

Safety in Water Supply Installations

According to Section 15 of the German Social Insurance Code (SGB VII), accident insurers issue accident prevention regulations as an autonomous right. Accident insurers include accident insurance companies and professional associations. Depending on the company type, both the Professional association for statutory accident insurance and prevention in the gas, district heating and water industry sectors (BGFW) (www.bgfw.net) and the accident insurance companies and accident insurance organisations of the local communities may be the responsible insurer in the field of water supply.

Accident prevention regulations The German accident prevention regulations have been designated the „Professional Association Guidelines for Health and Safety in the Workplace“ since 2004. The following abbreviations are used:

BGV	Professional Association Guidelines	BGR	Professional Association Rules
BGI	Professional Association Information	BGG	Principles of Occupational Medicine

The new BGV A1 is the central basis regulation of the redesigned body of requirements for prevention. It dovetails professional association ordinance law with federal work protection law, thus changing the relationship of the bodies from one of partial coexistence to one of cooperation with regard to legislation in preventing workplace accidents, occupational illnesses and work-related health hazards.

The entire set of rules is available for download on the Internet at the website of the National Association of Commercial Professional Associations (www.hvbg.de).

The following information explains the implementation of the body of regulations with regard to the construction of safety-related equipment in the field of water supply. The respectively valid regulations are cited individually.

Stairways and railings

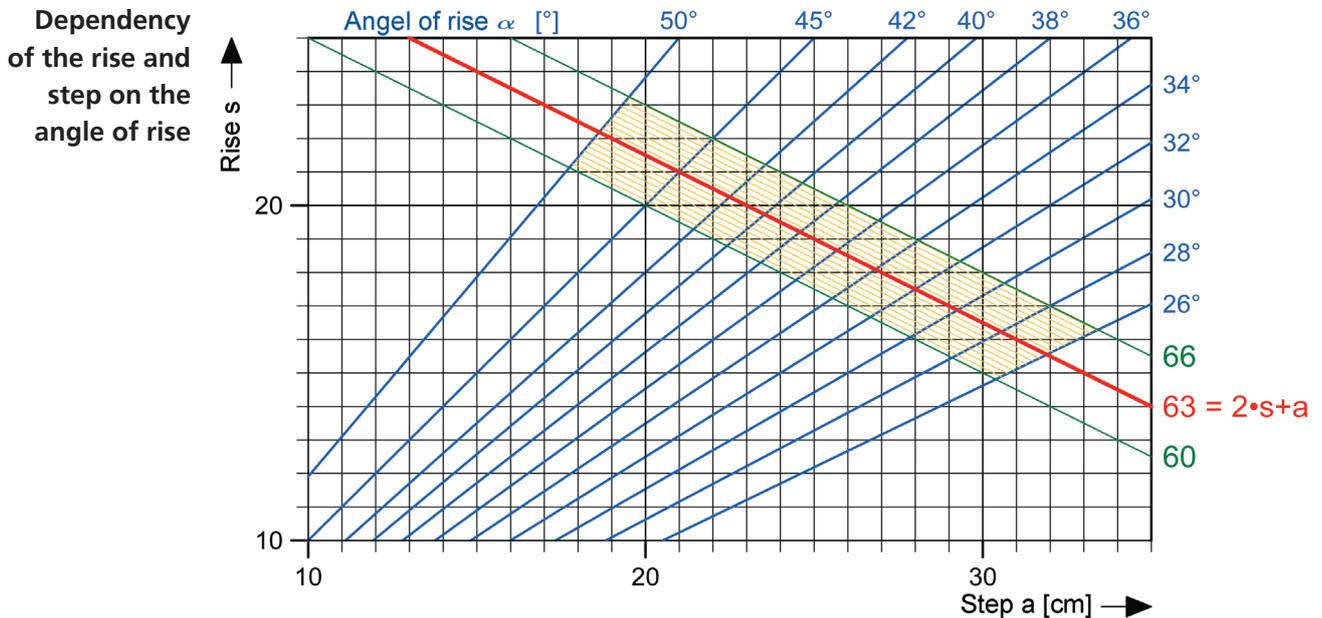
Stairways in general Stairways are structural installations, the design of which is primarily regulated by the building regulation laws of the individual regions, special building ordinances and the Workplace Ordinance.

