Architectural Testing

D7106.01-113-11-R0
ACOUSTICAL PERFORMANCE TEST REPORT
ASTM E 90 AND ASTM E 492

Rendered to

PROTECTO WRAP COMPANY

Series/Model: Flex Deck 90

Specimen Type: Sound Control & Crack Suppression Membrane

Overall Size: 3023 mm by 3632 mm

STC	**63**
IIC	**62**

Test Sample Identification:
Floor Topping: 7.3 mm Ceramic Tile
Underlayment: 2.4 mm Protecto Wrap Flex Deck 90 Sheet Membrane
Floor Slab: 203 mm Concrete Slab
Main Beams: Armstrong HD8906 Main Beam Drywall Main Beam
Cross Tees: Armstrong XL8945P Cross Tee
Insulation: 88.9 mm Guardian Faced R-13 Fiberglass Insulation
Ceiling: 15.9 mm Gold Bond® Fire-Shield® Type X Gypsum Board Gypsum Panel

Reference should be made to Architectural Testing, Inc. Report D7106.01-113-11 for complete test specimen description.

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ACCREDITED TL-144

Acoustical Performance Test Report

PROTECTO WRAP COMPANY
1955 South Cherokee Street
Denver, Colorado 80223

Report	D7106.01-113-11
Test Date	04/28/14
Report Date	05/07/14
Record Retention End Date	04/28/18

Project Scope

Protecto Wrap Company contracted Architectural Testing to conduct airborne sound transmission loss and impact sound transmission tests. A summary of the results is listed in the Test Results section, and the complete test data is included as attachments to this report. The client provided the test specimen.

Test Methods

The acoustical tests were conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E 90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
ASTM E 413-10, Classification for Rating Sound Insulation
ASTM E 492-09, Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
ASTM E 989-06 (2012), Classification for Determination of Impact Insulation Class (IIC)
ASTM E 2235-04 (2012) Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

Test Procedure

All testing was conducted in the VT test chambers at Architectural Testing, Inc. located in York, Pennsylvania. The microphones were calibrated before conducting the tests.

The sound transmission loss test was conducted in accordance with the ASTM E 90 test method using a single direction of measurement. Two background noise sound pressure level and twenty-five sound absorption measurements were conducted at each of five microphone positions. Four sound pressure level measurements were made simultaneously in both rooms, at each of five microphone positions.

Test Procedure (Continued)
The impact sound transmission test was conducted in accordance with the ASTM E 492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E 492, and twenty-five sound absorption measurements were conducted at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Test Conditions

Source Room		Receive Room	
Maximum Temperature	20.6 °C	Maximum Temperature	21.5 °C
Minimum Temperature	20.5 °C	Minimum Temperature	20.0 °C
Average Temperature	20.6 °C	Average Temperature	20.7 °C
Maximum Relative Humidity	43%	Maximum Relative Humidity	40%
Minimum Relative Humidity	41%	Minimum Relative Humidity	37%
Average Relative Humidity	43%	Average Relative Humidity	38%

Test Calculations
The STC (Sound Transmission Class) rating was calculated in accordance with ASTM E 413. The IIC (Impact Insulation Class) rating was calculated in accordance with ASTM E 989.

Test Specimen Construction
The test specimen was constructed in the 3023 mm long by 3632 mm wide by 457 mm high opening.

The ceramic tiles were set with light pressure into the bed of mortar and separated by 6.35 mm spacers. TEC Fast Setting mortar was mixed as per manufacturer's specifications and troweled on top of the underlayment using a 9.53 mm by 9.53 mm by square notch trowel. The mortar was allowed to cure according to the manufacturer's specifications. TEC Power Grout was mixed as per manufacturer's specifications and troweled into the 6.35 mm spaces between the ceramic tiles using a grout float. All excess grout was cleaned using a damp sponge. The grout was allowed to cure according to the manufacturer's specifications before testing. The perimeter of the ceramic tile floor was sealed to the test frame with duct seal.

A single layer of 0.05 mm self-adhesive polyethylene sheet was placed on the concrete. The Flex Deck 90 was placed onto the polyethylene sheet.

The concrete slab was installed into a test frame flush to the source room. The concrete slab was isolated from the test frame. The perimeter of the concrete slab was sealed with duct seal. Cure time for the concrete slab exceeded 28 days.

