Nordic certification system for road marking materials

Version 1:2015

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Preface

A Nordic certification system for road marking materials will be introduced in 2015. This implies that a documented product approval will be required in order to use the road marking material on roads managed by the national road authorities, in countries that apply the certification system.

Product approval will be based on monitored and documented performance measurements of material samples applied on test fields on public roads. The present report describes the certification system and the road trials.

In the first stage, the certification system applies for the countries of Norway and Sweden. It is supplemented by a road trial of road marking materials in Denmark, where tender specifications may request the availability of test reports that verify the minimum performances listed in tenders. Finland will not apply the certification system in this first stage, but may join later.

The guidelines and procedures related to the certification system have been developed by a working group consisting of Ole Hardt, The Danish Road Directorate, Tuomas Österman, Finnish Transport Agency, Bjørn Skaar, The Norwegian Public Roads Administration, Lars Petersson, The Swedish Transport Administration, Kai Sørensen, Johnsen Consult, Trond Cato Johansen, Ramböll, and Carina Fors and Sven-Olof Lundkvist, The Swedish National Road and Transport Research Institute (VTI).

Linköping, March 2015

Carina Fors
Quality review

Internal/external peer review was performed on 14 April 2015 by Jan Andersson. Carina Fors has made alterations to the final manuscript of the report. The research director Jan Andersson examined and approved the report for publication on 22 April 2015. The conclusions and recommendations expressed are the author’s/authors’ and do not necessarily reflect VTI’s opinion as an authority.

Kvalitetsgranskning

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Summary

Nordic certification system for road marking materials – Version 1:2015
by Carina Fors (VTI), Trond Cato Johansen (Rambøll) and Sven-Olof Lundkvist (VTI)

A Nordic certification system for road marking materials will be introduced in 2015. The system will be based on documented performance measurements of material samples applied on test fields on public roads.

The report describes the certification system and how it will be applied in the Nordic countries. Procedures and methods that will be used for application of materials and performance measurements are specified.
Sammanfattning

**Nordiskt certifieringssystem för vägmarkeringsmaterial – Version 1:2015**

av Carina Fors (VTI), Trond Cato Johansen (Ramböll) och Sven-Olof Lundkvist (VTI)

Ett nordiskt certifieringssystem för vägmarkeringsmaterial kommer att introduceras under 2015. Systemet kommer att baseras på dokumenterade materialtester på provfält, där materialen certifieras utifrån hur många hjulpassager de klarar.

Rapporten beskriver hur certifieringssystemet fungerar och hur det kommer att tillämpas i de nordiska länderna. Vidare beskrivs de procedurer och metoder som kommer att användas vid utläggning av material, samt vid mätning av materialens funktionsparametrar.
1. Introduction

A Nordic certification system for road marking materials will be introduced in 2015. When the system is in place, a documented product approval will be required in order to use the road marking material on roads managed by the national road authorities, in countries where the certification system applies.

There are several reasons for introducing a certification system:

- To promote fair competition
- To promote the development of new and better materials
- To obtain better documentation of the use of public funds
- To guarantee that the road authorities get the material paid for
- To improve the quality of the road markings from the road user perspective
- To increase the knowledge about road marking materials

The certification system comprises road marking materials only, i.e. not the combination of material and pattern of application (e.g. plain or a certain type of profile). Product approval will be based on monitored and documented performance measurements of material samples applied on test fields on public roads. In the first stage, the certification system will include all types of white and yellow longitudinal markings.

The certification system will be anchored in national guidelines and regulations. Performance requirements include retroreflection, daylight luminance coefficient, friction and colour. Approval will be given in relation to the number of wheel passages the material will withstand.

The procedures for application and measurements are based on the standards EN 1824 Road marking materials – Road trials and EN 1436 Road marking materials – Road marking performance for road users.

The certification system may be modified and/or extended later on. The system described in this report, Nordic certification system for road marking materials – version 1:2015, is the first stage.

1.1. Application of the certification system in the Nordic countries

1.1.1. Norway

The certification system will apply to roads managed by The Norwegian Public Roads Administration.

1.1.2. Sweden

The certification system will apply to roads managed by The Swedish National Transport Administration.

1.1.3. Denmark

The certification system will not apply to Denmark. Product certification will not be required, but tender specifications may request the availability of test reports that verify the minimum performances listed in tenders. A supplementary road trial will therefore be carried out in Denmark. Results from the Danish test site will be documented in a test report, which may be used to verify minimum requirements listed in tenders.
1.1.4. Finland

The certification system will not apply to Finland for the present. The Finnish road authorities will decide later on when and in which types of contracts a material certification is required. There is also a possibility that Finnish municipalities may apply the certification system later.

