Welcome to AntennaSelect™ Volume 17 – December 2014

Welcome to Volume 17 of our newsletter, AntennaSelect™. Each month we will be giving you an "under the radome" look at antenna and RF technology. If there are subjects you would like to see covered, please let us know what you would like to see by emailing us at: info@micronetixx.com

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Radomes – part 4

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In this issue of AntennaSelect ™, we will look at pressurized radomes. Pressurized radomes are used where it is desired to keep the antenna elements inside the radome either in dry air or a gas. A dehydrator or gas cylinder in the transmitter building keeps the pressure inside the transmission line and antenna slightly higher than ambient outside air pressure. This keep outside air from seeping into the transmission system. Of the radome systems used for TV broadcast antennas, the pressurized system is the most expensive to build.

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The reason for that is the pressurized radome system is mechanically more complex, and the radome it self is more expensive. Pressurized radomes need to be sealed at each end to keep dry air or gas from escaping. Most often fiberglass is used to build the radome sections. In a long antenna array such as a 24 bay UHF slot antenna, the radome will need to be built in sections and flanged together. Diameters from 12 inches (30.5 cm) to 24 inches (61 cm) are common.

Keeping the radome sealed in the antenna's operating environment requires some additional engineering. First, the expansion of the antenna pylon which is constructed from aluminum or steel will be higher than the fiberglass radome sections over a range of temperatures. The pylon has a lot more strength than the radome, and if there is no compensation for expansion and contraction the radome can easily be damaged.

One method to compensate for the expansion and contraction is to use a bellow. A bellows system installed on one end of the pylon allows it to expand and contract with little mechanical force difference exerted on the radome over temperature. The radome rides over the pylon.

A second issue with a pressurized radome is how do you seal the ends to keep air from escaping ? At Micronetixx we use thick sheets of silicon rubber to form gaskets at each end of the radome. The material is cut into a ring shape and placed on the flanges of the radome. The material has an excellent service life and responds well to large changes in temperature. Holes are cut into the material to match the bolt pattern of the radome system. There is a large surface contact area that ensures an excellent seal to keep dry air in and keep moisture out.

The third issue with a pressurized radome is to keep it from cracking at the flanges. We take an extra step to keep it from happening.

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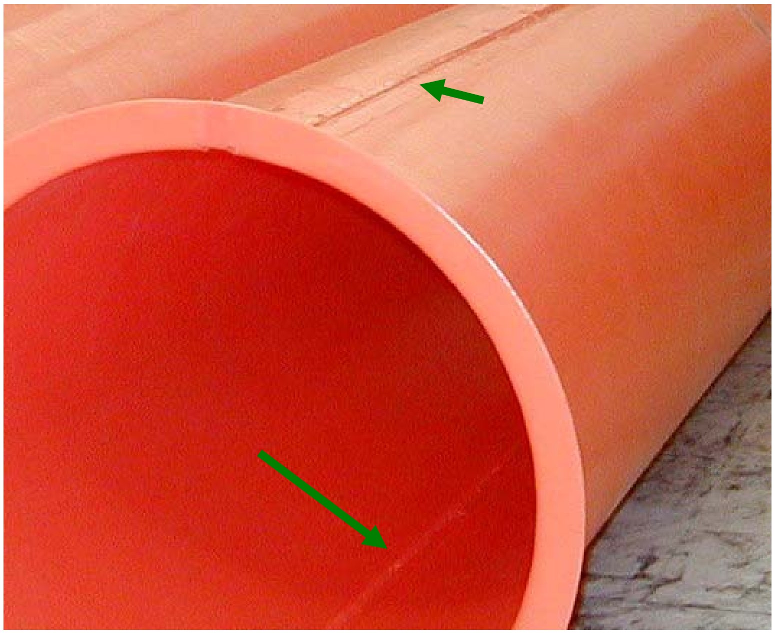
First our pressurized radome systems are formed from wrapped layers of fiberglass material. There are no welded or glued seams.



The picture to the left shows a fiberglass tube that could be used as part of a pressurized radome system. Note the two seams running up the tube. Over time these can easily crack. Even a small crack will allow dry air to escape.

The second issue with using a radome designed like the tube above is flanges on the ends of the radome. This type of design has two drawbacks. First the flange material is thin, making it hard to compress it into the gasket material. Even a slight over tightening of the bolts can cause the flange material to bend The second drawback is the 90 degree angle of the material where the flange meets the tube. This is a major stress point of the radome.

To solve these problems we design our radomes with thicker junction areas at the flanges. Also the flanges themselves are much thicker than the radome tube itself. We also add depressions at each bolt hole to allow the use of oversized washers underneath the bolt heads. This allows us to tighten the bolts down, compressing the gasket material to ensure a good seal. The picture on the next page shows the bottom of one of our pressurized radome systems.

