

Job No. 3013634

December 27, 2001

REPORT NO. 3013634-001

**SOUND TRANSMISSION LOSS TESTS
AND CLASSIFICATION OF SEVEN DOORS**

RENDERED TO

**THERMA TRU DOORS
108 MUTZFIELD ROAD
BUTLER, IN 46721**

INTRODUCTION

This report gives the results of Sound Transmission Loss tests and the determination of the Sound Transmission Class on seven doors. The doors were selected and supplied by the client and received at the laboratories on November 27, 2001. They appeared to be in a new, unused condition.

AUTHORIZATION

Purchase Order No. 20004575 from Therma Tru Doors.

TEST METHOD

Each specimen was tested in accordance with the American Society for Testing and Materials designation ASTM E90-99, "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions" and classified in accordance with the American Society for Testing and Materials designation ASTM E413-87 (Re-approved 1999, "Classification for Rating Sound Insulation" and ASTM Standard E1332-90 (Re-approved 1998) entitled, "Standard Classification for Determination of Outdoor-Indoor Transmission Class".

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GENERAL

The sound-insulating property of a partition element is expressed in terms of the sound transmission loss. The procedure for determining this quantity is to mount (and perimeter seal) the test specimen as a partition between two reverberation rooms. Sound is introduced in one of the rooms (the source room) and measurements are made of the noise reduction between source (10,000 cu. ft.) room and receiving room (16,640 cu.ft.). The rooms are so arranged and constructed that the only significant sound transmission between them is through the test specimen.

The test opening is constructed such that it is approximately one inch larger in size than the test specimen. The specimen is placed in the test opening on a half-inch bead of "DUX-SEAL", a dense, non-hardening, clay-like material, to isolate it from the supporting base. The space between the test specimen and the wall opening is sealed on both sides employing the same sealing material. The test specimen is perimeter sealed (both sides) with the same material between the two reverberation rooms.

The purpose of the Sound Transmission Class (STC) is to provide a single figure rating that can be used for comparing the sound-insulating properties of partition elements used for general building design purposes. The higher the rating (STC) the greater the sound insulating properties of the partition.

The purpose of the Outdoor-Indoor Transmission (OITC) is to provide a single number rating that can be used for comparing building facade designs, including walls, doors, windows and combinations thereof. This rating is designed to correlate with subjective impressions of the ability of building elements to reduce the overall loudness of ground and air transportation noise. It is intended to be used as a rank ordering device.

DESCRIPTION OF TEST SPECIMENS

Each door was tested fully operational installed in a 5/4 kiln dried frame equipped with 1/2 inch stops and exterior casing brickmould. Gasketing/weatherstripping was jacketed thermoset closed-cell foam, press fit in kerfs at jamb stops in frames and extruded thermoplastic elastomer, finned and chambered design, press-fit into bottom edge of doors.

Sample Door "A" Smooth-Star, 36 inches wide by 95 1/4 inches high by 1 3/4 inches thick – 6 panel – 60 pounds. Faces: 1/16 inch minimum thickness, fiberglass-reinforced thermoset composite, surface lightly textured with 80-grit brushing. Color: White. Door Edges: Machinable kiln-dried pine, primed to match color of faces, lock edge reinforced with laminated veneer lumber core, lockset area reinforced with solid blocking for hardware backup. Door bottom edge: moisture-proof and decay-proof composite. Core: foamed-in-place polyurethane, CFC-free, density 2.0 pcf minimum, K-factor of 0.14 for minimum thermal transmittance.

Sample Door "B" Smooth-Star Flush Glazed – 36 inches wide by 95 ¼ inches high by 1 ¾ inches thick. 24 inches wide by 78 ¾ inches high glass – 88 ½ pounds. Faces: 1/16 inch minimum thickness, fiberglass-reinforced thermoset composite, surface lightly textures with 80-grit brushing. Color: White. Door edges: machinable kiln-dried pine, primed to match color of faces, lock edge reinforced with laminated veneer lumber core, lockset area reinforced with solid blocking for hardware backup. Door bottom edge: moisture-proof and decay-proof composite. Core: foamed-in-place polyurethane, CFC-free density 2.0 pcf minimum, K-factor of 0.14 for minimum thermal transmittance. Factory-glazed: perimeter molding flush with skin and made as integral part of skin. Glass minimum 1/8 inch tempered, two thicknesses with sealed airspace between, air-space typically 3/8 inch.

Sample Door "C" Fiber-Classic – 36 inches wide by 79 ¼ inches high by 1 ¾ inches thick – 6 panel – 43 pounds. Faces: 1/16 inch minimum thickness, fiberglass - reinforced thermoset composite, wood-grained in natural northern red oak patterns. Door edges: machinable kiln-dried pine, primed to match color of faces, lock edge reinforced with engineered lumber core, lockset area reinforced with solid blocking for hardware backup. Door bottom edge: moisture-proof and decay-proof composite. Core: foamed-in-place polyurethane, CFC-free, density 2.0 pcf minimum, K-factor of 0.14 for minimum thermal transmittance.

