

BRL 0601  
d.d. 05-04-2017

**ASSESSMENT DIRECTIVE  
FOR THE  
KOMO® PRODUCT CERTIFICATE  
FOR  
WOOD PRESERVATION**

Authorized by the Committee of Experts of SKH on 25-11-2016

Accepted by the KOMO Accepted by the KOMO commission of quality and verification of the  
KOMO foundation on 05-04-2017

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## **GENERAL INFORMATION CONCERNING THIS PUBLICATION**

This assessment directive was declared binding on 05-04-2017 by the certification body SKH, in accordance with the SKH Regulations for Certification, and shall, as from 21-08-2013 be used for the issuing of a KOMO® quality declaration for “Wood preservation”.

This completely revised Assessment directive replaces BRL 0601 “Wood preservation” dated 21-08-2013.

In case of arguments the Dutch version shall be consulted.

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If harmonized European technical specification are applicable to a building product, the assessments for the KOMO quality declaration based on this assessment directive can not replace the CE-marking on that building product and/or replace the mandatory performance declaration

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## 1. INTRODUCTION

### 1.1 General

The requirements laid down in this assessment directive are used by the certification bodies, recognised by the Council of Accreditation and in possession of an licence from KOMO, during the evaluation of an application for and/or the continuation of a KOMO® product certificate "Wood preservation".

Besides the requirements in this assessment directive, the certification bodies lay down, , supplementary requirements, as in general procedure requirements of certification and attestation in the general certification or attestation requirements of the body concerned.

The technical field of this assessment directive (AD) is E4: Wood preservation Technology with preservatives.

### 1.2 Subject

The present Assessment Directive concerns the preservation of timber in accordance with the methods under vacuum and pressure and immersion under atmospheric pressure.

### 1.3 Validation

KOMO® product certificate based on this assessment directive can be issued starting at the moment SKH officially acknowledge this assessment directive.

This assessment directives replaces BRL 0601 "wood preservation" d.d. 21-08-2013

Product certificates issues based on this directive will be invalid from 05-10-2017.

Certificates based upon Directive 0601 "Wood Preservation" d.d. 21-08-2013 can be issued until 01-05-2017.

### 1.4 Relation with European Construction Products Regulations (CPR, EU 305/2011)

Product which can be treated according to this directive may be subject to CE-marking according to one of the following harmonised standards. This does not imply that the result of the preservative treatment subject is to CE-marking:

NEN-EN 13986	Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking
NEN-EN 14080	Timber structures - Glued laminated timber and glued solid timber - Requirements
NEN-EN 14081-1	Timber structures - Strength graded structural timber with rectangular cross section - Part 1: General requirements
NEN-EN 14229	Structural timber - Wood poles for overhead lines
NEN-EN 14250	Timber structures - Product requirements for prefabricated structural members assembled with punched metal plate fasteners
NEN-EN 14279	Laminated Veneer Lumber (LVL) - Definitions, classification and specifications
NEN-EN 14374	Timber structures - Laminated veneer lumber (LVL) - Requirements
NEN-EN 14915	Solid wood panelling and cladding - Characteristics, evaluation of conformity and marking

### **1.5 Requirements regarding the research and test institutes and laboratories**

The reports presented by the applicant to fulfil the requirements regarding the assessment directive are met, should be issued by laboratories that work according to:

- NEN-EN-ISO/IEC 17020 for inspection bodies;
- NEN-EN-ISO/IEC 17021 for certificationbodies certifying systems;
- NEN-EN-ISO/IEC 17025 for Laboratories;
- NEN-EN-ISO/IEC 17065 for certification bodies certifying products.

An institute is expected to fulfil the criteria when a quality declaration can be presented issued by the Raad voor Accreditatie (RvA) or issued by a accreditation company recognized by the RvA in mutual recognition. If no certificate of accreditation can be presented the certifying body itself can verify if the accreditation criteria are met.

### **1.6 KOMO® product certificate**

Based on the KOMO-system that apply to this assessment directive, the following KOMO® product certificate can be issued:

- KOMO® product certificate “Method Vacuum-Pressure” and/or KOMO® product certificate “Method Immersion”, for private requirements.

On the KOMO-website ([www.komo.nl](http://www.komo.nl)) the model KOMO® product certificates can be found applicable to the assessment directive. The product certificates issued should match this model.

## 2. DEFINITIONS

Applicant	The executive company, the timber treater as applicant of the KOMO® product certificate.
Producer	The executive company, the timber treater as holder of the KOMO® product certificate.
Wood preservation	The treatment of timber against biological attacks with a wood preservative by means of the method of vacuum/pressure or the immersion method.
Wood preservative	A preventive acting product against timber decaying fungi and/or timber attacking insects allowed in accordance with the Biocide Product Directive, in order to extend the life span of timber.
Working stock	Quantity of ready-to-use impregnation liquid that is contained in the wood preservation system (this is the total of all possible compartments, such as mixing drum and storage drum), in accordance with the directions for use of the supplier of the preservative.
Autoclave, cylinder or vessel	The compartment of a vacuum and pressure installation in which the timber is impregnated.
Immersion tank	The compartment of the installation in which the timber is immersed.
To refusal	In case the prescribed quantity of preservative has not been absorbed when applying the full-cell process, the treatment can be terminated after pressing at least 2 hours.

### 3. PROCEDURE FOR OBTAINING THE KOMO® PRODUCT CERTIFICATE

Before the (voluntary) certification agreement is concluded and the product certificate is issued, there will be an initial inspection. In case the applicant has multiple production locations, the Production location involved has to be assigned.

Start

The applicant of the product certificate indicates according to which technical specification the preservative treated wood is produced. The applicant also indicates which applications and which statements are to be included in the declaration. Documents substantiating these statements are presented.

#### 3.1 Initial Inspection

To obtain the a KOMO® product certificate the certifying body starts an initial inspection, including the following:

- examination of the documents presented by the applicant to evaluate the compliance to the requirements of this assessment directive;
- determination of the supplementary product specifications;
- assessment of the processing instructions (user instructions);

The certification body will control the claimed requirements according to this assessment directive.

#### 3.2 Assessment of the applicant's quality system

In order to obtain the a KOMO® product certificate the certifying body starts an initial inspection of the quality system of the applicant:

- Assessment of the production process
- Assessment of the Internal Quality System of the applicant

1. Assessment of the presence and performance of all other required procedures.

The certification body examines whether the (internal) quality system of the applicant is in accordance with chapter 10 of this assessment directive.

#### 3.3 Issuing the KOMO® product certificate

The results of the initial inspection for the KOMO® quality declaration are reported and presented to the decider maker. The decider evaluates the results and decides whether a KOMO® product certificate can be issued or supplementary data or tests are required before a KOMO® product certificate have to be provided.

By issuing the product certificate the certification body declares that:

- The internal quality system of the certificate holder:
  - o Complies to the requirements as mentioned in this assessment directive;
  - o Is controlled by an independent third party on a regular basis;
- The certified product specifications comply to the requirements of this assessment directive.

#### 3.4 External quality control

Once the KOMO® product certificate has been issued, the certification body carries out controls as described in chapter 14.

