

FIG. 493 REFLEX - ESTRIADO  
FIG. 494 LISO - TRANSPARENTE

MAXOS®

SAFETY SIGHT AND LEVEL GAUGE GLASSES SPECIAL-TEMPERED  
MADE IN GERMANY



## MAXOS® product range

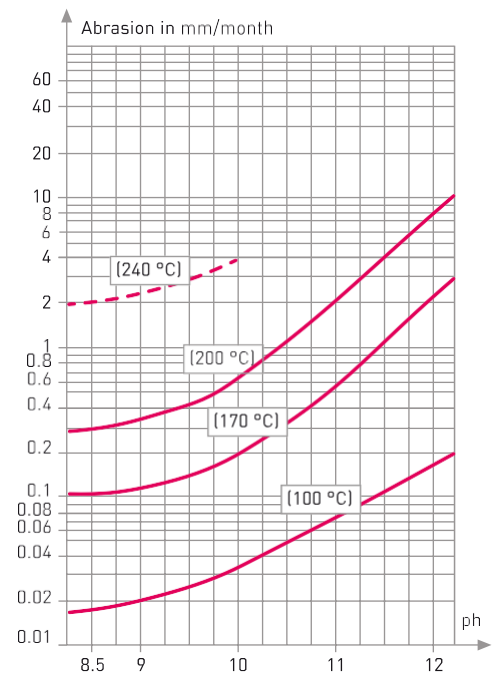
Special tempered reflex and transparent level gauge glasses and disc sight glasses can be supplied in accordance to:

- DIN 7080/7081
- BS 3463
- JIS B 8211
- MIL – G – 16356 D
- Auer USA specification
- High pressure
- Customer specification
- Aluminosilicate glass on request

## Glass type SUPRAX® 8488

Coefficient of expansion $\alpha$ 20 °C/300 °C	$4.3 \times 10^{-6} \text{ K}^{-1}$
Transformation temperature	540 °C
Glass temperature for the viscosities dPas (Poise)	$10^{13.0}$ 560 °C $10^{7.6}$ 800 °C $10^{4.0}$ 1200 °C
Density at 25 °C	2.3 g/cm <sup>3</sup>
Modulus of elasticity	$67 \times 10^3 \text{ N/mm}^2$
Poisson's ratio $\mu$	0.20
Thermal conductivity $\lambda$ at 90 °C	$1.2 \frac{\text{W}}{\text{m K}}$
Refractive index $n_d$ ( $\lambda = 587.6 \text{ nm}$ )	1.484
Photoelastic parameter K	$3.2 \cdot 10^{-6} \text{ } \frac{1}{\text{N}}$

Chemical characteristics	Hydrolytic resistance	Acid resistance	Alkali resistance
Test acc. to	DIN ISO 719	DIN ISO 1776	DIN ISO 695
max. abrasion acc. to DIN ISO	0.1	<100 $\mu\text{g Na}_2\text{O}$ each 100 cm <sup>2</sup>	>75–175 mg each 100 cm <sup>2</sup>
MAXOS® max. abrasion	0.050	<60 $\mu\text{g Na}_2\text{O}$ each 100 cm <sup>2</sup>	<100 mg each 100 cm <sup>2</sup>
MAXOS®	HGB 1	–	class A2



The abrasion of MAXOS® glass in watery phase for several temperatures as a function of the pH-value.

MAXOS® – a registered trademark of Auer Lighting GmbH  
SUPRAX® – a registered trademark of SCHOTT AG

# MAXOS® LEVEL GAUGE GLASSES

## Long form reflex and transparent

Bending strength is determined by the surface compressive stress and the inherent resistance of the glass. The inherent resistance is heavily dependent upon the surface quality.

For safety reasons, the stress to the glasses caused by internal forces, thermal stress and vessel pressure have to be totally absorbed by the surface compressive stress so that a tensile stress of the glass surface is prevented.

