KLAASWOOD®

DURABILITY PERFORMANCE

WTT THERMOTREAT 2.0

Documentation of Durability Performance

In this document we review and document WTT durability performance. It shows how durability performance of WTT thermo wood is clearly superior when compared to other, older systems such as ThermoWood. The documentation is also more rigid, detailed and complete.

1. Durability Laboratory Test

	Durability Class (EN 350)		Test Procedure*	
	WTT	ThermoWood	WTT	ThermoWood
Softwood	1 Very Durable	2** Durable	EN 73 + EN 113 EN 84 + EN 113	EN 113
Hardwood	1 Very Durable	1 Very Durable	EN 73 + EN 113 EN 84 + EN 113	EN 113

* EN 113 is the durability test procedure, where the wood is subjected to fungi/rot attack

EN 73 + 84 are ageing tests, performed before the EN 113 durability test. These subject the wood to physical stress by water/leaching (EN84) and evaporation (EN73). The purpose of these two tests is to simulate the real environment outside the laboratory.

** for performance and test procedures for ThermoWood, please consult their website at: **https://www.thermowood.fi/1**

KWD

2. Durability Field Test

	Durability Performance		Test Procedure*	
	WTT	ThermoWood	WTT	ThermoWood
Softwood	No decay	Not reported	CEN/TS 12037	Not reported
Hardwood	No decay	Not reported	CEN/TS 12037	Not reported

* This test is performed in Malaysia where the climate is extremely aggressive. The thermo treated wood is compared to non-treated wood, as well as CCA (chemically) treated wood. After 6 years, the WTT thermo treated wood show no signs of decay. It performs just as well as the CCA treated wood. The untreated wood shows severe fungi attack (see photos in appendix 3 below).

3. Equilibrium Moisture Content (EMC)

$EMC_{65\%}$ should always be at 6% or lower. Ask your supplier to document EMC, or get the wood tested yourself.

EMC is the moisture content of the wood, when it has stabilized at standard conditions (21oC, 65% relative humidity). For untreated wood it is typically 11-15%. Thermo treatment reduces the EMC. Significant research – including our own – demonstrates that to achieve good durability, EMC after treatment should not be above 6% as a rule of thumb. If it is, the wood will certainly fail and start to rot at some point, when used outdoors.

EMC is the only safe way to determine if the thermo treatment has been effective, and the only valid basis for guaranteed outdoor wood performance.

On the following pages, we present a summary of our performance documentation.
Full documentation can be found on our website **www.wtt.global.**

Appendices

1. Summary of durability laboratory tests. Note how this test documents the relationship between EMC and durability performance ("results" section on page 1)

   We have lab tests for the following species:
   - Scots Pine sapwood
   - Scots Pine heartwood
   - Radiata Pine
   - Norwegian Spruce
   - Beech

2. Summary of durability field tests (Scots Pine, Spruce and Beech)

3. Photo report from durability field tests

4. NTR/NWPC certification

Peter Klaas, Ph.D.
Managing Director, WTT

Appendix 1

Summary Lab Tests

Species	Durability Class
Scots Pine sapwood	1
Scots Pine heartwood	1
Radiata Pine	1
Norway Spruce	1
Beech	1

Appendix 2

Summary of durability field tests in Borneo

Species	Durability Class
Beech/WTT thermotreat	0 / no decay
Scots Pine sapwood/WTT thermotreat	1 / slight attack
Spruce/WTT thermotreat	1 / slight attack
Scots Pine/no treatment (reference)	4 / failure (total decay)
Beech/no treatment (reference)	4 / failure (total decay)

