Thermaflex®

Sound Generation in Sound Power Level (LW)dB 10^{-12} Watt

Thermaflex Flexible Duct vs. "Empty" Metal Duct

M-KE Flexible Duct Per Length of 10 ft. in Straight Position

	Octave Band No. Center Freq. Hz	(2) 125	(3) 250	(4) 500	(5) 1000	(6) 2000	(7) 4000	(8) 8000
6 inch ID	Lw @ 1000fpm	(32)	29	22	(17)	(17)	(19)	(20)
	Lw @ 1500fpm	(32)	35	31	28	19	(19)	(20)
	Lw @ 2000fpm	(32)	40	39	36	31	23	(20)
	Lw @ 3000fpm	46	47	48	47	43	38	31
Empty Metal Duct	Lw @ 1000fpm	(32)	28	(21)	(17)	(17)	(19)	(20)
	Lw @ 1500fpm	(32)	34	32	25	(17)	(19)	(20)
	Lw @ 2000fpm	(32)	37	37	32	24	(19)	(20)
	Lw @ 3000fpm	43	45	45	46	38	36	27
8 inch ID	Lw @ 1000fpm	34	30	22	(16)	(17)	(18)	(18)
	Lw @ 1500fpm	36	35	35	32	25	(18)	(18)
	Lw @ 2000fpm	42	41	42	39	34	27	21
	Lw @ 3000fpm	52	50	53	51	49	43	38
Empty Metal Duct	Lw @ 1000fpm	(30)	(26)	25	(16)	(17)	(18)	(18)
	Lw @ 1500fpm	(30)	(26)	26	21	(17)	(18)	(18)
	Lw @ 2000fpm	(30)	34	33	28	20	(18)	(18)
	Lw @ 3000fpm	41	44	44	40	37	32	25
12 inch ID	Lw @ 1000fpm	(30)	28	22	18	(17)	(18)	(18)
	Lw @ 1500fpm	31	34	35	32	23	(18)	(18)
	Lw @ 2000fpm	41	39	40	39	32	21	(18)
	Lw @ 3000fpm	51	50	51	51	47	41	35
Empty Metal Duct	Lw @ 1000fpm	(30)	(26)	(19)	(16)	(17)	(18)	(18)
	Lw @ 1500fpm	(30)	29	20	19	19	(18)	(18)
	Lw @ 2000fpm	36	38	37	30	30	20	(18)
	Lw @ 3000fpm	45	46	42	39	38	35	29

Thermaflex

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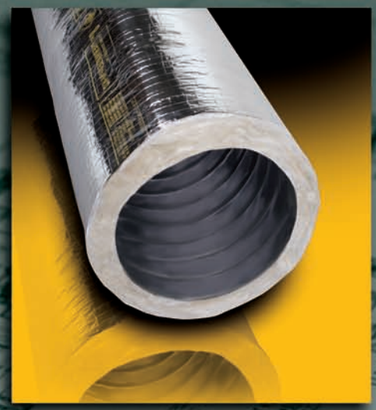
Thermaflex®

Acoustical Data

FLEXIBLE DUCT APPLICATION INFORMATION



Acoustical Tests and Terminology

Air Diffusion Council Flexible Air Duct Test Code FD-72 R1
Thermaflex considers the Air Diffusion Council Flexible Air Duct Test Code FD-72 R1 as the most dependable standard pertaining specifically to flexible ducts and air flow. Therefore, our air flow and friction loss tests have been conducted in full conformity with ADC FD-72 R1. Our goal is to present data as accurately and reliably as possible for flexible ducts.

Use of Air Diffusion Council Test Code provides data most nearly approaching results which can be expected under field operating conditions, providing flexible ducts are installed properly; e.g., suspended or supported properly to avoid sagging or kinking, use of accurate lengths to eliminate "snaking" of excess ducting between connecting points or use of other careful, workmanlike practices.

Test Standards, Equipment and Methods
Thermaflex Air Duct Data have been obtained in accordance with the Air Diffusion Council Flexible Air Duct Test Code 72 R1 and ASME Power Test Code PTC 19.5.4 – 1959. (See Chapter 4, "Flow Measurement," Part 5 – "Measurement of Quantity of Materials.") ADC FD72 R1 Air Duct Test Code specifies the instruments and apparatus specifically for air frictions loss determination.

Test Data
Test data presented in this brochure were obtained in tests and measurements made by an accredited independent testing laboratory in accordance with test standards, equipment and methods as stated in the preceding section.

Sound Attenuation (Net Insertion Loss, or I.L.)
Sound attenuation is the reduction of sound power level as a sound travels through a duct. The sound attenuating properties of a flexible duct are determined by the insertion loss method with and without air flowing through the duct. The net insertion loss is measured in the test laboratory as the difference between the sound attenuating effectiveness of the flexible duct and an empty standard sheet metal duct. This difference is expressed in decibels at reported frequencies. Data are presented in this brochure for flexible ducts in straight positions and in 90° bends.

