**CONFIDENTIAL**

# TEST REPORT ON DETERMINATION OF SOUND TRANSMISSION LOSS OF 88 MM THICK METAL STUD PARTITION SYSTEM

**No. NVH/8278/2016-17/590 (V-4)-1** **13th January 2017**

**1.0 CUSTOMER NAME** : Ramco Industries Ltd.
52, R.K. Mutt Road,
I floor, Mylapore
Chennai – 600 004,
Tamilnadu

**2.0 LETTER REF.** : E-mail dated 23rd December 2016

**3.0 TEST COMPONENT** :

88 mm thick metal stud partition system with following details given by customer. Please refers Annexure 1 for isometric view and elevation drawing and details of 88 mm thick metal stud partition system.

**Main System** : 88 mm thick metal stud partition comprising of a composite framework which includes a 70mm G.I stud of 0.55 mm thick and having two unequal flanges of 34 and 36 mm each placed at 610 mm center to center in 72 mm G.I floor and ceiling channel with two equal flanges of 32 mm each fixed to floor and ceiling. This is done with the help of nylon sleeves and wood screws with a gap of 600 mm.

Single layer of 8 mm thick and 1200 -1250 kg/m³ density Hicem flexo boards are then screw fixed to the studs and channels at 200 mm centers on both sides of the frame work, with 25 mm long G.I self-drilling & tapping screws having Phillips head. The board's joints are to be staggered to avoid through passage.

**Insulation** : 50 mm thick (Density - 48 kg/m³) Rock wool mat is to be placed in the cavity of the partition.

**Jointing and Finishing** : Finally edges of the facing boards are to be jointed and finished so as to have a seamless finish which includes filling and finishing with specially formulated jointing compound and 48 mm wide self-adhesive fibre tape.

**4.0 TEST REQUIREMENTS** :

Measurement of sound transmission loss of above mentioned 88 mm thick metal stud partition system as per ISO 10140-2 / ASTM E-90 and determination of sound transmission class (STC) as per ASTM E- 413 and weighted sound reduction index $R_w$ (C; $C_{tr}$) with spectrum adaptation terms as per ISO 717-1.



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## 5.0 TEST PROCEDURE :

The above mentioned 88 mm thick metal stud partition system of size 2.4 m x 2.4 m was mounted in the wall between two reverberation chambers and sealed all around at edges. Please refer figure 1 for test set up and mounting of system. The airborne sound transmission loss test was carried out five times on same system from both sides in a reverberation chambers and average value reported as per ISO 10140-2 / ASTM E-90 standard at temperature 25°C ± 1°C and humidity 46%.

## 6.0 DATE OF EVALUATION :

Test was carried out on 88 mm thick metal stud partition system on 10th January 2017 at NVH laboratory, ARAI-Pune in presence of Ramco Industries Ltd representatives Mr. Nareshkumar A.

## 7.0 INSTRUMENTATION :

| Sr. No | Instrument Name | Type / Model No | Make | Calibrated on | Calibration due on |
|---|---|---|---|---|---|
| 1 | Multi-channel Data Acquisition System | 3560 D | Bruel & Kjaer, Denmark | 14-Jun-16 | 14-Jun-17 |
| 2 | ½" Random Incidence Microphone | 378B20 (Sr. No. 109015 and Sr. No. 109016) | PCB, USA | 16-Jun-16 | 16-Jun-17 |
| 3 | Power Amplifier | 2716 | Bruel & Kjaer, Denmark | - | - |
| 4 | Omni directionnel sound source | Omni power 4296 | Bruel & Kjaer, Denmark | - | - |
| 5 | Reverberation Chambers | 80 $m^3$ and 110 $m^3$ | - | - | - |

## 8.0 TEST RESULTS :

Table 1 and figure 2 shows the values and plot for sound transmission loss of 88 mm thick metal stud partition system in the one-third octave frequency bands of 100 Hz to 8000 Hz, STC (sound transmission class) and $R_w$ ($C_{100\text{-}5000}$; $C_{tr100\text{-}5000}$) (weighted sound reduction index and spectrum adaptation terms).