The Finnish Transport Agency has no plans for any certification system of its own. When product approval requirements will be introduced in Finland, the Nordic certification system will be followed.

1.2. Roles and responsibilities

The Nordic road authorities constitute the controlling authority of the certification system:

- The Norwegian Public Roads Administration, Norway.
- The Swedish Transport Administration, Sweden.

The Swedish National Road and Transport Research Institute (VTI) has the formal responsibility of the road trials and the material approval. VTI supervises the measurements and analyses data. Ramböll carries out measurements and is responsible for administration and contact with participants.

The procedures and the guidelines for the road trials and for the certification system has been compiled by a working group with representatives from the road authorities in Norway, Sweden, Denmark and Finland, and from VTI, Ramböll and Johnsen Consult.

The administration of the road trials refers to Ramböll and VTI.

Contact information can be found in Appendix 4.
2. Road marking materials

The certification system includes materials for longitudinal markings only. Any material intended for longitudinal marking can be used, including preformed road markings, provided that the materials comply with current legislation.

Materials for temporary markings and inlaid markings are not included in the certification system.

The road marking materials will be tested as applied assemblies, with drop on materials as recommended by the manufacturer.

2.1.1. Colour

The certification system includes white and yellow materials.

2.1.2. Type I and type II

The certification system will, for the present, include only type I markings. A material that is approved as a type I marking is approved for use also as a type II marking. Thus, at the Swedish test site, all materials applied for certification purposes shall be applied as type I markings.

At the supplementary test site in Denmark, materials may be applied as type I and as type II markings.

Suppliers are free to apply type II markings for test purposes at both test sites, if they wish.

2.1.3. Content of material

All ingredients/components of the material, including glass beads and binder, are parts of the material. This means that the certification is valid only for the specific mixture (type of binder, amount of glass beads etc.) that was applied on the test field. The only exception from this rule is the drop on glass beads: the certification permits the use of another drop on product than that that was used on the road trials, provided that the technical specifications of the products are identical.

A product data sheet for the road marking material must be handed in together with the registration form. Suppliers will not be asked to provide the administration of the road trials with recipes of their materials.

Drop on glass beads shall be in accordance with EN1423, and their properties shall be documented according to the specifications and classes given in the named standard.

2.1.4. Requirements regarding health, environment and safety

Materials applied on the test field must comply with current chemicals-, health, safety-, and environment legislation and practice in the Nordic countries. Materials must not contain any heavy metals or other materials that are in violation of legislation. Volatile organic compounds (VOCs) shall not exceed 2% by weight of any materials.

Solvent based paint is prohibited in the Nordic countries and is thus not allowed on the test field.

Cold plastic materials are allowed on the road trials, but they are currently not used in the Nordic countries.
3. Test sites

The road trials of the certification system will be carried out in Sweden. A supplementary test site will be available for material tests in Denmark. The locations of the test sites are shown in Figure 1.

The reason for having two test sites is the differences between Finland, Norway and Sweden on one hand, and Denmark on the other hand, with respect to climate and the use of studded tyres.

Figure 1. Locations of the test sites. (Image: modified from NuclearVacuum/CC-BY-SA-3.0)

3.1. The Swedish test site

3.1.1. Location

The Swedish test site is located in western Sweden, approximately 130 km east of Oslo, Norway. The location is intended to represent the average climate conditions in Finland, Norway and Sweden.

The road used for the test site is road E45, 3 km north of the village Sunne. The GPS coordinates in WGS84 DDM are:

- Start: N 59° 51.945, E 13° 07.988
- End: N 59° 52.322, E 13° 08.388

The stretch of road used for the test site is approximately 800 m long. Signs with the text *Provfält vägmarkering* (English: *Test field, road markings*) will inform drivers about the test site.

3.1.2. Road characteristics

The road used for the test site is a two-lane rural road located in a fairly open landscape, Figure 2. The road is straight and relatively flat and without any major junctions. The posted speed limit is 90 km/h.

Only the northbound lane will be used for the test field. This minimizes the risk of poor visual conditions due to sun glare for drivers passing the test site.
There is a 3-way intersection at each end of the road, and one 3-way intersection along the road, where the connecting road is directed towards the west, i.e. it connects to the southbound lane. Road marking materials will not be applied in the intersections.

![Image](figure2.png)

*Figure 2. The road used for the Swedish test site. Photo: Mohammad-Reza Yahya, VTI.*

The width of the road is 9 m. Each lane is 3.75 m and the shoulders are 0.75 m.

