement + Test	Result - Remark	Verdict
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.		P
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.		P
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.		P
	The moment shall be determined by measuring the maximum force in newtons required to slowly (not faster than 1o/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.		P
6.2.4	Means shall be provided for recording the number of operating cycles of the test door.		P
6.3	**Force measurement**		P
	A force gauge or comparable 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 method.		P
6.4	**Actuating means**		P
	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.		P
	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.		P
6.5	**Closing overload performance test apparatus**		P
	The apparatus shall comprise a cable/pulley/mass system as illustrated in Figure D.1, weighted in accordance with Table 2 for the particular power size of closer under test.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The cable shall be of steel, shall have a diameter of between 4 mm and 6 mm, and shall be attached as shown in Figure D.2 . The pulleys shall have a minimum diameter of 150 mm and shall be fitted with free-spinning ball or needle roller bearings.		P
	The angle between the cable and the face of the test door when it is opened at $90^0 \pm 5^0$ shall be $30^0 \pm 5^0$, and when the door is in the closed position, shall be $90^0 \pm 5^0$.Means shall be provided by which the test door can be suddenly released from an open position of 90^0.		P
	Means shall be provided for arresting the falling weights when the test door reaches 15^0 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 5^0 open position to arrest the test door at the closed position		P
	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		P
7	**Test methods**		—
7.1	**General**		P
7.1.1	***Tolerances***		P
	Throughout this test method the following tolerances shall apply, unless otherwise stated:		P
	mass expressed in kilograms (kg) ±2 %;		P
	length expressed in millimetres (mm) ±2 %;		P
	angular position expressed in degrees (^{0})$\pm 2^0$;		P
	force expressed in newtons (N) ±2 %;		P
	time expressed in seconds (s) ±5 %;		P
	temperature expressed in degrees Celsius (C) ±2℃		P
	moment expressed in Newtons-metres (Nm)±2 %.		P
	The ambient temperature of the test environment shall be controlled throughout the tests to between 15℃ and 30℃.		P
7.1.2	***Sampling***		P
	Three test samples shall be used for performance verification to this European Standard (see flow chart Annex B):		P

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Clause	Requirement + Test	Result - Remark	Verdict
	test sample A for general requirements and operation at extremes of temperature;		P
	test sample B for mechanical performance and durability;		P
	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.		P
	In each case, the door closer shall be adjusted so that its minimum closing moment between 0^0 and 4^0 are as near as possible to the values specified in Table 1.		P
	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.		P
7.2	**Test procedure — Sample A — General requirements and operation at extremes of temperature**		P
	The tests shall be carried out in the order as detailed in **7.2.1** to **7.2.3**.		P
7.2.1	***General***		P
	Verify that the requirements of **5.1** and Clause **8**, and where relevant, **5.2.12** and **5.2.18** are met.		P
	The door closer shall be mounted on a test door according to **6.2** in accordance with the manufacturer’s standard installation instructions.		P
7.2.2	***Test of temperature dependence***		P
	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.		P
	With the door closer temperature stabilized at 20℃ ±1 ℃adjust the closer to provide a smooth closing action from open to fully closed, in a time of 5 s. Take the average of three readings.		P
	Stabilize the door closer temperature at –15 ℃ ±1℃, open the door slowly to 90^0 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.		P
	Without readjusting the regulator(s), stabilize the door closer temperature at 40℃± 1℃ and again, measure the closing time from the 90^0 open position. Take the average of three readings		P
	Verify that the averaged closing time from 90^0, at each temperature extreme, does not decrease to less than 3 s or increase to more than 25 s.		P
7.2.3	***For double action door closers only***		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Allow the closer to stabilize to ambient temperature and attach an indicator strap to the door closer spindle carrying a pointer 300 mm long measured from its tip to the spindle centre.		P
	Apply a moment of 5 N_m to the spindle in each direction and measure the deflection of the pointer from the zero position. The closer shall be rejected if the total measured free play exceeds 3 mm.		P
7.3	**Test procedure — Sample B — Mechanical performance and durability**		P
	The tests shall be carried out in the order as detailed in **7.3.1** to **7.3.6**.		P
7.3.1	***General***		P
	Apply weights to the test door so that its total mass and centre of gravity are in accordance with Table 2 and **6.2.2**, for the particular power size of closer being tested.		P
	Mount the door closer on the test apparatus according to the manufacturer's standard installation instructions. Open the test door to the maximum angle permitted by the closer under test and verify that the door closer complies with **5.2.7**.		P
7.3.2	***Door closer adjustment***		P
	Adjust the door closer regulator(s) such that the test door closes smoothly from 90^0 to fully closed within a time of between 3 s to 7 s. If the closer has an additional regulator for the latch control, adjust this to provide a smooth transition from closing to latching speed and to provide a positive, but not slamming,action.		P
	Backcheck or delayed action closers shall have that feature set to its minimum effect or rendered inoperable.		P
7.3.3	***Test apparatus adjustment***		P
7.3.3.1	*Single action door closers*		P
	Adjust the test door actuating mechanism to open the test door smoothly to 90_, in a time of between 2 s and 3 s, allowing the test door to close under the control of the door closer under test.		P
	Ensure that the test door has returned fully to the closed position before initiating the next opening operation.		P
	Continue cycling for a total of 5 000 test cycles.		P
7.3.3.2	Double action door closers		P
	Adjust the test door actuating mechanism to open the test door smoothly to 90^0 in one direction, in a time of between 2 s and 3 s, allowing the test door to close under the control of the door closer under test.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Ensure that the test door has returned fully to the closed position before initiating the next opening operation in the other direction.		P
	Continue alternate cycling in each direction for a total of 5 000 test cycles.		P
7.3.4	***Tests at 5 000 test cycles***		P
7.3.4.1	*Calculation of opening/closing moments*		P
	Record the ambient temperature. Allow the door closer body surface to cool to within 2 ℃ of ambient temperature.		P
	Adjust the closing time regulator(s) to a fully open position and measure both the opening and closing forces of the door closer. The forces are measured by slowly (not faster than 1^0/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 from 0^0 to 4^0 and from 88^0 to 92^0. In each case the maximum value is to be noted Take the average of three readings.		P
	Use the same method to open the door to a 60^0 opening. Note the maximum opening force obtained during this procedure. Take the average of three readings.		P
	Allow the door to close from its maximum opening angle permitted by the door closer under test to 2^0 and note the minimum closing force obtained during its travel. Take the average of three readings		P
	In the case of double action door closers this procedure shall be carried out in each direction. NOTE 1 For double action door closers this procedure may require the use of a different test door that does not limit the angle of opening.		P
	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 2 This procedure does not preclude the use of automatic measuring and recording equipment.		P
	Verify that the values of the opening/closing moments are in accordance with Table 1 for the particular power size of the closer being tested.		P
7.3.4.2	Efficiency		P
	Calculate the door closer efficiency as a percentage as follows: $\text{Efficiency} = \frac{\text{Average of max. closing force between } 0^\circ \text{ and } 4^\circ \times 100}{\text{Average of max. opening force between } 0^\circ \text{ and } 4^\circ}$		P
	Verify that the value of the efficiency is in accordance with the values stated in Table 1 for the particular power size of door closer being tested.		P