Application conditions	Maximum permissible		Maximum permissible	
	pressure		temperature	
Saturated steam or hot water in direct contact with reflex or transparent sight glasses	35	500	243	470
Saturated steam or hot water in contact with transparent sight glasses protected with mica	103	1,500	320	608
Non-corrosive, non-steam service and no technically significant glass attack, with reflex or transparent glasses	280	4,000	38	100
Transparent sight glasses in contact with medias with no technically significant glass	345	5,000	38	100
High pressure transparent sight glasses in special armatures (gauges)	414	6,000	38	100

## Bending strength (typical values)

Standard level gauge glasses

≥ 150 N/mm<sup>2</sup>      21,000 psi

Average

170 N/mm<sup>2</sup>      25,000 psi

High pressure level gauge glasses

≥ 180 N/mm<sup>2</sup>      26,000 psi

Average

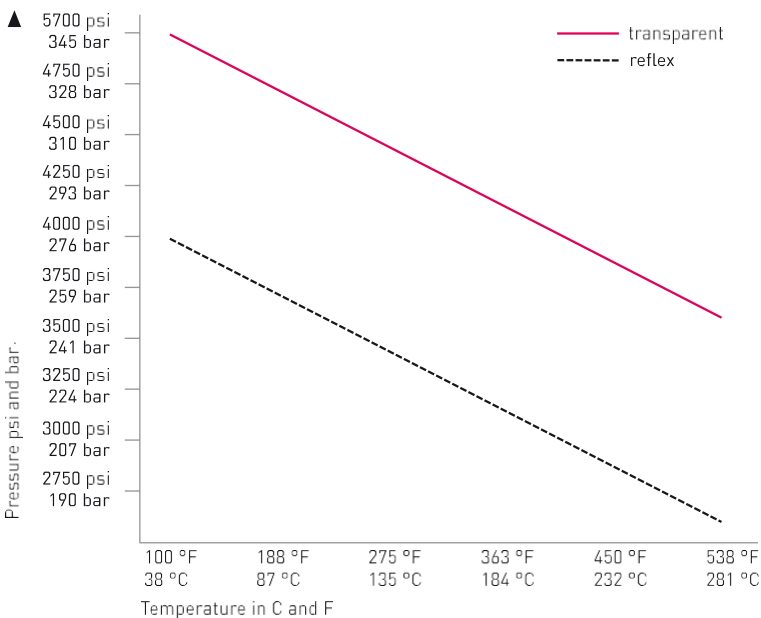
200 N/mm<sup>2</sup>      29,000 psi

## Temperature

Thermal shock resistance  $\Delta T$  265 K

Max. permissible temperature 300 °C (572 °F)

Protected with mica      320 °C (608 °F)



Special tempered MAXOS® glass under polarized light.

## Available sizes

### Surface compressive stress

#### Standard level gauge glasses

≥ 90 N/mm<sup>2</sup> 13,000 psi

#### Average

100 N/mm<sup>2</sup> 14,500 psi

#### High pressure level gauge glasses

≥ 100 N/mm<sup>2</sup> 14,500 psi

#### Average

110 N/mm<sup>2</sup> 16,000 psi

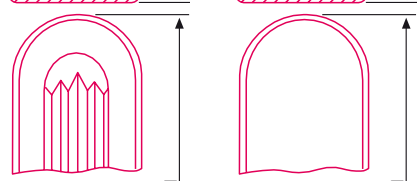
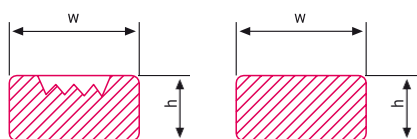
### Parallelism

#### Standard level gauge glasses

≤ 0.08 mm 0.003 inches

#### High pressure level gauge glasses

≤ 0.05 mm 0.002 inches



Reflex type glass  
(R form)

Transparent type glass  
(T form)

Size	Dimensions						max. flatness tolerance			
	Length (l)		Width (w)		Thickness (h)		Standard		High pressure	
	mm	inch*)	mm	inch*)	mm	inch*)	mm	inch*)	mm	inch*)
0	95	3.740	34	1.339	17.5	0.689	0.05	0.002	-	-
1	115	4.500	34	1.339	17.5	0.689	0.05	0.002	0.05	0.002
2	140	5.500	34	1.339	17.5	0.689	0.05	0.002	0.05	0.002
3	165	6.500	34	1.339	17.5	0.689	0.05	0.002	0.05	0.002
4	190	7.500	34	1.339	17.5	0.689	0.08	0.003	0.05	0.002
5	220	8.625	34	1.339	17.5	0.689	0.08	0.003	0.05	0.002
6	250	9.874	34	1.339	17.5	0.689	0.13	0.005	0.05	0.002
7	280	11.000	34	1.339	17.5	0.689	0.13	0.005	0.05	0.002
8	320	12.625	34	1.339	17.5	0.689	0.13	0.005	0.05	0.002
9	340	13.374	34	1.339	17.5	0.689	0.13	0.005	0.05	0.002
10	370	-	34	-	17.5	-	0.13	-	-	-
11	400	-	34	-	17.5	-	0.13	-	-	-
<b>Tolerances*)</b>	<b>+ 0</b>	<b>+ 0</b>	<b>+ 0.2</b>	<b>+ 0.008</b>	<b>+ 0</b>	<b>+ 0</b>			<b>High pressure is effective only for transparent glasses.</b>	
	<b>- 1.5</b>	<b>- 0.039</b>	<b>- 0.8</b>	<b>- 0.039</b>	<b>- 1.0</b>	<b>- 0.028</b>				

\*) Inch dimensions are only valid for Auer USA Specification.

	Length (l)	Width (w)	Thickness (h)	flatness tolerance
	mm	mm	mm	mm
1		30	17.5	0.05
2	140	30	17.5	0.05
3	165	30	17.5	0.05
4	190	30	17.5	0.05
	220	30	17.5	0.08
6	250	30	17.5	0.08
7	280	30	17.5	0.13
8	320	30	17.5	0.13
9	340	30	17.5	0.13
Tolerances	up to 250 ± 0.8	+ 0.5	+ 0	
	above 250 ± 1.0	- 0.8	- 1.0	

Special design for reflex and transparent on request:  
e.g. 21 mm thickness.

# MAXOS® DISC SIGHT GLASSES

## Technical characteristics

Bending strength	> 160 N/mm <sup>2</sup>	23,000 psi
Surface compressive stress	> 100–140 N/mm <sup>2</sup>	14,500–20,000 psi
Parallelism	≤ 0.20 mm	0.008 inches
Flatness*)	: Diameter:	5 up to 100 mm ≤ 0.05 above 100 up to 150 mm ≤ 0.08 above 150 up to 200 ≤ 0.12 above 200 mm ≤ 0.15
Thermal shock resistance Δ T	265 K	
Max. permissible temperature	300 °C	572 °F
Protected with mica	320 °C	608 °F

\*) Measurements of flatness are taken only in the sealing area.

## Dimensional tolerances (DIN 7080)

### Diameter

up to 135 mm	± 0.5 mm
150 to 200 mm	± 0.8 mm
above 200 mm	± 1.0 mm

### Thickness

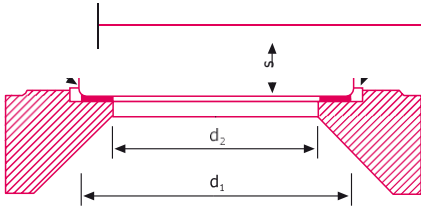
up to 20 mm	+ 0.50 mm / – 0.25 mm
above 20 mm	+ 0.80 mm / – 0.40 mm



## Available sizes

Special dimensional design on request, e.g. Ø min. 30 – max. 265 mm and thickness min. 10 – max. 30 mm.

Sight glass edge  $\geq$  Edges beveled / chamfered



$$s \geq 0.55 \cdot d_m \sqrt{\frac{p \cdot S}{10 \cdot \sigma_{DV \text{ zul.}}}}$$

- $s$  Theoretical minimum glass thickness in mm
- $d_m$   $\frac{d_1 + d_2}{2}$  Mean sealing diameter in mm
- $d_1$  Glass and sealing outside diameter in mm
- $d_2$  Sealing inside diameter in mm
- $p$  Permissible pressure in bar
- $\sigma_{DV \text{ zul.}}$  Min. value of surface compressive stress in N/mm<sup>2</sup>
- $S$  Safety factor = 5