#### 3.5 Validity of the KOMO® product certificate

The validity of the KOMO® product certificate is unlimited. The validity can be limited (terminated) by:

- Alterations of this assessment directive;
- Failure to comply with the commitments of this assessment directive

Valid certificates are listed on the website of KOMO ([www.KOMO.nl](http://www.KOMO.nl)).

In case of failure to comply with the commitments of this assessment directive the certification body can suspend the validity temporarily. A suspension can be in the first place of a maximum of 1 year. The certification body can extend the suspension with a total not more than 2 years.



In case of ending a suspension, the certifying body must be informed that production is again started. The certification body can then decide to end the suspension.  
When the suspension period exceeds 1 year there must be a mandatory inspection control whether the certificate can be revalidated.

When the duration of the suspension exceed the total of 2 years, the certification body must end the certificate.

#### 4. QUALITY REQUIREMENTS

Quality requirements deviate from additional requirements owing to the fact that they are established in a different way.

The following standards apply as quality requirements for the **production process** insofar as there are no explicit exceptions or deviations made in this assessment:

NEN 2909	Timber preservation. Immersion method.
NEN 2913	Timber preservation - Vacuum and pressure method - Treatment with creosote-oil - Requirements with regard to the application of the timber;
NEN 2930	Timber preservation - Vacuum and pressure treatment method – Treatment with preservatives other than creosote oil;
NEN-EN 212	Timber preservatives – Guide to sampling and preparation of wood preservatives and treated timber for analysis;
NEN-EN 350-2	Durability of wood and wood-based products - Natural durability of solid wood - Part 2: Guide to natural durability and treatability of selected wood species of importance in Europe;
NEN-EN 335	Durability of wood and wood-based products - Use classes: definitions, application to solid wood and wood-based products;
NEN-EN 351-1	Durability of wood and wood-based products - Preservative-treated solid wood – Part 1: Classification of preservative penetration and retention;
NEN-EN 351-2	Durability of wood and wood-based products - Preservative-treated solid wood. Part 2: Sampling and analysis of preservative-treated wood;
NEN-EN 1014-1	Wood preservatives - Creosote and creosoted timber - Methods of sampling and analysis - Part 1: Procedure for sampling creosote
NEN-EN 1014-2	Wood preservatives - Creosote and creosoted timber - Methods of sampling and analysis - Part 2: Procedure for obtaining a sample of creosote from creosoted timber for subsequent analysis
NEN-EN 1014-3	Wood preservatives - Creosote and creosoted timber - Methods of sampling and analysis - Part 3: Determination of the benzo(a)pyrene content of creosote
NEN-EN 1014-4	Wood preservatives - Creosote and creosoted timber - Methods of sampling and analysis - Part 4: Determination of the water-extractable phenols content of creosote

## **5. ADDITIONAL REQUIREMENTS**

### **5.1 Requirements for raw materials**

#### **5.1.1 Timber**

- The timber to be treated shall be free from:
  - paint and other types of finishes, which could influence the treatment in a negative way;
  - the timber to be treated shall be free from substances, which could influence the treatment in a negative way or could lead to the release of unwanted emissions to the air, the soil or the water during the production or waste phase, the users phase or the waste phase;
  - saw and planing leftovers to prevent an undesired flowing of waste (sludge etc.);
  - frost, dirt, ice, snow etc.;
  - visible attack by fungi or other micro-organisms influencing the treating process. Blue stain, however, is allowed up to a maximum of 5% of the timber surface;
  - round wood shall be free from bark and cambium (round wood peeled according to NEN 5492);
- The average moisture content of the timber to be treated shall be below 30%. For sawn spruce applies that the average shall be lower than 35%. For the determination of the moisture (according to NEN 5461) the wettest place in the timber and measured in the middle of the parcel shall be the determining factor. Quality level AQL10 according to NEN 5461, shall be used as criterion of approval;
- Planed and sawn timber shall be put on stickers in order to promote the accessibility of the preservative and, if a process of accelerated fixation follows, to guarantee the heat transmission on the timber surface. Stickers shall be of equal thickness. Timber species and treatment of the stickers shall preferably be in agreement with the timber to be treated and the preservative;
- Stickers and packaging material should fulfil the same requirements as the timber to be treated;
- Timber in which case the outlining is undesirable (as e.g. in façade covering) may be stickered per two layers (with the faces towards each other);
- Processing to the timber shall all be completed before treatment is started. If it is unavoidable that processing will be done after treatment of the timber, the processed part shall receive an after treatment with a preservative permitted for the application;
- In one charge only timber of equivalent treatability and the same moisture content shall be treated. Table 1 lists the most commonly used timber species. For the timber species not listed see NEN-EN 350-2. Round wood and sawn timber should not be mixed. These requirements do not apply in case of vacuum/pressure treatment 'to refusal'.

**Table 1:** Treat ability of some softwood species considered for treatment

Timber species	Botanical name	Degree of impregnation <sup>1)</sup>	
		Heartwood	Sapwood
Fir	<i>Abies alba</i>	moderate	easy/moderate
Pine	<i>Pinus spp.</i>	difficult	easy
Hemlock (western)	<i>Tsuga heterophylla</i>	moderate/difficult	easy
Larch, European	<i>Larix decidua</i>	difficult/very difficult	easy
Oregon pine/Douglas	<i>Pseudotsuga menziesii</i>	difficult/very difficult	moderate/difficult
Spruce	<i>Picea spp.</i>	difficult	difficult

1) for the meaning of easy, moderate, difficult and very difficult" consult NEN-EN 350-2.

## 5.1.2 Wood preservative

### 5.1.2.1 Preservatives allowed

For the purposes of the treatment of timber the holder of a KOMO® product certificate is only allowed to apply wood preservatives for which a Suitability Declaration Wood preservatives has been issued by an authorized certification body (SKH Publication 06-04 "Basis of assessment for Wood Preservatives") For an overview see the website of the relevant certification body. In addition a Material Safety Data Sheet of a approved preservative shall be available at the company.

The producer shall apply the preservative in accordance with the provisions in the national authorisation approval, the Suitability Declaration Wood preservatives and supplementary regulations of the supplier.

### 5.1.2.2 Composition of Preservatives

The composition of the working stock of the wood preservative should be at least 2x per annum on the amount of the active ingredients (so-called chemical balance) according to the method appropriate to the Suitability Declaration Wood preservatives. This analysis may be carried out by the supplier of the preservatives. In case of disturbance of the chemical balance, the frequency of the controls can be increased by the certification body.

The certification body has the right to have a control at least 1x per year on the amount of the active ingredients in accordance with the method of analysis contained in the Suitability Declaration Wood preservatives at an independent, accredited analysis laboratory. An identical sample is always stored for the purposes of a second opinion. The control sample is analysed on all active ingredients. The results must correspond to the composition set out in the authorisation approval and in the Suitability Declaration Wood preservatives, with the relevant maximum permissible deviations.

### 5.1.2.3 Concentration control

The concentration of the working stock shall be determined and registered daily and during each addition of preservative. This measurement takes place by means of the method as laid down in the instruction supplied by the supplier of the preservative. The concentration of the working stock shall, if required, be brought to the prescribed concentration. When an installation has been equipped with separate compartments for the storage of the working stock the concentration in each compartment of the preservative shall be determined and registered.

