Certified translation from German to English

Deutsches
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DIBt

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Authorisation and approval body for construction products and types of construction

General Building Inspectorate Approval / General Type Approval

Date:	**Ref. code:**
13 June 2024	I 71-1.10.9-622/4

Number:
Z-10.9-622

Scope of application
from: 12 June 2024
to: 12 June 2029

Applicant:
Lichtgitter GFK GmbH & Co. KG
Siemensstraße 6
48703 Stadtlohn

Object of this Notice
Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings

The General Building Inspectorate Approval is hereby authorised and granted for the subject matter referred to above.
This notice comprises twelve pages and four annexes with 22 pages.
The object received general building inspectorate approval for the first time on 11 June 2019.

I GENERAL PROVISIONS

1 This notice proves the usability and practicality of the subject matter within the scope of the state buildings laws.

2 This notice does not replace the approvals, agreements and certifications specified by law for implementation of the construction project.

3 This notice is issued notwithstanding the rights of third parties, and private property rights in particular.

4 Notwithstanding any more extensive regulations outlined under "Special provisions" below, copies of this notice are to be made available to the user of the subject matter. Furthermore, the user of the subject matter must be informed that this notice must be available at the place of application. On request, copies must also be made available to the respective authorities.

5 This notice may only be duplicated in full. Publication of excerpts shall require the approval of Deutsches Institut für Bautechnik. Texts and drawings from promotional literature must not contradict this notice; translations must include the following reference: "Translation of the German original which has not been verified by Deutsches Institut für Bautechnik".

6 This notice is issued irrevocably. The provisions can be subsequently supplemented and modified, especially if so required by new technical findings.

7 This notice refers to the information and documents submitted by the applicant. Changes to these basic principles are not recorded by this notice and must be disclosed without delay to Deutsches Institut für Bautechnik.

II SPECIAL PROVISIONS

1 Subject matter and area of application

1.1 Subject of approval and area of application

The subject of approval are gratings made of glass fibre reinforced plastic (GRP gratings) with the following type designation and their connecting elements:

- GFK-K 525-38-5, GFK-K 525-40-5
- GFK-K 530-20-5, GFK-K 530-38-5, GFK-K 530-40-5
- GFK-K 538-19-5, GFK-K 538-38-5, GFK-K 538-40-5
- GFK-K 550-25-5
- GFK-KS 750-38-7
- GFK-KS 950-38-9
- GFK-KS 960-38-9

The longitudinal and cross bars of the GRP gratings are arranged in a square (square mesh spacing); they have a bar height of 25 mm to 60 mm and a bar width of 5 mm to 11 mm. The surface (tread surface) of the bars is sanded or concave in shape. The maximum external dimensions of the GRP gratings are 1687 mm (width) and 4274 mm (length). They can be cut to any dimensions.

The GRP gratings are normally flammable.

These construction products may be used for load-bearing floor coverings.

1.2 Subject of authorisation and area of application

The subject of the authorisation is the planning, dimensioning and execution of load-bearing floor coverings made of GRP gratings and their attachment to a substructure using connecting elements.

The GRP gratings may be installed as single-span or multi-span beams, single-axis or double-axis tensioned. The support must be linear.

The area of application of load-bearing floor coverings is specified for actions from effective loads in accordance with DIN EN 1991-1-1/NA[1], Table 6.1DE or dead loads in accordance with DIN EN ISO 14122-2[2], Section 4.2.5.

The load-bearing floor coverings may be installed both indoors and outdoors. The temperature impact must not exceed +80 °C.

The floor coverings must not be used to stabilise the substructure or to stabilise or reinforce the building or structure.

2 Specifications for construction products

2.1 Properties and composition

2.1.1 GRP gratings

The GRP gratings must be made of unsaturated polyester resin with textile glass rovings. The chemical composition of the polyester resin, the textile glass rovings and their positional arrangement must comply with the specifications filed with Deutsches Institut für Bautechnik.

The cross-sectional dimensions and the weight of the GRP gratings must comply with the specifications in Annexes 1.1 to 1.12. The surface (tread surface) of the bars must be slip-

1 DIN EN 1991-1-1/NA:2010-12 National Annex - National determined parameters - Eurocode 1: Actions on structures – Part 1-1: General actions – Densities, self-weight, imposed loads for buildings

2 DIN EN ISO 14122-2:2016-10 Safety of machinery – Permanent means of access to machinery – Part 2: Working platforms and walkways

resistant (concave or sanded bar surface). The requirements of Annexes 3.1 and 3.2 must be complied with.

The GRP gratings must fulfil the fire behaviour requirements of building material class B2 in accordance with DIN 4102-1.[3]

2.1.2 Connecting elements

The following fasteners may be used to attach the GRP gratings to the substructure (see Annexes 2.1 to 2.6):

- upper plate parts or upper clamp parts made of hot-dip galvanised steel in accordance with DIN EN ISO 1461[4], at least S 235 or made of stainless steel in accordance with DIN EN 10088-4[5] with a minimum tensile strength of 530 MPa,
- lower parts made of hot-dip galvanised steel in accordance with DIN EN ISO 1461[4], at least S 235 or made of stainless steel in accordance with DIN EN 10088-4[5] with a minimum tensile strength of 530 MPa,
- countersunk screw at least M8 in accordance with DIN EN ISO 7046-1[6] or DIN EN ISO 10642[7] or hexagon head screw at least M8 in accordance with DIN EN ISO 4017[8] or DIN EN ISO 4018[9] (minimum strength class 4.6) made of hot-dip galvanised steel or stainless steel of minimum strength class 70 and associated
- square nut in accordance with DIN 557[10] or hexagon nut in accordance with DIN EN ISO 10511[11].

Adequate corrosion protection in accordance with DIN EN 1090-2[12] must be provided for the connecting elements depending on the respective corrosion load. When determining the corrosion protection, at least the environmental conditions corresponding to corrosivity category C3 (moderate) in accordance with DIN EN ISO 9223[13] must be assumed. The minimum thickness of the zinc coatings to be applied must be determined in accordance with DIN EN ISO 14713-1[14], Table 2, taking into account the corrosivity category and the protection duration or protection duration class.

3	DIN 4102-1:1998-05	Fire behaviour of building materials and building components – Part 1: Building materials; concepts, requirements and tests
4	DIN EN ISO 1461:2022-12	Hot-dip galvanised coatings on fabricated iron and steel articles – Specifications and test methods
5	DIN EN 10088-4:2010-01	Stainless steels – Part 4: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for construction purposes
6	DIN EN ISO 7046-1:2011-12	Countersunk flat head screws (common head style) with type H or type Z cross recess – Product grade A – Part 1: Steel screws of property class 4.8
7	DIN EN ISO 10642:2020-02	Fasteners – Hexagon socket countersunk head screws with reduced loadability
8	DIN EN ISO 4017:2022-10	Fasteners – Hexagon head screws - Product grades A and B
9	DIN EN ISO 4018:2022-10	Fasteners – Hexagon head screws - Product grade C
10	DIN 557:1994-01	Square nuts; product grade C
11	DIN EN ISO 10511:2013-05	Prevailing torque type hexagon thin nuts (with non-metallic insert)
12	DIN EN 1090-2:2018-09	Execution of steel structures and aluminium structures – Part 2: Technical requirements for steel structures
13	DIN EN ISO 9223:2012-05	Corrosion of metals and alloys – Corrosivity of atmospheres - Classification, determination and estimation
14	DIN EN ISO 14713-1:2017-08	Zinc coatings – Guidelines and recommendations for the protection against corrosion in iron and steel structures – Part 1: General principles of design and corrosion resistance

2.2 Manufacture, packaging, transport, storage and marking

2.2.1 Manufacturing

The construction products in accordance with Section 2.1 must be manufactured in the factory.

The GRP gratings must be produced by hand insertion into a mould with a pressing process and, if necessary, cut to the required surface.

The exact manufacturing process must comply with the specifications filed at Deutsches Institut für Bautechnik.

2.2.2 Packaging, transport and storage

Packaging, transport and storage of the construction products in accordance with Section 2.1 may only be carried out in accordance with the manufacturer's instructions. The GRP gratings must be transported and stored in such a way that they are neither damaged nor deformed.

Damaged or deformed GRP gratings must not be installed.

2.2.3 Marking

The GRP gratings and the connecting elements or their packaging, instruction leaflet or delivery note must be labelled by the manufacturer with the compliance mark (Ü mark) in accordance with the compliance mark regulations of the federal states.

The following information must also be affixed:

- Type designation of the GRP gratings

Marking is only permissible when the conditions are complied with in accordance with Section 2.3.

2.3 Declaration of compliance

2.3.1 General information

2.3.1.1 Declaration of compliance for GRP gratings

The declaration of compliance for GRP gratings in accordance with Section 2.1.1 with the provisions of the General Building Inspectorate Approval documented by this notice must be provided for each manufacturing plant along with a declaration of compliance by the manufacturer on the basis of in-plant production control and a declaration of compliance from a duly recognised certification body as well as regular external monitoring by a recognised monitoring agency in accordance with the provisions set out below.

The manufacturer of the construction product must involve a recognised certification body and a recognised monitoring body for the issue of the certificate of compliance and external monitoring, including the product tests to be carried out.

The manufacturer will submit the declaration of compliance by marking the construction product with the compliance mark with reference to the designated purpose.

A copy of the certificate of compliance must be made available by the certification agency to Deutsches Institut für Bautechnik for information purposes.

2.3.1.2 Declaration of compliance for the connecting elements

A declaration of compliance of the connecting elements in accordance with Section 2.1.2 (unless they are regulated by a European harmonised standard) with the provisions of the General Building Inspectorate Approval covered by this notice must be provided for each manufacturing plant with a declaration of compliance from the manufacturer on the basis of an initial test by the manufacturer and a factory production control.

The manufacturer will submit the declaration of compliance by marking the construction product with the compliance mark with reference to the designated purpose.

2.3.2 In-plant production control

An in-house production control system must be set up and carried out in each manufacturing plant for GRP gratings and connecting elements. In-plant production control is defined as ongoing monitoring of production by the manufacturer to ensure that the construction products manufactured by them comply with the specifications of the General Building Inspectorate Approval recorded by this notice.

At least the following tests must be carried out as part of in-house production control:

a) GRP gratings

- The resin and the textile glass fibre rovings must be subjected to an incoming inspection. For this purpose, the manufacturer of the GRP gratings must obtain confirmation from the manufacturer of the resin and the manufacturer of the glass fibre product by means of an inspection certificate 3.1 in accordance with DIN EN 10204[15] that the raw materials supplied comply with the provisions in Section 2.1.
- The manufacturer must keep records showing when the individual components of the resin formulation and the textile glass rovings were received and when they were processed. The textile glass rovings must be stored in accordance with DIN 61854-1[16].
- The material feed must be recorded by the manufacturer.
- The manufacturer must carry out the following tests or have them carried out for each batch and type, but at least every 1000 m² of total grating surface produced:
  - Dimensions

    Compliance with the dimensions specified in Annexes 1.1 to 1.12 must be checked. The specified dimensions are nominal dimensions; individual values must not exceed the following permissible deviations:
    - Grating height H: ± 2.0 mm
    - Bar width S: ± 0.3 mm (on average - measured over 10 meshes)
  - Weight per unit area

    The weight must be checked. The values specified in Annexes 1.1 to 1.12 are nominal values; individual values must not exceed a percentage deviation of ± 5%.
  - Textile glass and mineral filler content

    The textile glass and mineral filler content must be determined in accordance with DIN EN ISO 1172[17] on representative test specimens of the GRP gratings. The following mass % values must be observed:
    - Textile glass content $M_{glass} \geq 30\%$
    - Mineral filler content $M_{filler} \leq 38\%$
  - Determination of bending properties and shear strength

    The tests to determine the flexural strength, the flexural modulus of elasticity, the creep tendency and the shear strength must be carried out in accordance with the conditions in Annexes 3.1 and 3.2. The specified requirements for the test results must be complied with.

15 DIN EN 10204:2005-01 Metallic products – Types of inspection documents

16 DIN 61854-1:1987-04 Textile glass; woven glass fabrics for plastics reinforcement; woven glass filament fabric and woven roving; technical delivery conditions

17 DIN EN ISO 1172:2023-12 Textile-glass-reinforced plastics – Prepregs, moulding compounds and laminates – Determination of the textile-glass and mineral-filler content using calcination methods

- Visual inspection

  The GRP gratings must be visually inspected.

b) Connecting elements

   For the connecting elements, each batch must be confirmed that the dimensions and material properties comply with the provisions in Section 2.1.2. This can be done by means of an inspection certificate 3.1 in accordance with DIN EN 10204[15].

The results of in-plant production control must be recorded and evaluated. Records must include at least the following information:

- name of construction product and/or base material and components
- type of control or test
- date of manufacture and testing of the construction product and/or base material or components
- result of controls and tests and, where applicable, comparison with requirements
- signature of person responsible for in-plant production control

Records must be kept for at least five years and submitted to the inspection body commissioned with external quality control (of GRP gratings). They must be submitted to Deutsches Institut für Bautechnik and the responsible top building supervisory authority on request.

In the event of unsatisfactory test results, the manufacturer must take the requisite measures to remedy the deficit without delay. Construction products which do not meet the requirements must be handled in such a way as to eliminate the possibility of mix-ups with compliant products. After remedying the deficit, the respective test is to be repeated without delay – insofar as this is technically possible and necessary as proof of corrective action.

2.3.3 External quality control of GRP gratings

At each GRP grating manufacturing plant, the factory and the in-house production control system must be inspected regularly, but at least twice a year, by an external inspection body.

As part of external monitoring, an initial inspection of the GRP gratings must be carried out, samples must be taken and tested for tests in accordance with Section 2.3.2 a) and samples can also be taken for random tests. Sampling and testing are the responsibility of the recognised inspection body.