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Clause	Requirement + Test	Result - Remark	Verdict
7.3.4.3	*Closing time*		P
	Adjust the closing time regulator(s) as necessary and verify that the closing time from 90^0 is capable of adjustment to between 3 s and 20 s, according to **5.2.6**.		P
7.3.4.4	*Closing overload test*		P
	Adjust the closing time from 90^0 open to 10 s. Hold the test door open at 90^0 with the cable and weights attached, according to **6.5** and Annex D, Figure D.2, and then release the door, allowing the weights to fall.		P
	This test shall be carried out 10 times. NOTE The falling mass is arrested when the door is 15_ open, the door continuing to close under its own momentum until it is arrested by the energy absorbing stop at 5_ or the frame at 0^0, or in the case of double action closers, until it stops of its own accord.		P
7.3.4.5	*For delayed closing door closers only*		N/A
	Adjust the door closer to the maximum delay time and open the test door to 90^0. With a force gauge positioned perpendicular to the door face, measure the force and calculate the moment required to move the test door out of the delay zone in a time of between 2 s and 5 s.		N/A
	The closer shall be rejected if the required moment is greater than 150 Nm, or less than twice the 90^0 closing moment stated in Table 1 for the particular power size of closer being tested.		N/A
	Restabilize the door closer to a temperature of 20℃, and open the test door to 95^0. Verify that the closing time from 90^0 to the end of the delay zone can be adjusted to at least 20 s in accordance with **5.2.1**.		N/A
	Adjust the test door actuating mechanism to open the test door smoothly to 95^0 in a time of between 2 s and 4 s, allowing the test door to close under the control of the door closer under test. Adjust the door closer to a delay time of 20 s from 90^0 to the end of the delay zone. Ensure that the test door returns fully to the closed position, and after a waiting period of 270 s start the next opening operation. Continue cycling to a total of 500 test cycles.		N/A
	During the last 5 cycles of the test, measure the delay time from 90^0 to the end of the delay zone and verify that each measurement is between 10 s and 30 s.		N/A
7.3.5	***Continuation of cycling tests***		P
7.3.5.1	*All door closers except those incorporating backcheck function*		P

