

Wood protection of dimensionally stable and limited dimensionally construction elements according to DIN 68800 part 1-3

The DIN 68800 series of standards currently consists of the following parts:

- DIN 68800-1 Wood preservation Part 1: General
October 2011 (substitute for DIN 68800-1: 1974-05)
- DIN 68800-2 Wood preservation Part 2: Preventive constructional measures in buildings
February 2012 (substitute for DIN 68800-2: 1996-05)
- DIN 68800-3 Preventive protection of wood with wood preservatives
February 2012 (substitute for DIN 68800-3 1990-04 and DIN 68800-5: 1978-05)

Standards do not generally have a legal character, but define the "generally accepted rules of technology", in the case of DIN 68800 with regard to the entire range of wood protection measures in building construction. The standard only applies in Germany, European standards such as EN 599-1 Durability of wood and wood products - effectiveness of wood preservatives as determined by biological tests - are not affected. For contracts with private individuals, the validity of DIN 68800-3 can be agreed in Germany according to the German Civil Code, but this does not necessarily apply. On the other hand, it is binding for VOB contracts in public procurement.

The standard allows companies greater freedom of choice for coating structures with or without wood protection, depending on the type of wood used. Chemical wood protection is still permitted. **However, the aim of DIN 68800 is to reduce the use of wood preservatives to the required minimum.** However, it also causes problems regarding the recommended use of wood preservatives on the individual part. In addition, it is necessary to document the wood protection used and to reach a separate agreement with the client.

a) General advice in DIN 68800:

- A **classification of wooden components according to their stress is based on the 5 use classes according to EN 335**. Weathered windows and doors are usually classified in use class (GK) 3.1, although an occasional increase in wood moisture content to over 20% is not acceptable for a wooden window and must be prevented by constructional measures and coating. Classification in GK 2 (Table D1 from DIN 68800-1) is carried out with a rear-ventilated shell (wood-aluminium).
- In DIN 68800, **constructional wood preservation** is expressly given **priority over preventive chemical wood protection**. By using high-quality types of wood of durability classes 1 to 3 according to DIN EN 350-2, preventive protective treatments with wood preservatives can be renounced with at all! The central importance of the natural durability of wood species according to DIN EN 350-2 is repeatedly emphasised in the standard.

- The standard also contains information on **the selection of wood types** (including for window construction according to DIN EN 350-2 - see also VFF leaflet H0.06) **based on** a recommended **lower limit of the durability class** (Table E 1 of ~~EN~~ DIN 68800-1). A distinction is made between an **expected durability of the wooden component** of up to 30 years and over 30 years, in each case under normal and heavy use and also under normal and increased protection level (e.g. taking into account the value of the components, safety aspects and the interchangeability of the elements).
- For dimensionally stable components exposed to **high levels of stress** (e.g. windows on the west and south sides, installation flush with the façade, free-standing or in a mountainous position, near the sea or higher than 3rd floor), wood of class 3 - 4 must be used at least. Wood species of durability classes 3 - 4 are for example Douglas fir, larch and pine, Western Red Cedar, if their sapwood content is max. 5%. Intermediate classes are formed if the durability of a wood species cannot be clearly assigned.
- For dimensionally stable components exposed to **normal levels of stress**, wood with a natural durability recommendation of class 4 can be used. This class includes spruce, hemlock, fir or meranti with a lower wood density of 400-500 kg/m³.
- A prerequisite for the expected durability of up to 30 or over 30 years is a permanently intact coating. If the coating is defective, the durability may be shorter than with uncoated components.
- The durability of a wood species always refers to the coloured heartwood. A sapwood content of $\leq 5\%$ does not change the classification yet. **Sapwood** itself is **always** - regardless of the type of wood - classified in **the worst durability class 5**.
- The standard contains information on use classes in which the listed **wood species may be used without additional chemical wood protection measures** (Table 5 of DIN 68800-1). The table covers use in all use classes from 0 to 5; it is therefore not only intended for window construction. It is always assumed that the sapwood content of the colour heartwood \leq is 5%!

b) Chemical wood protection according to DIN 68800-3 - General information:

- Protection against blue stain is necessary for wood that is sensitive to blue stain.
- For preventive chemical wood protection (protection against wood-destroying fungi, not against blue stain fungi), there are basic statements in DIN 68800-1 Chapter 8 Selection of measures for the protection of wood:

"If the protection success of non-load-bearing wooden components is not ensured by constructional measures according to DIN 68800-2 and the natural durability of the wood types intended for this purpose, additional preventive wood protection measures with wood preservatives according to DIN 68800-3 can be carried out. **These measures must be specifically agreed and then carried out in accordance with this standard**". "For non-load-bearing components, the use of thermally or chemically modified wood must be agreed separately.

