

# Test Report for Laboratory Measurement of Sound Transmission Loss

TEST REPORT REFERENCE NUMBER: **ATS16-049-RP007**

DATE OF REPORT: **02 December 2016**

TESTED FOR: **Fujian Jumbo New Material Corporation Limited**

**Industrial Zone, Chang Shan Overseas Chinese Economic Development Zone, Zhang Zhou, Fujian, China**

ATTENTION: **Mr. Tommy Liu**

UNIT UNDER TEST: **JUMBO High Density (HD) 150mm thickness Gypsum Block Wall System with 5mm thick JUMBO Plastering (JUMBO MP300) on both sides**

TEST STANDARD: **ASTM E90 – 09**

TESTED AT: **Unit E, 2/F., Century Industrial Centre, 33-35 Au Pui Wan Street, Fo Tan, Shatin, New Territories, Hong Kong.**

Approved by:

  
Ir Dr. Fan CHONG / Managing Director  
CEng, RPE, MHKIE, FIMechE, FIOA  
MHKIOA, MCIBSE, MASHRAE, MHKIQEP



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## 1. METHOD OF TEST

The test was conducted in accordance with ASTM E90 – 09 “Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements” in the reverberation rooms of Acoustic Testing Services Limited. The single number rating of airborne Sound Transmission Loss is given as Sound Transmission Class (STC) by evaluation in accordance with ASTM E413 – 10 “Classification for Rating Sound Insulation”.

## 2. INSTRUMENTATION

Description:	Serial Number:
Bruel & Kjaer Type 3560-B Real Time Frequency Analyzer	2454296
Ultragraph Pro Equalizer	N0517513166
STK V-6 Amplifier	C04OM013
Bruel & Kjaer Type 4292 OmniPower Sound Source	021005
Bruel & Kjaer Type 4292-L OmniPower Sound Source	005007
Bruel & Kjaer Type 4942 Random Incident ½” Microphone (Source Room)	2497997
Bruel & Kjaer Type 4942 Random Incident ½” Microphone (Receiving Room)	2497998
Bruel & Kjaer Type 4231 Sound Level Calibrator	2478237

The measuring equipment has been calibrated by an external recognized accredited laboratory, and is in current calibration.

## 3. PRINCIPLE OF TEST

The Sound Transmission Loss of a partition is usually measured in a laboratory by placing the element in an opening between two adjacent reverberant rooms designed for such tests. Noise is introduced into one of the rooms, referred to as the source room, and part of the sound energy is transmitted through the test element into the second room, referred to as the receiving room. The resulting mean space-average sound pressure levels in the source room and the receiving room are  $L_1$  and  $L_2$ , respectively.

The Sound Transmission Loss is given by

$$TL = L_1 - L_2 + 10 \lg(S/A) \quad \dots(1)$$

where,

- $L_1$  is the average sound pressure level in the source room, in dB;
- $L_2$  is the average sound pressure level in the receiving room, in dB;
- $S$  is the area of the test specimen, in  $m^2$ ;
- $A$  is the equivalent absorption area in the receiving room, in metres sabins.

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$$A = (0.9210Vd / c) \quad \dots(2)$$

where,

- $V$  is the receiving room volume, in  $m^3$ ;  
 $d$  is the rate of decay of sound pressure level in receiving room, dB/s;  
 $c$  is the speed of sound in the medium, m/s.

The speed of sound changes with temperature and shall be calculated for the conditions existing at the time of test from the equation:

$$c = 20.047\sqrt{273.15 + t} \quad \dots(3)$$

where,

- $t$  is the receiving room temperature, measured to nearest degree Celsius.

The Sound Transmission Class (STC) of test specimen is calculated by comparing the sixteen values of Sound Transmission Loss from 125 Hz to 4000 Hz with a defined reference curve which is incremented until the requirements of ASTM E413 – 10 are met.