EN 1154:1996 + A1:2002			
Clause	Requirement + Test	Result - Remark	Verdict
	Resume the cycling test to a total of 500 000 test cycles.		P
	Reset the closing time regulator(s) in accordance with **7.3.2** and record the time.		P
	The regulator(s) shall remain unaltered until completion of **7.3.6.1**.		P
7.3.5.2	*For door closers incorporating back check function*		P
7.3.5.2.1	*General*		P
	Reset the closing time regulator(s) in accordance with **7.3.2**. The backcheck function is tested by setting up the actuating means of the test apparatus in such a way that it can accelerate the door to an opening angle of 50^0 at such a rate that it will:		P
	a) achieve an opening angle of 110^0 without backcheck effect in operation (for door closers with adjustable backcheck); or		P
	b) have an angular velocity of one radian per second (1 rad/s) ± 10 %, at an opening angle of 60^0 (for door closers with fixed backcheck and for door closers with an opening angle of less than 110^0		P
7.3.5.2.2	*For door closers incorporating an adjustable backcheck function* With the same setting of the test apparatus as obtained in **7.3.5.2.1** adjust the backcheck action of adjustable backcheck closers to arrest the test door at the 80^0 open position and continue the cycling test for a total of 100 000 test cycles.		P
	Allow the door closer body surface to cool to within 2℃ of the original ambient temperature recorded in **7.3.4.1** and verify that the test door is arrested before the 90^0 open position. The adjustable backcheck shall not be readjusted prior to this test.		P
	Upon completion remove the backcheck action and reset the test apparatus in accordance with **7.3.3**.		P
	Continue cycling for a further 400 000 test cycles.		P
7.3.5.2.3	*For door closers incorporating a fixed backcheck function* With the same setting of the test apparatus as obtained in		N/A
	the test door shall be arrested by the backcheck at the 90^0 open position or less. Continue the cycling test for a total of 100 000 test cycles.		N/A
	Allow the door closer body surface to cool to within 2℃ of the original ambient temperature recorded in **7.3.4.1** and verify that the test door is arrested before the 90^0 open position.		N/A
	Continue cycling for a further 400 000 test cycles with the test apparatus set to open the test door to an opening angle of between 70^0 and 75^0		N/A
7.3.6	***Tests at 500 000 test cycles***		P
7.3.6.1	*Closing time*		P

EN 1154:1996 + A1:2002			
Clause	Requirement + Test	Result - Remark	Verdict
	Allow the door closer body surface_ to cool to within 2℃ of the original ambient temperature recorded in **7.3.4.1** and measure the time taken for the test door to close from 90^0 to the fully closed position. The door closer shall be rejected if this time is more than 2 times, or less than 0,7 times the original value set in **7.3.5.1** or **7.3.5.2**.		P
7.3.6.2	*Calculation of closing moments and efficiency* Repeat the tests of closing moments and efficiency specified in **7.3.4.1** and **7.3.4.2**. Verify that the values of minimum closing moments and efficiency are not less than the values stated in Table 1.		P
	Door closers with adjustable closing force are considered acceptable if, after adjustment, they can achieve at least the values stated in Table 1.		P
7.3.6.3	*Closing time*		P
	Adjust the door closer regulator(s) to give the minimum closing speed and verify that the closing time from 90^0 open to fully closed is not less than 20 s.		P
7.3.6.4	*Closing overload tests* Carry out a further ten closing overload tests according to **7.3.4.4**.		P
7.3.6.5	*For delayed closing door closers only*		N/A
	Restabilize the door closer to a temperature of 20℃, and open the test door to 95^0. Verify that the closing time from 90^0 to the end of the delay zone can be adjusted to at least 20 s in accordance with **5.2.14**		N/A
7.3.6.6	*For double action door closers only* Remove the door closer from the test door and carry out the test of **7.2.3**. The closer shall be rejected if the total measured free play exceeds 6 mm.		N/A
7.4	**Test procedure — Sample C — Corrosion resistance**		P
	The tests shall be carried out in the order as detailed in **7.4.1** to **7.4.4**.		P
7.4.1	***General***		P
	Apply weights to the test door so that its total mass and centre of gravity are in accordance with Table 2 and **6.2.2**, for the particular power size of closer being tested. Mount the door closer on the test apparatus according to the manufacturer's standard installation instructions.		P
7.4.2	***Calculation of closing moments***		P

