The reference title and language for this EAD is English. The applicable rules of copyright refer to the document elaborated in and published by EOTA.

This European Assessment Document (EAD) has been developed taking into account up-to-date technical and scientific knowledge at the time of issue and is published in accordance with the relevant provisions of Regulation (EU) No 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).
Contents

1 Scope of the EAD................................................................. 5
   1.1 Description of the construction product .......................... 5
   1.2 Information on the intended use(s) of the construction product ........................................... 5
       1.2.1 Intended use(s) .................................................. 5
       1.2.2 Working life/Durability ....................................... 5

2 Essential characteristics and relevant assessment methods and criteria .............................................. 6
   2.1 Essential characteristics of the product ......................... 6
   2.2 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product ........................................... 7
       2.2.1 Bending strength ............................................. 7
       2.2.2 Shear strength ............................................... 7
       2.2.3 Compression strength ....................................... 7
       2.2.4 Tensile strength ............................................ 8
       2.2.5 Racking strength and stiffness ............................. 8
       2.2.6 Embedding strength ....................................... 8
       2.2.7 Creep and duration of the load ......................... 8
       2.2.8 Structure and cohesion of the core at high temperatures ........................................... 9
       2.2.9 Dimensions .................................................. 9
       2.2.10 Dimensional stability .................................... 9
       2.2.11 Density ..................................................... 9
       2.2.12 Surface hardness ......................................... 9
       2.2.13 Reaction to fire ........................................... 9
       2.2.14 Water vapour permeability – water vapour transmission ........................................... 10
       2.2.15 Water absorption ......................................... 10
       2.2.16 Hard body impact ...................................... 10
       2.2.17 Thermal conductivity .................................. 10

3 Assessment and verification of constancy of performance ............................................................ 10
   3.1 System(s) of assessment and verification of constancy of performance to be applied .................. 10
   3.2 Tasks of the manufacturer ....................................... 11
   3.3 Tasks of the notified body ...................................... 12

4 Reference documents ......................................................................................................................... 13

Annex 1 – Determination of bending strength and bending modulus of elasticity .................................... 14
   Anx 1.1 General .......................................................... 14
   Anx 1.2 Sampling and making of samples ......................... 14
   Anx 1.3 Assembly of the tester .................................... 14
   Anx 1.4 Bending test .................................................. 14

Annex 2 – Use considerations for walls .................................................................................................. 16
   Anx 2.1 General .......................................................... 16
   Anx 2.2 Construction .................................................. 16
   Anx 2.3 Shear ............................................................ 16
   Anx 2.4 Imperfection .................................................. 16
   Anx 2.5 Edge distance ............................................... 17
   Anx 2.6 Butt of coverings ........................................... 17
Anx 2.7 Pressure in ribs

Annex 3 – Determination of deformation and modification values

- Anx 3.1 General
- Anx 3.2 Sampling and making of samples
- Anx 3.3 Assembly of the tester
1 SCOPE OF THE EAD

1.1 Description of the construction product

Gypsum plasterboards for load-bearing applications are composed of a reinforced gypsum plaster core encased in, and firmly bonded to paper liners to form flat rectangular boards. The nominal thickness of the gypsum plasterboards amounts from 12.5 mm to 20.0 mm.

Board types DEFH2IR or better according to EN 520 are considered within this EAD.

The product is not fully covered by the following harmonised technical specifications:

- hEN 520 2009-08 because of deviating intended use, and
- EAD 070001-00-0504 2015-03 because of deviating board type and additional characteristics.

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

It is assumed that the product will be installed according to the manufacturer’s instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer’s stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

1.2 Information on the intended use(s) of the construction product

1.2.1 Intended use(s)

The gypsum plasterboards are used for load bearing applications as system components for drywall constructions (e.g. on wooden based or steel based substructures).

The gypsum plasterboards are intended to be used in service classes 1 and 2 according to EN 1995-1-1.

The substructure is not part of the product.

1.2.2 Working life/Durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer’s request to take into account a working life of the gypsum plasterboards for load-bearing applications for the intended use of 50 years when installed in the works. These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

---

1 The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than referred to above.
2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 1 shows how the performance of gypsum plasterboards for load-bearing applications is assessed in relation to the essential characteristics.

