ADC Antennas are designed for all environments

The ADC UHF Broadband Panel

Alan Dick Broadcast engineers have over 30 years of experience in designing antennas for use in all parts of the world from the arctic to the tropics. Since our aim is to supply antennas that have a 25 year life we have to pay particular attention to the many design details that will ensure Alan Dick Broadcast products withstanding all environmental conditions. This is because in the end it is mechanical integrity, rather than electrical performance, that generally determines the life of an antenna. To date we have many systems that are still operating in excess of 25 years.

With so much experience behind us we have the advantage of a considerable amount of feedback. When problems have arisen in the past with a particular product or in an unusual environment, we have been able to learn from them and to apply the experience to improvements. In our opinion there is no substitute for this type of knowledge. Whilst environmental simulation chambers have many uses and go some way, they are not the same as real practise. As a result our customers are today able to benefit from over 30 years genuine experience.

The antennas proposed have been fully developed for a number of years now and incorporate many features necessary to provide long reliable service. We have listed below what experience tells us are the key climatic conditions for many environments which our antenna systems are designed to withstand.

Electrical Storms

Damage resulting from lightning is minimised by making all exposed metallic parts of antenna panels D.C. grounded. Dipole feed inner conductors are also D.C. grounded via short circuit stubs. As a result of the panel design, by virtue of the short circuit reactance compensation stubs across the dipole feed points, all distribution feeders, power dividers and main feeders also have their inner conductors grounded. Their outer conductors are directly grounded by means of D.C. connections to the supporting structure. At both the lower and upper ends of the main feeders it is ADC practise to make a direct D.C. bond between the feeder outer and the support tower.

High humidity

For effects on corrosion see comments on corrosion below:

High humidity on its own does not present any problem, it is only the fact that it makes condensation more likely that requires antenna designs to take account of it. Naturally the area most sensitive to condensation is the inside of transmission lines and power dividers. Generally all R.F. components are sealed against the ingress of humid air. Where this is not the case very conservative air gaps between inner and outer conductors are maintained. Also insulators are of such a design that in critical positions they have tracking paths well in excess of the direct distance between inner and outer conductors. Furthermore the materials used for the insulators make it very difficult to wet their surfaces.

In the case of the offered antenna systems complete sealing of the distribution feeder system is provided and furthermore it is maintained under a small positive internal pressure, via the main feeders, by means of a suitable dehydrator unit which formed a part of our offer. The Broadband Panel input is a gas barrier forming a seal at the extremities of the feed system.

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Dust

The protection measures required to ensure against the intrusion of small water droplets (humidity) and small solid particles (dust), are similar. Thus the precautions outlined in the previous paragraph are equally effective when it comes to protecting the panels and the distribution feeder system from dust and dirt.

High temperatures

High ambient temperatures have the effect of reducing the R.F. power rating of components due to the limited safe operating temperature of dielectric materials. We have designed the antenna systems in accordance with the maximum ambient temperatures likely to be experienced by the installed antennas, plus appropriate factors of safety.

Variations in Ambient Temperature

This can be a problem in unpressurised antenna systems if they are not carefully designed. If components are not sufficiently airtight then they will 'breath' and over a period of time will allow the ingress of water. As a result we pay particular attention to either completely sealing components (power dividers for example) by using double 'O' rings etc., or by deliberately allowing components to 'breathe' (the panel itself has a ventilated radome). Therefore in either case large variations in temperature should not cause a problem.

Ultra Violet Radiation

All exposed non metallic materials have minimum sensitivity to ultra violet radiation. We have in the past carried out exhaustive tests to satisfy ourselves in this respect. The resins employed in the GRP (Glass Fibre Reinforced Plastic) radomes are of the highest quality and conform to all relevant British Standards.

High wind speeds

Our antenna systems are designed to withstand wind speed well in excess of any likely to be encountered. It is obviously important that all fixings are adequately designed to withstand the loads that are imposed upon them. The panels, support spine and interface brackets form an integral unit with respect to mechanical design. ADC is of course well known as a word class designer and manufacturer of masts and towers as well as of antennas. In this respect our in-house design expertise puts us ahead of companies that manufacture only antennas. Attention is also paid to using a sufficient number of rugged cable clamps to ensure that cables are suitably protected against vibration due to high wind speeds.

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Insects

The ingress of insects within sealed feed system components is obviously not possible so in this respect they cannot affect the electrical performance of the antennas. Items that are allowed to breath do so via a very small hole which based on our longstanding experience throughout the world, precludes infestation by insects. Non metallic materials such as the cable jacketing are unattractive to insects in our experience.

Ice

Our antenna systems are designed to handle icing conditions more commonly found in the environments of North America and Europe. From an electrical point of view wet snow is generally more damaging than ice. Covering the panel with a GRP radome affords virtually complete protection.

Corrosion

The panel radiating elements are pressed from brass sheet and assembled using stainless steel nuts and bolts and copper rivets. The panel reflecting screen is NS4 aluminium alloy sheet (an alloy specifically developed for this type of use) with Alocrom anti-corrosion protection finish. As well as providing the electrical reflecting screen for the dipoles the back plate also holds the eight M10 stainless steel hank bushes which provide extremely rigid fixings for the panel. Rigid distribution feeder components are manufactured in copper alloys, which are inherently very corrosion resistant. In the complete array assemblies nuts and bolts that are 10mm diameter or less are rust resisting stainless steel. Larger nuts and bolts are galvanized. There are no aluminium alloys used in the feed systems of the proposed antennas.

Corrosion can be a particular problem when dissimilar metals are in contact with each other. Because of this we keep the number of such joints down to an absolute minimum. Where they do occur we plate one of the surfaces with a material that is electrically more acceptable to its mating surface. For example, the junction between brass and aluminium in the Broadband Panel is electro tin plated. Furthermore we put a corrosion inhibiting paste between all metal surfaces within the distribution feeder and dipole assemblies whether they are dissimilar or not.

Salt laden atmosphere is a well known hazard, enabling corrosion. However, the materials and thought put into our component designs enable Alan Dick Broadcast to point to many successful installations that have withstood such conditions for many years. The same applies to many other forms of airborne pollution.