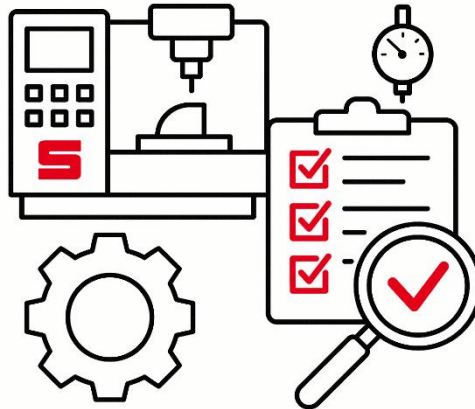


Supfina Qualitätsrichtlinie QR002

(General tolerances in technical drawings for suppliers of Supfina Grieshaber GmbH & Co. KG)

Version: 6.0



The contents of the factory standard (Supfina Qualitätsrichtlinie QR002) apply when it is referenced in the drawing header as shown in Figure 1 - drawing header of the Supfina Grieshaber GmbH & Co. KG.

3D data file do not scale or change manually!		Maße, Form- und Lagetoleranzen, Werkstuekkanten, Oberflächenangaben sowie Allgemeintoleranzen nach Supfina Werksnorm: QR002 ! Dimensions, shape and position tolerances, workpiece edges, surface specifications and general tolerances according to: Supfina works standard: QR002 !		ISO 5456-2 Projektionsmethode 1 Projection method 1 	Entstanden aus / Developed from
Werkstoff - Werkstoff Nr. / Material - Material no.				Masse / Weight (kg)	Bezugs-Nr. / Reference No.
Zeichnungsart / Drawing type					Massstab / Scale
Verantw. Abt. / Resp. Dept. - Tech. Referenz / Tech. reference		Erstellt durch / Created by		Genehmigt von / Approved by	
				Blattgr. / Sheet Size: A4 Bem. Einh. / Dim. unit: MM	
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	Name , Beschreibung / Description			Zeichnungsnummer / Draft No.	
	Vers			Ausgabedatum / Date of issue	Spr. / Lang. Blatt/Sheet
				de / en	1-1

Figure 1 - drawing header

ATTENTION:

In the context of the factory standard (Supfina Qualitätsrichtlinie QR002), the **envelope principle** applies!

Any deviations from the Supfina factory standard (Supfina Qualitätsrichtlinie QR002) must be agreed with Supfina in advance and set out in writing!

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1 Purpose and scope

This Supfina factory standard (Supfina Qualitätsrichtlinie QR002) shall only apply to technical drawings prepared by the Supfina Grieshaber GmbH & Co. KG. When invoked, it takes precedence over all DIN, EN and ISO standards in the document header, even if the use of symbols might suggest otherwise. Any withdrawn or invalid standards referred to in this work remain valid for the purposes of this document. The factory standard specifies the tolerances that apply when dimensions are not accompanied by tolerance specifications. If customer drawings are provided, the details given in them shall apply. Deviating tolerances can be agreed separately.

This policy applies to all products, services, materials and components that the supplier provides to the client as part of their business relationship. The scope includes, in particular – though not exclusively – compliance with technical specifications, drawings and applicable standards.

2 Standard references in the factory standard

The following documents (standards) cited below are mandatory for the application of this document, as at the date of issue:

DIN 30630:2008-3	Technical drawings - General tolerances in mechanical engineering – tolerance rules and overview
DIN ISO 2768 - 1:1991	General tolerances - Tolerances for lengths and angles without individual specific entries
DIN ISO 2768 - 2:1991	General tolerances - Tolerances for form and position
DIN EN ISO 1101:2017-09	Geometrical product specifications
DIN EN ISO 13920:1996	General tolerances for welded structures
DIN EN ISO 9013-1:2017	Thermal cutting – Classification of thermal stages – Geometric product specification and quality
DIN ISO 13715:2020-01	Workpiece edges of indeterminate shape
DIN 2413:2020-04	General pipes in pipeline construction
DIN EN 10253-2:2008-09	Formed parts for welding

Table 1 - Standard reference

3 General note

Supfina drawings always show finished dimensions, unless otherwise stated explicitly on the drawing!

Tolerances are not modeled in CAD models!

e.g.: Length 50mm -0.1/-0.3 → model is modeled 50.0 mm long.

4 Tolerance rule according to DIN 30630:2008-03

In the case of a dimension for which no specific tolerance is specified, and to which more than one standard for general tolerances applies, the larger of the relevant general tolerances shall apply.

5 General tolerance according to ISO 2768:1991

For all drawings, the general tolerance shall apply according to **DIN ISO 2768 – mK**

5.1 General tolerances for lengths and angles according to DIN ISO 2768-1:1991

Nominal size range [mm]							
of 0.5*) up to 3	over 3 up to 6	over 6 up to 30	over 30 up to 120	over 120 up to 400	over 400 up to 1000	over 1000 up to 2000	over 2000 up to 4000
Limit deviations for linear dimensions [mm] tolerance class m (medium)							
± 0.1	± 0.1	± 0.2	± 0.3	± 0.5	± 0.8	± 1.2	± 2

Table 2 - General tolerances for lengths and angles

*) For nominal sizes below 0.5 mm, the limit deviations shall be indicated adjacent to the relevant nominal size.

5.2 Limit deviations for radius of curvature and chamfer heights in accordance with DIN ISO 2768-1:1991

Nominal size range [mm]		
of 0.5*) up to 3	over 3 up to 6	over 6
Limit deviations [mm] tolerance class m (medium)		
± 0.2	± 0.5	± 1

Table 3 - Limit deviations for radius of curvature and chamfer heights

*) For nominal sizes below 0.5 mm, the limit deviations shall be indicated adjacent to the relevant nominal size.

5.3 Limit deviations for angles according to DIN ISO 2768-1:1991

Nominal size range [degree and minutes]				
up to 10	over 10 up to 30	over 30 up to 100	over 100 up to 300	over 1000 up to 3000
Tolerance [mm] tolerance class K				
$\pm 1^\circ$	$\pm 0^\circ 30'$	$\pm 0^\circ 20'$	$\pm 0^\circ 10'$	$\pm 0^\circ 5'$

Table 4 - Limit deviations for angles

The shorter side of the angle should be used to select the value from the table.

5.4 General tolerances for straightness and flatness according to DIN ISO 2768-2:1991

Nominal size range [mm]					
up to 10	over 10 up to 30	over 30 up to 100	over 100 up to 300	over 300 up to 1000	over 1000 up to 3000
Tolerance [mm] tolerance class K					
0.05	0.1	0.2	0.4	0.6	0.8

Table 5 - General tolerances for straightness & flatness

When selecting a value from the table, the length of the relevant line applies. For flatness tolerances, it is the greater of the side length of the surface or the diameter of the circular surface that applies.