<table>
<thead>
<tr>
<th>No</th>
<th>Essential characteristic</th>
<th>Assessment method</th>
<th>Type of expression of product performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2.2.1</td>
<td>Level</td>
</tr>
<tr>
<td>1</td>
<td>Bending strength</td>
<td>2.2.2</td>
<td>Level</td>
</tr>
<tr>
<td>2</td>
<td>Shear strength</td>
<td>2.2.3</td>
<td>Level</td>
</tr>
<tr>
<td>3</td>
<td>Compression strength</td>
<td>2.2.4</td>
<td>Level</td>
</tr>
<tr>
<td>4</td>
<td>Tensile strength</td>
<td>2.2.5</td>
<td>Description</td>
</tr>
<tr>
<td>5</td>
<td>Racking strength and stiffness</td>
<td>2.2.6</td>
<td>Level</td>
</tr>
<tr>
<td>6</td>
<td>Embedding strength</td>
<td>2.2.7</td>
<td>Level</td>
</tr>
<tr>
<td>7</td>
<td>Creep and duration of the load</td>
<td>2.2.8</td>
<td>Description</td>
</tr>
<tr>
<td>8</td>
<td>Structure of the cohesion of the core at high temperature</td>
<td>2.2.9</td>
<td>Description</td>
</tr>
<tr>
<td>9</td>
<td>Dimensions</td>
<td>2.2.10</td>
<td>Description</td>
</tr>
<tr>
<td>10</td>
<td>Dimensional stability</td>
<td>2.2.11</td>
<td>Level</td>
</tr>
<tr>
<td>11</td>
<td>Density</td>
<td>2.2.12</td>
<td>Description</td>
</tr>
<tr>
<td>12</td>
<td>Surface hardness</td>
<td>2.2.13</td>
<td>Class</td>
</tr>
</tbody>
</table>

Basic Works Requirement 1: Mechanical resistance and stability

Basic Works Requirement 2: Safety in case of fire

Basic Works Requirement 3: Hygiene, health and the environment

Basic Works Requirement 4: Safety and accessibility in use

©EOTA 2016
## Basic Works Requirement 6: Energy economy and heat retention

<table>
<thead>
<tr>
<th>17</th>
<th>Thermal conductivity</th>
<th>2.2.17</th>
<th>Level</th>
</tr>
</thead>
</table>

1) This characteristic also relates to BWR 4.
2) Load bearing capacity and stiffness regarding mechanical actions perpendicular to the gypsum plasterboard.
3) Load bearing capacity and stiffness regarding mechanical actions in plane of the gypsum plasterboard.

### 2.2 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product

Characterisation of products to be assessed shall be done in accordance with available specifications, notably:

- Thickness of the gypsum plasterboard
- Density of the gypsum plasterboard

#### 2.2.1 Bending strength

Bending strength and the bending modulus of elasticity perpendicular to the plane of the boards and in plane of the boards shall be determined according to Annex 1. Testing shall be performed after storage under climatic conditions of 20°C and 65% humidity.

Tests with vector of momentum in direction of production and perpendicular to direction of production of the gypsum plasterboards shall be performed.

The characteristic values shall be determined in accordance with EN 14358.

The provisions of EN 520 regarding board type R must be met.

The bending strength and bending modulus of elasticity perpendicular to and in plane of the gypsum plasterboards shall be given in the ETA.

#### 2.2.2 Shear strength

Shear tests shall be performed according to EN 789, Clause 10 and Annex B.

Tests shall be performed on specimen orientated in direction of production as well as perpendicular to direction of production of the gypsum plasterboards.

Evaluation of the shear strength and the shear modulus of elasticity shall be performed according to EN 789.

The characteristic values shall be determined in accordance with EN 14358.

The shear strength and shear modulus shall be given in the ETA.

#### 2.2.3 Compression strength

Compression tests perpendicular to the plane of the boards and in plane of the boards shall be performed according to EN 789.

Tests shall be performed on specimen orientated in direction of production as well as perpendicular to direction of production of the gypsum plasterboards.

Evaluation of the compressive strength and the compressive modulus of elasticity perpendicular to the plane of the boards and in plane of the boards shall be performed according to EN 789.

The characteristic values shall be determined in accordance with EN 14358.
The compressive strength and compressive modulus of elasticity perpendicular to and in plane of the gypsum plasterboards shall be given in the ETA.

