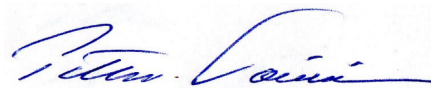


Nova Orman Urunleri San. Tic. A.S. (Novawood)

Thermally Modified Timber
Inspection report no 112-1-2018

Date of inspection:	9.1.2018
Date of previous inspection:	3.10.2016
Company representative(s)	Ilhan Col, Mustafa Alkan and Ali Güney
Finotrol's representative(s):	Petteri Torniainen
Reference documents:	FC-2: Thermally Modified Timber (TMT)
Content of the inspection:	Heat treatment of timber Thermo-D (pine, ash)
Result of inspection:	No non-conformities.
Non-conformities:	Minor non-conformities (0) Non-conformities (0) Major non-conformities (0)
Further actions:	Certification decision will be held valid.

Signature:



Petteri Torniainen, Finotrol Oy

Content of inspection

The following parts according to the FC-2 were assessed

The plant has a valid ISO 9001:2008 system audited by IQR covering "Production and sales of natural Thermowood lumber. Last auditing date 2.3.2017. No non-conformities were reported. The last updated certificate issued 9.3.2017

- **Handling of documents, sustenance of documents, organization**
Factory manager: Ilhan Col, Production and quality control: Mustafa Alkan,
General Manager: Göksel Yildiz
- **Validity of personnel and training.** Individual training/education sheets.
- **Instructions.** The manufacturer of the plant supplies the operating instructions of equipment.
- **Treatment records.** All the processes are saved on the process computer. External copies and paper copies have been taken.

Production control

The following things were assessed in treatment facilities:

- **Raw material, storaging, preparations, wood species.**
All the raw material (pine) are imported by Metsä, Kyrö sawmill. Ash is coming from USA and Canada. All the wood as pre-dried ~ 14...16%. Clear visual quality requirements regarding e.g. quality, size of knots. Automatic stacking.
- **Dimensions.** Pine 25...32...50 x 100...125...150. Most common 25 x 125 mm. Ash 26...32...38...52 x 102...127...152...178...203
- **Heat treatment equipment:** Two Jartek kilns and two units for kiln drying. The capacity of each Jartek kilns ~ 30...35m³/charge.
- **Production:** Total production 11 000 m³ (year 2017). Annual production of certified products (pine) 2 205 m³ and (ash) 7 200 m³. More production regarding other wood species like iroko.
- **Treatment degree:** Thermo-D (pine 212°C, ash 210°C).
- **Profiling, moulding etc.** Own profiling, part of the treated wood is supplied as a rough (no planed) after treatment
- **Handling of reclaims.** Company has appropriate definitions for claims. No reclaims regarding treatment quality 2017. Persons responsible Ilhan and Mustafa.
- **Handling of products and marking.** The finished packages are including the following information (TMT, FSC, dimensions, number of pieces, volume, treatment degree, package number, bar code and company logo). Packaging requirements specified by the customers.

Quality control and testing

During the visit the following procedures were carried out:

- **Quality control facilities and equipment:** Separate facilities equipped with several measuring devices. Colour, EMC and dimensional stability determined.
 - Sensors: Kiln 1: T_{wood} 8/8 T_{air} 4/4, T_{Wet} 2/2, Fans ok
 - Sensors: Kiln 2: T_{wood} 6/8 (sensors 1 and 3 out) T_{air} 4/4, T_{Wet} 2/2, Fans ok
- **Control of charges.** The following charges were checked.
 - Kiln 1. Pine 22...25 mm 30.10 – 1.11.2017 (67h), Wood temperature $\geq 212^{\circ}\text{C}$ ~120 min, max 212°C , Thermo-D
 - Kiln 1. Pine 25 mm 23.11 – 26.11.2017 (65h), Wood temperature $\geq 212^{\circ}\text{C}$ ~125 min, max 213°C , Thermo-D
 - Kiln 2. Pine 32 mm 16.12 – 19.12.2017 (55h), Wood temperature $\geq 210...211^{\circ}\text{C}$ ~140 min, max 212°C , Thermo-D
 - Kiln 2. Pine 25 mm 6.12 – 8.12.2017 (46h), Wood temperature $\geq 211^{\circ}\text{C}$ ~135 min, max 213°C , Thermo-D
 - Kiln 2. Ash 25 mm 27.11 – 29.11.2017 (49h), Wood temperature $\geq 209^{\circ}\text{C}$ ~125 min, max 211°C , Thermo-D

Comment: The controlled charges are according to Thermowood requirements. High repeatability.

- **Moisture content.** Measured moisture of pine after treatment 5,0...6,0 %. Ash has a bit lower MC ~4%. Required MC 4 - 7 %.
- **Colour.** 10 randomly sampled pieces from each kiln (1 and 2) was measured. All the samples were from separate batches.
- **Results.**
 - Kiln 1. Dimensions 25...32 mm. Wood specie: pine (*Pinus sylvestris*)

	L^*	a^*	b^*
1	47,3	10,13	22,37
2	48,2	9,07	21,01
3	48,6	9,09	21,46
4	52,66	9,54	23,99
5	50,55	9,97	22,36
6	47,67	9,72	21,55
7	49,87	9,22	23,55

8	46,75	9,49	20,39
9	49,19	9,38	21,64
10	47,58	9,96	21,68
Mean	48,54	9,56	22,0

- Kiln 2. Dimensions 25...32 mm. Wood specie: pine (Pinus sylvestris)

	L*	a*	b*
1	50,39	9,95	22,69
2	47,99	9,74	21,33
3	49,24	9,86	21,07
4	50,98	9,58	22,55
5	49,48	8,78	21,14
6	50,28	10,49	22,25
7	48,13	9,34	19,98
8	49,10	10,45	23,5
9	50,52	9,09	22,47
10	52,16	11,14	23,99
Mean	49,83	9,84	22,10

Requirements (Thermo-D): **L* 45 – 55 (ref a* 8 - 10) b* 19 - 24**

Comment regarding results: High repeatability. According to measurements the difference between the charges and kilns are very small. All the colour values (L* and b* which are relevant with Thermo-D) are very well in the range of requirement. Internal quality control regarding colour measurement is not correlating with the values measured by the auditor. L* values are much darker and b* value shows too high (yellow). Light source D65/10° instead of D65/2° has been used which is probably explaining the difference.