5.5 General tolerances for perpendicularity according to DIN ISO 2768-2:1991

Perpendicularity tolerances for nominal size ranges for the shorter angle side [mm]		
over 100 up to 300	over 300 up to 1000	over 1000 up to 3000
Tolerance [mm] tolerance class K		
0.6	0.8	1

Table 6 - General tolerances for perpendicularity

The longer side, which forms a right angle, serves as a reference point. If the geometric elements have the same nominal dimension, any one of them may be taken as the reference element.

5.6 General tolerances for symmetry according to DIN ISO 2768-2:1991

Nominal size range [mm]			
up to 100	over 100 up to 300	over 300 up to 1000	over 1000 up to 3000
Tolerance [mm] tolerance class K			
0.6		0.8	1

Table 7 - General tolerances for symmetry

The general tolerances for symmetry apply if at least one of the two geometric elements has a centre plane, or if the axes of the two geometric elements are at right angles to one another. The longer of the two geometric elements is used as the reference element.

5.7 The general tolerances for runout and coaxiality of bores and shafts, in relation to their internal or external diameters according to ISO 2768-2:1991

Nominal size range [mm]					
up to 10	over 10 up to 30	over 30 up to 100	over 100 up to 300	over 300 up to 1000	over 1000 up to 3000
Tolerance [mm] tolerance class m					
0.1	0.2	0.3	0.4	0.6	0.8

Table 8 – General tolerances for runout & coaxiality

In the case of general tolerances for runout, the bearing seats are taken as the reference elements, provided they are marked as such. The longer of the two geometric elements is otherwise used for runout. If the two geometric elements have the same nominal dimension, any one of them may be taken as the reference element.

6 General tolerances for welded structures according to DIN ISO 13920:1996

6.1 Limit deviations for lengths for welded structures

Nominal size range [mm]							
2 up to 30	over 30 up to 120	over 120 up to 400	over 400 up to 1000	over 1000 up to 2000	over 2000 up to 4000	over 4000 up to 8000	over 8000 up to 12000
Limit deviations for linear dimensions [mm]							
±1	±2	±2	±3	±4	±6	±8	±10
Corresponds to tolerance class according to DIN EN ISO 13920:1996							
B	B	B	B	B	B	B	B

Table 9 - Limit deviations for lengths, welded structures

6.2 Limit deviations for angles for welded structures

Nominal size range l [mm] (length of shorter side)					
up to 400	over 400 up to 1000	over 1000	up to 400	over 400 up to 1000	over 1000
Limit deviations Delta Alpha (in degrees and minutes)			Calculated and rounded limit deviations t (in mm/m ¹)		
±1°	±45`	±30`	±18	±13	±9
Corresponds to tolerance class according to DIN EN ISO 13920:1996					
C	C	C	C	C	C
¹⁾ The value given in mm/m corresponds to the tangent of the limit deviations. It must be multiplied by the length, in meters, of the shorter side.					

Table 10 - Limit deviations for angles, welded structures

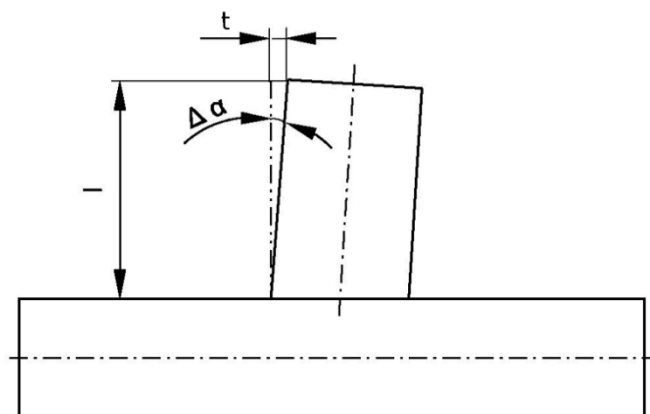


Figure 2 - Limit deviations for angles, welded structures

6.3 Tolerances for straightness, flatness and parallelism in welded structures

Nominal size range [mm]						
over 30 up to 120	over 120 up to 400	over 400 up to 1000	over 1000 up to 2000	over 2000 up to 4000	over 4000 up to 8000	over 8000 up to 12000
Tolerances t [mm]						
±1	±1.5	±3	±4.5	±6	±8	±10
Corresponds to tolerance class according to DIN EN ISO 13920						
F	F	F	F	F	F	F

Table 11 - Tolerances for straightness, flatness and parallelism in welded structures

7 Thermal cutting, laser cutting according to DIN EN ISO 9013:2017

Workpiece thickness [mm]		> 0 up to ≤ 1	> 1 up to ≤ 3.15	> 3.15 up to ≤ 6.3	> 6.3 up to ≤ 10	> 10 up to ≤ 50
Tolerance class		1	1	1	1	1
Limit deviations [mm] for nominal dimensions [mm]	≥ 35 < 125	± 0.2	± 0.3	± 0.4	± 0.6	± 0.7
	≥ 125 < 315	± 0.2	± 0.3	± 0.5	± 0.7	± 0.8
	≥ 315 < 1000	± 0.3	± 0.4	± 0.5	± 0.7	± 1.0
	≥ 1000 < 2000	± 0.3	± 0.4	± 0.5	± 0.7	± 1.6
	≥ 2000 < 4000	± 0.3	± 0.4	± 0.6	± 0.8	± 2.5

Table 12 - Thermal cutting, laser cutting

7.1 Further information on thermal cutting, laser cutting and waterjet cutting

- **Class 1:** "Higher-spec" machines and cutting processes, such as laser cutting, generally meet Class 1 requirements Table 12 - Thermal cutting, laser cutting. **Note: ISO 9013 does not describe the water jet cutting process. For waterjet cutting, class 1 (Table 12 - Thermal cutting, laser cutting) must also be complied with!**
- **Class 2:** Coarser cutting processes, such as oxy-fuel cutting or plasma cutting, are classified as Class 2 processes. Tolerance class 2 then applies.

The **nominal size** is the **dimension** shown on the drawing; the actual dimensions are to be measured on the cleaned cut surfaces. The **dimensional limits** do not include the variations caused by **perpendicularity** and **inclination tolerance**. The limit dimensions set out in the preceding Table 2 - General tolerances for lengths and angles and Table 3 - Limit deviations for radius of curvature and chamfer heights apply to dimensions without specified tolerances where reference is made to this standard in drawings or in the order specifications.