2.2.4 Tensile strength

Tension tests in plane of the boards shall be performed following EN 789, whereas the dimensions of the specimen shall be \( w \times L \times t = 50 \text{ mm} \times 350 \text{ mm} \times t \text{ mm} \) with a sample reduction to 30 mm width in the middle. The length of the specimen may be extend up to 600 mm for determination of the tensile modulus.

Tests shall be performed on specimen orientated in direction of production as well as perpendicular to direction of production of the gypsum plasterboards.

In addition, tests can be performed on specimen orientated under a defined angle to the direction of production of the gypsum plasterboards. Hereby, at least the following angles shall be tested: 15°, 30°, 45°, 60°, and 75°. The minimum number of samples per angle is 10.

Evaluation of the tensile strength and the tensile modulus of elasticity in plane of the gypsum plasterboards shall be performed according to EN 789.

The characteristic values shall be determined in accordance with EN 14358.

The tensile strength and tensile modulus of elasticity in plane of the gypsum plasterboards shall be given in the ETA.

2.2.5 Racking strength and stiffness

Shear tests shall be performed according to EN 594. At least two configurations with the minimum and maximum number of fasteners shall be tested.

The load deflection curve shall be recorded. Afterwards the static failure load shall be determined according to EN 594.

The tests shall be carried out under normal conditions of regular application.

The racking resistance and stiffness of timber frame wall panels shall be compared with the results of the calculation method according to EN 1995-1-1, chapter 9.2.4. If no correspondence with the above mentioned design procedure can be proved, the causes are to be ascertained and necessary modifications of the design procedure in the evaluation report are to be explained.

2.2.6 Embedding strength

The embedding strength shall be evaluated according to EN 383.

The embedding strength shall be given in the ETA.

2.2.7 Creep and duration of the load

Design for duration of load and creep can be undertaken in accordance with EN 1995-1-1 by using the following factors:

<table>
<thead>
<tr>
<th>Hard gypsum plasterboards</th>
<th>( k_{mod} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service class</td>
<td>Permanent action</td>
</tr>
<tr>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>2</td>
<td>0.15</td>
</tr>
</tbody>
</table>
### 2.2.8 Structure and cohesion of the core at high temperatures

The structure and cohesion of the core shall be evaluated according to EN 520, Clause 5.10. The provisions of EN 520 regarding board type F must be met.

### 2.2.9 Dimensions

The dimensions of the gypsum plasterboards shall be determined according to EN 520, Clause 5.2 to 5.6, and given for the specific board type.

### 2.2.10 Dimensional stability

Thickness and density of the gypsum plasterboard shall be evaluated following EN 323. Determination of the moisture content following EN 322, alternatively according to EN 520.

Evaluation of the dimensional stability shall be executed under EN 326-1, alternatively according to EN 520.

Testing of the effects of shrinkage and swelling shall be done in accordance with EN 318.

The dimensional stability measured as shrinkage and swelling of the gypsum plasterboard shall be given.

### 2.2.11 Density

The density shall be determined according to EN 520, Clause 5.11, and given in the ETA. The provisions of EN 520 regarding board type D must be met.

### 2.2.12 Surface hardness

The surface hardness shall be determined according to EN 520, Clause 5.12, and given in the ETA. The provisions of EN 520 regarding board type I must be met.

### 2.2.13 Reaction to fire

The gypsum plasterboard is considered to satisfy the requirements for performance class A2-s1,d0 of the characteristic reaction to fire in accordance with the EC Decision 2006/673/EC without the need for testing on the basis of it fulfilling the conditions set out in that Decision and its intended use being covered by that Decision.

Therefore the performance of the product is A2-s1,d0.

<table>
<thead>
<tr>
<th>Service class</th>
<th>k_{def}</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.0</td>
</tr>
<tr>
<td>2</td>
<td>4.0</td>
</tr>
</tbody>
</table>

As an alternative, the deformation and modification values may be evaluated according to EN 1156 and EN 1990 with the provisions and specimen according to Annex 3. The expected time of use according to EN 1990, Table 2.1, shall be 50 years.

