



INTEROPERABILITY UNIT

TECHNICAL DOCUMENT

ATTACHMENT DEVICES FOR REAR-END SIGNALS, CLEARANCE FOR DRAW HOOKS, SPACE FOR SHUNTING STAFF OPERATION, FOOTSTEPS AND HANDRAILS

REFERENCE: ERA/TD/2012-04/INT

DOCUMENT TYPE: TECHNICAL DOCUMENT

VERSION: 1.3

DATE: 02/12/2014

**AMENDMENT RECORD**

Version	Date	Section number	Modification/description	Author
1.0	04/06/2012		Preparation of version 1.0	Andreas SCHIRMER Mikael AHO
1.1	14/12/2012		Recast of chapter 4: Text simplified, structure improved, detailed minimum requirements on the footsteps (section 4.2), shunter's stand (section 4.3) and requirements on gangways (section 4.4) introduced.	Andreas SCHIRMER
1.2	18/01/2013		Consideration of comments from WAG TSI WP	Andreas SCHIRMER
1.3	02/12/2014		Editorial mistakes corrected	Oscar MARTOS Kamil PRAVDIK

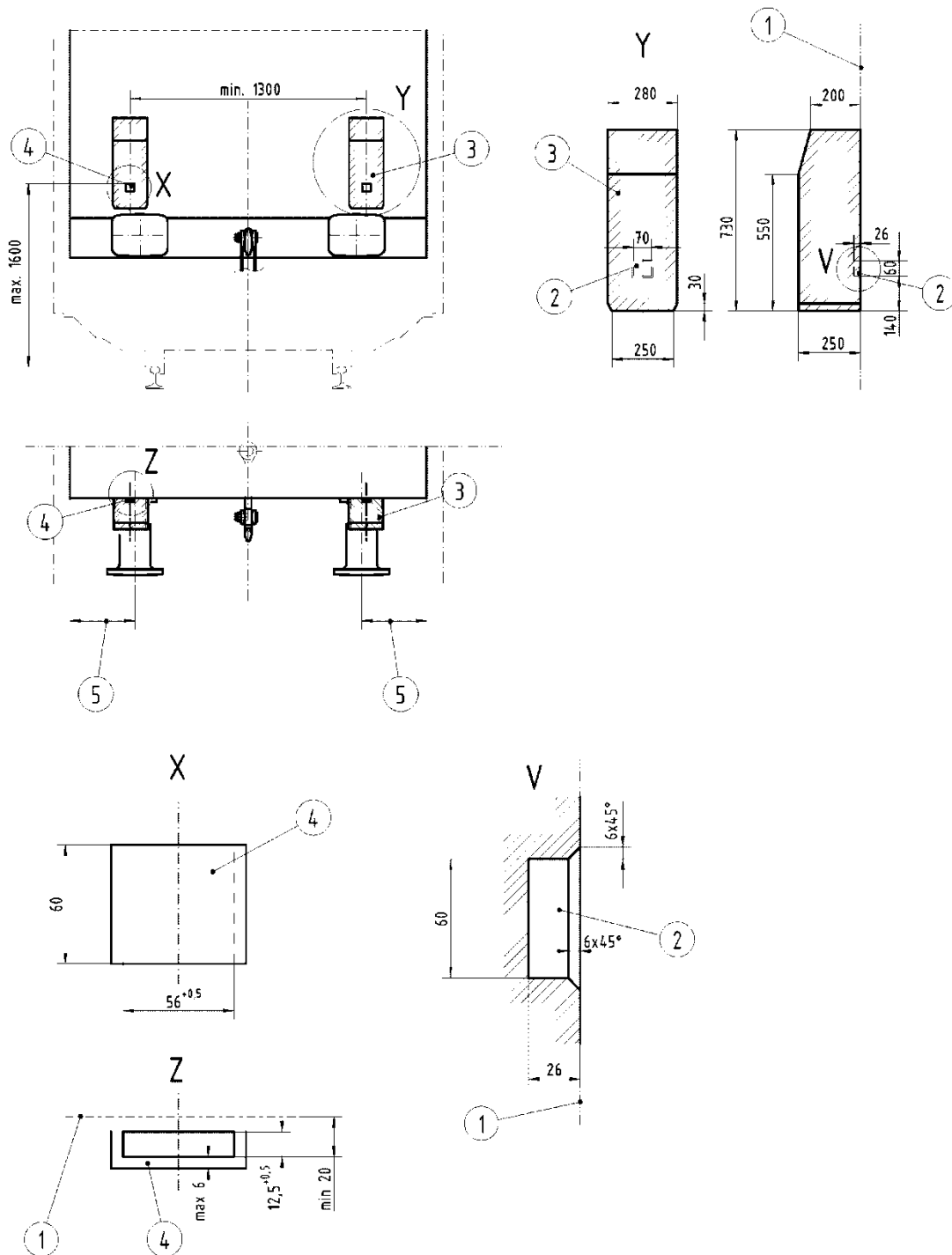


Table of Contents

1. Attachment device for rear-end signal (point 4.2.6.3)	4
2. Clearance for draw hooks (Appendix C, Section 1)	5
3. Space for shunting staff operation (Appendix C, Section 1).....	6
4. Footsteps and handrails (Appendix C, Section 2)	7

1. Attachment device for rear-end signal (point 4.2.6.3)

The dimensions and clearance of the attachment devices shall be as described in the figure 1.