8 Cold bending of flat steel products according to DIN 6935:2011-10

Special bending radii can be found in the Supfina drawings. For radii without specified dimensions, the DIN 6935 standard applies:2011-10.

Material thickness [mm]	Size deviation[mm]	Angle deviation [°]	Minimum bending radius [xs]
up to 3	0.5	1	1
> 3-6	1	1.5	1.2
> 6-10	1.5	2	1.5
> 10-20	2	2.5	2
> 20	3	3	2.5

Table 13 - Cold bending of flat steel products

9 Tolerances for linear dimensions of sheet metal parts produced by forming, excluding the radius of curvature according to DIN 6930-2:2011-10

9.1 Limit deviations for linear dimensions on formed sheet metal parts (excluding radius of curvature) in accordance with tolerance class m (medium)

Nominal size range [mm]	Tolerance class		
	f (fine)	m (medium)	g (rough)
up to 6	±0.1	±0.2	±0.4
>6 to 10	±0.16	±0.3	±0.6
>10 to 25	±0.2	±0.4	±0.8
>25 to 63	±0.3	±0.5	±1.0
>63 to 160	±0.4	±0.6	±1.2
>160 to 400	±0.6	±1.0	±2.0
>400 to 1000	±0.8	±1.6	±3.2
>1000 to 2500	±1.6	±2.4	±5.0

Table 14 - Limit deviations, length reforming

9.2 Limit deviations for radius of curvature on formed sheet metal parts in accordance with tolerance class m (medium)

Nominal size range [mm]	Tolerance class		
	f (fine)	m (medium)	g (rough)
up to 6	±0.2	±0.4	±0.6
>6 to 10	±0.4	±0.6	±1.2
>10 to 25	±0.6	±1.0	±2.0
>25 to 63	±0.8	±1.2	±2.5
>63 to 160	±1.0	±1.5	±4.0
>160 to 400	±1.2	±2.0	±6.0
>400 to 1000	±1.6	±2.5	±10.0
>1000 to 2500	±2.0	±4.0	±15.0

Table 15 - Limit deviations, radius of curvature sheet parts

10 Tubing

10.1 General tolerances for pipelines

Applies only to bent pipes without soldered or welded joints.

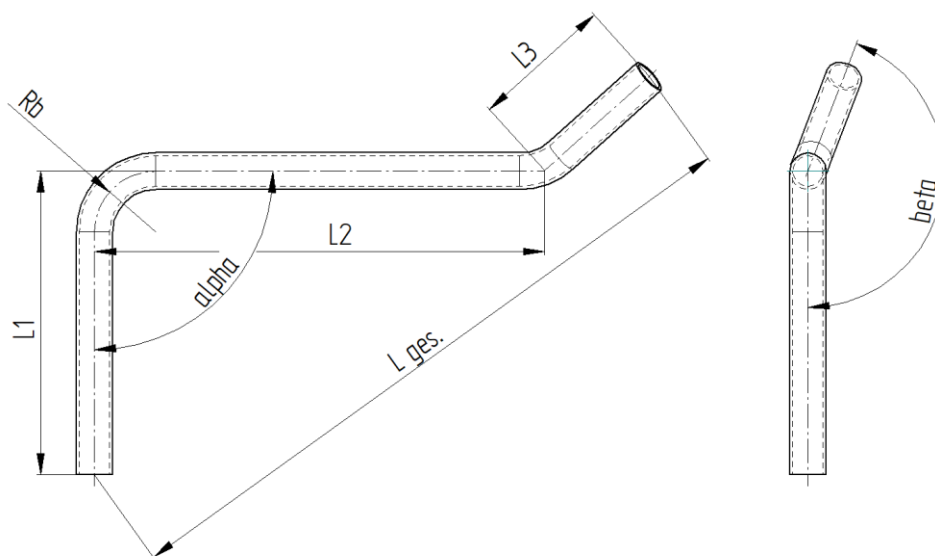


Figure 3 – pipeline example

Target	< 50	50 < 100	100 < 250	250 < 1000	> 1000
L tot.	± 1.0	± 1.5	± 2	± 3	± 4
L1, L2, L3, ...	+ 1.0	+ 1.5	+ 1.5	+ 2	+ 3

Table 16 - General tolerances for lengths of pipes

Bending angle	Alpha	± 2°
Swivel angle	beta	± 2°
Bending radius	R _b	± 3

Table 17 - General tolerances of angles and radii for pipelines

10.2 Workpiece edges of indeterminate shape in accordance with DIN ISO 13715 and cut surfaces for pipes

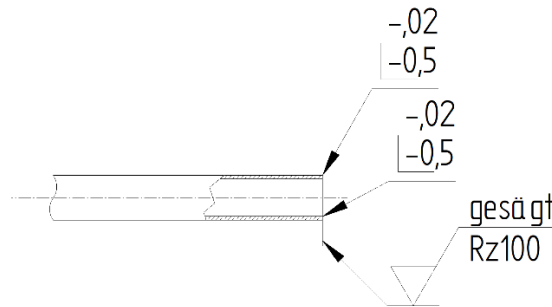


Figure 4 – Specifications on cut surfaces of pipes

10.3 Permissible out-of-roundness of bent pipework and fittings

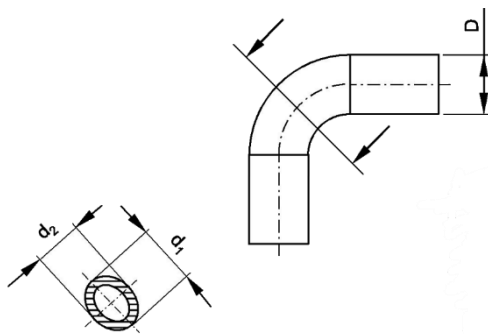


Figure 5 – Out-of-roundness of pipes

Calculation according to
DIN 2413:2020-04

$$U = \frac{2(d_1 - d_2)}{(d_1 + d_2)} * 100 [\%]$$

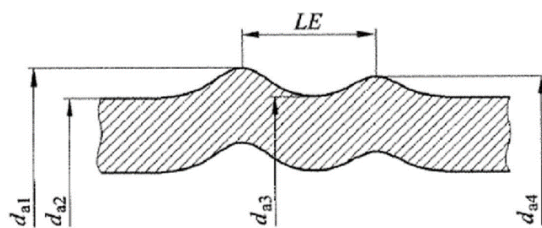
Formula 1 - Out-of-roundness of pipes

D	Permissible out-of-roundness U
≤ 12	≤ 10%
> 12 ≥ 50	≤ 8%
> 50	≤ 5%

Table 18 - Out-of-roundness of pipes

10.4 Permissible wave formation in the bending zone of pipes

Waviness may occur in the bend area due to an unfavorable bend radius to wall thickness ratio. In accordance with DIN EN 10253-2:2008-09, the formation of waves is permitted within the following limits:



$$LE \geq 15 \times h_m$$

Figure 6 - Wave formation on pipes

$$h_m = \frac{d_{a1} + d_{a4}}{2} - d_{a3}$$

Formula 2 - Wave formation on pipes

Average wave height h_m no larger than 3 % D
(specified outer diameter — nominal size)
or 25 mm; the lower value shall apply.

10.5 General tolerances for pipelines for cutting ring assembly

Saw the pipe off at a right angle, (**Error! Reference source not found.**) an angle tolerance of $\pm 1^\circ$ is permitted. Pipe cutters and angle grinders must not be used for this purpose. The ends of the pipes are easy to deburr, both inside and out. The inside of the pipe must be free of burrs and any residue of cooling lubricant.

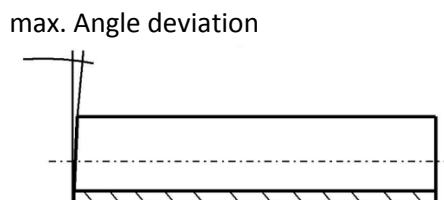


Figure 7 - Pipelines for cutting ring assembly

11 Surface texture

The values from **Error! Reference source not found.** are guide values. It is not possible to convert Ra to Rz precisely, as this depends on the profile shape.

Arithmetic mean roughness	R _a	1.6	2.5	3.2	12.5	25
Averaged Roughing depth	R _z	6...21	9...30	12...35	25...50	80...160

Table 19 – Conversion values surfaces

11.1 Surfaces in general

Unless otherwise explicitly stated on the drawing, the following Table 20 – Standard specification surfaces applies to surface specifications in Supfina drawings. The standard surface finish for surfaces where no surface finish is specified is y / Ra 3.2.

Oberflächenangaben vgl. DIN ISO 1302 SURFACE TEXTURE PER DIN ISO 1302 Ra nach DIN EN ISO 4287 in μm Ra ACCORDING TO DIN EN ISO 4287 SHOWN IN μm					
$\left(\sqrt{f}\right) = \sqrt{\quad}$	Standard $\left(\sqrt{y}\right) = \sqrt{\text{Ra } 3.2}$	$\left(\sqrt{r}\right) = \sqrt{\text{Ra } 0.4}$			
$\left(\sqrt{x}\right) = \sqrt{\text{Ra } 12.5}$	$\left(\sqrt{s}\right) = \sqrt{\text{Ra } 16}$	$\left(\sqrt{v}\right) = \sqrt{\text{Ra } 0.2}$ geschliffen grind			
$\left(\sqrt{k}\right) = \sqrt{\text{Ra } 63}$	$\left(\sqrt{z}\right) = \sqrt{\text{Ra } 0.8}$	$\left(\sqrt{w}\right) = \sqrt{\text{Ra } 0.1}$			

Table 20 – Standard specification surfaces

Quality assurance guideline QR002

This table does not need to be shown on the drawing!

11.2 Deviating standard surface

If a surface has a surface finish specification other than the standard (γ / Ra 3.2), this must also be indicated on the drawing as described below in "Figure 8 – Standard surface". In the following example in Figure 8 – Standard surface, surface S (Ra 1.6) would apply to the general drawing. **All areas that do not comply with the applicable standard surface area must be marked accordingly on the drawing.**

Standard Oberfläche (ohne Angabe):
Standard surface (Not specified):



Figure 8 – Standard surface

11.3 Outdated triangular specifications

Older drawings may still contain outdated triangular surface area specifications; the conversion is carried out in accordance with Table 21 - Conversion of triangular specifications in Ra from row 2.

Vergleich früherer Oberflächenangaben (zur Änderung bestehender Unterlagen)													
DIN 140 (zurückgezogen)						DIN ISO 1302 (Beiblatt 2, 10.80)							
Gleichmäßigkeit durch saubere spanlose Fertigung													
Geschruppt, Riefen fühlbar, mit bloßem Auge sichtbar													
Geschlichtet, Riefen mit bloßem Auge noch sichtbar													
Feingeschlichtet, Riefen mit bloßem Auge nicht mehr sichtbar													
Feinstgeschlichtet													

11.4 Supplementary specifications

Supplementary specifications on the drawing such as in Figure 9 – Example of supplementary specification must always be observed! They can be found above the specification from Table 20 – Standard specification surfaces in this document.



Figure 9 – Example of supplementary specification

12 Workpiece edges of indeterminate shape in accordance with DIN ISO 13715:2020-01

Unless otherwise indicated in the drawing, the edges of the workpiece must be finished in accordance with the specifications in Figure 10 – Edge status:

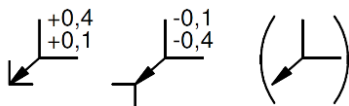


Figure 10 – Edge status

13 Supfina welding factory standard

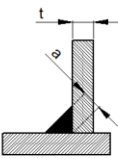
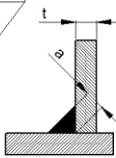
13.1 General

Unless specific agreements are in place or details have been added to the drawing, the following points must be complied with. Deviating welding processes must be coordinated with Supfina.

The dimensional tolerances and welding specifications stated in the drawing, or in the applicable factory standard if none is available, must be adhered to.

13.2 Welding specifications in drawings

The welding specifications on older drawings — which refer to standards that are no longer valid or have been superseded — should generally be replaced with the following specifications.

Liefervorschriften für Schweißverbindungen			Delivery specification for welded connections		
Für unbemaßte Kehlnähte gilt:			For undimensioned hollow seams applies:		
Materialdicke " t "	Kehlnahtdicke " a "		Material thickness " t "	Fillet weld thickness " a "	
bis 2	= 1/2 * t		to 2	= 1/2 * t	
über 2 bis 4	2		over 2 to 4	2	
über 4 bis 8	3		over 4 to 8	3	
über 8 bis 10	4		over 8 to 10	4	
über 10 bis 14	5		over 10 to 14	5	
über 14 bis 16	6		over 14 to 16	6	
über 16 bis 20	7		over 16 to 20	7	
über 20 bis 26	8		over 20 to 26	8	
über 26 bis 34	10		over 26 to 34	10	
über 34 bis 40	12		over 34 to 40	12	
über 40 bis 50	15		over 40 to 50	15	
über 50 bis 60	18		over 50 to 60	18	
über 60	siehe Angaben		over 60	see details	
Allgemeintoleranzen nach DIN EN ISO 13920 Toleranzklasse - B F			General tolerances according to DIN EN ISO 13920 Tolerance class - B F		
Gütesicherung nach DIN EN ISO 5817			Quality assurance acc. to DIN EN ISO 5817		
Bewertungsgruppe:	gewählt:	Anhang C	Evaluation group:	selected:	Anhang C
D		wenn erforderlich siehe Angaben	D		if required see details
C	x		C	x	
B			B		
Spannungsarm gegläht. Teil zum Bearbeiten verzugsfrei spannen			Stress relieved annealed. Clamping part for machining distortion free		
Jede Detailangabe in der Zeichnung übersteuert diese Liefervorschrift!			Any detail specification in the drawing overrides this delivery specification!		