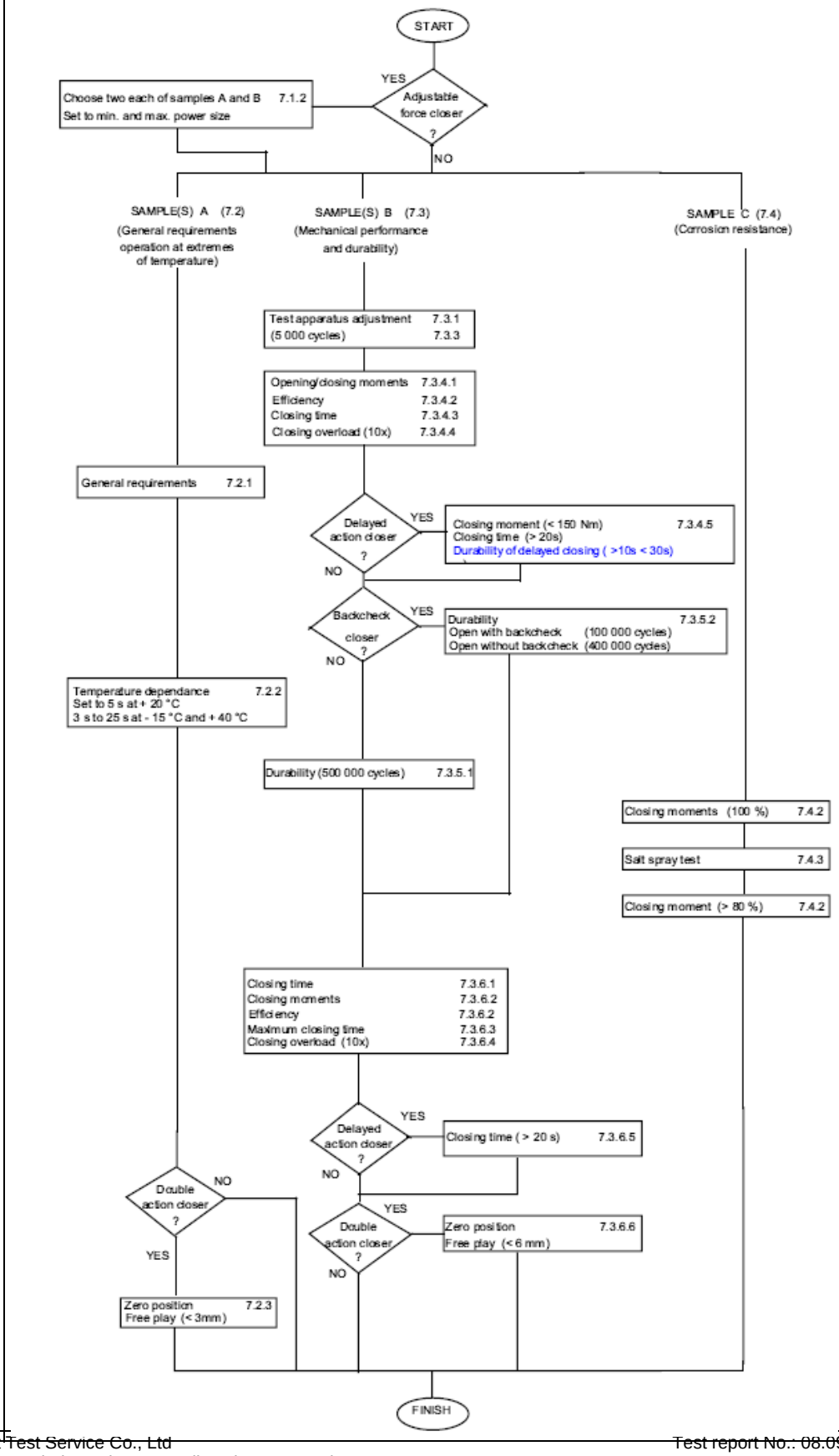
EN 1154:1996 + A1:2002			
Clause	Requirement + Test	Result - Remark	Verdict
	Adjust the closing time regulator(s) to a fully open position, open the door to at least 95^0 and measure the closing forces of the door closer. The forces are measured by slowly (not faster than 1^0/s) allowing the door to close using the force gauge positioned perpendicular to the door face when the door is in an open position from 92^0 to 88^0 and from 4^0 to 0^0 In each case the maximum value is to be noted. Take the average of three readings.		P
	Allow the door to close from its maximum opening angle permitted by the closer under test and note the minimum closing force obtained during its travel. Take the average of three readings.		P
	Calculate the 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.		P
7.4.3	***Salt spray test***		P
	Remove the door closer from the test apparatus and carry out a salt spray test according to EN 1670 for the grade of corrosion resistance claimed.		P
7.4.4	***Verification of closing moments***		P
	After completion of the salt spray test and within a maximum time of 24 h reinstall the door closer on the test apparatus and repeat the procedure described in **7.4.2**. Verify that the door closer meets the requirements of **5.2.17**.		P
8	**Marking**		—
	Each door closer and separately supplied accessory manufactured to this standard shall be marked with the following:		P
	a) the manufacturer's name or trademark, or other means of identification;		P
	b) product model identification;		P
	c) the classification according to Clause **4**;		P
	d) the number of this European Standard;		P
	e) the year and week of manufacture. NOTE This information under e) can be in a coded form.		P
	In the case of concealed door closers, the above information shall be readily visible after removal of the cover plate.		P
	For accessories (where there may be insufficient space to provide the information given in the clause), only item a) is mandatory.		N/A
	Accessories claiming compliance with Annex A, shall be marked with the information a) to e) above. In preferential order the information shall be placed:		N/A
	1) on the product itself; or		P

