Reference Sound Source Type 4204 is a calibrated source of sound power with very well defined operating characteristics and predictable performance. It is rugged, compact and stable, and is therefore suitable for both field and laboratory use.

Type 4204 is intended for use as a reference source for determination of the sound power output of equipment by the various comparison methods including the method described in ISO 3741, and by the survey methods described in ISO 3747. Type 4204 is also used for measuring environmental correction $K_2$ when determining sound power according to ISO 3744. It is also useful in the field of building acoustics to determine the sound absorption and the sound insulation of a room.

### Uses and Features

**Uses**
- Comparison method for determination of sound power of noise sources according to ISO 3741
- Measurement of environmental correction, $K_2$ according to ISO 3744
- Sound absorption measurements
- Sound insulation measurements

**Features**
- Fulfils ISO 3741, ISO 3744, ISO 3745, ISO 3747 and ISO 6926 for calibrated sound power sources
- Frequency range from 50 Hz to 20 kHz
- Sound power output 91 dB re 1 pW (A-weighted, 50 Hz line frequency) and 95 dB re 1 pW (A-weighted, 60 Hz line frequency)
- Temperature range –10°C to +50°C
- 50 and 60 Hz operation
- Long-term stability
- Individual calibration chart supplied
- Compact and rugged
- Fitted with safety grid
Characteristics

The reference sound source consists essentially of a specially designed centrifugal fan driven by a powerful asynchronous motor. The motor is an external rotor type, and due to its high moment of inertia, it has a very stable speed of rotation. The motor is mounted on a cast aluminium base, shaped to minimize reflections. The complete assembly of motor and fan is within a cylindrical safety grid fitted with two carrying handles.

The directional characteristic of the reference sound source in the vertical plane varies less than 6 dB for any frequency in the range 100 Hz to 10 kHz (measured in 1/3-octaves). In the horizontal plane, the variation is less than 0.2 dB for frequencies up to 10 kHz (measured in 1/3-octaves). Fig. 1 shows some typical vertical directional characteristics. The reference sound source fulfills the requirements for reference sound sources as stated in ISO 3741, ISO 3747, ISO 6926 and ANSI S1.3 1. The use of a reference sound source in noise and sound power measurements on machines is also described in DIN 45635.

The reference sound source has a frequency range of 100 Hz to 20 kHz. In the range from 100 Hz to 10 kHz, the acoustic power output is greater than 70 dB re 1 pW in any 1/3-octave frequency band. The A-weighted output is typically 91 dB (50 Hz line frequency) and 95 dB (60 Hz line frequency). Fig. 2 shows a typical 1/3-octave frequency response curve of Type 4204.

Each reference sound source is individually calibrated and, as standard, a calibration table is supplied showing the sound power output from 100 Hz to 20 kHz at 230 V/50 Hz and 115 V/60 Hz operating voltages. Temperature, barometric pressure, humidity and rotational speed are all given on the calibration table. The maximum interval between successive calibration is 24 months. If there are signs of physical damage to Type 4204, then a recalibration is recommended.

In the field, the sound power produced may differ from the calibrated value. Changes in mains supply line voltage and frequency, ambient pressure, and temperature all affect the rotational speed of Type 4204. In addition, changes in ambient pressure and temperature alter the specific acoustic impedance of the air, also changing the sound power. Once the values are measured, however, simple formulae can be used to calculate the correct sound power levels from the values given on the calibration table.

Carrying Case WE-0268

Fig. 3
WE-0268 is a tough, padded carrying case. It is an optional accessory for use with Type 4204 and especially useful for protection during shipment to and from calibrations, as well as for relocation generally. It has a fold-away handle on one of the top edges and pivoted rollers attached to its base for safe, easy transportation.
Accredited Calibration Services at Brüel & Kjær

To ensure traceable measurement history from day one, you can order accredited calibration with your new Type 4204.

If there are signs of physical damage to Type 4204 then a recalibration is recommended. We recommend that your Type 4204 is calibrated at a Brüel & Kjær ISO 17025 certified laboratory annually or biennially. If any errors are detected by the technician during calibration, repair will be performed prior to returning the instrument to you.