The modification and deformation values $k_{\text{mod}}$ and $k_{\text{def}}$ shall be given in the ETA for the relevant service class and duration of load.
When the product does not meet the provisions of EC Decision 2006/673/EC, the gypsum plasterboard shall be tested, using the test method(s) relevant for the corresponding reaction to fire class, in order to be classified according to EN 13501-1, taking into account the provisions of EN 520, Annex B.

2.2.14 Water vapour permeability – water vapour transmission

Water vapour permeability – water vapour transmission shall be determined according to EN ISO 12572 and given in the ETA.

The provisions of EN 520 regarding board type E must be met.

2.2.15 Water absorption

Water absorption shall be determined according to EN 520, Clause 5.9, and given in the ETA.

The provisions of EN 520 regarding board type H2 must be met.

2.2.16 Hard body impact

Hard body impact shall be determined according to EN 1128 and given in the ETA.

2.2.17 Thermal conductivity

Thermal conductivity shall be determined according to EN 520, Clause 4.7, and given in the ETA.

3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

3.1 System(s) of assessment and verification of constancy of performance to be applied

For the product covered by this EAD the applicable European legal act is: 1995/467/EC of the European Commission as amended by 2001/596/EC and 2002/592/EC

The systems are: 1, 3, 4
3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 2.

Table 2  Control plan for the manufacturer; cornerstones

<table>
<thead>
<tr>
<th>No</th>
<th>Subject/type of control</th>
<th>Test or control method</th>
<th>Criteria, if any</th>
<th>Minimum number of samples</th>
<th>Minimum frequency of control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visual inspection of gypsum plasterboards for load-bearing applications</td>
<td>¹)</td>
<td>¹)</td>
<td>100 %</td>
<td>—</td>
</tr>
<tr>
<td>2</td>
<td>Thickness of gypsum plasterboard</td>
<td>EN 520</td>
<td>EN 520</td>
<td>see 2.2 / test standard</td>
<td>for every type of gypsum plasterboard after onset of production</td>
</tr>
<tr>
<td>3</td>
<td>Density</td>
<td>EN 520</td>
<td>See 2.2.1.11</td>
<td>see 2.2 / test standard</td>
<td>see 2.2 / test standard</td>
</tr>
<tr>
<td>4</td>
<td>Water vapour permeability – Water vapour transmission</td>
<td>EN ISO 12572</td>
<td>EN 520, Type E</td>
<td>3</td>
<td>once per year</td>
</tr>
<tr>
<td>5</td>
<td>Bending strength and E-modulus regarding mechanical actions perpendicular to the gypsum plasterboard ¹)</td>
<td>EN 520</td>
<td>¹)</td>
<td>3</td>
<td>for every type of gypsum plasterboard after onset of production</td>
</tr>
<tr>
<td>6</td>
<td>Mass per unit area and content of organic additives in paper layers</td>
<td>EN 520</td>
<td>EN 520</td>
<td>EN 520</td>
<td>once per year</td>
</tr>
<tr>
<td>7</td>
<td>Reaction to fire of core and control of organic additives in the core</td>
<td>EN 13501-1</td>
<td>class according to EN 13501-1</td>
<td>see test standard referred to in EN 13501-1</td>
<td>once per year</td>
</tr>
</tbody>
</table>

¹) According to the specifications and configurations of the gypsum plasterboards.
3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for gypsum plasterboards are laid down in Table 3.

Table 3  Control plan for the notified body; cornerstones

<table>
<thead>
<tr>
<th>No</th>
<th>Subject/type of control</th>
<th>Test or control method</th>
<th>Criteria, if any</th>
<th>Minimum number of samples</th>
<th>Minimum frequency of control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Initial inspection of the manufacturing plant and of factory production control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(for system 1 only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>The notified body shall ascertain that, in accordance with the test plan, the</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>manufacturing plant of the single product manufacturer, in particular personnel and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>equipment, and the factory production control are suitable to ensure a continuous and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>orderly manufacturing of the gypsum plasterboard according the European Technical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assessment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td><strong>Continuous surveillance, assessment and evaluation of factory production control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(for system 1 only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>It shall be verified that the system of factory production control and the specified</td>
<td></td>
<td></td>
<td></td>
<td>2/year</td>
</tr>
<tr>
<td></td>
<td>manufacturing process are maintained taking account of the test plan.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4 REFERENCE DOCUMENTS

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the European Technical Assessment, is of relevance.

