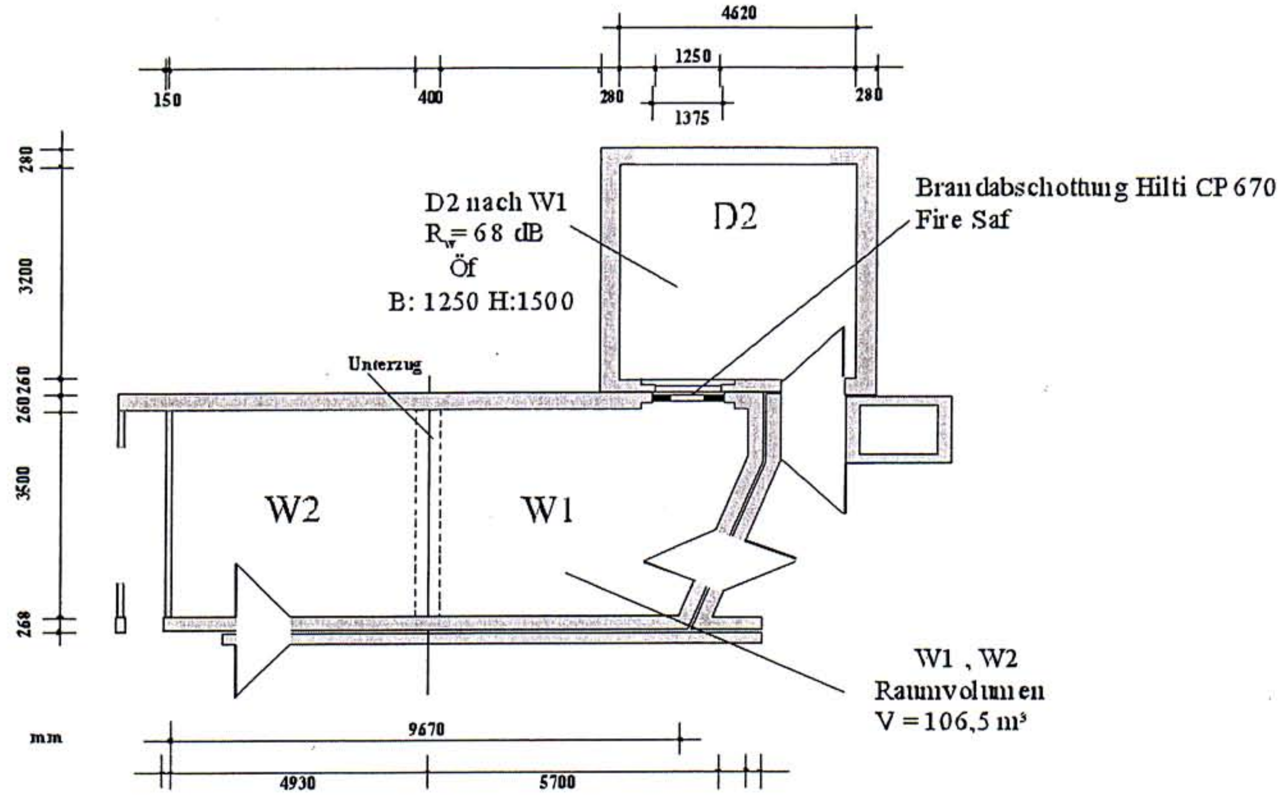

Figure 3: Window test bench between the adjoining rooms D2 and W1
Measurement of a small building component to determine
the normal sound level difference $D_{n,w}$.

Translation of diagram text:
Fire Proof Penetration Hilti CP 670
Fire Safety Board System in
window test bench sized to 60 cm x 50 cm
with gypsum board partition wall

Installation of test specimen, CP 670 Fire Safety Board System in gypsum board partition wall

Appendix 1 (A 51648) shows the manufacturer's vertical cross-sectional view with the indicated material. Installation and set up of test object are pictured below.

