

**Specification for fire doors**

**AMENDMENT NO. 1**

September 2022

**1. Page 6, Table of contents**

a. *Add* “Annex U Building hardware – Push and pull handle furniture: Requirements and test methods” after Annex T.

b. *Add* the following after Figure T.1:

U.1 Typical example of axial strength test setup

U.2 Measurement of displacement for axial strength test

U.3 Typical example of torque of return mechanism test setup

U.4 Typical example of durability test setup

U.5 Typical example of rotational test setup

**2. Page 9, Foreword**

*Insert* the following after “Acknowledgment is made for the use of information from the above organisations”:

Acknowledgement is also made for the use of figures from the following organisations:

1. dormakaba Singapore Pte Ltd for the reproduction of the figure of a knob type used in Figure U.1, U.2, U.3 and U.5.
2. ASSA ABLOY Singapore Pte Ltd for the reproduction of the figure of an exterior view of a push and pull handle used in Figure U.1.

Figures are included as examples in this Singapore Standard for the sole purpose of illustration. They do not connote any endorsement whatsoever of any product, service and/or design concept by the Working Group and Enterprise Singapore.

**3. Page 12, 3.11 Non-self-latching bolt**

*Add* “Roller latch and ball catch are also considered as non-self-latching as they do not have a chamfered front.” after the 1<sup>st</sup> sentence.

**4. Page 16, 4.1.3.5 Lockset and flushbolts**

Replace 4.1.3.5 with the following:

**4.1.3.5 Lockset and flushbolts**

All doorsets shall remain latched by the lockset and flushbolts when the door leaves are in a closed position. A non-self-latching bolt as defined in 3.11 shall not be accepted as a self-latching bolt.

**5. Page 19, 5.3.1 General**

Replace 5.3.1 with the following:

**5.3.1 General**

Except as provided in 5.3.3, two prototypes of a side-hung or pivoted fire door shall be tested. One prototype shall be mounted so that the door leaf swings towards the fire in the test furnace and the other prototype shall be mounted so that the door leaf swings away from the fire. The exposed face of the doorset can also be the face that is deemed to be onerous by the recognised testing laboratory.

**6. Page 24, Table 3 Limitation to size variations**

Replace Table 3 with the following:

**Table 3 – Limitation to size variations**

Door type	Category A allowances	Category B allowances
Hinged and pivoted doors	Unlimited size reduction is permitted for all types except insulated steel doors where a reduction to 50 % width and 75 % height of tested specimen is the limit of variation.  Size increase is not permitted.	Unlimited size reduction is permitted for all types except insulated steel doors where a reduction to 50% width and 75% height of the tested specimen is the limit of variation.  Size increase is permitted up to: 15 % height 15 % width 20 % area
Sliding doors		Unlimited size reduction is permitted.  Size increase is permitted up to: 50 % height 50 % width 50 % area

**7. Page 27, 7.6.1.1 General**

Replace the last sentence with the following:

Each vision panel, except for wired glass, shall incorporate a permanent identification mark bearing the brand and model.

**8. Page 28, 7.6.3 Types of doorset**

*Replace 7.6.3 with the following:*

**7.6.3 Types of doorset**

The construction of a single-leaf doorset from a double-leaf doorset, tested on the most onerous fire situation shall be assessed.

**9. Page 43, D.3.6**

*Replace “0.5 h fire rating: Grade B” with “0.5 h fire rating: Grade C”.*

**10. Page 85, Addition of a new annex**

*Add the following Annex U after Annex T.*

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## **Annex U** (normative)

### **Building hardware – Push and pull handle furniture: Requirements and test methods**

#### **U.1 General**

**U.1.1** This test procedure enables the mechanical performance of push and pull handles of digital lockset to be determined when installed in accordance with the manufacturer's installation instructions.

**U.1.2** The spindle tested shall be specific to the push and pull handle and mortise lockcase supplied with it.

**U.1.3** The mechanical performance shall consist of tests that determine the durability of the mechanism and the mechanical strength.

**U.1.4** The range of door thickness for the installation of the digital lockset and the designed maximum angle of rotation of the spindle shall be specified.

**U.1.5** The push and pull handles of the digital lockset shall be tested separately according to U.3 and shall meet the requirements of U.2. As described in U.3, test 1 to test 6, shall be sequentially conducted on the same half set of push and pull handle.