Appendix 3

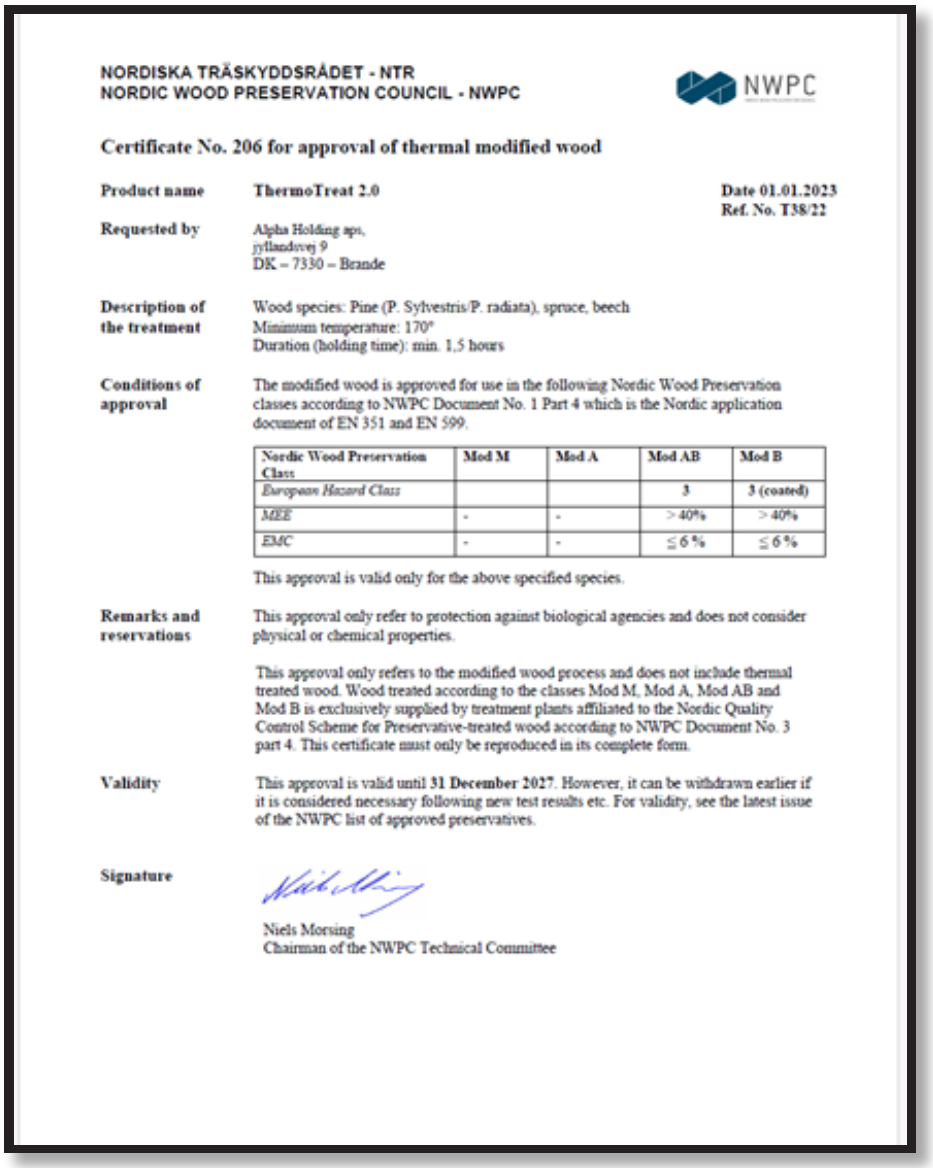
Photo documentation from durability field tests in Borneo

Unmodified reference sample – failed after 3 years

Modified Beech – no decay after 6 years

Appendix 4

Nordic Wood Protection Council (NWPC) Certification for useclass 3



NORDISKA TRÄSKYDDSRÅDET - NTR
NORDIC WOOD PRESERVATION COUNCIL - NWPC

NWPC

Certificate No. 206 for approval of thermal modified wood

Product name **ThermoTreat 2.0**

Date 01.01.2023
Ref. No. T38/22

Requested by Alpha Holding aps,
Jyllandsvej 9
DK – 7330 – Brande

Description of the treatment Wood species: Pine (P. Sylvestris/P. radiata), spruce, beech
Minimum temperature: 170°
Duration (holding time): min. 1,5 hours

Conditions of approval The modified wood is approved for use in the following Nordic Wood Preservation classes according to NWPC Document No. 1 Part 4 which is the Nordic application document of EN 351 and EN 599.

Nordic Wood Preservation Class	Mod M	Mod A	Mod AB	Mod B
European Hazard Class			3	3 (coated)
MEE	-	-	>40%	>40%
EMC	-	-	≤6 %	≤6 %

This approval is valid only for the above specified species.

Remarks and reservations This approval only refer to protection against biological agencies and does not consider physical or chemical properties.

This approval only refers to the modified wood process and does not include thermal treated wood. Wood treated according to the classes Mod M, Mod A, Mod AB and Mod B is exclusively supplied by treatment plants affiliated to the Nordic Quality Control Scheme for Preservative-treated wood according to NWPC Document No. 3 part 4. This certificate must only be reproduced in its complete form.

Validity This approval is valid until **31 December 2027**. However, it can be withdrawn earlier if it is considered necessary following new test results etc. For validity, see the latest issue of the NWPC list of approved preservatives.

Signature

Niels Morsing
Chairman of the NWPC Technical Committee

WTT thermotreat is the only sustainable, non-toxic modification technology which is listed and certified in any national or international standard.