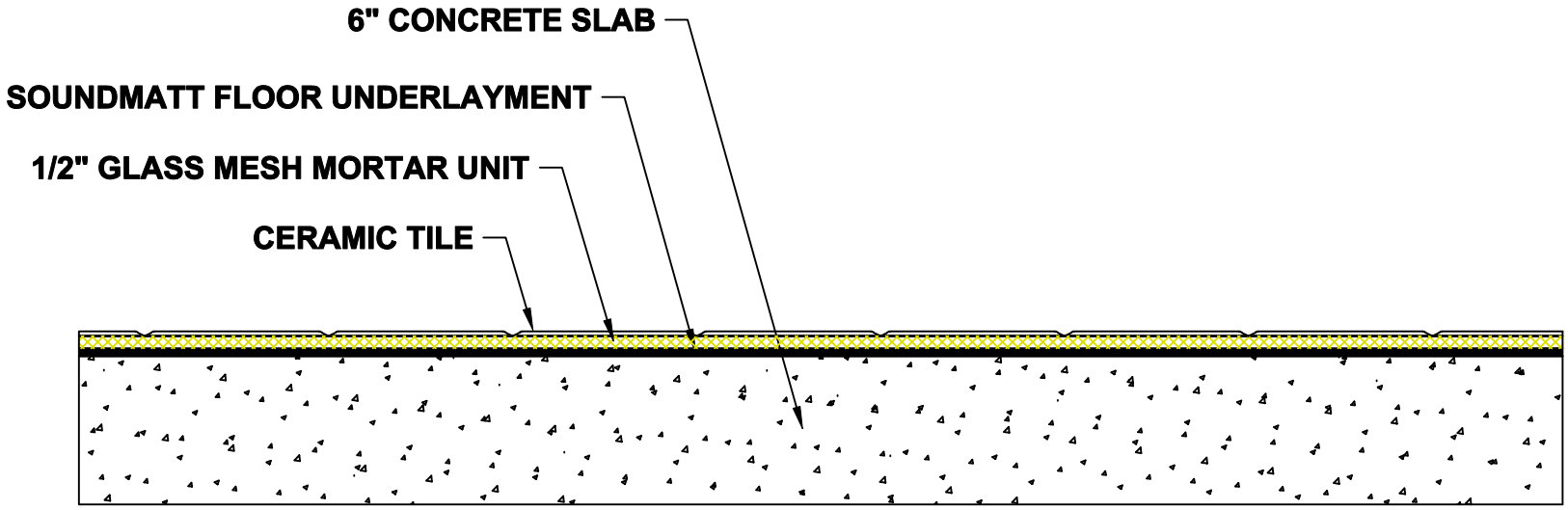
STC 60
IIC 53



KINETICS Noise Control	TITLE	LAST DATE REVISED	REVISED BY	DRAWING NO.
	TEST B7-d	11-10-04	JAE	B7-d

INTRODUCTION

Airborne sound transmission loss and impact sound transmission measurements were performed on four floor assemblies. Three of the floors comprised wood joists, and one floor comprised a concrete slab with a topping. For report purposes, the floors are identified as Floor "A", Floor "B", Floor "C" and Floor "D". A complete description of each floor construction is given in this report.

FACILITIES AND EQUIPMENT

Measurements were controlled by a desktop PC-type computer interfaced to a Norwegian Electronics type 830 real time analyser. Both rooms have a volume of 175 m^3. Airborne sound transmission loss tests were performed in the forward (receiving room is the lower room) and reverse (receiving room is the upper room) directions. Results presented in this report are the average of the tests in these two directions. For impact sound transmission, the lower room is the receiving room.

Each room has a calibrated Bruel & Kjaer condenser microphone cartridge - type 4166 that is moved under computer control to nine positions used for the acoustical measurements. There are four incoherently excited random noise sources and fixed diffusing panels in each room to increase the randomness of the sound field.

TEST PROCEDURES

One-third octave sound pressure levels were measured for 30 seconds at each microphone position and then averaged to get the average sound pressure level in the room. Five sound decays were averaged to get the reverberation time at each microphone position in the receiving room. These times were averaged to get the spatial average reverberation times for the room. The space average sound pressure levels of both the source and receiving rooms and the spatial average reverberation times of the receiving room were used to calculate airborne sound transmission loss and impact sound transmission values. A complete description of the test procedure is available on request.

The test specimen was mounted in the IRC acoustical floor test opening which measures 4.70 m x 3.78 m. The area used for the calculations of airborne sound transmission loss and impact sound transmission was 17.85 m^2.

Airborne Sound Transmission Loss

Airborne sound transmission tests were conducted in accordance with the requirements of ASTM E90-97, Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions, and of ISO 140/III 1978(E), Laboratory Measurement of Airborne Sound Insulation of Building Elements. The Sound Transmission Class was determined in accordance with ASTM Standard Classification E413-87, Classification for Rating Sound Insulation. The Weighted Sound Reduction Index was determined in accordance with ISO 717, Rating of Sound Insulation in Buildings and of Building Elements, Part 1: Airborne Sound Insulation in Buildings and of Interior Building Elements.