The results of certification and external quality control must be kept for at least five years. They must be submitted by the certification agency and/or inspection body to Deutsches Institut für Bautechnik and the responsible top building supervisory authority on request.

3 Provisions governing planning, dimensioning and realisation

3.1 Planning

The load-bearing floor coverings and the substructure must be planned in compliance with the Technical Building Regulations[18], unless otherwise specified below.

Provided that the characteristic strength values and the dimensions listed in Annexes 2.1 to 2.5 (upper plate section, upper clamp section and lower section) are complied with, other regulated or officially approved connecting elements can be used.

The GRP gratings must rest on a stable substructure. The support width must be at least 30 mm when installed, taking into account the tolerance and installation clearance (see Annex 2.7). The construction must be planned without constraints.

When planning the required grating surface, it must be taken into account that longitudinal cutting through a bar is not permitted.

18 See: www.dibt.de, section "Technical Building Regulations"

Tel.: 0 68 53 / 92 25 ... Marius Schütz ... Für die Gerichte ... allgemein beeidigte Übersetzerin ... und die saarl. Notare

If structural openings or recesses are required, it must be checked in each individual case whether circumferential support is required for structural reasons.

If the GRP gratings are likely to come into contact with chemical substances, their resistance to such chemicals must be checked.

3.2 Dimensioning

3.2.1 General information

The load-bearing floor coverings and the substructure must be dimensioned in compliance with the Technical Building Regulations[18], unless otherwise specified below.

3.2.2 Load-bearing capacity and fitness for purpose

3.2.2.1 Verification

In each application, the stability verification must be performed for the ultimate limit state (ULS) and the serviceability limit state (SLS).

The following values must be observed:

$\frac{E_d}{R_d} \leq 1{,}0$ (ULS) and $\frac{E_d}{C_d} \leq 1{,}0$ (SLS) with

E_d: Rated value of the action

R_d: Rated value of the component resistance for the verification in the ULS

C_d: Rated value of the component resistance for the verification in the SLS

The internal forces and deformations may be determined linearly and elastically according to first-order theory, e.g. using the finite element method. The effective loads (surface loads) as well as the snow and wind loads must be applied as for a closed surface.

The following values are to be used for the pull-in areas of vertical concentrated loads:

- 50 mm x 50 mm for effective loads in accordance with DIN EN 1991-1-1/NA[1], Table 6.1DE
- 200 mm x 200 mm for dead loads in accordance with DIN EN ISO 14122-2[2], Section 4.2.5

When performing the verification, the influencing factors A_1 (load duration) must be taken into account for the acting loads and the influencing factors A_2 (media influence) and A_3 (ambient temperature) for the component resistances.

For applications with at least 1 connecting point per 0.72 m² for a rated value of the action E_d = 3.72 KN/m², proof of the lifting wind loads is provided in the approval procedure.

The proof of stability of the load-bearing substructure is not the subject of this approval and must be provided for each individual case in accordance with the Technical Building Regulations[18].

3.2.2.2 Rated values of actions, E_d

The rated value of the action E_d results from the characteristic values of the actions E_k, taking into account the partial safety factors γ_F, the coefficients ψ and the influencing factors of the action duration A_1.

The characteristic values of the actions E_k, the partial safety factors γ_F and the coefficients ψ are to be taken from the Technical Building Regulations[18], whereby the values in Annexes 1.1 to 1.12 are to be used for the characteristic values of the dead load depending on the type of grating.

The influencing factors A_1^f related to the strength (fracture behaviour) and A_1^E modulus of elasticity (deformation) can be found in Table 1 below, taking into account the duration of action.

Table 1: Influencing factors of action duration

Duration of the load impact	$A_1^f = A_1^E = A_1$
very short	1.00
short one week	1.15
medium three months	1.35
long to continuous	1.50

The duration of action of the loads must be calculated as follows:

- dead load: continuous
- live loads:
  must be defined for the type of utilisation for each project: at least short
- snow loads: medium
- exceptional snow load in the northern German lowlands: short
- wind loads: very short

The actions E_k are to be increased by multiplication with the influencing factors A_1.

3.2.2.3 Rated values of the component resistances, R_d and C_d

The rated values of the component resistances R_d (ULS) and C_d (SLS) result from the characteristic values of the component resistances R_k and C_k, taking into account the material safety factors γ_{MR} and γ_{MC}, the influence factor for media influence A_2 and the influence factor for ambient temperature A_3 as follows:

$$R_d = \frac{R_k}{\gamma_{MR} \cdot A_2 \cdot A_3} \qquad C_d = \frac{C_k}{\gamma_{MC} \cdot A_2 \cdot A_3}$$

The characteristic values to be used for determining the rated values can be found in Tables 2 and 3 below.

Table 2: Strengths

Construction material properties		Characteristic values
Flexural strength $f_{b,k}$	- Bottom pull zone - Top pull zone	250 N/mm² 200 N/mm²
Shear strength (shear force) τ_k		20 N/mm²

Table 3: Modulus values and elongation limits

Construction material properties	Average values
Flexural modulus of elasticity E_m - all grating types except types GFK-K 530-40-5 and GFK-KS 950-38-9	14500 N/mm²
- grating types GFK-K 530-40-5 and GFK-KS 950-38-9	13500 N/mm²
	Rated value
Elongation limit, axial pull $\varepsilon_{C,d}$	0.65%

The following material safety factors are to be applied:

$\gamma_{MR} = 1.4$ and $\gamma_{MC} = 1.0$

Influencing factor for media influence to be applied:

$A_2 = 1.1$

It applies to all media with low influence, according to media list 40-2.1.1 of the "Media lists 40" published by DIBt, edition November 2022.

The influence factor for temperature influence is:

$$A_3 = 1{,}0 + \frac{0{,}4 \cdot (T_D - 20\ °C)}{HDT - 30\ °C} \geq 1.1$$

T_D: Design temperature in °C

HDT: 90 °C, heat deflection temperature

When verifying the limit elongation, see section 3.2.2.5, the influence factors A_2 and A_3 must be set to 1.0.

3.2.2.4 Proof of stability in the ULS

The following strength verifications must be performed:

- Verification of the bending stress

$$\left(\frac{\sigma_{E,d}}{\frac{f_{b,k}}{\gamma_{MR} \cdot A_2 \cdot A_3}} \right) \leq 1{,}0$$

- Proof of shear stress

$$\left(\frac{\tau_{E,d}}{\frac{\tau_k}{\gamma_{MR} \cdot A_2 \cdot A_3}} \right) \leq 1{,}0$$

3.2.2.5 Proof of stability in the SLS

The following verifications must be performed:

- Proof of deformation v (only for DIN EN ISO 14122-2²)

$$\left(\frac{v_{E,d}}{\frac{v_{C,k}}{\gamma_{MC} \cdot A_2 \cdot A_3}} \right) \leq 1{,}0$$

When calculating the deformation $v_{E,d}$, the bending stiffness is to be assumed to bet $E_m \cdot I$ with

E_m: Modulus of elasticity in accordance with Table 3

I: Moment of inertia

The maximum deformation for live loads in accordance with DIN EN ISO 14122-2[2], Section 4.2.5

$v_{C,k} \leq l/200$ with l = span of the GRP gratings and

$v_{C,k} \leq 4.0$ mm to neighbouring components

must be observed.

- Proof of limit elongation ε

$$\frac{\varepsilon_{E,d}}{\varepsilon_{C,d}} \leq 1{,}0$$

$\varepsilon_{C,d} = 0.65\%$ (see Table 3)

The rated value of the strain $\sigma_{E,d}$ resulting from the normal stress $\varepsilon_{E,d}$ must be determined as follows:

$$\varepsilon_{E,d} = \frac{\sigma_{E,d}}{E_m}$$

3.2.3 Reaction to fire

The load-bearing floor coverings are normally flammable.

3.3 Realisation

3.3.1 General information

The load-bearing floor coverings must be realised in compliance with the Technical Building Regulations[18], unless otherwise specified below.

The building contractor must submit a declaration of compliance in accordance with §§ 16a Para. 5 in conjunction with §§ 21 Para. 2 MBO to confirm the compliance of the type of construction with the General Type Approval. The sample in Annex 4 must be used for the declaration of compliance. This confirmation must be handed over to the building owner.

3.3.2 Laying and fixing the GRP gratings

The GRP gratings may only be laid and installed by companies with the necessary experience. Damaged GRP gratings (e.g. delamination or deformation) must not be installed.

The GRP gratings must be installed without restraint. Impact tools must not be used to adjust the construction.

Drilling holes in the bars of the GRP gratings is generally not permitted, with the exception of the holes for fastening a hinge (see Annex 2.7).

4 Provisions for use, maintenance and servicing

The GRP gratings must not come into contact with substances and materials that could damage the gratings. This must be assessed on a case-by-case basis. They may only be additionally treated with paints, coatings or similar in consultation with a recognised expert.

The GRP gratings may only be cleaned using water with additives that are harmless to the glass fibre reinforced unsaturated polyester resin material.

The GRP gratings must be regularly inspected by the client to check their external condition and fastening. If damage is detected, a recognised expert must be consulted in consultation with the applicant.

Renée Kamanzi-Fechner
Head of Division

Certified
Fischer

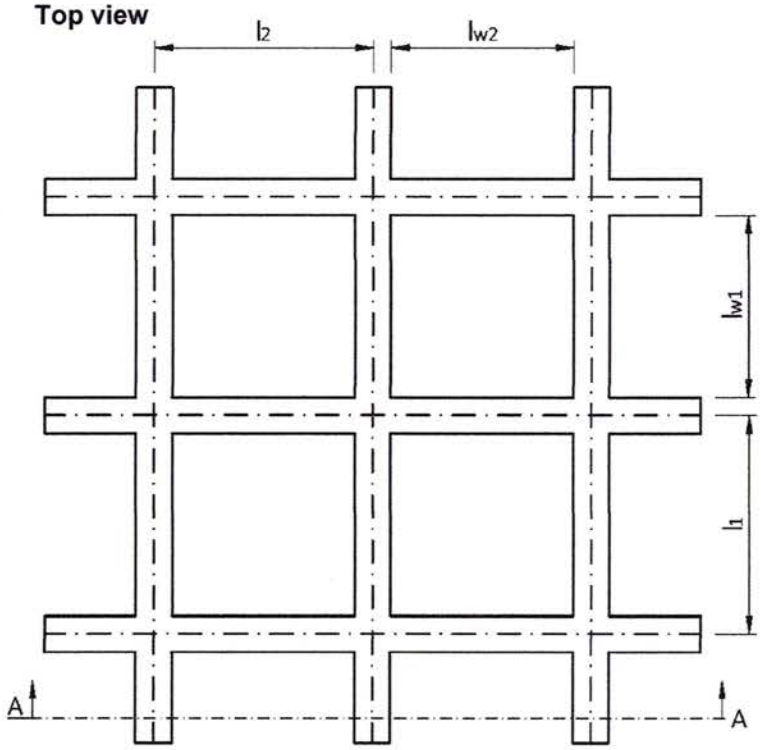
Translation of the German original which has not been verified by Deutsches Institut für Bautechnik.

In my capacity as a public translator for the English language, duly registered, commissioned and sworn by the President of the Landgericht (Regional Court) Saarbrücken, I hereby certify the foregoing to be a true and complete translation of the copy which has been submitted to me.
Marius Schütz, 66636 Tholey, 17 September 2024

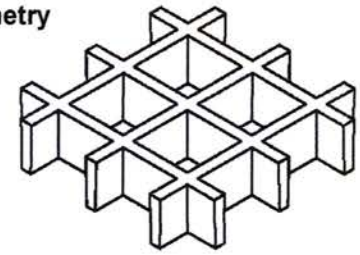
GFK-K 525-38-5

A section of the gratings is depicted.

Top view

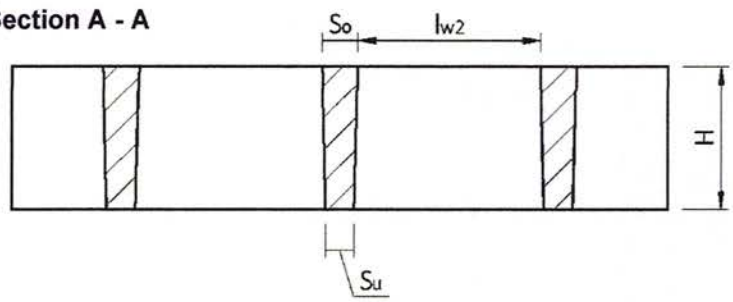


Isometry



Axial dimension: $l_1 = l_2 = 38.1$ mm
Clear width: $l_{w1} = l_{w2} = 31.85$ mm

Section A - A



Height: H = 25.0 mm

Concave or sanded bar surface

Upper bar width: $S_o = 6.25$ mm
Lower bar width: $S_u = 5.0$ mm

Surface weight of gratings: 12.04 kg/m² Dead load: 0.1204 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension plus the upper bar width.

