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9WOOD, INC.
ACOUSTICAL PERFORMANCE TEST REPORT

SCOPE OF WORK
ASTM C423 SOUND ABSORPTION TESTING ON 1000 SERIES SKU 1114-4 CROSS PIECE WOOD GRILLES WITH FIBERGLASS DUCT LINER

REPORT NUMBER
H5145.03-303-11 R0

TEST DATES
10/06/17 AND 10/11/17

ISSUE DATE
11/06/17

RECORD RETENTION END DATE
10/18/21

PAGES
12

DOCUMENT CONTROL NUMBER
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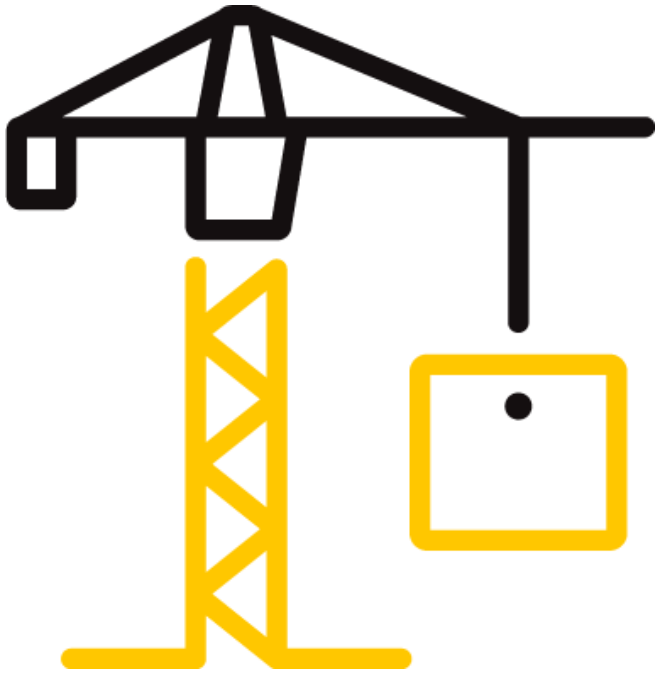

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TEST REPORT FOR 9WOOD, INC.
Report No.: H5145.03-303-11 R0
Date: 11/06/17

REPORT ISSUED TO
9WOOD, INC.
999 South A Street
Springfield, Oregon 97477

SECTION 1
SCOPE

Intertek Building & Construction (B&C) was contracted by 9Wood, Inc. to perform a sound absorption test. Results obtained are tested values and were secured by using the designated test method(s). The complete test data is included herein. The client provided the test specimen. All measurements were conducted in the HT test chambers at Intertek B&C located in Lake Forest, California.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

For INTERTEK B&C:

COMPLETED BY:	Leeland S. Hoover	**REVIEWED BY:**	Bradlay D. Hunt
TITLE:	Technician I	**TITLE:**	Laboratory Manager
SIGNATURE:	Leeland Hoover/S.S. Digitally Signed for: Lee Hoover by Shannon Stein	**SIGNATURE:**	Digitally Signed by: Bradlay Hunt
DATE:	11/06/17	**DATE:**	11/06/17

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SECTION 2
SUMMARY OF TEST RESULTS

SERIES/MODEL	1000 Series SKU 1114-4 Cross Piece Wood Grilles							
SAMPLE TYPE	Wood Ceiling							
MOUNTING TYPE	Type A							
DATA FILE NO.	**1/3 OCTAVE SOUND ABSORPTION COEFFICIENTS AT THE OCTAVE BAND FREQUENCIES**						**NRC**	**SAA**
	125	**250**	**500**	**1000**	**2000**	**4000**		
H5145.01C	0.16	0.84	0.99	0.82	0.86	0.70	0.90	0.88

