**PRODUCT DATA**

**PULSE Sound Power in Reverberation Rooms Type 7884**

**PULSE™ Sound Power in Reverberation Rooms Type 7884** is software for determining sound power based on the standards ISO 3741, ISO 3743-1 and ISO 3743-2.

Laboratory reverberation rooms as described in ISO 3741 are particularly suitable when performing precision grade tests on comparatively small machines when the sound emitted is predominantly steady in character.

Special reverberation rooms constructed to fulfil the requirements of ISO 3743-2 are less expensive than the laboratory reverberation rooms described in ISO 3741. The methods described in ISO 3743-2 provide measurements of engineering grade, particularly suitable for direct measurement of A-weighted sound power levels of a series of small noise sources.

The hard-walled test rooms as described in ISO 3743-1, are used for engineering grade measurements. Most ordinary, unfurnished rooms without special acoustical treatment comply with the requirements of this standard.

**Uses and Features**

**Uses**
- To declare the sound power emitted under defined conditions
- To verify the declared values (legislation, voluntary awards)
- To compare the noise emitted by machinery and equipment of various types and sizes (for example, when benchmarking, or in engineering work, when developing quieter products)

**Features**
- Comprehensive solutions for determining sound power levels according to ISO 3741, ISO 3743-1 and ISO 3743-2
- Interactive measurement set-up and information windows to guide you through the measurement process
- Measurement data and results can be conveniently saved to familiar Microsoft® Excel® workbooks for customized reporting and further post-processing
- Scalable solution

**PULSE Template for Reverberation Rooms**

Type 7884 is a dedicated PULSE LabShop template that enables the determination, storage and reporting of the sound power of noise sources operating in reverberant test environments, using measurement and calculation procedures based on ISO 3741, 3743-1 and 3743-2.

**Table 1 Overview of the ISO reverberation room standards**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>ISO 3741 Precision</th>
<th>ISO 3743-1 Engineering</th>
<th>ISO 3743-2 Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test environment</td>
<td>Reverberation room</td>
<td>Hard-walled room</td>
<td>Special reverberation room</td>
</tr>
<tr>
<td>Criterion for suitability of test environment</td>
<td>Room volume and reverberation time to be qualified</td>
<td>Volume &gt; 40 m³, Absorption coeff. &lt; 0.20</td>
<td>70 m³ &lt; Volume &lt; 300 m³, 0.5 s &lt; Tnom &lt; 1 s</td>
</tr>
<tr>
<td>Volume of sound source</td>
<td>Preferably: &lt;2% of test room volume</td>
<td>Preferably: &lt;1% of test room volume</td>
<td>Preferably: &lt;1% of test room volume</td>
</tr>
<tr>
<td>Character of noise from source</td>
<td>Steady, broadband, narrowband or discrete frequency</td>
<td>Any, but no isolated bursts</td>
<td>Any, but no isolated bursts</td>
</tr>
</tbody>
</table>

![PULSE Sound Power in Reverberation Rooms Type 7884](image)
The similarities between the standards are reflected in the template, which leads you through all the steps necessary to fulfil the requirements of the chosen standard by means of a task list. The tasks are arranged logically to provide an intuitive user interface.

**Fig. 1** Interactive reverberation room template: use Measurement Setup to select the required standard, configure the measurement, select calculation parameters and determine measurement uncertainty.

Making a Complex Process Simple

Graphical features, such as pop-up text, colour coding and warnings, allow quick updates on measurement status, determination of pending actions, and validation of specific parameters within the standard. The flexibility of the program allows you to skip repetitive tasks. The results can be exported to Microsoft® Excel® for report generation.

**Method**

Sound power is determined from sound pressure measurements obtained from a distributed set of microphones in the test environment. Depending on the actual situation, sometimes multiple microphone positions as well as multiple source positions have to be measured. To correct for the influence of the test environment, multiple measurements may have to be made with several positions of a reference sound source. Another possibility is that the reverberation time can be measured and stored in the measurement project. Type 7884 provides you with a clear indication of the status of the measurement by means of a colour-coded user interface.

**Fig. 2** The bookkeeping of the various measurements is clearly shown by means of colour codes, icons and tabulated values.
**Typical Setup**

To measure the sound pressure levels, either a set of microphones or a single rotating microphone may be used.

