



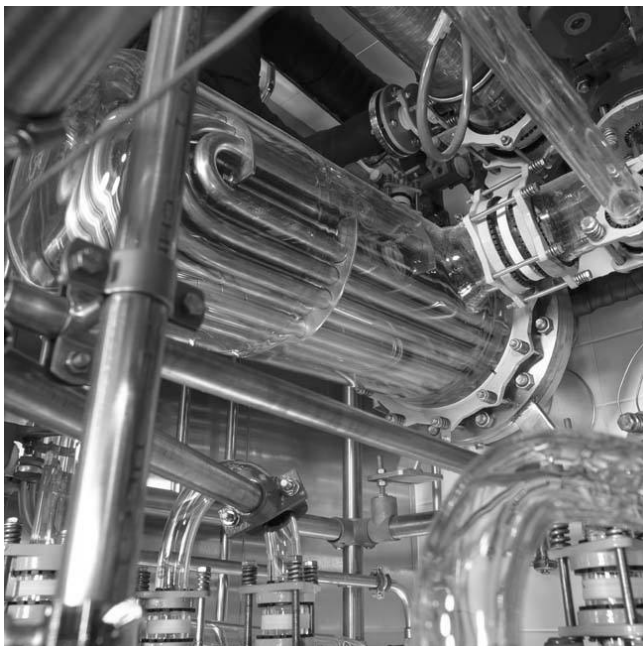


## BOROSILICATE GLASS 3.3 A MODULAR KIT WITH A SYSTEM P140e.0

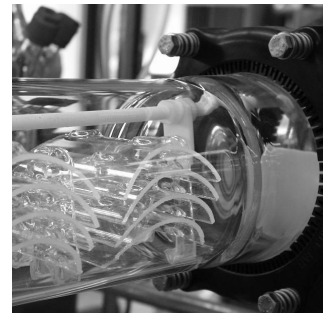
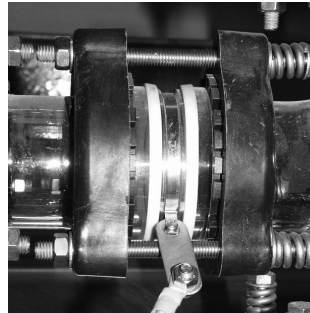
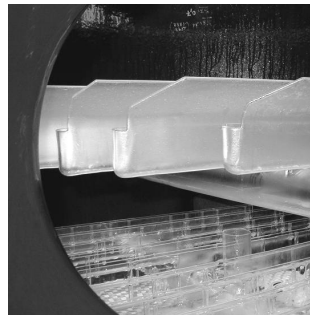
There are above all four properties that make borosilicate glass 3.3 a recommendable material for plant and pipeline in the chemical and pharmaceutical industry. First and foremost of course its almost universal resistance to corrosion. In times of increased GMP requirements corrosion-resistant can also be translated as inert, i.e. having no interaction with the material being processed and thus absolutely ideal for pharmaceutical applications.

Nominal bores DN15 to DN1000

-  Corrosion-resistant
-  Smooth inert surface
-  Transparency
-  Modular kit system with CE mark



Heat exchanger made from glass and stainless steel



Its second special property is its extremely smooth surface which makes it difficult for materials to bake on and also indicates its suitability for GMP applications because it can be cleaned so well.

Although often seen as not important at in the case of PMS-controlled plants, its transparency is a decisive benefit of borosilicate glass 3.3 plant and pipeline. It is not only in the event of a breakdown or when starting up plants that visual control of the process is a benefit, but also, when monitoring production, the operating staff can often see changes in colour or the carry-over of droplets that long go unobserved by the measurement and control system.

The fourth special feature is the comprehensive modular kit system that has been developed for borosilicate glass 3.3. There is virtually no other corrosion-resistant material that has so many standard units and components available as borosilicate glass 3.3. The range available includes not only pipeline and fittings but also valves and related components, column components and vessels plus readings recorders for all the current measurement values.