Standard practice does not permit welding of vertical seams!

Care must be taken to ensure that the root is fully covered and to avoid any binding errors.

Figure 11 - Welding specifications on drawings

13.3 Heat treatment

Please refer to the information on the drawing to determine whether heat treatment is required.

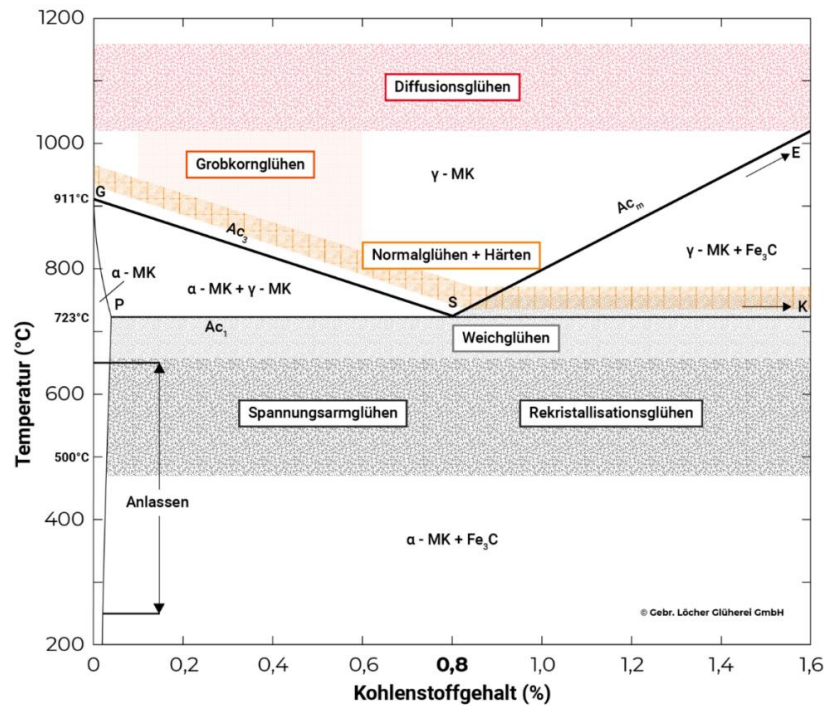


Figure 12 - Heat treatment processes

13.4 Welding specifications for HV seams

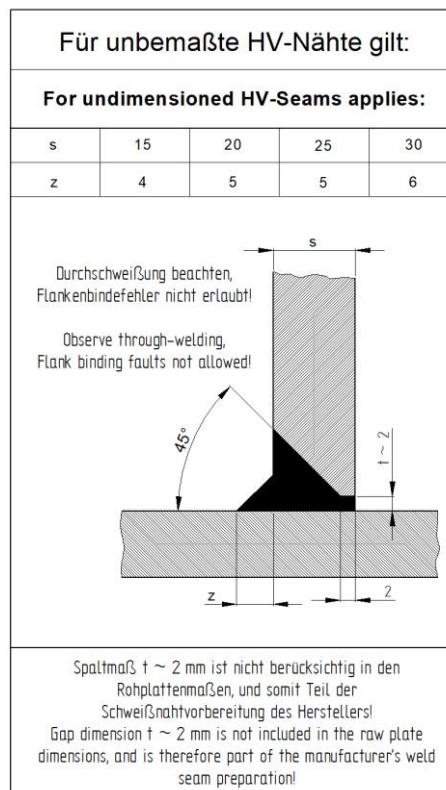


Figure 13 - HV seams

13.5 Welding specifications for oil-tight welded products

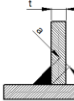
Liefervorschriften für öldichte Schweißkonstruktionen und deren Verbindungen			Delivery specifications for oil-tight welded constructions and their connections		
Für unbemaßte Kehlnähte gilt:			For undimensioned hollow seams applies:		
Materialdicke "t"	Kehlnahtdicke "a"		Material thickness "t"	Fillet weld thickness "a"	
bis 2	$= \frac{1}{2} \cdot t$		to 2	$= \frac{1}{2} \cdot t$	
über 2 bis 4	2		over 2 to 4	2	
über 4 bis 8	3		over 4 to 8	3	
über 8 bis 10	4		over 8 to 10	4	
über 10 bis 14	5		over 10 to 14	5	
über 14 bis 16	6		over 14 to 16	6	
über 16 bis 20	7		over 16 to 20	7	
über 20 bis 26	8		over 20 to 26	8	
über 26 bis 34	10		over 26 to 34	10	
über 34 bis 40	12		over 34 to 40	12	
über 40 bis 50	15		over 40 to 50	15	
über 50 bis 60	18		over 50 to 60	18	
über 60	siehe Angaben		over 60	see details	
Allgemeintoleranzen nach DIN EN ISO 13920 Toleranzklasse - B F			General tolerances according to DIN EN ISO 13920 Tolerance class - B F		
Gütesicherung nach DIN EN ISO 5817			Quality assurance acc. to DIN EN ISO 5817		
Bewertungsgruppe:	gewählt:	Anhang C	Evaluation group:	selected:	Anhang C
D		wenn erforderlich siehe Angaben	D		if required see details
C	x				
B					
Spannungsarm gegläht. Teil zum Bearbeiten verzugsfrei spannen			Stress relieved annealed. Clamping part for machining distortion free		
Jede Detailangabe in der Zeichnung übersteuert diese Liefervorschrift!			Any detail specification in the drawing overrides this delivery specification!		
Deckplatten, Ablaufinnen und Ölbühnen öldicht geschweißt alle Platten sandgestrahlt In voll verschweißte Kästen müssen Entlüftungsbohrungen vorgesehen werden. Form der nicht dargestellten Blecheckverbindungen nach Wahl des Herstellers. Alle Schweißnähte ohne Unterbrechung. Durchschweißung beachten, Flankenbindefehler nicht erlaubt! ✓ = Konturen gebrannt zulässig			Cover plates, drainage channels and oil tanks, oil-tight welded all plates sandblasted Vent holes must be provided in completely welded boxes. Shape of sheet metal corner joints not shown, at manufacturer's option. All welds without any interruption. Observe through-welding, Flank weld failures not allowed! ✓ = flame-cutted outlines permitted		
Dichtheitsprüfung mit Kaltreiniger oder Petroleum min 12 Std. durchführen ! ! öldicht geschweisst !			Perform a leak test with cold cleaning fluid or petroleum for min. 12 hours! ! oil-tight welded !		

