IBK fibertec

GRP Antenna Radomes

Self-Supporting Cylinders and Panels

Radomes – Advantages

Communication antennas have been erected on tall tower structures. Enclosing these antenna systems with glass-fibre reinforced plastics (GRP) will have several advantages:

- The antenna systems are protected against environmental conditions like accumulation of ice, snow, rain, wind and dirt
- Antennas are protected against corrosion
- The antenna systems can be upgraded, inspected and maintained at any time regardless of weather conditions

We generally offer two possibilities to protect antenna systems:

- Self-supporting GRP cylinder to substitute the supporting structure of a steel mast
- GRP panels (hanging segments) which are mounted around a steel mast

Weather resistance

The surface of a radome is composed of three coats of varnish which corresponds to the latest technical standards and results in maximum brilliancy of colour as well as durability.

Hoher Bogen, Germany · Self-supporting radome

Wendelstein, Bavarian Alps
Erecting new radome with DVB-T antennas from KATHREIN

Dresden, Germany

Lifetime

Tests with a 20-year-old GRP cylinder showed that the statical and dynamical properties nearly didn't change. Many cylinders were erected more than 30 years ago!

Quality

Regarding these outstanding radomes it is obvious that we are aware of our special responsibility for these products. Only products with the highest quality level will leave our factory which is unique in this industry.

Brocken, Germany · Cylinder, dia. 5.25 ft., height 75.5 ft. · Panels, dia. 14.1 ft. and 21.3 ft., height 55.8 ft. and 118.1 ft.

GRP panels

Mounting GRP panels on a test facility at IBK-Fibertec

Säntis, Switzerland · 126 ft. self-supporting GRP cylinder on top and GRP panels with a height of 219.5 ft. beneath

Sizes

The cylindrical or conical radomes are produced on electronically controlled filament winding machines.
The cylinders are made by the continuous winding of resin and roving it onto a mandrel.

We are able to produce GRP cylinders with diameters from 0,66 ft. up to 13 ft.

Our longest mandrel with a diameter of 5.25 ft. has a length of more than 72 ft.

The length of a self-supporting cylinder is limited by the allowed deflection of the top and its diameter.

Having a diameter of 5.25 ft. we can realize self-supporting radomes with a length of more than 100ft.

Due to our manufacturing process GRP panels can be produced in a great variety of forms and diameters.

Filament winding at IBK-Fibertec using a mandrel with a diameter of 5.25 ft. and a length of 72.2 ft.

GRP cylinders · Diameter 1 ft. · Length 19.7 ft.

Düsseldorf, Germany · Conical GRP cylinder (1981 – 2004)
Diameter 9.9 – 13.1 ft. · Length 52.5 ft.

GRP cylinder · Diameter 9.9 ft.

Self-Supporting Radomes – Components

IBK-Fibertec developed several technical details and options for the radomes to meet various economical and technical requirements of our customers:

Scruton Windings

In order to reduce wind-induced vibrations you can spend scruton windings around the surface of the cylinder. In order not to disturb the antenna's radiation they are made of GRP.

Oscillation damper

In addition to scruton windings IBK-Fibertec offers a passive damper which can be adjusted to damp the whole tower.

Cross Bars and Holders

In order to mount the antennas inside a cylinder you need bars and holders which can be made of steel.
They can be also produced of GRP to minimize the influence of the radiation.

Lightning protection

On top of the radomes it is possible to install lightning rods or a robust lightning basket with a railing function. Lightning ropes outside connect the lightning basket with the tower structure beneath the radome.

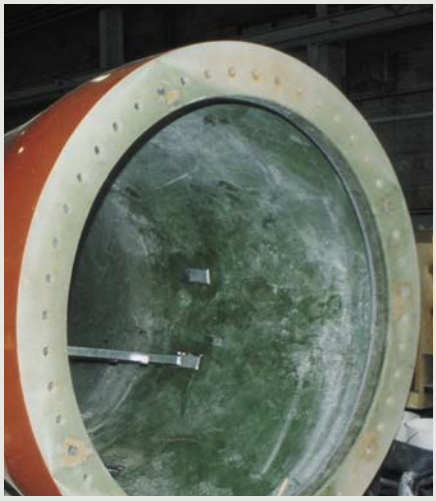
Caps

The radomes have a cap which can be made of galvanized steel or GRP.
The default cap has