Test Specimen Construction (Continued)
Twelve gauge hanger wires were attached to the bottom side of the concrete with eye bolts at twelve locations. The hanger wires were twisted around the eye bolts a minimum of three times within 76 mm from the eye bolt. The hanger wire was bent and inserted into the HD8906 main beam and twisted around itself a minimum of three times within 76 mm from the main beam creating a 305 mm plenum. The XL8945P cross tees were inserted into the main beams on 406 mm centers.

A single layer of R-13 faced fiberglass insulation was loose laid onto the ceiling grid system. The Type X gypsum board was fastened with fine thread drywall screws on 305 mm centers. The perimeter of the gypsum board was sealed with acoustical caulk. The joints between the gypsum board were sealed with acoustical caulk and pressure sensitive tape.

Test Specimen Materials

Material	Dimensions (mm)	Thickness (mm)	Manufacturer and Series	Quantity	Average Weight	Total Weight
Ceramic Tile	304.8 by 304.8	7.30	N/A	10.98 m²	14.23 kg/m²	156.2 kg
Sheet Membrane	914.4 by 3023	2.40	Protecto Wrap Flex Deck 90	10.98 m²	2.71 kg/m²	29.8 kg
Concrete Slab	3023 by 3632	203.00	N/A	10.98 m²	488.24 kg/m²	5360.9 kg
Drywall Main Beam	38.1 by 43 by 2870	0.50	Armstrong HD8906 Main Beam	10.9 lin m	0.45 kg/m	4.9 kg
Cross Tee	38.3 by 37.3 by 1219	0.50	Armstrong XL8945P	27.2 lin m	0.45 kg/m	12.2 kg
Fiberglass Insulation	2962 by 584	88.90	Guardian Faced R-13	10.98 m²	1.33 kg/m²	14.6 kg
Gypsum Panel	1219 by 3032	15.90	Gold Bond® Fire-Shield® Type X Gypsum Board	10.56 m²	11.23 kg/m²	118.6 kg

Comments
The total weight of the floor/ceiling assembly was 5697.2 kg. Architectural Testing will store samples of the test specimen for four years. Photographs of the test specimen are included in the attachments. A design drawing is included in the attachments.

Architectural Testing will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Architectural Testing for the entire test record retention period.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing.

For ARCHITECTURAL TESTING, INC:

Digitally Signed by: Daniel Mohler

Digitally Signed by: Bradlay Hunt

Daniel B. Mohler
Technician II - Acoustical Testing

Bradlay D. Hunt
Project Manager - Acoustical Testing

Attachments (7)

** Stated by Client/Manufacturer*
N/A - Non Applicable

Revision Log

Revision	Date	Page(s)	Description
R0	05/07/14	N/A	Original Report Issue

Attachments

Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	63763	06/12 *
Source Room Microphone	PCB Piezotronics	378B20	64902	11/13
Source Room Microphone	PCB Piezotronics	378B20	64903	11/13
Source Room Microphone	PCB Piezotronics	378B20	64904	11/13
Source Room Microphone	PCB Piezotronics	378B20	64905	11/13
Source Room Microphone	PCB Piezotronics	378B20	64906	11/13
Receive Room Microphone	PBC Piezotronics	378B20	64907	11/13
Receive Room Microphone	PCB Piezotronics	378B20	64908	11/13
Receive Room Microphone	PCB Piezotronics	378B20	64909	11/13
Receive Room Microphone	PCB Piezotronics	378B20	64910	11/13
Receive Room Microphone	PCB Piezotronics	378B20	64911	11/13
Receive Room Environmental Indicator	Comet	T7510	63810	09/13
Receive Room Environmental Indicator	Comet	T7510	63811	09/13
Source Room Environmental Indicator	Comet	T7510	63812	09/13
Microphone Calibrator	Norsonic	1251	C002919	07/13
Tapping Machine	Norsonic	N-211	Y003242	03/14

** The calibration frequency for this equipment is every two years per the manufacturer's recommendation.*

Test Chambers

VT Receive Room Volume	155.8 m^3
VT Source Room Volume	190 m^3

Architectural Testing

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SOUND TRANSMISSION LOSS

ASTM E 90

Test Date	04/28/14
Data File No.	D7106.01A
Client	Protecto Wrap Company
Description	7.3 mm Ceramic Tile, 2.4 mm Protecto Wrap Flex Deck 90 Sheet Membrane, 203 mm Concrete Slab, 0.5 mm Armstrong HD8906 Main Beam Drywall Main Beam, 0.5 mm Armstrong XL8945P Cross Tee, 88.9 mm Guardian Faced R-13 Fiberglass Insulation, 15.9 mm National Gypsum 5/8" Type X Gypsum Board Gypsum Panel
Specimen Area	10.98 m²
Technician	Daniel B. Mohler