The road surface consists of a thin asphalt overlay that was placed in 2012. The roughness class is RG3 i.e. the averaged measured texture depth is in the range of 0.90–1.20 mm. The roughness classification is based on the annual road surface assessments, which provides information on Mean Profile Depth (MPD). From this data, the averaged Measured Texture Depth (MTD) has been estimated (Freitas et al, 2008). A picture of the road surface is shown in Figure 3.

![Image](figure3.png)

*Figure 3. The road surface on the Swedish test site. Photo: Mohammad-Reza Yahya, VTI.*

### 3.1.3. Traffic volume

The annual average daily traffic (AADT) is 3815 vehicles per day (estimated in 2011). The amount of heavy vehicles is 11% of the total number of vehicles.

Measurements of the traffic volume and the transversal distribution of wheel passages will be done at the test site annually, see Section 3.3.

### 3.1.4. Climatic conditions

The annual average temperature during the years 2009–2013 was 5 °C. The average temperature during summer was 15 °C and during winter -6 °C. The highest and lowest temperatures registered
were 31 °C and -28 °C, respectively. The annual average precipitation was 743 mm. On average, there was snow approximately 4 months per year. *(Weather data: www.smhi.se)*

The Köppen classification of the test site is Dfb, close to the boundary of the Dfc climate zone, based on data for the period 1951–2000 (Kottek et al. 2006). The large areas in the inlands in the north of Finland, Norway and Sweden belong to climate zone Dfc, while the most densely populated areas in the south of Finland and Sweden and along the south and west coasts of Norway belong to climate zones Dfb and Cfb. The climatic class according to EN 1824 is C3.

During winter time, the road will be cleared from snow by a snowplough (steel blade). The road entrepreneur will be instructed to be careful when clearing the road at the test site.

The weather conditions at the test site will be registered continuously during the road trials, see Section 3.4.

### 3.1.5. Studded tyres

Studded tyres are permitted in Sweden from 1 October to 15 April. In 2014, the amount of cars with studded tyres in Karlstad, which is located 70 km south of the test site, was 80 % (Trafikverket, 2014).

### 3.2. The Danish test site

#### 3.2.1. Location

The Danish test site is located on Zealand, approximately 50 km north of Copenhagen, Denmark. The road used is Nordre Strandvej, north-west of the town of Helsingør, route 237. The start and end of the stretch of road used for the test site are (exact distances are given by the delineator posts in Denmark):

- Start: 5.6 km from Helsingør
- End: 10.6 km from Helsingør

Thus, the stretch of road used for the test site is 5 km long. Warning signs with subpanels will inform drivers about the test site, Figure 4.

#### 3.2.2. Road characteristics

The road used for the test site is a two-lane rural road surrounded by a rather dense forest, Figure 5. The road is relatively straight and flat and without any major junctions. The posted speed limit is 80 km/h. The northbound lane will be used for the test field.

The width of the road is 7 m. Each lane is 3.25 m wide.

The road surface consists of flexfalt type 6 that was placed in 2008. The roughness class is RG1, i.e. the averaged measured texture depth is < 0.60 mm.
Traffic volume

The annual average daily traffic (AADT) is 2686 vehicles per day (estimated in 2015). The amount of heavy vehicles is 2.1% of the total number of vehicles.

Measurements of the traffic volume and the transversal distribution of wheel passages will be done at the test site annually, see Section 3.3.

Climatic conditions

The annual average temperature during the years 2011–2014 was 9 °C. The highest and lowest temperatures registered were 30 °C and -11 °C, respectively. On average, the temperature was below 0 °C 58 days per year. The annual average precipitation was 628 mm. (Weather data: www.dmi.dk)

The Köppen classification of the test site is Cfb, based on data for the period 1951–2000 (Kottek et al. 2006). The climate zone Cfb covers the whole of Denmark, the southern parts of Sweden and the south and west coasts of Norway. The climatic class of the Danish test site according to EN 1824 is C3, i.e. Cfb with winter maintenance. The extent of winter maintenance may vary a lot between years.

The road will be cleared from snow by a snowplough (rubber blade or steel blade).

The weather conditions at the test site will be registered continuously during the road trials, see Section 3.4.

Studded tyres

Studded tyres are permitted in Denmark from 1 November to 15 April. The amount of cars with studded tyres is low (estimation: about 5%).

Figure 5. The road used for the Danish test site. Photo: Kai Sørensen.
3.3. Measurements of wheel passages

The number of wheel passages and the transversal distribution of wheel passages will be measured annually at the test sites. The assessment of wheel passages will be conducted after the markings have been applied, in order to account for any influence on vehicles’ lateral position from the markings.

