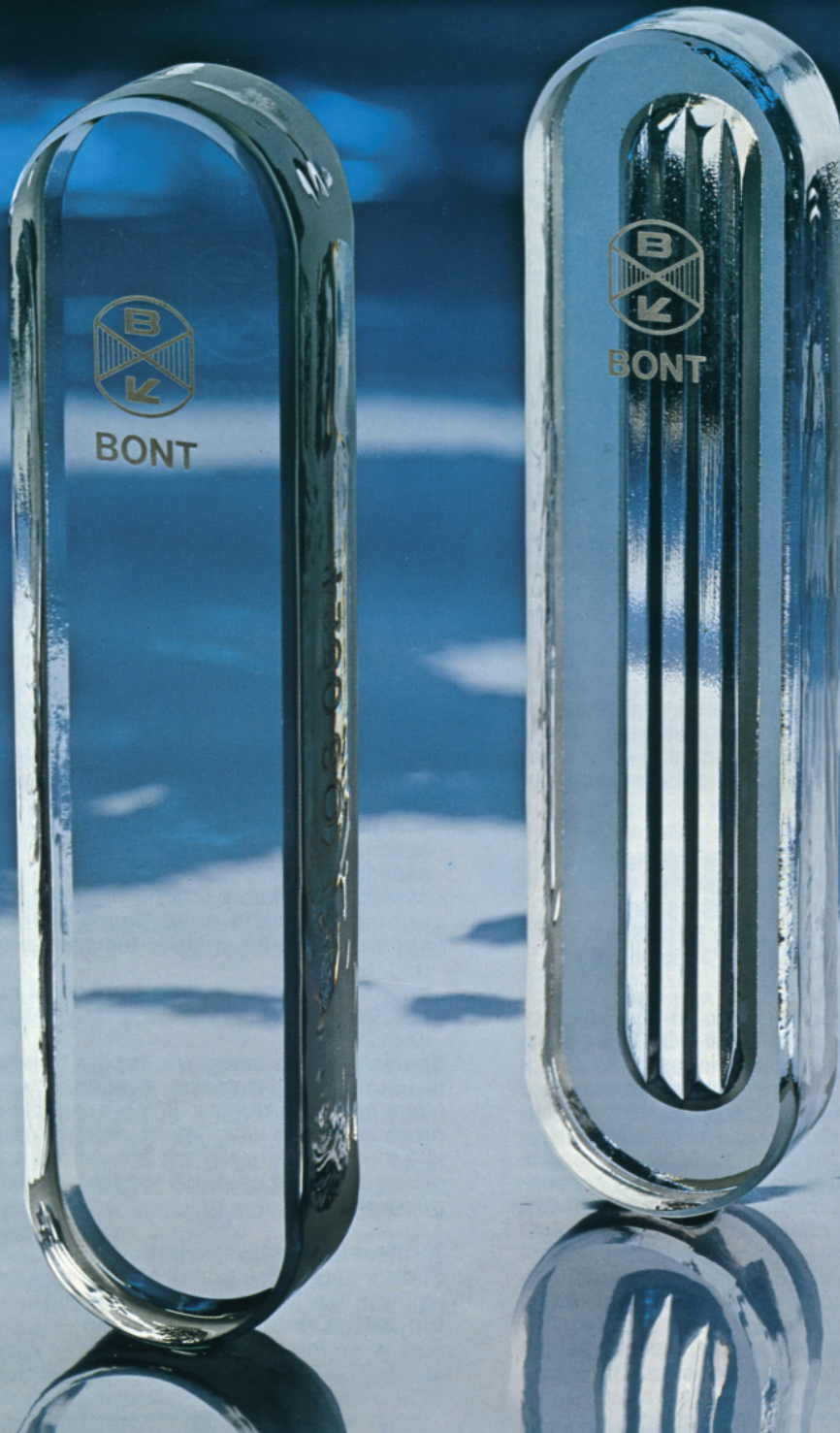
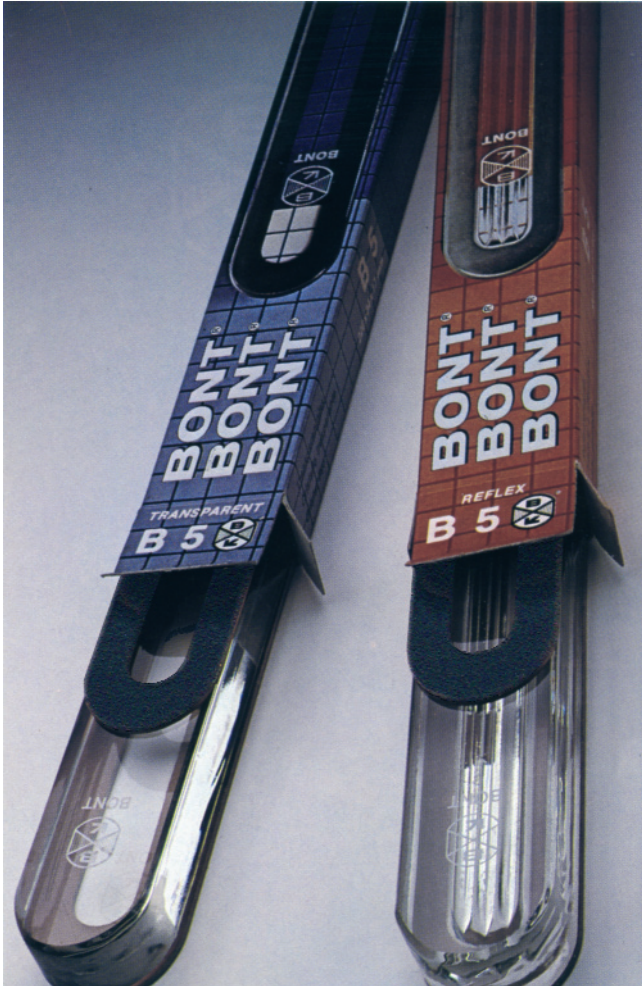