STC contour consists of a horizontal segment from 1250 Hz to 4000 Hz, a middle segment increasing by 5 dB from 400 Hz to 1250 Hz and a low frequency segment increasing by 15 dB from 125 Hz to 400 Hz. The STC rating of an element is determined by plotting the 1/3 octave band TL of the element and comparing it with the STC contour. The STC contour is shifted vertically until the TL curve falls mainly below the contour and the following criteria are met:

1. the TL curve is never more than 8 dB below the STC contour in any 1/3 octave bands; and
2. the sum of the deficiencies below the contour over the 16 1/3 octave bands does not exceed 32 dB.

When the STC contour is shifted to meet these criteria, the STC rating is given by the value of the contour at 500 Hz.

The measured sound transmission loss values are obtained from a single direction measurement.

#### 4. MEASUREMENT PROCEDURES

- 4.1 Firstly, the background noise level was measured in the receiving room before the sound pressure level measurement.
- 4.2 Then, sound source was generated in the source room. The sound pressure levels were measured for 15s in the source room and receiving room simultaneously for each measurement. Total 16 measurements of sound pressure level in each room were made.
- 4.3 After measurements of sound pressure level, the decay rates were measured at total 3 microphone positions with 5 times measurement at each microphone positions in the receiving room.
- 4.4 Before and after the measurement, the used measurement system was calibrated by sound level calibrator.

#### 5. RESULTS APPLICATION

The results obtained can be used to design building elements with appropriate acoustic properties, to compare the sound insulation properties of building elements and to classify such elements according to their sound insulation capabilities.

The test was performed in laboratory facilities in which transmission of sound through flanking paths is suppressed. Results of measurements shall not be applied directly in the field without accounting for other factors affecting sound insulation, especially flanking transmission and loss factor.

The test results obtained relate only to the Unit Under Test.

## 6. DETAILS OF TEST

Date of receipt of Unit Under Test:	22 October 2016
Date of commencement of construction of Unit Under Test:	30 October 2016
Date of test:	31 October 2016
Unit Under Test:	JUMBO High Density (HD) 150mm thickness Gypsum Block Wall System with 5mm thick JUMBO Plastering (JUMBO MP300) on both sides
Sample I. D.:	ATS16-049-TS004
Dimensions used for calculation:	3500 mm (width) X 3000 mm (height)
Manufacturer:	Fujian Jumbo New Material Corporation Limited
Installed by:	Fujian Jumbo New Material Corporation Limited
Additional Description:	
Brand:	"JUMBO"
Model:	B 150
Density:	1100 kg/m <sup>3</sup> (±5%)
Size:	600mm (L) x 247mm (H)
Thickness:	150mm
Others:	Gypsum block fixed to supporting frame using JUMBO Gypsum Bonding Adhesive (JUMBO MB100). Jointing of blocks to be filled by JUMBO Gypsum Bonding Adhesive (JUMBO MB100). 5mm thick JUMBO Plastering (JUMBO MP300) was applied on surface of gypsum block wall on both sides.

The details of the Unit Under Test refer to the drawings given in Appendix 1, if applied. The information of the Unit Under Test is provided by the Client and is not verified by the laboratory.

## 7. TEST RESULTS

### Source Room:

Temperature: 26 °C  
Humidity: 70 %  
Volume: 221 m<sup>3</sup>

### Receiving Room:

Temperature: 26 °C  
Humidity: 70 %  
Volume: 80 m<sup>3</sup>

### Specimen Dimension used for calculation:

Width: 3500 mm  
Height: 3000 mm

### Sound Transmission Loss (TL):

Freq. (Hz)	1/3 Oct, TL (dB)	1/1 Oct, TL (dB)
100	35	37
125	37	
160	40	
200	37	38
250	38	
315	40	
400	43	45
500	45	
630	49	
800	50	52
1000	52	
1250	55	
1600	56	58
2000	59	
2500	59	
3150	60	61
4000	62	
5000	63	

**STC = 50**



Figure 1. Sound Transmission Loss against Frequency

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**APPENDIX LIST**

- |            |                            |
|------------|----------------------------|
| APPENDIX 1 | Details of Unit Under Test |
| APPENDIX 2 | Photographic Records       |



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**APPENDIX 2**

**Photographic Records**



Set-up of Unit Under Test (Source room)



Set-up of Unit Under Test (Receiving room)

**End of Report**

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