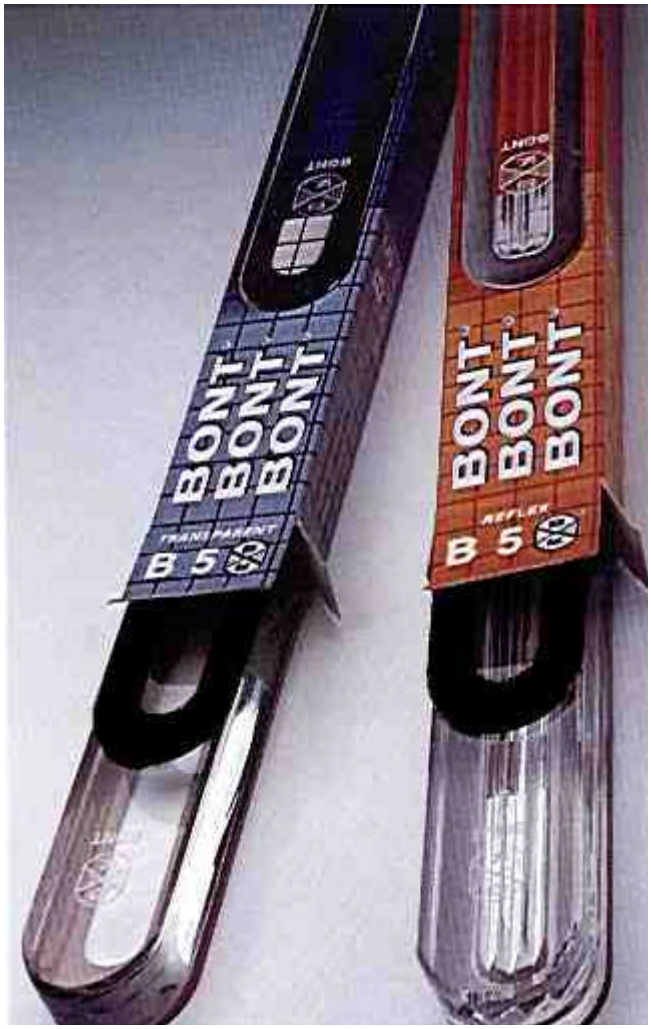
BONT®

Reflex and Transparent Glasses for Liquid Level Gauges

Bulletin B95 - 21 - E



BONT® Sight Glasses for Level Gauges have chemical and physical properties right for the purpose. In fact the brandname BONT® is stamped on the glasses, only if these pass the several tests they undergo during the manufacturing cycle through the final test.
Since our company manufactures yearly the largest quantity of level gauges the world over, we can maintain this supremacy only if all the components of our apparatuses are of the most suitable quality. In fact the glass is a very important component of the gauge.

Applicable Standards

BONT®, sight glasses comply with the following standards:

- DIN 7080 / 7081
- BS 3463
- ONORM M 7353 / 7354
- OMV H 2009
- JIS B 8211
- MIL G 16356 D
- Esso Eng. Spec. 123
- S.O.D. Spec. 123

Chemical Properties

BONTI® sight glasses hold a very precise place as for chemical composition within the very large group of "Borosilicate Glass" which is suitable for many application; this is a necessary condition in order to constantly obtain the requested quality. We do not use other glass qualities which would have inadequate characteristics even when operating conditions are not severe. In this way the products range concentrates along a sole quality with obvious technical and economical advantages.
Each individual BONT® sight glass is manufactured by moulding, using only the inside of the melted part and removing the whole external part in order to obtain best quality glasses practically with no striae.
Chemical Resistance of BONT® sight glasses is due also to their heat treatment and all events they show the following properties:

- Hydrolytic Resistance: DIN ISO 719, Class 1
- Hydrolytic Resistance: DIN ISO 720, Class 1
- Alcali Resistance: DIN ISO 695, Class 2
- Acid Resistance: DIN 1776, 100 ug Na_2 on 100 cm^2

Hydrolitic Resistance is particularly important for glasses fitted on steam boiler level gauges at low and medium pressure.