SERIES/MODEL	1000 Series SKU 1114-4 Cross Piece Wood Grilles							
SAMPLE TYPE	Wood Ceiling							
MOUNTING TYPE	Type E400							
DATA FILE NO.	**1/3 OCTAVE SOUND ABSORPTION COEFFICIENTS AT THE OCTAVE BAND FREQUENCIES**						**NRC**	**SAA**
	125	**250**	**500**	**1000**	**2000**	**4000**		
H5145.01G	0.73	1.00	1.13	0.98	0.93	0.71	1.00	1.00

SECTION 3
TEST METHOD(S)

The specimens were evaluated in accordance with the following:

ASTM C423-17, *Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method*

ASTM E795-16, *Standard Practices for Mounting Test Specimens During Sound Absorption Tests*

SECTION 4
SPECIMEN MOUNTING

For the Type A mounting, the test specimen was placed directly against the floor of the reverberation room with the absorptive side facing the sound field. The perimeter of the specimen was sealed to the floor with plywood and duct tape.

For the Type E-400 mounting, the specimen was placed on the Type E test assembly so that the absorptive face of specimen was suspended 400 mm above the floor of the reverberation room. The perimeter of the specimen was sealed to the test assembly with duct tape. The perimeter of the test assembly was sealed to the floor with duct tape.

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SECTION 5
EQUIPMENT

The equipment listed below meets the requirements of the test methods stated in Section 3 of this report.

INSTRUMENTATION

INSTRUMENT	MANUFACTURER	MODEL	DESCRIPTION	ASSET #	CAL DATE
Data Acquisition Unit	National Instruments	PXI-4462	Input Card	INT00627	10/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	INT00395	10/16
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	INT00396	10/16
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	INT00397	10/16
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	INT00239	04/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00240	04/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00241	04/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00242	04/17
Source Room Microphone	PCB piezotronics	378C20	Microphone and Preamplifier	INT00243	04/17
Receive Room Microphone	PBC Piezotronics	378C20	Microphone and Preamplifier	INT00244	04/17
Receive Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00245	04/17
Receive Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00246	04/17
Receive Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00247	04/17
Receive Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT00228	04/17
Receive Room Environmental Indicator	Comet	T7510	Receive Room	INT00299	10/17
Source Room Environmental Indicator	Comet	T7510	Source Room	INT00300	10/17
Microphone Calibrator	Norsonic	1251	Pistonphone Calibrator	INT00288	06/17

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

TEST CHAMBER

	VOLUME	DESCRIPTION
RECEIVE ROOM	231 m^3	Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor
SOURCE ROOM	196 m^3	Stationary diffusers only Temperature and humidity controlled

	MAXIMUM SIZE	DESCRIPTION
TL TEST OPENING	4.27 m wide by 3.05 m high	Vibration break between source and receive rooms

N/A-Not Applicable

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SECTION 6
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Leeland S. Hoover	Intertek B&C
Ryan R. Lau	Intertek B&C

SECTION 7
TEST PROCEDURE

The sensitivity of the microphones was checked before measurements were conducted. Empty room sound absorption measurements were conducted before the specimen was installed. Full room sound absorption measurements were conducted after the specimen was installed.

For the empty and full room measurements, ten decay measurements were conducted at each of the five microphone positions. Data was obtained at 1/3 octave band frequencies ranging from 80 to 5000 hertz. The air temperature and relative humidity conditions were monitored and recorded during the measurements.

Intertek B&C will store samples of test specimens for four years.

SECTION 8
TEST CALCULATIONS

The Sound Absorption Coefficient is the full room absorption minus the empty room absorption divided by the area of the sample in m^2. The Sound Absorption Coefficient is dimensionless.

The Noise Reduction Coefficient (NRC) rating is the arithmetic average of the sound absorption coefficients at 250, 500, 1000 and 2000 hertz. The average is rounded to the nearest multiple of 0.05.

The Sound Absorption Average (SAA) rating is the arithmetic average of the sound absorption coefficients at the frequencies ranging from 200 to 2500 hertz. The average is rounded to the nearest multiple of 0.01.