Dimensions $d_1 \times s$	Inspection aperture	Permissible pressure	Dimensions $d_1 \times s$	Inspection aperture	Permissible pressure
30 x 15	20	200	1.181 x 0.591	0.787	2900
31.6 x 12.75	20	150	1.244 x 0.502	0.787	2175
34 x 17	24	200	1.339 x 0.669	0.945	2900
x 7	25		1.378 x 0.276	0.984	363
40 x 12	30	50	1.575 x 0.472	1.181	725
45 x 10	32	40	1.772 x 0.394	1.260	580
45 x 12	32	50	1.772 x 0.472	1.260	725
50 x 10	35	25	1.969 x 0.394	1.378	363
50 x 12	35	40	1.969 x 0.472	1.378	580
55 x 10	40	25	2.165 x 0.394	1.575	363
60 x 10	45	16	2.362 x 0.394	1.772	232
60 x 12	45		2.362 x 0.472	1.772	363
60 x	45	40	2.362 x 0.591	1.772	
60 x	45		2.362 x 0.787	1.772	1377
63 x 8	48	8	2.480 x 0.315	1.890	116
63 x 10	48	16	2.480 x 0.394	1.890	232
63 x 12	48	25	2.480 x 0.472	1.890	363
63 x 15	48	40	2.480 x 0.591	1.890	580
65 x 10	50	12	2.559 x 0.394	1.969	174
65 x 15	50	40	2.559 x 0.591	1.969	580
70 x 12	55	16	2.756 x 0.472	2.165	232
70 x	55		2.756 x 0.591	2.165	363
x 12	60	16	2.953 x 0.472	2.362	232
80 x	65	10	3.150 x 0.394	2.559	
80 x 12	65	16	3.150 x 0.472	2.559	232
80 x 15	65	25	3.150 x 0.591	2.559	363
80 x 20	65	40	3.150 x 0.787	2.559	580
90 x 10	70	8	3.543 x 0.394	2.756	116
92 x 10	72	8	3.622 x 0.394	2.835	116
95 x 10	75	6	3.740 x 0.394	2.953	87
95 x 15	75	16	3.740 x 0.591	2.953	232
100 x 10	80	7	3.937 x 0.394	3.150	101
x 12	80	10	3.937 x 0.472	3.150	
x 15	80	16	3.937 x 0.591	3.150	232
x 20	80		3.937 x 0.787	3.150	363
100 x 25	80	40	3.937 x 0.984	3.150	580
110 x 12.5	85	10	4.331 x 0.492	3.346	145
113 x 15	88	10	4.449 x 0.591	3.465	145
115 x 15	90	10	4.528 x 0.591	3.543	145
120 x 15	95	10	4.724 x 0.591	3.740	145
125 x 15	100	10	4.921 x 0.591	3.937	145
125 x 20	100	16	4.921 x 0.787	3.937	232
125 x 25	100		4.921 x 0.984	3.937	363
x 30	100	40	4.921 x 1.181	3.937	
x 15	105	10	5.118 x 0.591	4.134	
135 x 25	110	25	5.315 x 0.984	4.331	363
150 x 10	125	2	5.906 x 0.394	4.921	29
150 x 15	125	8	5.906 x 0.591	4.921	116
150 x 20	125	10	5.906 x 0.787	4.921	145
150 x 25	125	16	5.906 x 0.984	4.921	232
150 x 30	125	25	5.906 x 1.181	4.921	363
175 x 20	150	10	6.890 x 0.787	5.906	145
175 x 25	150	16	6.890 x 0.984	5.906	232
x 30	150		6.890 x 1.181	5.906	363
x 20		8	7.874 x 0.787	6.890	116
x 25		10	7.874 x 0.984	6.890	
200 x 30	175	16	7.874 x 1.181	6.890	232
250 x 20	225	4	9.843 x 0.787	8.858	58
250 x 25	225	8	9.843 x 0.984	8.858	116
250 x 30	225	10	9.843 x 1.181	8.858	145
265 x 30	240	8	10.433 x 1.181	9.449	116

All MAXOS® glasses are marked with a production code number.