EAD 070001-00-0504 (2015-03): Gypsum plasterboards for load-bearing applications


EN 318: Wood based panels – Determination of dimensional changes associated with changes in relative humidity
EN 322: Wood-based panels – Determination of moisture content
EN 323: Wood-based panels - Determination of density
EN 326-1: Wood-based panels – Sampling, cutting and inspection – Part 1: Sampling and cutting of test pieces and expression of test results
EN 383: Timber structures — Test methods — Determination of embedment strength and foundation values for dowel type fasteners
EN 520 (2009-08): Gypsum plasterboards — Definitions, requirements and test methods
EN 594: Timber structures — Test methods — Racking strength and stiffness of timber frame wall panels
EN 789: Timber structures — Test methods — Determination of mechanical properties of wood based panels
EN 1128: Cement-bonded particleboards - Determination of hard body impact resistance
EN 1156: Wood based panels – Determination of duration of load and creep factors
EN 13501-1: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests
EN 14358: Timber structures — Calculation of characteristic 5-percentile values and acceptance criteria for a sample
EN ISO 12572: Hygrothermal performance of building materials and products — Determination of water vapour transmission properties
ANNEX 1 – DETERMINATION OF BENDING STRENGTH AND BENDING MODULUS OF ELASTICITY

Anx 1.1 General
The bending strength and the bending modulus of elasticity perpendicular to the plane of the board and in plane of the board shall be determined parallel and perpendicular to the production direction under normal climatic conditions of 20 °C at 65 %.

Anx 1.2 Sampling and making of samples
The gypsum plasterboards used for testing shall correspond to the average of the production. From these gypsum plasterboards 30 perpendicular board strips per production direction shall be cut off having the dimensions listed below. The cutting edges shall be placed perpendicular to the plane of the board. When cutting the samples a minimum distance of 200 mm off the edge and 100 mm away from the next sample shall be kept. The samples shall be marked.

Number of samples: 30 pieces / production direction
Dimensions: \( w \times L \times H \)

<table>
<thead>
<tr>
<th></th>
<th>Width w</th>
<th>Span ( \lambda )</th>
<th>Length L</th>
<th>Height H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bending perpendicular to the plane of the board</td>
<td>400 mm</td>
<td>( 40 \times t )</td>
<td>( \lambda + 100 )</td>
<td>( t )</td>
</tr>
<tr>
<td>Bending in plane of the board</td>
<td>( t )</td>
<td>( 20 \times t )</td>
<td>( \lambda + 100 )</td>
<td>( 3 \times t )</td>
</tr>
</tbody>
</table>

\( t \) ... nominal thickness of gypsum plasterboard

Anx 1.3 Assembly of the tester
The board strips are placed in a bending test machine on which the load of the strip acting as test load shall be placed in the middle of the span and depending on the production direction placed parallel or perpendicular to the direction of the fibre.

Anx 1.4 Bending test
The load \( F \) is applied at a constant rate of loading so that the maximum load is achieved within \( (300 \pm 120) \) s. Hereby, the mean value is about 300 s for one sample. The load-displacement curve shall be recorded continuously until the ultimate load \( F_{\text{max}} \) is reached.
The bending strength and the bending modulus of elasticity perpendicular to the plane of the board and in plane of the board shall be determined from:

\[ f_m = \frac{3F_{\text{max}}l_A}{2wH^3} \]

\[ E_m = \frac{l_A^3(F_2 - F_1)}{4wH^3(a_2 - a_1)} \]

![Diagram with load F and displacement a]
ANNEX 2 – USE CONSIDERATIONS FOR WALLS

Anx 2.1 General
Design of wall elements may be according to EN 1995-1-1, 9.2.4.2 “Simplified verification of wall elements – Method A”. Hereby, the following considerations shall be taken into account:

Anx 2.2 Construction
Single openings in the covering, smaller than 200 mm x 200 mm, may be neglected for calculation of load. For multiple openings the sum of lengths and the sum of heights must be smaller than 10 % of the covering length or height. Effects of bigger openings need to be considered.