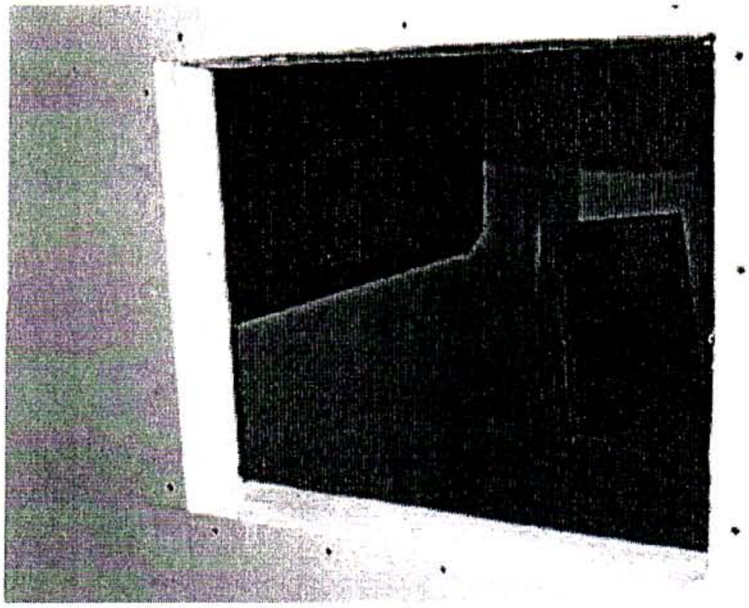

Figure 4: Opening of gypsum board partition wall joint sealed with CP 606

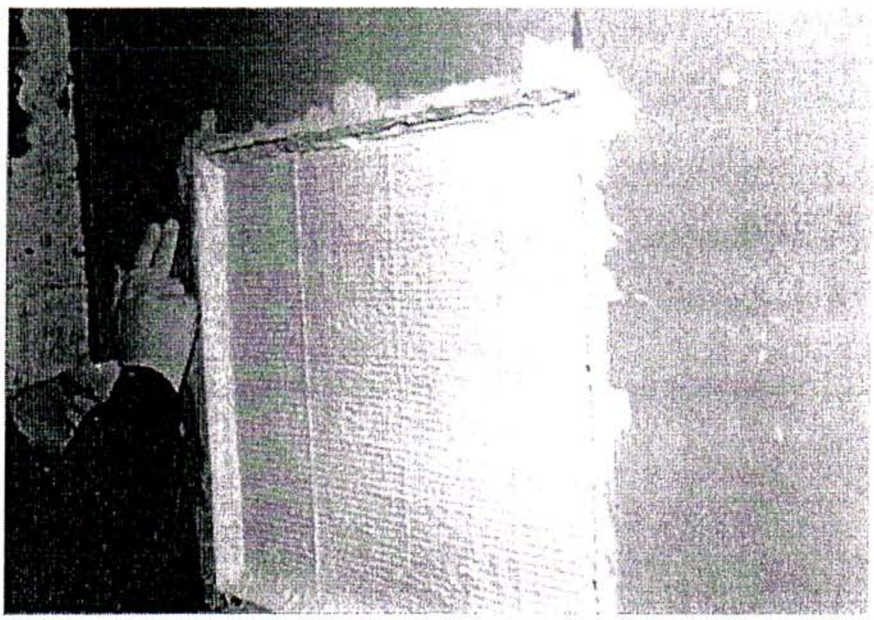

Figure 5: Fire Stop Safety Board CP 670 installed in gypsum board and sealed with CP 606

Test procedure:

The test was performed according to DIN EN 20140 – 10 or ISO 140-10 by determining the standard sound level difference by the equation (1)

$$D_n = L_1 - L_2 - 10\lg\frac{A}{A_0} \quad dB \tag{1}$$

with

$$A = 0{,}16\ \frac{V}{T} \tag{2}$$

and

	L_1	Sound pressure level in source room	[dB]
	L_2	Sound pressure level in receiving room	[dB]
	A	equivalent absorption area	[m^2]
	A_0	Reference absorption area A_0= 10 mm^2	[m^2]
	V	Volume of the receiving room	[m^3]
	T	Reverberation time in receiving room	[s]

The measurement procedure is defined in DIN 52210-1 or DIN EN 20140-3 (ISO 140-3). The sound pressure level L_1 is generated in the source room that leads to the sound pressure level L_2 in the receiving room. The resulting sound level difference is calculated by the equation (3):

$$D = L_1 - L_2 \quad dB \tag{3}$$

The sound reduction index originates from the sound power that reaches the surface S of the structural member of the transmission room and is radiated from the same surface into the receiving room. This calculation for a diffuse room is calculated by the equation (4):

$$R = L_1 - L_2 + 10\lg\frac{S}{A} \quad dB \tag{4}$$

with	R	Sound reduction index for the structural member	[dB]
	S	common partition between the measuring rooms	[dB]

The sound reduction index and the normal sound level difference are given an apostrophe (R´ and D_n´) if the sound travels not only through the partition wall, but also through bypasses between source room and receiving room. Then R´ or D´ mean: Sound insulation with bypass or standard building bypasses.
The test set up with a maximum sound insulation of R_w =68 dB met the requirements of laboratory test facilities without flanking transmission according to standard EN ISO 140-1.
The window test facility complies with the requirements of 3.3.2.1 and Table 1 of standard DIN 52 210-2/1984, that specify the flanking sound reduction index.

Measurement Equipment

Third octave noise is sent from the source room using a speaker with omni directional radiating characteristics. Omni directional microphones rotating in inclining, overlapping circles measure the receiving and source sound levels. The equivalent absorption surface is determined by the reverberation time measurements.
The measuring instruments are subject to calibration specifications and regular inspections by the PTB (National Metrology Institute) in Braunschweig (Brunswick). They are under quality and suitability control of the IAB.

Measured Values:

Frequency	Sound pressure Level Differences	Reverberation Time	Standard Sound pressure difference
f / Hz	D / dB	T / s	D_n / dB
50	33,9	6,03	40,9
63	33,1	3,66	37,9
80	29,1	1,94	31,1
100	25,9	1,54	26,9
125	34,6	1,31	34,9
160	38,5	1,38	39,1
200	46,3	1,17	46,1
250	43,6	1,56	44,7
315	43,0	1,15	42,7
400	40,3	1,07	39,8
500	40,2	1,08	39,7
630	38,2	1,21	38,2
800	30,3	1,19	30,2
1k	30,5	1,39	31,1
1,25k	40,9	1,28	41,1
1,6k	44,2	1,27	44,4
2k	40,6	1,26	40,8
2,5k	42,3	1,08	41,8
3,15k	46,4	0,99	45,5
4k	51,6	0,87	50,1
5k	56,8	0,76	54,8

The test object has the following surface dimension: 0,60 m x 0,50 m = 0,30 m².

Measured results:

The sound insulation between 100 and 3150 Hz in accordance with ISO 717-1 was measured with:

$$D_{n,w} = 39 \text{ dB}$$

Temperature in Source/Receiving room:	14°C
Relative Humidity:	31%

Date of Measurement: December 12, 2002

Summary report for test object according to enclosed form, Appendix 2 (A 51641)

The sound insulation index of the test specimen Hilti CP 673 Fire Safety Coating in a gypsum boarded stud construction achieved the following rating in the miniaturised window test bench

$$D_{n,w} = 39 \text{ dB}$$

Date: January 23, 2003

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Enclosure 1 (Cross-sectional view A 51648)
Enclosure 2 (Measurement and evaluation sheet A 51641)