Sample Door "D" Fiber-Classic Flush Glazed – 36 inches wide by 79 ¼ inches high by 1 ¾ inches thick – 26 inch wide by 63 ¼ inch high glass – 68 pounds. Faces: 1/16 inch minimum thickness, fiberglass- reinforced thermoset composite, wood-grained in natural northern red oak patterns. Door edges: machinable kiln-dried pine, primed to match color of faces, lock edge reinforced with engineered lumber core, lockset area reinforced with solid blocking for hardware backup. Door bottom edge: moisture-proof and decay-proof composite. Core: foamed-in-place polyurethane, CFC-free, density 2.0 pcf minimum, K-factor of 0.14 for minimum thermal transmittance. Factory-glazed: perimeter moldings flush with skin and made as integral part of skin. Glass minimum 1/8 inch tempered, two thicknesses with sealed airspace between air-space typically 3/8 inch.

Sample Door "E" Classic-Craft – 36 inches wide by 79 ¼ inches high by 1 ¾ inches thick – 6 panel – 63 ½ pounds. Faces: 3/32 inch minimum thickness, molded from proprietary thermoset composite, wood-grained to duplicate hand-crafted red oak master. Door edges: machinable kiln-dried clear northern red oak, flush and square with door faces, lock edge reinforced with full-length 3 ½ inch wide engineered lumber core. Door bottom edge: moisture-proof and decay-proof composite. Core: foamed-in-place polyurethane, CFC-free, density 2.0 pcf minimum, K-factor of 0.14 for minimum thermal transmittance.

Sample Door "F" Premium Insulated Steel – 36 inches wide by 79 ¼ inches high by 1 ¾ inches thick – 6 panel – 50 ½ pounds. Faces: .021 inch minimum thickness, tension-leveled cold rolled steel, zinc-coated, minimum coating weight 0.11 ounces/sf, conversion-coated to permit paint bond. Door edges: machinable kiln-dried pine, mechanically locked to door faces, four-sided with solid blocking in full area of passage and deadbolt locksets. Door bottom edge: moisture-proof and decay-proof composite. Core: foamed-in-place polyurethane, CFC-free, density 2.0 pcf minimum, K-factor of 0.14 for minimum thermal transmittance. All door surfaces factory painted in medium gloss white.



Sample Door "G" Smooth-Star HPC – 36 inches wide by 79 ¼ inches high by 1 ¾ inches thick – 6 panel – 86 ½ pounds. Faces: 1/16 inch minimum thickness, fiberglass- reinforced thermoset composite, Surface lightly textured with 80-grit brushing. Color: white. Door edges: machinable kiln-dried pine, primed to match color of faces, lock edge reinforced with engineered lumber core, lockset area reinforced with solid blocking for hardware backup. Door bottom edge: moisture-proof and decay-proof composite. High Performance Core.

The description of the test specimens was supplied by the client.

RESULTS OF TESTS

1/3 Octave Band Center <u>Frequency Hz</u>	<u>Sound Transmission Loss in dB</u>			
	<u>Sample A</u>	<u>Sample B</u>	<u>Sample C</u>	<u>Sample D</u>
80	14	14	11	14
100	17	18	14	18
125	16	19	15	19
160	19	20	17	21
200	21	21	18	22
250	21	20	18	20
315	24	19	20	19
400	26	21	22	23
500	27	23	23	26
630	28	24	24	27
800	28	26	23	27
1000	25	29	22	28
1250	22	27	20	28
1600	21	26	19	26
2000	27	33	23	26
2500	35	36	28	31
3150	38	36	32	34
4000	39	33	35	32
5000	39	35	35	33
Sound Transmission Class	25	27	23	27
Outdoor-Indoor Transmission Class	23	23	20	24

PRECISION

For any pair of rooms and microphone system, the 95% confidence interval ΔTL , for transmission loss must be less than the following.

<u>Range of One-Third Octave Bands</u>	<u>Transmission Loss Uncertainty, dB</u>	
	<u>Required</u>	<u>Actual</u>
125 and 160	3	<1.5
200 and 250	2	<1.5
315 - 4000	1	<1

RESULTS OF TESTS

1/3 Octave Band Center <u>Frequency Hz</u>	<u>Sound Transmission Loss in dB</u>		
	<u>Sample E</u>	<u>Sample F</u>	<u>Sample G</u>
80	13	12	16
100	16	16	19
125	16	16	21
160	20	19	23
200	22	21	25
250	22	21	25
315	23	23	26
400	25	24	27
500	26	26	29
630	28	26	29
800	28	25	28
1000	29	24	29
1250	28	19	30
1600	22	22	30
2000	25	30	31
2500	29	33	33
3150	31	34	35
4000	34	35	36
5000	35	35	37
Sound Transmission Class	26	23	30
Outdoor-Indoor Transmission Class	23	22	27