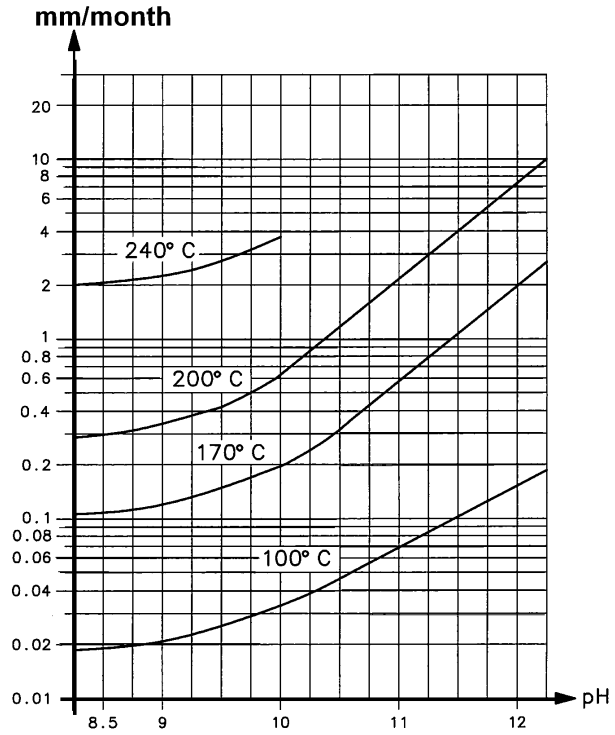


Fig. 849 Reduction (mm/month) of glass thickness without protection,proceeding on boiler water pH and temperature

Physical Properties

- In order to reach the requested physical properties, each
- glass is heat treated according to a process similar to steel hardening treatment. Glasses are therefore called:
- tempered, toughened, hardened, prestressed, or extra hard. These definitions are perfectly equivalent. Final result depends obviously on raw material quality and heat treatment accuracy.

Main physical properties are:
Resistance to bending strain: >150 N/mm 2
Mean Coefficient of linear expansion (30 °C to 300 °C): ≤ 4,3 . 10-6 . K-1 - DIN 52328
Transition Temperature: 550 °C - DIN 52324.
Main physical property is Resistance to bending strain, very high in BONT®, sight glasses.
Other important positive features are:

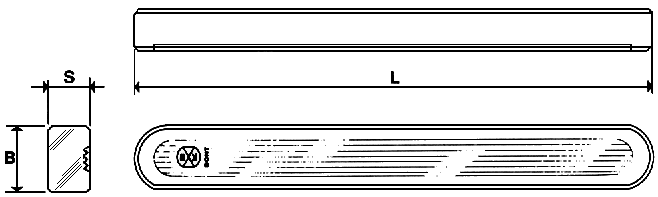
- high transparency
- colourlessness
- no inclusions
- no internal striae
- regular polarization pattern indicative of precise toughening (Fig. 803)
- good thermal shock resistance: glass must withstand instantaneous thermal shocks breakages through a Dt of 265 °C.

Special attention shall be paid to length, width, thickness and especially flatness tolerances. From the latter point of view BONT® sight glasses have very strict tolerance values, definitely lower than most of the ones on the market. What above ensure less stress and longer life of glass and joints.

Reflex or Transparent Glasses

There are two types of sight glasses:

Fig. 801 Reflex Glass



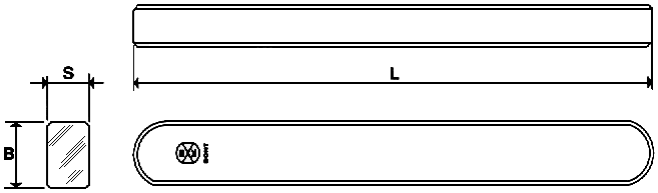
These glasses have one smooth face (external face) and

the other face provided with moulded prismatic grooves (internal face).

