

Nordic requirements for quality control and marking of pressure-treated timber

Part 1: Pine and other permeable softwoods.

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1 Introduction

This document contains rules for quality control requirements and marking of pressure-treated solid pinewood in the preservation classes M, A, AB and B according to the definition given in NWPC Document No. 1 and EN 351 part 1. Collection of samples is based on the requirements in EN 351 part 2 and this document.

Penetration and/or retention requirements in this document can be substituted by product standards.

Pressure-treated glulam is included in this document if the glulam product satisfies the requirements of retention and penetration.

This document is not valid for any subsequent investigations of pressure-treated timber in use.

An updated list of organisations in the Nordic countries which carry out the quality control for pressure-treated timber, can be acquired from the NWPC secretariat:

Nordic Wood Preservation Council (NWPC)

For current address, see:

WEB-site: www.ntr-nwpc.com

The original language for this document is Swedish.

2 Affiliation to the quality control

2.1 General

Producers who satisfy the requirements in NWPC Document no. 1, section 5 can seek affiliation to the quality control and use the NWPC's quality marks when the requirements in sections 2.2 to 2.5 in this document are fulfilled.

2.2 Responsible contact person

One responsible contact person and a deputy shall be appointed for the production, and be specified in the application form, see section 2.7.

2.3 Equipment

The preservation plant shall be equipped in such a way that the requirements for the requested classes can be fulfilled.

The plant shall be equipped with instruments that can continuously monitor the process: the pressure times, pressure and vacuum and produce a written report of the process.

If the process requires heat (e.g. creosote-treatment), the plant shall normally have instruments that register the temperature of the preservative.

If the preservative is delivered as a concentrate (paste or powder that shall be diluted) the plant shall have equipment to measure the concentration of the preservative solution.

The plant shall have equipment to measure the moisture content in the timber before treatment. If this is an electrical device, the electrodes shall be isolated and be long enough to reach the heartwood.

The plant shall also have equipment to measure the uptake of the preservative in the timber. The plant can choose the method for measurement of the uptake, but the method shall be approved by the quality control organisation.

2.4 Instructions

There shall be written instructions for:

- The plant's operation and maintenance.
- Preparation of the preservative solution (if dilution is required).
- Internal factory control (in some cases also for the measurement of penetration).
- Fixation (for water-borne preservatives).

2.5 Internal factory control

The routine internal factory control shall be carried out under the leadership of the responsible contact person according to chapter 5.1.

2.6 Class approval

Before the plant can be a member of the control scheme, the equipment, the product and the internal factory control shall be examined and approved by the control organisation.

2.7 Affiliation to the Control Scheme

Every producer (see NWPC Document no. 1, chapter 2, paragraph 3) of pressure-treated wood can apply for affiliation to the quality control scheme and be controlled for each production site (e.g. different addresses).

Application for affiliation to the control scheme, see chapter 1 shall be made on the application form from the national control organisation.

Affiliation to the control organisation is a written agreement between the producer and the control organisation. The agreement shall ensure that the control is carried out in accordance with this document.

2.8 Affiliated producers' rights and obligations

When the requirements in this document are satisfied, the producer has the right to produce classified, pressure-treated wood and to mark it with the Nordic quality marks (or the Norwegian quality marks), see chapter 6.

Only producers that are members of the control scheme according to this document have the right and obligation to produce classified pressure-treated timber with NWPC's quality

marks, see chapter 6 (and appendix 5 in national documents). Timber produced according to other requirements shall be marked clearly with distinguishing marks.

The costs in connection with the class approval, yearly controls, analysis and license fee for the quality marks shall be paid by the producer according to the rules of the national control organisation.

The producer himself is responsible for the pressure-treated wood he produces. See chapter 5.1.1 and 6.

Any changes in connection with the production or responsible contact person shall be reported in writing to the national control organisation secretariat without delay.

3 Definitions

Charge: All timber treated in one operation.

Batch: Clearly identifiable units of timber treated with the same preservative and the same retention and penetration, e.g. transmission poles, sleepers etc. class and owner (in the case of service treatment).

Sampling unit: One unit (e.g. one pole, one board, one fence post) of timber treated with preservative that is taken from one batch of pressure-treated timber.

Composite sample: A collection of all sampling units taken from the batch at random according to the sampling plan to determine the retention..

Sample group: A collection of all composite samples taken at one producer.

Other definitions can be found in the standards EN 335, EN 350, EN 351 and EN 599.

4 Product requirements

4.1 *Wood species and timber requirements*

All species of pine (*Pinus spp.*) are approved for treatment to the classes M, A, AB and B. See also NWPC document no. 1 and the list of preservatives approved by NWPC.

The timber must not have visible attack of wood destroying fungi or other micro organisms, which leads to softening of the wood or reduction of its strength and/or mass, and shall in principle be free from bark and inner bark.

Stored de-barked, green transmission poles shall be marked with week and year when the first pole is put in place for drying. De-barked poles shall not be kept in stock uncovered in two successive summer periods. The second period starts 1 July.

The moisture content (MC) in the wood shall be sufficient so that the penetration requirement for the class is satisfied.

Note For pressure treatment in the classes M, A and AB the recommended MC shall be less than 25 %.
Water-stored timber should not be used for class B timber.

4.2 Requirements of the preservative

The preservative shall be approved by NWPC according to NWPC Document no. 2. The control organisation shall be informed immediately when the producer changes preservative.

Note National environmental restrictions can restrict the use of the NWPC approved preservatives fully or partially.

4.3 Penetration requirement

4.3.1 General

The control of the penetration can be carried out on all timber treated since the foregoing control - also creosote treated timber.

Note Penetration control should be carried out after any specified conditioning period.

Sometimes it is not possible to treat small zones of sapwood near the heartwood e.g. transition wood. These shall be overlooked when the penetration is judged. This untreated zone can be no more than the two annual rings nearest the heartwood.

For creosote treated timber the sampling and calculation of the penetration are described in EN 12490.

4.3.2 Class M, A and AB

The penetration requirement for the classes M, A and AB is penetration class P8 in EN 351 part 1, table 1, i.e. full penetration of the sapwood to the heartwood.

4.3.3 Class B

The penetration requirement for the class B is penetration class P5 in EN 351 part 1, table 1, i.e. at least 6 mm lateral and 50 mm axial penetration in the sapwood.

4.3.4 Penetration tolerance

The penetration in each batch (e.g. poles, sawn timber) shall be determined to see that the penetration is within the given tolerance.

The maximum tolerance accepted is 10 % i.e. AQL = 10 (AQL is accepted quality level) according to ISO 2859-1:1989, see Table 4.1.. This means that maximum 10 % of number of units in a batch can differ from the penetration requirement.

The sample group and the maximum number of samples not satisfying the penetration requirement is shown in Table 4.1.

Table 4.1 Number of samples that have to be taken according to the batch size and the maximum number of samples that can have unsatisfied penetration at AQL=10 %.

Sampling units in a batch	Number of samples	The highest number of samples not satisfying the penetration requirements
5* - 150	5	1
151 - 500	8	2
501 - 3.200	13	3
3.201 - 35.000	20	5
35.001 - 500.000	32	7
above 500.000	50	10

*) If the number of units in a batch is less than or equal to 5 each sample shall be tested.

4.4 Retention requirements and tolerances

4.4.1 General

The retention of the preservative shall be determined for each batch. Only those samples in each composite sample that have satisfied the penetration requirement shall remain in the composite sample for analysis of retention.

Note The analysis of the retention should be carried out after any specified conditioning.

Normally the preservative retention in a batch is determined by analysing one composite sample which contain all the analysing zones from the samples that fulfil the penetration requirement, see section 10.4 and 11.4. For deviation see EN 351, section 5.3.

The average retention in the analysing zone shall at least fulfil the minimum requirements of the approval in NWPC document 2 for the preservative in the appropriate class. (Updated list of approved preservatives can be obtained from the NWPC web-site, see page 4.)

4.4.2 Creosote

Analyses of retention shall only be carried out on creosoted timber that is treated in the 30 days prior to inspection. Sampling, penetration and retention analysis shall be carried out according to EN 1290.

4.4.3 Poles treated with CCA-preservative

When the samples from poles are bore-cores and the average sapwood depth is over 30 mm the retention is given a tolerance of – 1.0 kg/m³ sapwood in class A and – 2 kg/m³ sapwood in class M.

- Note 1** This section is valid until a revised version of EN 351-2:1995 is available.
- Note 2** For other waterborne preservatives, NWPC can decide other tolerances if relevant documentation is available.

5 Production control

5.1 *Factory control*

The purpose with the factory control is to ensure that the quality of the product fulfils the requirements for the different classes as defined in NWPC document no. 1.

The impregnation and the factory control shall be carried out under supervision of the responsible contact person.

Consignments of new preservative shall be checked to ensure receipt of the correct product.

If the preservative is delivered in a concentrated form, the concentration in the storage tank shall be controlled at least every third dilution.

Before treatment the timber shall be controlled to ensure compliance with the requirement in section 4.1.