Maximum length: $L_{max} = 107 \times 38.1$ mm + 6.25 mm = 4083 mm

Maximum width: $B_{max} = 44 \times 38.$ mm + 6.5 mm = 1683 mm

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings

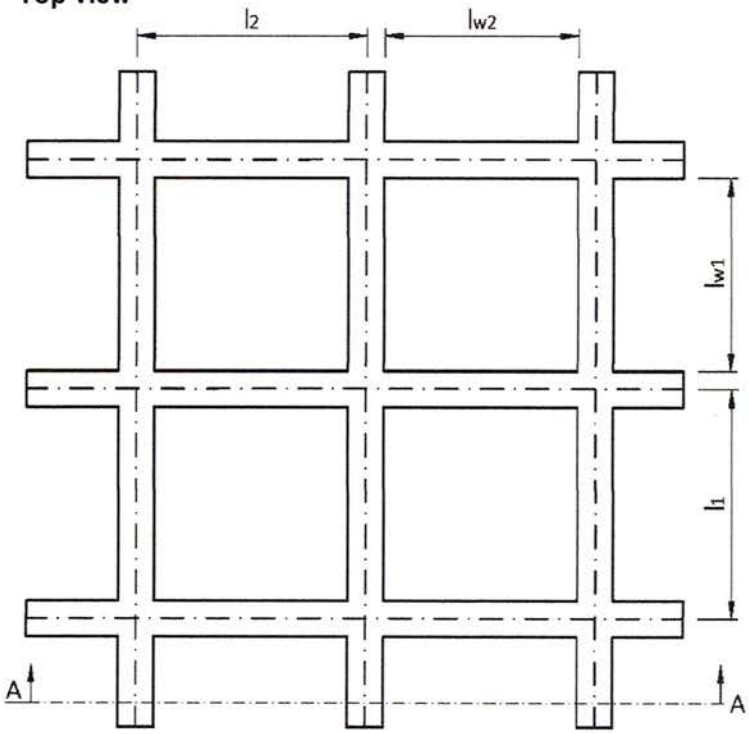
GRP grating "GFK-K 525-38-5"
Geometry, dimensions and weight

Annex 1.1

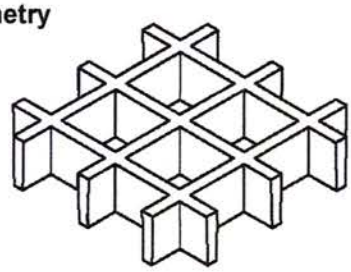
GFK-K 525-40-5

A section of the gratings is depicted.

Top view

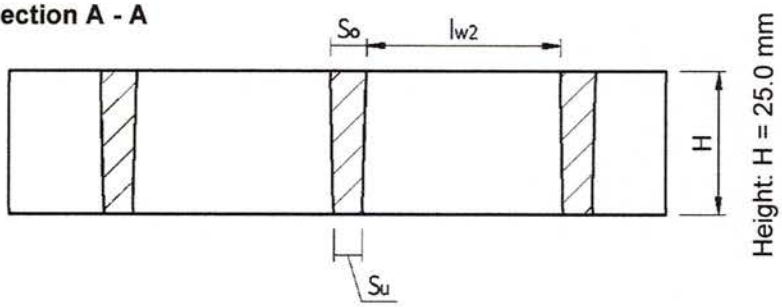


Isometry



Axial dimension: $l_1 = l_2 = 40.0$ mm
Clear width: $l_{w1} = l_{w2} = 33.75$ mm

Section A - A



Height: H = 25.0 mm

Concave or sanded bar surface

Upper bar width: $S_o = 6.25$ mm
Lower bar width: $S_u = 5.0$ mm

Surface weight of gratings: 11.59 kg/m² Dead load: 0.1159 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension plus the upper bar width.

Maximum length: $L_{max} = 102 \times 40.0$ mm + 6.25 mm = 4086 mm

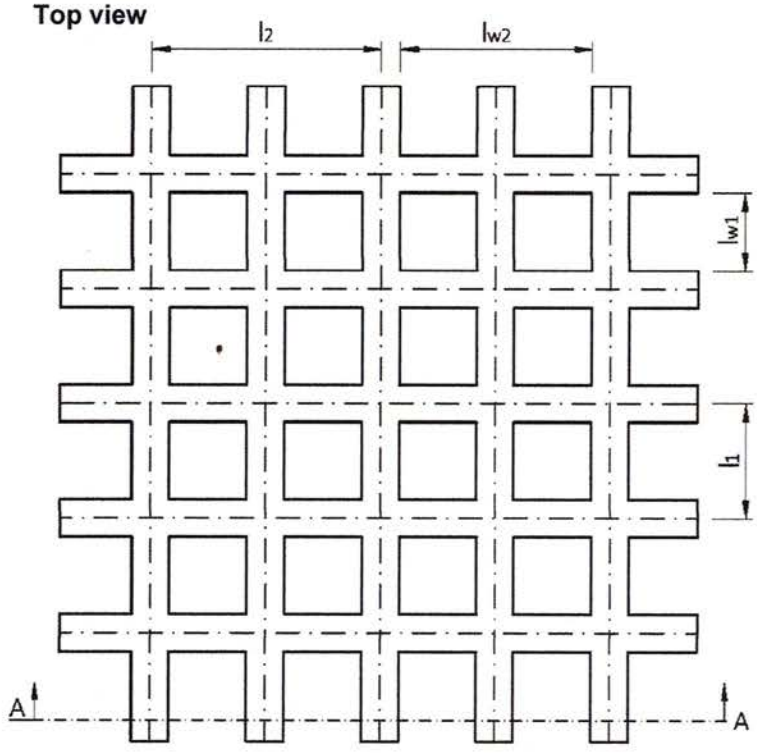
Maximum width: $B_{max} = 42 \times 40.$ mm + 6.5 mm = 1686 mm

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	
GRP grating "GFK-K 525-40-5" Geometry, dimensions and weight	Annex 1.2

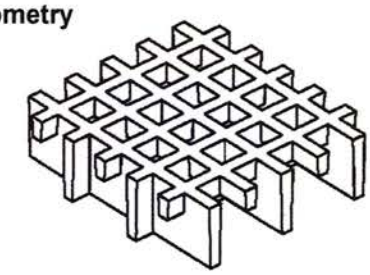
GFK-K 530-20-5

A section of the gratings is depicted.

Top view

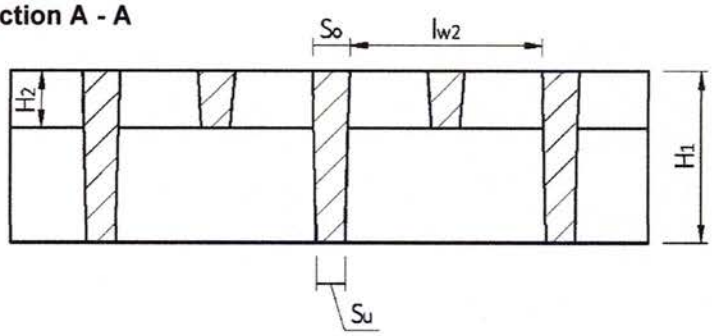


Isometry



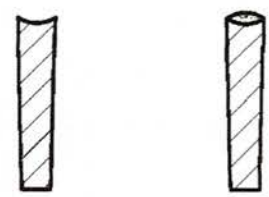
Axial dimension: l_1 = 20.0 mm
Axial dimension: l_2 = 40.0 mm
Clear width: l_{w1} = 13.5 mm
Clear width: l_{w2} = 33.5 mm

Section A - A



Concave or sanded bar surface

Height: H_1 = 30.0 mm
H_2 = 10.0 mm



Upper bar width: S_o = 6.5 mm
Lower bar width: S_u = 5.0 mm
The upper and lower bar width also applies for bars of height = H_2 = 10.0 mm

Surface weight of gratings: 17.43 kg/m² Dead load: 0.1743 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension l_2 plus the upper bar width.

Maximum length: L_{max} = 102 x 40.0 mm + 6.25 mm = 4086 mm
Maximum width: B_{max} = 42 x 40. mm + 6.5 mm = 1686 mm

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings

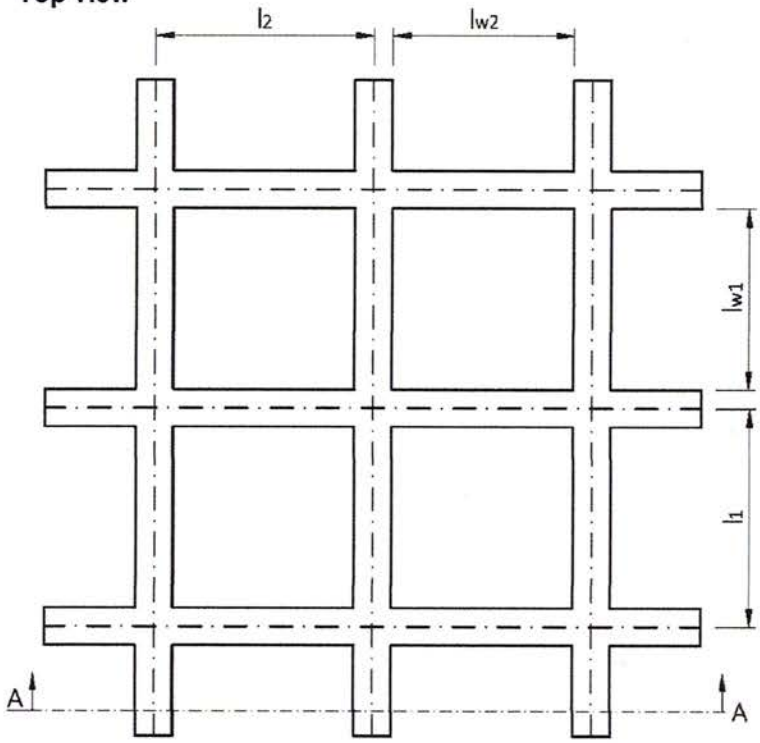
GRP grating "GFK-K 530-20-5"
Geometry, dimensions and weight

Annex 1.3

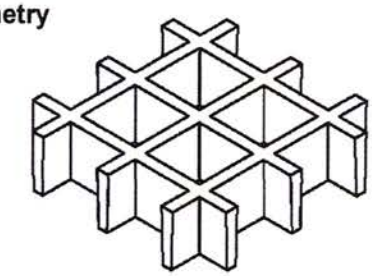
GFK-K 530-38-5

A section of the gratings is depicted.

Top view

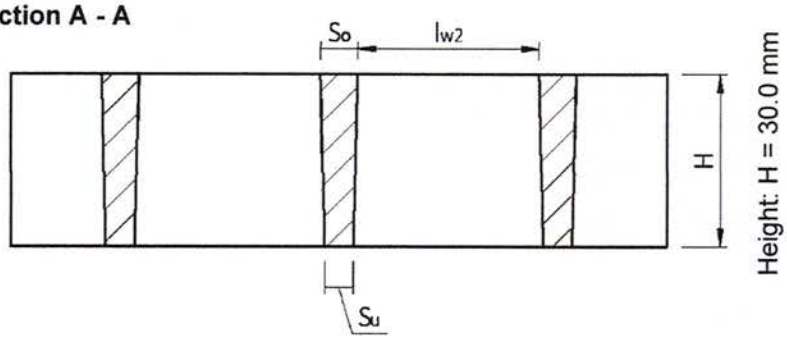


Isometry



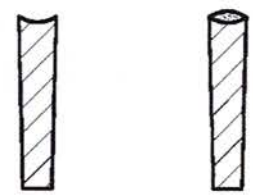
Axial dimension: $l_1 = l_2 = 38.1$ mm
Clear width: $l_{w1} = l_{w2} = 31.6$ mm

Section A - A



Height: H = 30.0 mm

Concave or sanded bar surface



Upper bar width: $S_o = 6.5$ mm
Lower bar width: $S_u = 5.0$ mm

Surface weight of gratings: 14.47 kg/m² Dead load: 0.1447 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension plus the upper bar width.

Maximum length: $L_{max} = 107 \times 38.1$ mm + 6.5 mm = 4083 mm

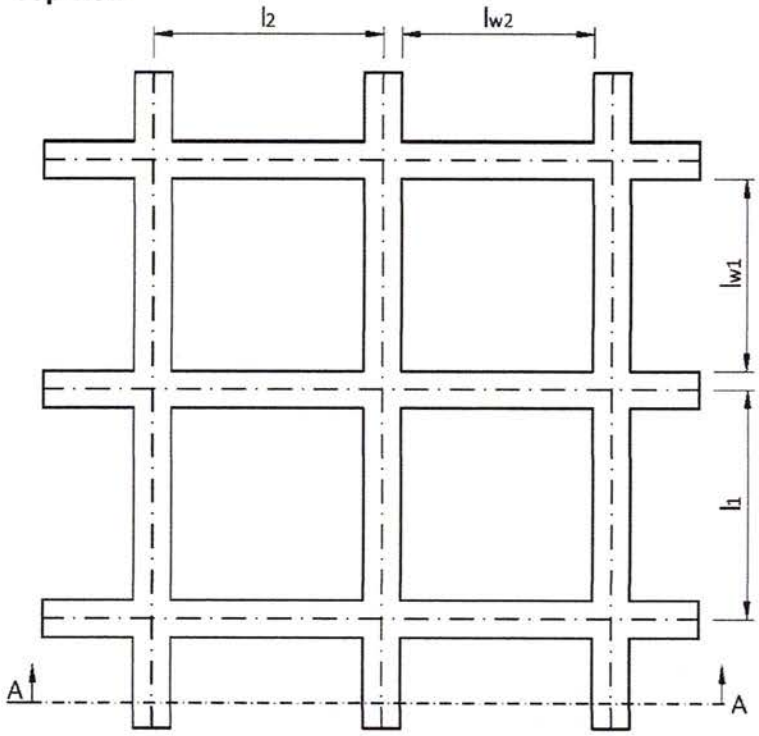
Maximum width: $B_{max} = 44 \times 38.1$ mm + 6.5 mm = 1683 mm

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	
GRP grating "GFK-K 530-38-5" Geometry, dimensions and weight	Annex 1.4

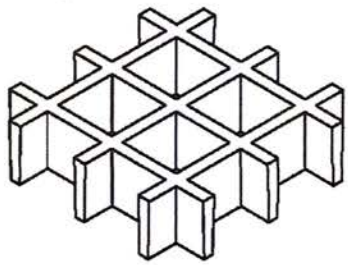
GFK-K 530-40-5

A section of the gratings is depicted.