The concentration of the work stock shall be tuned to the required retention in combination with the number of litres that can be taken up by the timber to be treated.  
The temperature of the work stock should be at least 5 °C.

## 5.2 Requirements for factory equipment of the producer

In order to qualify for a quality declaration an applicant must have industrial operating equipment complying with the following requirements.

- If an environmental permit has been issued to the certificate holder, it is assumed that the requirements laid down have been complied with;
- If an environmental permit has not been issued, the requirements may be supported with technical specifications and certification reports of the relevant equipment or may be ascertained during the initial inspection (measurements, markings, visual inspection).

See also paragraphs 5.3, 5.4, 5.5 and 5.6.

### 5.2.1 Installation: general

- A mixing system suitable to bring the wood preservative to the correct concentration;
- Provisions for the measuring of the consumption of the quantity of wood preservative per treatment. Indirect (subsequent) demonstration is permitted where a close relationship is shown between process parameters and the demanded retention and penetration (i.e. pressure period with uptake determined afterwards);
- The installation material (including the storage vessel, pipes, pumps etc.) shall be such that the composition (and effect) of the preservative is not negatively influenced or contaminated. Pipes shall be installed above ground, may not be fixed to drinking water pipes and the mixing system and may not be conducted through liquid-tight facilities;
- Liquid-tight vessels and floors should be resistant to the effect of the preservative and shall have a free capacity of at least 110% of the maximum quantity of preservative or condensate being processed respectively be in storage;
- The construction of the vessel must be strong enough in order to offer resistance to the liquid pressure resulting in liquid leakage.

### 5.2.2 Installation: vacuum pressure

- The autoclave loaded with timber must be capable of maintaining an air pressure ranging from 20 kPa to the required pressure (technical specifications, certification reports);
- The storage reservoir must have sufficient capacity to be able to fill the autoclave completely (technical specifications);
- Vacuum and pressure pumps, capable to realize the required air and liquid pressure in the treating autoclave (technical specifications);
- A manometer to read the air and liquid pressure in the treatment autoclave with an accuracy of not more than 10 kPa (technical specifications);
- Recording and registration equipment by which the complete cycle of the process shall be registered legible and the actual status of the process, can be read off;
- The vacuum/pressure installation with accessories (including the storage and mixing vessels) must be installed in or above a liquid-tight vessel (visual inspection);
- The vacuum pump and pressure-release pipes must be equipped with a water lock or equivalent device (visual inspection).

### 5.2.3 The installation: immersion

- The immersion installation shall have sufficient dimensions to be able to fully submerge the timber to be treated and shall have a facility to prevent the floating of the timber to be treated (technical specifications);
- The draining system has been constructed in such a way that the leaking fluid returns to the reservoir with working fluid (visual inspection);

- The floor under the immersion installation and the place where the timber drains shall be fluid-tight and shall be constructed in such a way that the fluid collected can be re-used in the process (visual inspection);
- The installation with accessories shall be positioned in or above a fluid tight tank.

### 5.3 Storage and mixing of preservative

- A reservoir shall be provided with an efficient ventilation and a high level security to prevent that no more than 95% of the maximum contents is filled. Each reservoir shall have a reliable and safe sampling point (visual inspection);
- Each connection to a reservoir below the highest fluid level shall have a metal seal as near as possible to the wall of the reservoir. This seal shall be executed in such a way that it is clearly visible whether the seal is open or close.

See also paragraph 5.2.

#### 5.3.1 Storage of cresote oil

- The heating by which the contents of a tank can be heated shall be set up in such a way that the temperature of the fluid in the tank shall not come above the starting boiling point of the hydrocarbon fractions, determined according to the ASTM, method D-86 (technical specifications).
- The tank shall be provided with at least a thermometer directly installed on the tank indicating the temperature of the contents. In case of more than one meter these shall measure independently from each other (visual inspection). Nauwkeurigheid  $\pm 2$  °C, 1x per 10 jaar te kalibreren. Tanks in which shall be worked under pressure shall be provided with pressure-vacuum valves which are assembled above the highest fluid level (to be determined by visual inspection); These pressure-vacuum valves shall be constructed in such a way that raining in is prevented (to be determined by visual inspection);
- The valves shall be installed in such a way that freezing respectively caking or crystal forming, is not possible. They shall, under all circumstances, function fluently and without sparks (technical specifications);
- The pressure-vacuum valves may only open, when the over- and under pressure determined for the tank, are exceeded. All other openings that are situated on the roof shall, except for measurements and maintenance, always be closed;
- Vapours emitting from the storage tank shall, before being transported to the outside air be guided, via an efficient condenser or another efficient provision, in order to limit as the emission of creosote fractions as much as possible (to be determined by visual inspection).

#### 5.3.2 Storage in packaging:

The storage of preservatives in packaging shall take place in a storage site according to the guidelines of the Committee Prevention of Calamities by Dangerous substances, PGS15 'Storage of hazardous substances in packaging, storage of fluids and solid substances'.

### 5.4 The deceleration track

See also paragraph 5.2.

The deceleration track of the vacuum/pressure installations shall be placed on a fluid-tight floor. The floor shall be situated on sufficient fall, shall be kept clean and draining to the catching tanks under the installation or elsewhere and shall have a connection that is fluid resistant (to be determined by visual inspection or certification documents).

Conformity can be reached by means of a (local) government accepted regulation or direction concerning environmental laws. When no (local) law is available CUR/PBV 44 (4<sup>th</sup> reviewed issue) or according to assessment BRL SIKB 7700 can be used.

## 5.5 The after-treatment

To comply with the requirements, see also 5.2

- An after-treatment installation shall be positioned in, or in the direct area of the room or the building where the treating installation has been situated. The area where the impregnated timber is transported from the treating installation to the after-treatment installation shall be asphalted fluid-tight. For the transport of dry, drip free timber normal asphaltting is enough. Precipitation and draining fluid shall be returned to a storage in order to be re-used in the process;
- The after-treatment installation shall be situated in a fluid-tight tank;
- The fluid being released during the after-treatment shall be received and be returned to a storage reservoir for the preservative or to another storage tank destined for the storage of the free coming fluid, or shall have to be cleaned;
- Both in case of natural fixation under cover (or otherwise protected from precipitation) and fixation in conditioned rooms, the impregnated timber shall be placed on a liquid-tight floor. Precipitation and drained liquid shall be re-directed to a storage reservoir in order to be re-used in the process.

## 6. VOLUME- AND SURFACE AREA CALCULATION

A Correct calculation of the volume shall take place on behalf of the production process.

### 6.1 Roundwood

The calculation of the volume of round wood on behalf of the treating process shall be based on the following formulae.

For cylindrical milled round wood:

$$V = 1/4 \times \pi \times d^2 \times l \times n$$

legend

V = volume in m<sup>3</sup>  
d = diameter in m<sup>1</sup>  
l = length in m<sup>1</sup>  
n = number of pieces

For peeled round wood:

$$V = 1/12 \times \pi (D^2 + D \times d + d^2) \times l \times n$$

legend:

V = volume in m<sup>3</sup>  
D = diameter in m<sup>1</sup> at 10 cm from the thickest end  
d = diameter in m<sup>1</sup> at 10 from the thinnest end  
L = length in m<sup>1</sup>  
n = number of pieces

V can also be determined by means of tables for measuring the cubic contents, as referred to in appendix 1. In case of half round wood the volume is divided by 2.

### 6.2 Sawn, planed and profiled timber

The calculation of volume of sawn, planed and profiled timber on behalf of the treating process takes place on the basis of length x width x thickness, taking into consideration possible planed respectively profiled timber.

The calculation of the surface takes place on the basis of:

$$(2 \times \text{length} \times \text{width}) + (2 \times \text{length} \times \text{thickness}) + (2 \times \text{thickness} \times \text{width}).$$



## 7. CALCULATION OF RETENTION

The retention to be realised shall be in accordance with the Suitability Declaration Wood preservatives.

### 7.1 Retention in kg/m<sup>3</sup>

The definition of retention is the quantity of preservative left behind in the timber per charge. In the case of the vacuum and pressure method this quantity consists of the 'initial uptake' when the autoclave is filled with the preservatives, litres pumped away during the pressing period and litres flowed back during and after the final vacuum. It is therefore incomplete to estimate the usage by means of the quantity of litres pressed away.

The registration of the usage shall be based on the difference in volume or weight of the work stock before and direct after impregnation and/or the difference in weight of the timber direct before and direct after the impregnation process.

The calculation of the retention, expressed in kg/m<sup>3</sup>, is executed using the following formula:

$$R = \frac{(V_0 - V_e) * C}{V_H * 100} \quad \text{or} \quad R = \frac{(m_{na} - m_{voor}) * 1/d * C}{V_H * 100}$$

legend:

$V_0$  = volume of original stock of working fluid (l)  
 $M_{after}$  = mass of the timber after treatment (kg)  
 $V_e$  = volume of the end stock of working fluid (l)  
 $m_{voor}$  = mass of the timber before treatment (kg)  
 $C$  = concentration of the solution (%)  
 $d$  = volumetric mass of the treatment liquid (kg/l)  
 $V_H$  = volume of the timber to be treated (m<sup>3</sup> hout)  
 $R$  = retention in kg/m<sup>3</sup>

### 7.2 Retention in g/m<sup>2</sup>

The calculation of the retention expressed in g/m<sup>2</sup> (immersed timber) take place as follows:

$$R = \frac{(V_0 - V_e) * C}{O * 100}$$

legend:

$V_0$  = olume initial stock of treatment liquid (l)  
 $V_e$  = volume end stock of treatment liquid (l)  
 $O$  = surface area of the timber treated (m<sup>2</sup>)  $(2(l * b) + 2(l * d) + 2(d * b)) * N$   
 $C$  = concentration in %  
 $R$  = retention in g/m<sup>2</sup>

### 7.3 Retention and Suitability Declaration Tmber Preservatives

Conversion of the critical value included in the Ordinance of Approval in the penetration zone to the retention per m<sup>3</sup> of total timber volume is calculated by the following formula::

$$E = \frac{((A - B) * kw)}{A}$$

legend:

$E$  = retention in kg/m<sup>3</sup>  
 $A$  = total volume of timber of the charge  
 $B$  = volume of the zone **not** to be penetrated of the charge  
 $Kw$  = critical value

### 7.3.1 Sawn timber

Volume of the total charge (A):

$$A = (d * b * l * N)$$

Volume calculation of the **not** to be penetrated zone (B):

$$B = ((d - 2p) * (b - 2p) * (l - 2a) * N)$$

waarbij

d = dikte in m<sup>1</sup>

### 7.3.2 Cylindrically milled round wood:

Volume calculation of the total charge (A):

$$A = (1/4 * \pi * d^2 * l * N)$$

Volumeberekening van de **niet** in te dringen zone (B):

$$B = (1/4 * \pi * (d - 2 * p)^2 * (l - 2 * a) * N)$$

waarbij

d = diameter in m<sup>1</sup>

### 7.3.3 Debarked round wood:

Volume calculation total charge (A):

$$A = (1/12 * \pi * (D^2 + D * d + d^2) * l * N)$$

Volume calculation of the zone **not** to be penetrated (B):

$$B = ((1/12 * \pi * ((D-2*p)^2 + ((D-2*p)*(d-2*p)) + (d-2*p)^2) * (l-2 * a) * N)$$

where:

D = diameter in m<sup>1</sup> at 10 cm from the thicker end

d = diameter in m<sup>1</sup> at 10 cm from the thinner end

Other abbreviations:

b = width in m<sup>1</sup>

l = length in m<sup>1</sup>

N = number of items

p = the penetration zone to be analysed appropriate to the NP class selected (laterally) (in m<sup>1</sup>)

a = the penetration zone to be analysed appropriate to the NP class chosen at the top end (in m<sup>1</sup>)

E = retention in kg/m<sup>3</sup>

kw = critical value in in kg/m<sup>3</sup> as shown in the authorisation order for the relevant use class

## 8. METHODS OF TREATMENT

### 8.1 General for vacuum/pressure and immersion treatment

- The procedures to be applied for the impregnation of timber in the relevant installations shall be laid down in a procedure book being present in the layout. In the procedure book at least the following actions shall be carried out and also which pressure and time at which point of time shall be recorded. The procedure book shall be in the vicinity of the impregnation installation;
- Nearby the installation a process register shall be available in which each charge of impregnated timber has been registered under which circumstances the impregnation process has taken place, the time thereof and whether a certain form of after-treatment has taken place.

### 8.2 Vacuum pressure impregnating

- The autoclave shall be closed after the timber has been placed in the autoclave. The registration apparatus shall be made ready and started as soon as a start has been made with the treatment. The timber shall whether or not be subjected to an initial vacuum. Subsequently the wood preservative is admitted to the autoclave until fully filled and all the timber is completely submerged under the preservative. After that a fluid pressure is built-up in the autoclave under admission of preservative by which the wood preservative is pressed into the timber. During the pressing phase the autoclave stays also fully filled with preservative. Subsequently the pressure is discontinued and follows an after-vacuum after removal of the wood preservative. At the end of each charge the quantity of preservative taken up is registered;
- After the final vacuum provisions or procedures shall be guaranteed in such a way that human beings will not be exposed to the preservative in the form of mist (keep a rest period of 30 minutes before opening the installation);
- In order to obtain an effective, clean fixation it is necessary to place the timber on a slope in the treating vessel. The treated timber shall in each case be sufficiently leaked out before fixation. This slope shall be at least 4 °.

#### 8.2.1 Pressing 'to refusal'

In case of pressing to refusal a full treatment shall always be applied. The following scheme shall be kept.

- *Initial vacuum period*  
Reduce the pressure in the treatment autoclave to an absolute air pressure not exceeding 20 kPa and keep this pressure reducing during at least 15 minutes. Fill the autoclave after this with the wood preservative maintaining the reducing of the pressure.
- *Pressing period*  
Increase the pressure on the wood preservative up to at least 900 kPa. When the prescribed quantity of preservative has not been absorbed when applying the full-cell process, the treatment can be terminated after pressing for at least 2 hours. This shall explicitly be reported on the treating form. Remove the wood preservative from the autoclave after pressing.
- *Final vacuum period*  
In order to let the surface of the timber dry quicker the timber shall once more be subjected to a vacuum at the end of the process. Decrease thereto the air pressure again to an absolute pressure not higher than 20 kPa and keep the air pressure decrease for at least 15 minutes.