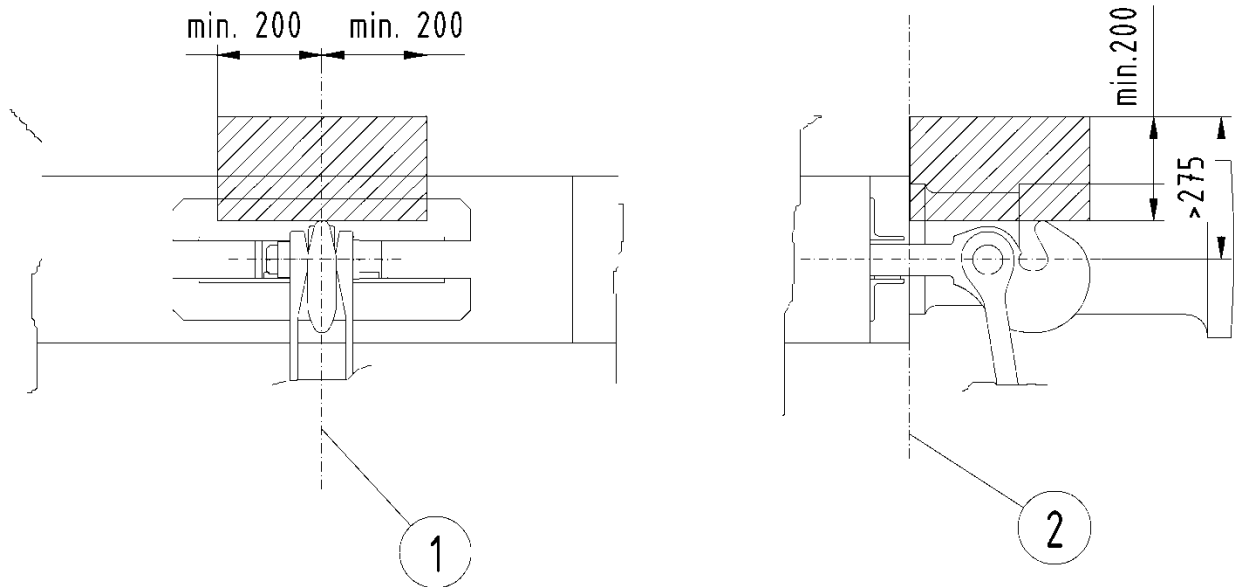


- Key:
- 1 outside of wagon end wall or bracket fixing plane
 - 2 clearance for tail light bracket
 - 3 clearance for tail light
 - 4 tail light bracket
 - 5 preferred place for tail light position

Figure 1: Required dimensions and clearance for tail light brackets and access

2. Clearance for draw hooks (Appendix C, Section 1)

The clearance for the draw hook shall be in accordance with figure 2.