Top view

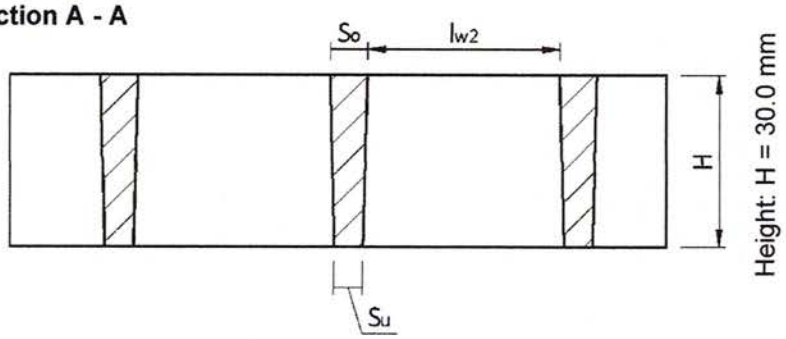


Isometry



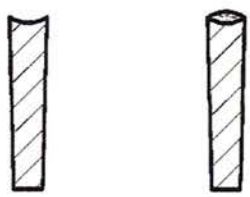
Axial dimension: $l_1 = l_2 = 40.0$ mm
Clear width: $l_{w1} = l_{w2} = 33.5$ mm

Section A - A



Height: H = 30.0 mm

Concave or sanded bar surface



Upper bar width: $S_o = 6.5$ mm
Lower bar width: $S_u = 5.0$ mm

Surface weight of gratings: 13.79 kg/m² Dead load: 0.1379 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension plus the upper bar width.

Maximum length: $L_{max} = 102 \times 40.0$ mm + 6.5 mm = 4086 mm

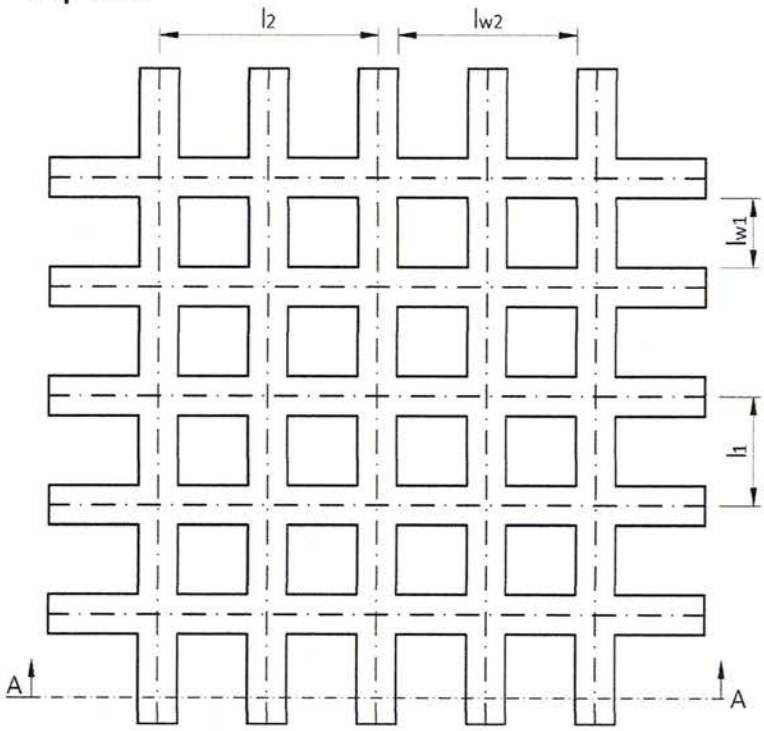
Maximum width: $B_{max} = 42 \times 40.0$ mm + 6.5 mm = 1686 mm

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	
GRP grating "GFK-K 530-40-5" Geometry, dimensions and weight	Annex 1.5

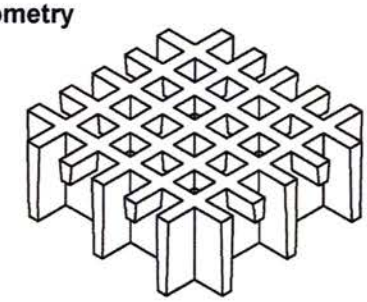
GFK-K 538-19-5

A section of the gratings is depicted.

Top view

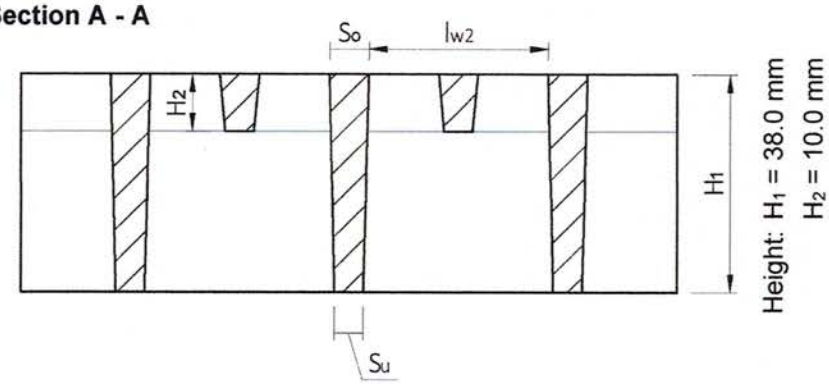


Isometry



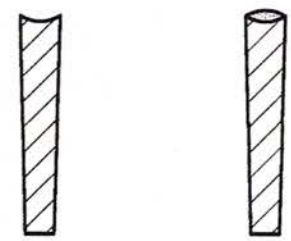
Axial dimension: l_1 = 19.1 mm
Axial dimension: l_2 = 38.1 mm
Clear width: l_{w1} = 12.2 mm
Clear width: l_{w2} = 31.2 mm

Section A - A



Height: H_1 = 38.0 mm
H_2 = 10.0 mm

Concave or sanded bar surface



Upper bar width: S_o = 6.9 mm
Lower bar width: S_u = 5.0 mm
The upper and lower bar width also applies for bars of height = H_2 = 10.0 mm

Surface weight of gratings: 23.16 kg/m² Dead load: 0.2316 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension l_2 plus the upper bar width.

Maximum length: L_{max} = 107 x 38.1 mm + 6.9 mm = 4084 mm

Maximum width: B_{max} = 44 x 38.1 mm + 6.9 mm = 1683 mm

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings

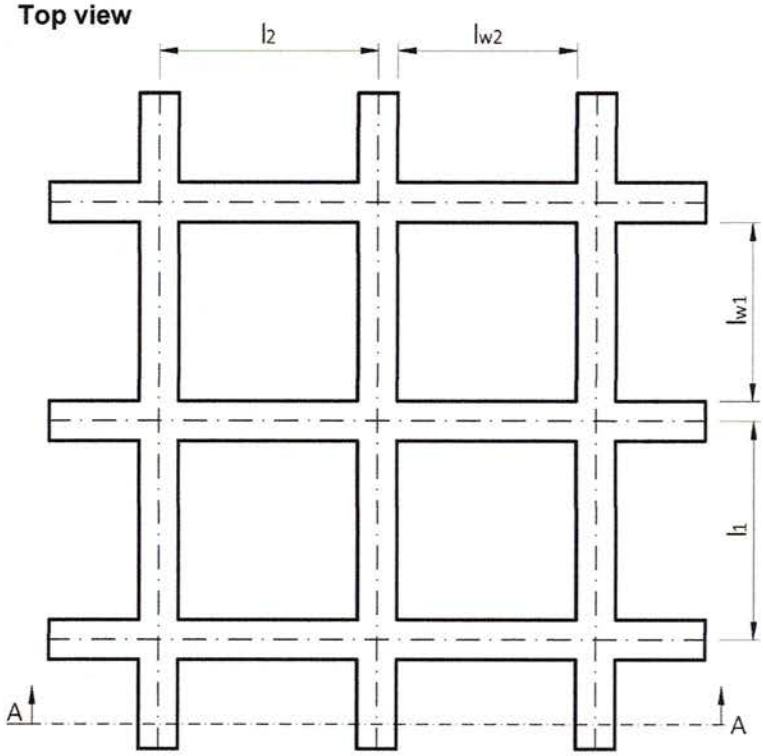
GRP grating "GFK-K 538-19-5"
Geometry, dimensions and weight

Annex 1.6

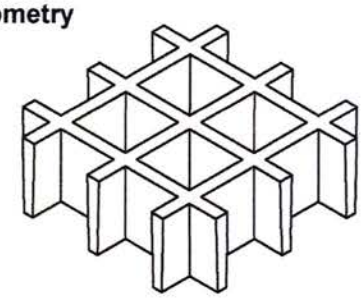
GFK-K 538-38-5

A section of the gratings is depicted.

Top view

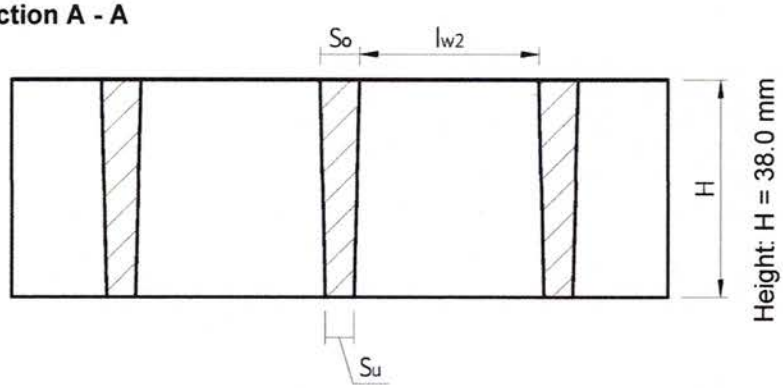


Isometry



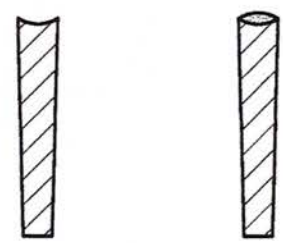
Axial dimension: $l_1 = l_2 = 38.1$ mm
Clear width: $l_{w1} = l_{w2} = 31.2$ mm

Section A - A



Height: H = 38.0 mm

Concave or sanded bar surface



Upper bar width: $S_o = 6.9$ mm
Lower bar width: $S_u = 5.0$ mm

Surface weight of gratings: 18.82 kg/m² Dead load: 0.1882 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension plus the upper bar width.

Maximum length: $L_{max} = 107 \times 38.1$ mm + 6.9 mm = 4084 mm

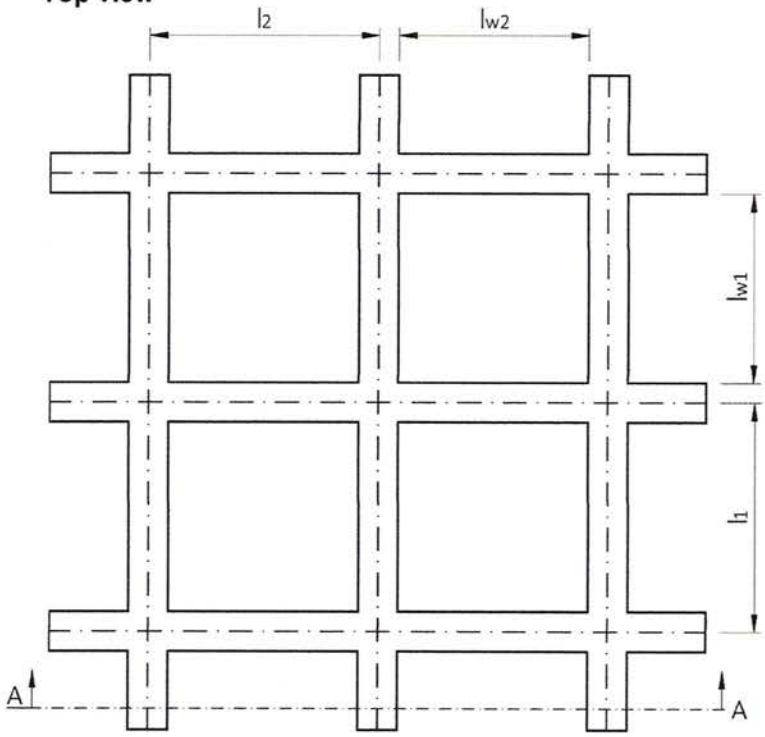
Maximum width: $B_{max} = 44 \times 38.1$ mm + 6.9 mm = 1683 mm

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	
GRP grating "GFK-K 538-38-5" Geometry, dimensions and weight	Annex 1.7

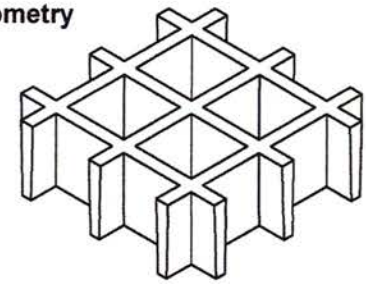
GFK-K 538-40-5

A section of the gratings is depicted.

Top view

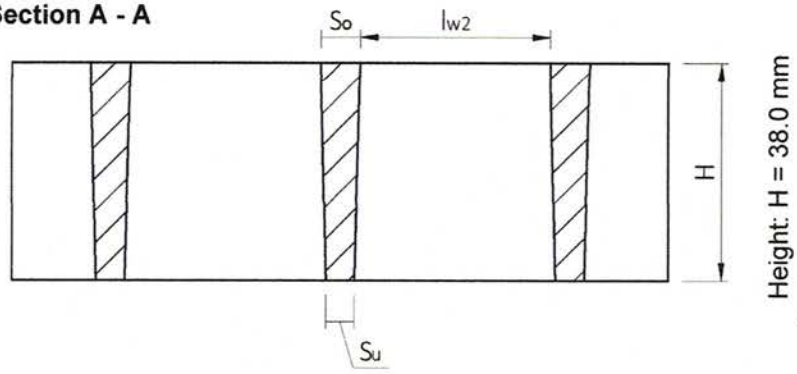


Isometry



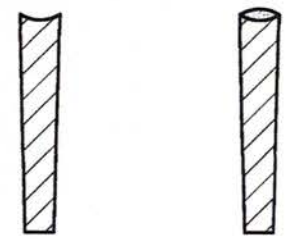
Axial dimension: $l_1 = l_2 = 40.0$ mm
Clear width: $l_{w1} = l_{w2} = 33.1$ mm

Section A - A



Height: H = 38.0 mm

Concave or sanded bar surface



Upper bar width: $S_o = 6.9$ mm
Lower bar width: $S_u = 5.0$ mm

Surface weight of gratings: 18.43 kg/m² Dead load: 0.1843 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension plus the upper bar width.