For application with reflex level gauges.
Reflex glasses have following dimensions:

Size	Type A			Type B			Type A-BR13		
	Length	Width	Thickn.	Length	Width	Thickn.	Length	Width	Thickn.
	L	B	S	L	B	S	L	B	S
1	115	30	17	115	34	17	115	30	17
2	140	30	17	140	34	17	140	30	17
3	165	30	17	165	34	17	165	30	17
4	190	30	17	190	34	17	190	30	17
5	220	30	17	220	34	17	220	30	17
6	250	30	17	250	34	17	250	30	17
7	280	30	17	280	34	17	280	30	17
8	320	30	17	320	34	17	320	30	17
9	340	30	17	340	34	17	340	30	17

Fig. 802 Transparent Glass



These glasses have both smooth faces.

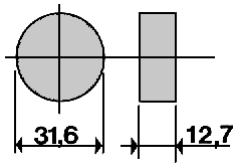
For application with transparent level gauges.
Transparent glasses have following dimensions:

Size	Type A			Type B			Type A-BT12		
	Length	Width	Thickn.	Length	Width	Thickn.	Length	Width	Thickn.
	L	B	S	L	B	S	L	B	S
1	115	30	17	115	34	17	–	–	–
2	140	30	17	140	34	17	–	–	–
3	165	30	17	165	34	17	163	27,6	16,8
4	190	30	17	190	34	17	188	27,6	16,8
5	220	30	17	220	34	17	218	27,6	16,8
6	250	30	17	250	34	17	248	27,6	16,8
7	280	30	17	280	34	17	278	27,6	16,8
8	320	30	17	320	34	17	318	27,6	16,8
9	340	30	17	340	34	17	338	27,6	16,8

- Size of glasses are now indicated by Arabic numerals (1, 2, etc.). Former size indication was in Roman numerals (1, 11, etc.).
- Transparent glasses type A (cross section 30 x 17 mm) are only spare parts for old pattern level gauges manufactured by us before 1945.
- Transparent glasses type A-BR12 are only spare parts for transparent bodies type BT12, non more in production.

A special transparent glass is the round glass for application with high pressure (usually bicolour) level gauges. This glass is a small disc (Fig. 792.4) with very strict tolerances.

Fig. 792.4



Joints for glasses

- Each sight glass is usually supplied with 2 joints (1 sealing joint + 1 cushion joint), of asbestos free material.
- External length and width of joint are the same as those of the respective glass. Standard thickness is approx. 1.3 mm.
- Reflex glasses type A-BR13 - for fitting in BONT® reflex gauges type BR13 - need special sized joints. See maintenance instructions.
- Transparent glasses type A-BT12 - for fitting in BONT® transparent gauges type BT12 - need special sized joints. See maintenance instructions.

Glass Protection

When glass protection against corrosive fluids is to be taken into consideration, remember that protective sheets are always smooth and consequently they can shield the smooth face of transparent glasses but not the grooved face of reflex glasses. Therefore:

- reflex glasses: only external face can be shielded by mica sheets or other materials against corrosive environmental agents.