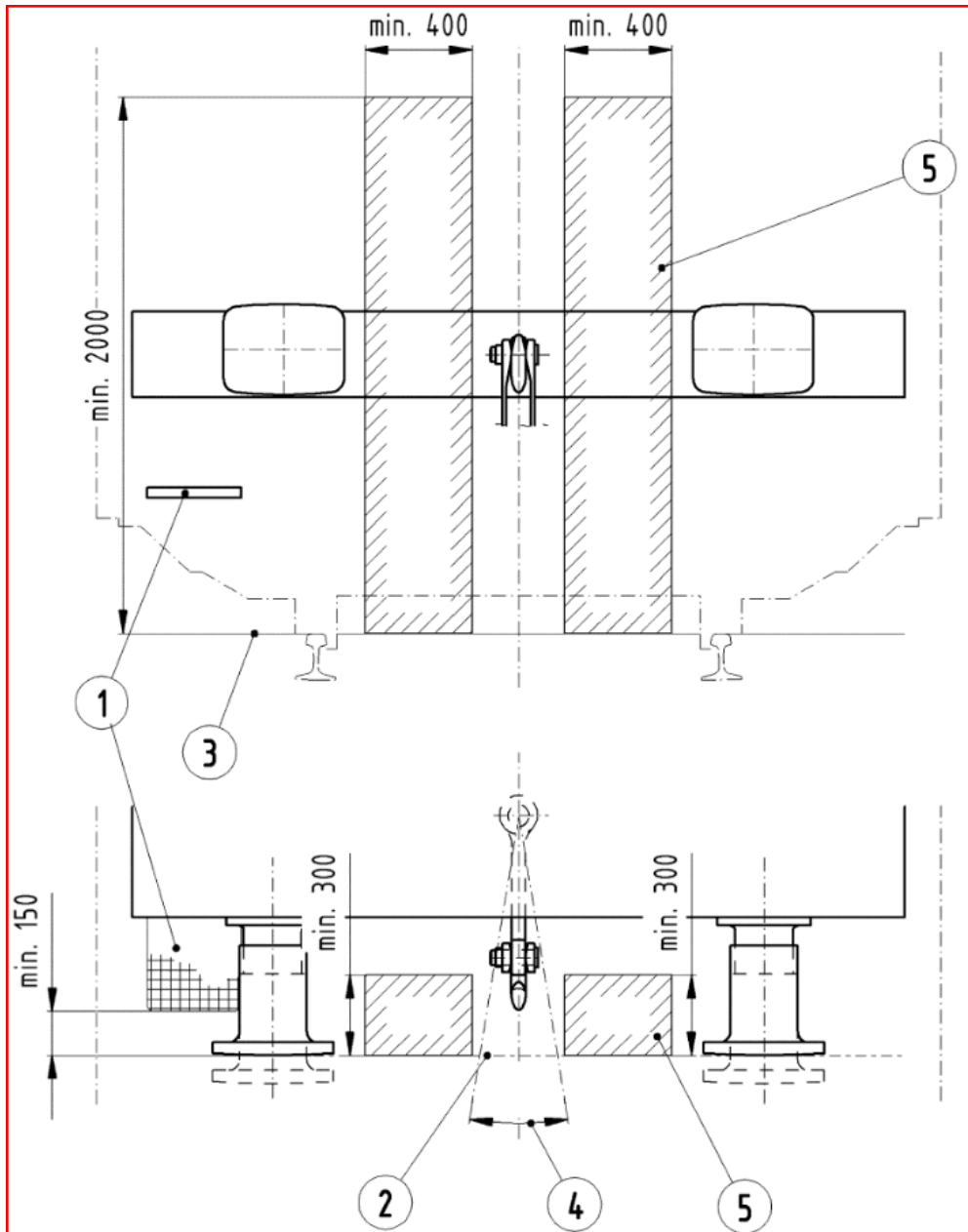


Key: 1 center line of wagon
2 buffer fixing plane

Figure 2: Required clearance above draw hook

3. Space for shunting staff operation (Appendix C, Section 1)

The space for shunting staff operation shall be in accordance with figure 3. Flexible connecting cables and flexible hoses may be inside this space. With exception of the shunter handrails (see Appendix C, section 2 of the WAG TSI) there shall be no devices under the buffers that hinder the access to the space.



- Key:
- 1 end step
 - 2 contact plane of fully compressed buffers
 - 3 top of rail
 - 4 lateral movement of coupling at coupled units
 - 5 space for shunter

Figure 3: Required space for shunter during coupling and uncoupling



4. Footsteps and handrails (Appendix C, Section 2)

4.1 Minimum requirements for handrails

All handrails

- shall be of round steel bar or steel pipe with a min. diameter of 20 mm and a max. diameter of 35 mm.
- shall withstand the loads, which are applied by staff,
- shall respect a clearance to the nearest obstructions of at least 120 mm.

4.2 Minimum requirements for footsteps

All footsteps

- shall have sufficient space above and around in order to enable the staff to use them safely.
- shall be slip resistant
- shall withstand the loads, which are applied by the staff.

The minimum requirements concerning slip resistance deemed to be complied with if the grating in accordance with figure 4 is used or if the following requirements are fulfilled:

a) Skid resistance

The average value of the friction coefficient measured in three directions (lengthwise, breadthwise and diagonally) shall reach the following minimum values:

- | | |
|-----------------------------|--------|
| a) in dry condition | = 0,65 |
| b) in wet condition (water) | = 0,65 |
| c) in oiled condition | = 0,30 |

Friction coefficient values shall be ascertained by means of a 100 mm x 100 mm movable plate, on which a rubber pad with 80 shore hardness shall be glued. This plate shall be loaded with a weight of 75 kg. For the measurements carried out with water and oil, the grating shall be fully immersed.

b) Grating structure

To ensure that the gratings are sufficiently well-adapted to winter conditions, a ratio of at least 50 % of "void" area to total area shall be observed (the "void" area is the free space afforded by the grating apertures in the vertical direction). Only apertures with a minimum area of 400 mm² shall be taken into account to determine this ratio.

With regard to the ability to withstand the load the following shall be fulfilled:

Metal gratings shall withstand, without residual deformation, a horizontal compression force of at least 4 kN, exerted parallel and at right angles to the edge of the step board, and of at least 8 kN exerted diagonally in relation to the edge of the step board. Elastic deformations shall not exceed 10 mm.



4.3 Shunter's stand

There shall be at least one shunter's stand consisting of one shunter's step and one handrail at each end of the unit to enable shunting staff to travel on board the unit during shunting operations. The handrails and footsteps shall be in accordance with section 4.1 and 4.2 with the following additions and exceptions:

handrail

- A clearance of 100 mm between the handrails and the nearest obstruction is permitted.
- The handrail shall be made from steel pipe with a diameter of 30 +5/0 mm, with a minimum wall thickness of 2 mm and a minimum clearance of 230 mm.

footstep

- The shunter's steps shall be at least 150 mm from a vertical plane at the end of the fully compressed buffers (see figure 3).
- The shunter's steps and handrails shall be placed as set out in figure 5.
- The free space above the shunter's steps shall be as set out in figure 6 with the exception concerning the handrail specified in figure 5.
- The dimensions of the shunter's step shall be in accordance with figure 4. For specific operation the size of the footstep can be reduced from 350 mm width and 350 mm length to 270 mm width and 225 mm length.
- The shunter's steps shall be fixed by means, which allow removable mounting.
- The material for the shunter's steps support shall be S355J2C + N in accordance with EN 10025-2.
- Cold forming for shunter's steps support is not allowed.
- The grating shall be according to figure 4.

The shunter's stand is not required where the end of the unit is equipped with a gangway in accordance with section 4.4.

Furthermore, there shall be a handrail under each buffer (shunter's handrail) of the unit which shall be as specified in figures 7 and 8.