### 8.3 Immersion

- When using the immersion method the timber to be treated shall be completely immersed in a preservative during the time prescribed by the supplier, being independent of the timber species, the preservative to be applied, the application purpose and the retention required. The immersion method shall be considered when it is indicated explicitly in the Ordinance of approval that this method may be used;
- Let the treated timber, after pulling it up and down at least once, drop in the immersion installation filled with the work fluid or admit the work fluid in the reservoir in which the timber has been stacked, in such a way that the timber is fully immersed and that no air bubbles are present in the timber parcel. Secure the timber against floating;
- Let the timber completely immersed during the time required to obtain the required result and pump subsequently the preservative out of the reservoir or take the timber out of the immersion installation;
- Let the timber drain for at least 20 minutes under a slope of at least 4 ° in such a way that the timber can be transported dripping-free over the hardened working site. Determine the retention realised;
- Determine the retention realised.

## **9. AFTER -TREATMENT**

After applying the wood preservatives mixed with water a process shall be followed in which the components of the preservative applied can be fixed to the timber (= fixation) before the timber can be released for sale and/or application.

Beside natural fixation, where the period of time is dependent on temperature and type of preservative, there are also accelerated fixation methods.

An accepted method of accelerated fixation is the heating of the impregnated timber under climatic conditions determined beforehand by means of the bringing in of saturated steam. In particular the timber temperature and the time of heating determine the extent of fixation.

There shall be an automatic registration of the temperature and the time.

Other methods for accelerated fixation are also accepted in case they are included in the Suitability Declaration Wood preservatives and it is demonstrated that the degree of fixation is achieved with the method used is sufficient.

## 10. REQUIREMENTS FOR THE FINISHED PRODUCT

### 10.1 Depth of penetration

The control on the required penetration take place by means of (drill) cores or on saw faces of components sampled from the consignment treated. The requirements in respect of the penetration have been included in the tables 4 and 5.

The requirement for penetration refers to the lateral penetration of the sapwood but also includes the heartwood where heartwood and sapwood cannot be distinguished from each other by eye.

**Tabel 2:** Classes of penetration (NP = New Penetration class)

Penetration classes according to NEN-EN 351-1	Zone to be analysed for retention	Penetration required	
		Timber species difficult to impregnate	Timber species easy to impregnate
NP1	3 mm	none	none
NP2	3 mm lat.	≥ 3 mm lat.	≥ 3 mm lat.
NP3	6 mm lat.	≥ 6 mm lat.	≥ 6 mm lat.
NP4*	25 mm lat.	≥ 25 mm lat.	--
NP5	Complete sapwood	--	Complete sapwood.
NP6	Complete sapwood	--	Complete sapwood + ≥6 mm heartwood on the outside

lat. = lateral (sideways)

\*) NP4 applies only to round wood (specifically. telephone poles).

**Tabel 3:** Required penetration by hazard class

Use class (NEN-EN 335-1)	Timber species difficult to impregnate	Timber species easy to impregnate
1	NP1	NP1
2	NP1	NP2
3	NP1	NP5
4	NP2	NP5
5	--	NP6

The requirements included in these tables apply unless general accepted deviating product specifications are used for certain well-defined products on the basis of European or national standards.

#### *Tolerance*

- It is sometimes not possible to treat the intermediate zone (between sapwood and heartwood). That can be ignored when assessing the depth of penetration. This untreated zone cannot be more than 2 annual rings away from the heartwood.
- The assessment of the depth of penetration shall take place after completion of the after-treatment.
- The penetration shall be determined by means of a sampling (NEN-EN 351-2).
- The following maximum deviations, expressed as a percentage of units of the consignment (poles, boards) that not comply with the penetration requirements, are allowed:  
10% for timber species easy to be penetrated.  
25% for timber species difficult to be penetrated.
- The penetration shall be assessed weekly in 5 boards or poles of a charge taken at random. Charges being treated to refusal are not considered for this sampling.

Direct testing of samples on penetration may be impractical during normal operating circumstances (third party impregnation).

Indirect demonstration is permitted if a direct relationship between penetration and retention is determined (to be assessed by the certifying body) and the process parameters of the preservation process.

The accuracy of this relationship must be determined at least 2x per year. This analysis may be carried out by the supplier of the wood preservatives. The certifying body can increase the testing frequency if an adequate relationship is not shown.

The certifying body has the right to perform a control on the penetration at least 1x per year at an independent accredited analysis laboratory.

Samples shall be taken from straight pieces of timber without splits or defects and at least 10 cm from knots. The assessment must be done in the middle of the test sample (plank, beam) and at least 50 cm from the end.

The assessment shall be carried out both with an increment borer or on the end grain of the sample according to NEN-EN 351-2.

If there is no clear difference between heartwood and sapwood a colouring test liquid can be used.

The assessment of the depth of penetration by the active ingredient will be done visually by means of the method prescribed by the supplier.

## **10.2 Retention**

### **10.2.1 Vacuum Pressure impregnation**

Retention is determined after every treatment cycle (charge).

The retention determined after the impregnation process, according to chapter 7, may not be lower than the retention required as prescribed in the Ordinance of Approval.

Considering the normally occurring variation in impregnability a tolerance, measured over a complete charge, on the prescribed net retention of – 10% is allowed.

When the retention realised is lower, the consignment shall be subject once again (when required more than once) to a treatment until the retention prescribed has been realised, unless a full treatment to refusal has taken place using the vacuum pressure method (minimum pressure time of 120 minutes).

Random sampling is used to determine retention by chemical analysis based on the samples taken for the penetration depth. The retention is determined at least 2x per year. This analysis may be carried out by the supplier of the preservatives. The certifying body has the right to perform a control on the retention at least 1x per year at an accredited analysis laboratory. The chemical analysis is carried out in accordance with the assessment method(s) included in the Suitability Declaration Wood preservatives.

### **10.2.2 Immersion**

Retention by immersion is determined after every time the stock of treatment liquid is completed to full stock again. Calculation has to be done over the lot of immersion cycles done with the completion of the working stock.

The retention determined after the immersion process, according to chapter 7, may not be lower than the retention required as prescribed in the Ordinance of Approval.

Considering the normally occurring variation in impregnability a tolerance, measured over a complete charge, on the prescribed net retention of – 10% is allowed.

When the retention realised is lower, the consignment shall be subject once again (when required more than once) to a treatment until the retention prescribed has been realised.

Random sampling is used to determine retention by chemical analysis based on the samples taken for the penetration depth. The retention is determined at least 2x per year. This analysis may be carried out by the supplier of the preservatives. The certifying body has the right to perform a control on the retention at least 1x per year at an accredited analysis laboratory. The chemical analysis is carried out in accordance with the assessment method(s) included in the Suitability Declaration Wood preservatives.