**U.1.6** The fire performance of the push and pull handle shall also be tested in accordance with Annex B. For asymmetrical push and pull handle, it shall be tested on both faces.

**U.1.7** For the half set of furniture (push or pull handle) to be fixed to a test block of solid wood of size 150 mm +/- 5 mm (width) x 20 mm +/- 1 mm (thickness), the height can be varied to accommodate the handle. For axial strength test block of size 150 mm +/- 5 mm (width) x 40 mm +/- 2 mm (thickness), the height can be varied to accommodate the handle.

**U.1.8** Electromechanical or mechanical lock shall come with mechanical fail-safe features on the non-secure side to ensure occupant escape. Notwithstanding any standards/codes mentioned in this standard, it shall not contradict the fail-safe features required.

**U.1.9** The mortise lock case and mechanical cylinder (if any) shall be tested separately in accordance with BS EN 12209 or BS EN 14846, and BS EN 1303 respectively.

#### **U.2 Requirements**

**U.2.1** After the axial strength test, the permanent deformation of the push and pull handles shall be  $\leq 2$  mm as shown in Figure U.2.

**U.2.2** The furniture (push or pull handle) shall return to its original at-rest position within +/- 1 ° or +/- 1 mm where applicable from any intermediate angle after the torque of return mechanism of spring-loaded furniture test.

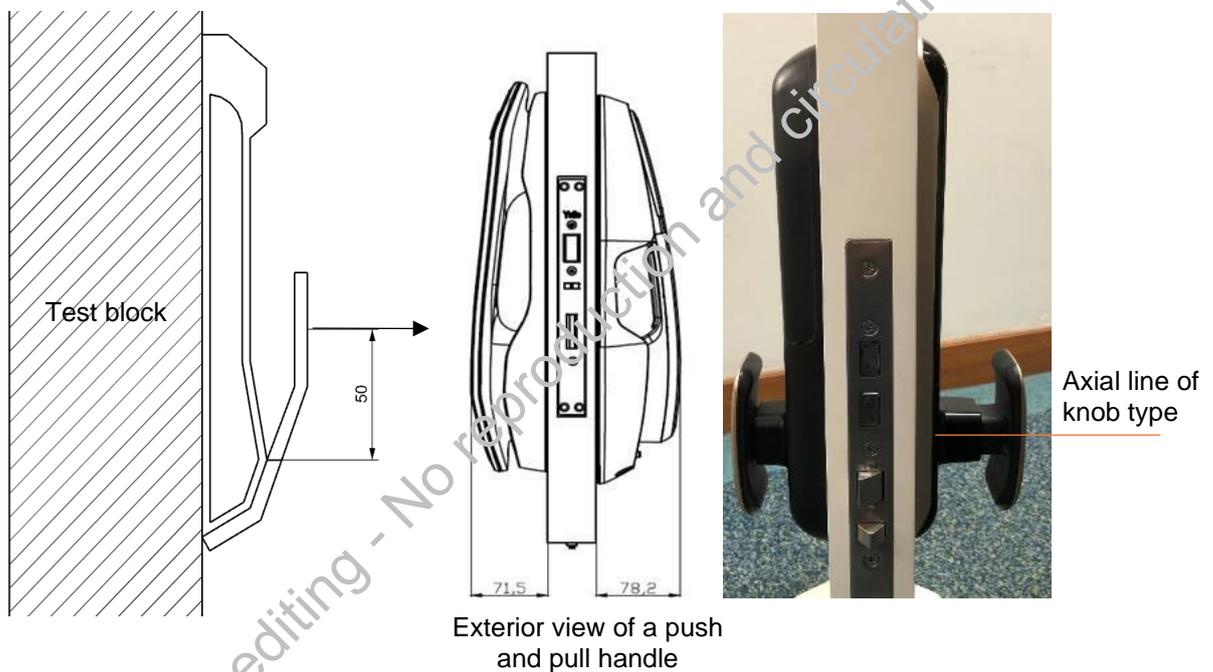
**U.2.3** After the durability test, there shall be no failure of any component and the push and pull handle shall still be operational after the test. After the test, the at-rest position of the handle shall be +/- 1 ° or +/- 1 mm where applicable.

**U.2.4** After the rotational strength test, there shall be no failure of any component and the push or pull handle shall still be operational. The permanent deformation shall be  $\leq 5$  mm.