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SECTION 9
TEST SPECIMEN DESCRIPTION

Eight 0.30 m by 2.74 m panels were arranged to produce the 2.44 m by 2.74 m (96" by 108") test specimen. The cross piece wood grille consisted of 32 19 mm by 2743 mm wood pieces. Providing an open area of 75%. The total weight of the specimen was 85.84 kg.

DESCRIPTION	THICKNESS	WEIGHT
1000 Series SKU 1114-4 Cross Piece Wood Grilles	3.75 inches 95.25 mm	2.63 lbs/ft^2 12.84 kg/m^2
2" Fiberglass Duct Liner	1.80 inches 45.8 mm	0.25 lbs/ft^2 0.11 kg/m^2

** - Stated per Client/Manufacturer*

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TEST REPORT FOR 9WOOD, INC.
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Date: 11/06/17

SECTION 10
TEST RESULTS

ASTM C423
SOUND ABSORPTION TEST

ACCREDITED
Testing Laboratory

TEST DATE	10/06/17	
DATA FILE NO.	H5145.01C	
CLIENT	9Wood, Inc.	
DESCRIPTION	Series/Model: 1000 Series SKU 1114-4 Cross Piece Wood Grilles with Fiberglass Duct Liner	
TECHNICIAN	Leeland S. Hoover	
SPECIMEN AREA	6.69 m²	
MOUNTING TYPE	Type A	
	EMPTY	**FULL**
TEMP °C	19.7	20.6
RH %	40	41
B.P. (mb)	1013	1014

FREQ (Hz)	**EMPTY ROOM ABSORPTION** (m^2)	**UNCERTAINTY**	**FULL ROOM ABSORPTION** (m^2)	**UNCERTAINTY**	**ABSORPTION COEFFICIENT**	**RELATIVE UNCERTAINTY**
80	4.61	0.283	5.10	0.245	0.07	0.056
100	4.41	0.338	5.23	0.268	0.12	0.065
125	4.85	0.242	5.94	0.347	0.16	0.063
160	4.69	0.091	6.67	0.125	0.30	0.023
200	5.73	0.085	9.52	0.079	0.57	0.017
250	6.33	0.123	11.93	0.087	0.84	0.023
315	6.24	0.053	13.01	0.050	1.01	0.011
400	5.34	0.066	12.72	0.023	1.10	0.010
500	4.53	0.047	11.16	0.201	0.99	0.031
630	4.75	0.048	10.48	0.025	0.86	0.008
800	4.76	0.034	10.06	0.025	0.79	0.006
1000	4.74	0.025	10.20	0.019	0.82	0.005
1250	4.71	0.022	10.58	0.020	0.88	0.004
1600	4.84	0.017	11.40	0.011	0.98	0.003
2000	5.55	0.010	11.33	0.072	0.86	0.011
2500	5.72	0.009	11.28	0.075	0.83	0.011
3150	5.70	0.011	10.53	0.014	0.72	0.003
4000	5.90	0.014	10.57	0.007	0.70	0.002
5000	6.31	0.012	10.50	0.009	0.63	0.002

NRC RATING	0.90	*(Noise Reduction Coefficient)*
SAA RATING	0.88	*(Sound Absorption Average)*

Notes:

1) The NRC rating is the arithmetic average of the sound absorption coefficients at 250, 500, 1000, and 2000 hertz. The average is rounded to the nearest multiple of 0.05.

2) The SAA rating is the arithmetic average of the sound absorption coefficients at the frequencies ranging from 200 to 2500 hertz. The average is rounded to the nearest multiple of 0.01.