Freq (Hz)	**Background SPL** (dB)	**Absorption** (m²)	**Source SPL** (dB)	**Receive SPL** (dB)	**Specimen TL** (dB)	**95% Confidence Limit**	**Number of Deficiencies**
80	48.4	15.6	95	55	39	6.56	-
100	41.1	10.4	91	54	39	3.52	-
125	35.3	9.6	94	52	44	3.11	3
160	29.5	9.6	90	50	42	3.81	8
200	23.7	10.7	90	43	48	2.48	5
250	23.8	9.8	92	42	52	1.89	4
315	22.3	9.0	92	40	54	2.03	5
400	20.9	7.7	91	34	59	1.43	3
500	24.5	7.2	92	32	63	1.45	0
630	23.0	6.8	93	31	66	1.19	0
800	21.0	7.1	93	29	68	0.83	0
1000	21.2	6.9	93	29	68	0.94	0
1250	20.3	7.2	93	28	69	0.85	0
1600	16.1	7.2	93	27	69	0.95	0
2000	10.1	8.5	93	26	69	0.93	0
2500	7.9	9.6	92	26	68	0.94	0
3150	6.7	10.9	92	22	71	1.04	0
4000	6.2	13.1	92	19	72	1.32	0
5000	6.2	16.0	92	15	76	1.27	-
6300	6.5	21.1	85	6	78	1.07	-
8000	6.9	29.2	84	5	76	1.26	-
10000	7.1	37.4	79	5	70	1.21	-

STC Rating **63** *(Sound Transmission Class)*

Deficiencies 28 *(Sum of Deficiencies)*

Notes: *1) Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.*
2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

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SOUND TRANSMISSION LOSS

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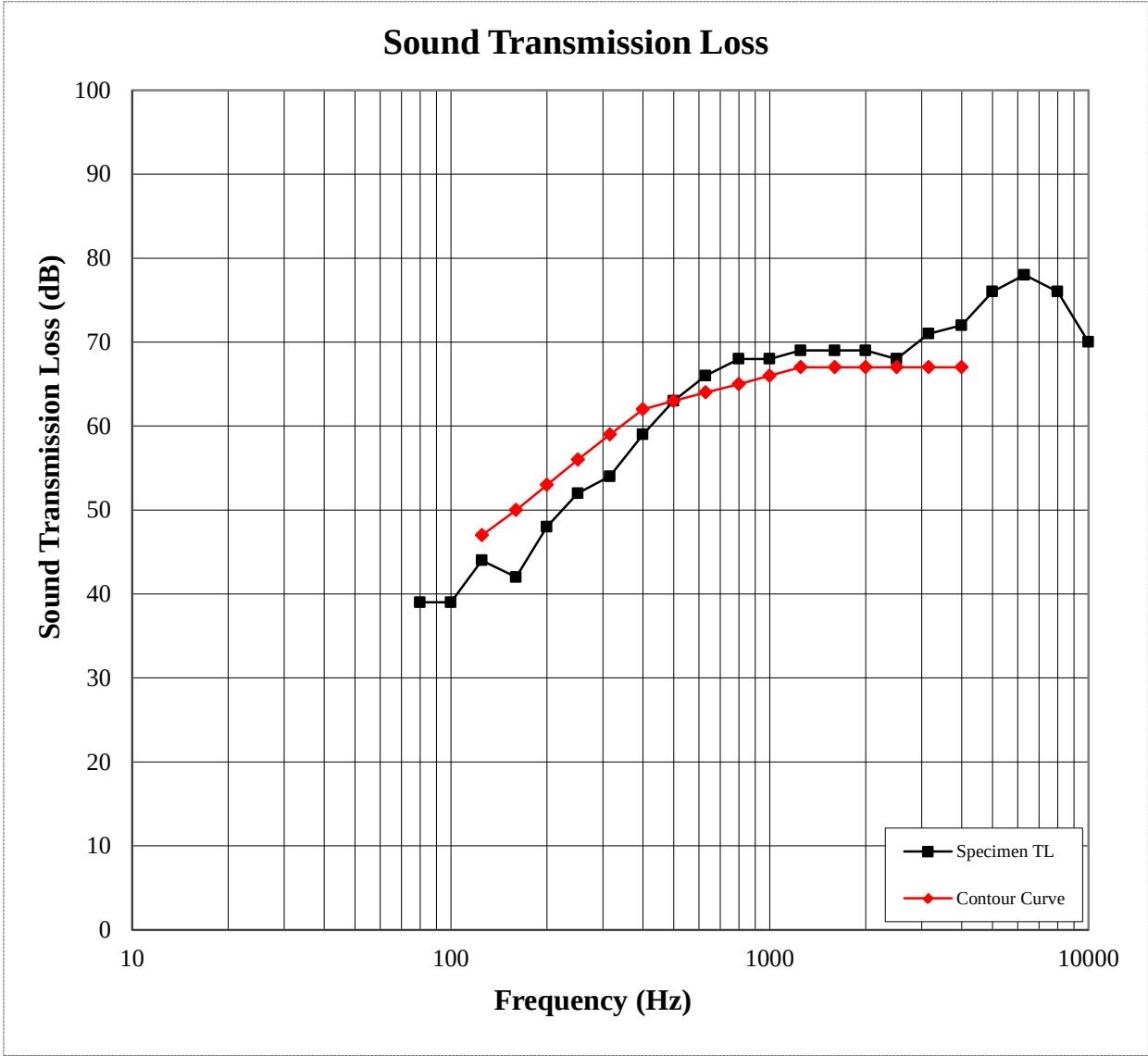
Specimen Area	10.98 m²
Technician	Daniel B. Mohler