*Fig. 4 Typical calibration certificate issued by an accredited calibration laboratory*

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**Compliance with Standards**

<table>
<thead>
<tr>
<th>Category</th>
<th>Standards and Regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety</strong></td>
<td>EN/IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use. ANSUL 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use.</td>
</tr>
<tr>
<td><strong>EMC Immunity</strong></td>
<td>EN/IEC 61000–6–1: Generic standards – Immunity for residential, commercial and light industrial environments. EN/IEC 61000–6–2: Generic standards – Immunity for industrial environments. EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements. <strong>Note:</strong> The above is only guaranteed using accessories listed in this Product Data sheet.</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>IEC 68–2–3: Damp Heat: 90% RH (non-condensing at 30°C).</td>
</tr>
<tr>
<td><strong>Mechanical</strong></td>
<td>Non-operating: IEC 66–2–6: Vibration: 0.3mm, 20m/s², 10–500Hz. IEC 68–2–27: Shock: 750m/s².</td>
</tr>
</tbody>
</table>
Specifications – Reference Sound Source Type 4204

POWER SUPPLY
Supply Voltage: 110, 115, 127, 230 or 240 V AC, 50 or 60 Hz
Power Consumption: 50 Hz: 500 VA; 60 Hz: 700 VA

SOUND POWER OUTPUT
Measured in 1/3-octaves from 100 Hz to 20 kHz: >70 dB re 1 pW

A-WEIGHTED SOUND POWER OUTPUT (NOMINAL)
91 dB re 1 pW @ 50 Hz line frequency
95 dB re 1 pW @ 60 Hz line frequency

A-WEIGHTED SOUND PRESSURE LEVEL
Nominal; diffuse field in a room with an equivalent absorption area of 10 m²
87 dB(A) @ 50 Hz line frequency
91 dB(A) @ 60 Hz line frequency

VARIATION OF SOUND POWER OUTPUT
With Supply Voltage: (±10% (50 Hz) and ±5% (60 Hz) of nominal voltage): <±0.2 dB @ 50 Hz line frequency
<±0.3 dB @ 60 Hz line frequency

VARIATION OF SOUND PRESSURE LEVEL
With Barometric Pressure: Sound power output is proportional to barometric pressure at a constant speed of rotation

FREQUENCY OF ROTATION
Nominal
48 Hz @ 50 Hz line frequency
56 Hz @ 60 Hz line frequency

The frequency of rotation during calibration is given on the calibration chart

DIMENSIONS
Height: 300 mm (11.8“)
Diameter: 300 mm (11.8“)
Weight: 21 kg (46 lb)

CALIBRATION
Maximum time between calibrations: 24 months

Ordering Information

Type 4204 Reference Sound Source
Includes the following accessories:
• VF-0044: 6.3 Amp fuse
• 2×VF 0043: 12.5 Amp fuses

OPTIONAL ACCESSORIES
WE-0268 Carrying case for protection during shipment to and from calibrations and during relocation generally

Service Products

ACCREDITED CALIBRATION
4204-CA1 Accredited Calibration of Sound Source Type 4204, at power 100 V, 50 Hz
4204-CA2 Accredited Calibration of Sound Source Type 4204, at power 100 V, 60 Hz
4204-CA3 Accredited Calibration of Sound Source Type 4204, at power 115 V, 50 Hz
4204-CA4 Accredited Calibration of Sound Source Type 4204, at power 115 V, 60 Hz
4204-CA5 Accredited Calibration of Sound Source Type 4204, at power 230 V, 50 Hz

INITIAL ACCREDITED CALIBRATION
4204-CI1 Initial Accredited Calibration of Sound Source Type 4204, at power 100 V, 50 Hz
4204-CI2 Initial Accredited Calibration of Sound Source Type 4204, at power 100 V, 60 Hz
4204-CI3 Initial Accredited Calibration of Sound Source Type 4204, at power 115 V, 50 Hz

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