Sound Generation
Sound generation, also called "self noise" or "generated noise" or "regenerated noise," is the sound power generated by air flow through the test duct. When applied to flexible air duct that services terminal devices, this form of rating is useful for determining whether the flexible duct sound generation will exceed the sound generation of the terminal device. Sound generation data are presented in decibels at reported frequencies and air velocities. Also presented are sound operation data for equivalent diameters of duct made of light gauge sheet metal.

Radiated Noise
Radiated noise is the sound that is radiated (transmitted) through the duct wall. Radiated noise is measured with and without air flow with the duct connected and disconnected within the reverberation room. Radiated noise reduction is the difference between the measured sound with the duct disconnected and the duct connected expressed in decibels at reported frequencies.

Decibels
The acoustical properties of materials used in air distribution systems are compared and selected in terms of decibels (dB). Sound pressure levels are referenced to .0002 microbar and sound power levels (LW) are referenced to 10^{-12} watt.

Noise Criteria
Noise criteria information and data, given and explained in the ASHRAE Guide, represent a series of reasonably acceptable sound spectra related to the use of a space for given functional purposes.

Precautions
The test procedure used in obtaining the acoustical data obtains a measurement of the difference in sound level between the entrance of the test specimen and the discharge of the test specimen. The test procedure does not differentiate between the sound attenuation achieved by action of the sound absorptive materials in the flexible duct and sound that is transmitted through the walls of the duct.

This differentiation is not important when the air duct is located in unoccupied non-critical areas such as crawl spaces, unused basements, duct spaces and shafts, etc.

When flexible duct is used in ceiling plenums to reduce noise discharged from the low pressure end of air terminal boxes or ducts, some care should be taken to evaluate the single pass transmission loss of the suspended ceiling separating the plenum from the space below.

Results cannot be predicted accurately based on interpolation for sizes not tested or extrapolation of data for lengths longer than 10 feet.

Limitations
Independent laboratory tests were conducted on ten (10) feet lengths of duct in straight and elbow arrangements at zero and 2500 fpm airflow for the Insertion Loss and Radiated Sound data; and at 1000, 1500, 2000 and 3000 fpm airflows for the Self Noise data. Since it is difficult to predict the arrangement and airflow that will be used in the numerous applications of insulated flexible air duct, actual test values appear in the data tables in this technical bulletin. The data, however, applies only within the range of the manufacturer's recommended applications as noted in this and other product information available from Thermaflex.

If a flexible air duct application is proposed outside the guidelines of this brochure, we invite your inquiry as to suitability for intended use.

In this brochure, Thermaflex is publishing data based on many laboratory tests. Although we believe this data is reliable as the present state of the acoustical testing arts permit and that the data can be used as a guide for design, the company cannot be responsible for building design and construction.

Results of Tests and Measurements

Sound Attenuation, With and Without Air Flow Through Duct

M-KE Straight Duct Insertion Loss (I.L.) per Length of 10 ft. in dB

	Octave Band No. Center Freq. Hz	(2) 125	(3) 250	(4) 500	(5) 1000	(6) 2000	(7) 4000	(8) 8000
6" ID	I.L. @ 0 Flow	14	36	36	37	37	20	14
	I.L. @ 2500fpm	11	33	37	39	37	19	14
8" ID	I.L. @ 0 Flow	13	36	34	37	29	17	14
	I.L. @ 2500fpm	13	35	34	39	29	17	14
12" ID	I.L. @ 0 Flow	11	28	26	32	25	11	8
	I.L. @ 2500fpm	10	26	26	35	24	11	9

M-KE Duct as Elbow, Insertion Loss (I.L.) per Length of 10 ft. in dB

	Octave Band No. Center Freq. Hz	(2) 125	(3) 250	(4) 500	(5) 1000	(6) 2000	(7) 4000	(8) 8000
6" ID	I.L. @ 0 Flow	16	36	37	42	39	27	8
	I.L. @ 2500fpm	16	36	37	42	39	26	8
8" ID	I.L. @ 0 Flow	16	34	39	42	34	20	12
	I.L. @ 2500fpm	14	33	38	42	33	19	12
12" ID	I.L. @ 0 Flow	11	25	30	33	28	13	9
	I.L. @ 2500fpm	10	23	31	33	28	12	9

Radiated Noise Reduction per Length of 10 ft./M-KE Duct in Straight Position

	Octave Band No. Center Freq. Hz	(2) 125	(3) 250	(4) 500	(5) 1000	(6) 2000	(7) 4000	(8) 8000
6" ID	I.L. @ 0 Flow	8	7	10	12	12	19	21
	I.L. @ 2500fpm	8	7	9	12	13	18	21
8" ID	I.L. @ 0 Flow	7	11	11	11	11	13	13
	I.L. @ 2500fpm	7	11	12	12	11	13	14
12" ID	I.L. @ 0 Flow	4	6	6	6	8	11	18
	I.L. @ 2500fpm	4	5	6	6	8	12	18