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**Razširjena uporaba rezultatov preskusov požarne odpornosti – Nenosilne stene – 2. del: Zidovje in bloki iz mavca**

Extended application of results from fire resistance tests - Non-loadbearing walls - Part 2: Masonry and gypsum blocks

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ICS

English Version

## Extended application of results from fire resistance tests - Non-loadbearing walls - Part 2: Masonry and Gypsum Blocks

Application étendue des résultats obtenus lors d'essais de résistance au feu - Murs non porteurs - Partie 2 : Maçonnerie et carreaux de plâtre

Erweiterter Anwendungsbereich der Ergebnisse von Feuerwiderstandsprüfungen - Nichttragende Wände - Teil 2: Mauersteine und Gips-Wandbauplatten

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 127.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (prEN 15254-2:2005) has been prepared by Technical Committee CEN/TC 127 "Fire safety in buildings", the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

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## 1 Scope

(1) This part provides guidance, and where appropriate defines procedures, for variations of certain parameters and factors with the design of internal and external non-loadbearing walls and made of clay units, calcium silicate units, aggregate concrete units, autoclaved aerated concrete units and gypsum blocks with different types of mortar that have been tested in accordance with EN 1364-1.

(2) Manufactured stone masonry units according to EN 771-5 are not covered.

## 2 Normative references

Additionally to the already listed references, the following apply:

EN 1991-1-2, *Basis of design and actions on structures — Actions on structures exposed to fire*

EN 1996-1-1, *Design of masonry structures — General rules*

EN 1996-1-2, *Design of masonry structures — General rules — Structural fire design*

EN 771-1, *Specification for masonry units — Clay masonry units*

EN 771-2, *Specification for masonry units — Calcium silicate masonry*

EN 771-3, *Specification for masonry units — Aggregate concrete masonry units (Dense and light-weight aggregates)*

EN 771-4, *Specification for masonry units — Autoclaved aerated concrete masonry units (AAC)*

EN 771-5, *Specification for masonry units — Manufactured stone units*

EN 998-1, *Specification for mortar for masonry — Rendering and plastering mortar*

EN 998-2, *Specification for mortar for masonry — Masonry mortar*

EN 12859, *Gypsum blocks — definitions, requirements and test methods*

EN 12860, *Gypsum based adhesive for gypsum blocks — definitions, requirements and test methods*

prEN XXX, *Design and installation of gypsum blocks*

## 3 Definitions

(1) For the purpose of this part the definitions given in EN 15254-1 and EN 1996-1-2, together with the following, apply:

### 3.1

#### (2) unit grouping

is defined in EN 1996-1-1

### 3.2

#### (3) unfilled perpend joints

are vertical plain joints or joints with tongue and groove, not filled with mortar or adhesive

## 4 General principles

### 4.1 General

(1) The fire behaviour of masonry mainly depends on:

- the masonry unit material - clay, calcium silicate, autoclaved aerated concrete, dense/lightweight aggregate concrete or gypsum;
- the type of unit - solid or hollow (type of holes, percentage and direction of holes), shell and web thickness;
- the dimensions of units, especially the height;
- the gross density of units;
- the strength of units;
- the type of mortar - general purpose, thin layer or lightweight mortar;
- the type of perpend joint – filled or unfilled perpend joint, especially for unplastered walls;
- the use of finishes;
- the geometrical slenderness of the wall as defined in EN 1996-1-1;
- the length of the wall between vertical stiffeners.

(2) For the determination of values by consideration of test results, the interpretation of any existing fire test results has to be based on the requirements for the relevant test method from EN 1363-1, EN 1363-2 and EN 1364-1. For the evaluation of historic test data, differences between the test methods, in particular, fixed ends, free ends or one fixed end and one partly free end with respect to both directions (horizontal and vertical) have to be considered.

(3) Extrapolations are only possible within the same type of material – e.g. tests on clay unit masonry with units according to EN 771-1 can only be used for extrapolations for clay unit masonry.