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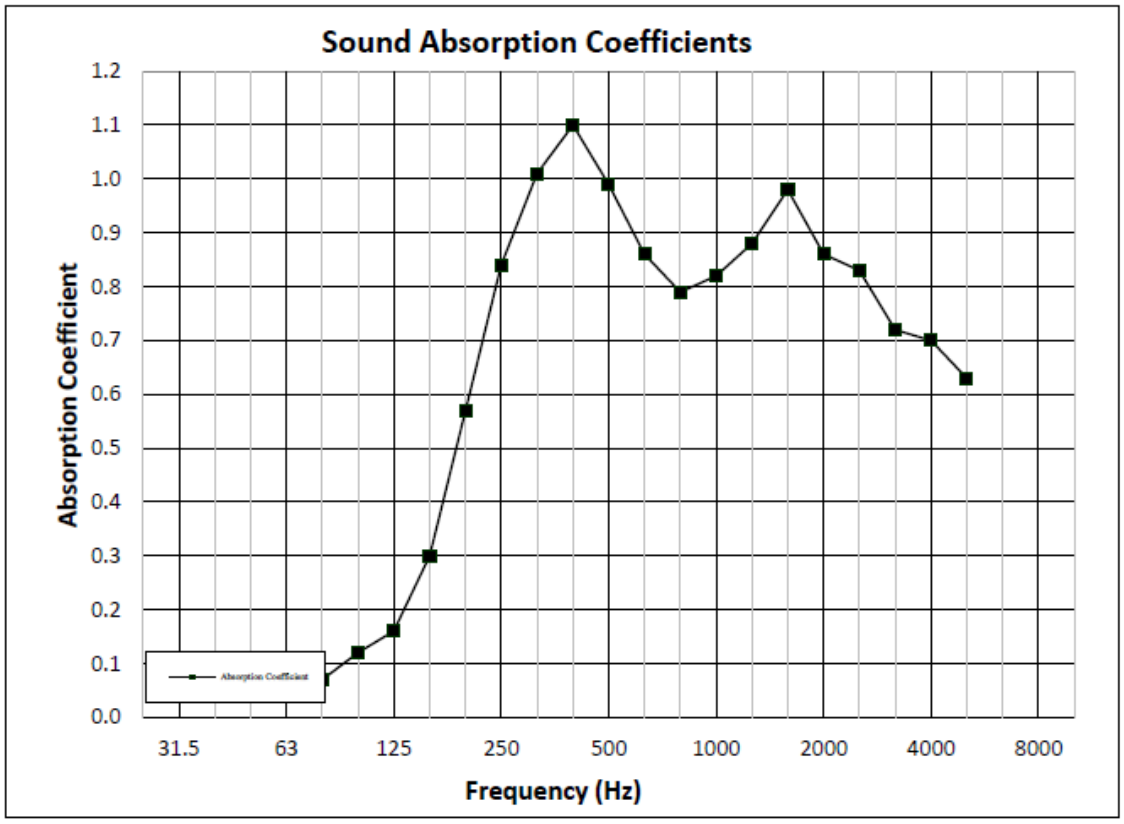
ASTM C423
SOUND ABSORPTION TEST

ACCREDITED
Testing Laboratory

TEST DATE	10/06/17	
DATA FILE NO.	H5145.01C	
CLIENT	9Wood, Inc.	
DESCRIPTION	Series/Model: 1000 Series SKU 1114-4 Cross Piece Wood Grilles with Fiberglass Duct Liner	
TECHNICIAN	Leeland S. Hoover	
SPECIMEN AREA	6.69 m²	
MOUNTING TYPE	Type A	
	EMPTY	**FULL**
TEMP °C	19.7	20.6
RH %	40	41
B.P. (mb)	1013	1014



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ASTM C423
SOUND ABSORPTION TEST

ACCREDITED
Testing Laboratory

TEST DATE	10/11/17	
DATA FILE NO.	H5145.01G	
CLIENT	9Wood, Inc.	
DESCRIPTION	Series/Model: 1000 Series SKU 1114-4 Cross Piece Wood Grilles with Fiberglass Duct Liner	
TECHNICIAN	Leeland S. Hoover	
SPECIMEN AREA	6.69 m²	
MOUNTING TYPE	Type E400	
	EMPTY	**FULL**
TEMP °C	19.7	21.0
RH %	50	53
B.P. (mb)	1012	1012