### U.3 Performance tests

#### U.3.1 Axial strength of furniture (Test 1)

The test sample shall be subjected to a pre-load of 15 N at a distance of 50 mm (+/- 1 mm) from the axis of rotation for the lever type (for the knob type where the means of operation is at the axial line of operation, the force application will be at the axial line, as shown in Figure U.1, followed by a force of 800 N (+5 % / -0 %) without shock in the operational direction). The force shall be applied for 60 s (+10 s / 0 s) and then slowly reduce to the pre-load value of 15 N (+/- 1 N).



**Figure U.1 – Typical example of axial strength test setup**

Re-measure the distance from the reference point of 75 mm (+/- 2 mm) from the axis of rotation (for the handle where the means of operation is at the axial line of operation, the permanent deformation distance is the displacement between the initial and final value).

The test shall fulfil the requirements as specified in U.2.1.

The test shall be carried out separately on both the push and pull handles.

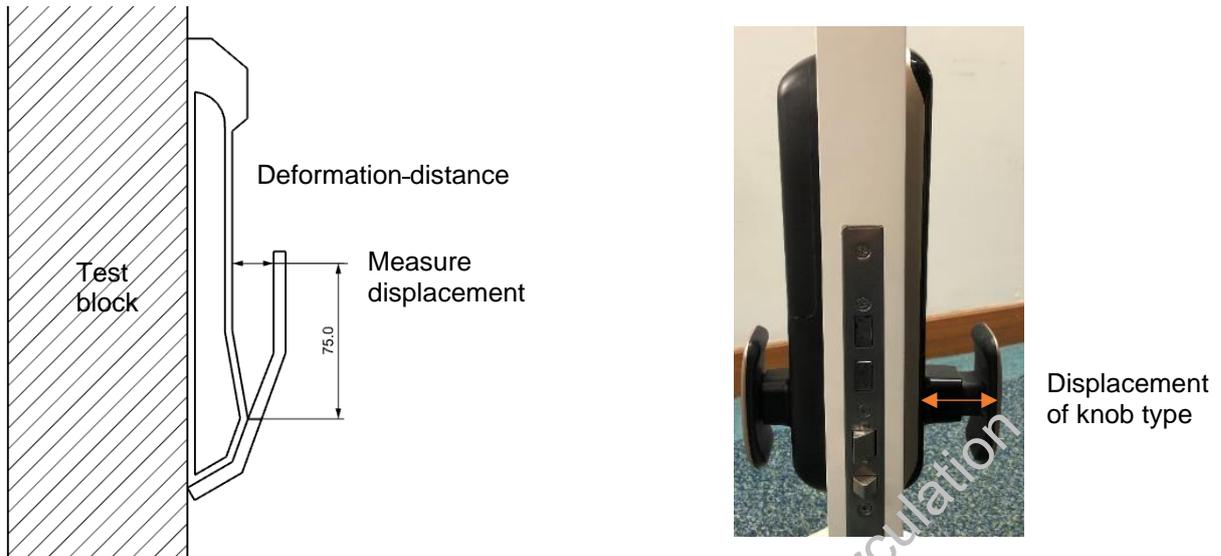


Figure U.2 – Measurement of displacement for axial strength test

### U.3.2 Torque of return mechanism of spring-loaded furniture (Test 2)

Measure and record the torque required to pull or push the handle through its designed angle of rotation from the original at-rest position, as shown in Figure U.3. Remove the torque gradually over a period of 1 s to 3 s and measure the at-rest position of the lever handle. Repeat the test at 10 ° intervals for angle of rotation between 5 ° to the designed angle of rotation.