The measurement equipment that will be used is based on coaxial cable technique, which provides data with high accuracy. Data will be collected during approximately one week in the summer (i.e. studded tyres are not used when data is collected). The measurements of wheel passages will be carried out by VTI.

From the collected data, the distribution of wheel passages will be calculated according to the procedures described in Annex B in EN 1824. Roll-over classes will then be determined from the calculated distributions, see Section 7.4.

3.4. Measurements of weather conditions

The following data will be registered at the test sites each year:

- Annual average temperature
- Average summer temperature
- Average winter temperature
- Annual precipitation
- Number of sun hours
- Number of weeks with snow
- Number of times the snow plough has operated

Meteorological data will be retrieved from the Swedish Meteorological and Hydrological Institute (SMHI) and the Danish Meteorological Institute (DMI), respectively. Information about snow plough operations is obtained from the road entrepreneurs.
4. Application of road marking materials

The application of road marking materials are based on EN 1824. Details are given below.

4.1. Application pattern

The application pattern is based on the longitudinal pattern described in Section 5.2.3 in EN 1824. Each marking material is applied as a row of longitudinal lines in the direction of the traffic.

Specifications:
- Six longitudinal lines in a row in the lane and, at the Swedish test site, a seventh line on the shoulder
- Length of the lines: 3 m
- Width of the lines: 0.3 m
- Distance between two adjacent lines: 0.2–0.3 m (depends on the width of the lane)
- Distance between two adjacent rows of lines: Depends on the number of materials/rows, but at least 2 m.

The position of the lines will be pre-marked. The administration of the road trials is responsible for the application of pre-markings.

The seventh line on the shoulder serves as a reference without any wheel passages.

A dummy material not included in the actual tests will be applied on the first row, since there is a possibility that the wear will be higher on that row.

4.2. Application method

Preferably, materials shall be applied using self-propelled road marking equipment. Application by hand is permitted, e.g. in case the supplier do not have a self-propelled machine. The application method will be documented in the certification report.

4.3. Material thickness

Materials can be applied in three thicknesses:
- 0.4 mm wet (paint)
- 1.5 mm (example: spray plastic). Maximum thickness allowed at application: 2.0 mm.
- 3.0 mm (example: extruded thermoplastic). Maximum thickness allowed at application: 3.5 mm.

Prefab and tape shall be applied in commercially available thicknesses.

The thickness will be measured when the material is applied. For each row of lines, a steel plate will be placed in the end of the line that is expected to reach the highest number of wheel passages. When material is applied on that line, the length of the line should be lengthened so that material is applied also on the steel plate. The thickness of the material is then measured on the steel plate. In addition, the thicknesses of a random sample of lines (other than those with the highest P class) will be measured by a portable measurement tool.

The thickness of the material will be measured including drop-on glass beads, except for paint which will be measured without drop-on glass beads.

If the thickness of the material is greater than the maximum thickness allowed, the material will be excluded from the road trial.
4.4. **Weather conditions at application**

The supplier is to verify that the weather conditions during application of his materials are within acceptable limits. Meteorological data at application will be registered.

4.5. **Practical information about the application of materials**

The test sites will be open for application of materials for approximately one week. Suppliers will get instructions on when and where to apply their materials. The application will be organized so that the risk of materials being spoiled by weather, traffic or other suppliers’ equipment or presence is minimized.

The lane where the markings will be applied will be closed during application and for a few hours after application. The administration of the road trials will be responsible for the closing of the road.

4.6. **Suppliers’ responsibilities**

Supplier, or his representative, will be responsible for his participating products during installation on the test field, and he has to verify a correct application of his materials.

Suppliers are obliged to:

- Apply their own materials on the test field(s) at their own cost
- Follow the instructions given by the administration of the road trials on-site
- Provide the administration of the road trials with a sample of each material (see Chapter 6)
5. Performance measurements

Performance measurements are based on EN 1824 and EN 1436.

5.1. Periodicity of measurements

Initial measurements of all materials will be carried out approximately two weeks after application. Follow-up measurements will be carried out after one year and, if the supplier wishes, after two years. After two years, higher P classes will have been reached, which implies that the material may be certified for a higher P class.

The follow-up measurements will preliminary be carried out in August each year (this may be adjusted in order to reach a certain number of wheel passages, see also Section 7.4).

In case a material does not fulfil the requirements stated in Chapter 7 at the initial measurements, the material will be excluded from the road trials. No follow-up measurements will be done.

5.2. Performance parameters

The following parameters are included in the certification system:

- Coefficient of retroreflected luminance, $R_L$ dry
- Luminance coefficient under diffuse illumination, $Q_d$
- Friction
- Chromaticity coordinates, x, y

Performance requirements are given in Chapter 7.