Penetration of the preservative in the timber shall be controlled regularly. The control shall be carried out as described in appendix 1, section 10.1 and 10.2 for the classes M, A and AB and as shown in Figure 5.1 for class B. How often samples shall be collected is dependent of the production volume. The minimum requirement is sampling from one batch of one commodity during a production week. A more frequent sampling can be demanded by the control organisation for some batches or commodities.

For the classes M, A and AB the penetration control is carried out by taking at least 3 samples (cross section or borings) from different sampling units or a number according to Table 4.1.

For the class B the samples will be taken from three different sampling units, see Figure 5.1 or a number as defined in Table 4.1.

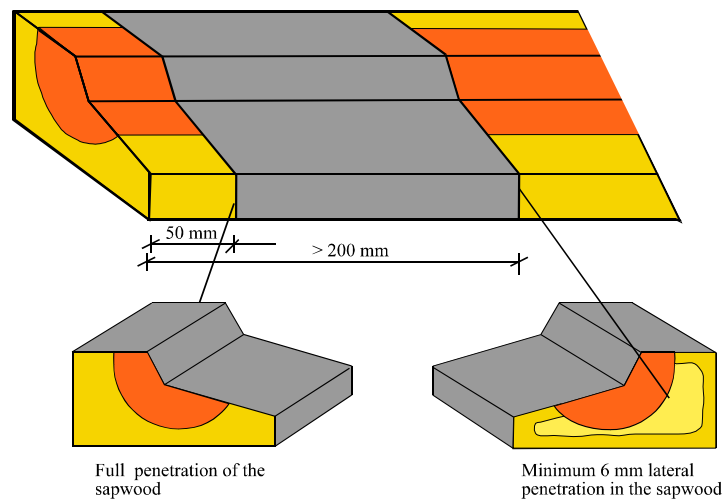


Figure 5.1 Sampling for factory control in a sample with unprofiled ends for class B.

If one of the three samples has insufficient penetration, three new samples shall be taken. If two or more of these six samples have insufficient penetration the whole batch shall be re-impregnated, see section 5.1.1.

If Table 4.1 is used the number of non-complying samples has to be according to the table, see also Table 10.1 and Table 10.2. If the number of samples with insufficient penetration is higher than permitted in the table, the batch shall be dried (if necessary) and re-impregnated, see section 5.1.1.

5.1.1 Insufficient penetration

If the factory control shows insufficient penetration and/or retention, the whole batch shall be re-impregnated. A new factory control shall be carried out on the re-impregnated batch, see section 5.1.

If the requirements are not met after re-impregnation, the batch cannot be marked with the quality marks. If the timber has been marked before the treatment, all marks have to be removed.

5.1.2 Journal

The production shall be registered in a journal with the following information:

- Date and charge number
- Wood species, quantity and volume
- Preservation class
- The highest moisture content measured before the pressure treatment
- The name of the preservative, concentration (when diluted) and temperature (if heating is part of the process i.e. creosote)
- The process (time, pressure and vacuum)
- Preservative uptake per charge (litre/m³) or an equivalent control of the retention (kg/m³)
- The result of the factory penetration control (number of samples/number approved)
- Any re-impregnation of the batch and the result of the new penetration control

Write the batch number on all printouts from computers or diagrams from recorders. These printouts shall be an appendix to the journal. The responsible contact person shall sign the journal and it shall be filed according to national laws or at least for 5 years.

5.2 External control (Third party control)

The aim of this external control is to ensure that the factory control is carried out according to this document, and to check the quality of the treated wood by taking spot samples from the stock.

Only persons approved by a national control organisation can carry out this external control, normally through two unannounced visits during a calendar year. The visiting time is determined by the control organisation.

During this control visit the controller shall:

- Check that all requirements in the factory control have been carried out
- Check the journal and/or written diagrams and/or computer printouts and sign the last journal
- Check the equipment used for factory control
- Take a sample of the preservative for chemical and/or physical analysis
- Take samples of the pressure treated timber for penetration and retention analysis, see Table 5.1 and Appendix 1 and 2
- Control the marking / labelling (according to national requirements, see section 6)
- Control the operating instructions at the plant
- Control that the requirements for delivery are fulfilled

Table 5.1 Tolerances for the active ingredients in the preservatives

The active ingredients (according to the certificate of approval)			Tolerance in percentage of nominal composition
	substance	≤ 2,5 % m/m	±15,0 %
2,5 %	< substance	≤ 10,0 % m/m	± 10,0%
10,0 %	< substance	≤ 25,0 % m/m	± 6,0 %
25,0 %	< substance	≤ 50,0 % m/m	± 5,0 %
50,0 %	< substance	< 100,0 % m/m	± 2,5 %

After the control visit a report with the results will be sent to the producer with information about any other observations during the visit.