Figure 14 - Oil-tight welds

Deviating from the above Figure 14 - Oil-tight welds, tightness may also be tested with the dye penetration process according to DIN EN ISO 3452-1:2022-02. Evidence of oil tightness in the form of a test report must be provided to Supfina. Supfina will provide the QPP 4000 test report as a template where required or on request; any additional or supplementary documents are the responsibility of the supplier.

Pipes and manifolds carrying media that are welded into products must be welded in an oil-tight manner and sealed with a nozzle thread upon completion. A pressure test must then be performed: check for pressure reduction with 7 bar ± 1 for at least 10 minutes. The pressure gauge is connected directly to the supply pipe near its connection point to the distribution system. Evidence of watertightness in the form of a test report (QPP 4000) must be provided to Supfina! **Media-carrying pipes and pipes to be tested are marked as follows on Figure 15 - Marking of media-carrying pipes.**

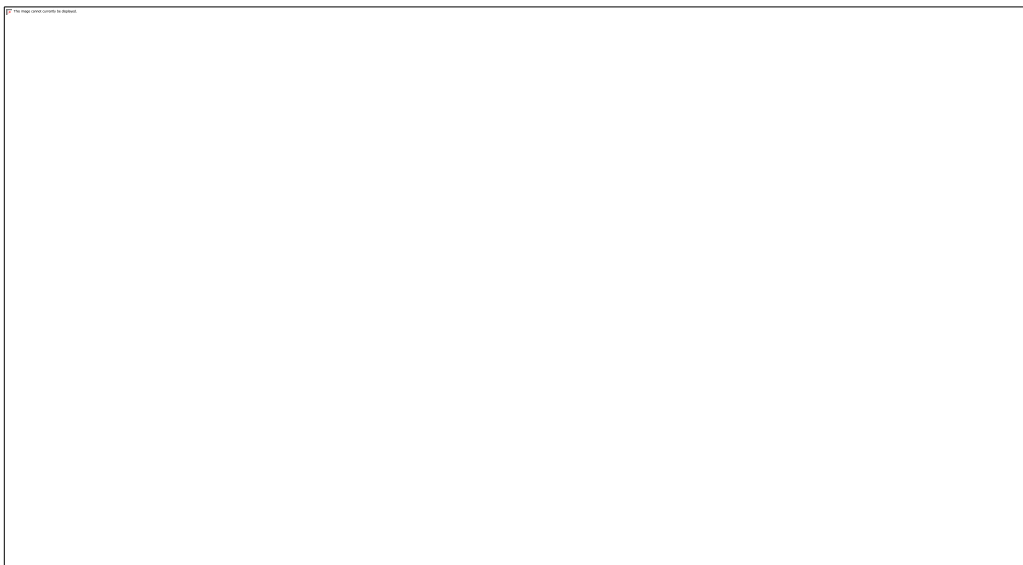


Figure 15 - Marking of media-carrying pipes

ATTENTION: If the supplier is unsure as to which seams need to be welded to be oil-tight, they must consult Supfina! In the case of painted or powder-coated parts, weld seams and joint edges must be filled beforehand; please refer to the following points 14.1/ 14.2!

13.6 Welding seam preparation

Unless otherwise specified in the drawing, weld preparation shall be carried out in accordance with DIN EN ISO 9692-1:2013. In the area around the seam, the parts must be bare metal before tack-welding (no rust, mechanical residues, oil, paint, grease, scale, dust, etc.).

13.7 Heat treatment: Welding in cold-formed areas / annealing

When welding is carried out in cold-formed areas, including the adjacent areas, with a width of 5 t, the requirements of DIN 1993-1-8 (Eurocode 3) (e.g. normalizing annealing prior to welding) must be complied with.

(t corresponds to the sheet thickness; further details are set out in DIN 1993-1-8 (Eurocode 3)).

13.8 Heat treatment: Stress-relief annealing / stress-relief shaking

This requirement is indicated in the drawings (welding specifications). Unless otherwise specified by Supfina, the manufacturer is free to perform stress-relief annealing if deemed necessary.

Attention! The parts must be annealed before the final mechanical finishing process. Stress-relief shaking is not permitted; consultation with Supfina is essential!

Stainless steels, pre-hardened steels and steels containing niobium and tantalum must not be stress-relief annealed!

14 Surface post-treatment

Applies to surfaces in general: The type and requirement for the surface coating are specified in the drawing or order. Details regarding RAL colour codes can be provided in a separate colour chart or in the order. Unless otherwise specified, wet paint or powder coating may be used for the finish.

ATTENTION: The dimensions shown in the drawings, including tolerances, apply after surface treatment!

As indicated in point Error! Reference source not found., Supfina drawings show finished dimensions!

14.1 Painting

Before applying the primer or starting to paint, it is essential to ensure that the surface has been properly prepared in accordance with the paint supplier's specifications.

Only two-component paint is permitted for the primer and topcoat, and it must be supplied by the same manufacturer for both.

As a general rule, the paint finish must be applied by spraying; application by roller or brush is only permitted with Supfina's approval. The manufacturer's specifications must be observed.

Machined surfaces, functional surfaces and bores must NOT be painted. An exception to this rule regarding drilling applies to perforated sheets (e.g. perforated sheet metal)!

The film thicknesses of the primer and topcoat are both at least 50 µm, giving a total film thickness of at least 100 µm.

Powder manufacturer according to manufacturer's choice.

The supplier must provide a paint sample before the first delivery to Supfina is made.

Unless otherwise stated, the approved paint sample applies. Otherwise the following applies to the surface structure: **Fine textured, matt**

Unpainted surfaces must be protected from rust. Before shipping, all unpainted surfaces of components must be provided with corrosion protection.

To ensure oil-tight welded parts, seal the welds and joint edges (e.g. with Sikaflex) before painting!

14.2 Powder coating

Before applying the powder coating, it is essential to ensure that the surface has been properly prepared in accordance with the powder supplier's specifications.

Machined surfaces, functional surfaces and bores must NOT be powder-coated. An exception to this rule regarding drilling applies to perforated sheets (e.g. perforated sheet metal)!