5.3. Measurement details

The coefficient of retroreflected luminance, $R_L$, and the luminance coefficient under diffuse illumination, $Q_d$, will be measured in three points on each line, within the measurement area defined by figure 2 in EN 1824 (a 0.15 x 2 m large area centred on the line). The parameter values are calculated as the average of the three measurements. Measurements of $R_L$ and $Q_d$, will be done using an LTL-XL (Delta, Denmark).

Friction will be measured in the centre of each line (one measurement per line). Measurements will be carried out using a Portable Friction Tester version 4 (PFT), which allows for relatively fast and simple measurements. In case the PFT indicates that the friction of a material is lower than the requirements, a new measurement will be carried out using the standard instrument Skid Resistance Tester (SRT). The evaluation of the material will then be based on the value obtained from the SRT.

Chromaticity coordinates will be measured in one point on each line. A Konica Minolta Spectrophotometer CM-2500c will be used to measure the chromaticity coordinates.

All measurements will be carried out in the direction of the traffic. Measurements will be done on dry markings in dry weather. The markings will not be cleaned before carrying out the measurements.

All measurement equipment will be calibrated.
6. Samples for identification

Samples will be taken from all materials that are applied on the test fields for certification purposes. Samples will be taken directly from the application machine during installation at the test field. Material samples will be used for identification analysis that will be executed either directly after sampling, or after some time of storage. The sampling will be done by the administration of the road trials.
7. Certification

7.1. General

7.1.1. Norway and Sweden

The certification system applies to Norway and Sweden. In these countries, material certification will be required in order to use the road marking material on roads managed by the national road authorities.

7.1.2. Denmark

The certification system does not apply to Denmark. A test on the supplementary road trial site in Denmark will result in a test report serving as documentation of the performances obtained in relation to the number of wheel passages in conditions prevailing in Denmark. Tender specifications may request the availability of test reports that verify the minimum performances listed in tenders.

7.1.3. Finland

The certification system does not apply to Finland for the present. If Finland decides to join the certification system later, material certifications received from the Swedish road trials will be valid in Finland.

7.2. Certification materials and test materials

Suppliers will have to register their materials either as a certification material, a documentation material or a test material, before the material is applied on the test field.

- **Certification material**: The material is applied on the test field for certification purposes, which implies that it will receive certification for use in Norway and Sweden, provided that it fulfils the performance requirements. Application and performance measurements will be done in accordance with the procedures described in this report. The results of the materials registered as certification materials will be published in a public report, see Section 7.6. Certification materials can be applied on the Swedish test site only.

- **Documentation material**: The material is applied on the test field for documentation purposes, which implies that it will receive documentation of the performance for use in Denmark. Application and performance measurements will be done in accordance with the procedures described in this report. The results of the materials registered as documentation materials will be published in a public report, see Section 7.6. Documentation materials can be applied on the Danish test site only.

- **Test material**: The material is applied on the test field for test purposes only. The application and the performance measurement will be done in the same way as for certification materials. The results of the performance measurements will be available to the administration of the road trials and to the supplier of the material. The results will be confidential to other suppliers. The results will not be published anywhere, not even in a de-identified form. Materials registered as test materials cannot receive certification. Test materials may be applied on the Swedish as well as on the Danish test site.

This first stage of the certification system includes materials applied as type I markings and thus, certification materials shall be applied as type I markings. A material that is certified as a type I material is certified for use also as a type II marking, until further notice.

Documentation materials and test materials may be applied as type I or as type II markings.
7.3. Performance requirements

The performance requirements includes four parameters, which are given in Table 1.

*Table 1. Performance requirements*

<table>
<thead>
<tr>
<th>Performance parameter</th>
<th>White markings</th>
<th>Yellow markings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient of retroreflected luminance, $R_l$ dry [mcd/m²/lx]</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>Luminance coefficient under diffuse illumination, $Q_d$ [mcd/m²/lx]</td>
<td>130</td>
<td>100</td>
</tr>
<tr>
<td>Friction, [SRT units]</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Chromaticity coordinates, $x$, $y$</td>
<td>*</td>
<td>**</td>
</tr>
</tbody>
</table>

*) According to EN 1436
**) Includes both daytime and night-time colour. Daytime colour: according to class Y1 in EN 1436. Night-time colour: according to ASTM D6628.

Friction will primarily be measured by a PFT. Conversion between SRT units and PFT units are done according to (Wälivaara 2007):

$$SRT = 78.6\times PFT + 9.2 \pm 9.0$$

An SRT value of 50 corresponds to a PFT value of 0.52.

