**Application Considerations For Small Duct Rectangular Silencers**

Commonly rectangular splitter silencers are tested based on a recommended size of 600mm width x 600mm height (test unit). The aero-acoustic performance data obtained are then applied to all sizes. However, for silencers smaller than 600mm width x 600mm height, when the splitter thickness may be different due to its size, tests showed the aero-acoustic performance is very different. Hence, it is incorrect to apply the test unit's performance data to small silencers for selection. OLSON Acoustics has tested many small silencers, including those with half splitters, to provide accurate data for design and selection purposes.

Please see guide specification below.

**Materials**

1. **Casing** – The silencer casing shall be made of a 0.7mm thick galvanized steel sheet for silencers of size up to 450mm width x 450mm height. The casing shall be accurately pre-punched with appropriate holes for assembly of splitters, flanges, and adjacent modules. The splitter frame, inlet, and outlet fairings shall be made of the same thickness galvanized steel sheet similar to the casing.
2. **Perforated Lining** – Perforated plate linings shall be made of 0.5mm thick galvanized steel sheet perforated with 2.5mm diameter holes arranged staggered pattern with 5mm triangular pitch.
3. **Angle Frame** – The angle frame shall be made of 40mm x 40mm x 2.5mm thick pre-hot-dip galvanized steel sheet pre-punched with 7mm round holes for M6 bolts and nuts and spaced at 150 mm centers.
4. **Acoustic Infill** – Acoustic infill shall be of fiberglass of the appropriate density for maximum insertion loss performance. The material shall be non-combustible and meets Class 'O' requirements to BS Standard BS476 Part 6 and Part 7. It shall be inert, vermin- and moisture-proof.
5. **Angle Frame** – The angle frame shall be hot-dip at the mill to Z27 zinc coating. Other steel parts shall be hot-dipped galvanized to a minimum zinc coating of Z18 according to JIS Standard and of roll forming quality.
6. **Glass Cloth Fabric** (Optional) – The cloth fabric shall be used with the perforated plate for protection against fiberglass erosion. The material shall be not more than 1.0 mm in thickness and shall be non-combustible.

**Construction**

1. The silencer shall be constructed of a casing, splitters, and connecting flanges. The casing shall have snap-lock corner joints angle-reinforced to give it strength. The joints shall be filled with silicone sealant to prevent air leakage to a minimum pressure of 1000 Pascals.
2. The splitter shall consist of a die-formed bullnose fairing, a steel frame constructed of cold-formed angles, perforated steel plate linings, and acoustic infilled. The perforated sheet lining shall be riveted to the splitter frame; tack or spot welding shall not be allowed. These parts shall be assembled to form an aerodynamic shape splitter. When assembled within the casing, the splitters form bell-mouth entrance and tapered discharge for uni-direction airflow. For bi-direction airflow, the splitter shall be designed with bullnose and taper ends. The aerodynamic splitter design with selected infill and perforated lining shall meet the specified sound attenuation with less airflow resistance and lower generated noise. The acoustic infill shall be packed within the splitter frame to a minimum of 5 percent compression to prevent void forming.
3. Fiberglass cloth fabric (optional) required to prevent erosion of fiberglass infill shall be fastened together with the perforated sheet lining to the splitter frame with aluminium rivets.
4. Splitters shall be fastened to the casing with 4.75mm diameter high-quality aluminium rivets. No tack or spot welding shall be allowed.

**Performance**

The subcontractor shall submit the brand, the manufacturer name, the type of silencer, size, acoustic, and aerodynamic performance for approval. The test report shall be submitted for approval before ordering. The silencer should have been tested in an accredited laboratory with 600mm width x 600mm height test units for pressure loss, static and dynamic sound insertion loss (SIL and DIL), and generated noise according to ASTM Standard E477-99. For the DIL, the attenuator shall be tested with airflow in the forward and reverse direction in relation to the noise source. Tests shall also be carried out on smaller units to provide accurate aero-acoustic performance for small silencers. Silencer of the following lengths shall be tested: 600mm, 1200mm, 1800mm, and 2400mm.

The pressure loss across the sound attenuator shall not exceed the values, as shown in the sound attenuator schedule.

The fan manufacturer shall submit accurate fan sound power levels for the attenuator manufacturer's noise analysis to determine the dynamic insertion loss required to achieve the specified noise criteria. Noise analysis and resultant attenuator selection and pressure loss shall be submitted for approval before proceeding to manufacture. The fan manufacturer shall adjust the fan static according to the attenuator pressure loss.