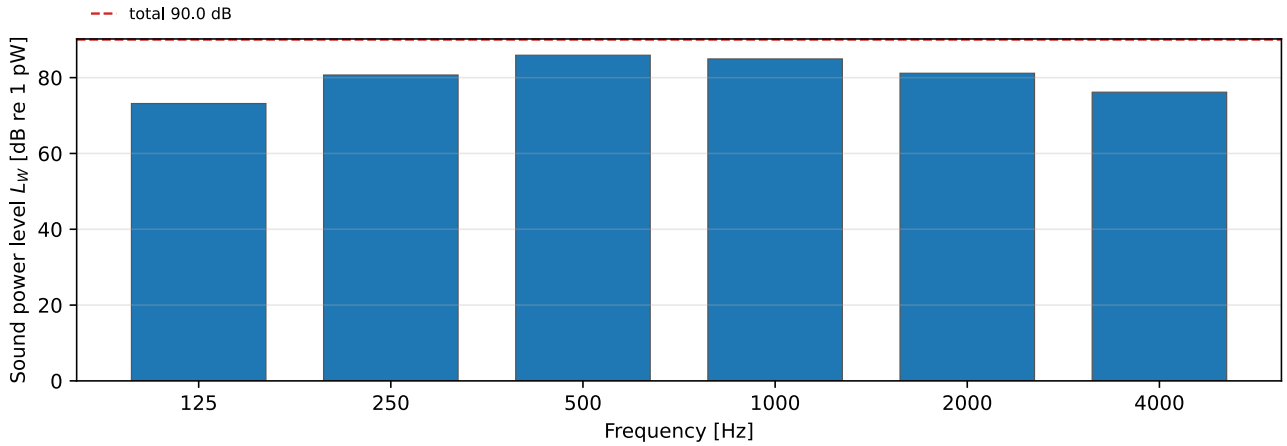
Sound power determination

Determination of the airborne sound power level from the surface vibratory velocity with a determined radiation factor, engineering method (ISO/TS 7849-2:2009).

Client:	Example manufacturing plant	Noise source:	Gearbox casing (steel panel)
Test environment:	Machine hall (source vibration survey)	Instrumentation:	Piezoelectric accelerometer (ISO 16063-21 calibration), s/n 0042
Temperature [°C]:	21	Relative humidity [%]:	45
Ambient pressure [kPa]:	101.1	Date of test:	2026-07-22

Octave-band sound power levels

f [Hz]	L_v [dB]	L_W [dB]
125	78.0	73.2
250	82.0	80.7
500	85.0	85.9
1000	83.0	84.9
2000	79.0	81.2
4000	74.0	76.2



Sound power level L_{WA} = 88.7 dB(A) re 1 pW

Total L_W = 90.0 dB re 1 pW
Radiating area S = 1.60 m²
Method: engineering, determined radiation factor ε

Result vs requirement: L_{WA} = 88.7 dB(A), declared limit ≤ 90.0 dB(A) → **PASS**

$L_W = L_v + 10\ \lg(S/S_0) + 10\ \lg(\varepsilon) + 10\ \lg(Z_{c,n}/Z_{c,0})$, S_0 = 1 m² (ISO/TS 7849-1:2009 Eq. 12, -2:2009 Eq. 15), with the surface velocity level $L_v = 20\ \lg(v/v_0)$, $v_0 = 5{\cdot}10^{-8}$ m/s (Eq. 3) and the fixed impedance term $10\ \lg(Z_{c,n}/Z_{c,0})$ = 10 lg(411/400) = 0.12 dB.

The engineering method uses a band-wise radiation factor $\varepsilon = P/(Z_{c,n}\ v^2\ S)$ determined from an independent power measurement (ISO/TS 7849-2:2009 Eq. 8, ISO 9614). The A-weighted sound power level L_{WA} combines the band levels with the A-weighting band corrections of ISO 3744:2010 Annex E. Levels are referenced to the reference sound power 1 pW.

Laboratory: Phonometry reference example
Report no.: EXAMPLE-7849
Date: 2026-07-22
Notes: Sound power from surface vibration, engineering method (ISO/TS 7849-2:2009).
Operator: phonometry Signature: _____

■ The results relate only to the tested specimen.