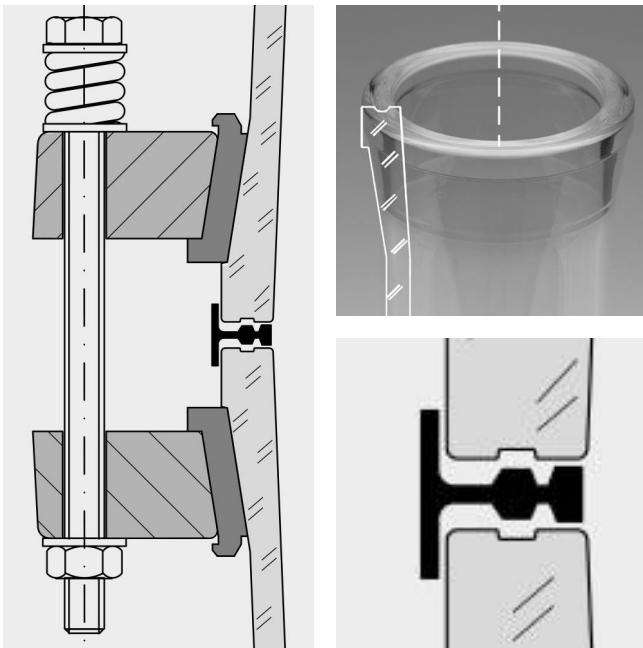
## HIGH-TECH FROM SAND

Borosilicate glass 3.3 consists of silica (80%), boron trioxide (13%), aluminium oxide (2.25%), soda (3.5%), with its high boron content giving the glass its name. Its properties are laid down in ISO 3585. This standard lists its chemical and mechanical properties. The distinguishing feature of the material is its extremely low linear thermal expansion coefficient which is  $3.3 \times 10^{-6} \text{ K}^{-1}$  and which is the derivation of the full designation of borosilicate glass 3.3.

## THE BENEFIT OF THE FLAT BUTTRESS END

The fundamental benefit of the QVF® modular kit system lies in the pipe ends used, the assessment of which has changed in recent years. Whereas priority was given at one time to supposed flexibility in modifying plants for short periods, nowadays, as it is no longer permissible to carry out modifications without prior planning and documentation, reliability and technical accountability are the main considerations.

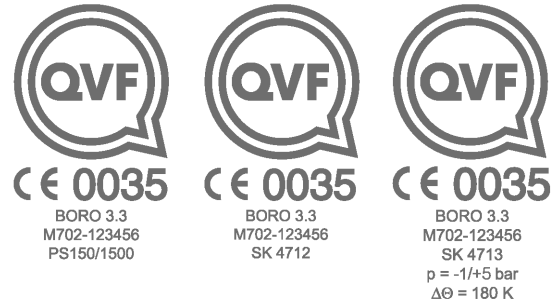
In addition to the basic benefits of the flat glass buttress end the "safety flat buttress end" (SPF) developed by QVF® has two special features which make it the obvious choice for GMP-compliant plant. All nominal bores up to DIN 300 have fire-polished sealing faces and a groove. The groove stabilises and ensures positive location of the PTFE gasket seated on the extremely smooth sealing face. Together with the special GMP gasket, which, via centring in the groove and on the outer edge, effects a seal on the inside diameter of the flange, the safety flat buttress end provides a coupling with minimal dead space in pipelines laid out at an angle of at least 5°.



Safety flat buttress end with GMP gasket

## CE MARKING

The former basis for the calculation and layout of glass plant was the German pressure vessel regulations and the relevant sections of the AD data sheets, especially AD-N4. In the course of harmonisation within the EU the pressure vessel regulations changed into European Pressure Equipment Directive 97/23/EC. This specifies that since June 2002 all glass plant must comply with this new European standard. Since this date it has been compulsory throughout Europe for all glass components from DN25 nominal bore upwards to carry the CE mark at a permissible pressure greater than 0.5 bar.



The World Product Range 2002 complies with this requirement. All the components comply with the new standard and carry the CE mark and the accreditation number of the relevant technical testing organisation.