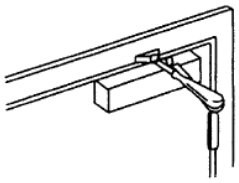
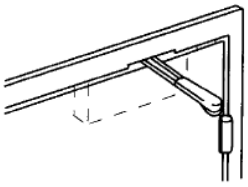
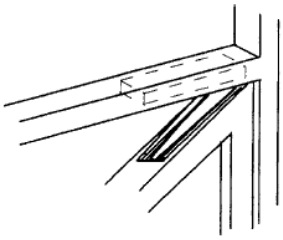
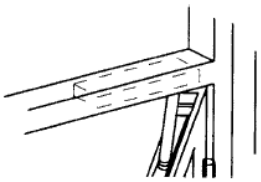
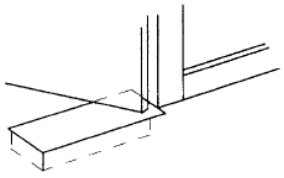
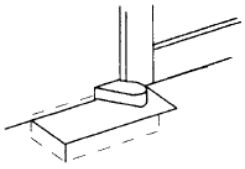
EN 1154:1996 + A1:2002			
Clause	Requirement + Test	Result - Remark	Verdict
	2) on a label attached to it; or		P
	3) on the installation instructions; or		P
	4) on its packaging. NOTE For CE marking and labelling, see Clause **ZA.3** of Annex ZA.		P
9	**Evaluation of conformity**		—
9.1	**Initial type test**		P
	Samples, selected in accordance with **7.1.2**, representing the series, shall be subjected to the full test sequence of Clause **7** and, where relevant, to Annex A.		P
	If necessary, (for example, after component changes or redesigns likely to affect the product performance) this initial type test shall be repeated.		N/A
9.2	**Factory production control**		P
9.2.1	***Documentation***		P
9.2.1.1	The manufacturer of door closing devices to this European Standard shall document, operate and maintain an adequate factory production control system to enable the achievement of the required product characteristics and the effective operation of the production control system to be checked.		P
9.2.1.2	The manufacturer shall draw up and keep up to date documents defining the factory production control which he applies. The manufacturer's documentation and procedures shall be appropriate to the product and manufacturing process. The factory production control system shall achieve an appropriate level of confidence in the conformity of the product. This involves:		P
	a) the preparation of documented procedures and instructions relating to factory production control operations;		P
	b) the effective implementation of these procedures and instructions;		P
	c) the recording of these procedures and their results;		P
	d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the factory production control to rectify the cause of non-conformity.		P
9.2.2	***Unit checks during manufacture***		P
	The manufacturer shall conduct the following unit checks during manufacture:		P
	a) check that the components meet the specifications;		P
	b) check the operation of the mechanism;		P