Maximum length: $L_{max} = 102 \times 40.0$ mm + 6.9 mm = 4087 mm

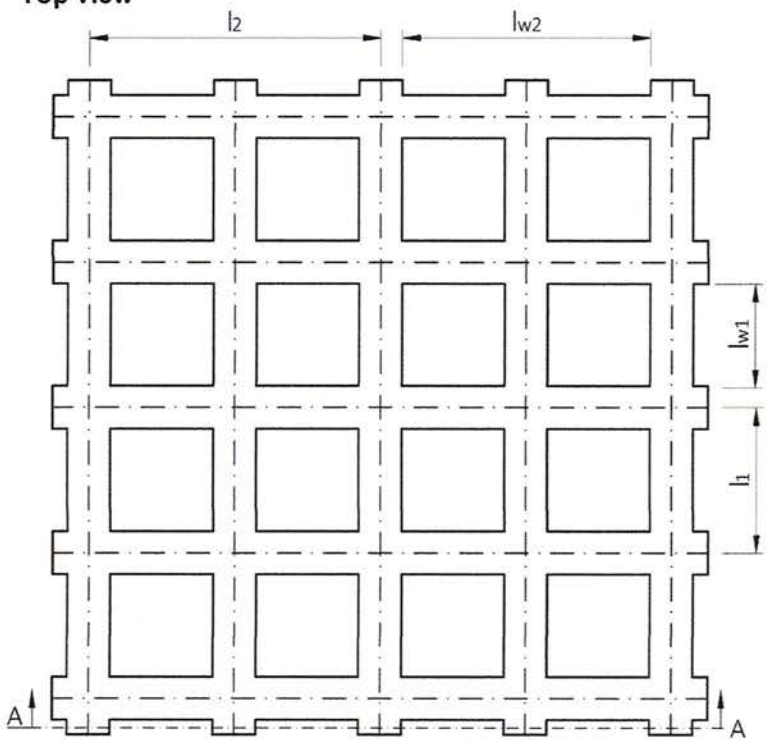
Maximum width: $B_{max} = 42 \times 40.0$ mm + 6.9 mm = 1687 mm

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	Annex 1.8
GRP grating "GFK-K 538-40-5" Geometry, dimensions and weight	

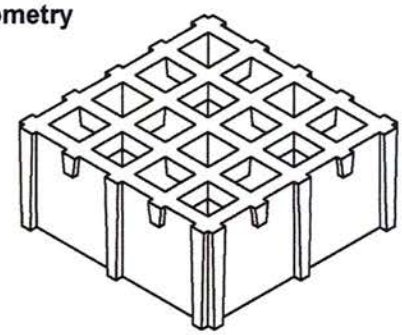
GFK-K 550-25-5

A section of the gratings is depicted.

Top view

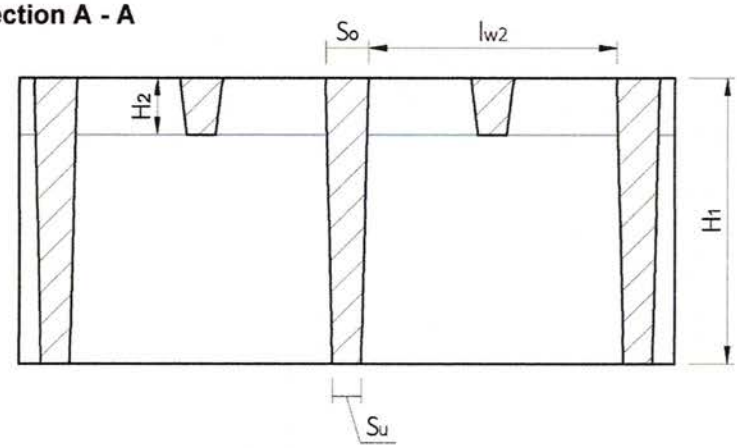


Isometry



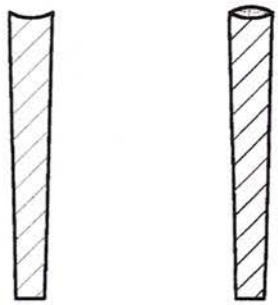
Axial dimension: l_1 = 25.4 mm
Axial dimension: l_2 = 50.8 mm
Clear width: l_{w1} = 17.9 mm
Clear width: l_{w2} = 43.3 mm

Section A - A



Concave or sanded bar surface

Height: H_1 = 50.0 mm
H_2 = 10.0 mm



Upper bar width: S_o = 7.5 mm
Lower bar width: S_u = 5.0 mm

The upper and lower bar width also applies for bars of height H_2 = 10.0 mm

Surface weight of gratings: 23.4 kg/m² Dead load: 0.234 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension l_2 plus the upper bar width.

Maximum length: L_{max} = 80 x 50.8 mm + 7.5 mm = 4071 mm

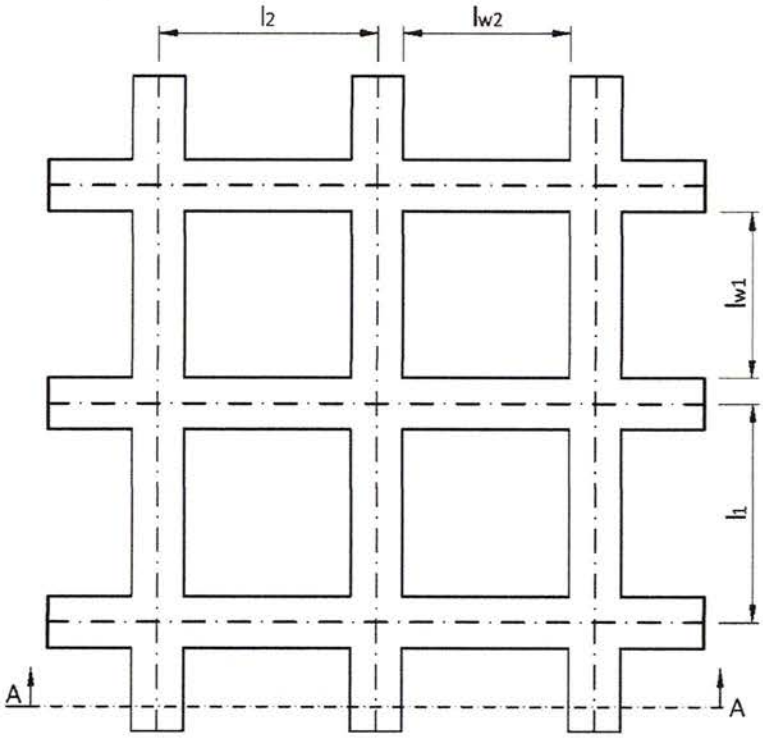
Maximum width: B_{max} = 33 x 50.8 mm + 7.5 mm = 1684 mm

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	
GRP grating "GFK-K 550-25-5" Geometry, dimensions and weight	Annex 1.9

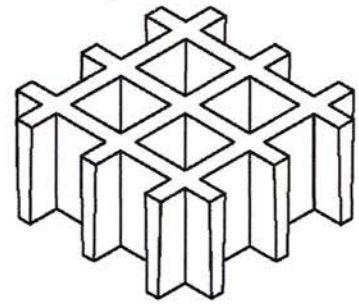
V

A section of the gratings is depicted.

Top view

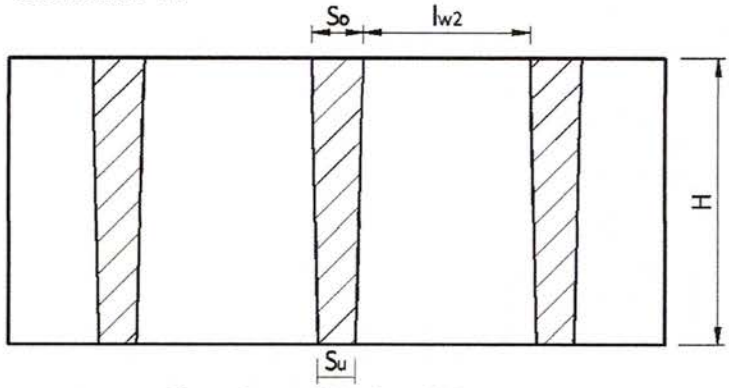


Isometry



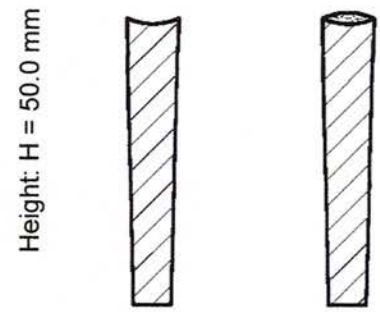
Axial dimension: $l_1 = l_2 = 38.1$ mm
Clear width: $l_{w1} = l_{w2} = 29.1$ mm

Section A - A



Upper bar width: $S_o = 9.0$ mm
Lower bar width: $S_u = 6.5$ mm

Concave or sanded bar surface



Surface weight of gratings: 31.5 kg/m² Dead load: 0.315 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension plus the upper bar width.

Maximum length: $L_{max} = 107 \times 38.1$ mm + 9.0 mm = 4086 mm

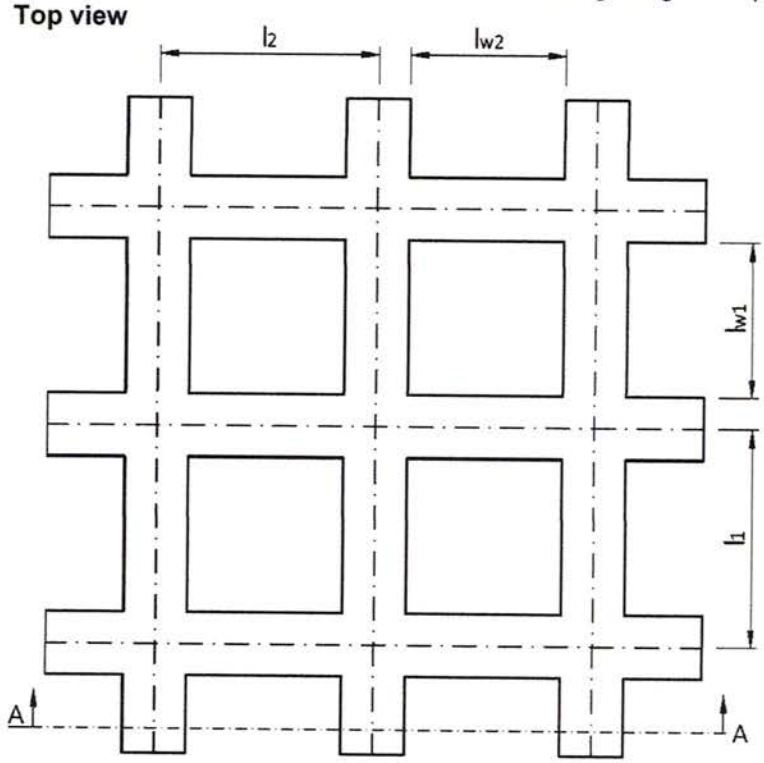
Maximum width: $B_{max} = 44 \times 38.1$ mm + 9.0 mm = 1685 mm

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	Annex 1.10
GRP grating "GFK-KS 750-38-7" Geometry, dimensions and weight	

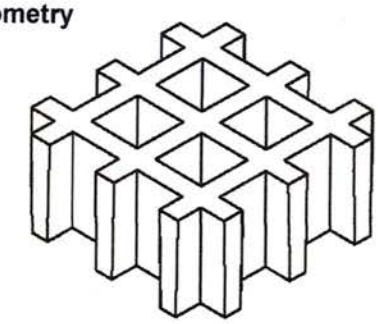
GFK-KS 950-38-9

A section of the gratings is depicted.

Top view

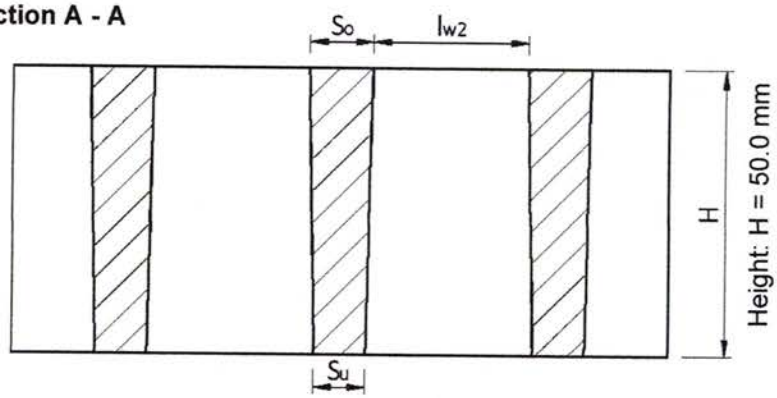


Isometry

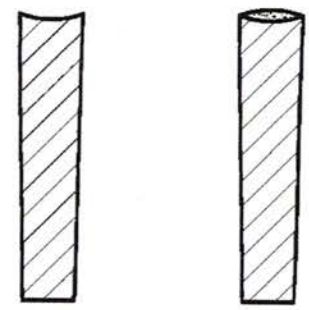


Axial dimension: $l_1 = l_2 = 38.1$ mm
Clear width: $l_{w1} = l_{w2} = 27.1$ mm

Section A - A



Concave or sanded bar surface



Upper bar width: $S_o = 11.0$ mm
Lower bar width: $S_u = 9.0$ mm

Surface weight of gratings: 40.0 kg/m² Dead load: 0.40 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension plus the upper bar width.

