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STEEL COMPONENTS FOR PALLET RACKING SYSTEMS

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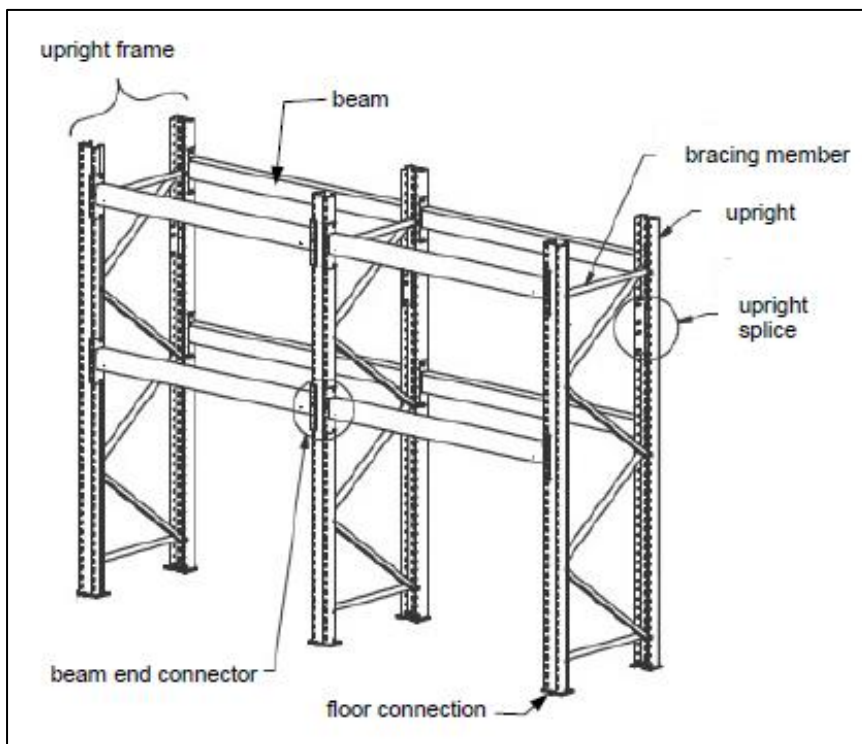
1 SCOPE OF THE EAD

1.1 Description of the construction product

The construction products are corrosion-protected steel components for pallet racking systems (PRS) according to 1.2 including upright frames, beams and connections. Special beam to column (upright) connections and bracing systems are utilized, in order to achieve a three dimensional steel 'sway' or 'braced' structure.

The most important components and typical examples of constructions are shown in Figures 01 and 02.

Figure 01: Racking system components



The products are not covered by a harmonised European standard (hEN).

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 products 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 products 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 products

1.2.1 Intended use(s)

The construction products are intended to be used for indoor and outdoor PRS and thus for the storage and retrieval of goods. The goods to be stored are generally on pallets or in box-containers.

The PRS are connected to the ground by metal anchors.

Indoor PRS are either intended to be used to support the load bearing structure of the corresponding construction works or parts thereof or to support accessible internal intermediate floors.

Figure 02a: Examples of constructions (silos, PRS is part of the load bearing structure)