FREQ (Hz)	**EMPTY ROOM ABSORPTION** (m^2)	**UNCERTAINTY**	**FULL ROOM ABSORPTION** (m^2)	**UNCERTAINTY**	**ABSORPTION COEFFICIENT**	**RELATIVE UNCERTAINTY**
80	4.52	0.278	7.18	0.284	0.40	0.059
100	4.42	0.319	8.00	0.188	0.53	0.055
125	4.84	0.160	9.70	0.253	0.73	0.045
160	4.72	0.065	10.59	0.133	0.88	0.022
200	5.77	0.149	12.46	0.083	1.00	0.025
250	6.34	0.079	13.00	0.051	1.00	0.014
315	6.24	0.062	13.32	0.054	1.06	0.012
400	5.31	0.083	13.09	0.023	1.16	0.013
500	4.57	0.045	12.10	0.107	1.13	0.017
630	4.78	0.032	11.30	0.025	0.97	0.006
800	4.77	0.033	11.09	0.041	0.95	0.008
1000	4.74	0.019	11.32	0.015	0.98	0.004
1250	4.73	0.027	11.15	0.019	0.96	0.005
1600	4.88	0.013	11.64	0.016	1.01	0.003
2000	5.55	0.019	11.80	0.076	0.93	0.012
2500	5.70	0.009	11.68	0.048	0.89	0.007
3150	5.76	0.018	10.79	0.010	0.75	0.003
4000	5.93	0.007	10.66	0.011	0.71	0.002
5000	6.36	0.006	10.50	0.008	0.62	0.002

NRC RATING	1.00	*(Noise Reduction Coefficient)*
SAA RATING	1.00	*(Sound Absorption Average)*

Notes:

1) The NRC rating is the arithmetic average of the sound absorption coefficients at 250, 500, 1000, and 2000 hertz. The average is rounded to the nearest multiple of 0.05.

2) The SAA rating is the arithmetic average of the sound absorption coefficients at the frequencies ranging from 200 to 2500 hertz. The average is rounded to the nearest multiple of 0.01.

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ASTM C423
SOUND ABSORPTION TEST