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IMPACT TRANSMISSION

ASTM E 492

Test Date	04/28/14
Data File No.	D7106.01A
Client	Protecto Wrap Company
Description	7.3 mm Ceramic Tile, 2.4 mm Protecto Wrap Flex Deck 90 Sheet Membrane, 203 mm Concrete Slab, 0.5 mm Armstrong HD8906 Main Beam Drywall Main Beam, 0.5 mm Armstrong XL8945P Cross Tee, 88.9 mm Guardian Faced R-13 Fiberglass Insulation, 15.9 mm National Gypsum 5/8" Type X Gypsum Board Gypsum Panel
Specimen Area	10.98 m²
Technician	Daniel B. Mohler

Freq (Hz)	**Background SPL** (dB)	**Absorption** (m²)	**Normalized Impact SPL** (dB)	**95% Confidence Limit**	**Number of Deficiencies**
80	51.4	15.9	59	3.1	-
100	41.6	11.2	49	1.4	0
125	34.8	10.0	48	3.3	0
160	29.0	9.6	47	3.3	0
200	23.2	10.7	48	7.8	0
250	26.8	9.9	53	1.3	3
315	22.9	9.0	51	2.3	1
400	22.7	7.8	51	1.4	2
500	25.2	7.2	51	2.9	3
630	22.9	6.7	50	0.8	3
800	22.6	7.1	51	2.2	5
1000	21.9	7.0	48	3.3	3
1250	19.4	7.2	45	3.5	3
1600	16.7	7.2	41	2.5	2
2000	9.6	8.3	36	3.2	0
2500	7.8	9.5	33	2.8	0
3150	6.9	10.8	28	1.0	0
4000	7.2	12.8	26	0.6	-
5000	7.7	15.9	21	2.6	-
6300	8.3	20.7	14	7.8	-
8000	8.8	28.5	15	8.4	-
10000	9.3	36.7	16	9.7	-

