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## Released:

The authoritative and approved version of this company standard is only available on the Broetje-Automation intranet. Hard copies and locally stored copies must be verified, as they are not subject to change management. The website of Broetje-Automation "www.broetje-automation.de" serves as an alternative source of company standards for external parties.

## **1 Application Area and Purpose**

This standard includes fixed and mobile platforms as well as stairs and stepladders. Furthermore, this standard includes fixed railings as well as railings that are not permanently attached to the machine or system or cannot be moved.

Among the various standards used, this Broetje Company Standard is of the third level. Priority is given to the applicable DIN EN ISO standards and company standards of our customers. The supplier has to inform himself.

### **1.1 Normative references**

This company standard contains definitions from other publications that may be based on dated and undated references. These normative references are cited in the respective places in the text and these publications are listed below. Dated references, subsequent changes or revisions of these publications are only part of this works standard if incorporated by amendment or revision. In the case of undated references, the latest edition of the referenced publications (including amendments) applies.

### **1.2 Design**

The design of working platforms must ensure that all activities of the work order are carried out safely and in an ergonomically favorable working position. Compliance with current ergonomics standards is mandatory.

The following principles shall apply:

- Component geometry in the workspace
- Type and scope of the work activity
- This may include tools, devices, machines that are being used, etc.

If steel structures are designed, compliance with the following literature is mandatory:

- Bemessungshilfen für profilorientiertes Konstruieren, Oberegge, Stahlbau-Verlagsgesellschaft mbH Köln (only available in German)
- Additional applicable standards can be found in Section 6 List of literature.

### **1.3 Design standards**

All platforms, stairs and stepladders and their steel structures shall be delivered pursuant to EN 1090 as well as a CE Declaration of Incorporation.

Compliance with all current, relevant standards, rules and regulation is mandatory.

The following standards are just a few mentioned here:

- EN 1090
- EN 1993
- EN 1999
- EN ISO 14122

This listing is to be understood as a guide to the supplier. Nevertheless, further unlisted standards and regulations must be observed and adhered to.

## **2 Special or project-specific design specifications**

Project-specific design specifications or departures from applicable standards and regulations must always be documented in writing and must be agreed upon by the Project Management.

If necessary, the customer's company standards are being used. This must be documented by both parties.

### **2.1 Surface coatings**

Surfaces are coated according to customer's specifications, however, consultation with the Project Management is mandatory.

### **2.2 Platforms and supporting structures**

#### **2.2.1 General information**

As a rule, open structural profiles should be used for a supporting structure. Within a contract, the same design solutions for platforms/structures shall be used. Consultation with the Project Management is mandatory.

As a standard practice, the contractor shall provide Broetje-Automation GmbH with a traceable and verifiable structural analysis.

#### **2.2.2 Floor covering**

Here, a variety of designs are used.

The standard floor covering is a multi-layer, waterproof glued film-faced plywood panel, 21 mm thick.

The slip resistance of the film-faced plywood panels with their coating applied must meet the floor R-rating R11 or higher according to DIN 51130.

For AIRBUS or PAG projects, the film overlaid plywood panel Metsä-Wood TOP with a top side coating of melamine resin, similar to RAL 7035 (light gray) 440 g/m<sup>2</sup> and with a crown structure as standard is to be considered. (Item number 755392)

Steel sheets are also used. Their coating must meet the above-mentioned requirements.

In the case of unsupported floor panels, their dimensions must not exceed 500 x 800 mm; otherwise, struts or similar supports must be incorporated.

The supplier and the exact design must be agreed upon with the Project Management and subsequently documented.

### 2.2.3 Foundation attachment

Liebig® chemical anchors type KLS or safety anchors type B shall be used as mounting bolts in the concrete. These anchors are generally a delivery component provided by the platform supplier. It must be ensured that all foundation plates can be adjusted (using tension and compression bolts, fixators) - see Figure 1 (foundation attachment):  
The minimum size of all fasteners must be M12, sheet metal plates must be at least 3 mm thick. The screws, anchors, dowels and sheet metal plates must be designed for the respective application. Filling openings and a practical cast iron frame solution shall be provided in the foundation plates and be part of the delivery scope.