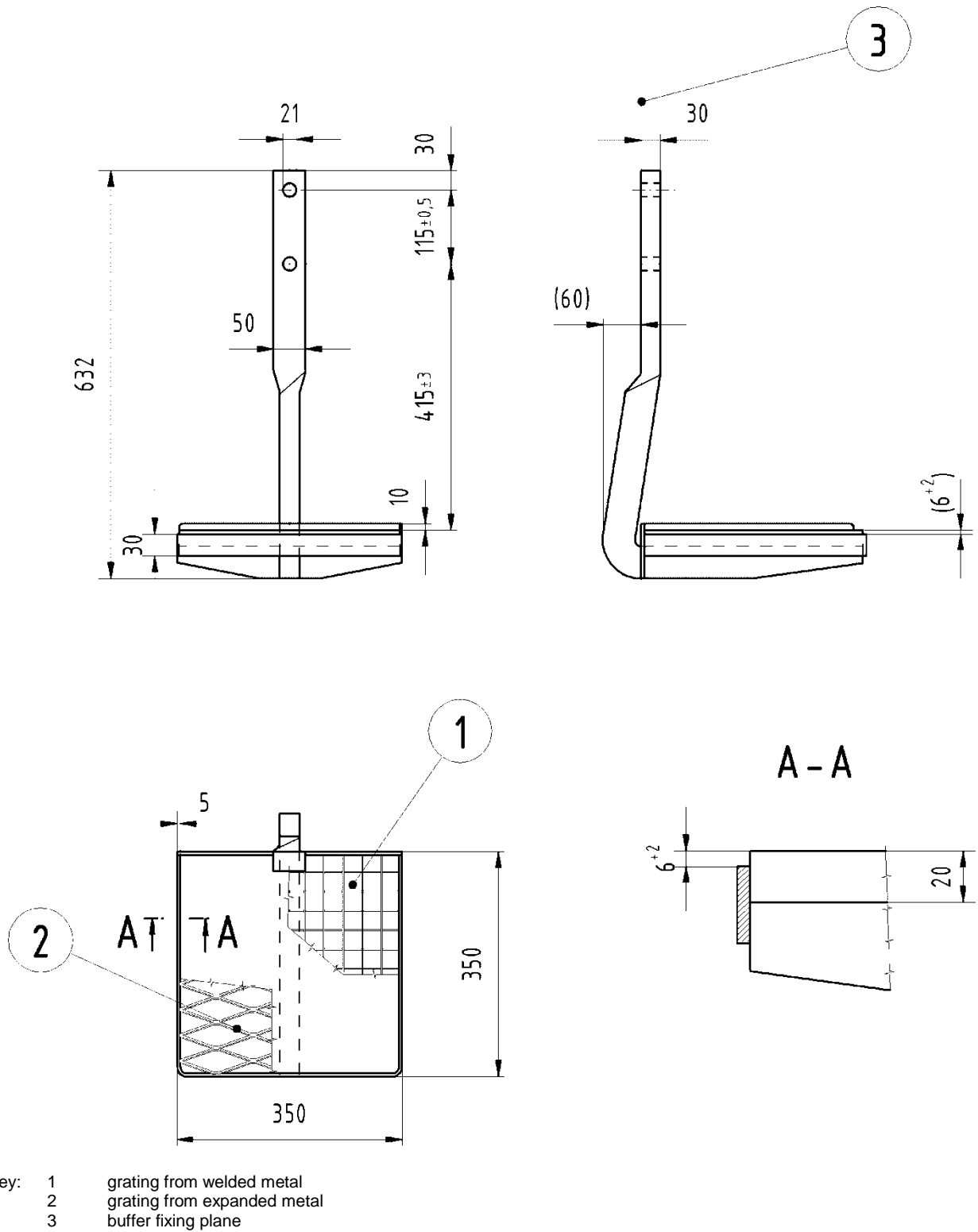
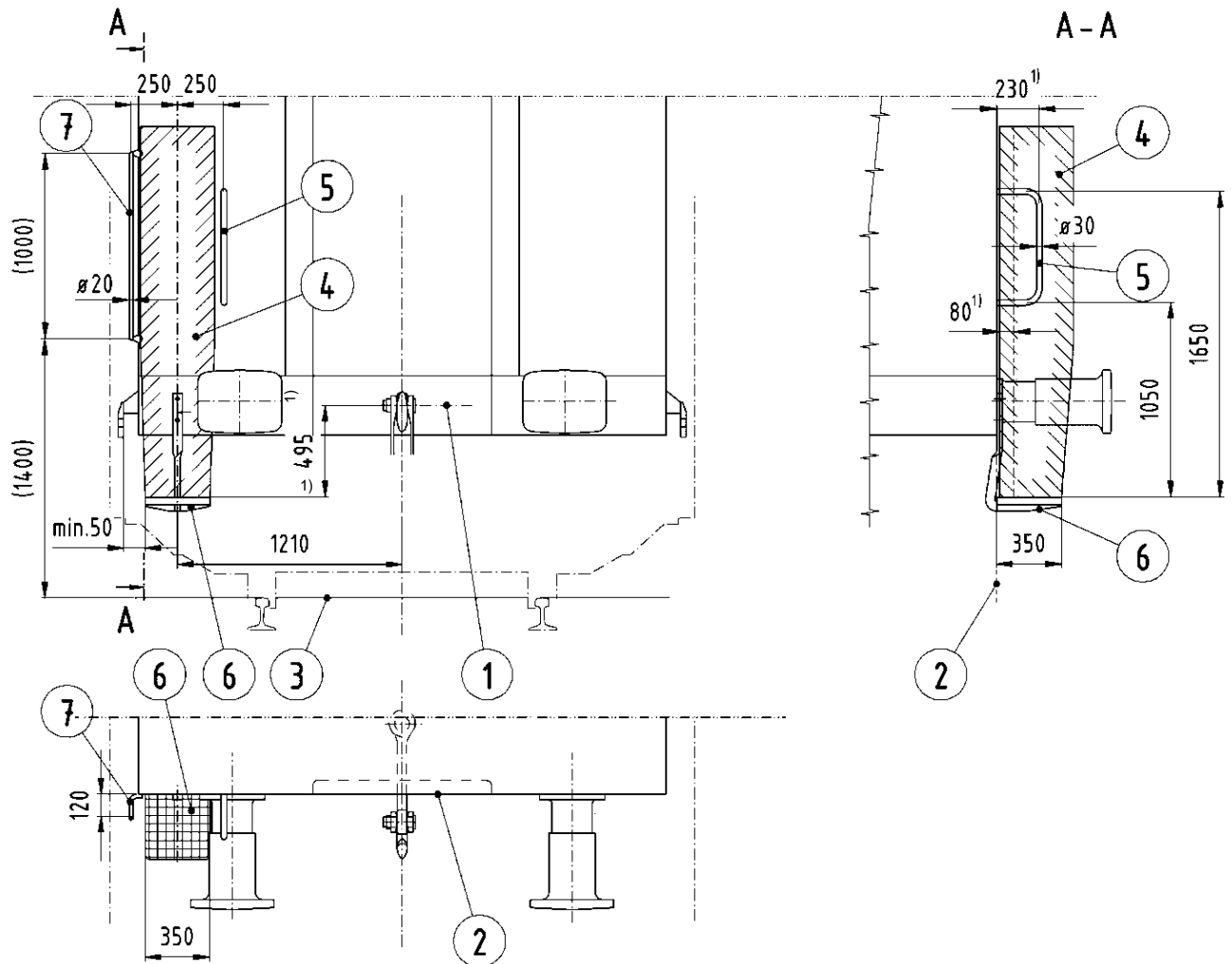