Requirements for stairways are contained in Germany in the Workplace Ordinance, the BGV A1 Accident Prevention Regulations in Sub-Sections 24, 25 and 33, Professional Association Information BGI 561 Stairways and in DIN standards 18064, 18065 and 24530.

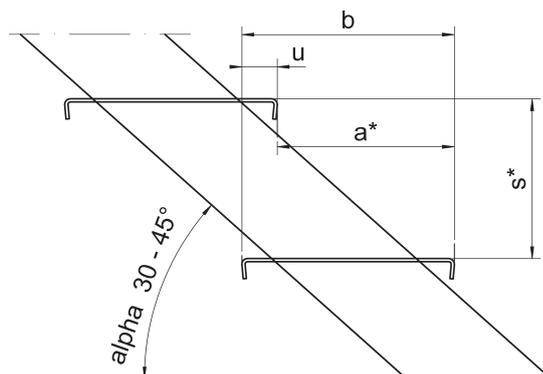
Stairways in structures Waterworks, pumping stations, water storage systems, ducts etc. are installations for water supply. Installations differ from public works in that, among other things, they are managed and accessed only seldom and by a small number of trained persons. For this reason, requirements on stairways in water supply installations are not nearly as high as in buildings open to the public! In addition, stairways and ladders may be necessary in installations for the monitoring and operation of the systems for accessing permanent platforms which provide optimum safety and convenience in the tightest of spaces. To fulfil these requirements, ladders and stairway structures which are made of steel and based on the following construction guidelines are often used here.

For this purpose, see also BGI 561 Stairways, Item 6.5.2 and EN ISO 14 122 Part 3 „Permanent Means of Access to Machinery – Part 3: Stairs, Stepladders and Guardrails“.

Konstruktion von Stahl- und Edelstahltreppen



Formula and data	• Step size formula	Step $a + 2 \cdot \text{Rise } s = \mathbf{630} \pm 30 \text{ mm}$
	• Rise s^*	170 bis 220 mm
	• Angle of rise α^{**}	30 up to 38° , in special cases up to 45°
	• Step a^*	290 – 200 mm
	• Step width b	220 – 250 - 280 mm
	• Overlap u	10 up to 15 mm
	• Tread width	600 – 800 – 1000 mm



Preferred dimensions in bold, deviations in special cases only within the above limits

* Dependent on angle of rise α

** Steep stairways with a larger angle of rise are permissible if no other solutions are possible for reasons of space. In this case, usage instructions are required for the stairway.

Angle of rise The angle of rise is determined by the height differential to be bridged and the horizontal tread length.

Tread length = Length of the flight line projected vertically on the floor.

The rise and step can be determined using the diagram above. The range which is valid according to the step size formula is specially marked.

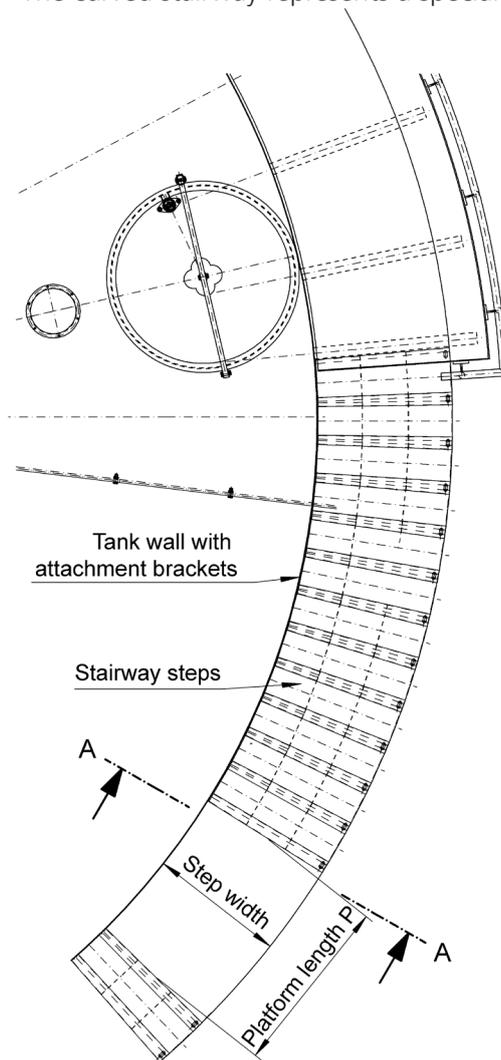
The step size within a flight of stairs must be complied with for each step, including the first and last steps.