The layer thickness for the powder coating must be between 60 and 80µm.

Powder manufacturer according to manufacturer's choice.

The supplier must provide a powder paint sample before the first delivery to Supfina is made.

Unless otherwise stated, the approved powder paint sample applies. Otherwise the following applies to the surface structure: **Fine textured, matt**

Uncoated powder surfaces must be protected from rust. Before shipping, all uncoated surfaces of components must be provided with corrosion protection.

To ensure oil-tight welded parts, seal the welds and joint edges (e.g. with Sikaflex) before powder coating!

14.3 Burnishing according to DIN 50938

Before the actual burnishing process begins, the workpiece surface must be clean and free of grease to ensure an even burnishing finish. After burnishing, the components must be cleaned and treated with an anti-corrosion oil or a similar agent. Care must be taken to ensure that the parts are thoroughly cleaned after burnishing, particularly in threaded holes.

Some of the parts shown in the drawings carry the note shown below. Any parts that are not shown in specific detail must be agreed with Supfina!

Brüniert DIN 50938
black-finished

Figure 16 - Burnishing specification

Equally valid and requiring observation is the specification "Burnished to DIN 50938" in the Supfina order relating to the component. This may be specified here either explicitly for the individual item or generally for the entire order. In that case, no further information is needed in the drawing.

14.4 Chemical nickel

According to DIN ISO 4527

Base material / chemical nickel coating containing phosphorus, coating thickness min.–max.

The precise specifications can be found in the drawing.

14.5 Hard coating (hard anodizing)

According to ISO 10074:2021

Layer thickness for wear protection: 50–80 µm

Hard coated surfaces must not be marked, covered with adhesive or coated further. The exception is engraving.

14.6 Anodizing

Anodized surfaces must not be marked, covered with adhesive or coated further. The exception is engraving. Surfaces must be prepared accordingly (no scratches etc.).

14.7 Molybdenum coating

Supfina's preferred supplier:

ICV GmbH Industrie-Coating + Verfahrenstechnik, Am Römerhof 11, 78727 Oberndorf

14.8 Diamond coating

Supfina's preferred supplier:

Jakob Lach GmbH & Co. KG, Donaustraße 17, 63452 Hanau

14.9 Balinit-C coating

BALINIT® C is a WC/C-based layer, i.e. a mixture of metal and diamond-like carbon.

Supfina's preferred supplier:

Oerlikon Balzers Coating Germany GmbH, Am Ockenheimer Graben 41, 55411 Bingen

15 Heat treatment

15.1 Annealing (soft annealing / normal annealing / stress-relief annealing)

See chapter 13.3 Heat treatment

15.2 Hardening and annealing

Use with annealing steels, e.g. 42CrMo4 / C45 / 34CrNiMo6

The temperatures used must be coordinated with Supfina.

15.3 Case hardening

Supfina uses the following specification, Figure 17 - Case hardening, as standard. Any specifications that deviate must also be included in the drawings and complied with accordingly.

Attention: The hardening depth refers to the finished component. Machining allowances must be selected by the manufacturer and the specified hardening depths must be adhered to for the finished part! For drawing data see Figure 17 - Case hardening. Consult with Supfina in case of any doubt.

einsatzgehärtet
u. angelassen
60 +4 HRC
Eht= 0,4-0,8

Figure 17 - Case hardening

15.4 plasma nitrated

Supfina uses the following specifications, Figure 18 - Plasma nitrified 1 and **Error! Reference source not found.**, as standard. Any specifications that deviate must also be included in the drawings and complied with accordingly.

Attention: The nitrating depth refers to the finished component. Machining allowances must be selected by the manufacturer and the specified nitrating depths must be adhered to for the finished part! Consult with Supfina in case of any doubt.

Plasmanitriert
plasma nitrided
700-750 HV0.2
Nht= 0,4-0,6

Figure 18 - Plasma nitrified 1

Plasmanitriert
plasma nitrided
700-750 HV0.2
Nht= 0,4-0,6
Gewinde abdecken – weich!
Threads covered – not hardened!

Figure 19 - Plasma nitrified 2

15.5 Induction / vacuum hardening

The drawings specify the hardening processes, such as induction or vacuum hardening.

16 Filling components to reduce vibrations

To reduce vibrations and increase mass, components, particularly welded frames, may be filled with concrete. Specifications can be found in the drawing. Deviations from specifications (material type etc.) must be coordinated with Supfina! The placement of reinforcing steel is determined by the contractor and must be agreed with Supfina

Figure 20 - Drawing specifications for filling components and Figure 21 - Specifications for reinforcement filling components show a possible specification on a machine base drawing.