Anx 2.3 Shear
The load-bearing capacity of the covering must be checked. A simplified method for the shear stress in the covering is allowed when the load bearing capacity of the covering is not to be checked during assessment of the wall elements. The maximum load bearing capacity of the covering results from the shear flow, which correlates to the load bearing capacity of the connection between the ribs and the covering. The following must be verified:

\[
\frac{\tau_d}{f_{v,d}} = \frac{F_{f,\text{ed}} k (t \cdot s)}{f_{v,d}} \leq 1
\]

With
- \( \tau_d \) - design value of shear stress in the covering
- \( f_{v,d} \) - design value of shear strength for mechanical actions in plane of the gypsum plasterboard
- \( F_{f,\text{ed}} \) - design value of the load bearing capacity for shearing off the single fastener
- \( s \) - spacing of fasteners
- \( t \) - thickness of the covering

Additional stress resulting from the spacing of ribs and middle areas of the covering as well as discontinuous forces and forces acting perpendicular to the rib axes may be considered by a reduction in the shear strength of the plates with a factor of 0.5 for both-sided and 0.33 for one-sided covering.

For thicknesses of plates smaller than 1/35 of rib distances, buckling of the covering must be considered through reduction of load bearing capacity by the factor \( 35 \cdot \frac{t}{b_{\text{net}}} \).

Hereby, the characteristic shear strength of the board must be taken equal or lower than the tension strength identified in Section 2.2.4 of the board for mechanical actions in plane of the gypsum plasterboard.

Anx 2.4 Imperfection
Effects of imperfection of a vertically loaded wall in terms of inclination may be taken into account by the following horizontal equivalent load:

\[
F_{\text{Ed}} = \frac{q_{\text{Ed}} \cdot l}{70}
\]

Hereby \( l \) is the length of the wall, loaded vertically through a line load \( q_{\text{Ed}} \). \( F_{\text{Ed}} \) acts as a pair of forces at the bottom and at the top of the wall on the stiffening elements.

The horizontal displacement of the components resulting from this equivalent load \( F_{\text{Ed}} \) as well as the external forces must be smaller than \( h/100 \).

Consideration of imperfections in terms of inclination as well as examination of horizontal deformations is not necessary in the following cases:
- The length of the covering is minimum \( h/3 \),
- Width of the plates is minimum \( h/4 \),
- The covering is embedded in a stiff underconstruction,
- An increase of characteristic values of load bearing capacity of fasteners according to EN 1995-1-1, 9.2.4.2(5) is not taken into account.

**Anx 2.5 Edge distance**

Edge distance of fasteners plates and ribs for wall elements with allover shear rigid connected plates may be taken as $a_{d.c}$.

**Anx 2.6 Butt of coverings**

There may be one butt for wall elements calculated according to this section if the edges of the plates are connected in a rigid manner. Without detailed examination of deformations and when the width of the plate is smaller than 0.5 $h$, the load bearing capacity for slabs with horizontal butts under horizontal loads must be reduced by 1/6.

**Anx 2.7 Pressure in ribs**

For check of transmission of rip-pressure loads through for transverse ribs according to EN 1995-1-1, 9.2.4.2(14) the characteristic load bearing capacity may be considered with 20% increased values.
ANNEX 3 – DETERMINATION OF DEFORMATION AND MODIFICATION VALUES

Anx 3.1 General
The deformation and modification values of the board shall be determined under climatic conditions according to the conditions of the service classes named in EN 1995-1-1.

Anx 3.2 Sampling and making of samples
The gypsum plasterboards used for testing shall correspond to the average of the production. From these gypsum plasterboards 6 board strips per load level shall be cut off having the dimensions listed below. The cutting edges shall be placed perpendicular to the plane of the board. When cutting the samples a minimum distance of 100 mm off the edge and 100 mm away from the next sample shall be kept. The samples shall be marked.

Number of samples: 6 pieces / per load level and climatic conditions
Dimensions: w x L x H

<table>
<thead>
<tr>
<th>Width w mm</th>
<th>Span lₐ mm</th>
<th>Length L mm</th>
<th>Height H mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>570</td>
<td>lₐ + 100</td>
<td>t</td>
</tr>
</tbody>
</table>

lₐ … nominal thickness of gypsum plasterboard

Anx 3.3 Assembly of the tester
The board strips are placed in an assembly on which the dead load g is set up in a 4-point bending test.

Measurement of global deformations.

©EOTA 2016