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## 9.0 CONCLUSIONS :

| The sound transmission class (STC) is calculated as per ASTM E- 413 and weighted sound reduction index with spectrum adaptation terms $R_w$ ($C_{100-5000}$;$C_{tr100-5000}$) is calculated as per ISO 717-1 for 88 mm thick metal stud partition system | |
|---|---|
| Sound transmission class (STC) | 50 dB |
| Weighted sound reduction index with spectrum adaptation terms $R_w$ ($C_{100-5000}$;$C_{tr100-5000}$) | 50 (-2; -8) dB |

| Report Prepared By: | Reviewed By: | Approved By: |
|---|---|---|
| M. P. Joshi | S. K. Jain | N. V. Karanth |
| Manager | Dy. General Manager | Sr. Deputy Director & HoD |



Certificate No.:T-0158

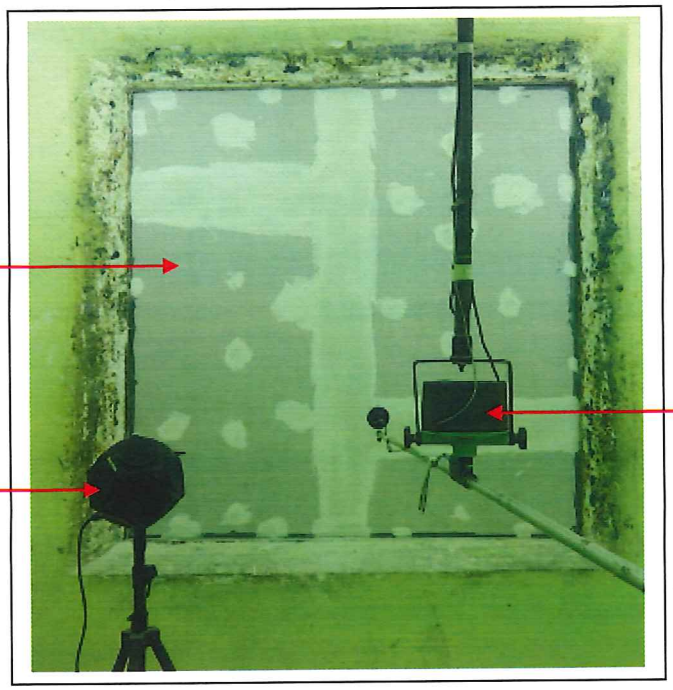
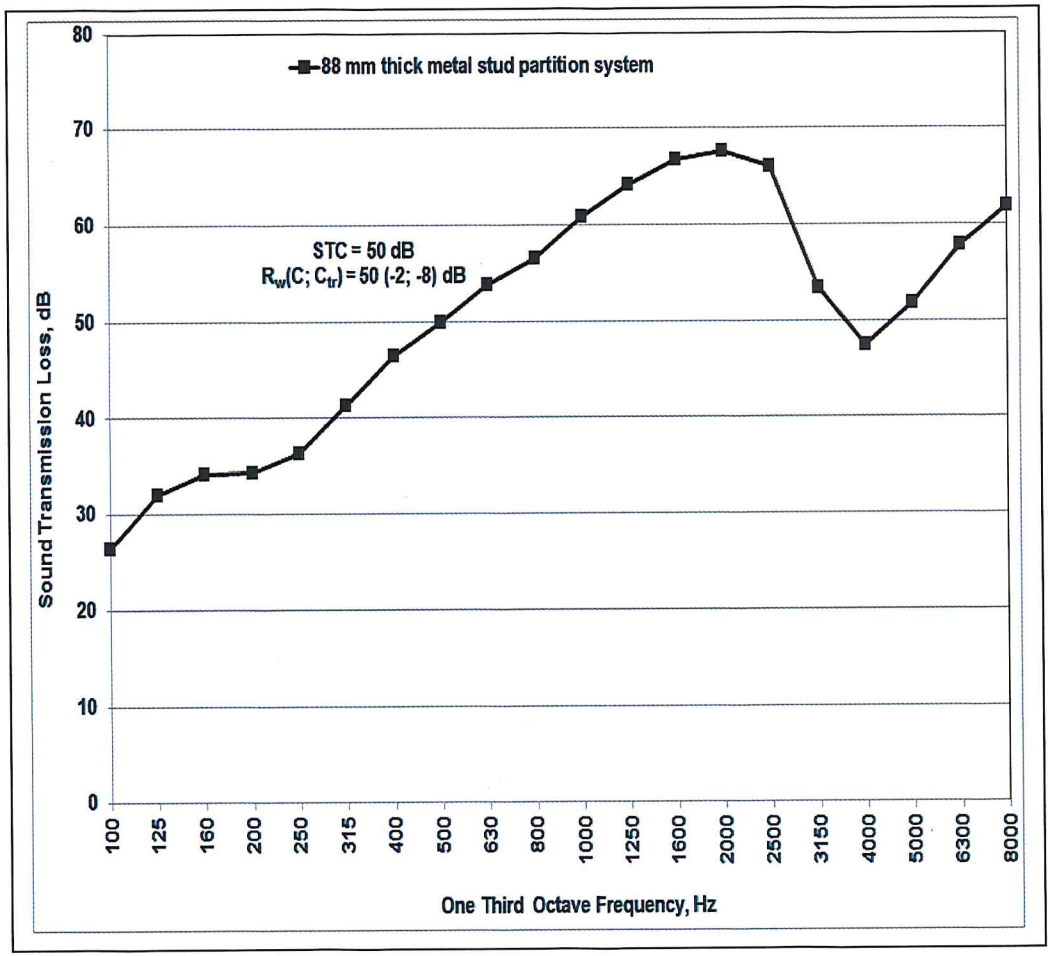