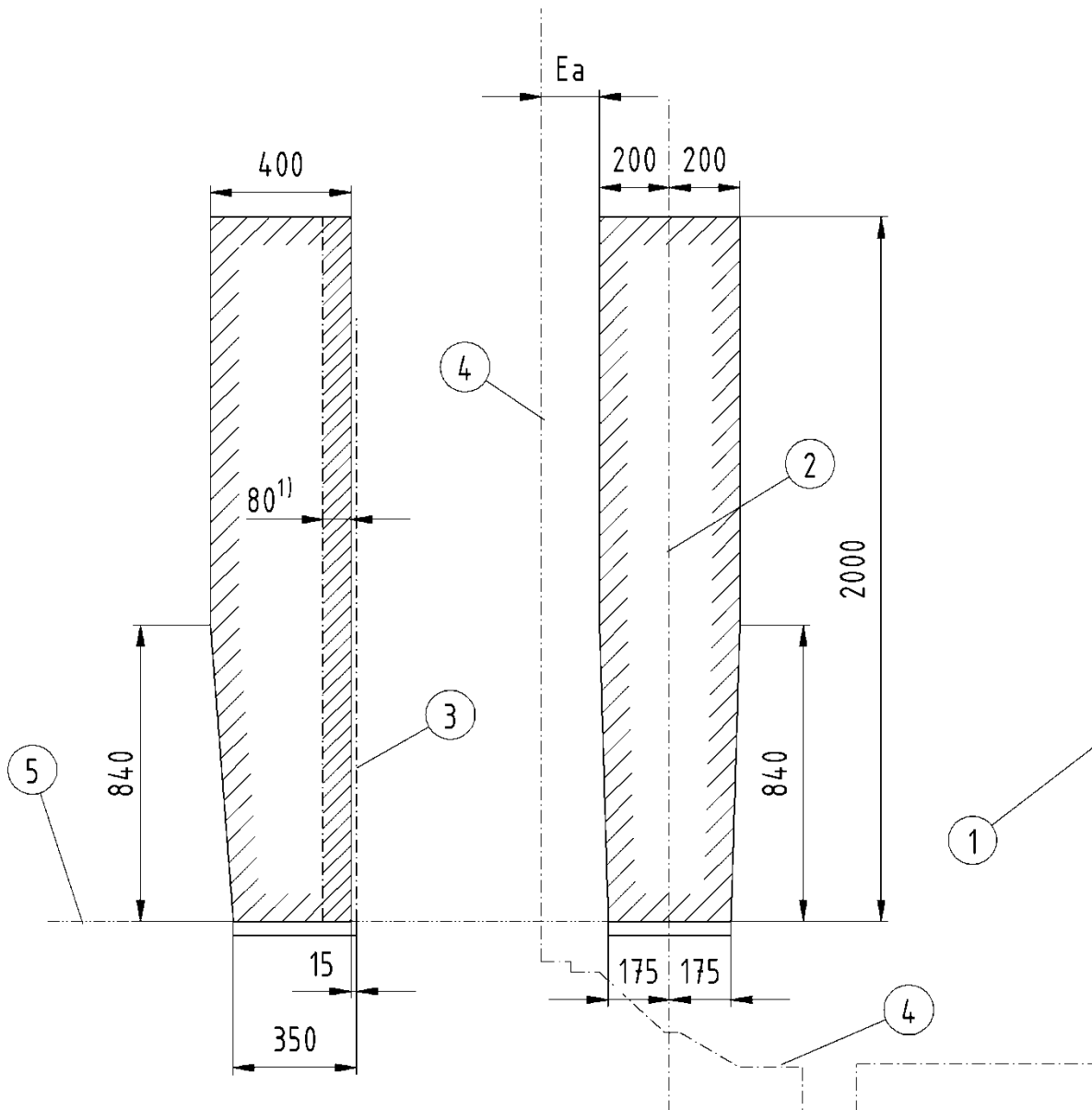
Figure 4: Shunter's step



- Key:
- 1 AC centre line
 - 2 buffer fixing plane
 - 3 top of rail
 - 4 reserved space as specified in Figure 5
 - 5 handrail
 - 6 step
 - 7 2nd handrail corner upright (only at wagon s with end walls)

1) In exceptional cases (e.g. particular gauges), and in order to comply with the reserved space stated in figure 6, as long as the kinematic gauge is respected, the shunter's stand can be adjusted in horizontal direction. Only if this method is not successful, a vertical adjustment of the shunter's stand could be accepted, but not more as