(4) To establish the extended application, the rules given in chapter 5 shall be followed for each of the given parameters.

### 4.2 Classifications

(1) In some cases there are different extended application rules given for the classifications EI and EI-M as defined in EN 13501-2.

(2) All the given rules are always valid for the same classification.

### 4.3 Test procedure

(1) For the classification according to these extended application rules additional measurements during the test procedure according to EN 1363-1 and EN 1363-2 are needed:

- measurement of the deflection of the test specimen at least in mid height;
- measurement of the temperature within the test specimen at least in mid height across the wall thickness. Thermocouples have to be placed every centimetre up to 5 centimetres from the exposed side and then every 5 centimetres;

- gross density, compressive strength and moisture content of the units;
- gross density and compressive strength of the mortar.

## 5 Establishing the field of extended application

### 5.1 Units according to EN 771-1, 771-2, 771-3 and 771-4

#### 5.1.1 Definitions for units

- (1) The test results are valid for the tested type of unit. If solid units, i.e. group 1 units acc. EN 1996-1-1 are tested, the results are only valid for group 1 units.
- (2) For perforated units, the test results can be extrapolated for units with the same or a smaller percentage of voids.
- (3) For perforated units, the test results can be extrapolated for units with the same or a higher thickness of webs and shells and for the same or higher values of the combined thickness.
- (4) Results for perforated units can be extrapolated for solid units.
- (5) For the classification **EI** the test results are valid for the tested size of the unit and units larger in height, length and width.
- (6) For units with a length between 240 and 1000 mm, test results for a unit length from that range are valid for the whole range of unit lengths between 240 and 1000 mm.
- (7) For the classification **EI-M** it is not possible to extrapolate from tests on masonry walls with unit heights equal or smaller than 250 mm to units with heights equal or greater than 500 mm.
- (8) Test results for wall thicknesses smaller than 140 mm are valid for masonry with units with the same or a up to 600 kg/m<sup>3</sup> higher declared value of the gross density of the units. Test results for wall thicknesses equal to or greater than 140 mm are valid for masonry with units with the same or higher declared value of the gross density of the units.
- (9) The test results are valid for masonry with the same or a higher declared value of the compressive strength of units. The test results are also valid for units with a declared value of the compressive strength that is up to 20 % lower than tested.

#### 5.1.2 Definitions for masonry mortars

- (1) For all types of mortar – general purpose mortar, lightweight mortar, thin layer mortar – the test results are valid for mortar compressive strengths equal or higher than tested. Test results with general purpose mortar are valid for general purpose mortar and thin layer mortar.
- (2) Test results with lightweight mortar with a gross density up to 800 kg/m<sup>3</sup> tested are also valid for walls with lightweight mortars with a density higher than tested and for general purpose mortar with a bond strength classification equal or greater than M5.
- (3) Test results with lightweight mortar with a gross density > 800 kg/m<sup>3</sup> are also valid for general purpose mortar with a bond strength classification equal or greater than M5.

Test results with thin layer mortar are valid for all types of thin layer mortar and general purpose mortar with a bond strength classification equal or greater than M5.



(4) Test results for unplastered or unrendered specimens with unfilled perpend joints are valid for walls with a maximum perpend joint thickness equal or smaller than tested.

(5) Test results for unplastered or unrendered specimens with filled perpend joints are valid independent of the perpend joint thickness.

(6) Test results for unplastered specimens with unfilled perpend joints are valid for all types of perpend joints. Test results for plastered or rendered specimens are valid for all types of perpend joints.

(7) For the classification EI-M an extrapolation is possible within one type of mortar and from

- general purpose mortar to thin layer mortar;
- lightweight mortar to thin layer mortar;
- lightweight mortar to general purpose mortar with a strength equal or greater M5.

