

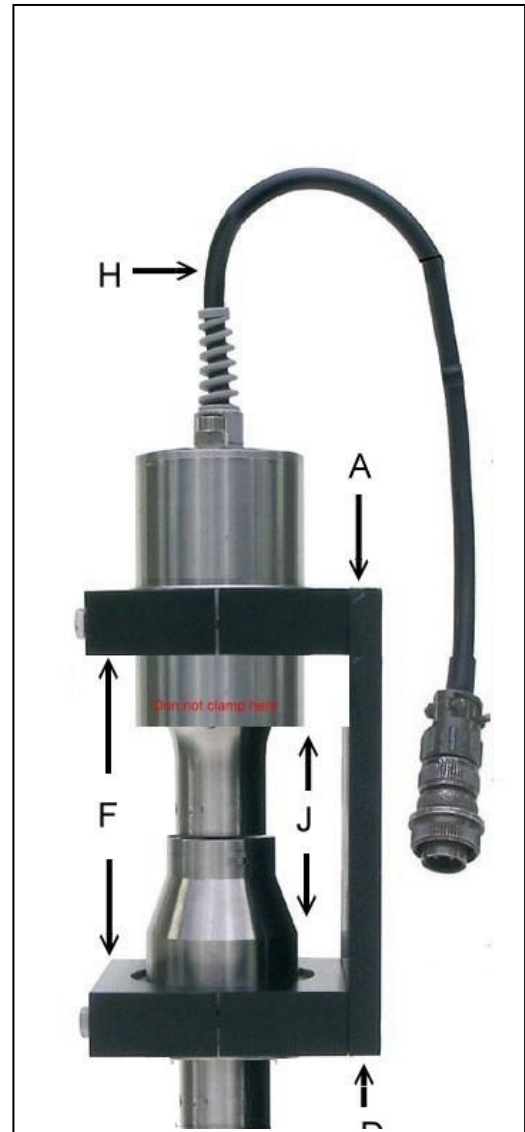
# **Ultrasonic Stack Mounting / Assembling Guidelines**

## **Correct acoustic stack mounting / assembling is vital to process consistency and equipment life.**

- 1) The ultrasonic stack should be supported in two locations. The two supports should be machined together or connected by a common plate which is rigid and prevents deflection, torsion and bending of the stack. A minimum of .5" (13mm) thick aluminum or steel plate should be used.
- 2) The bores of the two supports must be concentric within 0.1mm and must allow for a clearance of .003"-.010" oversize with respect to the booster/horn and transducer clamping ring diameters. This insures that there is no bending or excessive compression force applied to the booster/horn rings and transducer housing.
- 3) The booster/horn support should be designed with upper and lower ridges to prevent the ultrasonic stack from falling out of the support and to provide a thrust surface for axial forces. The support ridge should be .25mm wide and should allow at least .01mm axial clearance to prevent the booster/horn clamp ring from binding in the support and to make installing and removing the ultrasonic stack easier.
- 4) The support design should incorporate slots or other mounting provisions which allow for variation in stack component lengths. Boosters and horns can vary up to .5" (13mm) due to material properties. This may require an adjustment to the height of the stack above the product.
- 5) Supports which use split clamps are preferred for easy setup and adjustment. A minimum of .025" (1mm) gap should be maintained between the upper and lower sections of a split clamp. Inadequate or excessive clamping force can cause premature equipment failure and/or noisy operation. The bolt torque spec is 20 N-m for a 1/4-20 UNF screw (6mm).
- 6) Supports and other machinery must be designed so that there is no contact with the horn or booster except in designated clamping areas as per the guidelines in this document. Any other horn, booster or transducer contact could result in premature equipment failure and/or noisy operation.
- 7) Machinery should be designed to allow for free ultrasonic cable movement without binding. The minimum cable bending radius is 65mm.
- 8) Machinery should be designed so that the cutting or welding forces are axial to the centerline of the ultrasonic stack and parallel to the face of the sonotrode/horn. Offset or side loading can cause equipment failure and/or noisy operation.
- 9) Proper acoustic stack assembly is critical. The ultrasonic booster end which must be attached to the ultrasonic horn is marked on the booster.
- 10) Clean dry air for cooling must be provided to the ultrasonic stack assembly including the transducer. Cooling air must be filtered to 5 micron. No electrically conductive media or condensing water vapor is permitted inside the transducer housing. Additional cooling should be provided to the booster and horn to prevent any part of the ultrasonic stack assembly from exceeding 43°C. Exhaust air from the transducer may be utilized to cool other portions of the ultrasonic stack.
- 11) The transducers are standard rated for IP65. Additional low pressure wash down is permitted but submersion and high pressure wash down may compromise the transducer seals. Consult factory for higher ratings on a case by case basis. Components are made from anodized aluminum, stainless steel and titanium with Viton and Neoprene seals. Material compatibility with cleaning solutions should be verified before putting equipment into service.

