Acoustic Testing Services

At **3D Design and Construction**, we offer professional **acoustic testing** to evaluate and optimize the sound performance of buildings and spaces. From design validation to noise control, our tests provide the data you need to create quiet, comfortable, and acoustically balanced environments.

What Is an Acoustic Test?

An **acoustic test** measures how sound behaves within a space or how well materials and structures block or absorb sound. These tests are essential for verifying that a building meets sound performance targets, whether it's minimizing noise between hotel rooms or enhancing speech clarity in a classroom.

By identifying how sound and vibration move through walls, ceilings, floors, and open spaces, we help architects, engineers, and interior designers fine-tune their designs for both function and comfort.

Types of Acoustic Tests We Provide

1. **Reverberation Time (RT60) Testing**

- **Purpose:** Measures how long sound lingers in a space after the source has stopped.
- **Applications:** Lecture halls, theaters, Cinemas, recording studios, classrooms.
- **Benefit:** Ensures speech clarity and sound quality for various uses.

2. **Sound Insulation Testing (Airborne & Impact)**

- **Airborne Sound Transmission (STC Rating):**
  Tests how effectively walls, doors, and ceilings block sound between rooms.
- **Impact Sound Transmission (IIC Rating):**
  Measures noise from footsteps or dropped objects through the floors.
- **Applications:** Apartments, hotels, hospitals, office buildings.
- **Benefit:** Validates acoustic privacy and reduces disturbances.

3. **Background Noise Level Testing**

- **Purpose:** Measures ambient sound levels from HVAC systems, equipment, or external sources.
- **Applications:** Offices, healthcare spaces, libraries.
- **Benefit:** Verifies quiet conditions for concentration, healing, or communication.

4. **Vibration Testing**

- **Purpose:** Assesses structure-borne or ground-borne vibrations.
- **Applications:** Buildings near railways or highways, labs, performance spaces.
- **Benefit:** Protects structural integrity and sensitive equipment while improving occupant comfort.

5. **Sound Intensity and Source Location Testing**

- **Purpose:** Identifies dominant sources of unwanted noise or vibration.
- **Applications:** Mechanical rooms, industrial facilities, server rooms.
- **Benefit:** Enables targeted noise control solutions.

How Acoustic Testing Supports Architecture & Interior Design

- **Design Validation:** Confirms that acoustic elements perform as intended before project completion.
- **Smart Material Selection:** Informs choices for insulation, wall assemblies, flooring, and finishes.
- **Aesthetic Integration:** Enables sound solutions that blend seamlessly with the design vision.
- **Occupant Satisfaction:** Enhances user experience through better speech intelligibility and noise comfort.

How Acoustic Testing Helps Control Noise and Vibration

- **Noise Isolation:** Quantifies how effectively materials and layouts block unwanted sound.
- **Source Identification:** Locates specific problems, like loud HVAC systems or vibrating equipment.
- **System Optimization:** Fine-tunes mechanical noise and building systems for quiet operation.
- **Vibration Control:** Mitigates disruptions caused by traffic, construction, or mechanical systems.

Why Choose 3D Design and Construction?

We combine industry-standard testing protocols with deep architectural knowledge to deliver actionable insights. Whether you're designing a tranquil home, a corporate office, or a state-of-the-art concert hall, our acoustic testing services ensure your spaces sound as good as they look.

Contact us today to schedule an acoustic assessment or request a custom testing solution for your project.

The Nor140 – Sound Level Meter

The Measured functions

The functions available with the Nor140 include

SPL	Time-weighted Sound Pressure Level (F, S, I)
L_{max}	Maximum Time-weighted Sound Pressure Level
L_{min}	Minimum Time-weighted Sound Pressure Level
L_{eq}	Time-Average Sound Pressure Level
L_{eqI}	Time-Average Impulse-weighted Sound Pressure Level
L_E	Sound Exposure Level
L_{EI}	I-Time weighted Sound Exposure Level under measured functions
L_{peak}	Maximum Peak Level
L_N	Statistically Calculated Exceedance Level
RT	Reverberation time, T20 and T30 (Optional)
NC	Noise Criteria value
NR	Noise Rating value
RC	Room Criteria value
STIPA	Speech Transmission Index for Public Adress system (Optional)
T_{max5}	"Takt Maximalpegel" according to DIN45657 (Optional)

Moving L_{eq} with adjustable window length (Optional)

The spectral weighting functions A- and C- or Z-weighting are available for all functions including the L_{peak}. The SPL, L_{max} and L_{min} functions are measured for all the three time constants F, S and I. All the above functions are also measured in each band if 1/1 or 1/3 octave analyses extensions are added with the exception of L_{peak}.