Guidelines regarding sanctions if the requirements are not met, are described in section 7.

The controller cannot ask for information regarding conditions that are not included in this or other NWPC documents.

6 Marking

Producers affiliated to the national control organisations have the right and obligation to mark the products with the Nordic class marks. In Norway national marks are used on the domestic marked. Package marks shall at least include the following information, see Figure 6.1.

- Treated according to this document and EN 351-1:1995.
- Name of the preservative used.
- The Nordic class and penetration class according to EN 351-1: P 8 for the classes M, A and AB and P5 for class B.
- Retention (or refer to NWPC's list of approved preservatives).
- Charge number and year.
- Name of producer.






<p>Pressure Wood AS</p> 	<p>Pressure Wood AS</p> <p><u>NS</u> AB XX</p>
<p>Preservative: Pressure Z minimum retention: y kg/m³</p> <p>Charge no.: 125/01</p> <p>Penetration class::P8 (EN 351-1)</p>	<p>Preservative: Pressure Z minimum retention: y kg/m³</p> <p>Charge no.: 125/01</p> <p>Penetration class::P8 (EN 351-1)</p>
<p>This timber is treated according to NWPC -document no. 1 og EN 351-1, and controlled in accordance to NWPC-document no. 3 and EN 351-2.</p>	<p>This timber is treated according to NWPC -document no. 1 og EN 351-1, and controlled in accordance to NWPC-document no. 3 and EN 351-2.</p>

Figure 6.1 Minimum requirements for package labelling of class AB timber translated to English. Normally the label is in a Nordic language. To the left the Danish, Finnish, Icelandic and Swedish label. To the right the Norwegian label.

Each country will have its own additional information. For national marking requirements, see appendix 5 in the national NWPC Document no 3.

A colour code can be used to mark each piece of treated timber as an alternative to the class mark with letters.

Table 6.1 Illustration of the different class marks used by the Nordic countries.

Class	Colour code	The Nordic class marks	The Norwegian class marks
M	Blue		<u>NS</u> M XX
A	White		<u>NS</u> A XX
AB	Yellow		<u>NS</u> AB XX
B	Red		<u>NS</u> B XX

Transmission poles will normally have their own rules for marking.

7 Guidelines for sanctions when the quality requirements are not met

7.1 General

These guidelines are meant to harmonize the sanctions in the Nordic countries. However, the board members of the national quality control organisations can change one or more of these sanctions if they consider it necessary.

Before the sanctions are carried out, it shall be considered whether there are extenuating or aggravating circumstances.

7.2 Withdrawal of the mark

When the marking rights are withdrawn the producer cannot mark the timber with the Nordic or national class marks. The mark can be withdrawn for one commodity (sawn timber, poles etc), for one single class (M, A, AB or B), or for all classes or commodities for which the producer has approval. In the last case the withdrawal also covers the use of marks on invoices, letters, advertisement etc. and the producer is expelled from the quality control scheme.

The decisions of withdrawal of the mark shall be given to the producer and published according to the national rules.

The approval certificate or membership agreement shall be withdrawn.

7.3 Conditions for re-instatement.

To obtain re-instatement of the mark, the producer must inform the control organisation in writing, what action has been carried out to correct the situation that made the withdrawal of the mark necessary. The control organisation will then make at least one visit to control that the production again fulfils the requirements. If the production is approved, the producer will regain permission to mark.

7.4 Sanctions if the penetration is not approved

If the penetration is not approved by external control for one or more classes, the following procedure shall be carried out:

1. The control organisation informs the producer in the control report that the samples have inadequate penetration. Normally the producer has two weeks after receiving the report to inform the control organisation what action he will take to improve the penetration in the future. Under the next control visit, the controller shall check that the action has been carried out.
2. If the number of samples with insufficient penetration is high, the control organisation will make an extra control visit after the producer has carried out the action, and can require a more stringent inspection level than S3 at AQL 10 % according to ISO 2859-1

3. If the penetration at this extra control visit does not fulfil the requirement or if the producer does not provide written information about the action that shall be taken to improve the penetration, the control organisation normally withdraws the mark for the commodity or the class.
4. If more than two months have passed since withdrawal of the mark for a commodity or a class, or more than four months have passed since the control organisation reported inadequate penetration at an ordinary control visit, and no action is carried out, the control organisation will withdraw the mark for all products and all classes and suspend the producer from the control scheme.

