

related test method	<b>EN 1634-1: 2000 Fire resistance – Part 1: Doors</b>
subject	<b>Repeated opening and closing of doors, performed before fire resistance/smoke control test</b>
reference of original query	TC2 N340, N366, Annex A to N368

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**Problem**

EN 1634-1 states that some preliminary mechanical testing should be performed on the test specimen of a fire door prior to fire resistance testing. However, no information about this mechanical testing is given in the fire test method.

**Recommendation**

This Recommendation gives instruction and guidance to laboratories undertaking opening/closing tests prior to fire testing.

It is assumed that the equipment for opening/closing is in fully in accordance with EN 1191 and EN 12605. Regarding the sequence of tests, references to opening/closing applies to manual as well as mechanical operation. More information is provided in EN 14600.

**1 Apparatus****1.1 Opening and closing of the primary leaf**

Equipment for opening/closing shall pull or push the door leave(s) by the handle(s). There shall be no lateral forces apart from those in the direction of opening/closing.

No extra force shall be applied to the leaf at the open stop position apart from that just required maintain it in that position for the appropriate duration.

In some cases e.g. when the handle is a knob, it is impractical to attach the opening/closing apparatus directly to the handle. In such cases, it is permitted to attach e.g. by welding, a lever handle to the doorknob for the purposes of actuation.

Note 1: this is considered to be a modification of the test apparatus, not the test specimen.

Note 2: this modification is not applicable to doorsets equipped with panic hardware.

It is not permitted to substitute the handle with another device for the opening/closing test.



During closing there shall be no force applied on door leaf apart from dynamic closing forces. For doors without mechanical closing means, only the minimum external force necessary to achieve the desired operating velocity is allowed.

## **1.2 Opening and closing of the secondary leaf**

The provisions of 1.1 also apply to the secondary leaf although consideration needs to be given to fixing the opening actuators to door leaves with no handle.

The manner of fixing the actuator to the door leaf shall be agreed upon between manufacturer and test laboratory. The actuator shall be fixed so that no damage is caused to door leaf as far as possible. The manufacturer may be asked to prepare a fixture on secondary leaf for the purposes of attaching the actuator e.g. by welding it to a push plate. This fixture shall not affect fire behaviour of doorset if it is left on door leaf for the fire resistance test.

The opening/closing force shall be applied at the closing edge, or as close as possible to it.

If the secondary leaf is to be permanently closed and only opened occasionally (based on a declaration by the manufacturer), the shakedown test need not be performed on this leaf. This leaf shall be opened and closed manually 25 times according to EN 14600 before the shakedown test on the primary leaf.

## **1.3 Operating velocities**

Door leaves equipped with self-closing mechanisms shall be closed at the required closing velocities given in EN 1191. If the self-closing mechanism allows higher operating velocities than those required, it should be adjusted to limit the closing velocity (by braking the self closure spring) to follow the closing speeds given in EN 1191 as far as possible.

## **2 Calibration/validation parameters**

Individual parts of the equipment shall be calibrated separately (whichever necessary and as required).

### **2.1 Counters**

Parameters to be inspected before each test:

- Reliability of counting (owing to the particular type of proximity switch and sensing method);
- Avoidance of multiple counting in case that the leaf randomly hits the frame several times during one closing operation;

These parameters shall be verified by observing of behaviour of counters for the minimum of 20 cycles at the beginning of the opening/closing test. Operability of counters shall be verified after opening/closing test.

### **2.2 Operating velocities**

The most important parameter is the closing speed, which shall be achieved sufficiently in advance of closing to prevent possible fluctuations of the mechanism.

Velocities of the test specimen shall be measured before and after each opening/closing test by appropriate means (e.g. linear or angular transducers) during the entire opening and closing sequence. This feature shall preferably be built in the opening/closing apparatus.

If, after evaluation has been made for a certain period of time, it has been demonstrated that operating velocities at the beginning and end of the opening/closing tests do not differ by more than 10% with door leaves of various mass, various modes of operation, and various operating velocities, these measurements may be made at the beginning of each test.

Note 4: If the door is fitted with a self closing device and is working correctly (EN1154 compliant) it should stay within the 10% allowable tolerance when completing 5000 cycles, However if the closer has build-up problems it will slow down during cycling and may have to be adjusted.

If a calibration proves that the opening/closing equipment is capable of keeping the velocities within the desired limits with door leaves of various mass, various modes of operation, and various operating velocities, it is not necessary to perform the measurement before each test. A regular calibration is sufficient.

Whenever the closing velocity is measured, it shall be measured 5° before the closed position at least. The mechanical test is considered valid only if 90 % of the recorded velocities are within an area of +/- 10 % of the nominal velocity.

### **3 Procedural arrangements**

#### **3.1 Definition of friable material**

For the purpose of EN 14600, friable material is considered to be any material that is blown into or loosely filled into a door such as mineral wool. Material in the form of a mat or slab e.g. mineral wool mat, **plasterboard and calcium silicate boards are** not normally considered to be friable.

In case of any doubt the shakedown test should be performed.

#### **3.2 Specimen installation and set-up**

No adjustment or repair of the doorset is allowed between the opening/closing test and fire resistance or smoke control test.

No repairs are allowed at the junction between the doorframe and the supporting construction.

Repairs on the supporting construction are allowed but shall be clearly documented in fire test report.

#### **3.3 Order of operations prior to fire test**

The order of tests and other operations is described in EN 14600. Any repeated opening/closing test shall be completed immediately before the fire test (maximum two days before fire resistance/smoke control test). If the period is longer than two days, a manual 25 opening/closing operations shall be performed immediately before fire test (even if the shakedown test has been carried out).

If the test specimen has been moved, or repaired in any way, or the conditioning of the test specimen is changed between the opening/closing test and the fire resistance test, the opening/closing test shall be performed again.

If a shakedown test is necessary while another repeated opening/closing test is to be performed on the same specimen built in supporting construction for fire resistance test (for more than 5000 cycles), the final 5000 cycles of the opening/closing test shall be performed at operating velocities increased by 50 % (additional shakedown test is not necessary).

Door to frame gaps and closing forces shall be measured after mechanical or manual opening and closing.

If the gaps have changed after repeated opening/closing and ceased to be in accordance with manufacturer's specifications, the doorset may be set-up again at the request of the sponsor and the gaps measured again.

Note 5: Door to frame gaps may also be checked at two to three locations for each door after it has been mounted on the furnace to ensure that there has been no

change. If there are significant changes e.g. gaps changing by more than 1 – 2 mm then the doorset may be adjusted so that the gaps are the same as those measured after the opening/closing test.

#### **4 Information contained in fire test report**

Fire resistance and smoke control test reports do not have to contain all the information required by EN 1191 or EN 12605. However, all the information required by EN 1191 or EN 12605 shall be kept by the testing laboratory.

Regarding the repeated opening and closing test, the fire test report shall contain the following information (at least):

- Rationale for: selection of number of cycles, operating velocities and other relevant parameters;
- Number of cycles completed;
- Operating velocities;
- Mode of opening and closing (manually, powered, mechanical equipment, self closing devices);
- Construction differences from fire test specimen (if any);
- Maintenance performed on doorset or supporting construction during and after opening/closing test (if any);
- Declaration that gaps and closing force were measured after repeated opening/closing test;
- Declaration whether the gaps measured are in accordance with the specifications of the sponsor;
- Reference to EN 1191 or EN 12605 (as appropriate);
- Reference to mechanical test report (if produced from repeated opening/closing test)