# BONT<sup>®</sup>



**Reflex and Transparent Glasses  
for Liquid Level Gauges**



**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

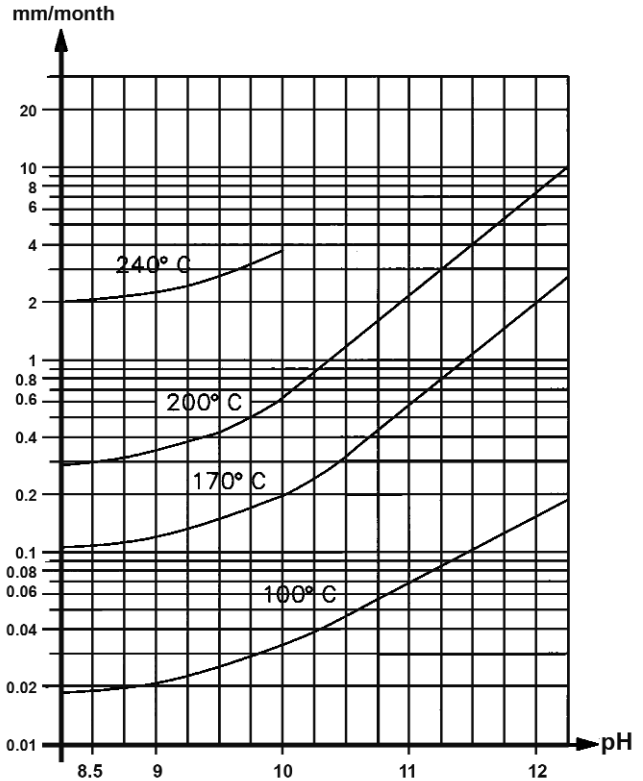
BONT® sight glasses hold a very precise place as for chemical composition within the very large group of "Borosilicate Glass" which is suitable for many application; this is a necessary condition in order to constantly obtain the requested quality. We do not use other glass qualities which would have 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
- Alkali Resistance: DIN ISO 695, Class 2
- Acid Resistance: DIN 1776,  $\leq 100 \mu\text{g Na}_2\text{O}$  on  $100 \text{ cm}^2$

Hydrolytic 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:  $>150 \text{ N/mm}^2$
- Mean Coefficient of linear expansion ( $30^\circ\text{C}$  to  $300^\circ\text{C}$ ):  $\leq 4,3 \cdot 10^{-6} \cdot \text{K}^{-1}$  - DIN 52328
- Transition Temperature:  $550^\circ\text{C}$  - 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  $\Delta t$  of  $265^\circ\text{C}$ .
- 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.