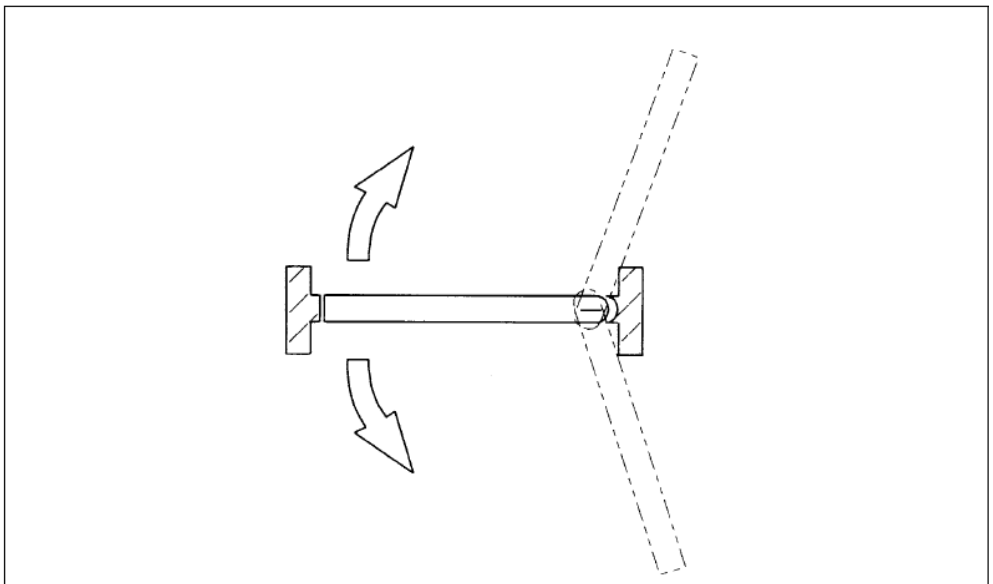
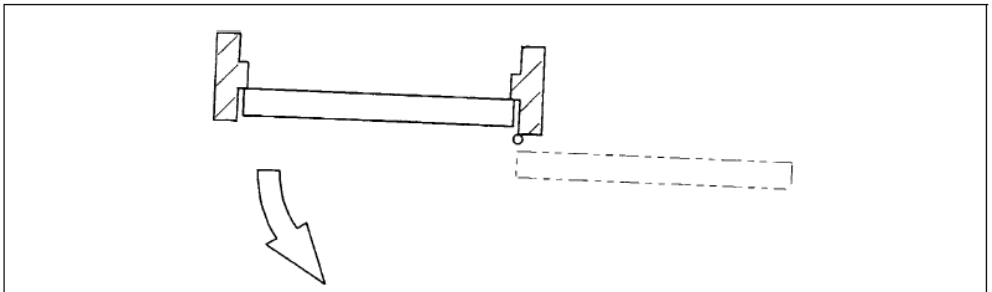
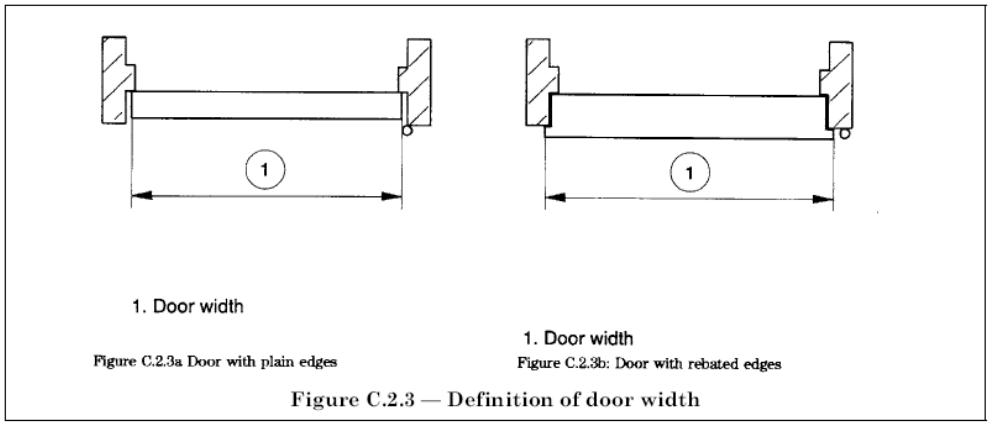
EN 1154:1996 + A1:2002			
Clause	Requirement + Test	Result - Remark	Verdict
	c) check the marking.		P
9.2.3	***Treatment of non-conforming products***		P
	The manufacturer shall treat non-conforming products as follows:		P
	a) isolate and identify non-conforming products;		P
	b) undertake the necessary corrective actions;		P
	c) repeat tests as appropriate to prove that product meets the specifications.		P
9.3	**Further testing of samples**		P
	At intervals of not more than six months, samples taken from finished product stock, selected in accordance with **7.1.2** and representative of the series, shall be subjected to the full test sequence of **7.3**		P
Annex A	**Additional requirements for door closing devices intended for use on fire/smoke door assemblies**		—
A.1	The door closer, when installed in accordance with the manufacturer's installation instructions, shall be capable of closing the test door from any angle to which it may be opened.		N/A
	Due to their low closing moments door closers size 1 and 2, without adjustable closing force, are NOT considered suitable for use on fire/smoke door assemblies. Door closers with adjustable closing force shall be capable of adjustment at least to power size 3. For such closers the installation instructions shall include precise instructions to the installer to ensure that the door closer power is adjusted on site to size 3 or more, to overcome resistance of any seals or latches fitted.		N/A
A.2	The door closer shall not include a hold-open device unless it is an electrically powered device in accordance with prEN 1155.		N/A
A.3	Control regulators shall either be concealed, or operable only by means of a tool.		N/A
A.4	The design of a door closer shall be such that it is not possible to inhibit its closing action in any way, without the use of a tool.		N/A
A.5	Any incorporated delayed action function shall be capable of adjustment to less than 25 s, between the door closing angles of 120_ and the end of the delay zone.		N/A