- a hatch
- an air drain
- fittings for the aircraft lighting
- fittings for lightning rods or a lightning basket

Flanges

- External, galvanized steel flange
- Internal, galvanized steel flange
- External GRP flange
- Internal GRP flange



Internal GRP flange

External steel flange

Oscillator damper

Scruton windings

GRP cap

Steel cap with lightning basket

Cylinder Design

Each radome is produced according an extra structural analysis. In addition material characteristics are evaluated and compared to the calculations concerning the radomes capability to withstand the force of wind, accumulation of ice or the power caused by an earthquake.

The demand that a certain deflection at the top of a radome shall not be exceeded has the consequence that the safety factor of a self-supporting IBK-Fibertec radome is much higher than statically necessary. In order to compare theoretical and practical behaviour of a self-supporting radome a crash test was carried out in 1989.

The tested radome had a diameter of 5.25 ft and a height of 42.42 ft. The horizontal force acted in a height of 41.8 feet.

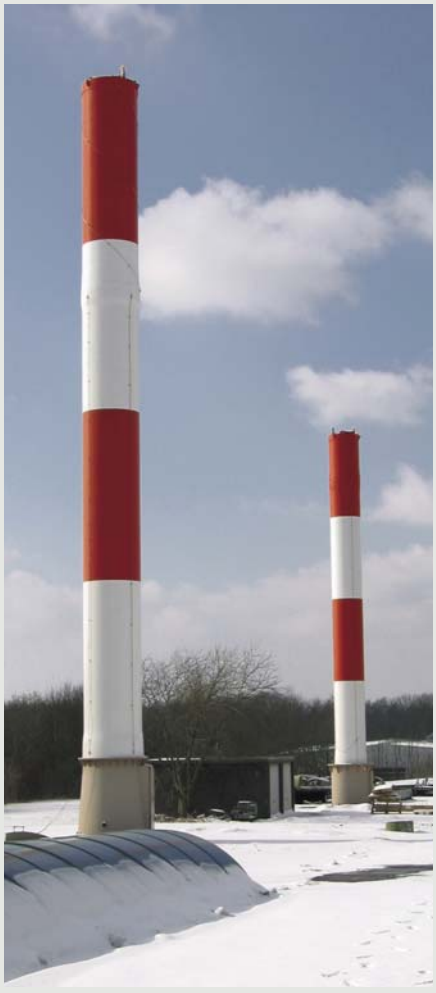
At a top load of 83,790 pounds the test had to be interrupted because the steel flange of the test bed and the fixing bolts of the radome had been heavily deflected. However, the radome and its flange were not damaged.

Two weeks later after the installation of a new and stronger test bed the crash test was carried out for the second time. This time the GRP-radome started to break having a horizontal load of 105,840 pounds at the top. Thus, the crash test at the test field of ABB Mannheim showed that the ultimate breaking strength safety factor was more than fifteen!

Crash test with a GRP cylinder

Each radome is tested before delivery

Twisted bolts yet before the cylinder could be crashed



GRP cylinders mounted on test facilities at IBK-Fibertec

Erection of Radomes

Generally the GRP cylinders are erected
- with a framework,
- by helicopter or
- by crane.

In case the cylinder with all antennas is too heavy for erecting in one piece it will be designed in several sections, which can be carried and mounted one after another.

About IBK-Fibertec

IBK-Fibertec GmbH is a family-owned company, following the company IBK GmbH which was founded by Manfred Westrup in 1979.
In the years before Manfred Westrup already headed the production and development of GRP radomes at the Deutsche Gerätebau GmbH.
In 2003 his son Harald Westrup and his son-in-law Bernd Burgwedel joined the company and founded IBK-Fibertec GmbH in 2007 to continue the GRP business from IBK GmbH.

References

In 30 years from 1976 until 2006 more than 320 radomes were built and there were no complaint at all. Our radomes are mounted worldwide in more than 20 countries.

Our quality management system
is certified in accordance with
DIN ISO 9001:2000.

ISO 9001 : 2000
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