

***Rules for substitution and
standardised sound reduction indices
in accordance with DIN EN 12758:2019-12***

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1. Foreword

DIN EN 12758 “Glazing and airborne sound insulation - Product descriptions, determination of properties and extension rules” lays down the rules for the determination of the sound insulation properties of glass products.

Therefore, either measurement in accordance with DIN EN ISO 10140-2 must be carried out or the substitution rules or standardised sound reduction indices of DIN EN 12578 can be applied or used.

Once the measurement has been carried out, the measurement results obtained in accordance with DIN EN ISO 717-1 must be used to subsequently determine the weighted sound reduction index R_w and the spectrum adaptation terms C and C_{tr} and compiled in a sound insulation test certificate. The standard test size is 1.23 m x 1.48 m.

In the new version of the standard dated 2019-12 the following important amendments have been implemented:

1. The rules for the further use of the measured sound reduction indices of glass products have been extended. This has significant advantages in practice.
2. The table with the typical sound reduction indices has been extended.
3. In addition, an annex describing the characterisation of (acoustic) PVB films using the method set out in ISO 16940 has been included.

2. CE marking

The rules for CE marking are described in Annexes ZA of the harmonised European product standards.

According to these rules, the sound reduction indices must be determined by a notified testing laboratory in accordance with DIN EN 12758. Consequently, the values obtained in this way must be included in the declaration of performance.

Information on essential characteristics, e.g. in advertising, contractual agreements or product documentation, is permitted only if these characteristics are explained in the declaration of performance.

3. Determination of the sound reduction indices of glass products

The following options are permitted:

- Measurement in accordance with the series of standards DIN EN ISO 10140, Acoustics - Laboratory measurement of sound insulation of building elements and DIN EN ISO 717-1, Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation
- Tabulated values of DIN EN 12758
- Rules for substitution in accordance with DIN EN 12758

There is currently no standardised calculation method for determining the sound reduction indices of glass products.

4. Spectrum adaptation terms

As set out in the glass product standards, the R_w -value and the associated spectrum adaptation terms C and C_{tr} must be specified in accordance with DIN EN ISO 717-1.

Example: $R_w(C; C_{tr}) = 34(0; -2)$ dB

Table 1 of DIN EN 12758 states the generally accepted values of R_w , C and C_{tr} for a wide range of glass products.

These correction values cover specific standard noise situations and adapt the weighted sound reduction index to the relevant prevailing outdoor noise source. The C-values take account of the subjective perception of the user. These correction values are also stated in the test certificates.

The correction value C takes account of highway road traffic, railway traffic at medium and high speeds, jet aircraft at short distance and other sources.

The correction value C_{tr} takes account of urban road traffic, railway traffic at low speed, propeller driven aircraft, jet aircraft at large distance and other sources.

5. Extended substitution rules

As set out in DIN EN 12758, it can be assumed that the sound reduction indices of glass products R_w (C; C_{tr}) are not negatively affected if the glass configuration is modified according to the following rules (a - f). In this case, further testing in accordance with DIN EN ISO 10140-1 is not required:

a) Rules for basic-glass products (Clause 8.2)

- The sound insulation properties are not dependent on the glass composition, glass colour (clear or body-tinted glass) or on subsequent, for instance thermal processing, e.g. into TSG or HSG.
- The acoustic performance of patterned glass is equivalent to that of glass with the next lowest thickness of float glass. Example: 6 mm patterned glass is described acoustically by the data for 5 mm monolithic float glass.
- The wire mesh within wired glass has no influence on the acoustic performance.

b) Rules for surface treatment and coatings (Clause 8.3)

Sand blasting, acid etching, enamelling and coating have no effect on the acoustic performance as long as the glass thickness stays within the allowable tolerance for the specific product.

c) Rules for laminated glass/laminated safety glass (Clause 8.4)

- Laminated glass can be described acoustically by the data for monolithic glass with the same or the next available lower thickness (i.e. the sum of the thicknesses of the glass components).
- Data for laminated glass may be adopted using the increased thickness of the interlayer of the same material type.
- For laminated glass incorporating monolithic glass of different thicknesses, there is no preferred direction of installation.
- The substitution of laminated glass is subject to the rules for the characteristic measurement parameters for the applicable films set out in ISO 16940.

d) Rules for insulating glass units (Clause 8.5)

- No distinction is made between air and argon fillings. If the test report specifies krypton as the gas type, then this gas type must be used.
- Whatever the composition of the IGU, with or without laminated glass, the acoustic performance does not depend on the direction of installation of the IGU.
- The influence of inserts (e.g. blinds, bars) in the cavity that do not touch the glass panes is negligible for the acoustic performance.
- Substitutes may be used for the sealants applied to the edge seal and for the spacers.