allowed by the kinematic gauge. The vertical position shall not be less than 480 mm from coupling centre line.

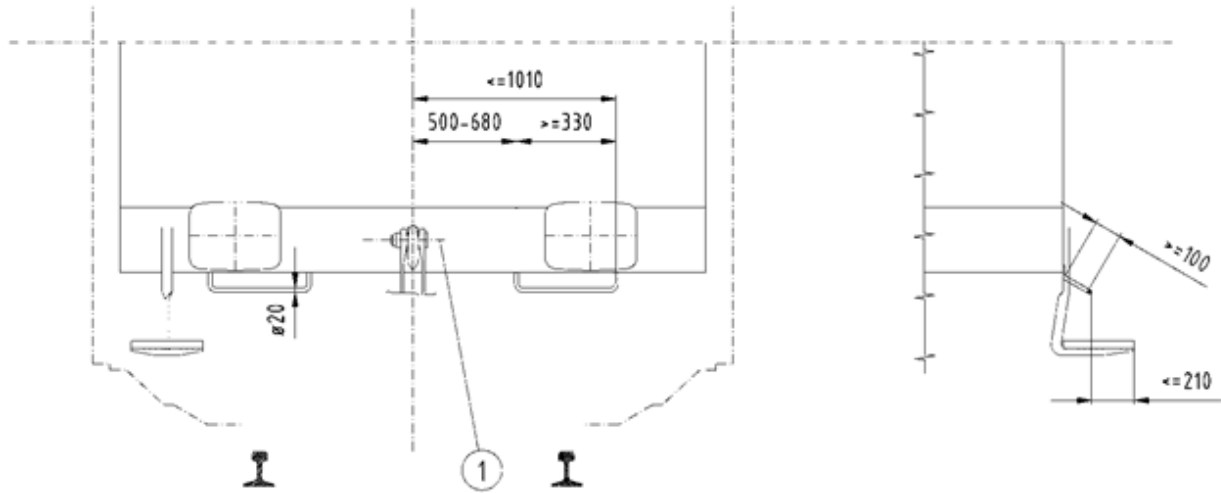
Figure 5: Shunter's stand



- Key:
- 1 centre line of wagon
 - 2 centre line of left end step
 - 3 buffer fixing plane
 - 4 kinematic gauge
 - 5 step level

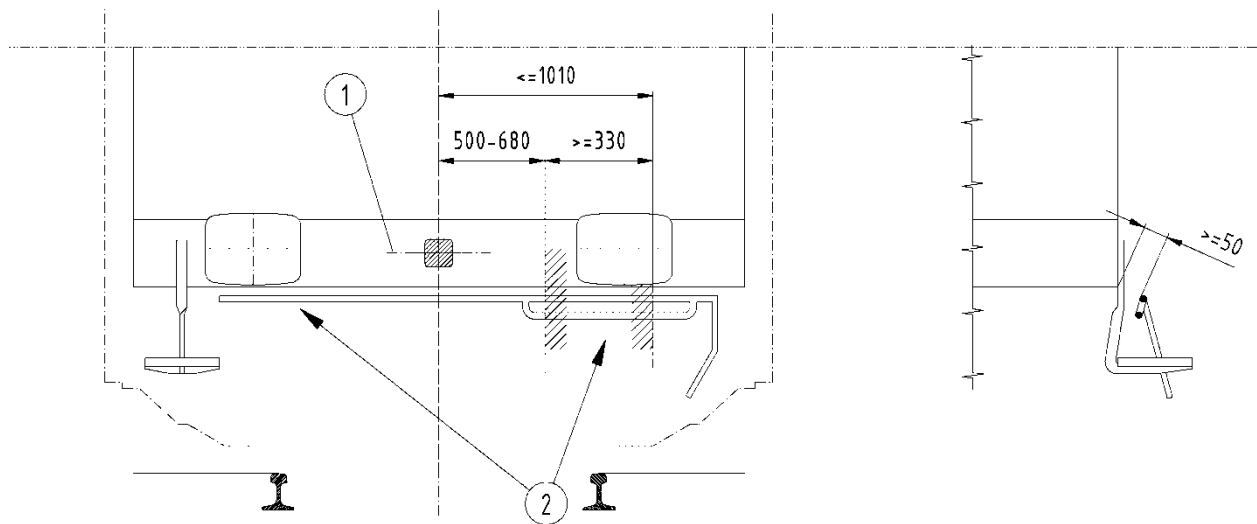
1) In the event of design problems, component parts such as the closing and locking devices of sliding walls may exceptionally infringe this space. These components must nonetheless be placed parallel to the end wall and have no projecting parts liable to cause injury.