- A. Common mounting plate to ensure concentricity between converter, booster and horn flat (+/- .0005"/.013mm).
- B. Slotted mounting holes on common back plate to accommodate changes in horn and booster lengths.
- C. Mount designed with undercuts to take up load from process on booster clamp ring surfaces.
- D. No deflection permitted. Mount should prevent stress and deflection on booster converter interface due to misalignment.
- E. Mount must maintain correct bore tolerances for booster clamp ring and probe. + .005" - .000" (.127mm - .000mm). Bores to be concentric. + or - .005" (.127mm).
- F. Inadequate or excessive clamping force on the these components can cause premature equipment and process failures. Bolt clamp torque specification - 15 lb.ft (20 Nm) 4 places
- G. Air cooling input, sufficient to prevent acoustic stack (horn/sonotrode, booster, converter) from exceeding 110°F (43°C ). (Application/process dependent)
- H. Cable placement to eliminate strain or sharp bends.
- I. Exhaust air may be plumbed to provide additional cooling to converter output end and horn (See Figure A, Page 4.)
- J. Nothing to come in contact with transducer output, booster body or sonotrode/horn. Do not attach to, or modify these components.
- K. Ensure proper orientation of booster, output end to sonotrode/horn.
- L. Load to be centered and parallel to face of sonotrode/horn. Minimize side load of acoustic stack.

**Proper acoustic stack assembly is critical.**



## STACK ASSEMBLY GUIDELINES

### 15, 20, 30 kHz

1. Clean the mating surfaces of the converter, booster, and horn, and remove any foreign material from the threaded holes.
2. Install the threaded stud into the top of the booster. If the stud is dry, apply 1 or 2 drops of a light acid free lubricating oil / Teflon oil or similar before installing.
3. Install the threaded stud into the top of the horn.
4. Install a single acoustic interface washer matching the size of the washer to the stud at each interface, *or use acid free grease (no more than like a small oil drop)*
5. Assemble the converter to the booster and the booster to the horn.
6. Torque to 220 in.-lbs (24.85 Nm) for 15 and 20 kHz stacks.  
Torque to 185 in.-lbs (20.90 Nm) for 30 kHz stacks.

### 40 kHz Installation

1. Clean the mating surfaces of the converter, booster, and horn, and remove any foreign material from the threaded holes.
2. Apply a drop of Loctite ®290 (or equivalent) to the studs on the booster and horn.

3. Install the threaded stud into the top of the booster; torque to specifications. Let cure for 30 minutes.
4. Install the threaded stud into the top of the horn; torque to specifications. Let cure for 30 minutes.
5. Coat each interface surface with a thin film of silicon grease - but do not apply silicon grease to a threaded stud.
6. Assemble the converter to the booster and the booster to the horn.
7. Torque to 95 in.-lbs, 10.73 Nm.



**Acoustic stack consists of:**

- Transducer/Converter/Probe
- Booster
- Horn/Sonotrode
- Mount

**Troubleshooting Tips**

**Problem** - excess noise or system overload.

1. Ensure proper cooling is in place.
2. Inspect complete acoustic stack for over temperature.

Components that have experienced excessive heat may be permanently damaged, consult factory before putting units back in production.

3. Remove acoustic stack from mount. Inspect for missing components; inspect for nicks, cracks, scrapes or evidence of metal to metal contact.
4. Inspect mount to ensure proper clamp torque and tolerances.
6. If problem still exists, contact manufacturer.