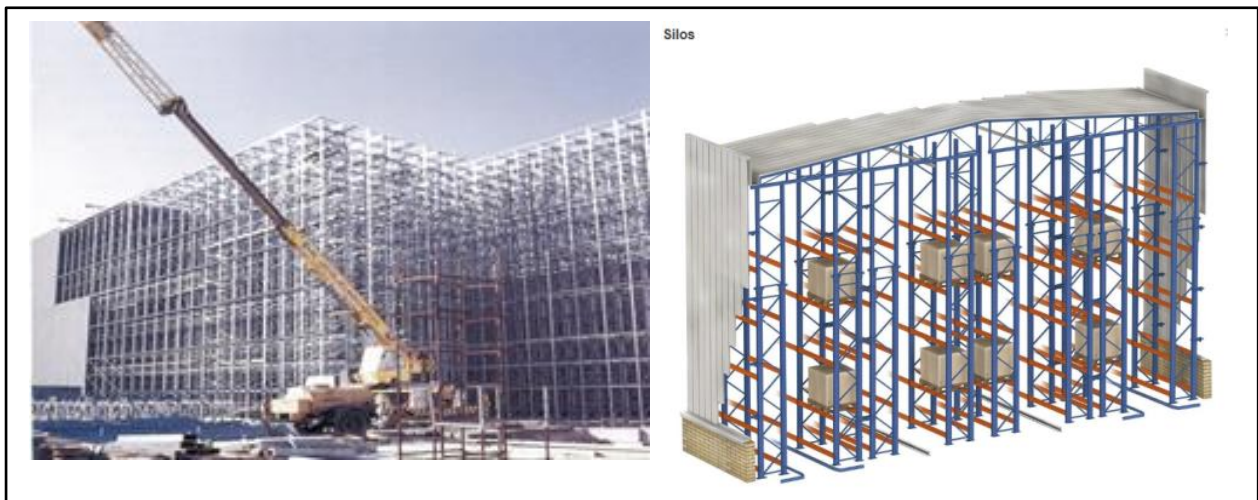
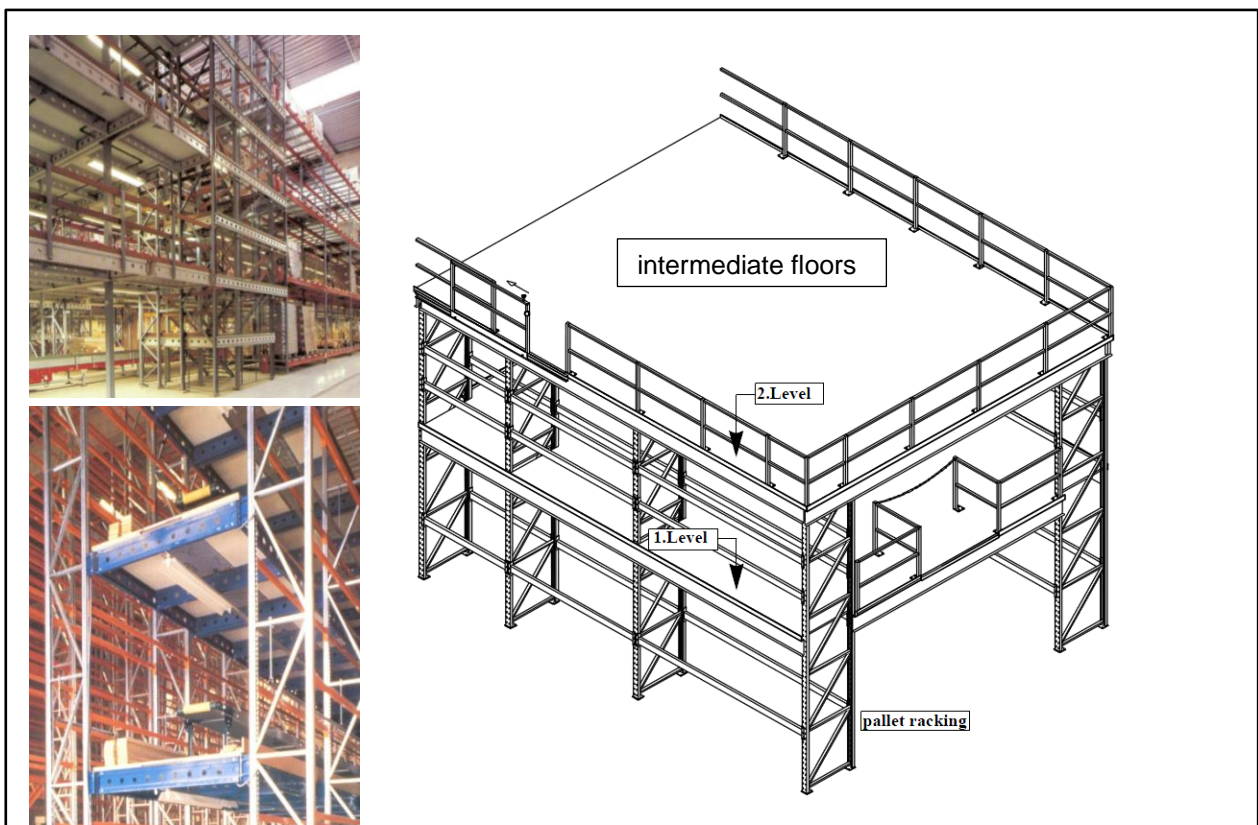


Figure 02b: Examples of constructions (PRS supporting internal intermediate floors)



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 steel components for pallet racking systems for the intended use of at least 10 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 products, 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 works¹.

The indications given as to the working life of the construction products 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 the working life referred to above.

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the products

The product performance of steel components of PRS affects the mechanical resistance and stability and/or the safety and accessibility in use of the corresponding buildings.

Table 2.1 shows how the performance of the steel components for PRS is assessed in relation to the essential characteristics.

Table 2.1 Essential characteristics of the products and methods and criteria for assessing the performance of the products in relation to those essential characteristics

| No | Essential characteristic | Assessment method | Type of expression of product performance (level, class, description) |
|---|--|-------------------|--|
| Basic Works Requirement 1: Mechanical resistance and stability | | | |
| 1 | Upright characteristics | 2.2.1 | |
| | Effective area of cross section A_{eff} [cm ²] | | Level |
| | Effective section moduli W_{eff} [cm ³] | | Level |
| | Reduction factor for lateral-torsional buckling χ_{LT} [-/-] | | Level |
| | Buckling curve $\chi (\bar{\lambda})$ | | Description / Level |
| 2 | Beam end connector (BEC) and connector lock characteristics | 2.2.2 | |
| | Bending strength M_{Rk} [kNcm] | | Level |
| | Stiffness $k (\eta)$ [kNcm/rad] | | Description / Level |
| | Moment-rotation curve (Rotational Stiffness) $k (\theta)$ [kNcm/rad] | | Description / Level |
| | Looseness φ_i [rad] | | Level |
| | Shear strength V_{Rk} [kN] | | Level |
| 3 | Floor connection characteristics | 2.2.3 | |
| | Ultimate moment of resistance for a range of axial loads N $M_{\text{Rk}} (N)$ [kNcm] | | Description / Level |