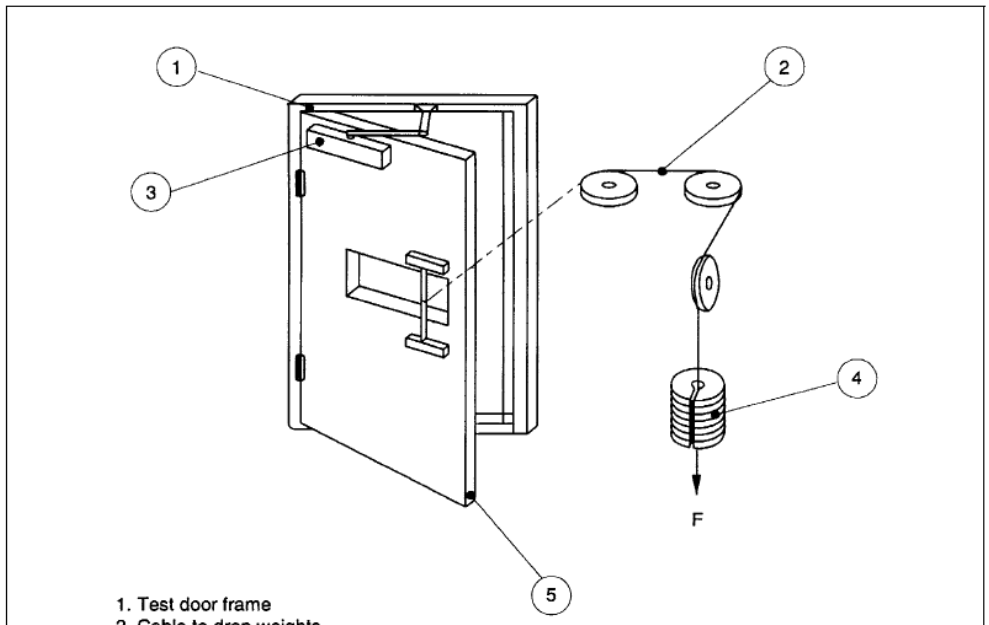
EN 1154:1996 + A1:2002			
Clause	Requirement + Test	Result - Remark	Verdict
A.6	The door closer, representative of its model, shall have been incorporated in a door assembly that has satisfied the appropriate criteria of a fire test. The test shall have been on a full sized assembly in accordance with EN 1634-1 or when relevant, in accordance with EN 1634-3. NOTE 1 A wider field of application will be obtained by subjecting the product to a test in accordance with another part of prEN 1634, currently being prepared by CEN/TC 127. NOTE 2 Products often penetrate the door leaf and interrupt the leaf edge/frame gap. The influence that this may have on the smoke control properties of a door assembly can only be determined by subjecting a full-sized door assembly, fitted with the component, to the test described in prEN 1634-3.		N/A
A.7	Where the door closer is intended for use with other, significantly different arm assemblies (for example slide tracks) which may be supplied separately, that combination shall also be tested according to Clause **7**.		N/A
Annex B	**Flow chart of test procedure**		—

EN 1154:1996 + A1:2002			
Clause	Requirement + Test	Result - Remark	Verdict
			P



EN 1154:1996 + A1:2002			
Clause	Requirement + Test	Result - Remark	Verdict
Annex C	**Door closer and door types**		—
C.1	**Typical door closer types**		N/A
	 Figure C.1.1 — Overhead door closer surface mounted		N/A
	 Figure C.1.2 — Overhead concealed door closer door mounted		N/A
	 Figure C.1.3a Double action  Figure C.1.3b Single action Figure C.1.3 — Overhead concealed door closer transom mounted		N/A
	 Figure C.1.4a Double action  Figure C.1.4b Single action Figure C.1.4 — Floor concealed door closer floor spring		P

EN 1154:1996 + A1:2002			
Clause	Requirement + Test	Result - Remark	Verdict
	 Figure C.2.1 — Typical door for double action door closer		P
	 Figure C.2.2 — Typical door for single action door closer		P
	 1. Door width Figure C.2.3a Door with plain edges 1. Door width Figure C.2.3b: Door with rebated edges Figure C.2.3 — Definition of door width		P
Annex D	**Overload performance test apparatus**		—

EN 1154:1996 + A1:2002			
Clause	Requirement + Test	Result - Remark	Verdict
	 1. Test door frame 2. Cable to drop weights 3. Door closer under test 4. Drop weights 5. Test door Figure D.1 — Typical general arrangement		P