Maximum length: $L_{max} = 107 \times 38.1$ mm + 11.0 mm = 4088 mm

Maximum width: $B_{max} = 44 \times 38.1$ mm + 11.0 mm = 1687 mm

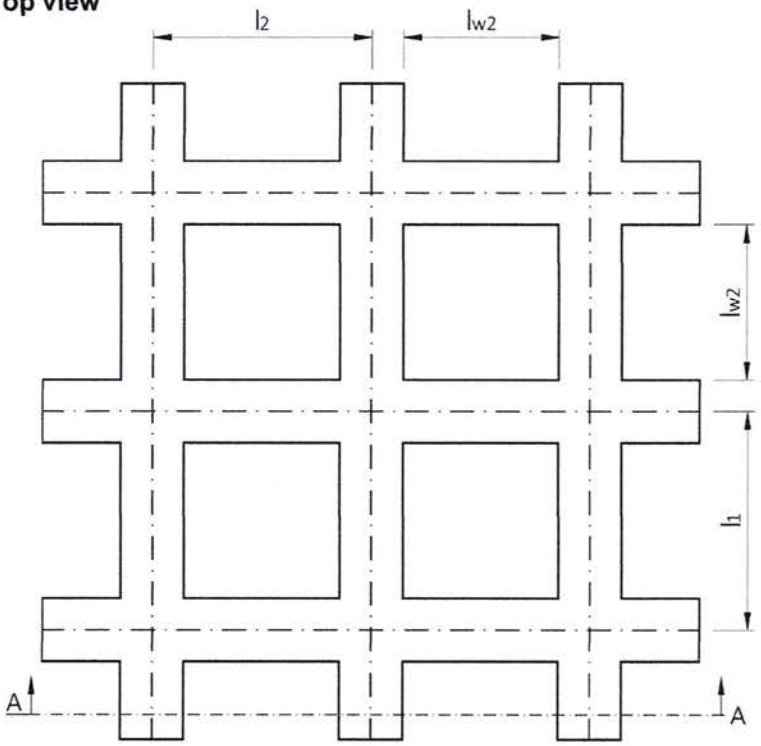
Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings

GRP grating "GFK-KS 950-38-9"
Geometry, dimensions and weight

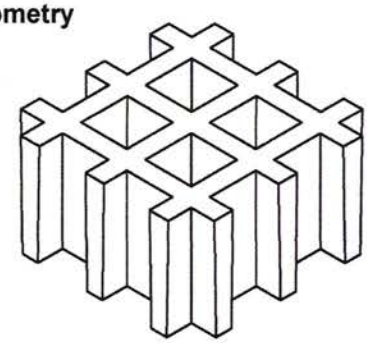
GFK-KS 960-38-9

A section of the gratings is depicted.

Top view

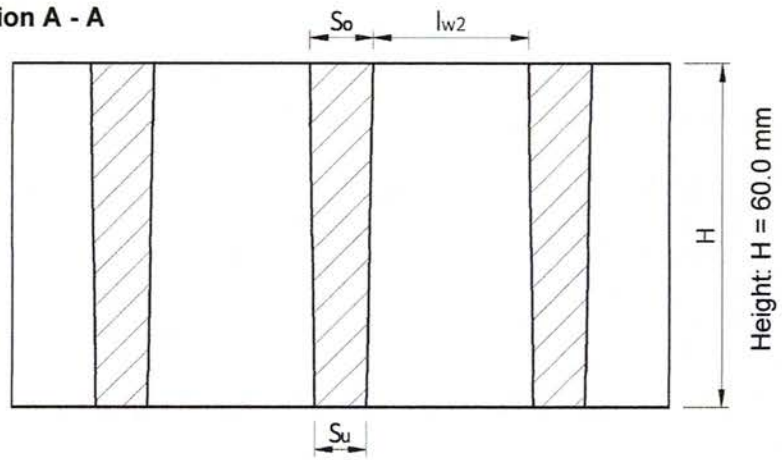


Isometry



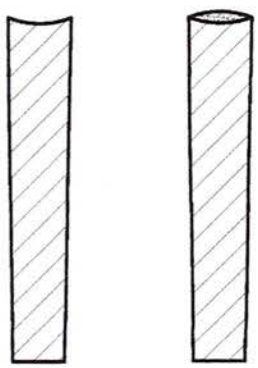
Axial dimension: $l_1 = l_2 = 38.1$ mm
Clear width: $l_{w1} = l_{w2} = 27.1$ mm

Section A - A



Height: H = 60.0 mm

Concave or sanded bar surface



Upper bar width: $S_o = 11.0$ mm
Lower bar width: $S_u = 9.0$ mm

Surface weight of gratings: 45.0 kg/m² Dead load: 0.45 kN/m²

The maximum grating length and width is calculated by multiplying the maximum number of meshes by the axial dimension plus the upper bar width.

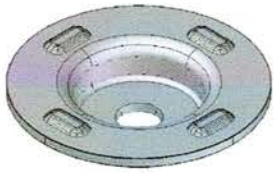
Maximum length: $L_{max} = 107 \times 38.1$ mm + 11.0 mm = 4088 mm

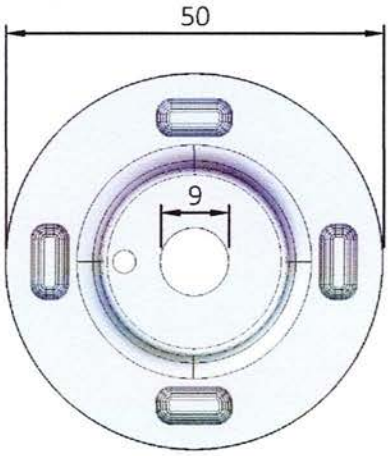
Maximum width: $B_{max} = 44 \times 38.1$ mm + 11.0 mm = 1687 mm

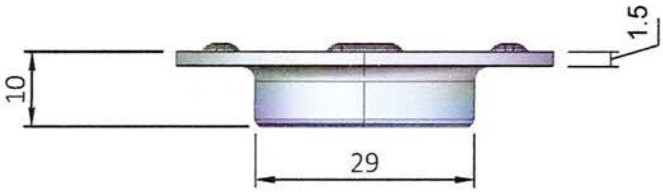
Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	
GRP grating "GFK-KS 960-38-9" Geometry, dimensions and weight	Annex 1.12

Certified translation from German to English

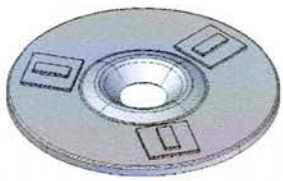
Upper plate part "XOT50"

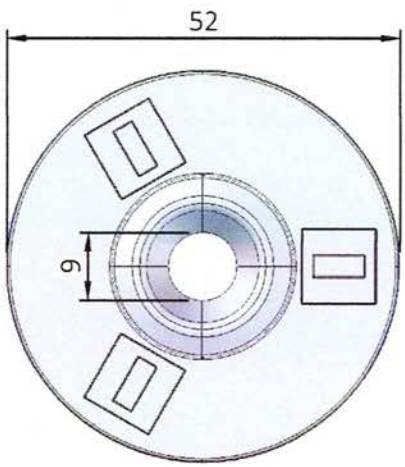






Upper plate part "XOT52"





Steel grade, see Section 2.1.2

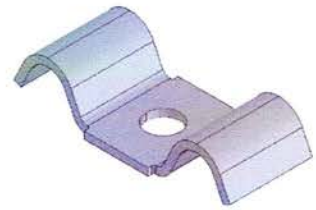
Dimensions in mm

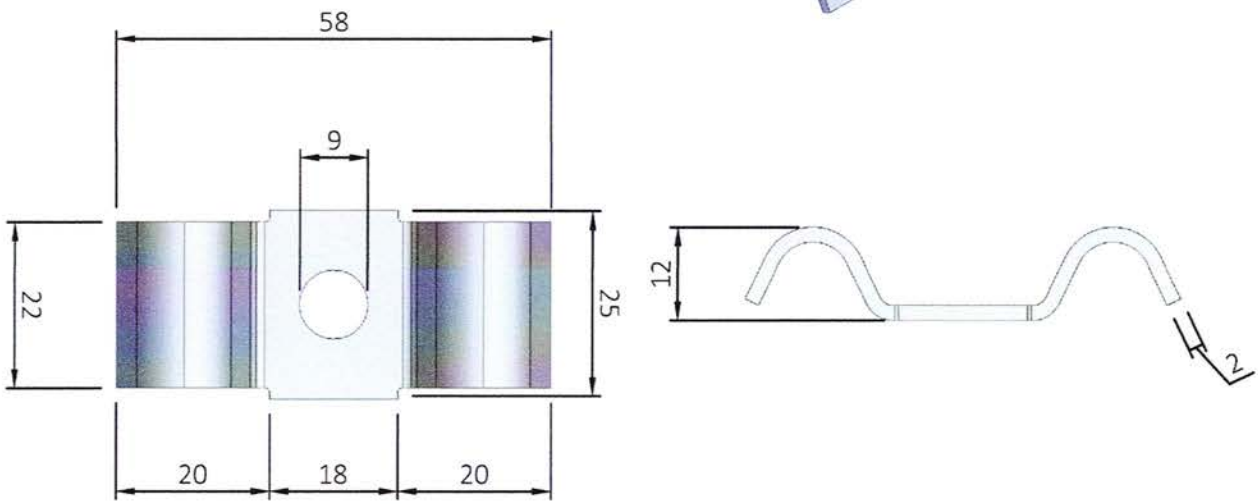
Für die Gerichte des Saarlandes und die saarl. Notare allgemein vereidigte Übersetzerin
Marius Schütz
* Tel.: 06 [illegible] *

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	Annex 2.1
Connecting elements Upper plate parts, geometry and dimensions	

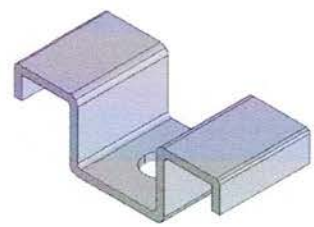
Certified translation from German to English

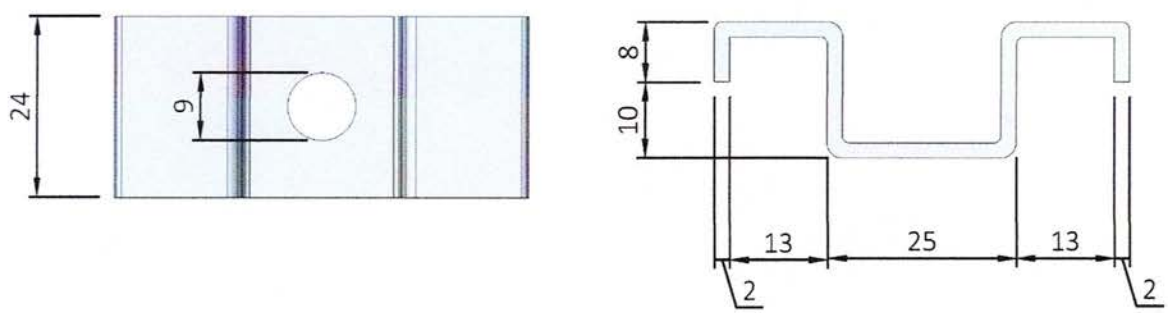
Upper clamp part "XOK13840"





Upper clamp part "XOM38"





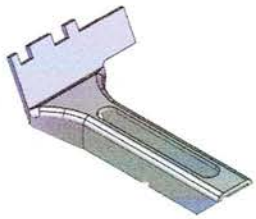
Steel grade, see Section 2.1.2

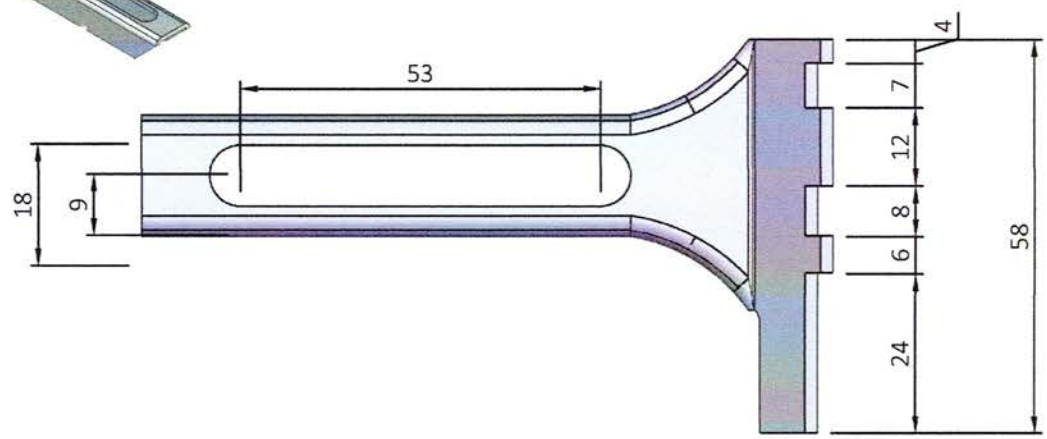
Dimensions in mm

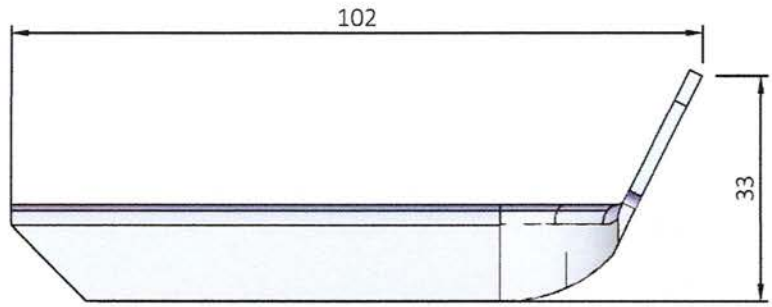
Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	
Connecting elements Upper clamp parts, geometry and dimensions	Annex 2.2