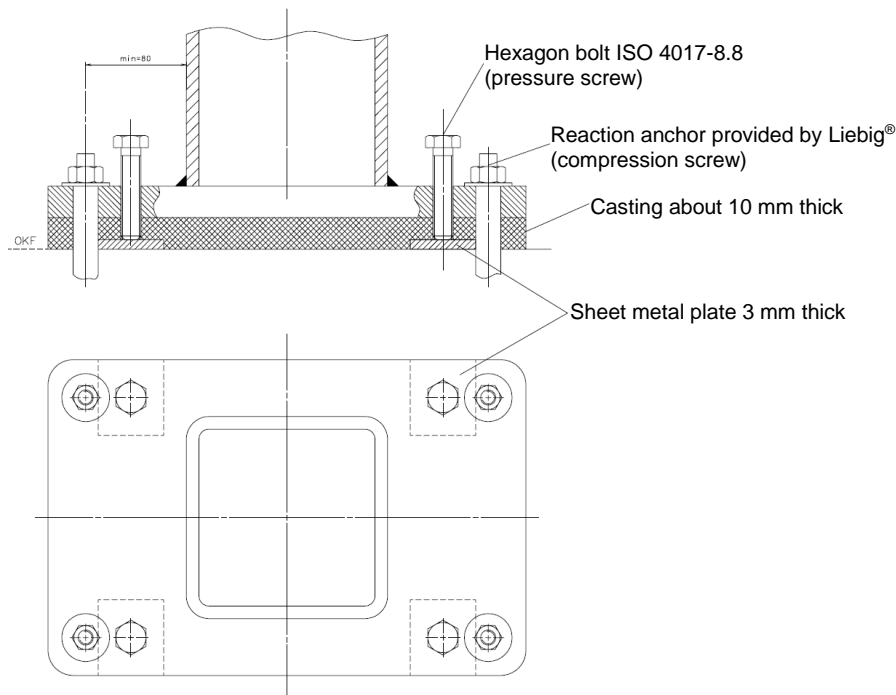


Figure 1: Foundation attachment

## 2.3 Stairs and stepladders

### 2.3.1 General information

A stair nosing shall be incorporated in all steps. Welded press lock gratings in accordance with standard DIN 24531-1 shall be used. Galvanized steps according to DIN EN ISO 1461 shall be used. Companies such as Lichtgitter GmbH, Goetjes GmbH or similar companies may be used as suppliers.

Intermediate platforms shall be made of welded press lock gratings as indicated above.

Dirt trap plates must always be installed in stairways and traffic routes above open spaces.

## 2.4 Railing

### 2.4.1 General information

If the vertical drop exceeds 500 mm, railings must be installed.

A railing is always required if the distance between the platform and the machine or wall is greater than 200 mm, or if the machine's safety equipment is not equivalent to the safety provided by a railing. However, a kick plate is always required if the distance between the platform and the adjacent structure exceeds 30 mm.

As a rule of thumb, the following aspects shall be considered:

1. Railing posts shall be fixed to the base construction, never on the floor coverings.
2. All-around welds must be used when connecting the posts to the kick plate.
3. Posts, knee rails, handrails and kick plate shall always be welded all-around or using a throat thickness of  $a = t$ .
4. Using a non-continuous seams when welding the kick plate -> risk of warpage
5. All pipe ends shall be seal-welded.
6. Only the welds on the handrail may be reworked mechanically.
7. If butt joints are to be used on the handrail, these joints shall be connected by using an internal centering aid.
8. Corner joints must always be mitered and an all-around weld shall be used.

### 2.4.2 Railing connection

If possible, the base of the railing shall be connected at the front of the platform.