### 5.1.3 Influence of plaster, rendering or external covering

(1) higher thickness of plaster or rendering. If plaster or rendering based on gypsum or lightweight aggregates is used, the result is valid for the tested type of plaster and renders LW and T according to EN 998-1. If tested without plaster or rendering the test results are also valid for plastered or rendered walls.

(2) Rendering for external walls can be replaced by a second leaf of masonry or a thermal insulation with insulation material of class A1 or A2.

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### 5.1.4 Geometrical parameters (standards.iteh.ai)

(1) If the wall is tested with 3 m height, the height can be extrapolated up to a slenderness (height ratio  $h/t$ ) of 40 and a maximum height of 8 m, the lower value applying, if the deflection of the tested specimen is smaller than half of the thickness of the wall.

(2) The length of a wall ( $l$ ) is unlimited but depending on the static calculation and stiffeners according to EN 1996-1-1.

(3) Test results are valid for the tested thickness of the wall ( $t$ ) and wall thicknesses equal or greater than tested. These limits cannot exceed those given in the design for the ultimate and service limit state according to EN 1996.

### 5.1.5 Connection systems

(1) Extrapolation is possible for the connection systems defined in EN 1996-1-2 annex E. Examples are:

- a) the masonry wall located between metal angles with a mineral wool infill;
- b) the masonry wall located between metal channel with a mineral wool infill;
- c) the masonry wall located within a pocket in the adjacent floor or wall with a mineral wool infill;
- d) the gap between the masonry wall and the wall or floor is filled with mineral wool or mortar. The joint may be capped with sealant material;
- e) the masonry wall is tied to the adjacent wall and the gap between the wall is filled with mineral wool or mortar. The joint may be capped with sealant material.

## 5.2 Gypsum blocks according to EN 12859

### 5.2.1 Definitions for blocks

- (1) The test results are valid for the tested type of blocks. If solid blocks are tested, the results are only valid for solid blocks. If perforated blocks are tested, the results are valid for perforated blocks with a smaller percentage of perforation, thicker shells and higher combined thicknesses as well as for solid blocks.
- (2) For the classification **EI** the test results are valid for the tested size of blocks and greater than tested for height, length and width of the blocks up to dimensions given in EN 12 859.
- (3) The test results are valid for partitions with blocks with the same or higher declared value of the gross density of the blocks.
- (4) The test results are valid for partitions with the same or a higher declared value of the flexural strength of blocks.

### 5.2.2 Definitions for adhesives

- (1) An extrapolation is only possible for gypsum blocks assembled with gypsum based adhesives defined in EN 12860.
- (2) The test results are valid for the tested adhesive strength and adhesives with adhesive strengths greater than tested.
- (3) For the classification **M** the tested type of adhesive cannot be changed.

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### 5.2.3 Influence of plaster, rendering or external covering.

- (1) Gypsum block are usually not plastered
- (2) Results for partitions tested with unfilled perpend joints and no plastering or rendering are valid for all types of perpend joints.
- (3) A 3 mm skin can be applied without adversely affecting performance

### 5.2.4 Geometrical parameters

- (1) If the wall is tested with 3 m height, the height can be extrapolated up to a slenderness (height ratio  $h/t$ ) of 60 and a maximum height of 8 m, the lower value applying, if the deflection of the tested specimen is smaller than half of the thickness of the partition. These limits cannot exceed those given in the design for the ultimate and service limit state according to EN XXX Design and installation of gypsum blocks
- (2) Limitations of the length of a wall depend on the static calculation and stiffeners according to EN 1996-1-1 and EN XXX Design and installation of gypsum blocks.
- (3) Test results are valid for the tested thickness of the wall ( $t$ ) and wall thicknesses equal or greater than tested.

### 5.2.5 Connection systems

- (1) If the wall is tested according to EN 1364-1, extrapolation is possible for the following connection systems:
  - a) Head connection with resilient strip: cork or mineral based, bonded underneath the top junction with a gypsum adhesive. The gap between the strip and the partition is filled with gypsum adhesive. The head angle is then covered with a joint paper tape;