Materials that do not fulfil the performance requirements at the initial measurement will be excluded from the road trials.

7.4. Certification in relation to P-classes

Materials will be certified in relation to the number of wheel passages it will stand. The six lines on the test field will be exposed to different numbers of wheel passages, which means that different roll-over classes will be reached on different lines.

Roll-over classes according to EN 1824 will be determined from the measurements of wheel passages (see Section 3.3), for each of the six lines (see Section 4.1), Table 2.

At the Swedish test site, the expected roll-over classes ranges from P0 to P3 or P4 after one year and P4 or P5 after two years. The time needed to reach the different P classes will be derived from the measurements of wheel passages, and possibly the points of time for the performance measurements will be adjusted in order to obtain data that represents all (possible) P classes.

Materials will thus be certified for a certain roll-over class (P-class). In order to be certified, all four performance requirements must be fulfilled for that particular class.

In case two or more of the six lines represent the same P class, the average of the performance parameters of these lines will be used as the result for that P class.

The materials have to fulfil the requirements for all classes lower than that it is certified for. Example: In order for a material to be certified as a P3 material, the performance requirements have to be fulfilled also for classes P0, P1 and P2.

If a material has been certified for a certain P class after one year (i.e. at the 1 year follow-up measurement), this certification is valid irrespective of the results of the measurements after two years. The 2 year follow-up measurements will merely be used to evaluate whether the material fulfils the requirement for a higher P class than what it already is certified for.
Table 2. Roll-over classes, EN 1824.

<table>
<thead>
<tr>
<th>Roll-over class</th>
<th>Number of wheel passages</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0</td>
<td>( \leq 50,000 )</td>
</tr>
<tr>
<td>P1</td>
<td>Between 50 000 and 60 000</td>
</tr>
<tr>
<td>P2</td>
<td>100 000 ( \pm 20% )</td>
</tr>
<tr>
<td>P3</td>
<td>200 000 ( \pm 20% )</td>
</tr>
<tr>
<td>P4</td>
<td>500 000 ( \pm 20% )</td>
</tr>
<tr>
<td>P5</td>
<td>1 000 000 ( \pm 20% )</td>
</tr>
<tr>
<td>P5.5</td>
<td>1 500 000 ( \pm 20% )</td>
</tr>
<tr>
<td>P6</td>
<td>2 000 000 ( \pm 20% )</td>
</tr>
</tbody>
</table>

7.5. Validity of certification

Materials that have received certification from the Swedish test site are approved for use in Norway and Sweden.

A certification is valid forever or until the requirements are changed.

Certifications from other European countries are not valid in Norway and Sweden due to climatic conditions and the use of studded tyres.

7.6. Documentation

The results of the performance measurements of all materials registered as certification materials will be published in a public report. Results will be published regardless of whether the material fulfils the requirements or not. The names of the supplier and of the material will be published along with the results.

The report will include a list of certified materials, and the roll-over classes the materials are certified for. Complete data from the performance measurements, i.e. the measured values of each performance parameter for each line and for each material, will be presented as well.

The report will be freely available from [www.vti.se](http://www.vti.se).

The results of the performance measurements of all materials registered as documentation materials will be published in the same public report as the certification materials.

Preliminary versions of report forms for registration, application and performance measurements can be found in Appendix 1-3.

7.7. Participant fee and other costs

A fee will be charged for each material applied on the test fields. There are two options:

- 1 year follow-up: Includes administration, performance measurements after two weeks (initial) and after one year (follow-up), and documentation of the results.

  **Participant fee: SEK 35 000.**
- 2 years follow-up: Includes administration, performance measurements after two weeks (initial) after one year and after two years (follow-up), and documentation of the results.

**Participant fee: SEK 50 000.**

The same participant fees apply to certification materials, documentation materials and test materials. The participant fee will be charged before the application of materials. If payment has not been received, materials must not be applied on the test field.

If a material is excluded from the trial because it did not fulfil the requirements regarding thickness at application, the supplier can choose to make a new application of the material, at an extra cost. If the supplier chooses to withdraw the material from the road trial, a portion of the participant fee is refunded.

Costs for application of materials (cost of labour, material, equipment) are paid by the supplier.

