Noise Characteristics of Automatic Flow Controllers

1. Subject and Scope

Valve noise is becoming an increasingly important issue as HVAC systems become more efficient and take up an ever smaller portion of a building envelope. The Hays Gold Standard valve, Mesurflo™, is the industry leader in low noise technology. Valves with superior noise characteristics are required whenever a valve is in the occupied space of a building. This tip will present data on the audible noise.

2. Applicability

When applying this data the valve should be considered as the speaker and the building occupant the receiver in a speaker-path-receiver network. A low noise valve is a requirement when a direct path (no sound insulation between the valve and occupant) exists such as in an HVAC terminal unit inside an office building. It is necessary to provide an almost air-tight seal to prevent noise propagation out of an enclosure.

3. Details

Hays noise test specification utilizes the ANSI S12.51-2002 test method. This test method is widely accepted and used in several ARI standards for rating sound from HVAC equipment[1]. Careful attention was paid to the test set up to minimize noise generated by other sources such as fluid flow upstream and downstream of the valve. At each test condition a base line measurement was made with the valve replaced by a short straight section of pipe. This value will represent the lowest possible level of noise achievable at that condition.

The test was run at a very low pipe water velocity to minimize the noise generated by other components of the test system. A pipe flow velocity of approximately 1.25ft/s was used. Testing was conducted at an inlet Reynolds number of approximately 5,000. All valves tested were combination flow control and isolation valves with the ball valve for isolation in the full open position. Each valve was tested at a variety of pressure drops from below typical operational levels to above typical operational levels, or, 2 to 48 psi. Flow through the valve was regulated by the flow control valve itself (except in the case of straight pipe where regulation was done outside the test chamber).

Overall A-weighted Sound Pressure Levels at Various Water Pressure Differences
Results in dBA

Water Pressure (psi)	48	32	16	8	4	2	Mean
Mesurflo™	24.90	24.75	23.95	0.00	0.00	0.00	12.27
Pipe	24.30	23.96	0.00	0.00	0.00	0.00	8.04
Competitor A	52.30	48.76	32.48	28.49	25.65	25.47	35.52
Competitor B	35.01	36.59	38.21	35.10	26.24	27.10	33.04
Competitor C	38.56	51.37	36.43	31.29	30.32	27.13	35.85

The Mesurflo™ is the clear leader in the overall A-weighted sound pressure data provided above. A-weighted sound data alone is not sufficient to judge the noise quality of a product. The characteristics and background of the room in which the device is to be located will have a great impact on the occupant's interpretation of noise. Fortunately the Mesurflo™ provides a clear benefit at almost every frequency. As a means of understanding the noise performance 20 dBA has been likened to someone sitting in the corner of your office whispering and 30 dBA is the level of a whisper of someone standing next to you.

4. Support

For additional information or questions on the content of this Technical Bulletin, please contact Hays Customer Service at 1-800-354-4297.

Technical Tips

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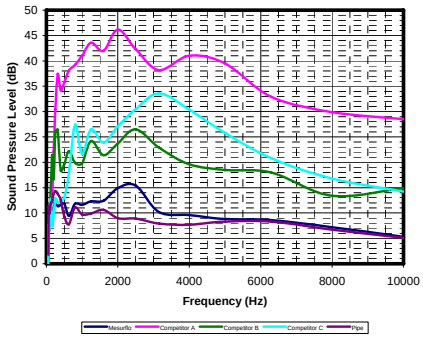
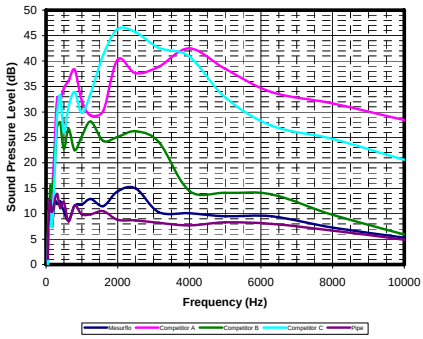
Overall Noise Summary Hays Mesurflo and Spring Valve Competition

All 1 gpm Isolation - Flow Control Combination Valves
Tested per Hays Standard Procedure (based on ANSI S12.51-2002)
Results ±3 dB at 0 dB, A-weighted

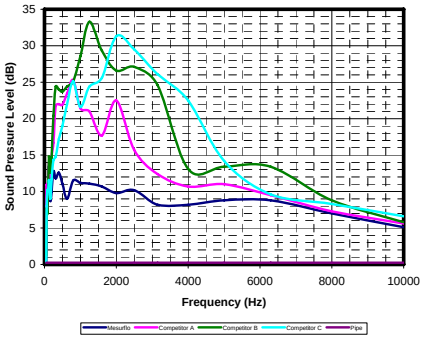
Noise Produced at 48 psi Differential Pressure



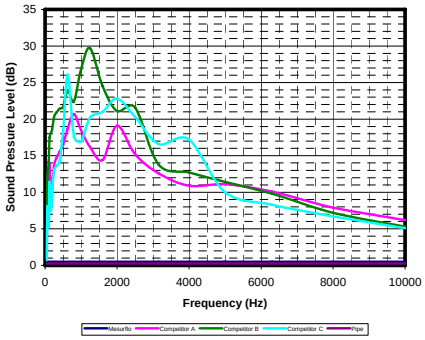
Noise Produced at 32 psi Differential Pressure



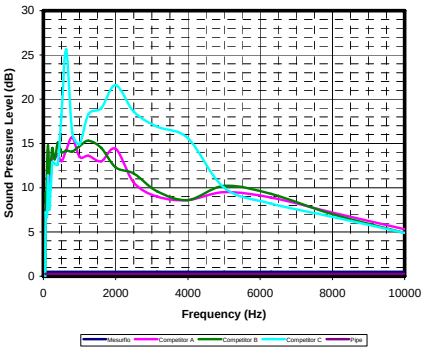
Noise Produced at 16 psi Differential Pressure



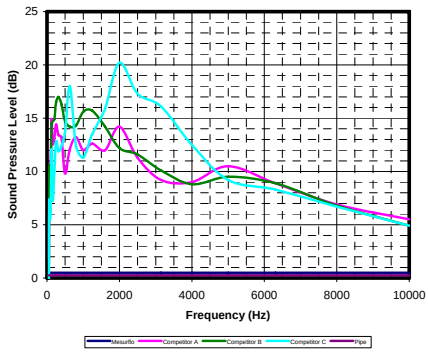
Noise Produced at 8 psi Differential Pressure



Noise Produced at 4 psi Differential Pressure



Noise Produced at 2 psi Differential Pressure



[1] The ARI standards that utilize the ANSI S12.51 test method include:

ARI 260-2001 Sound rating of ducted air moving and conditioning equipment
ARI 300-2000 Sound rating and sound transmission loss of packaged terminal equipment
ARI 350-2000 Sound rating of non-ducted indoor air-conditioning equipment
ARI 530-1995 Method of rating sound and vibration of refrigerant compressors