Figure 6: Required space above left footstep



Key: 1 AC centre line

Figure 7: Positions of shunter handrails



Key: 1 AC centre line
2 area which may be used by the shunter in the case of a wagon fitted with the automatic coupler

Figure 8: Position of shunter handrails by using automatic coupler



4.4 Gangways

The design and position of the gangways shall be as specified in figure 9.

To facilitate climbing onto the gangway, the following items shall be fitted on both sides of the unit:

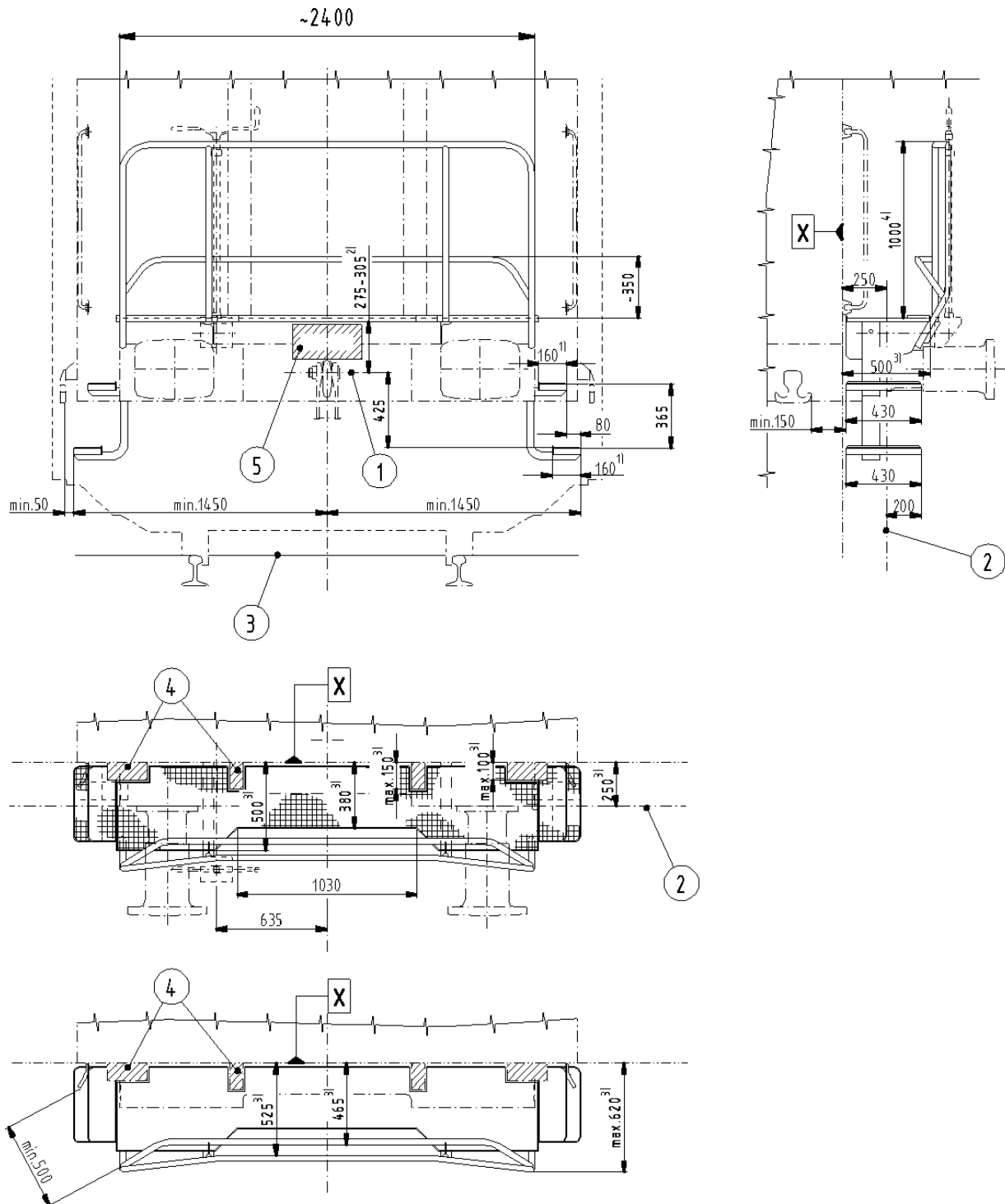
- Two footsteps (160 x 430 mm) long. The lower footstep shall be set at a height of 425 mm below the horizontal plane running through the centreline of the coupling.
- Vertical handrail, fitted to each corner upright.
- Vertical part of the railing shaped like a handrail.

It shall be possible for the shunting staff to remain on the upper footsteps while the vehicle is moving. To allow this, clearance shall be maintained over the upper footsteps as specified in figure 10.