No	Test Items	Standard requirement			Test result	Verdict
1	Closing moment	Doors mass 100kg 0°~4° closing moment ≥37, <54N·m 88°~92° closing moment ≥12 N·m			 42.4 N·m 18.2 N·m	Pass
2	Opening moment	0°~60° Opening moment ≤83N·m			42.9 N·m	Pass
3	Efficiency	≥65%			68.1%	Pass
4	Closing time	From a door opening angle of 90° shall be capable of adjustment to 3 s or less, and 20 s or more			 1.90 s 91.60 s	Pass
5	Angles of operation	Grade 4: For closing doors from 180° open. Closed Angle: On closing. Shall control the door from a minimum angle of 70°, down to the closed position.			Closing angle of the door can be control.	Pass
6	Overload performance	Test door mass 100kg, Overload test weight 27kg, after 10 times impact test, the sample should work normally 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℃, is not less than 20 s. The delay zone shall not extend below the 65° opening position. The moment required to override manually the delay action shall not exceed 150 N·m			After 10 times impact test, the sample can work normally	Pass
7	Temperature dependence	A set closing time (from a 90° open position) of 5 s at an ambient temperature of 20℃, shall not increase to more than 25 s or decrease to less than 3 s when tested at -30℃ and 40℃			-30℃: 12.40 s 40℃: 6.06 s	Pass
8	Fluid leakage	Throughout the test programme there shall be no leakage of fluid from the door closer			No leakage	Pass
9	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.			No damage	Pass
10	Back check	If provided with a back check function, the door closer shall be capable of arresting the test door before the 90° open position			Comply with the requirement	Pass
11	Durability	500 000 test cycles	Closing moment	Door mass 100kg 0°~4° closing moment ≥37, <54N·m 88°~92° closing moment ≥12 N·m	 43.8 N·m 19.1 N·m	Pass
			Opening moment	0°~60° Opening moment ≤≤83N·m	44.2 N·m	Pass
			Efficiency	≥65%	68.7%	Pass
			Closing time	From a door opening angle of 90° shall be capable of adjustment to 3		Pass

				s or less, and 20 s or more	2.1s 84.46 s	
12	Corrosion resistance	After being subjected to the relevant salt spray test, the closing moment of the door closer shall be not less than 80% the closing moment measured prior to the test			45.9 N·m 23.1 N·m After test, the sample can work normally, showed no sign of defect or other failure and no corrosion on the base metal	Pass
		Door mass 100kg 0^{o}~4^{o} closing moment ≥37, <54N·m 88^{o}~92^{o} closing moment ≥12 N·m				Pass
		Surfaces shall show no sign of tarnish, visible to unaided normal or corrected vision as blackening or adverse discolouration of the surface, that does not include an acceptable patina				Pass
		Surfaces shall withstand exposure for the time specified without corrosion of base metal substrate visible to unaided normal or corrected vision excepting an average of one spot per 650 mm^2 of significant surface and without any spots larger than 1.5mm in any direction				Pass
		The degree of blistering of surfaces shall not be greater than density 2 and the size of any blisters shall not exceed size 3 as both designated in EN ISO 4628-2				Pass

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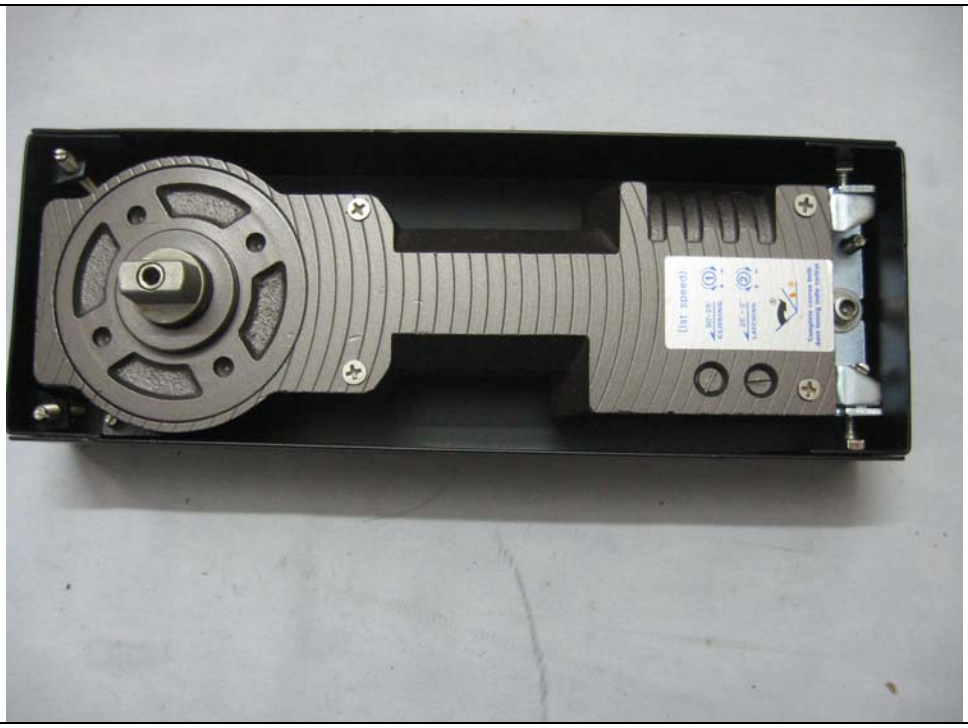

The end of report