| No | Essential characteristic | Assessment method | Type of expression of product performance (level, class, description) |
|----|--|-------------------|--|
| | Stiffness for a range of axial loads N k (N) [kNcm/rad] | | Description / Level |
| 4 | Upright frame characteristics | 2.2.4 | |
| | Transverse shear stiffness S [kN/rad] | | Level |
| | Range of transverse shear stiffness validity V _{max} [kN] | | Level |
| 5 | Beam characteristics | 2.2.5 | |
| | Effective section moduli W _{eff} [cm ³] | | Level |
| 6 | Upright splices characteristics | 2.2.6 | |
| | Ultimate moment of resistance for a range of axial loads N M _{Rk} (N) [kNcm] | | Description / Level |
| | Stiffness for a range of axial loads N k (N) [kNcm/rad] | | Description / Level |

In case the provisions related to the assessments methods provided for by EN 15512:2009 and referred to in this EAD would lead to the expression of the product performances by using a formula, a table containing at least 5 uniformly distributed grid-points is additionally to be given in the ETA.

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

The EAD provides assessment methods based on EN 15512:2009, Annex A, resulting in characteristic levels.

2.2.1 Upright characteristics

Upright characteristics are assessed according to chapters A.2.1, A.2.2, A.2.3 and A.2.9 of EN 15512:2009.

2.2.2 Beam end connector (BEC) and connector lock characteristics

Beam end connector and connector lock characteristics are assessed according to chapters A.2.4, A.2.5 and A.2.6 of EN 15512:2009.

If stiffness is assessed for different levels of η , a table of stiffnesses for different levels of η will be reported in the ETA.

2.2.3 Floor connection characteristics

Floor connection characteristics are assessed according to chapter A.2.7 of EN 15512:2009.

2.2.4 Upright frame characteristics

Upright frame characteristics are assessed according to chapter A.2.8 of EN 15512:2009.

V_{\max} is determined either by the highest test load if there is a linear behaviour of shear stiffness or by the test load where the linear behaviour gets lost, according to Figure A.13 and 14 of EN 15512:2009.

2.2.5 Beam characteristics

Beam characteristics are assessed according to chapter A.2.10 of EN 15512:2009.

2.2.6 Upright splices characteristics

Upright splices characteristics are assessed according to chapter A.2.11 of EN 15512:2009.

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 products covered by this EAD the applicable European legal act is: Decision 1998/214/EC.

The system is: **2+**

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 3.1.

Table 3.1 Control plan for the manufacturer; cornerstones

| No | Subject / type of control | Test or control method | Criteria, if any | Minimum number of samples | Minimum frequency of control |
|---|---|--|--|--|------------------------------|
| Factory production control (FPC) [including testing of samples taken at the factory in accordance with a prescribed test plan] | | | | | |
| 1 | Incoming raw materials | Inspection documents acc. to EN 1090-2:2008+A1 Table 1 | 100% compliance to material properties stated in the prescribed control plan (FPC). | acc. to EXC2 EN 1090-2:2008+A1 chapter 5.2 | |
| | | Checking of dimensions | Results shall be documented | acc. to EN 1090-2:2008+A1 chapter 12.2 | |
| 2 | Essential component dimensions and manufacturing tolerances influencing the performance (e.g. thickness, dimensions and tolerances of cross-sections and perforations, etc.). | By suitable measuring instruments | 100% compliance with required dimensions and tolerances stated in the prescribed control plan (FPC). Results shall be documented. Track of product quality shall be enabled. | Every change of a coil or a material-lot or every change of a tooling or a machine min. 3x per shift | |
| 3 | Welding | acc. to EXC2, EN 1090-2:2008+A1, table A.3 | | | |
| 4 | BEC characteristics | acc. to EN 15512:2009, Annex A and H | | | |
| 5 | Control of nonconforming products | acc. to EN 1090-2:2008+A1, chapter 12.2 | | | |

3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 3.2.

Table 3.2 Control plan for the notified body; cornerstones

| No | Subject/type of control | Minimum frequency of control |
|---|---|------------------------------|
| Initial inspection of the manufacturing plant and of factory production control | | |
| 1 | The notified body shall ascertain that, in accordance with the prescribed control plan (FPC), the manufacturing plant of the product manufacturer, in particular personnel and equipment, and the factory production control are suitable to ensure a continuous and orderly manufacturing of the steel components for PRS. | - |
| Continuous surveillance, assessment and evaluation of factory production control | | |
| 2 | It shall be verified by routine inspections of the notified body that the system of factory production control and the specified manufacturing process are maintained taking account of the prescribed control plan (FPC). | Once a year |

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.

| | |
|------------------------|---|
| EN 15512:2009 | <i>Steel static storage systems – Adjustable pallet racking systems – Principles for structural design</i> |
| EN 10204:2004 | <i>Metallic products – Types of inspection documents</i> |
| EN 1090-2:2008+A1:2011 | <i>Execution of steel structures and aluminium structures – Part 2: Technical requirements for steel structures</i> |