Certified translation from German to English

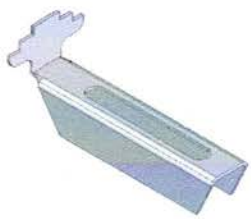
Lower part "XU117"

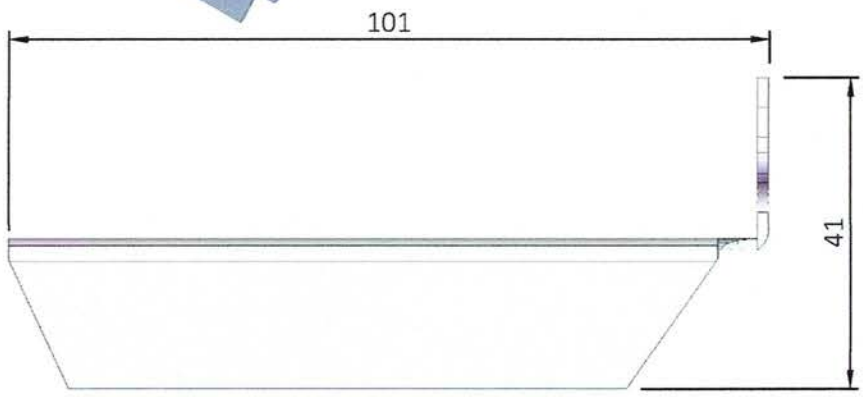


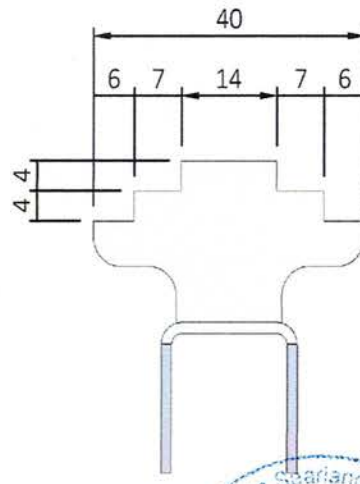




Lower part "XU13324"







Steel grade, see Section 2.1.2

Dimensions in mm

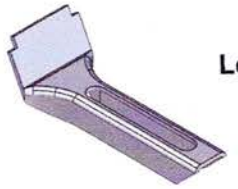
Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings

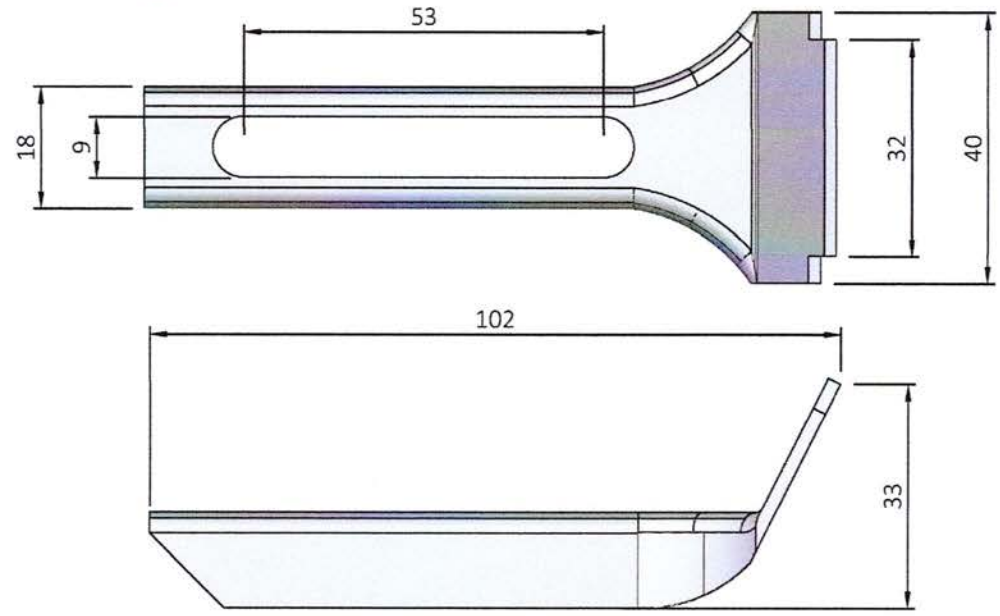
Connecting elements
Lower parts, geometry and dimensions

Annex 2.3

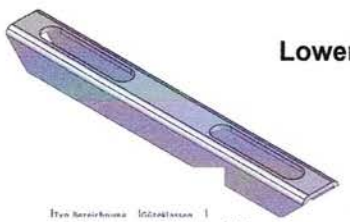
Certified translation from German to English

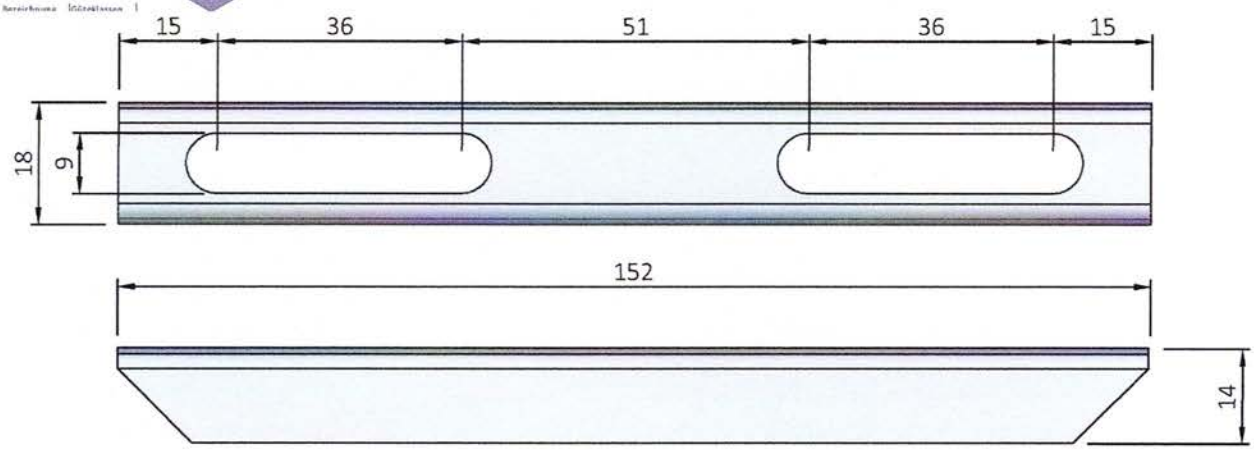
Lower part "XU13840"





Lower part "XU900"





Steel grade, see Section 2.1.2

Dimensions in mm

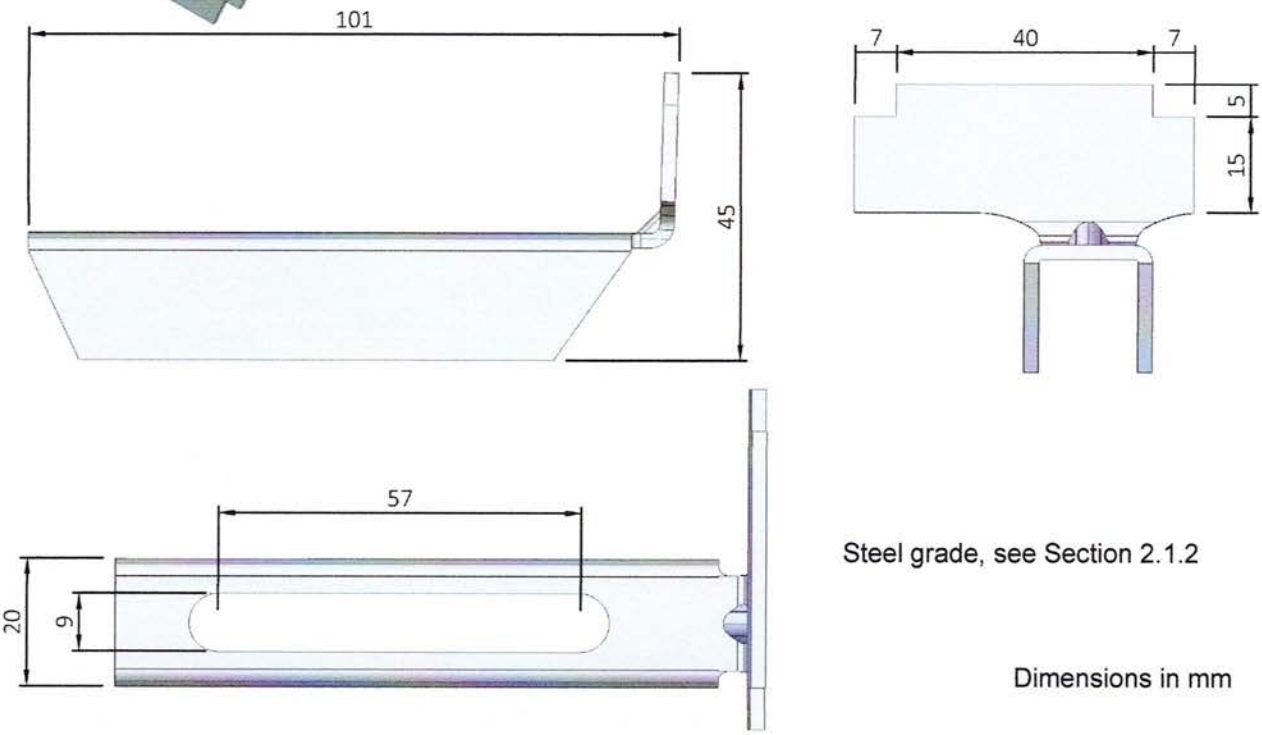
Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings

Connecting elements
Lower parts, geometry and dimensions

Annex 2.4

Certified translation from German to English

Lower part "XU15025"



Steel grade, see Section 2.1.2

Dimensions in mm

Assignment of the upper and lower parts in relation to the GRP grating types

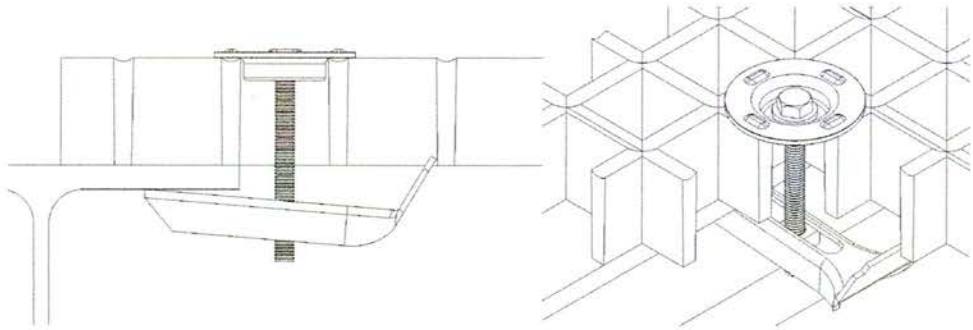
GRP grating	Upper plate parts		Upper clamp parts		Lower parts				
	XOT50	XOT52	XOK13840	XOM38	XU117	XU13324	XU13840	XU900	XU15025
K 525-38-5	X	X	X				X	X	
K 525-40-5	X	X	X				X	X	
K 530-20-5		X			X			X	
K 530-38-5	X	X	X				X	X	
K 530-40-5	X	X	X				X	X	
K 538-19-5		X			X			X	
K 538-38-5	X	X	X				X	X	
K 538-40-5	X	X	X				X	X	
K 550-25-5		X						X	X
KS 750-38-7		X		X		X		X	
KS 950-38-9		X		X		X		X	
KS 960-38-9		X		X		X		X	

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings

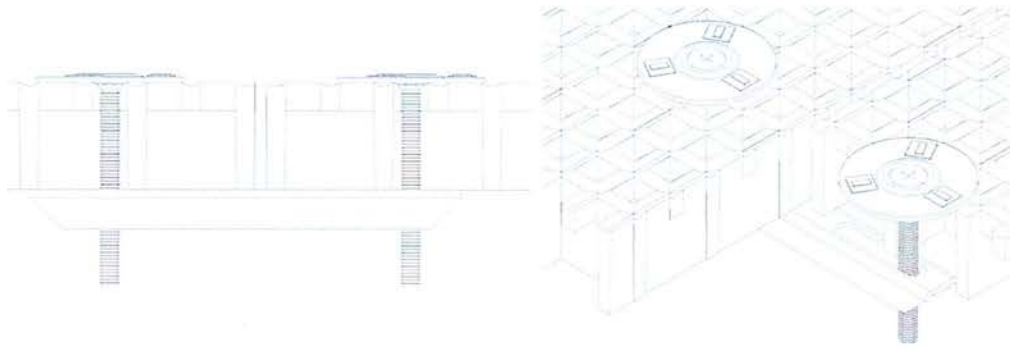
Connecting elements
Lower part, geometry and dimensions and assignment of the connecting elements in relation to the GRP grating types

Für die Richtigkeit der Übersetzung aus der deutschen in die englische Sprache
Saarlandes und die saarl. Notare
allgemein vereidigte Übersetzerin
Marius Schütz
Annex 2.5