### **10.3 Fixation**

Before the treated timber may leave the process area it shall be demonstrated that a sufficient degree of fixation has been reached. In this connection the process area is the demarcated area where all actions take place that have an adequately fixated timber as end result.

Treated timber may only be moved from the treatment/process area when the requirements for fixation according the Declaration of Suitability has been achieved.

When there is no method mentioned in the local national approval (wich is mentioned in the Declaration of Suitability), the In-Company test according to BGS 06-04 has to be performed to prove the degree of fixation.



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## 11. REQUIREMENTS REGARDING THE QUALITY SYSTEM

### 11.1 General

Requirements have been formulated in the following sections to which the quality system of the producer shall comply to.

### 11.2 Responsibility

The owner of the certificate will be always responsible for the quality of the fabrication process, the internal quality control and the quality of the product. The internal quality control has to comply with the requirements in this chapter. The certificate owner shall maintain a quality scheme with at least the requirements as described

#### *Initial inspection*

The certification body will control:

- The compliance of the quality scheme with the requirements of this assessment directive;
- The competence of the personnel involved;
- Whether the quality control scheme is implemented correctly.

#### *KOMO® product certificate*

The product certificate to be issued will mention that the internal quality system of the company is controlled periodically and therefore:

- The internal quality control scheme complies with the requirements;
- The certificate holder is able to assure the compliance of his product;
- The product meets the technical requirements.

### 11.3 Quality System Manager

Within the company, an official must be appointed who is responsible for maintaining the Internal Quality Control Scheme. This will be the contact person for the certification body.

### 11.4 Quality System

#### 11.4.1 Document Control

The written procedures for inspection and testing shall be assessed and approved for suitability and effectiveness by authorised persons within the company before distribution. Document control must ensure that only valid documents are available for inspection and testing. The documents shall be in Dutch, in English or German.

#### 11.4.2 Inspection and testing

##### 11.4.2.1 Internal Quality Control

The producer shall keep an Internal Quality Control Scheme. At least the following aspects and procedures should be included in writing:

- Inspection of incoming raw materials;
- Work instructions;
- Control of the production process;
- Control of the finished product (retention);
- Control of the finished product (storage, maintaining product characteristics);
- Control of measuring equipment;
- Result of calibration measurement of working liquid concentration (4.7);
- Recording of complaints.

#### *Non-conformity products*

Products or parts of products that during the production process do not comply with the requirements shall be set to aside and clearly marked. If necessary preventive and corrective measures shall be taken.

#### 11.4.2.2 Registration

A registration shall be kept of the inspections and tests described in the Internal Quality Control Scheme. Registered data need to be kept for a period of at least 10 years.

The manufacturer should have an appropriate and accessible registration of the inspections and tests carried out and keep these up to date in order to be able to show that the requirements have been complied with. Where necessary statistical methods shall be applied to the test results.

#### 11.4.2.3 Calibration

Measuring and testing equipment shall be calibrated at least once a year. A registration shall be kept of this calibration.

#### 11.4.2.4 Supplies

The timber to be treated shall be controlled upon receipt in accordance with the requirements mentioned in section 5.1.1. The results of this raw material inspection shall be registered.

The preservative shall be controlled every delivery on:

- quantity/number of units of the preservative supplied;
- the type of preservative supplied. This control consists of a check of the accompanying transport documents, the analysis report, as well as the labelling on the packaging units.

Clear recordings shall be kept of the type and quantity of the preservative delivered and the use thereof shall be present on behalf of the control by the certifying body.

#### 11.4.2.5 Laboratory

For the execution of the tests as indicated in the instructions of the supplier (fixation, penetration, retention) the company shall dispose of the prescribed test equipment and test apparatus and a room in which the test can be executed.

An external laboratory shall be accredited by the Council for Accreditation based on NEN-EN-ISO/IEC 17025.

#### 11.4.2.6 Non-conformity Products

Products or parts of products that during the production process do not comply with the requirements shall be set aside and clearly marked.

In case of an accidental shortcoming, it is sufficient to perform a correction on the production (disposal of the products or re-treatment).

In case of a structural shortcoming, restart of production can only begin after implementation of corrective measures and after re-control by the Certified Body.

#### 11.4.2.7 Storage of impregnated and fixated timber

- In case the storage of impregnated and fixated timber takes place in the open air, the relevant part of the site shall be laid hardened and on a slope to drainage points or drainage pipes being connected with a suitable drainage system.
- The asphaltting shall be well maintained

#### 11.4.2.8 Requirements controlling raw material control

The KOMO® product certificate holder shall have of the following:

- An electric moisture meter for the determination of the moisture content in accordance with NEN 5461. The moisture meter shall be adjustable for the timber species and timber temperature.
- Tape measure for the determination of the width, thickness and length of sawn timber and the circumference of round wood.
- Fit for the determination of the diameter of round wood according to NEN 5492.

- Equipment for determining the strength of the work fluid of the preservative, such as for example an areometer/thermometer combination, a refractometer or equipment for titration, or the requisites respectively computer software as described in the prescription by the supplier of the preservative used. In the case of automatic concentration determination of the strength, this should be calibrated at least 1 x per week with a measurement executed with calibrated equipment.

#### 11.4.2.9 Requirements for checking the end-product

Depending on the wood preservative and the requirements with respect to penetration depth, the holder of the KOMO® product certificate holders should possess:

- An increment borer with an internal diameter of at least 4 mm for determining the penetration depth;
- Product-specific reagent for determining the penetration depth (depending on the type of preservative and only when this is available);
- Software or procedures in order that guarantee that the required retention(s) is/are achieved (to be determined during initial inspection);
- The procedure supplied by the supplier of the preservative in order to demonstrate adequate fixation of the preservative in the end-product.

#### 11.5 Data to be registered by the producer

The producer shall at least record the following of each charge:

- Date and charge number;
- Timber species;
- Specification of the consignment (moisture content, dimensions, volume of timber or surface area of timber);
- Results of control of raw materials (section 5.1.1);
- Use class (in accordance NEN-EN 335-1 Table 4);
- Name of preservative (*number of approval by CTGB*);
- Net retention in kg/m<sup>3</sup> (for vacuum and pressure treated timber) respectively in g/m<sup>2</sup> for immersed timber) as derivative of concentration and consumption of work fluid;
- Method of treatment;
- Course of process (course of pressure over a period of time or time of immersion, temperature) including calculation of the retention according to chapters 6 and 7:
  - Vacuum pressure impregnation: every treatment cycle (charge);
  - Immersion: every completion of the stock of treatment liquid;
- Method and course of process of the after-treatment per charge;
- Results of control of depth of penetration in case of vacuum/pressure treated timber.

#### 11.5.1 Handling of complaints

The producer (holder of the product certificate) shall maintain a registration of complaints and that complaints are properly dealt with, related to the treated product referred to in the product certificate and the application thereof.

For every complaint there shall be indicated how the complaint was analysed and dealt with and where necessary taken corrective measures.