The administration of the road trials will bear the costs for closing of the road, pre-marking, plates for thickness measurements and containers for material samples.
References


### Appendix 1 – Report form for registration of materials

#### Registration of material (preliminary version)

<table>
<thead>
<tr>
<th>Company</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer:</td>
<td></td>
</tr>
<tr>
<td>Contact person:</td>
<td></td>
</tr>
<tr>
<td>Phone:</td>
<td></td>
</tr>
<tr>
<td>E-mail:</td>
<td></td>
</tr>
<tr>
<td>Street address:</td>
<td>City:</td>
</tr>
<tr>
<td>Postal code:</td>
<td>Country:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of material:</td>
<td></td>
</tr>
<tr>
<td>Country of origin:</td>
<td></td>
</tr>
<tr>
<td>Type:</td>
<td></td>
</tr>
<tr>
<td>☐ Certification material</td>
<td>☒ Swedish test site</td>
</tr>
<tr>
<td>☐ Documentation material</td>
<td>☒ Danish test site</td>
</tr>
<tr>
<td>☐ Test material</td>
<td>☐ Swedish test site</td>
</tr>
<tr>
<td>Select material type</td>
<td>☐ Danish test site</td>
</tr>
<tr>
<td>Select test site and material type</td>
<td></td>
</tr>
<tr>
<td>Colour:</td>
<td></td>
</tr>
<tr>
<td>☐ White</td>
<td>☐ Yellow</td>
</tr>
<tr>
<td>Follow-up:</td>
<td></td>
</tr>
<tr>
<td>☐ 1 year (SEK 35 000)</td>
<td>☐ 2 years (SEK 50 000)</td>
</tr>
<tr>
<td>Application method:</td>
<td></td>
</tr>
<tr>
<td>☐ Self-propelled machine</td>
<td>☐ By hand</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signature</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I hereby certify that the material complies with current chemicals legislation and practice in the Nordic countries:</td>
<td>☐ Yes</td>
</tr>
<tr>
<td>A product sheet is enclosed:</td>
<td>☐ Yes</td>
</tr>
<tr>
<td>Date:</td>
<td></td>
</tr>
<tr>
<td>Place:</td>
<td></td>
</tr>
<tr>
<td>Signature:</td>
<td></td>
</tr>
<tr>
<td>Clarification of signature:</td>
<td></td>
</tr>
</tbody>
</table>
To be filled in by the administration of the road trials

<table>
<thead>
<tr>
<th>Date</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Material ID</td>
<td></td>
</tr>
</tbody>
</table>
## Application of material (preliminary version)

### Product data

| Manufacturer: | |
| Name of material: | |
| Material ID: | |
| Type: | □ Certification material □ Documentation material □ Test material |

| Pattern of application: | □ Type I □ Type II |
| Colour: | □ White □ Yellow |
| Thickness: | □ 0.4 mm □ 1.5 mm □ 3.0 mm |

### Test site

| Test site: | □ Danish test site □ Swedish test site |
| Position on test site: | |

### Application

| Date of application: | |
| Installed by (contractor): | |
| Application method: | □ Self-propelled machine □ By hand |
| Application device: | |
| Thickness at application: | ______ mm □ Approved □ Not approved *(measured using a steel plate)* |
| Thickness samples: | Number:____ □ Approved □ Not approved *(measured using Zehntner)* |

### Meteorological data

| Road surface temperature (°C): | |
| Limit temperatures for material (°C): | |
| Limiting relative humidity for material (%): | |
| Ambient temperature (°C): | |
| Wind speed (m/s): | |

### Supplier’s signature

I hereby approve the application of the material and its participation in the road trials: □ Yes □ No

<p>| Date: | |
| Place: | |
| Signature: | |
| Clarification of signature: | |</p>
<table>
<thead>
<tr>
<th>Administrator’s signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>The material fulfils the requirements for participation in the road trial: ☐ Yes ☐ No</td>
</tr>
<tr>
<td>Date:</td>
</tr>
<tr>
<td>Place:</td>
</tr>
<tr>
<td>Signature:</td>
</tr>
<tr>
<td>Clarification of signature:</td>
</tr>
</tbody>
</table>
Appendix 3 – Report form for performance measurements

Performance measurements (preliminary version)