7.5 Sanctions if the retention is not approved

If the retention for a batch or class does not satisfy the requirement the following will happen:

1. The control organisation informs the producer in the control report that the retention of preservative in the samples was too low. The producer shall normally, within two weeks after receiving this report, send in at least 13 new cross section (or 20 bore cores) samples of the rejected commodity or class for new chemical analysis.
2. If the retention has been very low or if the new samples do not fulfil the requirements, the control organisation shall carry out an extra control visit.
3. If the retention still does not meet the requirements, or if the producer does not send in new samples, the mark is normally withdrawn for the commodity or the class.
4. If more than two months have passed since withdrawal of the mark for a batch or a class, or more than four months have passed since the control organisation reported inadequate retention at an ordinary control visit, and no action is carried out, the control organisation will withdraw the mark for all products and all classes and suspend the producer from the control scheme.

7.6 Sanction when the formulation is irregular

If the formulation of the preservative is outside the tolerance requirements,

1. A new sample shall be sent within two months after the producer has received the report.
2. If this sample also is not within the tolerance, a new sample shall be sent within a month.
3. If the formulation in the second sample is outside the tolerance the mark is withdrawn two months after the producer is informed.

7.7 *Sanction following other irregularities*

- If the labelling/markings according to this document or national requirements are not met
- If the delivery requirements in NWPC Document no. 1 are not met
- If the requirements to the wood in this document are not met
- If the requirements concerning internal factory controls are not met, then
 1. The control organisation makes a note of this irregularity in the report. The producer is normally given 14 days after receiving the report to notify the control organisation in writing the action that will be taking in order to meet the requirements again.
 2. If the irregularities are severe the control organisation will carry out an extra control visit after the producer has carried out the action.

If the irregularity is not rectified after an extra control visit, or if the plant does not/ cannot give acceptable actions within the given time, then:

3. The control organisation normally withdraws the mark for the commodity and/or the class, even if the preservation (penetration and retention) is acceptable.

If more than two months have passed after the producer has lost his mark or four months after an ordinary control visit when the irregularity was discovered and no action has taken place, then:

4. The control organisation withdraws the mark for all products and all classes and suspends the plant from the control scheme.

7.8 *Continuous violation of the requirements*

If at an ordinary control the producer has neglected to carry out the action he had promised in connection with earlier irregularities, the mark is withdrawn at once, and the plant is suspended from the control.

7.9 *Suspension from the control*

The plant can also be suspended from the control if:

- The mark is misused
- The control is hindered
- There are circumstances that can have the effect that the authorities or the public lose their confidence to the control scheme or treated wood in general
- The producer does not settle his account with the control organisation

8 *Withdrawal from the control scheme*

The producer can withdraw from the control scheme with one month's written notice. However, the producer is obliged to honour his economical obligations to the control organisation. These obligations can vary from country to country.

9 Deviation from these rules

The national control organisation can deviate from the requirements of sections 2, 5 and 6 of this document.. The control organisation shall state the reason for the deviation. It shall be time-limited and be approved by the NWPC technical group.

Appendix 1 (*normative*)

10 External control of the classes AB, A and M - Sampling, measuring and calculation of the penetration and retention of the preservatives

10.1 General

The sampling of timber pressure-treated with water-borne preservative and treated with solvent-borne preservative (LOSP) is according to EN 351 part 2 and for creosoted timber according to EN 12490.

- If the penetration and retention analyses can be carried out from the same sample, only one sample or core-boring from each sampling unit is necessary. If not, two samples have to be taken adjacent to each other.
- The sample is taken from a straight grain piece of wood without any cracks or other defects and at least 100 mm longitudinal from any knots. To determine the retention and lateral penetration the sample shall be taken in the middle of the test piece or at least 500 mm from one of the ends.
- The samples can be taken as core-borings or cross-sections whichever is practical.
- The border between heartwood and sapwood can, when in doubt be established with heartwood reagents. Special colour reagents can be used to establish the penetration of the preservative.

10.2 Sampling

At the external control the samples shall be collected from timber in stock produced since the last control. The sampling unit shall be taken at random from a batch of treated timber after the conditioning period. Pure heartwood samples shall be avoided.

The number of samples for penetration analysis is taken according to ISO 2859-1. The number of samples is determined from Table 10.1 (which is identical with table 4.1). The number of samples is determined according to the batches of treated timber in stock and which is treated since the last control.

Table 10.1 Number of samples that have to be taken.

Sampling units in a batch	Number of samples
5*- 150	5
151 - 500	8
501 - 3.200	13
3.201 - 35.000	20
35.001 - 500.000	32
over 500.000	50

**) If the number is less than or equal to 5, every piece of timber shall be tested.*

The same sampling frequency can be used for the internal factory control of the penetration of each batch.