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The picture to the left shows the Radome flange on a side mounted UHF slot antenna. The flange area is thickened up to provide superior strength. The first 6 inches of the radome itself has extra layers of Fiberglass to eliminate cracking.

Fiberglass radomes have a service life of 20 to 25 years. The sun will overtime begin to break down the outer layers of the radome surface. With enough breakdown of the surface the fiberglass belts themselves become exposed. Moisture can get into these belts and when there is a freeze/thaw cycle, break down the material even more.

Something we do at Micronetixx is to paint the radomes with a water based paint. The radome is burnished to enhance paint adhesion and it is then painted. In 3 to 4 years the paint will begin to fail. During that time the radome surface is protected, extending the surface life of the radome.

Pressurized radomes can extend the life of the antenna itself, especially in marine climates. If the antenna is kept under pressure, the elements of the antenna should look like they just left the factory floor, even after being in service for years.

LPFM antenna mounting tips

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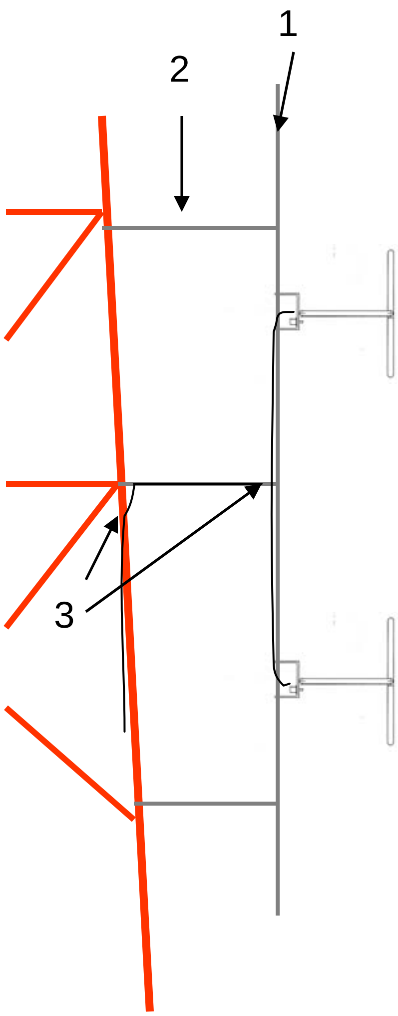
More new LPFM owners are asking questions about mounting their antennas. The majority of the questions we have been getting is mounting circular polarized antennas on structures, such as towers. The antennas themselves are Omni-directional, however the tower behind it will cause some scattering.

A number of stations are planning on using our FML series of low power, circular polarized antennas. For the first example, let's look at the mounting of a two bay antenna on the side of a self supporting tower.



Here are some tips:

1. The mounting pipe should be extended 3 feet or 1 Meter above the top of the FM bay. This mounting pipe affects the tuning of the antenna and its azimuth pattern. It also lessens the effect of the tower structure behind it.

2. The antenna should be offset from the tower by a minimum of two feet, with three feet or one meter a goal. The horizontal pipe should not extend beyond the vertical pipe if at all possible. If the horizontal mounting pole extends past the vertical pole and is close to the antenna, it will slightly detune it and disrupt the vertical component of the antenna.

3. Ground the transmission line where the tee of the antenna is, with as short as possible ground lead. Also ground the line when it reaches the tower with another ground kit. Keep the ground lead as short as possible. The grounding does two things: Behind the antenna are strong RF fields. The grounding of the line keeps the outer conductor from becoming a parasitic of the antenna.

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The second thing the grounding does is lightning protection. Grounding it both places as shown in the drawing minimizes chances of damage if there is a direct strike on the tower or the antenna support system.

Remember to ground the transmission line again at the bottom of the tower and at the entrance to the building.

If you are lucky enough to have a top monopole mount, the same rules apply for the mounting pole above the top bay – 3 feet higher than the antenna is the way to go. If you are using a multi bay antenna, ground the transmission line tee to the monopole with a grounding kit. A second grounding kit located about 4 feet down the monopole will keep the transmission line outer conductor from acting like a parasitic element. Make sure the monopole is well bonded electrically to the structure holding it.

Give you new antenna as much space as possible both horizontally and vertically - you will get the best performance and best coverage.

If you want help in planning your new LPFM station, let us know. Drawing and photos of what you have to work with, help us give you the best solution. We know that you have only 100 Watts to work with, our FML series antennas will give you excellent coverage.

Be on the lookout for the next volume of AntennaSelect™ coming out in February

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1 Gendron Drive Lewiston ME 04240 U.S.A.
V 207-786-2000 www.micronetixxantennas.com