ACOUSTIC – Acoustic Cleaning Solution (ACS)

Acoustic Cleaner Model ACS (Acoustic Cleaning Solution) is a high-quality industrial dedusting and acoustic cleaning solution. ACS Sonic Horns are a proven technology for removing and dislodging dry particulates and product buildup across a wide range of industrial applications. Thanks to its simple operating principle, the ACS sonic cleaner provides an effective, low-cost alternative that outperforms conventional cleaning methods.

We carefully analyze your specific process requirements and recommend the most suitable unit as well as the ideal installation method. To ensure optimal performance, follow the installation procedures described in this guide.

Our expertise in acoustics also covers noise reduction—see our ASS Sound Attenuator. Only those who know how to eliminate noise should be trusted to generate it.

» Operating Principle:

The ACS Acoustic Cleaner is a pneumatic device that generates low-frequency, high-energy acoustic waves to dislodge particulate buildup; the loosened material is removed by gravity and/or the system's normal gas flow. Sound is generated by the flexing of a titanium diaphragm driven by compressed air entering the sound generator. The acoustic wave is amplified through a resonant bell (horn), producing a 1 to 5 m wavelength capable of dislodging material adhered to surfaces. This low-frequency, high-intensity sound is proven to be the most effective cleaning method without causing mechanical wear—unlike vibrators, manual cleaning, or pneumatic hammers. The most effective sonic horns concentrate energy at their fundamental frequency, emitting low-frequency (75 Hz to 360 Hz), high-energy (135 dB to 150 dB) sound waves.



» Benefits:

- Lower Operating Costs: The ACS Acoustic Cleaner significantly reduces operating costs by minimizing unplanned equipment downtime.
- Low Impact: The acoustic energy generated is highly effective without causing structural fatigue or damage to equipment, unlike aggressive mechanical methods such as pneumatic rappers.

» Frequency Ranges:

Acoustic energy in the 63 to 290 Hz range has proven to be the most effective for sonic cleaning. Frequencies above 300 Hz are less efficient for cleaning and more audible and intrusive to the human ear. Low frequencies exhibit higher reflectivity on solid surfaces, resulting in lower sound absorption, and are more omnidirectional—allowing uniform sound penetration throughout enclosed vessels. Higher frequencies (> 300 Hz) are more directional and dissipate rapidly.

Another key factor is sound pressure level, measured in decibels (dB). For effective cleaning at the fundamental frequency, sound intensity must exceed 120 dB. Because decibels follow a logarithmic scale, the difference between 130 dB and 140 dB represents a tenfold increase in available acoustic power.

» Common Applications:

- Reactors: Widely used in reactor systems to prevent ash buildup on catalyst beds, reducing aggressive mechanical cleaning and offering a more economical, efficient solution.
- Boilers: Highly effective in removing soot and particulate deposits from heat transfer surfaces such as superheaters and economizers. Can complement or replace conventional sootblowers, cutting maintenance costs and improving thermal efficiency.
- Baghouses / Electrostatic Precipitators (ESP): Used to complement or replace traditional rapping or pulse systems, providing a low-cost, low-maintenance alternative for removing particulates from ESP plates or filter bags.

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Acoustic Cleaner Placement:

Proper installation of the ACS Acoustic Cleaner is essential for efficient operation. The unit must be strategically positioned according to the application type and operating environment.

- Horn Position: The ACS should be installed with the bell pointing downward or horizontally to prevent dust accumulation inside the horn. Avoid upward-facing installations.
- Spacing Between Units: For larger vessels such as baghouses or reactors, spacing must be tailored to the equipment geometry. In general, units are spaced closer near corners and further apart in central areas.

Models:

Model	Outlet (mm)	Length (m)	Weight (kg)	Compressed Air (Nm³/h *)	bar	dB(A)	Hz (*)	kPa·s/m	Distance (m)	Diameter (m)
ACS-1-220	89	0.4	20	1.7–2.1	3.5 / 6	138 / 142	187 / 230	66	4.5	1.8
ACS-2-230	207	0.5	30	1.6–2.0	3.5 / 6	134 / 138	179 / 220	12	9.0	4.5
ACS-2-280	370	0.5	32	1.9–2.3	3.5 / 6	138 / 146	220 / 280	12	7.0	6.0
ACS-3-100	356	1.6	54	1.7–2.1	3.5 / 6	145 / 149	81 / 100	4	18.0	6.0

Note: (*) Consumption assumes 10-second blasts every 10 minutes.

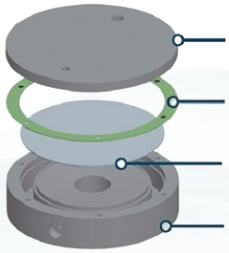
Return on Investment:

ROI: Most applications achieve an ROI of under 2 years. Fans run with less load and vibration, baghouses maintain lower pressure drop, and boilers operate with less fouling, reducing fuel consumption.

Basic Installation:

- System Mounting: The ACS must be supplied with compressed air at 4.5 to 6.5 bar to the diaphragm for maximum efficiency.
- Space Considerations: Ensure adequate clearance around the installation point for mounting and disassembly.

Proper placement ensures maximum sound intensity and cleaning performance. The ACS can be chain-suspended or flange-mounted to the vessel. For internal installations, chain suspension is recommended using 3/16" chain attached to 3/8" eyebolts at three (3) points on the flange.



Generator Components: SS Cover • Gasket • Titanium Diaphragm • Body

Important Notes:

- ACS units are ineffective at moisture levels above 25%;
- Standard activation cycle: 10 seconds every 10 minutes (~0.3 Nm³/blast or 2 Nm³/h @ 5.5 bar g).
- ACS units emit a spectrum of frequencies rather than a single pure tone, with the predominant frequency listed in the table.
- ACS units are designed for internal cleaning via air purge, water flush, and/or CIP.

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Noise Measurements:

Sound level readings were taken across several plants operating multiple sonic horns inside masonry buildings:

- Room noise level with ACS off: 90 to 91 dBA
- Room noise level with ACS on: 100 to 105 dBA
- Noise level near the ACS during operation: 103 to 110 dBA
- Noise level in adjacent room during ACS operation: 80 to 85 dBA

OSHA (Occupational Safety and Health Administration) standards state that continuous 8-hour noise exposure must not exceed 90 dBA without hearing protection. See table below:

Sound Level (dBA)	Permitted Time (hrs)	Sound Level (dBA)	Permitted Time (hrs)	Sound Level (dBA)	Permitted Time (hrs)	Sound Level (dBA)	Permitted Time (hrs)	Sound Level (dBA)	Permitted Time (hrs)	Sound Level (dBA)	Permitted Time (hrs)
85	16:00	90	08:00	95	04:00	100	02:00	105	01:00	110	00:30
86	13:56	91	06:58	96	03:29	101	01:44	106	00:52	111	00:26
87	12:08	92	06:04	97	03:02	102	01:31	107	00:45	112	00:23
88	10:33	93	05:17	98	02:38	103	01:19	108	00:40	113	00:20
89	09:11	94	04:36	99	02:18	104	01:09	109	00:34	114	00:17
										115	00:15

Safety Instructions:

☞ **Employee Notification:** Notify personnel that Acoustic Cleaners—which produce high-intensity sound waves—are installed in the work area.

☞ **Work Permit:** Obtain supervisor authorization before performing any work on an Acoustic Cleaner. Never enter a vessel or confined space containing Acoustic Cleaners without first isolating the compressed air supply and de-energizing the solenoid valves.

☞ **High Noise Intensity:** Never aim an Acoustic Cleaner at people and never activate it unless properly mounted to the equipment.

☞ **Maintenance:** Replacing all gaskets is required to prevent product or chemical leakage. Standard gasket service life is 1 (one) year and may be shorter depending on process conditions.

EPI / PPE: During operation and maintenance of the sonic cleaner, proper PPE is mandatory: Safety helmet; Safety glasses; Hearing protection; Gloves; Safety boots.

⚠ Prolonged exposure to loud noise without hearing protection may cause permanent hearing loss. For permissible exposure time limits, consult OSHA Safety Standards. Acoustic Cleaners generate 90 to 115 dB(A) outside the equipment where they are installed.

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