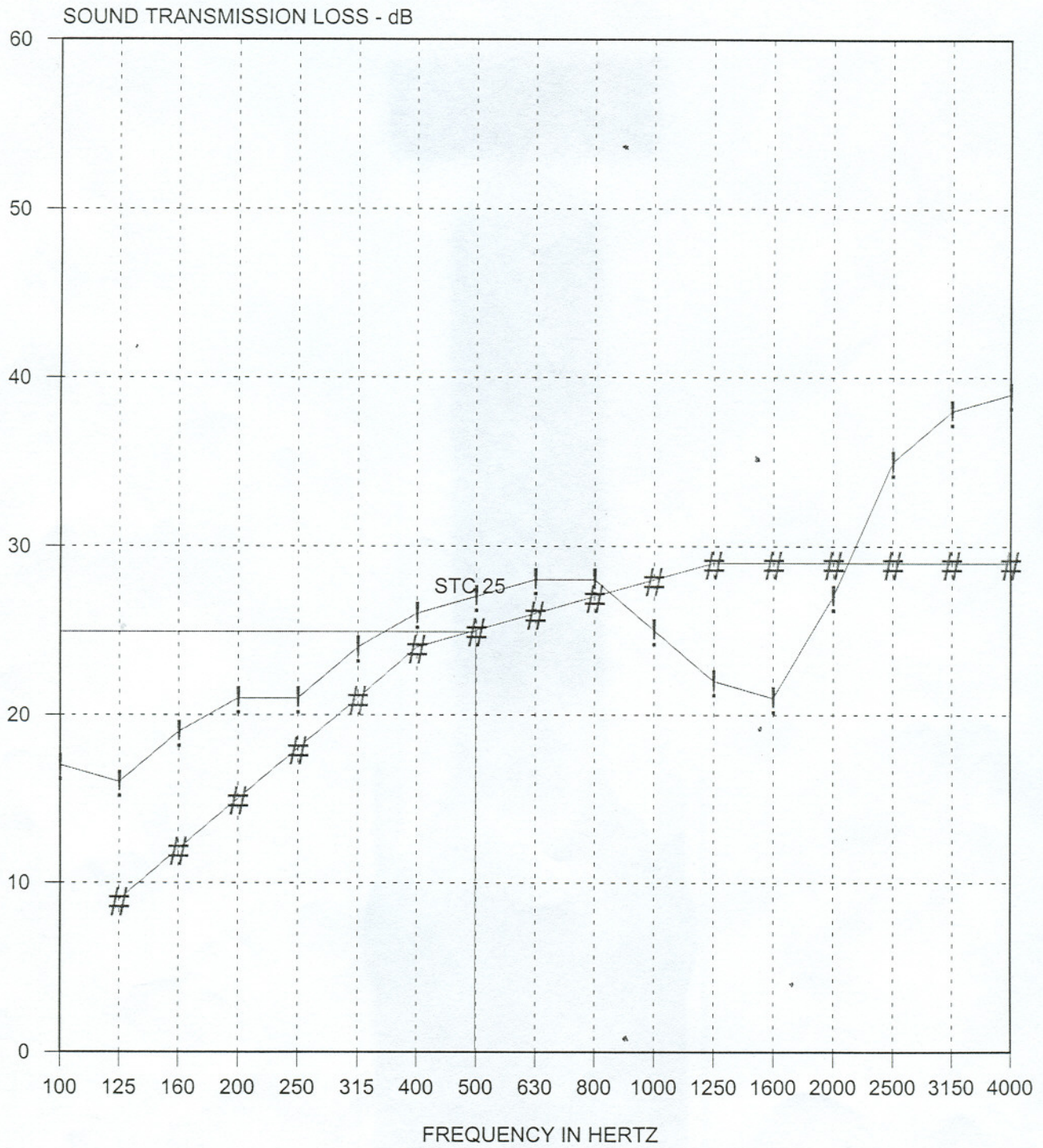
PRECISION

For any pair of rooms and microphone system, the 95% confidence interval ΔTL , for transmission loss must be less than the following.