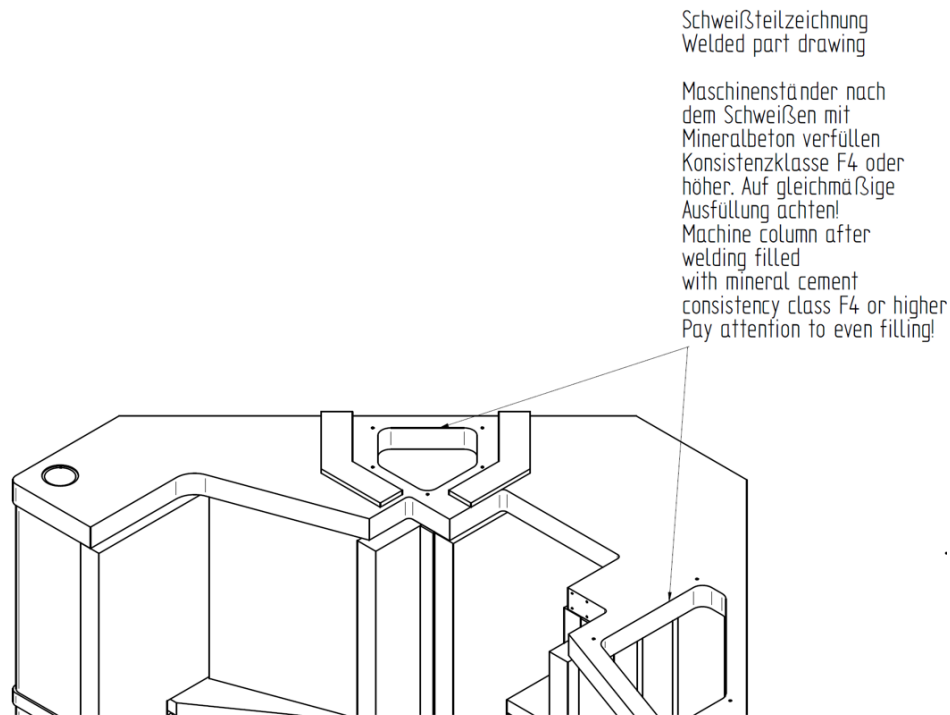


Figure 20 - Drawing specifications for filling components

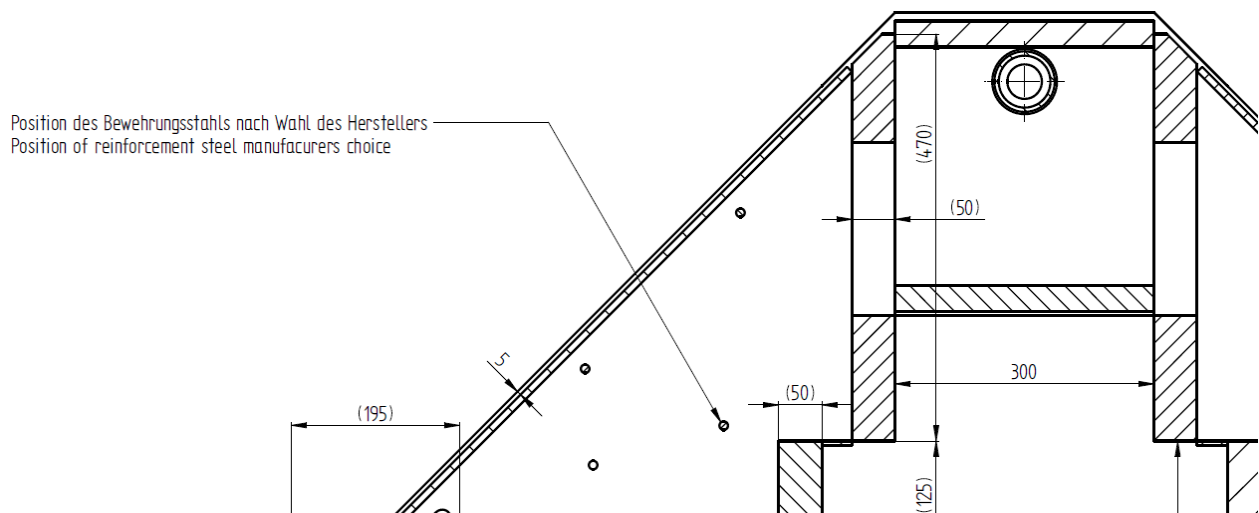


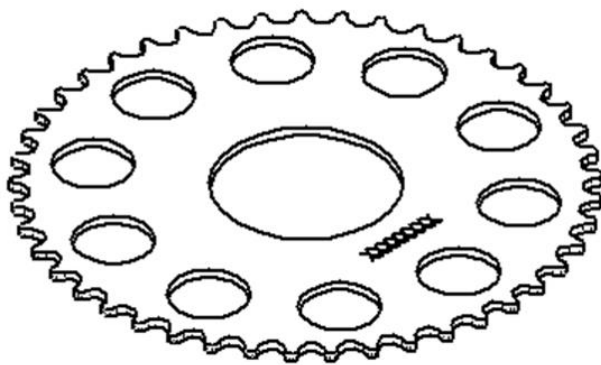
Figure 21 - Specifications for reinforcement filling components

17 Further specifications on drawings

17.1 Engraving / component labeling

If components need to be engraved, the details should be taken from the drawing as shown! Standard text 6mm / Arial. For smaller components or where space is limited, smaller font sizes are also permitted. Pay attention to good legibility! Unless otherwise stated, engravings may also be milled or lasered. It is essential to ensure good legibility following any surface coating!

Error! Reference source not found. shows a Supfina engraving specification.



Beschriftung mit Texthöhe 6 mm
Inscription with text height 6 mm

XXXXXXX durch die Artikelnummer ersetzen!
Replace XXXXXXXX with the article number!

Figure 22 - Example of engraving specifications

Attention: The relevant index must be added to the Supfina item number, as shown in the example:

10234768 / 0A

The item number and index can be found on the relevant order!

17.2 Bonding procedures

Details regarding bonding procedures can be found in the drawings and/or should be agreed with Supfina.

In general, surfaces should be thoroughly cleaned and degreased prior to bonding to ensure good adhesion. It is important to choose the right adhesive for the material in question and to follow the manufacturer's instructions carefully. Where possible, the bonding surfaces should cover the entire area and be optimized for the subsequent load. Once the adhesive has been applied, the parts must be pressed firmly together and left undisturbed for the full curing time.

Preparation of surfaces:**1) Cleaning:**

The surfaces to be bonded must always be thoroughly cleaned. Remove dust, grease, rust and other dirt.

2) Degreasing:

Only use cleaning agents approved by the adhesive manufacturer for this purpose. Please note that Nitro thinner may contain grease and is therefore unsuitable.

3) Roughening (optional):

With some materials, particularly plastics, roughening the surface with sandpaper or steel wool can improve adhesion. Observe the adhesive manufacturer's instructions.

18 Revision History

This document has a revision history; the current approved version is shown in the table below!

Date	Version	Changes to the QR002
2024-02-09	1.1	First version
2025-07-08	1.2	Revised first version
2025-08-29	2.0	Approved status
2025-09-01	2.1	Supplements & corrections
2025-09-09	2.2	Supplements & corrections
2026-01-21	3.0	Approved status
2026-02-27	5.1	Supplements & corrections
2026-02-27	6.0	Approved status 2026

Table 22 - Revision history

19 Confidentiality

Both the supplier and the client agree that all information exchanged in connection with this policy will be treated as confidential.

Forwarding requires written permission from Supfina.

20 Final clauses

1. If any part of this Directive is found to be invalid, this will not affect the validity of the other parts or the continued validity of the Directive as a whole. Any invalid provisions shall be replaced by a provision that comes as close as possible to the invalid one in terms of its economic substance. The same shall apply in case of a loophole.
2. This agreement is governed by German law, to the exclusion of the UN Convention on Contracts for the International Sale of Goods.
In the event of any disputes arising from the quality assurance agreement, the place of jurisdiction shall be the client's registered office. The contractual language is German. Amendments and supplements to this agreement must be made in writing. The same applies to any amendments or repeals of this written form clause.
3. No rights or obligations arising from this policy, or any part of it, may be assigned.

Signed:	Supfina Grieshaber GmbH & Co. KG
Mechanical engineering:	Daniel Sonntag, Markus Müller, Jürgen Ketterer
Purchasing:	Raphael König, Kai Möschle, Christian Schmidt
Quality assurance:	Patrick Haas, Jana Kose

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