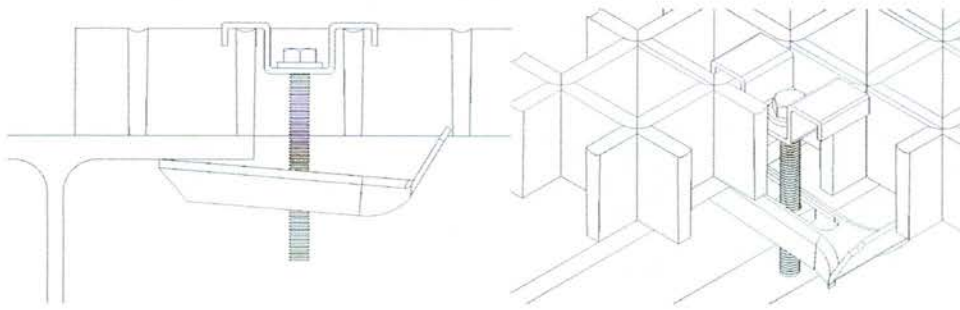
Fastening with upper plate part "XOT50", lower part, hexagon head screw and square nut



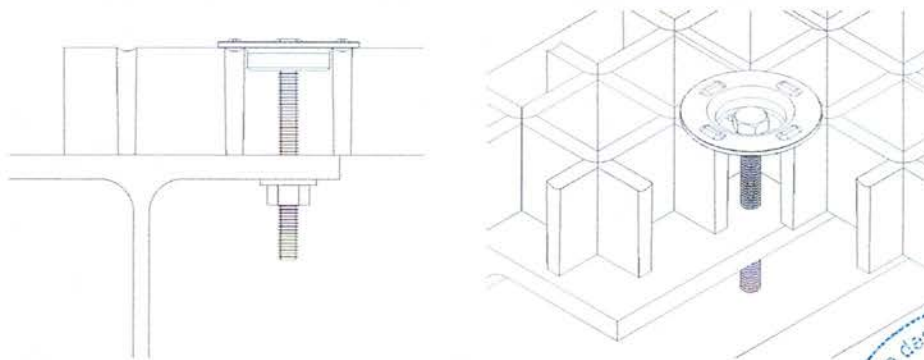
Fastening with upper plate part "XOT52", lower part "XU 900", countersunk screw and square nut



Fastening with upper clamp part "XOM38", lower part, hexagon head screw and square nut



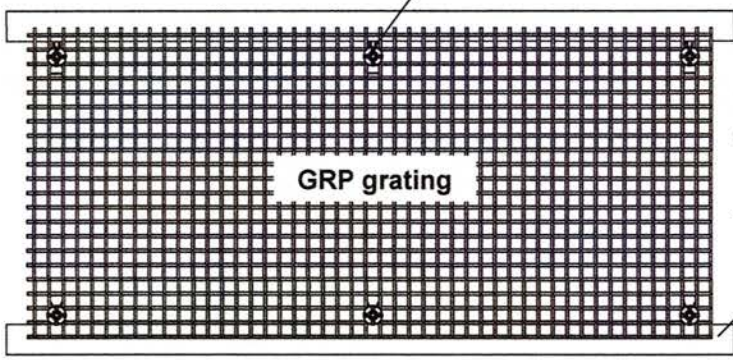
Fastening with upper plate part "XOT50", hexagon head screw and hexagon nut



Hexagon head screw, countersunk screw, hexagon head nut and square nut, see Section 2.1.2

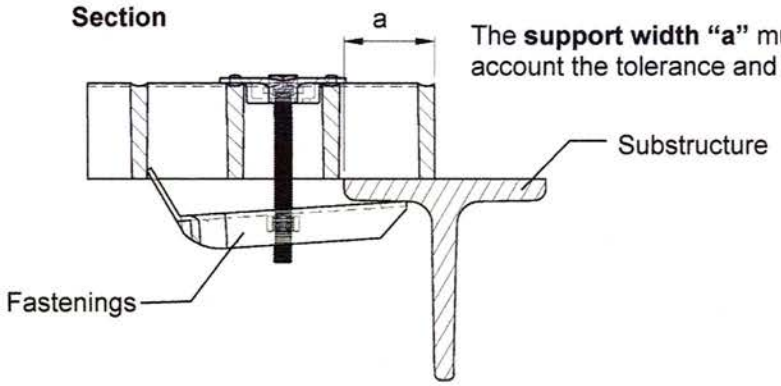
Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	
Fastening the GRP gratings to the substructure Fastening examples	Annex 2.6

Top view



Fastening the GRP gratings
- one fastening in at least each corner and
- at least one fastening per 0.72 m²

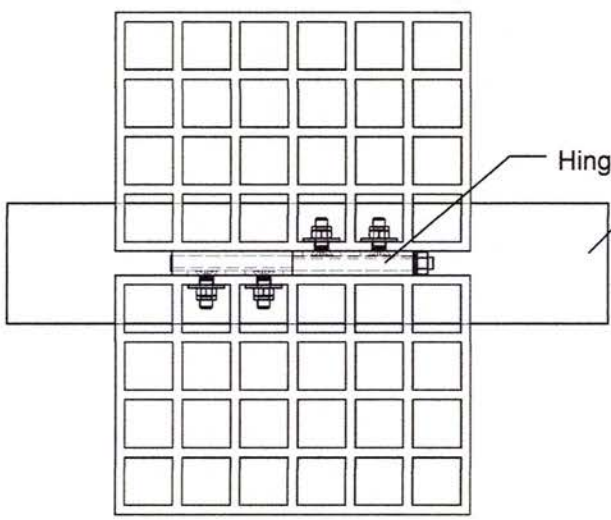
Section



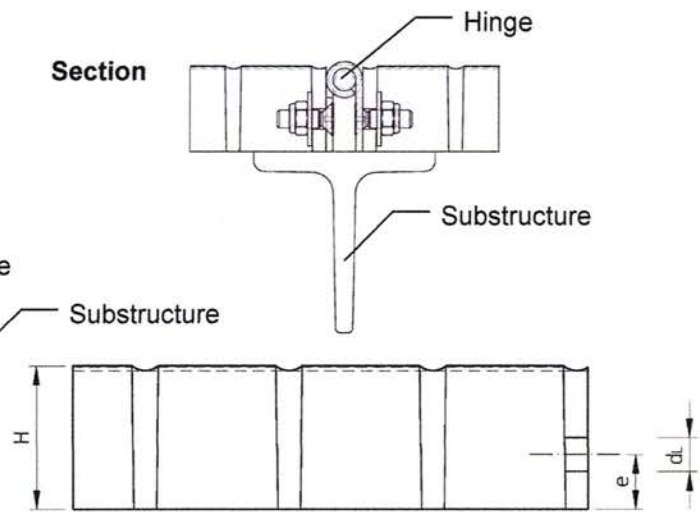
The **support width "a"** must be at least 30 mm, taking into account the tolerance and the installation clearance.

Fastening a hinge for a grating flap design

Top view



Section



Edge clearance: $e \geq 15$ mm
Hole diameter: $d_L \leq 9$ mm

The centre distance between the fastenings must correspond to the centre distance of the bars.

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings	Annex 2.7
Supporting and fastening the GRP gratings to the substructure Hinge fastening	

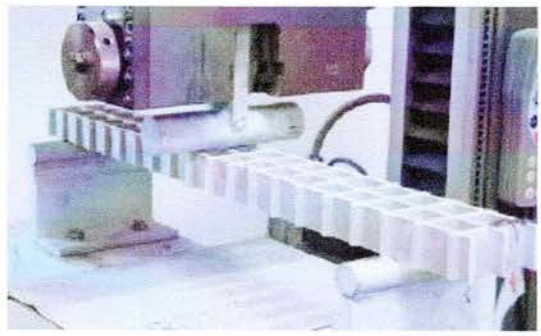
Certified translation from German to English

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings Annex 3.1

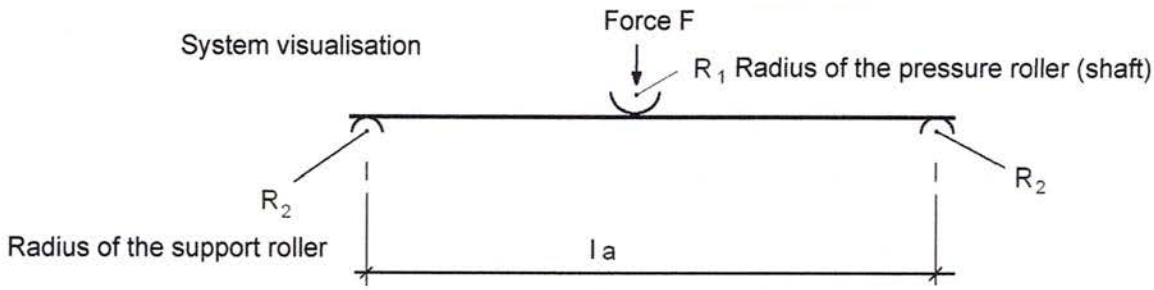
Determining the bending properties

Three-point bending test to determine the bending strength, the flexural modulus of elasticity and the creep tendency

The bending test must be carried out on grating sections on at least 3 test specimens in accordance with DIN EN ISO 14125.



System visualisation



Test conditions

Test climate:	normal climate 23/50, class 2 in accordance with DIN EN ISO 291
R_1 (pressure beam):	20 mm, the force F must be centred
R_2 (support):	10 mm
Support spacing:	la ≥ 16 x bar height (see Annex 1.1 to 1.12)
Specimen length:	l = la + 150 mm
Specimen width:	at least three bars of height H or height H_1 (see Annex 1.1 to 1.12)

The creep bending test to determine the flexural modulus of elasticity and the creep tendency must be carried out with a bending failure load of approx. 20% over 24 hours with a preload of 10% of the test load.

Test results to be complied with

Average value of the flexural strength $f_{b,m} \geq 280$ N/mm²

Minimum value of the bending strength $f_{b,min} = 250$ N/mm²

Short-term flexural modulus of elasticity (after application of the load, 6-minute value, mean value)

- all grating types except types GFK-K 530-40-5 and GFK-KS 950-38-9 $E_{0,b,m} \geq 14500$ N/mm²
- grating types GFK-K 530-40-5 and GFK-KS 950-38-9 $E_{0,b,m} \geq 13500$ N/mm²

$$kn = \frac{f_{24h} - f_{1h}}{f_{1h}} \cdot 100\%$$

Creep tendency ≤ 8% with f_{1h}: Deflection f after one hour and
f_{24h}: Deflection f after 24 hours

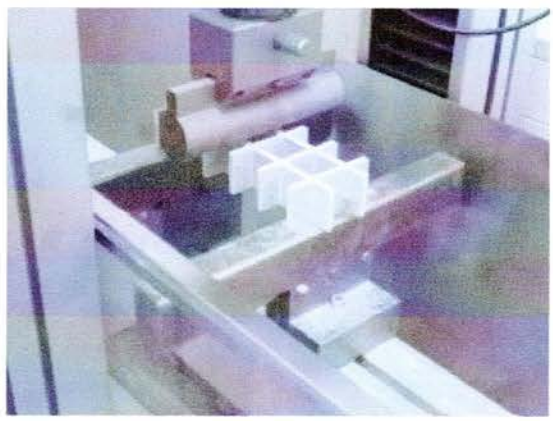
Certified translation from German to English

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings Annex 3.2

Determination of the shear strength

Three-point bending test to determine the shear strength

The bending test must be carried out on grating sections with a reduced span (short-beam test) on at least 3 test specimens in accordance with DIN EN ISO 14130.



Principle representation

The grating section must consist of at least three bars in the load-bearing direction.

Test conditions

Test climate:	normal climate 23/50, class 2 in accordance with DIN EN ISO 291
R_1 (pressure beam):	20 mm, the force F must be centred
Support spacing:	3 x bar height ≤ clear width ≤ 5 x bar height (see Annex 1.1 to 1.12)
Specimen length:	l = clear width + 150 mm
Specimen width:	at least three bars of height H or height H_1 (see Annex 1.1 to 1.12)

Test results to be complied with

Average value of the shear strength	$\tau_m \geq 25$ N/mm²
Minimum value of the shear strength	$\tau_{min} = 20$ N/mm²

Certified translation from German to English

Gratings made of glass fibre reinforced plastic including the connecting elements for load-bearing floor coverings **Annex 4**

Declaration of compliance on the professional installation of GRP gratings

This declaration must be completed by the specialist personnel of the company carrying out the work after completion of the load-bearing floor covering and handed over to the client (building owner).

Postal address or installation site

Street address or site no.: _____ Postal code, town:_____

Description of the load-bearing floor covering

Number of General Building Inspectorate Approval / General Type Approval **Z-10.9-622**

Description of the static systems of GRP gratings and their fastening:

GRP gratings:

☐	GFK-K 525-38-5	☐	GFK-K 525-40-5
☐	GFK-K 530-20-5	☐	GFK-K 530-38-5
☐	GFK-K 530-40-5	☐	GFK-K 538-19-5
☐	GFK-K 538-38-5	☐	GFK-K 538-40-5
☐	GFK-K 550-25-5	☐	GFK-KS 750-38-7
☐	GFK-KS 950-38-9	☐	GFK-KS 960-38-9

Maximum individual load:

Maximum surface load:

Postal address of executing company

Company: _____ Street address: _____

Postal code, town: _____ State: _____

We hereby declare that we have installed the load-bearing floor covering in accordance with the regulations of the General Building Inspectorate Approval / General Type Approval No. Z-10.9-622, the specifications of the planner, and the manufacturer's installation instructions.

Für die Gerichte des Saarlandes und die saarl. Notare
allg. beeidigte vereidigte Übersetzerin
Marius Schütz
* Tel.: 0 68 [illegible] *

Certified translation from German to English

....
(Date) (Name and signature of person responsible at executing company)

Translation of the German original which has not been verified by Deutsches Institut für Bautechnik.

In my capacity as a public translator for the English language, duly registered, commissioned and sworn by the President of the Landgericht (Regional Court) Saarbrücken, I hereby certify the foregoing to be a true and complete translation of the copy which has been submitted to me.
Marius Schütz, 66636 Tholey, 17 September 2024