

RT60 Measurements with 1/3 Octave Resolution

By Berno Nigsch



Acoustilyzer with RT60 measurement

The Acoustilyzer AL1 measures the RT60 reverberation time in octave band resolution. This application notes shows how this functionality can be extended for measuring the reverberation time with increased 1/3 octave band resolution.

The Acoustilyzer measures RT60 according to ISO 3382 standard, specifying 6 octaves (mid frequencies 125Hz - 4kHz) or 18 x 1/3 octaves (mid frequencies 100Hz - 5kHz). Besides that the AL1 is even able to measure an extended RT60 frequency range from 63Hz to 8kHz. The standard test signal for octave band resolution measurements is broadband pink noise.

Basic Instruction

In order to extend the RT60 measurement from 1/1 octave to 1/3 octave resolution a specific set of band limited pink noise signals is utilized. Three separate measurements are taken providing the RT60 results at the 1/3 octave test frequencies. Then the three measurements are combined within the Excel file "Acoustilyzer_RT60_third_octave.xls" resulting in the 1/3 octave RT60 result.

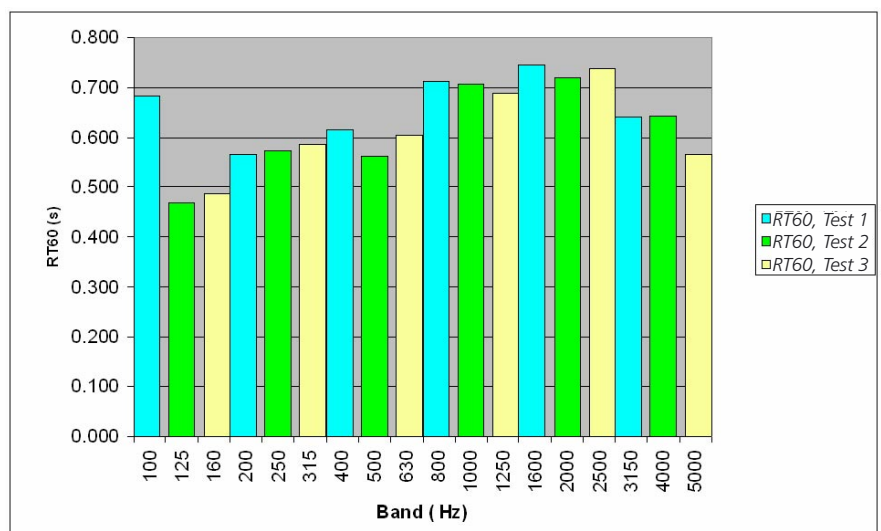


Chart: 1/3 octave RT60 test result

Requirements

1x Acoustilyzer AL1 with MiniSPL microphone

1x MiniLINK PC Software

1x Excel file "Acoustilyzer_RT60_third_octave.xls"
(included with zip-file for download at the AL1 website)

1x Minirator MR-PRO with required test signals

The memory space required for all test signals with 1, 2, 5 and 10 seconds on/off cycle time is 30Mbyte -> we suggest to load only

e.g. the 5 sec. test signal on the MR-PRO, so further memory space for other *.wav signals remains available.

Overview of dedicated RT60 test signals for 1/3 octave resolution:

Rt_01_1l:

pink noise spectra of the 1/3 octave bands

100Hz, 200Hz, 400Hz, 800Hz, 1.6kHz, 3.15kHz

Rt_01_2m:

pink noise spectra of the 1/3 octave bands

125Hz, 250Hz, 500Hz, 1.0kHz, 2.0kHz, 4.0kHz

Rt_01_3h:

pink noise spectra of the 1/3 octave bands:

160Hz, 315Hz, 630Hz, 1.25kHz, 2.5kHz, 5.0kHz

The maximum file name length for MR-PRO *.wav files is 8 digits, e.g. "Rt_01_1l" is the abbreviation of pink noise, 1 sec on/off cycle mode, with the lower 1/3 octave bands.

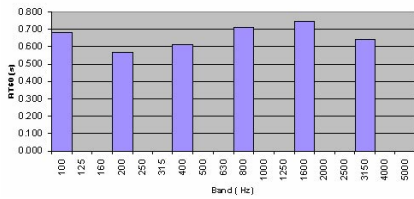
Instruction Step-by-Step

1. Select the RT60 test signal

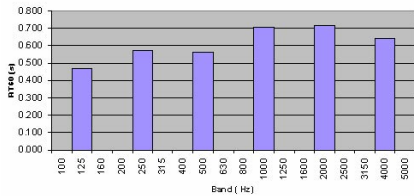
Different test signals with 1, 2, 5 and 10 seconds on/off time are available. We recommend choosing the test signal with a larger on/off time than the expected RT60 result, e.g. when expecting RT60 results in the range from 1-2 seconds, we suggest to select the test signal with 2 seconds on/off time.

2. Measurements

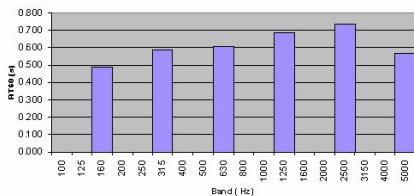
- a) Select track "Rt_01_1l" at your Minirator and carry out the RT60 measurement with the Acoustilyzer AL1. Detailed test instructions are listed in the AL1 user manual.
- b) Store the test result in the internal AL1 memory.
- c) Carry out the same measurements with the other two tracks "Rt_01_2m" and "Rt_01_3h".



Result with first signal Rt_01_1l



Result with second signal Rt_01_2m



Result with third signal Rt_01_3h

3. Combine Measurements in Excel

- a) Connect AL1 to your PC and start the MiniLINK software.
- b) Open the Excel-file "Acoustilyzer_RT60_third_octave.xlt"
- c) Within the MiniLINK window select the icon of file containing the measurement result Rt_01_1l
 - copy measurement by „Edit, Copy Text“ or CTRL+T
 - open excel sheet "Rt_01_1l"
 - select field A1 and paste data
- d) Carry out the same with the other two results
 - result "Rt_01_2m" -> excel sheet tab "Rt_01_2m"
 - result "Rt_01_3h" -> excel sheet tab "Rt_01_3h"

4. Result: RT60 in 1/3 octave band resolution

The 1/3 octave RT60 result is shown in the tab "Graphic".

Combined RT60 Test Result with 1/3 octave band resolution:

