KYDEX® Thermoplastic Sheet for Radomes (Antenna Covers)

For information applicable to KYDEX® FST please refer to 300 series technical briefs.

TB - 122-A

Introduction

Radomes protect the enclosed antenna from the environment. It also functions to protect the antenna during shipment, handling, and installation. Therefore the radome must satisfy both structural requirements and yet be electrically transparent in the antenna's operating frequency band.

The following properties make KYDEX® sheet ideal for use as Radome material. The grades that are recommended are KYDEX® 100 and KYDEX® 331/331d.

Transparency to RF

At the frequencies in question, the structural covering must be as invisible as possible to the radio signal. For this to be true, the dielectric constant (K) must be low, typically below 3.1-3.5 (Air = 1, Water = 80), and less importantly, the dissipation factor (DF) must be as close to 0 as possible.

Grade	60 Hz	100 Hz	1000 Hz	800 MHz	1 GHz
KYDEX® 100	K=3.4 DF=0.022	K=2.9 DF=0.030	K=3.13	K=2.5 DF=0.023	K=2.8 DF=0.013
KYDEX® 331/331d	K=2.9 DF=0.011	K=2.9 DF=0.012	K=2.9 DF=0.009	K=2.7 DF=0.004	K=2.7 DF=0.005

Grade	1.9 GHz	2.5 GHz	5 GHz	20 GHz
KYDEX® 100	K=2.42	K=2.6 DF=0.011	K= 2.7 DF=0.010	K=2.7 DF=0.009
KYDEX® 331/331d	K=2.6 DF=0.016	K=2.6 DF=0.016	K=2.6 DF=0.016	K=2.5 DF=0.017

Low Water Absorption

As opposed to hydroscopic materials such as ABS and fiberglass, KYDEX® sheet is very hydrophobic (very low water absorption). This is important because the absorption of water can degrade the antenna's performance by reducing the transparency to RF.

Long Term UV Resistance

One purpose of the radome is to make it blend in with its environment; to make it less unsightly. Therefore various colours must be available and it must not deteriorate under exposure to the sun. KYDEX® 100 in white and other light colours has very good UV resistance with minimal colour shift over time when used outdoors. ClearJet UV coating may also be used to increase the UV resistance of KYDEX® 100. Please see TB 142 UV Spray for more information.

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High Impact Resistance

During installation, the cover can take a lot of abuse during handling. The cover must be of a high strength material to withstand this abuse. KYDEX® sheet has one of the highest impact strengths of any polymeric sheet in the industry and is incredibly tough and resilient. This means that it can withstand impacts that would break or shatter most other plastics.

Good Thermoformability

The material must be able to be shaped into the desired three-dimensional shape quickly and easily. KYDEX® sheet is extremely easy to thermoform and will form to the deepest draws and with high definition. Special tooling for forming techniques is not necessary for even the most demanding shapes and detail.

Flammability Resistance

KYDEX® 100 and KYDEX® 331/331d meet UL Standard 94 V-0 flammability resistance. This can be important in meeting local codes or fire regulations. The radome is an important part of the antenna design. It is crucial that the material chosen meet the attributes described above to result in a radome that meets the needs of the designer and functions well over its life span.

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