Table 10.1 is based on the sample procedure in EN 351-2 (ISO 2859-1) with AQL = 10 % at special inspection level S3.

10.2.1 Measuring the penetration and tolerances

The penetration of the preservative is analysed in every sampling unit in each batch. The penetration is either full or insufficient. The maximum permissible number of test pieces with less than full penetration is shown in table 10.2. This is equivalent to a tolerance of 10 %, i.e. maximum 10 % of number of samples in the batch that can have insufficient penetration according to EN 351-2 (ISO 2859-1) with AQL 10 % at special inspection level S3.

Table 10.2 The highest number of samples that do not full the penetration.

The number of samples	The highest number of samples with less than 100 % penetration in the sapwood.
5 *)	1
8	2
13	3
20	5
32	7
50	10

**) If the number is less than or equal to 5, every sample shall fulfil the requirement.*

10.2.2 Cross section test piece

The cross section test piece shall be at least 70 mm long. From this a section with a thickness of 5 mm is cut for analysis. The penetration is evaluated visually after application of any reagents if necessary.

10.2.3 Bore samples

The increment borer shall be sharp and have an inner diameter of at least 4 mm. Bore samples are taken from big dimensions of round timber and sawn timber, and shall not be used to evaluate the axial penetration (class B).

Bore cores are taken in the radial direction and to such a depth that the heartwood is also included, see Figure 10.1.

If the sample contains only sapwood, the increment borer shall penetrate the geometric centre of the sample.

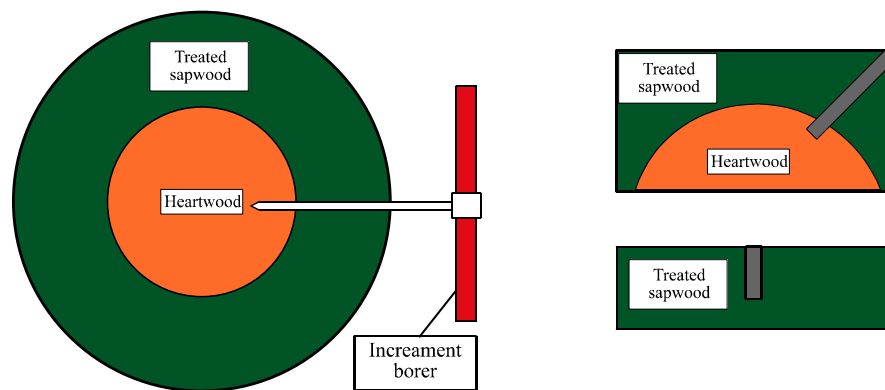


Figure 10.1 Example of samples for bore cores from poles and sawn timber.

If any part of the sample is lost the whole sample shall be rejected and a new one taken.

10.3 *Analysis of the composition of the preservative solutions*

For each treatment company the collected preservative solution is analysed at least once per year for all active ingredients by quantitative analysis according to common methods or methods recommended by the producer. The result shall be according to the formulation of the approved preservative. The tolerances are given in table 5.2.

10.4 *Analysis of the retention of preservative*

The retention is determined by quantitative chemical analysis according to approved methods or methods recommended by the producer. Composite samples from every batch are analysed separately. Blooming on the surface of the treated wood shall be removed before the analysis.

Only the samples with full penetration in the sapwood shall be analysed. One analysing unit shall contain at least 4 samples. The determination of retention is carried out on each batch.

From cross sections the whole sapwood is taken on app. 5 mm thick sections.

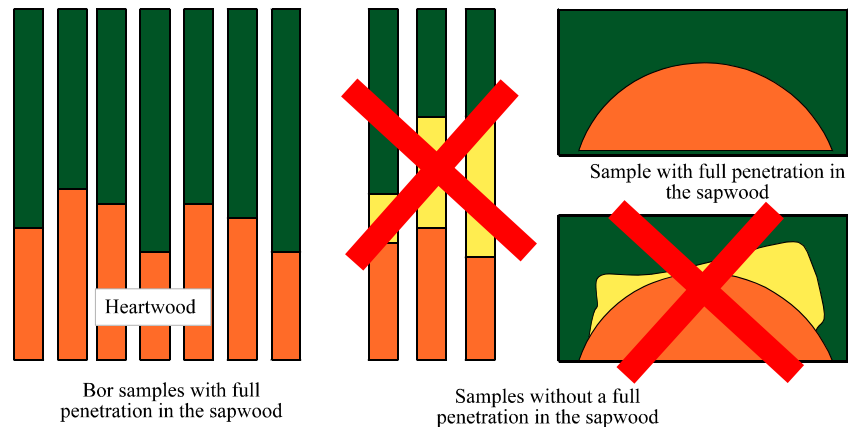


Figure 10.2 Samples that are collected to one analysing unit.