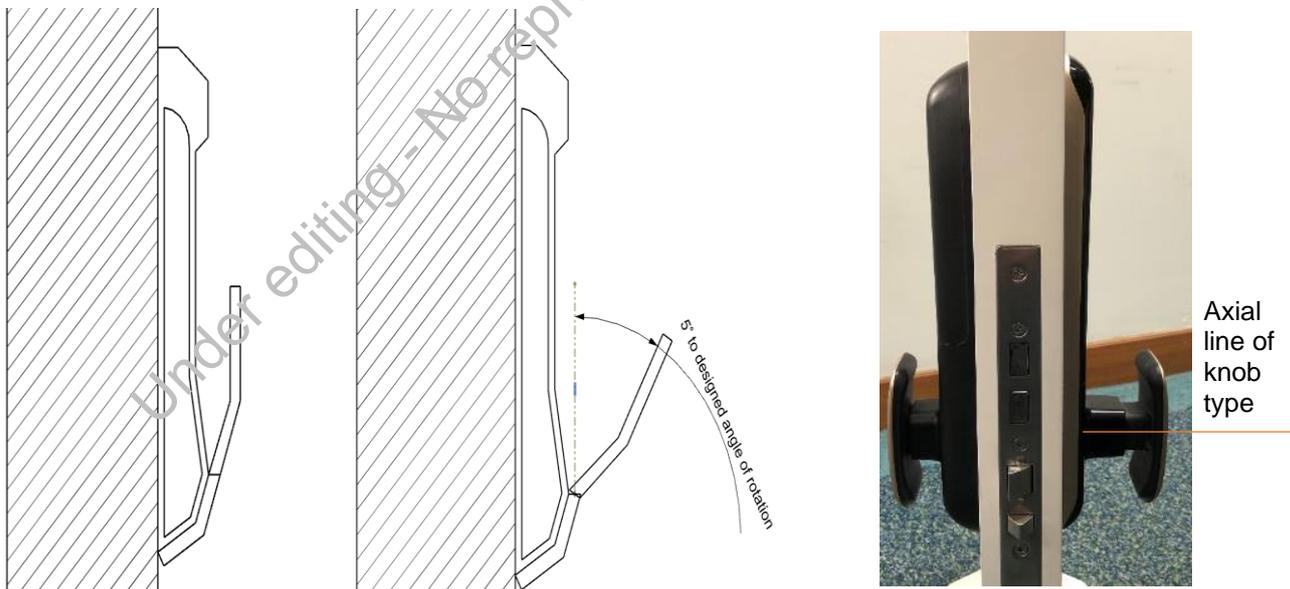


Figure U.3 – Typical example of torque of return mechanism test setup

For the handle where the means of operation is at the axial line of operation, measure and record the force required to push or pull the handle through its designed angle of depression from the original at-rest position. Remove the force gradually over a period of 1 s to 3 s and measure the at-rest position of the handle. Repeat the test at 5 mm intervals to the designed angle of rotation.

The test shall fulfill the requirements as specified in U.2.2.

The test shall be carried out separately on both the push and pull handles.

### U.3.3 Durability of mechanism (Test 3)

The handle shall be tested together with the intended lockcase, as shown in Figure U.4.

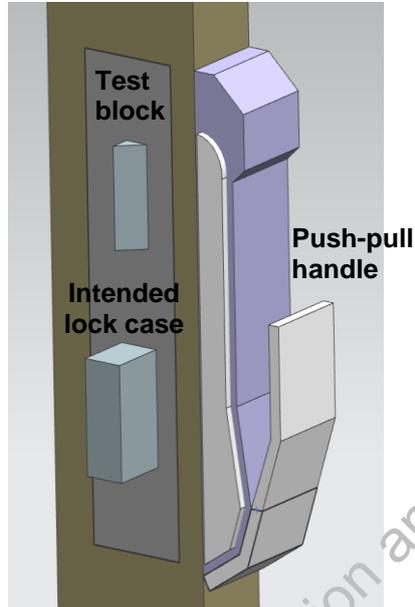


Figure U.4 – Typical example of durability test setup

Apply a force sufficient to bring the handle to the maximum angle of rotation  $-5^\circ$  for 200,000 cycles. For the linear type, apply a force sufficient to bring the handle to the maximum depression  $-1$  mm for 200,000 cycles.

The frequency of operation shall be between 6 to 24 operations per minute.

The test shall fulfill the requirements as specified in U.2.3.

The test shall be carried out separately on both the push and pull handles.

### U.3.4 Repeat test of axial strength of furniture (push or pull handle) (Test 4)

Repeat test 1 as described in U.3.1.