Impact Sound Transmission

Impact sound transmission measurements were made in accordance with ASTM E492-90, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine. This test used the standard tapping machine and the prescribed four impact positions on the floor. The impact insulation class was determined in accordance with ASTM E989-89, Standard Classification for Determination of Impact Insulation Class (IIC).

DESCRIPTION OF FLOOR "D"

Floor "D" comprised the following elements, listed from top to bottom:

	Surface weight (kg/m^2)	Weight (kg)
5 mm ceramic tile	15.6	311.4
13 mm Wonderboard	17.8	349.2
8 mm Soundmatt	0.9	18.8
152 mm concrete slab	357.0	7030.0
TOTAL		**7709.4**

Total thickness: 178 mm

The 152 mm concrete slab was provided by NRC. The concrete slab was sealed at the bottom to the test frame with a dense mastic.

Sheets of Soundmatt were laid on top of the concrete slab. The edges of the Soundmatt sheets were butted together. Sheets of Wonderboard were laid on top of the Soundmatt, installed according to the manufacturer's instructions. A 6 mm gap was left around the perimeter of each sheet. 50 mm wide fibre glass tape was used at the top and bottom of each Wonderboard joint. The tape was attached with a latex cement slurry. The slurry was also used to fill in the 6 mm gap around the perimeter of each sheet. Two layers of sill gasket were used around the perimeter to isolate the Wonderboard slab from the test frame. The ceramic tiles were installed according to the manufacturer's instructions.

RESULTS – FLOOR "D"

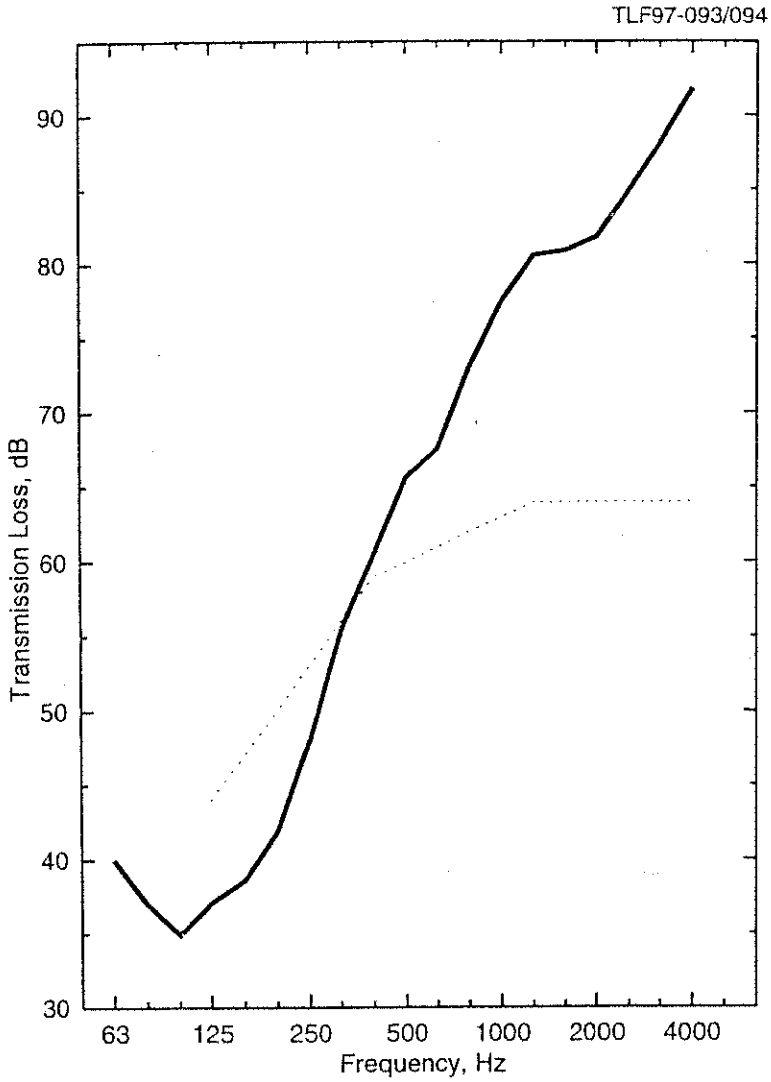
Results of the airborne sound transmission loss measurements of Floor "D" are given in Table 7 and Figure 7. Results of the impact sound transmission measurements of Floor "D" are given in Table 8 and Figure 8.

Table 7: Airborne sound transmission loss measurements of Floor "D", TLF-97-093/094.