<u>Range of One-Third Octave Bands</u>	<u>Transmission Loss Uncertainty, dB</u>	
	<u>Required</u>	<u>Actual</u>
125 and 160	3	<1.5
200 and 250	2	<1.5
315 - 4000	1	<1

Sound Transmission Loss

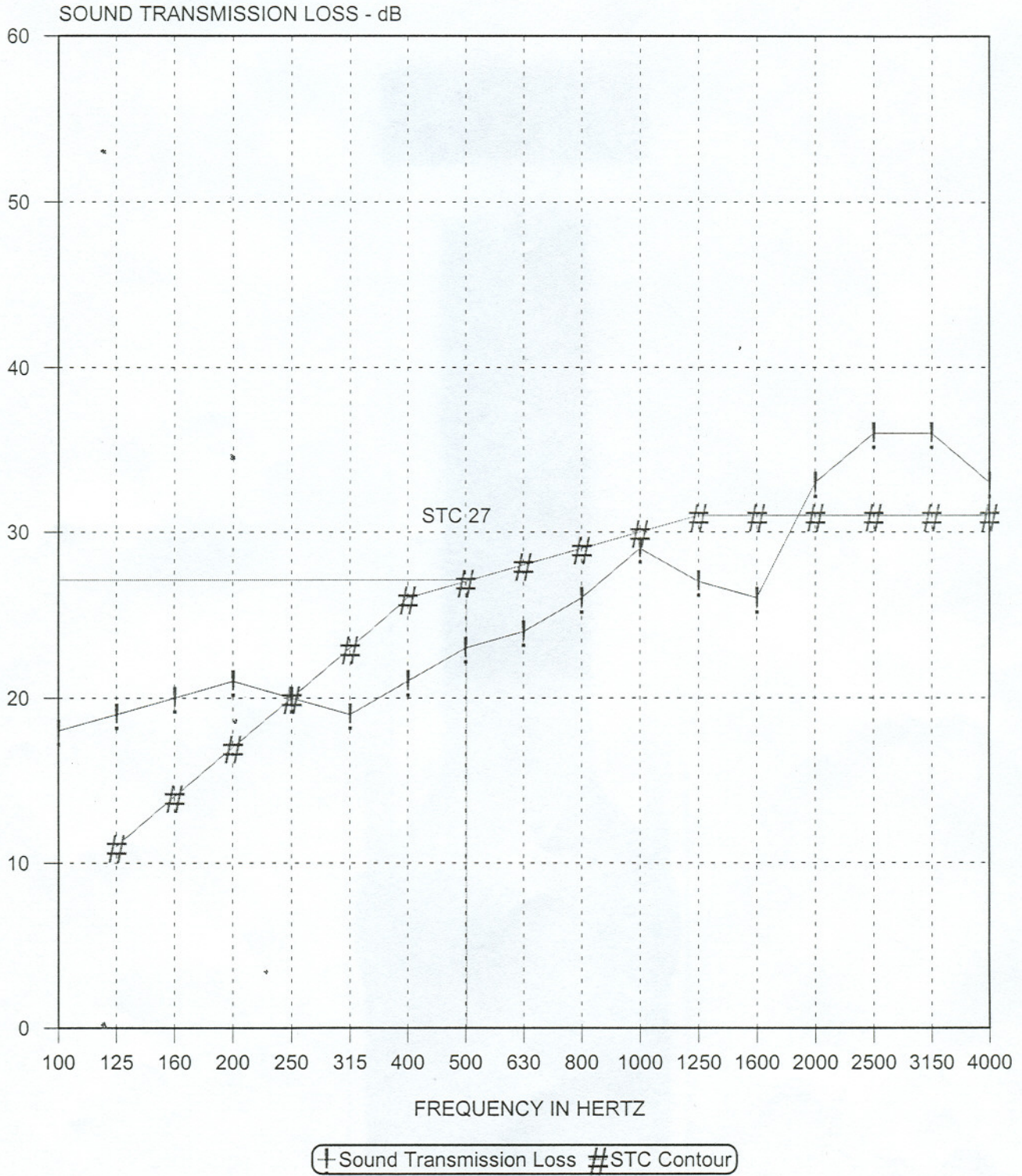
Sample "A"