Building acoustics

Sound insulation measurements

The Nor140 with the Building Acoustics option is a complete measurement tool for making both airborne and structureborne (impact) sound insulation measurements in accordance with the ISO 140, ASTM, and other national standards. A step-by-step menu takes the operator through all required 1/3-octave real-time measurements until the final sound reduction index is presented graphically on the screen in accordance with the ISO 717 Standards. Other national indices may be calculated in combination with the optional NorBuild software.

This feature includes analysing sound level measurements and averaging of multiple microphone positions, both in the source- and the receiving-rooms, measurement of the background noise level as well as measurements of the reverberation time in multiple locations in the receiving room. An on-board calculator uses the actual room dimensions to calculate the room volume V and insulation area S. The correct sound reduction index (R_w, $D_{nT,w}$, $D_{n,w}$, $L_{n,w}$ or $L_{nT,w}$) is then presented graphically on the instrument screen.

Alternatively, the Nor140 may be used to measure the survey grade sound insulation based on 1/1-octave real-time frequency spectra in accordance with the ISO 10052 Standard.

Reverberation time measurements

The Nor140 measures the reverberation decay based on either impulse or noise excitation. All frequency bands are measured either in 1/1- or 1/3-octave real-time spectra, and presented on the screen one-by-one.

Two reverberation time values are calculated for each decay in each frequency band. The T_{30} is calculated from 5 dB below the excitation signal down to 35 dB, but the Nor140 will additionally calculate the T_{20} value. All values are normalised to the required 60 dB decay time.

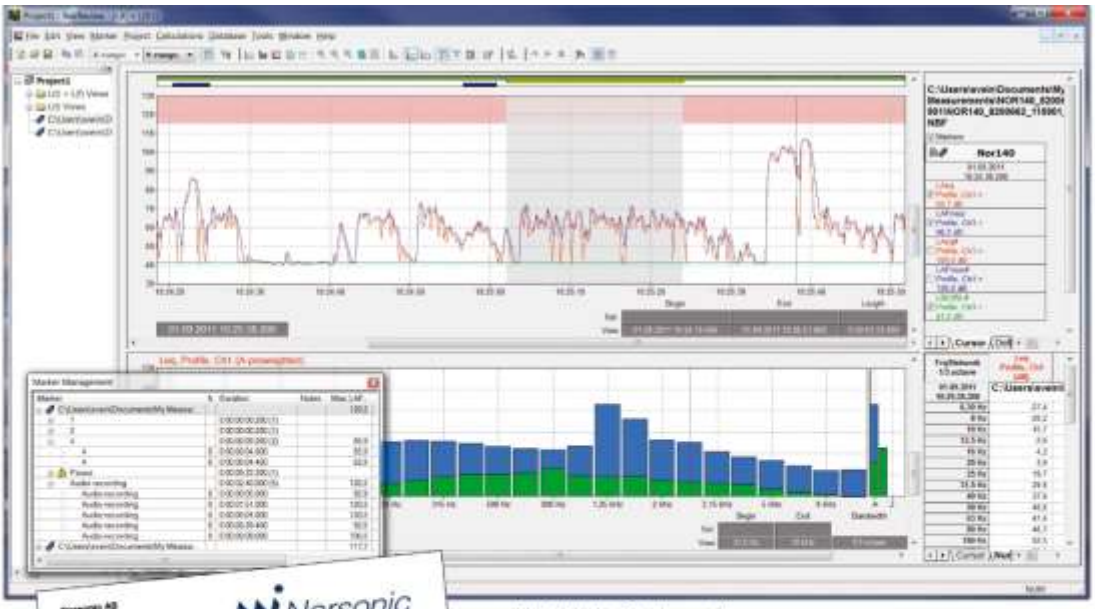
On-board noise generator

The Nor140 is equipped with an on-board noise generator supplying both white and pink noise. During the level and reverberation time measurements, the generator is turned on and off in synchronization with the actual measurements.

The generator contains a unique spectrum shaper feature allowing the adjustment of source room noise in accordance with the requirements in ISO 140 part 3 and 4. This requirement set a maximum value of 6 dB between all neighbour frequency bands. Simply run a short test measurement and the source room spectrum will be modified as close as possible to this requirement.

Dodecahedron Loudspeaker Nor283

- Dodecahedron loudspeaker.
- High power loudspeaker with omnidirectional characteristics.
- Conforms to ISO 10140-5 Annex D for laboratory airborne sound insulation
- Conforms to ISO 16283-1 Annex A for in-situ airborne sound insulation
- Conforms to ISO 3382-1 Annex A: 3 - 1 for room acoustic parameters (reverberation time)
- Using the Nor282 power amplifier with pink noise, and equalization: 123 dB (Lin)
- Using the Nor280 power amplifier with pink noise, and equalization: 120 dB (Lin)
- Supplied with individual omni directional calibration certificate.
- Dimensions: 270 mm (10.63").
- Weight: 5.3 kg (11.7 lb)



Nor1026 NorReview software

A special pure tone extension is available in order to perform tonal analysis.

