Weland standard straight flight staircases are manufactured of steel and are mainly used in industrial buildings and as escape staircases in different types of buildings. The staircases consist of stringers, treads and landings of grating as well as balustrades. The steel components are, as a rule, hot dip galvanized and supplied in separate parts for assembly on site.

Our manufacture also comprises straight flight staircases for other applications such as installations in office buildings, flats, entrances, public rooms, schools etc. In these cases the treads normally consist of other material than grating. Also the design of the balustrade and the surface treatment can differ.
CUSTOM DESIGN

The simplest method for design is to leave the planning to us. Our technical department can look back at many years of experience with the planning and dimensioning of straight flight staircases. Just send us your drawing, we do the rest.

We dimension and draw the staircase, and all you need to do is check the measurements and approve the drawing before manufacture starts.

ANGLE OF INCLINATION / RISE

For comfortable passage of staircases there should be a certain ratio between the angle of inclination, the rise and the going. The suitable angle of inclination lies between 30° and 45°, in practice, however, it is often necessary to compromise due to the limited space for the base line.

The table below shows the suitable rise and going when the angle of inclination is known.

<table>
<thead>
<tr>
<th>Angle of inclination</th>
<th>Suitable rise</th>
<th>Suitable going</th>
<th>Ratio* Base line/height of stair</th>
</tr>
</thead>
<tbody>
<tr>
<td>60°</td>
<td>240</td>
<td>160</td>
<td>0.58</td>
</tr>
<tr>
<td>57°</td>
<td>230-240</td>
<td>160</td>
<td>0.65</td>
</tr>
<tr>
<td>55°</td>
<td>230</td>
<td>200</td>
<td>0.70</td>
</tr>
<tr>
<td>52°</td>
<td>220-230</td>
<td>200</td>
<td>0.78</td>
</tr>
<tr>
<td>50°</td>
<td>220</td>
<td>200</td>
<td>0.84</td>
</tr>
<tr>
<td>47°</td>
<td>210-220</td>
<td>230</td>
<td>0.93</td>
</tr>
<tr>
<td>45°</td>
<td>210</td>
<td>230</td>
<td>1.00</td>
</tr>
<tr>
<td>42°</td>
<td>200-210</td>
<td>260</td>
<td>1.11</td>
</tr>
<tr>
<td>40°</td>
<td>200</td>
<td>260</td>
<td>1.19</td>
</tr>
<tr>
<td>37°</td>
<td>190</td>
<td>260</td>
<td>1.33</td>
</tr>
<tr>
<td>35°</td>
<td>180-190</td>
<td>300</td>
<td>1.43</td>
</tr>
<tr>
<td>32°</td>
<td>175</td>
<td>300</td>
<td>1.60</td>
</tr>
<tr>
<td>30°</td>
<td>170</td>
<td>300</td>
<td>1.73</td>
</tr>
</tbody>
</table>

* If the angle is not known, but the base line is given, divide the base line figure $L$ by the figure for the height of the stair $H$, then look up the closest figure in the column to the right.

Example:
Base line ($L$) = 3.5 m  
Height of stair ($H$) = 2.5 m

$$\frac{L}{H} = \frac{3.5}{2.5} = 1.4$$  
the angle of inclination is 35°
EXAMPLES OF STAIRCASES WITH ONE FLIGHT

1. Top tread one step height below existing landing.
2. Top tread on level with existing landing.
3. Staircase including landing.

EXAMPLES OF STAIRCASES WITH SEVERAL FLIGHTS

4. Top tread one step height below existing landing.
5. Top tread on level with existing landing.
6. Staircase including landing.
7. Staircase incl. landing below, existing landing on top.
8. Staircase incl. landing below, top tread on level with existing landing.
9. Staircase including landings.
10. Staircase incl. landing below, existing landing on top.
11. Staircase incl. landing below, top tread on level with existing landing.
12. Staircase including landings.
DIMENSIONING

For the dimensioning of stringers for a straight flight staircase Building Standards BBR94 and BKR94 apply. Base line, width, load etc. have to be considered. In order to facilitate the dimensioning we have worked out a diagram showing a graph intended to give a lead for choosing the suitable type of stringer. The graph is calculated for a staircase with an effective inclination of 35 degrees.

Table: Load Graph

<table>
<thead>
<tr>
<th>Type of Stringer</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>t (mm)</th>
<th>Bending Resistance W in cm³</th>
<th>Weight kg/m</th>
</tr>
</thead>
<tbody>
<tr>
<td>WUC 120/3</td>
<td>120</td>
<td>45</td>
<td>22</td>
<td>3</td>
<td>25,0</td>
<td>5,6</td>
</tr>
<tr>
<td>WUC 170/3</td>
<td>170</td>
<td>55</td>
<td>25</td>
<td>3</td>
<td>46,1</td>
<td>7,3</td>
</tr>
<tr>
<td>WUC 170/4</td>
<td>170</td>
<td>55</td>
<td>25</td>
<td>4</td>
<td>59,6</td>
<td>9,6</td>
</tr>
<tr>
<td>WUC 170/5</td>
<td>170</td>
<td>55</td>
<td>25</td>
<td>5</td>
<td>72,7</td>
<td>12,0</td>
</tr>
</tbody>
</table>

