



# Borosilicate Gauge Glasses



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MS ISO/IEC 17021:2011  
QS26122016 CB 16



Certificate Number : FM 646287  
ISO 9001 : 2015

- The quality of a sight (gauge) glass depends mainly on the chemical composition and mechanical strength of the glass material.
- Constant glass quality is provided through glass analyses and acid/alkali tests. The mechanical strength is attained through thermal pre-stressing.
- The gauge glass is the most important component of the liquid level gauge.
- Gauge glasses are suitable for installation in liquid level gauges of almost any make.
- Gauge glasses have high mechanical strength and are exceptionally resistant to alkalis, acids and boiler water (within the service limitation).
- Continuously quality control tests are carried out: purity of glass, flaws in glass, dimensional accuracy. This ensures the high quality standard of all gauge glasses.
- We manufacture reflex and transparent glasses according to the most varied international standards.

### Fields of application

- Oil refineries
- Petro-chemical plants
- Pharmaceutical manufacture
- Chemical processing
- Mechanical engineering, especially manufacture of boilers and storage vessels
- Food and beverage industry
- Water engineering
- Pulp and paper industry
- Textile industry
- Marine engineering
- Nuclear engineering



transparent glass (above) and reflex glass  
(underneath)



Circular gauge glasses made from borosilicate  
glass "extra-hard"

● **Reflex glasses**



Transparent glass (left side) and reflex glass (right) in polarized light



Package units for gauge glasses, sealing gaskets and cushion gaskets

- The side facing the medium chamber is provided with moulded grooves set at 90° angles.
- The moulding process increases the resistance of the glass grooves to wear; the "skin" which the glass attains during moulding gives it maximum smoothness and hardness.
- This makes it extremely resistant to the attack of boiler water.

● **Applications**

**Up to 35 bar saturated steam, reflex glasses provide the optimum solution:**

- They are corrosion resistant and provide an absolutely clear indication.
- Reflex glasses can be used with all media except steam at service conditions up to 400 bar or temperatures up to 400 °C.

## ● Transparent glasses



Transparent glass (left side) and reflex glass (right) in polarized light



Package units for gauge glasses, sealing gaskets and cushion gaskets

- Transparent glasses are also manufactured from "extra-hard" borosilicate glass. The surfaces on both sides are finely ground and polished to ensure optimal transparency.

## ● Applications

- In steam service above 35 bar and with media with a high pH-value.
- Transparent glasses must be protected by a mica shield on the side facing the medium chamber.
- Transparent glasses should always be chosen for contaminated, viscous or corrosive media.
- Within the given service limitations they may be used for all media except steam at pressures up to 340 bar or temperatures up to 400.°C.

## ● Packing

- Gauge glasses are packed in individual cardboard boxes
- In addition to the glass, each package contains a sealing gasket and cushion gasket and forms a complete unit ready for installation.

## ● Standards

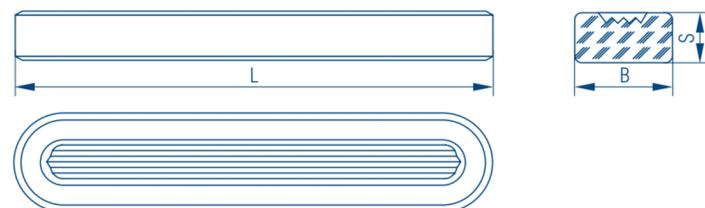
### We manufacture reflex and transparent glasses in series to the following standards:

- |   |  |
|---|--|
| - OeNORM M 7354 (long gauge glasses)        | - Esso Eng. Spec. 123 (Esso Research & Engineering Co. - New Jersey) |
| - DIN 7081 (long gauge plate glasses)       | - S.O.D. Spec. 123 (Standard Oil Development Company - New Jersey)   |
| - JIS B 8211 (Japanese Industrial Standard) | - BS 3463 (British Standard Institution).                            |
| - OMV-Spez. H 2009 (OMV-AG, Vienna)         |  |
| - MIL-G-16356 D (US-Navy-Ships)             |  |

## ● Quality control

Reflex and transparent glasses are subject to continuous control during manufacture in order to guarantee exact dimensions, stress conditions, material composition and resistance to bending strain.