NorReview may also be extended to display real time data on line in a noise monitoring system, in either single or multi-channel configurations.

Due to its flexibility and easy remote control programming, the Nor140 is widely used by many prestigious customers in their measurement applications. An example is Topsonic, a world leading company supplying advanced Airport Noise Monitoring systems. The Nor140 has been supplied to a numerous airports worldwide as a part of Topsonic's Airport Noise Monitoring systems.

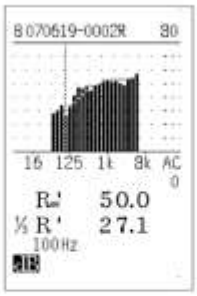
Norsonic offers a complete line of products for use in environmental noise monitoring systems. We supply enclosures for permanent monitoring installations, environmental cases for semi-permanent installations, outdoor microphones for applications in tough environments, cables, modems, weather stations and post-processing software.

Noise nuisance recorder

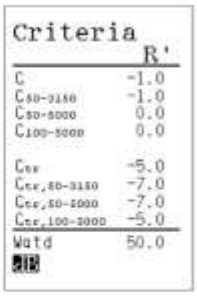
The Nor140 is the third generation of noise nuisance recorders from Norsonic. This is a very cost effective method of investigating domestic noise complaints, particularly those occurring outside normal office hours.

A novel approach to this application is embodied in the Nor140 through its digital recording of the actual sound at the same time as the measurement.

Building Acoustic measurement



Results



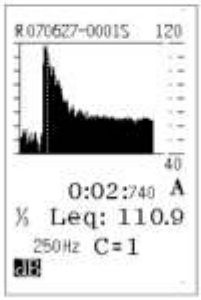
Corrections

- Extends the Nor140 instrument into a complete single channel building acoustic analyser.
- Synchronises excitation in the source room with the measurement operation.
- Makes room averaging of multiple microphone positions for sound level and reverberation time measurements for ISO 140/717 users.
- Calculates the survey and engineering grade airborne sound insulation ratings $R_{w'}$, $D_{n,w}$, and $D_{nT,w'}$.
- Calculates the survey and engineering grade impact sound insulation ratings $L_{n,w}$ and $L_{nT,w'}$.
- Calculates the correction terms C, Ctr and Ci including the extended frequency versions.
- In conjunction with NorBuild, can easily calculate rating per ASTM and other National Standards.
- Allows remote use in combination with the Nor1028/3 CtrlBuild software package.
- Can be used for cable-free measurements using the Nor520 Bluetooth transceiver.
- Fulfils the requirements of the survey grade ISO 10052 Standard.

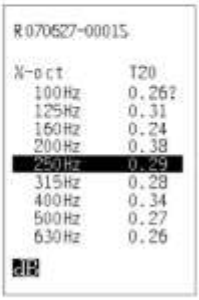
Option 11 turns your Nor140 into a powerful single channel building acoustic analyser. All the required parameters for performing both airborne and impact sound insulation are calculated. Using the Nor140 for measuring building acoustic, both airborne and impact noise has never been easier. With the Nor1028 NorBuild or Nor850 sound insulation reporting program, Norsonic offers a powerful and user-friendly building acoustic solution.

Reverberation time measurement

- Reverberation time based on impulse or noise (option 10) excitation.
- Calculates both T20 and T30; backward integrated decay for impulse.
- Displays the graphical reverberation decay for each frequency band.
- Covers the 63 – 8000 Hz frequency bands for the 1/1-octave filters.
- Covers the 50 – 10000 Hz frequency bands for the 1/3-octave filter.
- Possible to store the reverberation time measurement as a wave-file.



Reverberation decay



Numerical RT table

Certificate of Calibration

Certificate No.: 473906743

Object:	Sound Analyser Nor140
Supplier:	Norsonic AS
Type:	Nor140
Serial number:	1407217
Client:	3D Design & Construction

This instrument is tested and calibrated in accordance to the Norsonic production standard set for Nor140, ensuring that the instrument conforms to the following standards;

IEC 61672-1:2002 class 1
IEC 61260-1 class 1 Ed 1.0 2014-02
ANSI S1.4-1983 (R2001) with amd. S1.4A-1985 class 1
ANSI S1.43-1997 (R2002) class 1
ANSI S1.11-2004 class 1
DIN 45 657, Applicable parts
IEC 61094 part 4

Instrumentation used for calibration traceable to:

Electrical Parameters: IKM, Norway
Acoustical Parameters: PTB, Germany
Environmental Parameters: Justervesenet. Norway

Adjustments: None

Comments: None

Date of calibration:	**Calibration interval recommended**
2025-04-18	2 years

The environmental parameters applicable to this calibration are kept well within limits ensuring negligible deviation on obtained measurement results.

Calibrated by:

Sign.

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