![Diagram showing typical setup for determination of sound power in reverberation rooms according to ISO 3741](image)

**Specifications – PULSE Sound Power in Reverberation Rooms Type 7884**

A Windows®-based application for use with PULSE LabShop. The software is delivered via DVD or USB

**System**

**SYSTEM REQUIREMENTS**
- Microsoft® Windows® 10 Pro or Enterprise (x64) with either Current Branch (CB) or Current Branch for Business (CBB) servicing model
- Microsoft® Office 2016 (x32 or x64) or Office 2019 (x32 or x64)
- Microsoft® SQL Server® 2017 or SQL Server® 2019

**Minimum Licence Requirements:**
- BK Connect® Data Viewer Type 8400
- BK Connect Hardware Setup Type 8401
- BK Connect Data Processing Type 8403

**Note:** Microsoft SQL Server 2017 is included in BK Connect installation

**RECOMMENDED SYSTEM CONFIGURATION**
- Intel® Core™ i7, 3 GHz processor or better
- 32 GB RAM
- 480 GB Solid State Drive (SSD) with 20 GB free space, or better
- 1 Gbit Ethernet network
- Microsoft® Windows® 10 Pro or Enterprise (x64) with CB
- Microsoft® Office 2016 (x64)
- Microsoft® SQL Server® 2017
- Screen resolution of 1920 × 1080 pixels (full HD)

**FRONT END**

The software automatically detects the front-end hardware connected and configures the system. If IEEE 1451.4 capable transducers (with standardized TEDS) are being used, these are also detected and attached automatically to the correct channel of the input module.

For information about LAN-XI data acquisition modules, see product data BP 2215

* A dedicated data acquisition network (LAN or WAN) is recommended. A network that only handles data from the front end improves the stability of the data
Calibration

Use PULSE LabShop’s integrated Calibration Master, which initiates microphone calibration while you move the calibrator from one microphone to the next. The full calibration history for a transducer can be retained in the Transducer Database, which allows monitoring calibration data variations over a period of time.

SPW Reverberation Room (PULSE Template)

Provides measurement and calculation procedures for the determination of the sound power of noise sources using sound pressure, as described in the following international standards.

STANDARDS

ISO 3741: 2010 Determination of sound power levels and sound energy levels of noise sources using sound pressure. Precision methods for reverberation test rooms

SUITABLE TEST ENVIRONMENTS
- Reverberation rooms as specified in ISO 3741
- Reverberant fields as specified in ISO 3743–1 or ISO 3743–2

MEASUREMENT

L’p(R)ij  time-averaged sound pressure level produced by the background noise
L’p(R)ij  time-averaged sound pressure level from the reference sound source
L’p(S)ij  time-averaged sound pressure level from the noise source under test

- All quantities are measured in 1/3-octave band for any range with nominal mid-band frequencies from 50 Hz to 10 kHz or in 1/1-octave band for any range with nominal mid-band frequencies from 125 Hz to 8 kHz
- A-weighted values calculated from 1/1-octave or 1/3-octave values as specified in Annex C of ISO 3745: 2012

CALCULATION

K1  background noise corrections
Lp(R)j  mean corrected time-averaged sound pressure level from the reference sound source over all source positions
Lp(S)j  mean corrected time-averaged sound pressure level from the noise source under test over all source positions
NM  number of necessary microphone positions or separate microphone traverses for each source position
NS  number of necessary source positions
LW  sound power level in dB under the meteorological conditions at the time and place of the test
C2  radiation impedance correction to change the actual sound power relevant for the meteorological conditions at the time and place of the measurement into the sound power under reference meteorological conditions.

VALIDATION

Criterion for background noise
Requirement evaluation for additional microphone positions
Requirement evaluation for additional source positions

Ordering Information

Type 7884-X  PULSE Sound Power in Reverberation Rooms

RECOMMENDED HARDWARE

Type 4942-A-021  ½" Diffuse-field Microphone, incl. Preamp. Type 2671
Type 4231  Sound Calibrator
Type 3050-A-060  LAN-XI 6-ch. Input Module 51.2 kHz (Mic, CCLD, V)
UA-2101-060  LAN-XI Front Panel, 200 V Microphone

OTHER SOFTWARE AND ACCESSORIES

Type 4800-A-X  BK Connect Data Viewer (advanced)
Type 4804-X  BK Connect Data Processing Specialist (instead of Type 4803)
Type 4204  Reference Sound Source
Type 3923  Rotating Boom
UA-0801  Lightweight Tripod

* X is the licence type. X = N, where the licence is node-locked to PC host ID or dongle; or X = F, where the licence is floating, that is, shared via a licence server