• **Reflex glasses A, B, H**



• **Overall dimension (mm)**

Size	Type A			Weight g/piece	Type B			Weight g/piece	Type H			Weight g/piece
	L	B	S		L	B	D		L	B	S	
0	-	-	-	-	95	34	17	110	-	-	-	-
I	115	30	17	118	115	34	17	132	115	34	22	176
II	140	30	17	146	140	34	17	162	140	34	22	214
III	165	30	17	176	165	34	17	195	165	34	22	254
IV	190	30	17	200	190	34	17	228	190	34	22	294
V	220	30	17	237	220	34	17	264	220	34	22	344
VI	250	30	17	265	250	34	17	301	250	34	22	392
VII	280	30	17	303	280	34	17	338	280	34	22	445
VIII	320	30	17	334	320	34	17	387	320	34	22	503
IX	340	30	17	359	340	34	17	410	340	34	22	536
X	-	-	-	-	370	34	17	461	-	-	-	-

Gauge glasses Applicational range reflex glasses	1) Type A		1) Type B		Type H	
	bar	°C	bar	°C	bar	°C
For media with no significant glass attack, e.g. oils, hydrocarbons	400 150 0-10	120 400 430	265 180 0-10	120 400 430	300 200 0-10	120 400 430
For media with significant glass attack, e.g. saturated steam, HPHW, alkalis	35	243	35	243	2) 42	253

1) Glass types to OeNORM M 7354 or DIN 7081

2) For steam pressures above 35 bar we recommend the use of transparent glasses with mica shields.

● **Transparent glasses A, B, H, TA, 28**



● **Overall dimension (mm)**

Size	Type A			Weight g/piece	Type B			Weight g/piece	Type H			Weight g/piece	Type TA 28			Weight g/piece
	L	B	S		L	B	D		L	B	S		L	B	S	
I	115	30	17	122	115	34	17	137	-	-	-	-	113	27,6	16,8	114
II	140	30	17	152	140	34	17	172	140	34	22	218	-	-	-	-
III	165	30	17	176	165	34	17	204	165	34	22	260	163	27,6	16,8	168
IV	190	30	17	211	190	34	17	238	190	34	22	302	188	27,6	16,8	194
V	220	30	17	250	220	34	17	280	220	34	22	357	218	27,6	16,8	226
VI	250	30	17	280	250	34	17	317	250	34	22	400	248	27,6	16,8	258
VII	280	30	17	314	280	34	17	356	280	34	22	460	278	27,6	16,8	290
VIII	320	30	17	360	320	34	17	407	320	34	22	530	318	27,6	16,8	334
IX	340	30	17	387	340	34	17	430	340	34	22	536	338	27,6	16,8	356
X	-	-	-	-	370	34	17	480	-	-	-	-	-	-	-	-

Gauge glasses Applicational range reflex glasses	1) Type A		1) Type B		Type H		4) Type TA 28	
	bar	°C	bar	°C	bar	°C	bar	°C
For media with no significant glass attack, e.g. oils, hydrocarbons	240 160 0-10	120 400 430	290 200 0-10	120 400 430	340 230 0-10	120 400 430	- -	- -
For media with significant glass attack, e.g. saturated steam, HPHW, alkalis	2) 35 70	243 300	2) 35 85	243 300	2) 42 85	253 300	3) 120 180	324 356

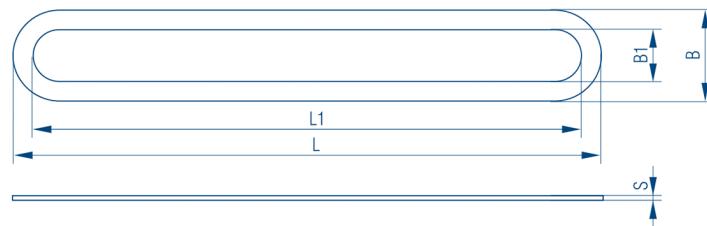
1) Glass types to OeNORM M 7354 or DIN 7081.

2) For steam pressures above 35 bar we recommend the use of transparent glasses with mica shields.

3) For steam pressures above 120 bar only TA 28 glasses. size I. may be used.

4) TA glasses may only be used with mica shields.