- In connection with a coating system according to DIN EN 927-1 (dimensionally stable, limited dimensionally stable and non-dimensionally stable timber components for exterior) protection treatment is subject to **penetration depth** class NP 1 (no special requirements) with the required **application quantity**. For the wood preservatives used, the performance requirements according to DIN EN 599-1 must be fulfilled in the intended use classes, including the proofs of effectiveness against blue stain fungi mentioned therein.

- There is generally **no risk of damage from insects** with coated non-load-bearing components made of wood and wood-based materials. If there are indications of an infestation risk, preferably heartwood of an appropriately resistant type of wood should be chosen or a protective treatment should be carried out. However, this must be expressly commissioned by the client.
- The wood protection to be used must generally be agreed with the customer! The DIN 68800-3 Chap. 7 **required information in the accompanying documents** for preventively protected wood products. However, this does not have to be taken into account in the case of the CE marking.

Note: However, there are currently no CE-certified window scantlings on the market! This information is apparently intended for timber assortments for timber construction, which are available with CE marking.

Example of documentation for Aquawood TIG HighRes:

Preventive protection of wood with wood preservatives according to DIN 68800-3: 2012-02 for non-load bearing timber components

Wood preservatives: Aquawood TIG HighRes

Registration number for Germany: DE-2013-BPF-08-00001-aaa

Registration number for Austria: AT/2014/Z/00167-BPF/8

Category of use: GK 3.1

Penetration depth category: NP 1

Application quantity: 120 g/m²

Name and location of the executing company, if necessary encrypted

Batch no. of Aquawood TIG HighRes and year of treatment

Example of documentation for Aquawood TIM:

Preventive protection of wood with wood preservatives according to DIN 68800-3: 2012-02 for non-load bearing timber components

Wood preservatives: Aquawood TIM 51202

Registration number for Germany: DE-2013-MA-08-00007

Registration number for Austria: AT/2013/Z/00115/8

Category of use: GK 3.1

Penetration depth category: NP 1

Application quantity: 120 g/m²

Name and location of the executing company, if necessary encrypted

Batch no. of Aquawood TIM and year of treatment

c) Chemical wood protection - for non-load bearing timber components (e.g. windows)

- Unlike the Austrian ÖNORM B 3803 / C 2350, DIN 68800 is not a special standard for window construction, but more broadly based.
- Regarding the use of wood preservatives on non-load-bearing timber components, which are subsequently coated, DIN 68800-3 only provides information in Appendix C (informative). Whether these references have the same meaning as in the actual text part is controversial and will only have to be clarified legally in cases of damage. It is also unclear whether a reference in a standard appendix is mandatory or only represents a recommendation. According to Beuth's practical commentary on DIN 68800 (2013), this part of the standard is an "Explanation and additional information", but it is not binding.

Wood protection of dimensionally stable and limited dimensionally stable construction elements according to DIN 68800/1-3

"Before applying a coating system in accordance with DIN EN 927-1, treatment with **bluish-resistant wood preservatives** may be necessary on raw wood components at risk of blue stain (as a rule for all sapwoods and generally for hemlock, spruce and fir) in the range of use classes GK 2 and GK 3.1".

- The standard (Table C.1) does not provide **protection against wood-destroying fungi and blue stain** for heartwood (up to 5% sapwood content) of durability classes 1 - 3 in GK 2 and GK 3.1 (windows, wood-aluminium windows). To wood species of durability classes 4 and 5 (not very durable or not durable) the following applies (unfortunately somewhat inaccurate):
 - For wood with a sapwood content > 5%, blue stain protection is recommended.
 - If wood is used whose sapwood content is not indicated or not recognizable, it is classified as sapwood content > 5%.
 - In GK 2 and GK 3.1, blue stain protection can be carried out; a hazard cannot be excluded with sufficient guarantee.