**Figure 1: The test set up for mounting of 88 mm thick metal stud partition system between two reverberation chambers**

**Table 1 and Figure 2: Values and plot for Sound Transmission Loss of 88 mm thick metal stud partition system at one third octave frequencies**

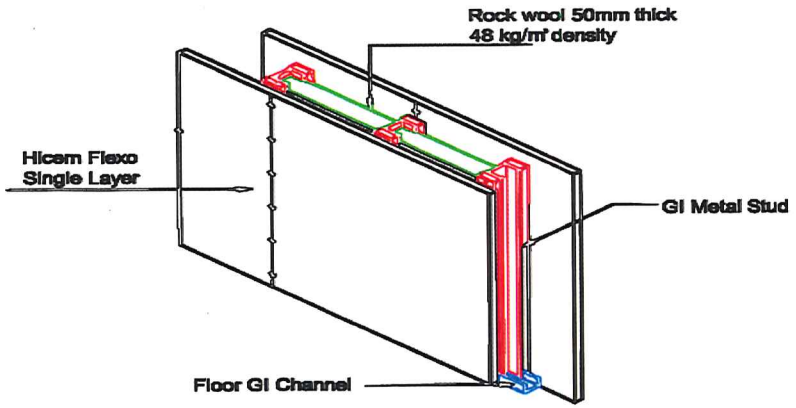
| One Third Octave Frequency, Hz | Sound Transmission Loss, dB | Standard Deviation |
|---|---|---|
| 100 | 26.4 | 2.4 |
| 125 | 32.0 | 2.8 |
| 160 | 34.1 | 1.8 |
| 200 | 34.4 | 1.4 |
| 250 | 36.3 | 1.6 |
| 315 | 41.3 | 2.2 |
| 400 | 46.5 | 1.8 |
| 500 | 50.0 | 1.4 |
| 630 | 53.8 | 1.8 |
| 800 | 56.5 | 1.3 |
| 1000 | 60.9 | 1.4 |
| 1250 | 64.2 | 1.5 |
| 1600 | 66.7 | 1.4 |
| 2000 | 67.6 | 0.8 |
| 2500 | 66.0 | 0.6 |
| 3150 | 53.5 | 0.5 |
| 4000 | 47.6 | 0.7 |
| 5000 | 51.8 | 1.1 |
| 6300 | 57.9 | 0.8 |
| 8000 | 61.9 | 1.0 |
| **STC** | **50** | 1.4 |
| **$R_w$ (C; $C_{tr}$)** | **50 (-2; -8)** | - |



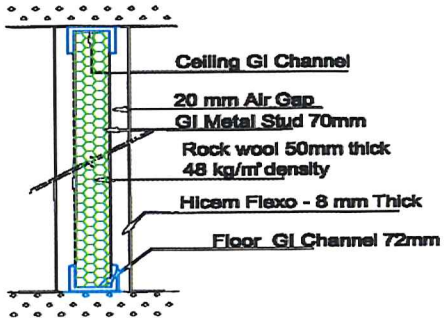

**The Measurement Uncertainty in sound transmission loss evaluation is ± 3 dB from 125 Hz to 630 Hz and ± 1.5 dB above 630 Hz with 95.45 % confidence level and K= 2.The measurement uncertainty has been computed at one third octave frequency band from 125 Hz to 8000 Hz.**

Annexure 1

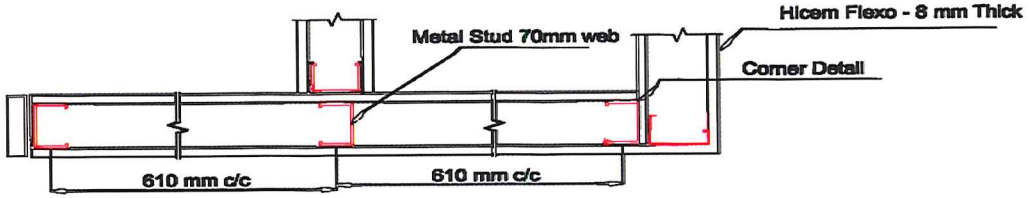
## SOUND INSULATED PARTITION - HICEM FLEXO




ISOMETRIC VIEW




ELEVATION




PLAN

Hicem Flexo - Size : 6 ' x 4' - 8 mm Thick + 20mm Air gap
Rock wool 50mm thick 48 kg/m density

RAMCO INDUSTRIES LIMITED