NAUTILUS MARINE SERVICE GmbH

History of VITROVEX
VITROVEX, Glass products for marine science and technology
Scientific systems and instruments
The Start

1989  First contact with JENAer Glaswerke, GDR

1990  Experiments with mouth-blown hemispheres and unsuccessful pressure tests

1991  First samples form steel mould and hydraulic stamp, pressure tests now successful

1994  Production by PILOTÉC GmbH

1997  Production by QVF Pilotec GmbH
Present Status

1998  Glass moulded by SCHOTT in Mainz

2002  QVF closes factory in Jena

2003  Nautilus takes over the marine product line

Since 1992 the same staff works for the VITROVEX line of products ensuring constant high quality derived from experiences gained in 16 years.
Material and Properties

VITROVEX products use SCHOTT borosilicate glass 3.3

Glass has properties which makes it ideally destined for deep sea use. It is
-corrrosion resistant
-light
-chemically, electrically and magnetically inert
-transparent
-inexpensive
Liquid glass flows from the dispenser into the mould (covered)
Production 2

A 17“ hemisphere in mould

Photo: SCHOTT
Production 3

Vacuum lifter transfers hemisphere from mould

Photo: SCHOTT
Production 4

Transfer from moulding station to transport

Photo: SCHOTT
Annealing

Photo: SCHOTT
1. Equator ground by milling machine and diamond tools (today grinding compound)

2. Manual smoothing

3. Manual polishing
Drilling

1. Adjustment of hemisphere on a rotatable and tiltable platform
2. Drilling according to specified location and diameter
3. Flat ground for sealing
Assembly of Connectors

Penetrators assembled according to customer’s specification for use as a glass instrument housing for an ocean bottom seismometer (OBS)

Photo: WHOI
VITROVEX Products 1

- Glass Floatation
- 17 inch for 6.700m, 9.000m and 12000m waterdepth
- 13 inch for 7000m waterdepth
- Other sizes upon request
Glass Floats are used as buoyancy material within oceanographic mooring.

Typical Currentmeter mooring system (AWI)
EDDYGRIP Floatation Modules

EDDYGRIP is a swivelling sphere attachment. It is neutrally buoyant and seawater resistant. Developed, tested and patented by Alfred-Wegener-Institut for Polar- and Marine Research.

Eddystop is a stopper to keep floatation in place.

Eddyrope is a 10mm rope made of Kevlar or Dyneema provided with a polyester protection braid.
VITROVEX Instrument Housings

- Glass Instrument Housings
- 17“ Spherical
- 13“ Spherical
- Cylindrical

Photo: CPPM-Marseille
VITROVEX CIH

- Cylindrical Instrument Housings

  used as LED-Beacon for calibration of ANTARES strings

  OAL  320mm
  OD   187mm
  ID   159mm
  P    600 bar
VITROVEX Laser Beacon

- Glass/Titanium Instrument Housing used as Laser Beacon
- Development in co-operation of University Valencia/Spain, SICO Quartz/IKTZ & NAUTILUS
VITROVEX Antennae

- Glass/Titanium Housings used as:
  - GPS antenna
  - DGPS antenna
  - GPS-Mouse
  - IRIDIUM antenna
  Submersible 3000m or 6000m
VITROVEX O-Ring Seal

- Instrument Housings, spherical with O-ring seal
- Used as pressure housing for main control electronics of an Autonomous Underwater Vehicle (AUV') of BLUEFIN ROBOTICS
In co-operation with the University in Hamburg, Geophysical Institute we developed a long-time recording Multi-Parameter recording system for seismological Research.

New version w/titanium frame
VITROVEX Seismometer
Measured Parameters

- Motion x, y & z
  - Frequency: 50 Hz to 50 (100) s
- Sound
  - Frequency: 10-3000Hz
- Current, temperature
  - Optional
- Attitude (heading, pitch and roll)
  - +/- 30° optional
- Tilt
  - 1° +/- 0.001° (optional)
Optical Domes

- Different optical quality
- 50-150mm diam.
- up to $\lambda/2$ surface
- BK7, quartz or borosilcate glass
Advantages of VITROVEX

1. High dimensional constance, providing that hemispheres can be mingled.
2. Hemispheres need no orientation due to high accuracy polishing
2. High transparency allows simple optical applications

UW Crawler with pan&tilt video camera (VENUS)
Photo: IUB-Bremen
The technological know how of glass and combination of glass and metal is utilised to develop new products.

The source of our glass is SCHOTT, the leading glass manufacturer.

The manufacturing methods are appropriate to the material and guarantee first class products.