Fasteners: 4x ISO 4017 M8 8.8 + washer ISO7090-B 8,4

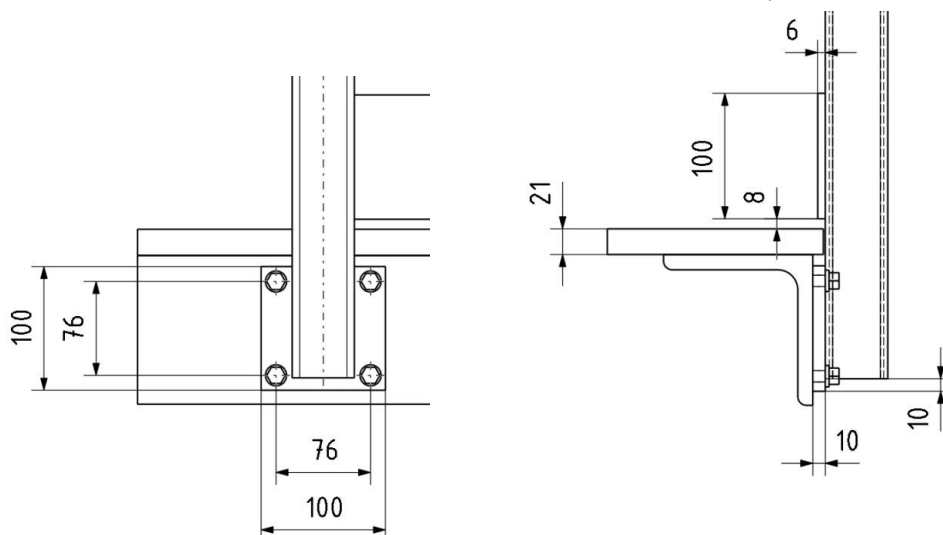


Figure 4: Example of a connection to an angle section

### 3 Assembly/operating instructions

The scope and the layout of the documentation shall be made in consultation with the Broetje Automation Documentation Department.  
Spare part lists shall be prepared according to a BA guideline.

### 4 References

The following standards were considered in the preparation of this company standard:

- DIN EN 1090 - Execution of steel structures and aluminium structures
- DIN EN 1993 - Design of steel structures
- DIN EN 1999 - Design of aluminum structures
- DIN EN ISO 14122 - Permanent means of access to machinery
- DIN EN 10204 Metallic products - Types of inspection documents
- Bemessungshilfen für profilorientiertes Konstruieren, Oberegge, Stahlbau-Verlagsgesellschaft mbH Köln (only available in German)
- BN 10.60 Fundamentals of steel constructions
- BN 10.50 Welding guidelines
- EN ISO 349 Safety of machinery
- DIN 24531 Gratings used as stairtreads
- DIN 33411 Part 1 to 5 Human physical strength: Terms
- DIN 33402 Part 1 to 2 Body dimensions of people
- DIN 33408 Part 1 Body templates
- DIN 1050 Principles for risk assessment
- DIN 1005 Part 1 to 5 Human physical performance
- DIN EN ISO 7250 Basic human body measurements for technological design
- DIN EN ISO 6385 Ergonomics principles in the design of work systems
- DIN 547 Part 1 to 3 Safety of machinery - Human body measurements
- DIN EN 842-3 Safety of machinery - Visual danger signals
- DIN EN 894-3 Safety of machinery - Ergonomics requirements for the design of displays and control actuators
- DIN EN ISO 3834-2 Quality requirements for fusion welding of metallic materials – Part 2: Comprehensive quality requirements (ISO 3834-2:2005); German version EN ISO 3834-2:2005
- ISO 3864 Graphical symbols - Safety colors and safety signs - Part 2: Design principles for product safety labels (ISO 3864-2:2004)
- DIN 18225 Industrial construction; traffic ways in industrial buildings
- DIN EN ISO 12944 1-8 Paints and varnishes - Corrosion protection of steel structures by protective paint systems
- DIN EN ISO 15536 1-2 Ergonomics - Computer manikins and body templates
- DIN EN ISO 12100 Safety of machinery (document withdrawn: DIN EN ISO 14121 Safety of machinery – Risk assessment – Part 1: guidelines)
- DIN EN ISO 13857 Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs

- DIN EN 614 Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles
- DIN EN 953 Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards
- DIN EN 982 Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics
- DIN EN 983 Safety of machinery - Safety requirements for fluid power systems and their components - Pneumatics
- DIN EN 12464-1 Light and lighting. Lighting of work places - Part 1: Indoor work places

## **5 Laws, regulations and accident prevention regulations**

Information on Workplaces Ordinance with Workplace Directives (ASR)

- ASR 7/3 Artificial lighting
- ASR 12/1-3 Protecting workers from falls and falling objects
- ASR 17/1, 2 Traffic routes
- BGV A1 General regulations
- BGI 561 Bulletin on stairs