The protective treatment against wood destroyers is recommended in GK 3.1; it can be carried out in GK 2. There is also the restrictive and unhelpful note b: "Under the premise of a perfect construction and quality of the wood, preventive protection against wood destroyers is not necessary. In case of doubt, a protective treatment should be given".

Note: If a manufacturer wants to be sure when using wood types of class 4 and 5 for wooden windows and wood-aluminium windows, he must carry out a preventive protective treatment against blue stain and wood destroyers (same situation as with the old standard version of DIN 68800)! The same applies to wood species of classes 3 - 4 if the wood supplier cannot confirm that the sapwood content is max. 5%!

Carrying out preventive wood protection measures with wood preservatives:

- Dimensionally stable timber components (windows and front doors) are usually treated all-around: After the all-round protective treatment, they are coated with a coating system according to DIN EN 927-2. Before installation and glazing, at least one primer and one intermediate coating should be applied in addition to the protective treatment with wood preservatives.

Note: Incl. top coat, a 4-layer-coating system is recommended, but at least a 3-layer-coating system!

- If appropriate wood preservatives are used, wood protection treatment and primer coating can be carried out in a single operation if necessary.

Note: This confirms the most frequently used ADLER coating system with pigmented TIG! Pre-impregnation with a colourless deep impregnation is not generally recommended.

- In order to achieve effective protection against wood-destroying fungi in the area of corner joints when using preventive wood preservatives in non-printing processes (e.g. short-term immersion, flow-coating, painting), the components should be individually impregnated before joining without affecting the required bonding quality according to DIN EN 204 or DIN EN 12765. According to Beuth's practical commentary on DIN 68800 (2013), this part of the standard is a "strong recommendation", which, however, does not necessarily have to be applied.

Note: Unfortunately, this **strong recommendation** causes many problems for window manufacturers. Only a relatively small number of companies (approx. 10% according to estimates by Holzforschung Austria) are able to realize production using individual parts or at short notice. For system manufacturers, too, there are still unsolved problems regarding suitable application equipment for priming the individual parts. The gluing of impregnated individual scantlings without loss of strength is also a difficult topic for coating and, above all, glue manufacturers.

Biocidal Products Directive:

According to the Biocidal Products Directive (98/8/EC), all wood preservatives must be approved and this approval must be recognized by all EC member states in which the wood preservatives are sold. Of course, ADLER has submitted all wood preservatives currently affected for approval and mutual recognition, which is why we can inform you that ADLER-Werk can now and in the future supply you with all wood preservatives such as Aquawood TIG HighRes without any problems as always.

All our wood preservatives are either approved according to European guidelines or do not currently require approval, meet the legal health and environmental requirements and can be resold without problems.

Overview of the most important wood species incl. recommendation from ADLER:

Type of wood	Dura- bility EN 350-2	Category of use:		Dan- ger of blue stain	Danger of fungal infesta- tion	Recommendation of ADLER	
		Wood	Wood- aluminium			Coating sys- tem with wood preservative	Product
Spruce	4	GK 3.1	GK 2	given	given	Yes	Aquawood TIG HighRes
Pine	3-4	GK 3.1	GK 2	Not pre- cluded	Not pre- cluded	Yes	Aquawood TIG HighRes
Larch	3-4	GK 3.1	GK 2	Not pre- cluded	Not pre- cluded	Yes	Aquawood TIG HighRes
Oak	2-3	GK 3.1	GK 2	none	none	possible with- out wood pre- servative	Aquawood TG WF
Meranti under 500 kg/m ³	4	GK 3.1	GK 2	given	given	Yes	Aquawood TIG HighRes
Meranti over 500 kg/m ²	1-2	GK 3.1	GK 2	none	none	possible with- out wood pre- servative	Aquawood TG WF
proportion of sapwood >5% Pine Larch Oak Meranti	5	GK 3.1	GK 2	given	given	Yes	Aquawood TIG HighRes