<table>
<thead>
<tr>
<th>Material and test site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material ID:</td>
</tr>
<tr>
<td>Test site:</td>
</tr>
<tr>
<td>☐ Danish test site</td>
</tr>
<tr>
<td>☐ Swedish test site</td>
</tr>
<tr>
<td>Position on test site:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Meteorological data:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road surface temperature (°C):</td>
</tr>
<tr>
<td>Ambient temperature (°C):</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of measurements:</td>
</tr>
<tr>
<td>Type:</td>
</tr>
<tr>
<td>☐ Initial</td>
</tr>
<tr>
<td>☐ 1 year</td>
</tr>
<tr>
<td>☐ 2 years</td>
</tr>
<tr>
<td>Line (1 is the leftmost in the direction of the road, 7 is on the shoulder)</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>( R_L ) (mcd/m²/lx), point 1</td>
</tr>
<tr>
<td>( R_L ) (mcd/m²/lx), point 2</td>
</tr>
<tr>
<td>( R_L ) (mcd/m²/lx), point 3</td>
</tr>
<tr>
<td>( Qd ), (mcd/m²/lx), point 1</td>
</tr>
<tr>
<td>( Qd ), (mcd/m²/lx), point 2</td>
</tr>
<tr>
<td>( Qd ), (mcd/m²/lx), point 3</td>
</tr>
<tr>
<td>PFT</td>
</tr>
<tr>
<td>Colour, x, white</td>
</tr>
<tr>
<td>Colour, y, white</td>
</tr>
<tr>
<td>Colour, x, yellow Y1</td>
</tr>
<tr>
<td>Colour, y, yellow Y1</td>
</tr>
<tr>
<td>Colour, x, yellow NTY</td>
</tr>
<tr>
<td>Colour, y, yellow NTY</td>
</tr>
</tbody>
</table>

If the PFT value does not fulfil the requirements, new measurements will be carried out using SRT

<table>
<thead>
<tr>
<th>SRT</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator’s signature</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>The performance measurements have been done in accordance with prescribed procedures:</td>
</tr>
<tr>
<td>Date:</td>
</tr>
<tr>
<td>Place:</td>
</tr>
<tr>
<td>Signature:</td>
</tr>
<tr>
<td>Clarification of signature:</td>
</tr>
</tbody>
</table>
## Contact Information

<table>
<thead>
<tr>
<th>Working group</th>
<th>Name</th>
<th>Organisation</th>
<th>E-mail</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Road authority rep.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ole Hardt</td>
<td>The Danish Road Directorate, Denmark</td>
<td><a href="mailto:oha@vt.dk">oha@vt.dk</a></td>
<td>+45 7244 3333</td>
</tr>
<tr>
<td></td>
<td>Tuomas Österman</td>
<td>Finnish Transport Agency, Finland</td>
<td><a href="mailto:Tuomas.Osterman@trafi.fi">Tuomas.Osterman@trafi.fi</a></td>
<td>+358 295 34 3000</td>
</tr>
<tr>
<td></td>
<td>Björn Skaar</td>
<td>The Norwegian Public Roads Administration, Norway</td>
<td><a href="mailto:bjorn.skaar@vegvesen.no">bjorn.skaar@vegvesen.no</a></td>
<td>+47 918 02 030</td>
</tr>
<tr>
<td></td>
<td>Lars Petersson</td>
<td>The Swedish Transport Administration, Sweden</td>
<td><a href="mailto:lars.petersson@trafikverket.se">lars.petersson@trafikverket.se</a></td>
<td>+46-771 921 921</td>
</tr>
<tr>
<td></td>
<td>Trond Cato Johansen</td>
<td>Administration of the road trials, Norge</td>
<td><a href="mailto:Trond.Cato.Johansen@ramboll.no">Trond.Cato.Johansen@ramboll.no</a></td>
<td>+47 905 365 05</td>
</tr>
<tr>
<td></td>
<td>Carina Fors</td>
<td>The Swedish National Road and Transport Research Institute (VTI), Sweden</td>
<td><a href="mailto:carina.fors@vti.se">carina.fors@vti.se</a></td>
<td>+46 709 430 436</td>
</tr>
<tr>
<td></td>
<td>Sven-Olof Lundkvist</td>
<td>The Swedish National Road and Transport Research Institute (VTI), Sweden</td>
<td><a href="mailto:sven-olof.lundkvist@vti.se">sven-olof.lundkvist@vti.se</a></td>
<td>+46 709 103 250</td>
</tr>
<tr>
<td></td>
<td>Kai Sørensen</td>
<td>Consult, Denmark</td>
<td><a href="mailto:kai.sorensen@newmail.dk">kai.sorensen@newmail.dk</a></td>
<td></td>
</tr>
</tbody>
</table>

For questions about the road trials and the certification system, please contact Trond Cato Johansen or Carina Fors.

For questions related to national guidelines, tendering, and contracts, please contact the respective road authority representative.

The Swedish National Road and Transport Research Institute (VTI), is an independent and internationally prominent research institute in the transport sector. Its principal task is to conduct research and development related to infrastructure, traffic and transport. The institute holds the quality management systems certificate ISO 9001 and the environmental management systems certificate ISO 14001. Some of its test methods are also certified by Swedac. VTI has about 200 employees and is located in Linköping (head office), Stockholm, Gothenburg, Borlänge and Lund.