IIC Rating **62** *(Impact Insulation Class)*

Deficiencies 25 *(Sum of Deficiencies)*

Note: *Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.*

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IMPACT TRANSMISSION

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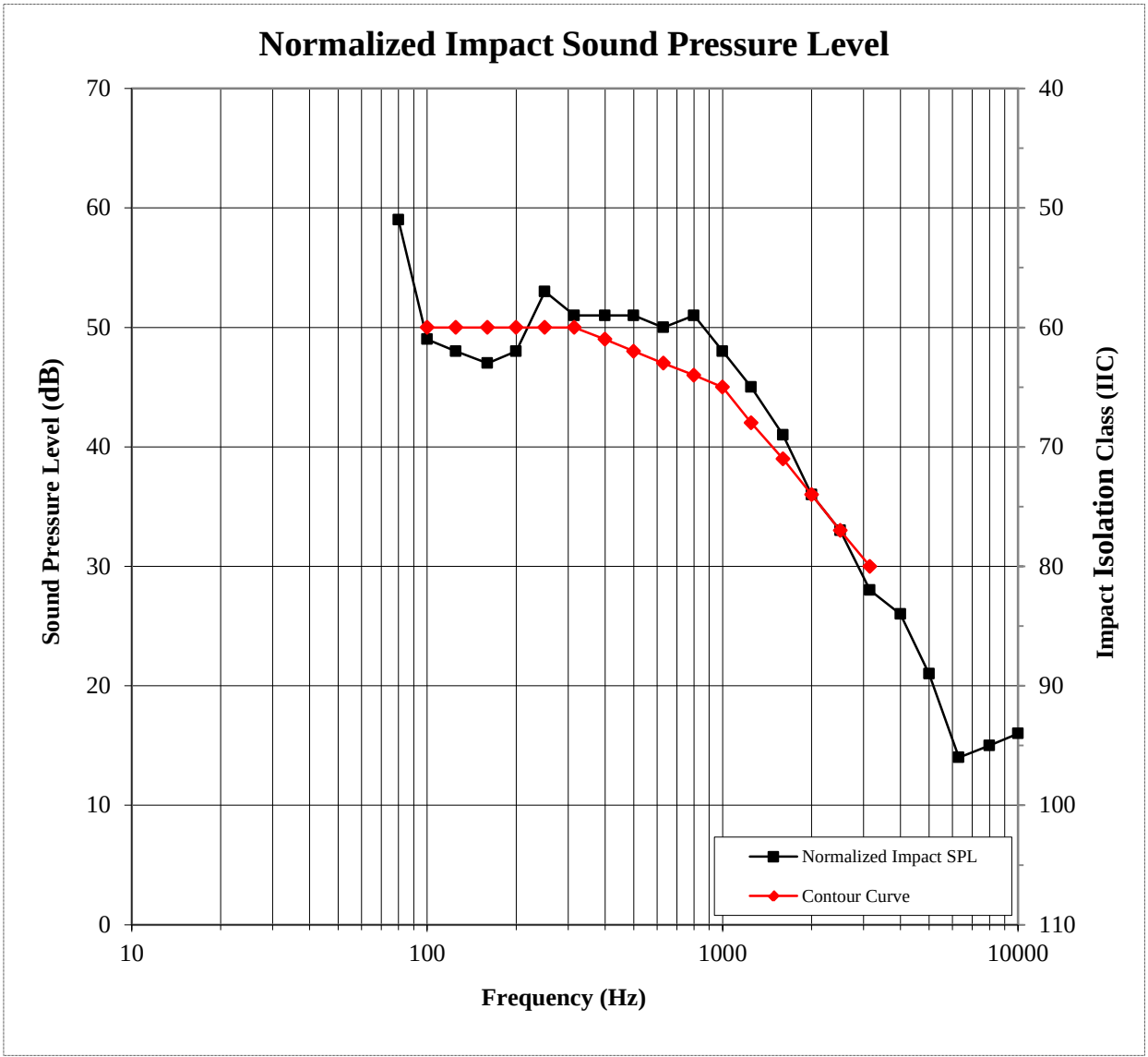
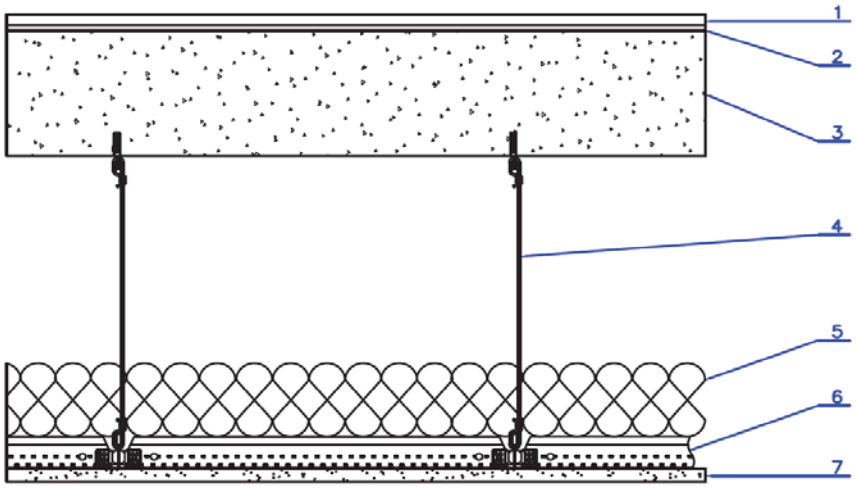


Photographs

Source Room View of Test Specimen Installation

Receive Room View of Test Specimen Installation

Drawing



Cross Section View of Test Specimen

1-Floor Topping
2-Underlayment
3-Floor Slab
4-Hanger Wire
5-Insulation
6-Drywall Grid System
7-Ceiling