- Sealing gasket, cushion gasket made from asbestos-free material

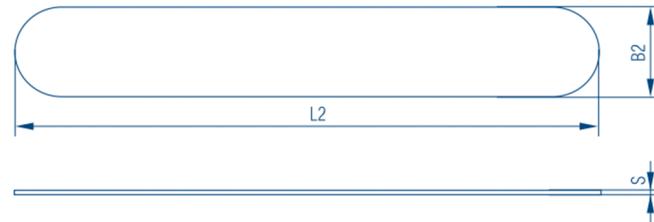


- Overall dimension (mm)

Size	Type A				Type B/H				Sealing gasket and protective gasket 1)				Cushion gasket 2)			
	L	L1	B	B1	L	L1	B	B1	L	L1	B	B1	L	L1	B	B1
O	95	70	30	15	95	70	34	15	-	-	-	-	-	-	-	-
I	115	90	30	15	115	90	34	15	133	97	47	19	112	97	27	17
II	140	115	30	15	140	115	34	15	-	-	-	-	-	-	-	-
III	165	140	30	15	165	140	34	15	183	147	47	19	162	147	27	17
IV	190	165	30	15	190	165	34	15	208	172	47	19	187	172	27	17
V	220	195	30	15	220	195	34	15	238	202	47	19	217	202	27	17
VI	250	225	30	15	250	225	34	15	268	232	47	19	247	232	27	17
VII	280	255	30	15	280	255	34	15	298	262	47	19	277	262	27	17
VIII	320	295	30	15	320	295	34	15	338	302	47	19	317	302	27	17
IX	340	315	30	15	340	315	34	15	358	322	47	19	337	322	27	17

Sealing and cushion gaskets s=1,5 mm    1) Protective gasket s=0,5 mm    2) Cushion gasket s=0,5 mm

- Mica shields



- Overall dimension (mm)

Size	Type A		Type B/H		Type TA 28	
	L2	B2	L2	B2	L2	B2
O	95	30	95	34	-	-
I	115	30	115	34	133	47 1)
II	140	30	140	34	-	-
III	165	30	165	34	183	47 2)
IV	190	30	190	34	208	47 2)
V	220	30	220	34	238	47 2)
VI	250	30	250	34	268	47 2)
VII	280	30	280	34	298	47 2)
VIII	320	30	320	34	338	47 2)
IX	340	30	340	34	358	47 2)

s=0,15-0,20

s=0,15-0,20

1) s=0,60 2) s=0,30-0,40

- Material

- A and B micas: stained first quality
- TA 28 micas: stained A quality

- KEL-F shield

- Size like mica shields
- Type B/H standard thickness = 1 mm

## Specification

<b>Material</b>	Borosilicate glass, thermally prestressed, optically tested, properties as laid down in DIN and OeNORM.
<b>Resistance to bending strain</b>	120 N/mm <sup>2</sup>
<b>Mean coefficient of linear expansion</b>	D 20/300 ≤ 4.5 . 10-6 . K-1; tested to DIN 523328
<b>Transition temperature</b>	tg=500.°C, tested to DIN 52324
<b>Alkali resistance</b>	alkali class 2, tested to ISO 675
<b>Water resistance</b>	Hydrolytic class 1, tested ISO 719
<b>Acid resistance</b>	Acid class 1, tested to DIN 12116

## Quality components

### - Chemical Composition

The chemical composition as well as the coefficient of expansion is continuously checked through glass analyses.

### - Mechanical Strength

Optimum mechanical strength of a gauge glass is attained through heat treatment (pre-stressing) in which – as in the hardening of steel – the glass is brought to a high temperature and quickly cooled down in a stream of air. This procedure increases the bending and shock resistance of the gauge glass to the value demanded by standards. The thermal pre-stressing of a gauge glass can be checked by means of a polarizing filter: as may be seen in the pictures on page 2 and 3, the stress lines are visible on the outer walls of the gauge glass as interference colours. A non-pre-stressed glass does not display these stress lines.

### - Dimensional Accuracy

We check the dimensional accuracy of every glass using special instruments

## Areas of application

- Observation of processes in industrial ovens, driers, filters, strainers, agitators and mixers.
- Observation of vessels such as tanks, boilers, silos
- Supervision of transportation of materials, e.g. in the solid state or liquids such as condensate or cooling fluids.
- Indication of liquid level e.g. of oil level in large gear boxes or of the medium level in impregnation or pouring plants, high capacity transformers, washing plants

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