## 12. MARKING

The treated timber supplied with the KOMO® productcertificate shall be marked per bundle or per packaging unit with:

1. The application of the KOMO®-mark or logo with minimal dimensions of 5 mm.  
 Besides KOMO® mark also the QR code can be used as it appears on the KOMO® website for the relevant certificate.
2. The application of the certificate number of the productcertificatand/or name of the manufacturer of the treated timber.
3. The application of a unique production/charge number.

When separating the bundle this sequence number need not be present on each unit. From each charge it shall be administered what the sequence numbers are and by which process parameters the timber has been treated;

4. A statement for which application the treated timber is suitable by means of at least the use class indication according to NEN-EN 335-1, or a colour or letter code as mentioned in table 4.
5. A statement of the trade name or the approval number of the preservative by which the timber has been treated.

The certification mark has to be fixed separate from any other quality marking to prevent any confusion.

**Table 4:** Areas of application based on the use classes according to NEN-EN 335-1

Use class	Application Area	Colour Code	Letter Code
1	Above ground, not exposed to the elements	Black	L
2	Above ground, with risk of wetting	Orange	
3	Above ground and periodically in contact with rain water	Blue	
4a	Contact with ground and ground water	White	G
4b	Permanently in ground (water) contact or fresh water contact	Green	W
5	Permanently in contact with brackish or salt water	Red	Z

### 13. INSTRUCTIONS FOR THE USER

For each delivery of a consignment of treated timber the producer shall supply instructions for the purchaser/user/consumer with the following content:

- This product has been treated with a wood preservative to prevent attack by wood destroying organisms with a legally approved preservative <trade name preservative + approval number> with the active ingredient(s) <active ingredients> according to the <method>.
- Legal restrictions and prescription for use for treated timber when applicable.
- When processing this product the normal safety instructions shall be taken in consideration such as in case of untreated timber.
- Processing to the timber shall all be completed before treatment is started. If it is unavoidable that processing will be done after treatment of the timber, the processed parts shall receive an after treatment with a preservative permitted for the application.
- Timber leftovers and sawdust shall be disposed of as domestic waste (private) or industrial waste (professional). It is not allowed to burn these in an open fire place, wood-burning stove or open fire.
- At the end of the period of use, treated timber shall be disposed of in accordance with the relevant legal instructions.

#### **Design of Instructions:**

This is free choice for the producer and depends on the product and buyers category. One could think of a sticker at the back of the invoice or delivery slip referring to a website, insertion in a folder or instructions for use with a do-it-yourself kit.

In order to inform the (end) user sufficiently the supplier is required to pass on this instruction to each buyer.

## **14. REQUIREMENTS REGARDING EXTERNAL QUALITY CONTROLS**

### **14.1 General**

External quality control is determined by the certifying body in accordance with the Regulations for Product Certification of the certification body.

### **14.2 Initial Inspection**

The certification body controls during the initial inspection whether the relevant factory complies with the requirements as given in this Assessment Directive. A report of the initial inspection shall be made, on the basis of which the KOMO® product certificate shall be issued.

The initial inspection report shall:

- Be complete: all requirements has to be mentioned;
- Trace-ability: all data shall be recorded.

The decider shall base the decision on the data put in the report. The decision to issue the certificate will not be the same person as who has done the initial inspection.

### **14.3 Annual Controls**

The certification body controls 3x per annum, without prior notice, whether the products comply with the technical specifications as mentioned in sections 5.1 and chapters 6 to 10, whether the production is in accordance with the specifications agreed upon between producer and the certification body and whether the internal quality system of the producer complies with the requirements of chapter 11 and 12.

If necessary, on the recommendation of the Board of Experts, the above-mentioned frequency of the inspections may be adjusted on the basis of the reasons presented.

A written report of these controls shall be made.

On the recommendation of the Board of Experts, the frequency of controls mentioned above can be adjusted.

The technical aspects noted in sections 5.2, 5.3, 5.4 and 5.5 shall be fully controlled during the initial inspection and when the treatment installation is modified.

## 15. REQUIREMENTS REGARDING THE CERTIFYING BODY

### 15.1 General

The certifying body shall comply with the requirements according to NEN-EN –ISOIEC 17065. and is accredited by the Raad voor Accreditatie (Dutch Accreditation Council) or have initiated the application procedure for the scope of this Assesment Directive.

The certifying body shall have a set of regulations, or an equivalent document, in which the general rules are mentioned to comply with for certification. In particular, these are:

- The general rules for performing out the initial inspection, split into:
  - Procedure to inform about the administrative process of an application;
  - Procedure for execution of the initial inspection;
- Procedure for decision of acceptance based on the initial inspection;
- The general rules with respect to perform controls and inspections and the controlled aspects of these inspections;
- The measures to be taken by the certifying body in the event of non-conformities; (sanction policy)
- The rules for termination of a certificate;
- The option of making an appeal against decisions or measures imposed by the certifying body.

### 15.2 Certification Staff

The staff concerned with the certification process is defined as followed:

- **Inspector:** tasked with carrying out the external controls;
- **Initial Inspector:** tasked with carrying out the initial inspection and assessing the reports of tests and laboratory;
- **Assessor:** assessment of the initial inspection controller and controller; decisions on the need for taking corrective measures;
- **Decision-taker:** tasked with taking decisions based on the initial inspections carried out, continuation of certification on the basis of the annual controls.

### 15.3 Qualification Requirements

Staff concerned with the certification process shall be qualified demonstrable for the activities required. The following qualification requirements apply in respect of education, training, expertise and experience as mentioned in Table 5.

**Table 5:** Qualification requirements for certification process staff.

Certification position	Training	Expertise and Experience
Inspector Initial Inspector	MBO level	- Production and use of preservatives or equivalent - Training as auditor ISO 9001 - Two years' experience in the timber industry or equivalent
Assessor	HBO level	- Construction training or equivalent - Production and use of preserved timber - Training in the timber sector or equivalent relevant experience
Decision-taker	HBO level	- Management experience - Certification experience or equivalent - Knowledge of accreditation criteria or equivalent - Knowledge of relevant certification systems

Staff shall be qualified demonstrable by means of assessing training and experience based on the above mentioned requirements. If qualification is based on different criteria this must be registered.

#### **15.4 Reporting to the Board of Experts**

The certification body reports at least annually about the work done for the specific field of certification. In this report the following aspects must be mentioned:

- Changes in the number of certificates (new/ended);
- Number of controls performed in relation to the prescribed control frequency;
- Results of the controls and inspections.

The board of experts has the possibility to make an interpretation document. This document has to be available by the website of the scheme coordinator who has written the assessment directive. Every certification body accredited for this assessment directive is mandatory to use this interpretation document.

#### **15.5 Sanction policy**

The sanction policy (measures to be taken by the certifying body in the event of non-conformities) is stated in the regulations of certification bodies (chapter 14.1) or in a separate document.



