

2.2.3 Result of the Formaldehyde Investigation

Table 2.2.1: Result of the Formaldehyde Investigation

Sample description - Description of the variation	Surface-related emission of formaldehyde at 90°C test chamber temperature [mg m ⁻² h ⁻¹]			Comments
	Test specimen 1	Test specimen 2	Mean value ^a (assessment value)	
"GRABNER-SAUNABOARD" Arolla Pine	0.38	0.39	0.39	-
"GRABNER-SAUNABOARD" Western_Red_Cedar	0.37	0.38	0.38	-
"GRABNER-SAUNABOARD" Hemlock	0.33	0.34	0.34	-
"GRABNER-SAUNABOARD" American Nut	0.27	0.22	0.24	-
"GRABNER-SAUNABOARD" Acacia	0.35	0.40	0.37	-
"GRABNER-SAUNABOARD" Birch	0.34	0.34	0.34	-
"GRABNER-SAUNABOARD" Spruce	0.29	0.27	0.28	-

^a Arithmetic mean value rounded up to two significant digits

3 EXPERT OPINION

3.1 Assessment Bases for the Investigation of Material Samples for the Emission of Formaldehyde

According to ÖNORM M 6219-1¹, which defines the requirements on public and commercial sauna installations, infrared cabins, steam- and other heat chambers, in sauna chambers only solid timbers and layered wood materials may be used, that have a maximum gas analysis value of $0.4 \text{ mg m}^{-2} \text{ h}^{-1}$ formaldehyde according to ÖNORM EN 717-2 (deviating from the ÖNORM, tested at 90°C).

3.2 Assessment Bases for Isocyanates in Wood Samples

There are no known guide values for the emission of isocyanates. If the value is less than the determination limit, it is to be assumed, that the emission is to be regarded as low.

3.3 Assessment Bases for Biocides in Wood Samples

The concentration of pentachlorophenol (PCP) in finished products, that also means in building materials, that are brought into circulation, is restricted by law to 5 mg/kg (ppm)². For wood up to 1 mg/kg can be assumed as basic load. Values up to 1 mg substance/kg indicate a very low load. With values up to 5 mg/kg the load is moderate, with values between 5 - 50 mg/kg the load is considerable. Values between 50 - 500 mg/kg are regarded as high and values above 500 mg/kg are regarded as very high.

If there are no concentration values for PCP in sedimented dust available, the German PCP-directive³, requires that the PCP-concentrations in possibly treated wood is investigated in further investigations. For this material samples are to be taken from a depth of 0 to 2 mm of the wood in question. If these result in PCP concentrations of over 50 mg PCP/kg wood, in addition to this it is recommended to determine whether the surface area of the treated wood that is in contact with interior air is greater than 0.2 m^2 per m^3 in relation to the room volume. If this is also the case, i.e. both values mentioned are exceeded, it is recommended to determine whether the expected annual average room air load is above $1 \text{ } \mu\text{g PCP/m}^3$ air. If this is the case, then it is recommended in the following, to carry out a renovation of the PCP-burdened room.

¹ ÖNORM M 6219-1 (2010): Requirements on public and commercial sauna installations, infrared cabins, steam- and other heat chambers Part 1: Planning and operation of saunas and saunas in combination with infrared heat sources - 2010 03 01

² PCP-Regulation (1991): Regulation of the Federal Minister for Environment, Youth and Family concerning the ban on Pentachlorophenol (PCP) dated 5.2.1991

³ PCP-Directive (1996): Directive on the assessment and renovation of Pentachlorophenol (PCP)-burdened building materials and components in buildings. Published by the project group »Pollutants« of the German specialist committee for construction standardization of the working group of the national ministers responsible for the building industry, housing and settlements (ARGEBAU)

3.4 Summarized Assessment

With the assessment values of 0.24 to 0.39 mg m⁻² h⁻¹, all seven investigated samples, which differ through different top layers, were below the maximum permitted gas analysis value of 0.4 mg m⁻² h⁻¹ and are therefore in conformity with the specifications of ÖNORM M 6219-1. The investigated materials are therefore suitable for sauna construction.

In comparison with lower emitting wood types such as hemlock or linden, the wood types cedar and acacia normally have a relatively higher emission of formaldehyde, when they are tested as solid wood sections at 90°C. In the present investigation the materials veneered with these two more strongly emitting wood types are also below the gas analysis value defined in ÖNORM M 6219-1.

No biocides were proven in the investigated mixed samples, which were obtained from seven "GRABNER-SAUNABOARD" base boards. In the test chamber investigations of two selected "GRABNER-SAUNABOARD" boards no emissions of isocyanates above the determination limit were proven.

Based on all available measurement results it can be assumed, that thin layers of veneer on a (relatively low emitting) "GRABNER-SAUNABOARD"-carrier board do not increase the emission of formaldehyde of the investigated woods above the gas analysis value defined in ÖNORM M 6219-1.

Furthermore it can be assumed with the greatest probability, that no significant increase in formaldehyde emission also occurs with other (not tested) wood types due to a veneer and that therefore all "GRABNER-SAUNABOARD"-boards veneered at works are suitable for sauna construction. This statement is only permitted for "GRABNER-SAUNABOARD" boards veneered at works, that are not bonded with any formaldehyde splitting glue.



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Dipl. Ing. Bernhard Damberger

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3 Expert Opinion

3.1 Assessment Bases

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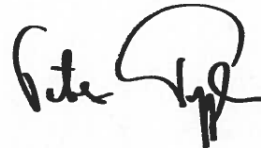
3.2 Assessment

For the investigated material with the designation "Grabner-Saunaboard Alder/Hemlock", at 90°C test chamber temperature the gas analysis value was significantly below the value of $0.4 \text{ mg m}^{-2} \text{ h}^{-1}$ required in ÖNORM M 6219-1 for the formaldehyde emission.



Initial findings

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¹ ÖNORM M 6219-1 (2010): Requirements on public and commercial sauna installations, infrared cabins, steam- and other heat chambers Part 1: Planning and operation of saunas and saunas in combination with infrared heat sources - 2010 03 01

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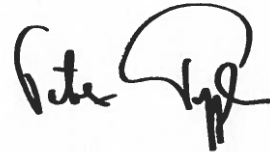
3.2 Assessment

For the investigated material with the designation "GRABNER-SONNBOARD", at 90°C test chamber temperature the gas analysis value was significantly below the value of $0.4 \text{ mg m}^{-2} \text{ h}^{-1}$ required in ÖNORM M 6219-1 for the formaldehyde emission.



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3.2 Assessment

For the investigated material with the designation Grabner-Saunaboard Structure "Oak Altaussee", at 90°C test chamber temperature the gas analysis value was significantly below the value of $0.4 \text{ mg m}^{-2} \text{ h}^{-1}$ required in ÖNORM M 6219-1 for the formaldehyde emission.



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3.2 Assessment

For the investigated material with the designation "Grabner-Saunaboard – StoneslikeStones", at 90°C test chamber temperature the gas analysis value was significantly below the value of $0.4 \text{ mg m}^{-2} \text{ h}^{-1}$ required in ÖNORM M 6219-1 for the formaldehyde emission.



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