Therma Tru Doors

Sound Transmission Loss

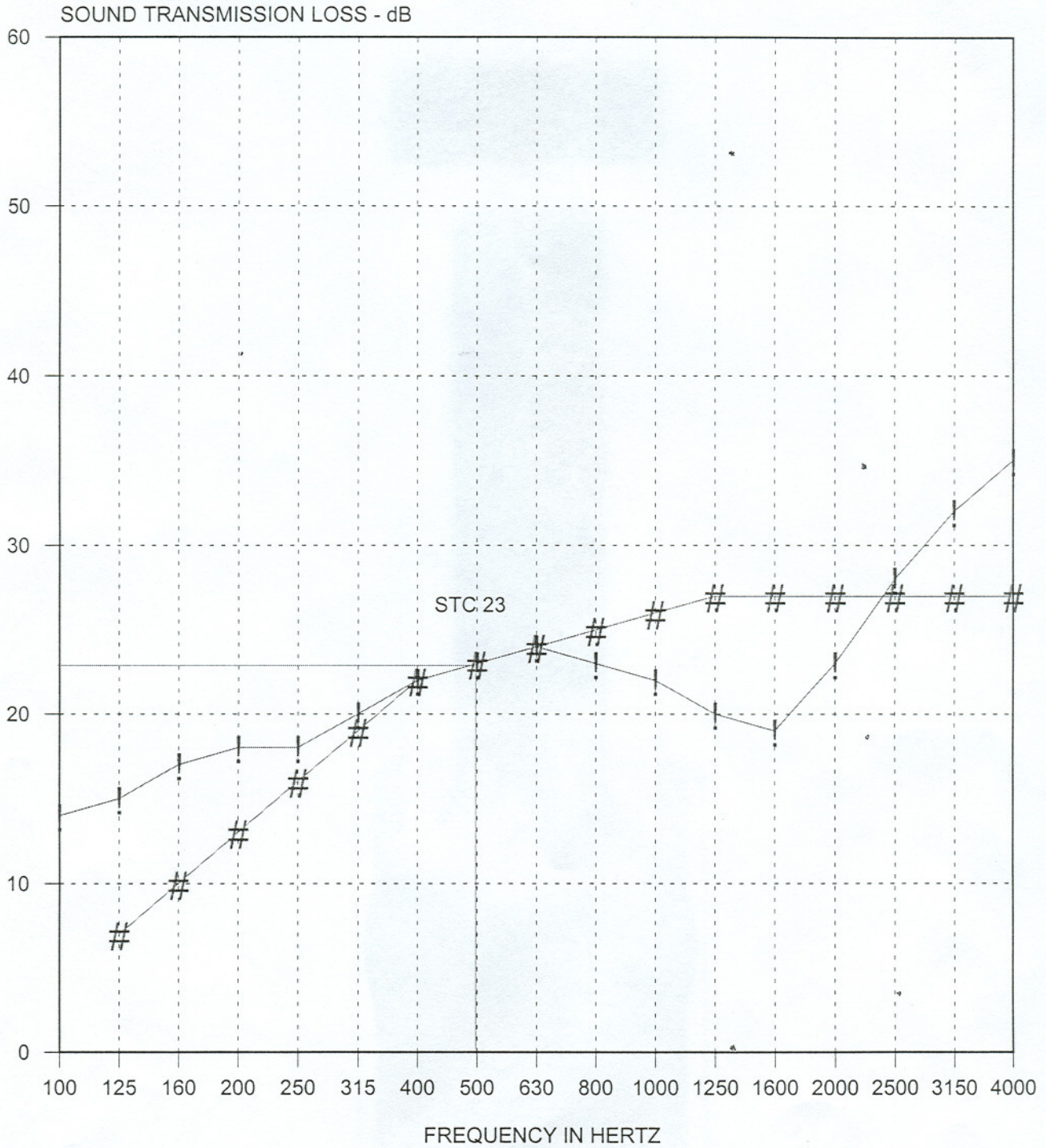
Sample "B"



Therma Tru Doors

Sound Transmission Loss

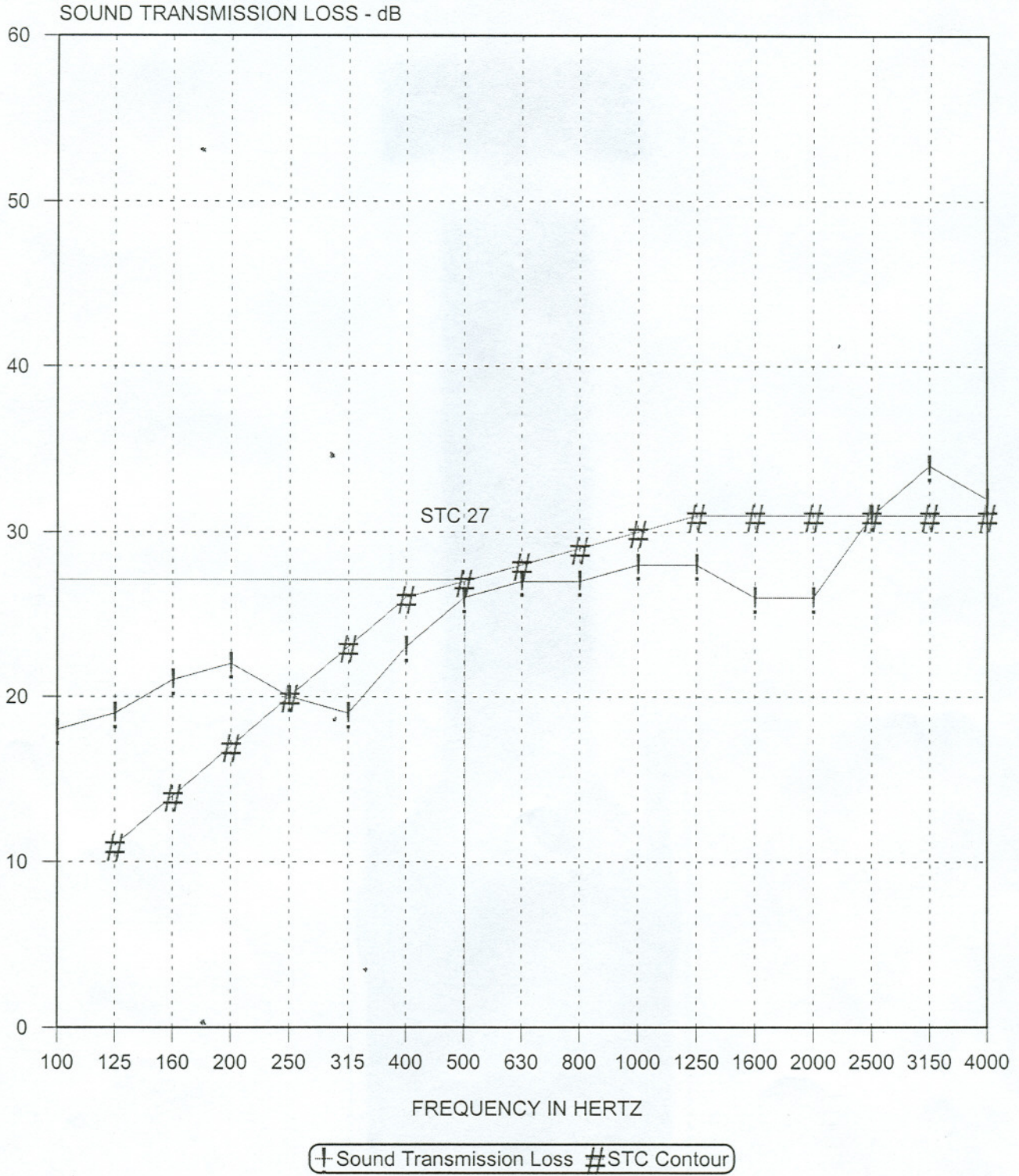
Sample "C"