The steps are made of folded dimple plate or grating and are non-slip. With folded steps, the front edge of the steps are to have the smallest radii possible.

Straight stairways Straight stairways or stairways with straight flights represent the normal case in stairway construction. Straight stairways are safe and easy to traverse as long as the angle of rise does not exceed 38°. Stairways with an angle of rise of 38°–45° are designated as steep stairways. These stairways are less safe to traverse, as the runs are too small (see table), resulting in an increased risk of slipping..

For this reason, steep stairways should only be provided for occasional use by a group of people who can be trusted to do so.

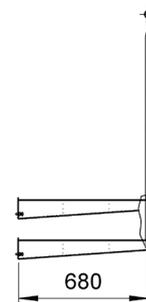
Curved stairways The curved stairway represents a special type of spiral stairway.



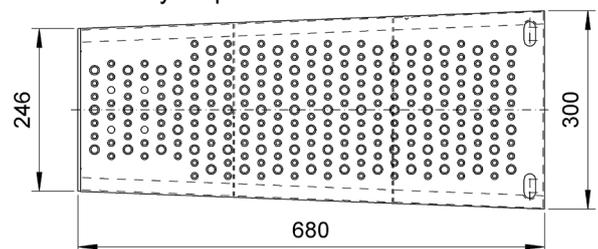
In the flight line, the rise ratio must correspond to that of a straight stairway with step measurements from the step size formula. The flight line runs in the centre of the flight width.

The step is to be at least 10 cm on the inside of the steps and no more than 40 cm on the outside.

A-A view



Stairway step view



Stairway platforms A stairway platform is required at the beginning and end of each flight of stairs. In most cases, they are parts of storey ceilings or operator platforms.

The platform length must be at least the same as the flight width and ≥ 1 m.

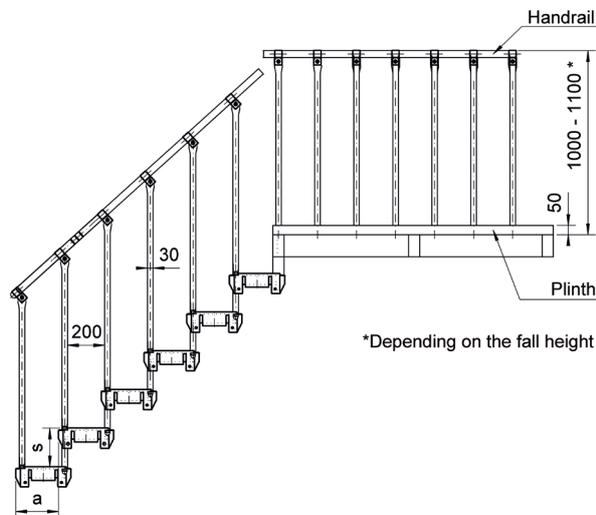
Intermediate platform In the case of long stairways, an intermediate platform is to be provided after max. 18 steps. To ensure good traversability, the **platform length P** is determined using the following formula:

$$P = a + n(2s + a) \quad n = \text{Number of steps in the platform}$$

Railings In the case of stairways with more than four steps, a fixed railing with a minimum height of 1 m is to be installed.

This also applies for platforms, landings etc. with a possible fall height of ≥ 1 m. In the case of fall heights over 12 m, the railing height must be at least 1.10 m. Plinths with a height of at least 50 mm must also always be installed around the circumference. If a filled-rod railing is not installed, at least one knee rail is to be installed in the centre.

Curved stairway with platform and filled-rod railing



Straight stairway with platform