- Data for an air-filled or argon-filled IGU can be used for krypton-filled IGUs or a mixture (Kr-Ar-air) for the same glass composition.
- Data for IGUs with spacer ≥ 12 mm can be used for the same IGU with wider spacer.
- Data for IGUs with spacer = 12 mm can be used for the same IGU with narrower spacer.
- If a monolithic glass is replaced with a laminated glass/laminated safety glass of at least the same thickness, the sound insulation is not reduced.

e) Rules for mirrors as well as painted glass, enamelled glass and filmed glass (Clause 8.6)

The application of a silver layer, paint, enamel or thin film will have no effect on the acoustic performance of the glass substrate.

f) Substitution of PVB films

DIN EN 12758 refers in Annex A to ISO 16940, which describes a method to compare the acoustic properties of laminated glass interlayers based on the stiffness and the loss factor of the interlayer. The "Bundesverband Flachglas" (Federal Glazing Trade Association) is of the opinion that the relevant data can be provided by a factory certificate issued by the film producers. Alternatively, comparative sound insulation tests may provide results for this.

6. Standardised sound reduction indices

The standard includes a table with monolithic glass types and air-filled or argon-filled standard insulating glass configurations. These standardised, conservatively measured sound reduction indices may be used in the absence of a test report. The R_w values (C ; C_{tr}) are specified below. In addition, the standard contains also the sound reduction indices R for individual one-third octave band frequencies.

Glass type and thickness in mm	R_w in dB	C in dB	C_{tr} in dB
Monolithic glass			
3	28	-1	-4
4	29	-2	-3
5	30	-1	-2
6	31	-2	-3
8	32	-2	-3
10	33	-2	-3
12	34	-1	-2
15	36	-1	-2
19	38	-2	-4
Laminated glass (LG) / Laminated safety glass (LSG)*			
6 LG	32	-1	-3
8 LG	33	-1	-3
10 LG	34	-1	-3
12 LG	36	-1	-2
16 LG ***	36	-1	-3
20 LG***	37	-1	-3
24 LG***	38	-1	-3
Double IGU **			
4 (cavity) 4	29	-1	-4
6 (cavity) 4	32	-2	-4
6 (cavity) 6	31	-1	-4
8 (cavity) 4	34	-2	-4
8 (cavity) 6	35	-3	-6
8 (cavity) 8	32	-2	-5
10 (cavity) 4	35	-2	-5
10 (cavity) 6	36	-2	-4
4 (cavity) 6 LG	33	-1	-5
6 (cavity) 6 LG	33	-2	-5
6 (cavity) 8 LG	36	-2	-5
6 (cavity) 10 LG	38	-1	-5
Triple IGU **			
4 (cavity) 4 (cavity) 4	30	-1	-5
6 (cavity) 4 (cavity) 4	34	-2	-5
8 (cavity) 4 (cavity) 6	37	-3	-7
8 (cavity) 6 (cavity) 6	35	-2	-5
10 (cavity) 6 (cavity) 8	40	-2	-5
4 (cavity) 4 (cavity) 6 LG	34	-2	-6
4 (cavity) 4 (cavity) 8 LG	36	-2	-6
6 (cavity) 4 (cavity) 8 LG	38	-2	-8
6 (cavity) 6 (cavity) 8 LG	38	-2	-6
6 (cavity) 6 (cavity) 10 LG	40	-2	-5
6 (cavity) 6 (cavity) 12 LG	40	-2	-4
6 LG (cavity) 4 (cavity) 6 LG	36	-3	-7
8 LG (cavity) 4 (cavity) 6 LG	40	-3	-7
8 LG (cavity) 4 (cavity) 8 LG	37	-2	-5
8 LG (cavity) 6 (cavity) 8 LG	39	-2	-6
12 LG (cavity) 4 (cavity) 8 LG	42	-2	-4
* LG without acoustic interlayer			
** 6 ≤ cavity ≤ 16			
*** values from DIN EN 12758:2011			

7. Size of glass elements

The tested sound reduction indices always refer to the size set out in the relevant test standard – 1.23 m x 1.48 m. Other element sizes may give deviating test results. Further relevant information is also provided in the VFF Merkblatt, Schall.01 “Schallschutz mit Fenstern, Türen und Fassaden” (VFF Guidance Sheet, Sound.01 “Sound Insulation of windows, doors and façades”) and the BF Bulletin 017 “Sound insulating glass”.

8. Literature

- [1] DIN EN 12758:2019-12
Glass in building – Glazing and airborne sound insulation – Product descriptions, determination of properties and extension rules
- [2] DIN EN ISO 717-1:2021-05
Acoustics – Measurement of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation
- [3] DIN EN ISO 10140-1:2021-09
Acoustics – Laboratory measurement of sound insulation of building elements – Part 1: Application rules for specific products
- [4] DIN EN ISO 10140-2:2021-09
Acoustics – Laboratory measurement of sound insulation of building elements – Part 2: Measurement of airborne sound insulation
- [5] ISO 16940:2008-12
Glass in building – Glazing and airborne sound insulation – Measurement of the mechanical impedance of laminated glass
- [6] VFF Merkblatt Schall.01 (Guidance Sheet Acoustics)
Sound insulation with windows, doors and façades
- [7] BF-Bulletin 017/2014
Sound insulation glass

This bulletin was produced by: Working Group “Sound insulation glass” at Bundesverband Flachglas e.V., Mülheimer Strasse 1 · D-53840 Troisdorf

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Bundesverband Flachglas e.V.
Mülheimer Strasse 1
53840 Troisdorf