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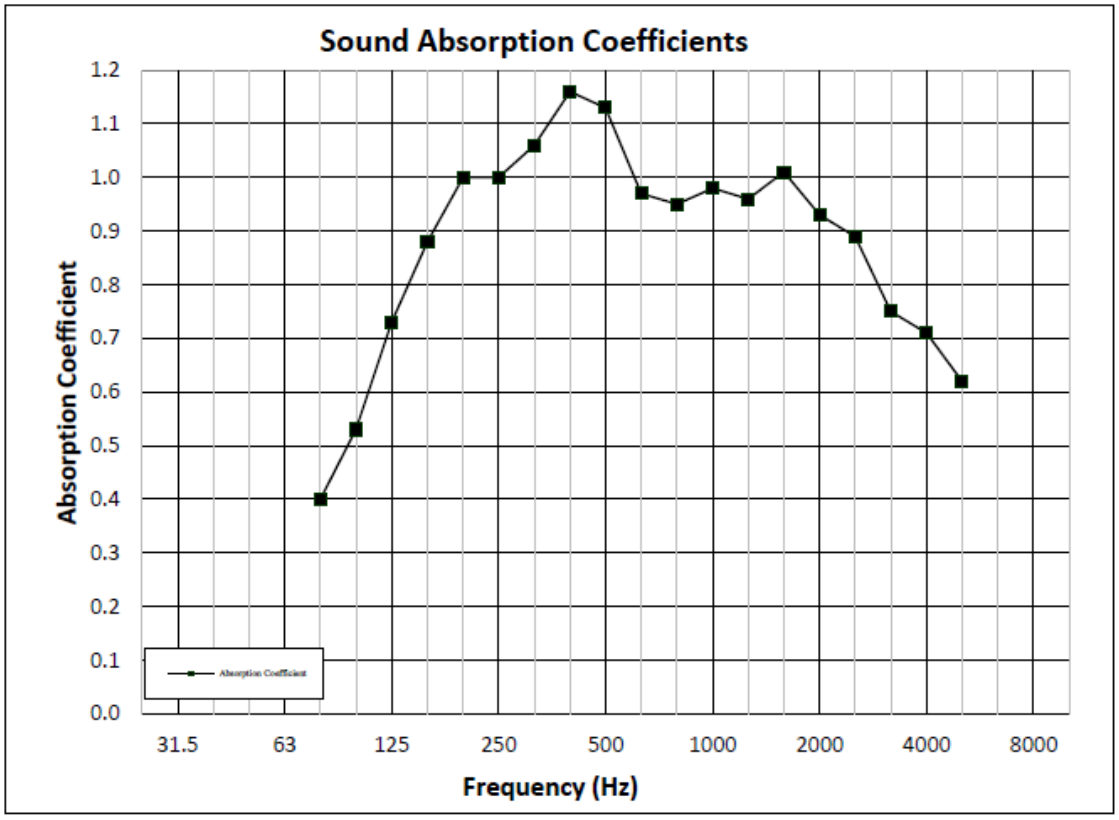
Testing Laboratory

TEST DATE	10/11/17	
DATA FILE NO.	H5145.01G	
CLIENT	9Wood, Inc.	
DESCRIPTION	Series/Model: 1000 Series SKU 1114-4 Cross Piece Wood Grilles with Fiberglass Duct Liner	
TECHNICIAN	Leeland S. Hoover	
SPECIMEN AREA	6.69 m²	
MOUNTING TYPE	Type E400	
	EMPTY	**FULL**
TEMP °C	19.7	21.0
RH %	50	53
B.P. (mb)	1012	1012



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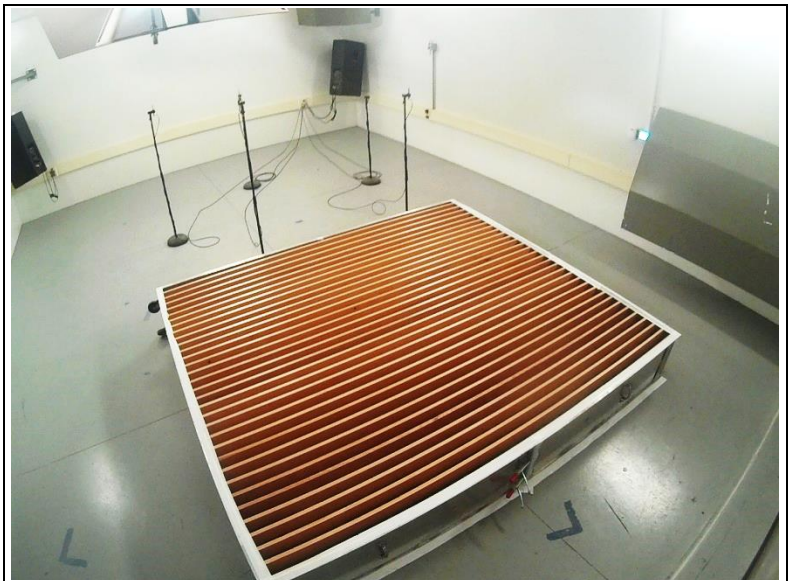
SECTION 11
PHOTOGRAPHS

View of Test Specimen (Type A Mount)



View of Test Specimen (Type E400 Mount)

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SECTION 12
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	11/06/17	N/A	Original Report Issue