Values for WUC profile

In case of other load values please contact Weland.
STANDARD STAIRTREADS

Type TH6 is manufactured from press-welded grating with mesh size 30 x 67 mm. Type TH6-S is manufactured from the same grating, but is provided with a safety front edge marking the front of the tread and giving increased non-slip properties. Standard stairtreads are hot dip galvanized and kept in stock. Stairtreads up to 900 mm length have end plates 60 mm high, from length 1000 mm end plates 70 mm high. This applies to all types of tread. Special type treads can be manufactured from grating chosen from Weland grating programme (see separate brochure).

STANDARD LANDINGS

Weland Standard landings are designed in the same way as the treads. Standard depth is 500, 700 and 1000 mm respectively. Landings other than standard design on requirement.

MEASUREMENTS OF TREADS AND LANDINGS

End plate tread

Hole-Ø 14 mm for M12 screw

End plate landing

The figures in the table indicate the approximate weight in kg.

STANDARD LANDINGS

Weland Standard landings are designed in the same way as the treads. Standard depth is 500, 700 and 1000 mm respectively. Landings other than standard design on requirement.
SPECIAL DESIGN TREADS

Apart from treads produced from grating we can also manufacture treads made of slit grating, checker plate, plate with carpet, wood of different types, marble, concrete, terrazzo etc. Get in touch with us already in the planning stage, we assist you with the solution. Treads can also be designed as riser treads for reducing the distance between the steps. Building Standards BBR99 chapter 8:232.

Slit grating

Staircase with treads of concrete covered with ceramic tiles

Checker plate

Staircase in public baths. Treads of plate with non-slip carpet

Plate with carpet

Staircase in residential house. Treads of concrete with top face of terrazzo

Wood

Staircase in residential house. Treads of concrete with top face of terrazzo

Concrete with top face of terrazzo

Riser tread
STANDARD BALUSTRADE

Straight flight staircases can be provided with balustrades on one side, on both sides or balustrade on one side and hand-rail fixed to the wall on the other. The height of balustrade is as standard 900 mm in the stair flights and 1100 mm on the landings. In case of danger of falling the height of balustrade in the flights can also be 1100 mm. See BBR99 chapter 8:232.

Typ 6: Handrail and balusters from tube Ø 42,4 mm, intermediate balusters from tube Ø 16 mm, daylight between balusters maximum 100 mm.

PLATFORM BALUSTRADE

Platform balustrades are manufactured on customer requirement and always with height 1100 mm. The fixing is done following alternatives A or B. If people are likely to be expected underneath the platform or its edge, the balustrade has to be provided with a kick strip to prevent objects from unintentionally getting kicked down. Weland also stocks standard railings manufactured in modules. These modules can be combined to the required length, see brochure Weland Universal Railings.

Typ 2: Handrail and balusters from tube Ø 42 mm, intermediate rails from tube Ø 27 mm.

FOOTBRIDGES

Footbridges manufactured from grating with complete railings, module build-up for easy and quick erection. The footbridge consists of grating and stringers welded to the gangway. The stringers also serve as kick strip. The modules are connected by bolts. The railing is supplied in loose parts for bolting together on site.

Typ 4: Handrail and balusters from tube Ø 42 mm.

Typ 6: Handrail and balusters from tube Ø 42,4 mm, intermediate balusters from tube Ø 16 mm, daylight between balusters maximum 100 mm.
Protective cage preventing trespassing.

Staircase with balustrade type 6.

Balustrade with handrail of wood, square profile posts and board cladding.

Special design balustrade with fill-ins of grating.

Protective cage preventing trespassing.
Industrial staircases and staircases for outdoor use are as standard hot dip galvanized in accordance with EN 1461. Staircases for internal use, other than industrial, can be supplied primer painted, varnished or treated to customer requirement.

**FIXING DEVICES**

1-flight stair, fixing angles
With landing, fixing angles
With landing, bracket
With landing, supporting leg
Multi-flight stair with supporting legs
Separate platform

**SURFACE TREATMENT**

Industrial staircases and staircases for outdoor use are as standard hot dip galvanized in accordance with EN 1461. Staircases for internal use, other than industrial, can be supplied primer painted, varnished or treated to customer requirement.
LADDERS
Weland stocks a standard ladder with measurements as shown in the figure. The ladder is manufactured without railing and hot dip galvanized. Ladders with other measurements and different design on requirement, see ordering straight flight staircase.

FOLDING GANGWAY STEPS
A somewhat odd product, the Weland balance bridge, is used mainly within the petrol and chemical industries. It is easily mounted and easy to handle. It is stoc ked in different sizes, always hot dip galvanized.