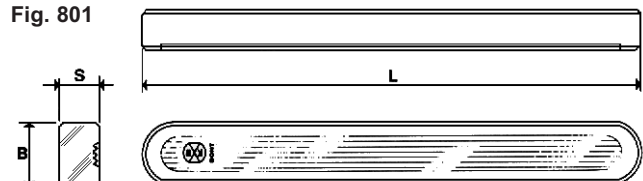
#### Reflex or Transparent Glasses

There are two types of sight glasses:

**Reflex type** (Fig. 801) for application with reflex level gauges.

These glasses have one smooth face (external face) and the other face provided with moulded prismatic grooves (internal face).

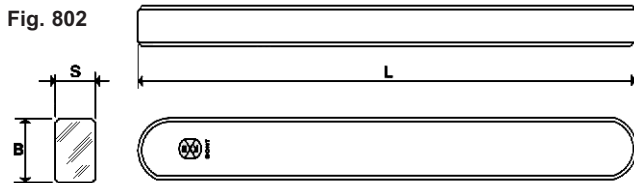
**Fig. 801**



Reflex glasses have following dimensions:

Size	Type A			Type B			Type A-BR13		
	Length	Width	Thickn.	Length	Width	Thickn.	Length	Width	Thickn.
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

**Transparent type** (Fig. 802) for application with transparent level gauges. These glasses have both smooth faces.



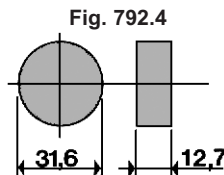
Transparent glasses have following dimensions:

Size	Type A			Type B			Type A-BT12		
	Length	Width	Thickn.	Length	Width	Thickn.	Length	Width	Thickn.
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.



#### Joints for glasses

- Each sight glass is usually supplied with 2 joints (1 sealing joint+1 cushion joint), of asbestos free material (Standard is Graphite).
- External length and width of joint are the same as those of the respective glass. Depending on type, thickness can be between 0.75 and 1.5 mm approx.
- 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.
- 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.



Fig. 803

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.

#### Maintenance

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®



# BONETTI®

The brandnames 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 materials:   **Carbon Steels**  
                                  **Stainless Steels**  
                                  **Hastelloy**  
                                  **Monel**  
                                  **Nickel**  
                                  **Titanium**  
                                  **Other special Alloys**  
                                  **Plastic Materials**



In 1905, **Cesare Bonetti** opened a shop in Milan, Italy, to manufacture small hand valves to meet the local demand. In the early 1920s, this small but growing firm, took on a new industrial look and moved into the production and sale of industrial valves.

**BONETTI®**, by this time, had become a well known company for the production of piston valves, sleeve-packed cocks, and glass level gauges. Subsequently, the production range, bearing the **BONT®** and **CMI Pasquini®** registered trademarks was increased to include new valves for high temperature and high pressure service designed to meet the strictest requirements of the time and using the most advanced design and manufacturing technology. This included double sealing valves, bellows valves, diaphragm valves. **CESARE BONETTI** Company had become also the most world known bypass level indicator manufacturer. Its complete range includes both glass and magnetic type, as well as electric and electronic systems and accessories for reading, monitoring and transmitting the level signal.

After two expansions, in 1969, the company moved to its new headquarters and main factory in Garbagnate Milanese, where Bonetti continues its passion for growth through research, development and design accuracy. Such expansion continued with the new factories of Limburg an der Lahn (Germany) and Suzhou (Popular Republic of China).

Production facilities are supported by international joint-ventures and by a sales network serving Customers around the world.

In 2005 BONETTI purchased Williams Valve Engineering ball valves business and manufacturing, moving all facilities in its Garbagnate main factory.

**WVE (Williams Valve Engineering)** trademark now identifies the new Bonetti's ball valve line.

This, in turn, increases its opportunities to continue to grow and expand.

Facilities:	
Enclosed surface	66,000 sq.m
Offices building (with car parking below) for three stories	2,200 sq.m
Facilities building (mess-hall, locker rooms, sanitary department, etc.) for three stories	2,000 sq.m
Manufacturing shed (including Production Department and general Facilities)	19,000 sq.m

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