### U.3.5 Repeat test of torque of return mechanism of spring-loaded furniture (Test 5)

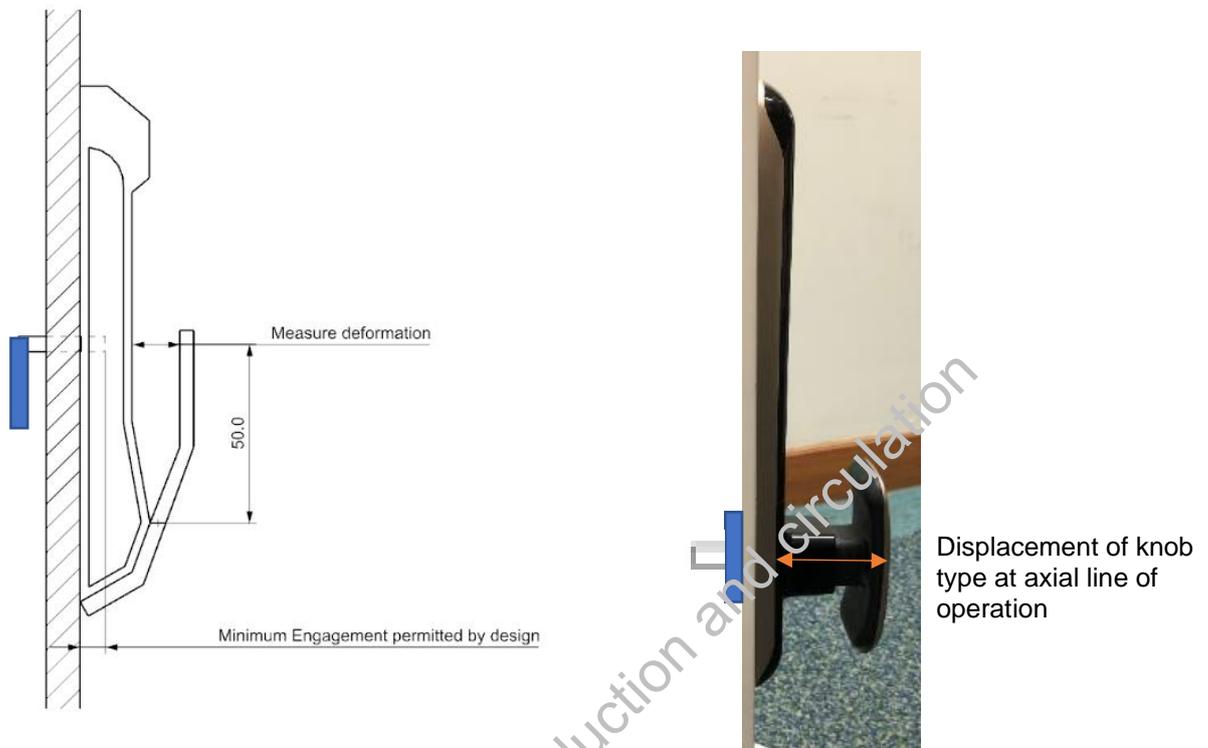
Repeat test 2 as described in U.3.2.

### U.3.6 Rotational strength (Test 6)

The half set of handle shall be mounted with the supplied spindle engaged at the minimum distance as specified by the manufacturer with a fixed reaction plate, as shown in Figure U.5. Measure the distance from the reference point of 50 mm ( $\pm 2$  mm).

The sample shall be subjected to a pre-torque of 1 Nm ( $\pm 0.1$  Nm) at a distance of 50 mm ( $\pm 1$  mm), followed by a torque of 40 Nm ( $\pm 5\%$ ) without shock in the direction of operation. The torque shall be applied for 60 s ( $+10$  s / 0 s) then slowly reduce to the pre-torque value of 1 Nm ( $\pm 0.1$  Nm).

Re-measure the distance from the reference point of 50 mm ( $\pm 2$  mm). The permanent deformation shall be  $\leq 5$  mm.



**Figure U.5 – Typical example of rotational test setup**

For the knob type where the means of operation is at the axial line of operation, the half set of handle shall be mounted with the supplied spindle engaged at the minimum distance as specified by the manufacturer with a fixed reaction plate. Measure the distance from the fixed reference point.

The sample shall be subjected to a pre-stress of 20 N (+/- 0.2 N), followed by a force of 800 N (+/- 5 %) without shock in the direction of operation. The force shall be applied for 60 s (+10 s / 0 s) then slowly reduced to the pre-stress value of 20 N (+/- 0.2 N).

Re-measure the distance from the axial line of operation (+/- 2 mm).

The test shall fulfill the requirements as specified in U.2.4.

The test shall be carried out separately on both the push and pull handles.