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**16. DOCUMENTS**

ASTM D-86:2012	Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure, Version 11b, 2012.
Biocide Products Regulation 528/2012	Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products;
BRL SIKB 7700:2014	Construction or repair of liquid facilities;
CUR / PBV 44 CUR	Recommendation 44, 4th revised edition;
NEN 2909:1985	Woodpreservation - Immersion method
NEN 2913:1992	Woodpreservation - Vacuum and pressure method - Treatment with creosote-oil - Requirements with regard to the application of the wood.
NEN 2930:1991	Woodpreservation - Vacuum and pressure treatment method - Treatment with preservatives other than creosote oil.
NEN 5461:1999	Kwaliteitseisen voor hout (KVH 2000) – Gezaagd hout en paalhout. Algemeen gedeelte.
NEN 5492:1985	Quality requirements for timber - Wooden poles
NEN-EN 212:2003	Wood preservatives – General guidance on sampling and preparation for analysis of wood preservatives and treated timber.
NEN-EN 335:2013	Durability of wood and wood-based products - Use classes: definitions, application to solid wood and wood-based products;
NEN-EN 350-2:1994	Durability of wood and wood-based products - Natural durability of solid wood - Part 2: Guide to natural durability and treat ability of selected wood species of importance in Europe
NEN-EN 351-1:2007	Durability of wood and wood-based products - Preservative-treated solid wood - Part 1: Classifications of preservative penetration and retention
NEN-EN 351-2:2007	Durability of wood and wood-based products - Preservative-treated solid wood - Part 2: Guidance on sampling for the analysis of preservative treated wood
NEN-EN 1014-1:2010	Wood preservatives - Creosote and creosoted timber - Methods of sampling and analysis - Part 1: Procedure for sampling creosote;
NEN-EN 1014-2:2010	Wood preservatives - Creosote and creosoted timber - Methods of sampling and analysis - Part 2: Procedure for obtaining a sample of creosote from creosoted timber for subsequent analysis;
NEN-EN 1014-3:2010	Wood preservatives - Creosote and creosoted timber - Methods of sampling and analysis - Part 3: Determination of the benzo(a)pyrene content of creosote;
NEN-EN 1014-4:2010	Wood preservatives - Creosote and creosoted timber - Methods of sampling and analysis - Part 4: Determination of the water-extractable phenols content of creosote;
NEN-EN-ISO 9001:2015	Quality management systems – Requirements;

NEN-EN-ISO/IEC 17020:2012	Conformity assessment - General criteria for the operation of various types of bodies performing inspection;
NEN-EN-ISO/IEC 17021:2015	Conformity assessment - Requirements for bodies providing audit and certification of management systems - Part 1: Requirements;
NEN-EN-ISO/IEC 17025:2005 +C1:2007:	General requirements for the competence of testing and calibration laboratories;
NEN-EN-ISO/IEC 17065:2012	Conformity assessment - Requirements for bodies certifying products, processes and services;
PGS 15:2011	Storage of packaged hazardous substances. Guideline for storage and temporary storage related to fire safety, occupational and environmental safety; <i>Opslag van verpakte gevaarlijke stoffen. Richtlijn voor opslag en tijdelijke opslag met betrekking tot brandveiligheid, arbeidsveiligheid en milieuveiligheid;</i>
SKH PUBL 06-04:2016	Basis of assessment for wood preservatives.

17. **APPENDIX 1: Cubicing tables round wood**

**Cubic table for impregnating milled round wood.**

**Content in m<sup>3</sup> per 100 items.**

		Diameter (cm)								
		4	5	6	7	8	9	10	11	12
Lengte (m)	0,60	0,075	0,118	0,170	0,231	0,302	0,382	0,471	0,570	0,679
	0,80	0,101	0,157	0,226	0,308	0,402	0,509	0,628	0,760	0,905
	1,00	0,126	0,196	0,283	0,385	0,503	0,636	0,785	0,950	1,131
	1,20	0,151	0,236	0,339	0,462	0,603	0,763	0,942	1,140	1,357
	1,40	0,176	0,275	0,396	0,539	0,704	0,891	1,100	1,330	1,583
	1,60	0,201	0,314	0,452	0,616	0,804	1,018	1,257	1,521	1,810
	1,80	0,226	0,353	0,509	0,693	0,905	1,145	1,414	1,711	2,036
	2,00	0,251	0,393	0,565	0,770	1,005	1,272	1,571	1,901	2,262
	2,25	0,283	0,442	0,636	0,866	1,131	1,431	1,767	2,138	2,545
	2,50	0,314	0,491	0,707	0,962	1,257	1,590	1,963	2,376	2,827
	3,00	0,377	0,589	0,848	1,155	1,508	1,909	2,356	2,851	3,393
	3,50	0,330	0,687	0,990	1,347	1,759	2,227	2,749	3,326	3,958
	4,00	0,503	0,785	1,131	1,539	2,011	2,545	3,142	3,801	4,524
	4,50	0,565	0,884	1,272	1,732	2,262	2,863	3,534	4,276	5,089
	5,00	0,628	0,982	1,414	1,924	2,513	3,181	3,927	4,752	5,655
	5,50	0,691	1,080	1,555	2,117	2,765	3,499	4,320	5,227	6,220
	6,00	0,754	1,178	1,696	2,309	3,016	3,817	4,712	5,702	6,786
7,00	0,880	1,374	1,979	2,694	3,519	4,453	5,498	6,652	7,917	
8,00	1,005	1,571	2,262	3,079	4,021	5,089	6,233	7,603	9,048	
9,00	1,131	1,767	2,545	3,464	4,524	5,726	7,069	8,553	10,18	
10,00	1,257	1,963	2,827	3,848	5,027	6,362	7,854	9,503	11,31	

Half-round wood: volumes to be divided by 2.

**Cubing table for the impregnation of white peeled timber according to the table for sizes in NEN 5492.  
 Contents in m<sup>3</sup> per 100 pieces**

		Diameter (cm)											
		5	6	7	8	9	10	9/10	11/12	13/14	15/16	17/18	19/20
Lengte (m)	0,80	0,140	0,205	0,283	0,374	0,477	0,593	0,533	0,790	1,096	1,454	1,861	2,318
	1,00	0,167	0,248	0,344	0,456	0,583	0,726	0,653	0,970	1,351	1,794	2,300	2,869
	1,20	0,193	0,287	0,401	0,533	0,684	0,854	0,767	1,144	1,597	2,126	2,730	3,403
	1,40		0,324	0,454	0,606	0,780	0,977	0,876	1,312	1,837	2,449	3,149	3,937
	1,60			0,504	0,675	0,872	1,094	0,980	1,474	2,068	2,763	3,558	4,454
	1,80			0,549	0,740	0,958	1,205	1,078	1,629	2,292	3,068	3,958	4,960
	2,00			0,592	0,800	1,040	1,312	1,172	1,778	2,509	3,365	4,347	5,455
	2,50	0,358	0,545	0,727	0,935	1,225	1,555	1,385	2,123	3,018	4,070	5,279	6,646
	3,00				1,046	1,383	1,767	1,569	2,432	3,484	4,724	6,152	7,769
	3,50						1,950	1,725	2,706	3,907	5,327	6,967	8,827
	4,00						2,104	1,855	2,946	4,288	5,881	7,725	9,821
	5,00								3,328	4,931	6,847	9,078	11,62
	6,00										7,633	10,22	13,18
	7,00											11,16	14,52
	8,00											11,92	15,63
	9,00											12,49	16,53
10,0											12,90	17,24	

The contents of the normal commercial sizes are given in accordance with NEN 5492.

Half-round wood: volumes to be divided by 2.