

Tube Diffuser Membrane Sizing and Ordering

Bulletin Brief

Proper installation, operation, performance, and life expectancy of flexible membranes is directly related to proper membrane sizing for specific applications. Membrane sizing includes overall length, inside diameter, perforation pattern, and how the membrane is secured to the support tube. Membrane design will be impacted by material type (EPDM, polyurethane, silicone, nitrile, etc.). Forwarding an existing membrane to EDI will allow laboratory measurement and assessment of membrane dimensions, material and perforation.

Technical Presentation

Measuring Membrane Length

To determine the membrane length, lay a new membrane out flat on a smooth surface. The membrane should lie naturally and should not be stretched by pulling or flattening. If the membrane typically has the ends rolled over for clamping, the rolled over portion of the membrane should also be laid out flat and included in the overall measurement.

Measurements should be taken to the nearest 0.125" (3.0 mm). If measuring a membrane taken from service, the support tube must also be measured closely as used membranes sometimes change geometry through shrinkage or occasionally swelling.

Measuring Membrane Perforation

While the membrane is laid out flat, measure the total perforation area length. Also, measure the gap or unperforated area on the top and bottom of the membrane.

Measurements should be taken to the nearest 0.125" (3.0 mm). Measurement of the slit, space between the slits, and space between the rows of slits is helpful information. These should be measured with a dial-type caliper with 0.001" (0.0254 mm) markings.

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Diffuser Air Outlets

Measure and confirm the membrane support tube for the location, size, and number of air outlet openings. If possible, include a sketch of the membrane support tube with the measurements.

It is critical to have non-perforated sections of membrane properly positioned over the air outlets in the support tube to assure proper check valve function of the membrane.

Sizing Membrane Inside Diameter (I.D.)

General formula for determining the inside diameter of a replacement membrane is

$$\text{O.D. of Support Tube} + \text{Required Clearance for Installation} = \text{I.D.}$$

The required clearance will vary for different types of material (EPDM, polyurethane, silicone, nitrile, etc.). Measure the support tube diameter carefully. This is the primary factor in selecting a proper diameter membrane. A new membrane on a membrane support tube sent to EDI can also be used to assure proper membrane diameter.

Securing Membrane on Support Tube

Proper securing of the membrane is required to help achieve optimum membrane performance. Clamps which are too loose and do not properly secure the membrane can allow air to escape under the clamp rather than going through the slits in the membranes. Clamps which are too tight, or the wrong kind can damage the membrane and lead to premature failure of the membrane.

For most membranes, EDI recommends all stainless (304 or 316 as required) stepless ear clamp. Stepless ear clamps typically have a very small range of effective clamping and it is therefore critical that the clamp be the proper size. EDI can provide either the correct clamp at time of membrane order, or for membranes with the clamp size undetermined, EDI can provide several samples for determination of best fit.

Worm gear clamps can also be used to secure membranes to the diffuser body. Care should be taken when purchasing worm gear clamps to ensure the entire clamp is stainless. Often, the band and housing on a worm gear clamp are stainless while the screw is not. Once the screw fails, the clamp will fail.

Also, care must be exercised when installing a worm gear style clamp. As the clamp is tightened, membrane material is pushed up into the slots on the worm gear clamp and the membrane can be cut by tightening the screw.

Overtightening a worm gear clamp can also lead to premature failure of the membrane. The sharp edge of the clamp can cut and damage the membrane leading to a leak or tear or in some cases cutting the end completely off the membrane. EDI recommends the stepless ear clamp to assure superior performance.

For specific information on proper design and evaluation of your existing system contact Environmental Dynamics, Inc. at 573-474-9456.