Therma Tru Doors

Sound Transmission Loss

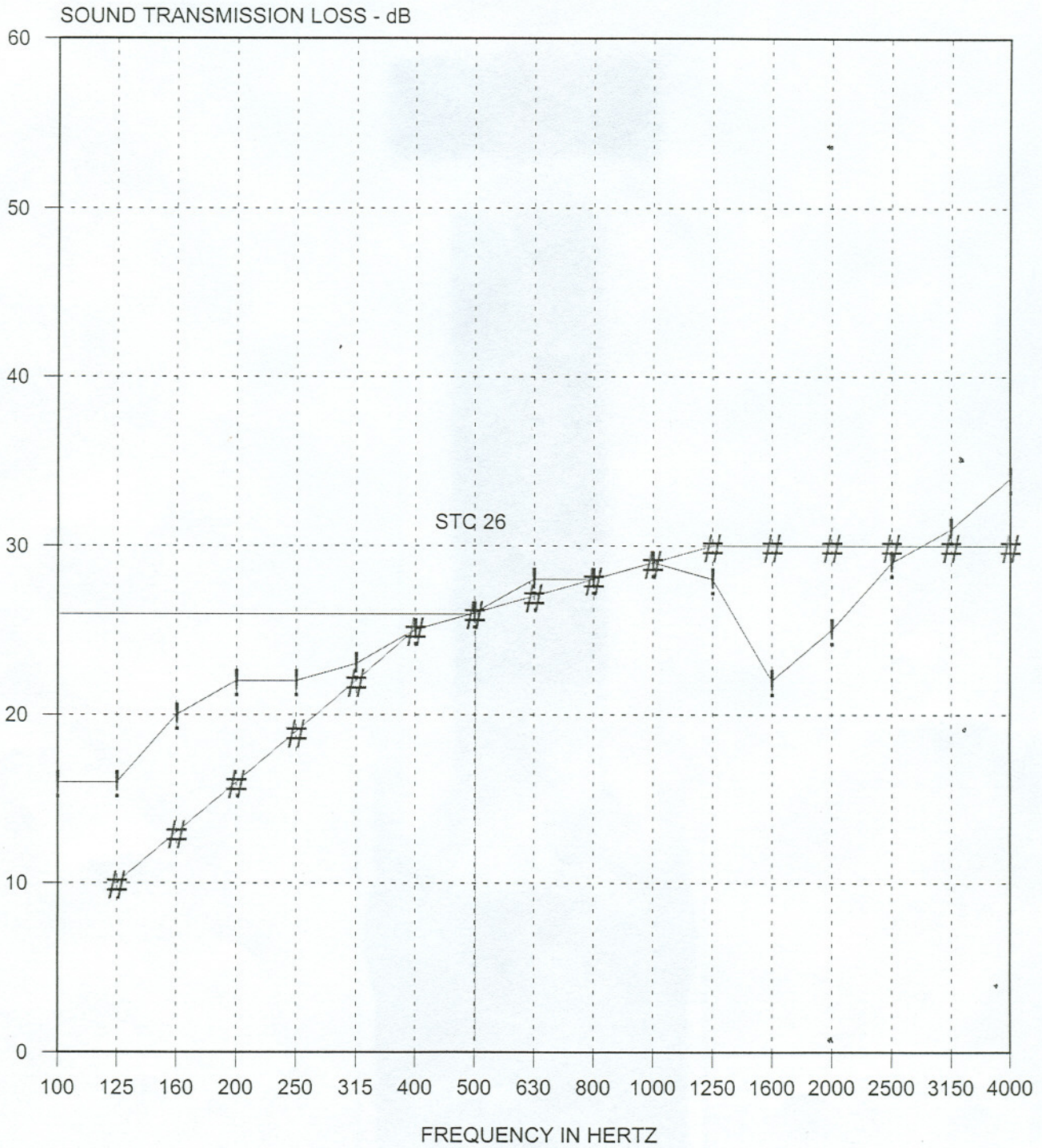
Sample "D"