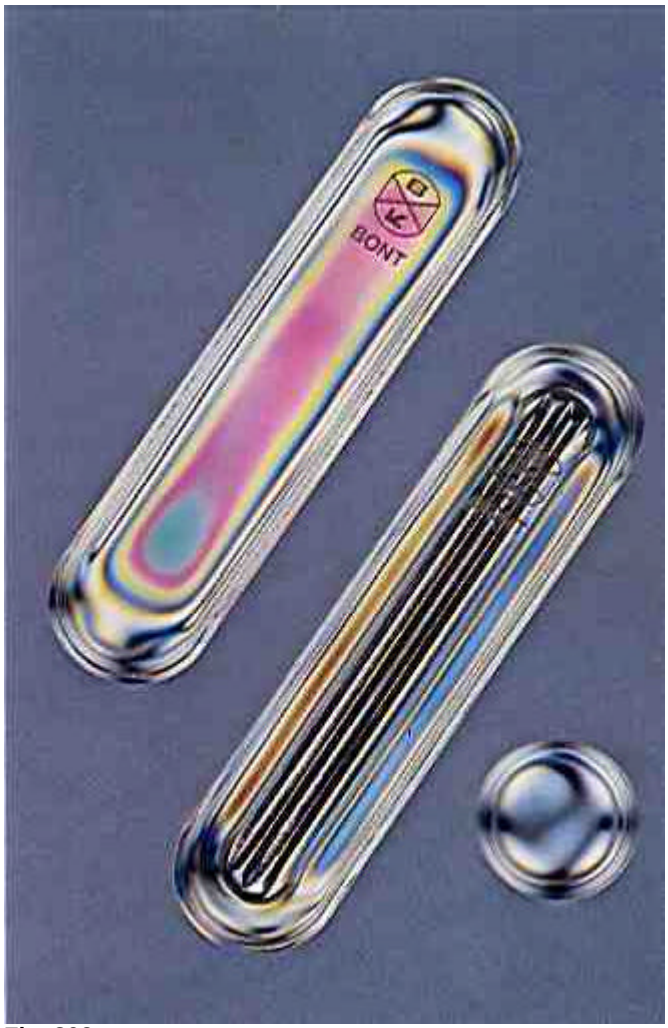


Fig. 803

- transparent glasses: both faces can be shielded by mica or transparent polytrifluorochloroethylene (Kel-F) sheet. Protection of the internal glass face in contact with fluid is usually sufficient.

The most frequent application of protective shield to glasses is with water/steam in boilers. In fact increase of operating pressure (and therefore of saturated steam temperature in level gauge) coincides with increase of water corrosive power, given that the max operating condition for reflex glasses is 35 bar (and 242 °C) water/steam, because their grooves cannot be shielded by any protection sheet.
We always recommend use of mica sheets as protection of transparent glasses on transparent level gauges with water/steam. The standard thickness of a mica sheet is 0.15 to 0.20 mm.
With regards to maintenance, strictly follow manufacturer instructions.
Maintenance must be made immediately when:

- leakage appears, even if very small;
- the glass appears opaque or slightly white specially in the steam area;
- grooves of the reflex glasses show sign of corrosion and/or erosion and the reading of the level is not clear.

The lack of maintenance and the lack of replacement of the deteriorated parts can cause the breakage of the glasses with all the relevant consequences.

Non-frosting Blocks

Frost on gauge obstructing level reading could develop when level gauge operates at fairly low temperature.
In such cases no modifications are needed for glasses, but a non-frosting block of transparent acrylic resin must be fitted outside the gauge body and sealed against the glass. This block shall have its protrusion higher than the probable frost thickness.

Recommended protrusion:

Working Temperature of the Fluid	Protrusion of the Block
0 °C through -19 °C	38 mm
- 20 °C through -49 °C	75 mm
- 50 °C through -99 °C	150 mm
-100 °C and lower	200 mm

BONT®

The Brandname offering

the widest range of Glass Level Gauges:

- **choice of types**
- **design conditions:** **PN 6 to PN 420**
  ANSI 150 to ANSI 4500
- **choice of manufacturing materials:** **Carbon Steels**
  Stainless Steels
  Hastelloy
  Monel
  Nickel
  Titanium
  Plastics

Branch Offices in Foreign Countries

Germany	**Bonetti Armaturen GmbH**	In den Fritzenstücker 4 - D 65549 LIMBURG / LAHN Tel. (06431) 7 20 41 Fax (06431) 7 20 66
Australia - New Zealand	**Bonetti Australia Pty Ltd**	136 Union Street (P.O. Box 170) BRUNSWICK, 3056 (Australia) Tel. (03) 3874311 - Fax (03) 3880698

Ask for information about our International Network of Technical Sale Representatives.

C E S A R E B O N E T T I S . p . A .

I-20024 GARBAGNATE MILANESE (Italy)
Via Cesare Bonetti 17
Telephone: +3902 990721- Telefax: +3902 9952483
Internet: http://www.cesare-bonetti.it

Export sales: **Telephone +3902 99072444**
Telefax +3902 99072400
E-mail: export@cesare-bonetti.it