

Durability of Mass Timber Structures – Classification and Recommendations

This technical note addresses the durability of mass timber structures. The document summarizes the service classes of wood according to the EN 335 Standard and provides recommendations adapted to Nordic products. It also includes the corrosivity categories for steel according to the ISO 9223 Standard. These European and international standards, not being prescribed in North America, are presented here for reference to help designers develop sustainable solutions.

It should be noted that service classes and service conditions serve different purposes. Service classes categorize the risks associated with moisture exposure, while service conditions are used to adjust specified resistances and stiffnesses based on climatic conditions. For more information on service conditions, refer to the CSA O86 Standard.

Service Classes (SC)

The European standard EN 335 defines the service classes that represent different service situations to which wood can be exposed. This standard also indicates the biological agents relevant to each situation. A service class is not a performance class and does not provide guidance for how long wood will last in service.

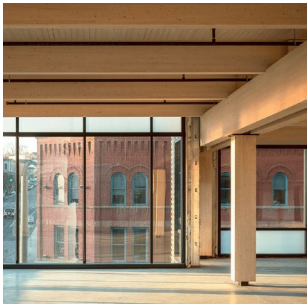
Table 1 presents this classification, adapted to Nordic products. The differences between the service classes are based on differences in environment exposures that can make the wood susceptible to biological degradation.

Table 1 – Wood Service Classes and Typical Protections

Service Class 1 (SC1)

- Situations in which the wood is inside a construction, not exposed to the weather and wetting.
- The attack by disfiguring fungi or wood-destroying fungi is insignificant and always accidental.
- Typical protection:
 - o Sansin KP-12UVW (protective undercoat)
 - o With or without finishing product

Note: For more information on finishing Nordic products, refer to technical note [NS-NT205](#).



Service Class 2 (SC2)

- Situations in which the wood is under cover and not exposed to the weather (particularly rain), but where occasional, but not persistent, wetting can occur.
- Condensation of water on the surface of wood may occur.
- Attack by disfiguring fungi and wood-destroying fungi is possible.
- Typical protection:
 - o Two coats of Sansin KP-30 (formerly SDF)
 - o Inspection frequency: 3 to 6 years ^(a)



Service Class 3.1 (SC3.1)

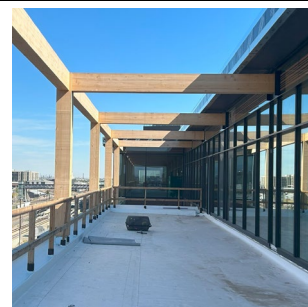
- Situations in which the wood is above ground and exposed to the weather (particularly rain).
- The wood products will not remain wet for extended periods. Water will not accumulate.
- Possible exposure to UV rays.
- Attack by disfiguring fungi and wood-destroying fungi is possible.
- Typical protection:
 - o Two coats of Sansin KP-30 (formerly SDF) + one coat of KP-32 (formerly SDF Topcoat)
 - o With pigmentation (opacity)
 - o Inspection frequency: 1 to 4 years ^(a)



Service Class 3.2 (SC3.2)

- Situations in which the wood is above ground and exposed to the weather (particularly rain).
- The wood products will remain wet for long periods. Water may accumulate.
- Attack by disfiguring fungi and wood-destroying fungi is possible.

Note: The durability of Nordic products under these conditions remains limited. The use of naturally weather-resistant wood species is recommended.



Service Class 4 (SC4)

- A situation in which the wood is in direct contact with ground and/or fresh water.
- Attack by disfiguring fungi and wood-destroying fungi is possible.

Not applicable

Note: The use of Nordic products under these conditions is not recommended.

a) Information regarding inspection frequency is provided for information purposes only. This strongly depends on climatic conditions. For more information on maintenance frequency and recommended finishing products, please register with Sansin Care.

Notes:

1. Service classes may vary within the same structure; it is the responsibility of the designer to assess the level of exposure of all wooden elements.
2. The risk of fungal deterioration depends on climatic and usage conditions (temperature, relative humidity, rain, design details, and maintenance provisions).
3. Attack by wood-boring insects, including termites, is possible in all service classes, although the frequency and importance of this risk depends on the geographical region. Local experts should be consulted for advice on the risk of insect attack.

Corrosivity Categories

The ISO 9223 Standard establishes a classification system for the corrosivity of atmospheric environments. The corrosivity category is a technical characteristic which provides a basis for the selection of materials and protective measures in atmospheric environments subject to the demands of the specific application, particularly with regard to service life. The key factors in the atmospheric corrosion of metals and alloys are the temperature-humidity complex, pollution by sulfur dioxide and airborne salinity.

Table 2 – Corrosivity Categories and Recommended Protections

Corrosivity category	Corrosivity	Humidity	Typical environments – Examples	Type of steel and recommended protection
C1	Very Low	Rare (SC1)	Heated spaces with low relative humidity and insignificant pollution – offices, schools, museums	- Zinc-plated screws - Powder coating
C2	Low	Rare (SC1 – SC2)	Unheated spaces with varying temperature and relative humidity; low frequency of condensation and low pollution – storage, sport halls	- Zinc-plated screws - Powder coating
C3	Medium	Occasional (SC2)	Spaces with moderate frequency of condensation and moderate pollution from production process – food-processing plants, laundries, breweries, dairies	- Zinc-plated screws - Powder coating
C4	High	Frequent (SC3)	Spaces with high frequency of condensation and high pollution from production process – industrial processing plants, swimming pools, coastal areas	- Zinc-plated screws - Stainless steel grade A4 - Hot-dip galvanization
C5	Very High	Permanent (SC4 – SC5)	Spaces with very high frequency of condensation and/or with high pollution from production process	Not applicable

Notes:

1. Corrosivity categories may vary within the same structure; it is the responsibility of the designer to assess the level of exposure of all steel elements.
2. Certain wood species as well as wood treated with fungicidal agents or flame retardants may be more corrosive. It is advisable to consult an expert regarding the type of steel and protection required.

For more information on finishing Nordic products: <https://www.nordic.ca/en/documentation/technical-documents/ns-nt205>

For more information on finishing with Sansin products: <https://www.nordic.ca/en/documentation/technical-documents/ns-nt206>

For more information on maintenance of mass timber structures: <https://www.nordic.ca/en/documentation/technical-documents/ns-ge2-ca>