The analysis data for all the preservatives active ingredients are used in the calculation of the retention. If the preservatives formulation by analysis of the solution fulfils the accepted tolerances, see section 10.3, the retention can be calculated using only one active ingredient, e.g. copper.

If the density of the wood is not determined by accepted methods, the dry density in the calculation shall be set to 480 kg/m^3 (for *Pinus spp.*). This is a normal density at 12 % moisture content of 520 kg/m^3 .

The retention of creosote in the wood is calculated by EN 12490.

The analysed retention (in kg/m^3 sapwood) shall be at least the retention approved by NWPC for the preservative in the respective class.

Appendix 2 (normative)

11 Third party control of Class B. Sampling, measurement and calculation of the preservatives penetration and retention

11.1 General

During the third party control only those samples produced from the producer's own timber shall be used. This can be waste components from production. The samples shall be taken at a distance of 100 mm from knots or other timber defects.

In the event of doubt, heartwood reagents can be used to establish the border between heartwood and sapwood.

Special reagents/methods shall be used to establish the active components in the treated zone if the preservative is colourless. The penetration is evaluated visually.

The number of samples is given in Table 10.1.

11.2 Measuring the penetration in the samples

The penetration shall be measured after most of the solvent has evaporated.

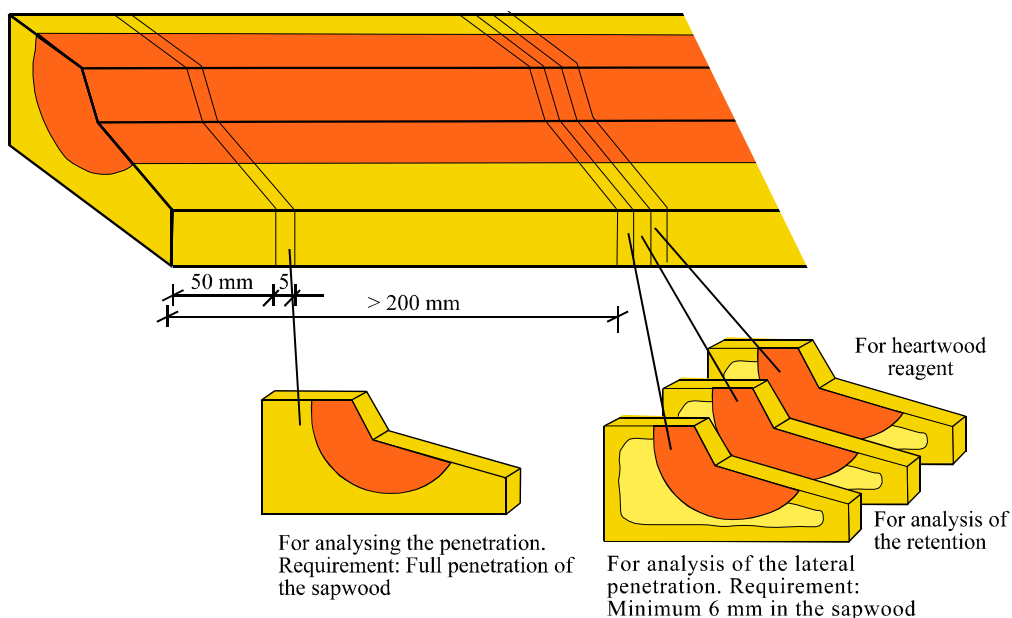


Figure 11.1 The determination of the penetration, axial and lateral, in the sampling unit with square-cut ends.

The penetration is measured in all the sampling units.

Both penetration requirements, axial and lateral, shall be fulfilled for approval of the penetration. If measurement of the axial penetration is not possible because of the nature of the product then only the lateral penetration shall be measured.

Failure to meet both penetration requirements, axial and lateral, in any one sample is regarded as only one non-compliance in the sample.

The highest permissible number of samples that do not have adequate penetration is shown in Table 10.2.

11.3 Analysis of the preservative's formulation

The sampled preservative is analysed for all active ingredients by quantitative chemical analysis according to approved methods or methods recommended by the producer. The results shall have conformity with the formulation of the approved preservative. The tolerances are given in Table 5.1.

11.4 Analysis of preservative retention

The retention of preservative is analysed only in the samples that fulfil 6 mm lateral penetration, see Figure 11.2. One analysis unit shall consist of at least 4 samples.