The surface of the steps and of the gangway shall be designed with a non-slip surface.

The gangway shall be equipped with a gangway handrail providing a secure hand-hold for the shunting staff, even while the vehicle is moving. An intermediate rail at knee height shall be provided to prevent the shunting staff from falling off. The ends of these intermediate rails shall be fashioned in such a way as to form a guide to the footsteps.

For traffic to UK, as long as the kinematic gauge is respected, the lower footsteps can be adjusted in the horizontal direction. Only if this method is not successful, a vertical adjustment of the lower steps could be accepted, but not more than permitted by the kinematic gauge.

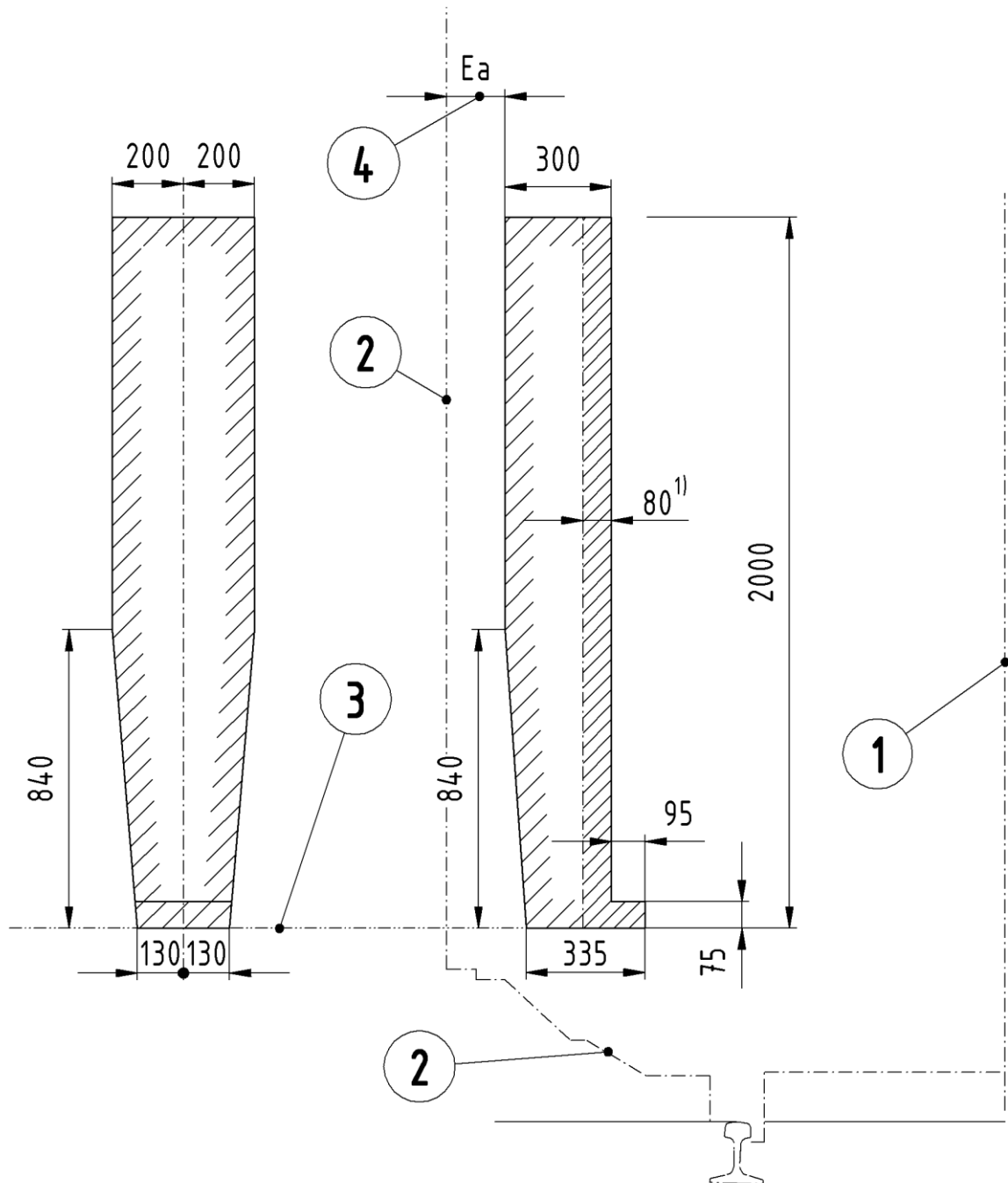


Key

- 1 coupling centre line
- 2 buffer fixing plane
- 3 top of rail
- 4 space for exceptionally infringement by components, closing and locking devices or superstructure
- 5 clearance for draw hook

- 1) step width
- 2) min. dimension for clearance of draw hook - see chapter 2, figure 2
- 3) distances from plane "X"
- 4) the height of the guard rail of 1000mm may be increased for operational reasons

Figure 9: Example for gangway



Key

- 1 centre line of wagon
- 2 kinematic gauge
- 3 step level
- 4 Transverse reduction according to EN 15273-2

1) In the event of design problems, component parts such as the closing and locking devices of sliding walls may exceptionally infringe this space. These components shall nonetheless be placed parallel to the end wall and have no projecting parts liable to cause injury.

Figure 10: Required space above the top access step of the platforms and gangways