Therma Tru Doors

Sound Transmission Loss

Sample "E"

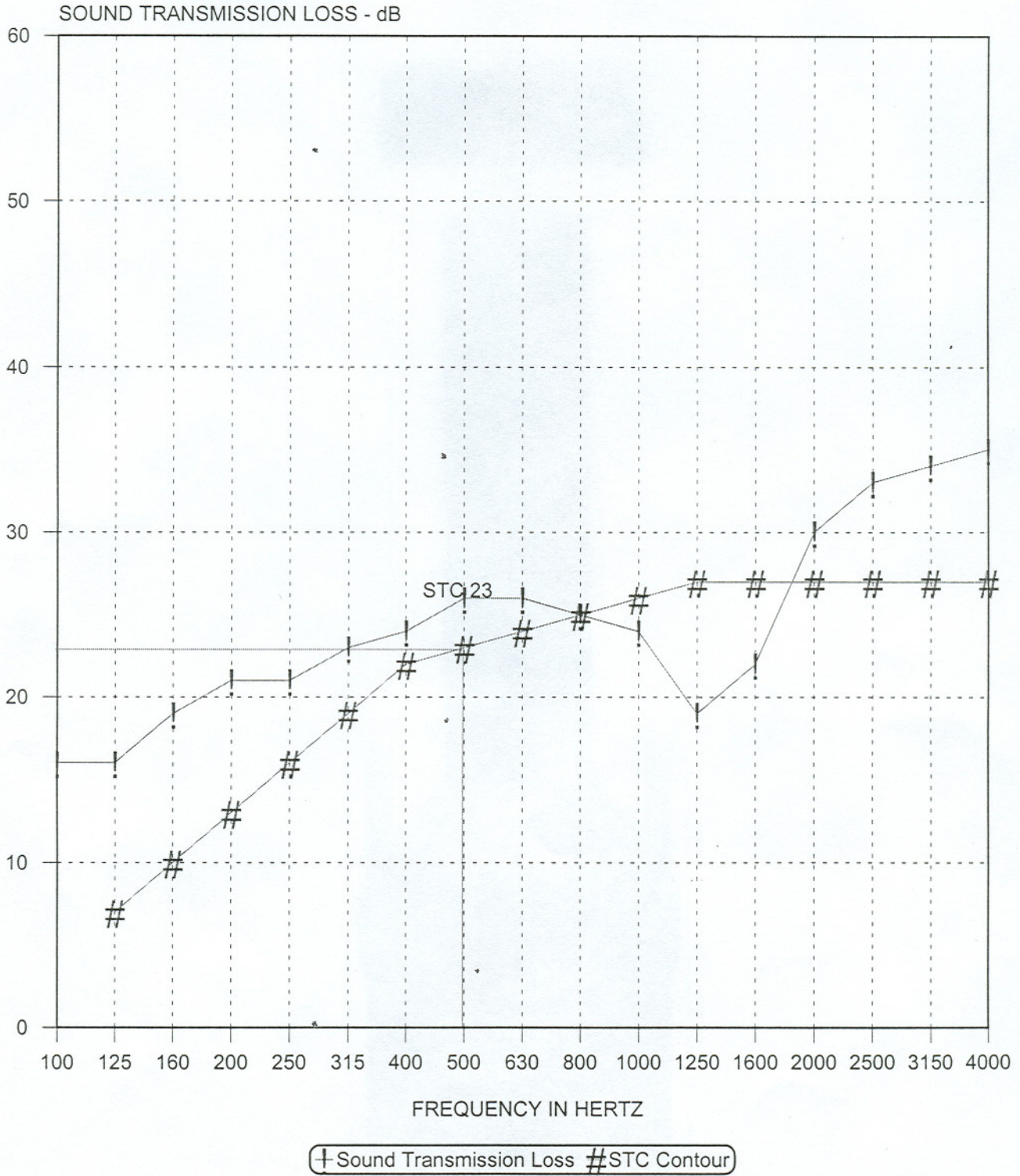


⊕ Sound Transmission Loss # STC Contour

Therma Tru Doors

Sound Transmission Loss

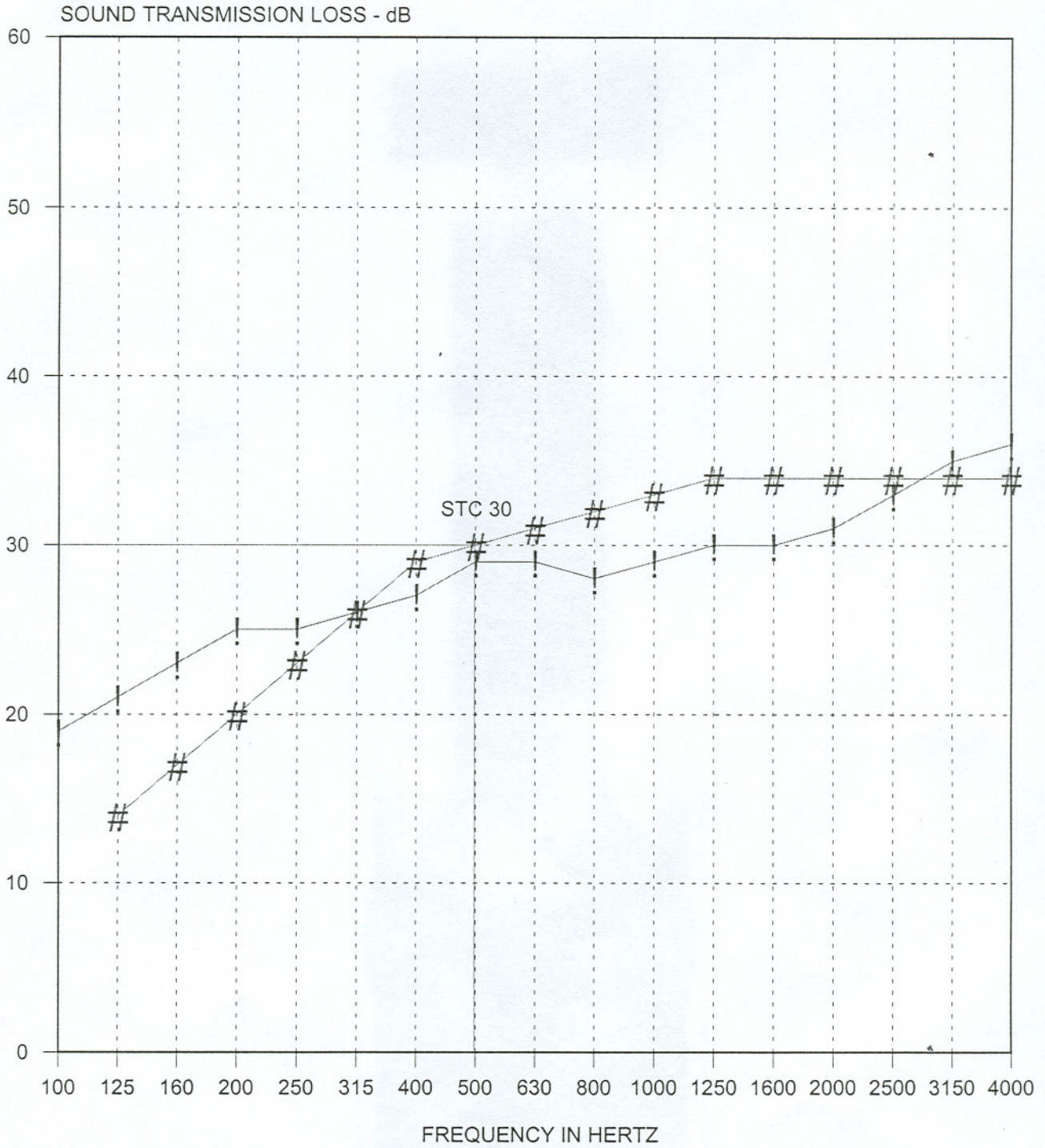
Sample "F"



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Sound Transmission Loss

Sample "G"



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REMARKS

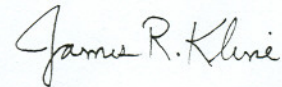
1. Aging Period: None
2. Ambient Temperature: 72°F
3. Relative Humidity: 35%

CONCLUSION

The test method employed for this test has no pass-fail criteria; therefore, the evaluation of the test results is left to the discretion of the client.

Date of Tests: December 14, 2001

Report Approved By:



James R. Kline, Technician
Acoustical Testing