SPECIAL DESIGN STAIRCASES
We also manufacture staircases differing from our standard design. This applies for instance to the stringers, material used in treads, railing and special surface treatment. Treads of concrete, marble and other stone material according to standard of our subcontractors.

HELICAL STAIRCASES
Weland helical staircases are manufactured with stringers in the same way as straight flight staircases. The staircases can be freestanding or follow the inside or outside of a silo.
FÖRESKRIFTER OCH ALLMÄNNA RÅD ENLIGT BBR99

Trappor

Trappsschakt för trappor som utgör huvudkommunikationer bör utföras med en minsta bredd enligt följande tabell.

<table>
<thead>
<tr>
<th>Trappor i olika byggnader och lokaler</th>
<th>Trappschaktets minsta bredd i m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inom och till en bostad</td>
<td>0,90</td>
</tr>
<tr>
<td>Till flera bostäder i en byggnad</td>
<td>1,20</td>
</tr>
<tr>
<td>som inte har hissar för bårtransporter</td>
<td></td>
</tr>
<tr>
<td>Till flera bostäder i en byggnad</td>
<td>0,90</td>
</tr>
<tr>
<td>som har hissar för bårtransporter</td>
<td></td>
</tr>
<tr>
<td>Till källare och vindar i flerbostadshus</td>
<td>0,90</td>
</tr>
<tr>
<td>Till källare och inredda vindar i småhus</td>
<td>0,80</td>
</tr>
</tbody>
</table>

Passagemått i utrymningsväg

Utymningsvägar skall utformas med sådan rymlighet och framkomlighet att de kan betjäna det antal personer de är avsedda för. Bredden i utrymningsvägar bör inte understiga 0,9 m. I utrymningsvägar från brandceller som är avsedda för fler än 150 personer bör bredden inte understiga 1,20 m.

Fri höjd (8:312)

Den fria höjden i en trappa skall vara minst 2,0 m.

Med fri höjd avses det vertikala måttet mellan två tänkta parallella linjer, varav den ena tangerar stegnosarna och den andra underkanterna av ovanförliggande byggnadsdelar eller inredningsdetaljer.

Brandklassning enl. R30

Weland raka trappor med standardkomponenter som WUC-vangprofiler kan dimensioneras enligt brandklass R30, utan brandskydds måling eller brandsisolering.

Testat och godkänt enligt ISO 834 och NT FIRE 005.

Räcken och ledständer (8:2321)

Trapplopp, trapplan, ramper och balkonger som inte avgränsas av väggar, skall ha räcken som begränsar risken för personskador. Trappor och ramper som är högre än 0,50 meter skall ha ledstäger eller motsvarande på båda sidor.

Ledstäger eller motsvarande skall vara lätt att gripa om. Trappor som är bredare än 2,5 meter bör delas med räcken eller ledstäger i två eller flera lopp.

Räcken i trapplopp bör vara minst 0,9 meter höga. Om en öppning vid sidan av ett trapplopp är så stor att störtningssrisk föreligger och fallhöjden är mer än ett normalt våningsplan, bör räcket vara minst 1,1 meter högt.

Räcken på trapplan inom en bostad bör vara minst 0,9 meter höga. Räcken på andra trapplan, balkonger och loftgångar bör vara minst 1,1 meter höga.

Barnsäkerhet

Trappor och balkonger (8:232, 2321)

Trappor, ramper, balkonger o.d. i utrymmen där barn kan vistas, skall utformas så att risken för barnolyckorblom och fallhöjden är mer än ett normalt våningsplan, bör räcket vara minst 1,1 meter högt.

Räcken på balkonger, trapplan och trapplopp bör, upp till en höjd av 0,8 meter, utformas så att de inte medger slutmöjlig. Vertikala öppningar bör vara minst 100 mm breda.

Fritt mått i höjded mellan ett balkonggräckes underkant och balkonggolvet eller mellan ett trappräckes underkant och trappstegens stegnos bör vara högst 50 mm. Fritt mått i höjded mellan ett trappräckes underkant och ett trapplan eller golv bör vara högst 100 mm.

För att barn inte skall kunna fastna med huvudet bör det ovanför en balkongfront inte finnas horisontella öppningar i intervallet mellan 110 och 230 mm.
ORDER SPECIFICATIONS

Fill in the form below or send dimensioned sketch or building drawing. We design the staircase for you.

1. Type of stair, height and base line

2. Type of stringer
   - WUC
   - U-profile
   - flat bar

3. Treads and landings
   - TH6
   - TH6-S

4. Stair width
   On each side of the staircase stringers, bases, balustrades, handrails etc. must not encroach more than 100 mm on the stair shaft. The distance between an adjacent wall and the flight to be maximum 50 mm.

5. Railing

   Right side (right side when climbing)
   - Railing type
   - No railing
   - Handrail

   Left side (left side when climbing)
   - Railing type
   - No railing
   - Handrail

6. Railing on landing
   - as per separate sketch

7. Surface treatment treads
   - hot dip galvanized

   Surface treatment other steel components
   - hot dip galvanized