Frequency (Hz)	Sound Transmission Loss (dB)	95% Confidence Limits*	Deviation below the STC Contour
63	40	±1.9	
80	37	±1.8	
100	35	±1.1	
125	37	±0.9	7
160	39	±0.6	8
200	42	±0.4	8
250	48	±0.4	5
315	55	±0.3	1
400	60	±0.3	
500	66	±0.2	
630	68	±0.2	
800	73	±0.3	
1000	77	±0.2	
1250	81	±0.1	
1600	81	±0.1	
2000	82	±0.1	
2500	85	±0.2	
3150	88	±0.2	
4000	92c	±0.1	
5000	95*	±0.1	
6300	96*	±0.1	

Sound Transmission Class (STC) = 60

Weighted Sound Reduction (R_w) = 59



Frequency (Hz)	Transmission Loss (dB)
63	40
80	37
100	35
125	37
160	39
200	42
250	48
315	55
400	60
500	66
630	68
800	73
1000	77
1250	81
1600	81
2000	82
2500	85
3150	88
4000	92c
5000	95*
6300	96*

STC 60

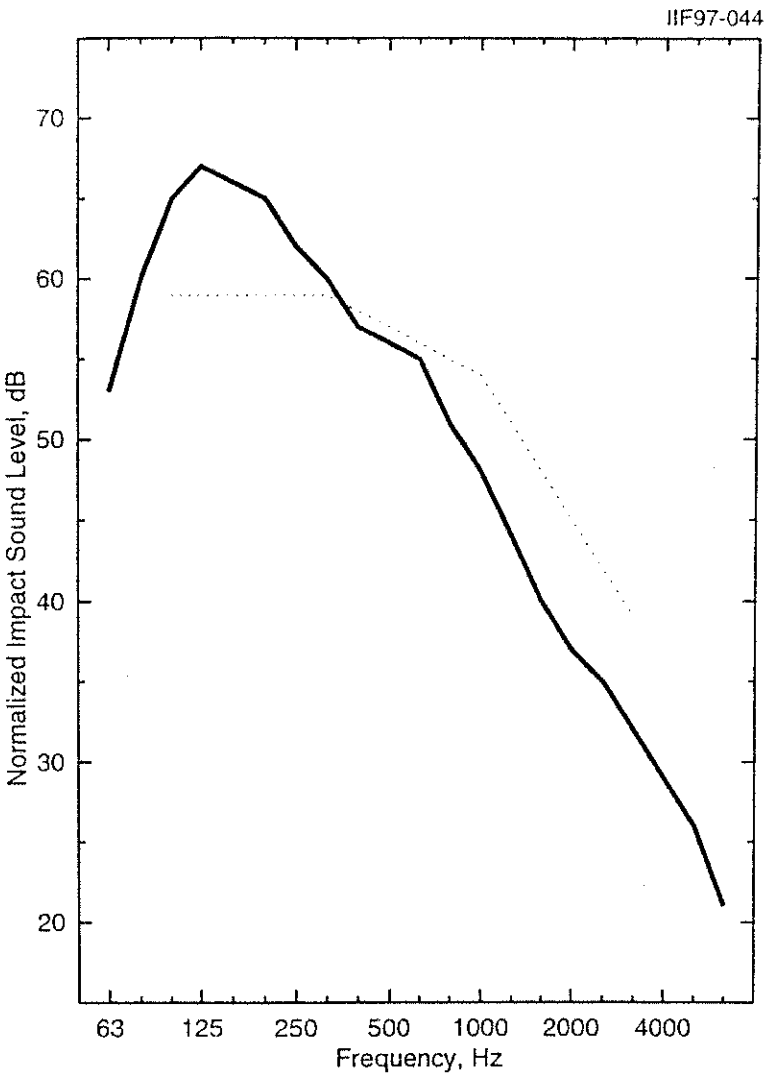
Figure 7: Airborne sound transmission loss measurements of Floor "D". The solid line is the measured data and the dotted line is the STC 60 contour.

Table 8: Impact sound transmission measurements of Floor "D", IIF-97-044.

Frequency (Hz)	Impact Sound Transmission (dB)	95% Confidence Limits*	Deviation above the IIC Contour
50	53	±1.4	
63	53	±1.3	
80	60	±1.3	
100	65	±0.8	6
125	67	±0.7	8
160	66	±0.4	7
200	65	±0.5	6
250	62	±0.3	3
315	60	±0.3	1
400	57	±0.2	
500	56	±0.2	
630	55	±0.1	
800	51	±0.1	
1000	48	±0.1	
1250	44	±0.1	
1600	40	±0.1	
2000	37	±0.1	
2500	35	±0.1	
3150	32	±0.2	
4000	29	±0.2	
5000	26	±0.3	
6300	21*	±0.8	

Impact Insulation Class (IIC) = 53

Weighted Normalized Impact Sound Pressure Level ($L_{n,w}$) = 57



Frequency (Hz)	Normalized ISPL (dB)
50	53
63	53
80	60
100	65
125	67
160	66
200	65
250	62
315	60
400	57
500	56
630	55
800	51
1000	48
1250	44
1600	40
2000	37
2500	35
3150	32
4000	29
5000	26
6300	21*

IIC 53

Figure 8: Impact sound transmission measurements of Floor "D". The solid line is the measured data and the dotted line is the IIC 53 contour.