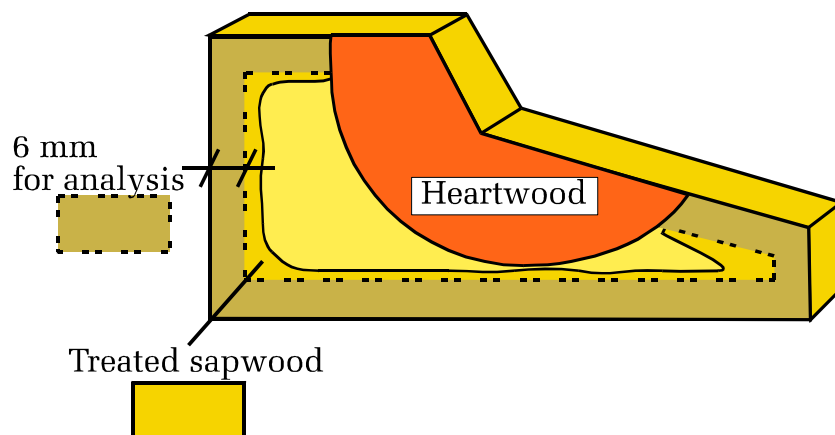


Figure 11.2 Sampling of samples for analysis of retention

The retention is determined by quantitative, chemical analysis according to approved methods or methods recommended by the producer.

Analysis data for all of the active components in the preservative are used in the calculation of the retention. If control analysis of the preservative's formulation shows compliance with the approved tolerances, see section 11.3, then the retention can be calculated by the analysis of one active ingredient.

If the density of the wood is not determined by approved methods, a dry density of 480 kg/m³ shall be used for the calculation of pine sapwood (*Pinus spp.*), see section 10.4.

The analysed retention (kg/m³ sapwood) shall be at least the same as the retention approved by NWPC for the preservative in the preservation class.

Appendix 3 (informative)

12 Reagents to establish the heartwood and copper[†]

12.1 Reagents for pine heartwood

Reagent 1

Solution A: 400 g Sodium nitrite (NaNO_2) dissolved in 600 ml water.

Solution B: Saturated solution of sulfanilic acid ($\text{C}_6\text{H}_7\text{NO}_3\text{S}$) in water.

Equal amounts of solution A and B are mixed and diluted with 5 parts of water to give the ready-to-use solution. This solution is stable for 1-2 hours.

The heartwood is coloured orange/red.

Reagent 2

Solution A: 5 g ortho-anisidine [2-methoxyaniline] ($\text{C}_7\text{H}_9\text{NO}$) in a mixture of 20 ml concentrated hydrochloric acid (HCl) and 1000 ml water.

Solution B: 100 g sodium nitrite (NaNO_2) in 1000 ml water.

Equal volumes of solution A and B are mixed. The mixture will last for app. 3 months.

Solution A and B will last for a couple of years. The heartwood is coloured red after app. 30 seconds.

12.2 Reagents for copper

Several water-borne preservatives contain copper as one of active ingredients. In most cases there is no need for any reagent to see the penetration since the copper gives a green colour.

The following reagent can be used:

Solution A: 1 part ammonium hydroxide (NH_4OH) and 3 parts of water.

Solution B: Saturated solution of Rubeanic acid in ethanol (95 %).

The treated wood is first brushed with solution A, then B.

The copper containing sapwood will be coloured dark blue. The solutions have unlimited stability.

[†] Note that certain reagents can be restricted in some countries.

Appendix 4 (informative)

13 References

- | | |
|--------------------------|---|
| NWPC Document no. 1:1998 | Nordic wood preservation classes
Part 1: Pine and other permeable softwoods
The Nordic Wood Preservation Council 1998 |
| NWPC Document no. 2:1998 | Condition for approval of wood preservatives for industrial wood preservation in the Nordic countries
Part 1: Pine and other permeable softwoods
The Nordic Wood Preservation Council 1998 |
| EN 351, 1995 | Durability of wood and wood based products –
Preservative-treated solid wood

Part 1, 1995: Classification of preservative penetration and retention.

Part 2, 1995: Guidance on sampling for the analysis of preservative-treated wood. |
| ISO 2859-1 | Sampling procedures for inspection by attributes

Part 1: Sampling plans indexed by acceptable quality level (AQL) or lot-by-lot inspection. |
| EN 12490 | Durability of wood and wood based products –
Preservative treated solid wood –
Determination of the penetration and retention of creosote in treated wood |

Appendix 5 (normative)

14 National marking rules

Different marking rules are used in the Nordic countries. Appendix 5 is therefore specific for Denmark, Finland, Iceland, Norway and Sweden and can be seen in their national edition of NWPC Document no. 3.