

**Status for CEN standardization work on natural stone**

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**Deliverable 3 (D3): 31/12/06 . Revised November 2008**  
**Status for Natural Stone Standardization work**  
**(Testing, product standards, requirements etc.)**

Leveranse 3 (D3):31/12/06  
Status i CEN TC komitéer for naturstein

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The report is divided in two parts.  
 Part I gives a summary of elements of priority importance.  
 Part II gives a more detailed description and comments to various aspects. It is foreseen that each Nordic country will assist in informing both the Natural stone industry and the building industry about the progress of the standardization work and important matter in further revisions of standards. This is planned to be done either through the Stone Federation web sites, the websites of project partners or by other information channels.

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As can be seen from the tables, there is a remarked difference especially in requirements for factory production control between the products. In EN 1341, -42 and 43, no specification about frequency is given, while as for roofing slates, a quite severe (and for producers expensive) testing programme and

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frequency is specified (about NOK 70.000 each year). This has been felt as one very important matter to discuss further between the Nordic countries, and has been given high focus. The work is continued through a separate project in Norway..... 24

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**PART I**

**Summary and concluding remarks**

This report gives an overview of existing standardization work and standards for natural stone developed in several Technical Committees within CEN, including standards that are now mandatory to use also in the Nordic countries. Focus has been made to highlights aspects and requirements that producers and users should be aware of in case of natural stone trade and application. Focus has also been made to highlights standards or particular matters that need to be further discussed and worked with on within the NICe project and further on after completion of the project, at Nordic level.

**Overview of standardization and standards**

The following CEN TC Technical committees are working with product standards, test methods and terminology standards for natural stone:

- CEN TC 246 - Natural Stone. Secretariat held by UNI, Italy.
- CEN TC 178 – Paving units and kerbs. Secretariat held by BSI, United Kingdom
- CEN TC 125 – Masonry. Secretariat held by BSI, United Kingdom
- CEN TC 128 – Roof covering products for discontinuous laying and wall claddings. Secretariat held by NBN, Belgium

As per 2008, 8 harmonized product standards, i.e. mandatory standards for natural stone have been published (marked in **bold** in the table below). In addition, product specifications for rough blocks, rough slabs and dimensional stone work have been published, but these are not mandatory, i.e. they are not harmonized standards and CE marking is not specified.

Published Product standards for natural stone. Harmonized/mandatory standards are marked in **bold**.

CEN TC	Number	Title	Attestation of conformity system	Current status Pr. Nov 2008	DAV
125	<b>EN 771-6:2005</b>	<b>Specifications for masonry units – Part 6: Natural stone masonry units</b>	<b>2+, 3,4</b>		
178	<b>EN 1341:2001</b>	<b>Slabs of natural stone for external paving. Requirements and test methods.</b>	<b>4</b>	Under development	2010-11
178	<b>EN 1342:2001</b>	<b>Setts of natural stone for external paving. Requirements and test methods</b>	<b>4</b>	Under development	2010-11
178	<b>EN 1343:2001</b>	<b>Kerbs of natural stone for external paving. Requirements and test methods</b>	<b>4</b>	Under development	2010-11
246	EN 1467:2003	Natural stone – Rough blocks – Requirements	-		
246	EN 1468:2003	Natural stone – Semifinished products (rough slabs) – Requirements	-		
246	<b>EN 1469:2004</b>	<b>Natural stone – Finished products, slabs</b>	<b>3,4</b>		

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		for cladding – Requirements			
246	EN 1205:20047	Natural stone – Finished products, modular tiles – Requirements	3,4		
246	EN 12058:2004	Natural stone – Finished products, slabs for floors and stairs – Requirements	3,4		
246	EN 12059:2008	Natural stone – Dimensional stone work – Requirements			
128	EN 12326-1:2004	Slate and stone products for discontinuous roofing and cladding – Part 1: Product Specification	4 (3)		
154	EN 13383-1:2004	Armourstone - Part 1: Specification	2+, 4	Under approval	2011-09

For testing of natural stone, nearly 30 separate standards have been published, and two standards for terminology and denomination are available.

Thus, this is the first time in history that all European countries have the same standards for natural stone products and natural stone testing. It is also the first time in history in Denmark and Norway, that national standards for testing of natural stone are available.

### Harmonized standards and CE marking. Important consequences for producers

It is the responsibility of the producer, or more correctly the supplier of the final natural stone product, to ensure that the properties of the product are documented before the product is sold or being used in a construction. It is now illegal to sell a product without such documentation, since the period allowed for national implementation of the standard is over (since 2006).

On basis of Initial type testing and Factory production control, the producer shall prepare a Conformity declaration based on a conformity evaluation, and he may affix the CE mark. The declaration document shall follow the product. The producer may evaluate himself whether the product conforms with the requirements.

For the Nordic countries, CE marking is for the time being only compulsory in Denmark and here for natural stone products for cladding. In Norway CE marking will be mandatory in 2011. In Europe, CE marking is so far compulsory only in Germany, Spain and Portugal for natural stone products for roofing, cladding, flooring and exterior pavements. Nordic natural stone products exported to e.g. Germany must thus be affixed with the CE mark.

Stone products that are CE marked are considered to satisfy minimum requirements with respect to product properties pursuant to the prevailing regulations in each country. Different countries have implemented particular national requirements in addition to those stated in hENs, e.g. Germany has a National requirement of slip resistance. Exporters must be familiar with such national requirements.

### Denomination of natural stone

For producers or suppliers of natural stone, trade and delivery of natural stones should be followed by the below mentioned denomination information about the actual stone. This shall also be accomplish CE marking documents and should also be given on general product data sheets etc. Specifiers, buyers and users should ask for this information in tender documents etc.

Denomination information to be given	Comment
Traditional, i.e. commercial (marketing) name	Geological names not related with the actual place of the stone and company names shall be avoided.
Petrological family	To be specified according to EN 12670
Typical colour	To indicate natural variations that can be expected. The various product standards give further specifications about reference samples etc.
Place of origin	As minimum, the city/village, municipality/community, county, province or department and country.
Other information	If available or agreed between buyer and seller, e.g. surface processing, natural features.

### Further Nordic involvement and influence in Standardization work

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*The involvement from industry and research in the Nordic countries has been, and is still humbly. This lack of involvement is a paradox and further involvement both at national and joint Nordic level has been given high priority in the NICE project and should be given priority also after the finalization of the project.*

*The availability and ease for applying the standards strongly request for especially the product standards to be available in our native languages. Here the Stone Federation in each country should put effort in making this possible.*

Comments to several product standards and test methods have been made through the work of the NICE project. It is of outermost importance for the Nordic countries to put special focus on further revisions of product standards and test methods that are under development for revision, or where the revisions are at an approval stage (time) that makes it possible for us to influence.

## PART II

### 2. Content and Purpose

This report give an overview of existing standardization work and standards for natural stone developed in several Technical Committees within CEN, including standards that are now mandatory to use also in the Nordic countries. Some comments/discussions about particular parts are also included.

One purpose of the report is to give a summary of existing standards and standardization works and particular what kind of aspects and requirements producers and users should be aware of in case of natural stone trade and application. Additionally, also the status for involvement in the CEN work within the field of natural stone in Norway, Denmark, Sweden and Finland will be presented, with the intention to form a basis for discussion in the NICE project 06151 (called NICE in the following) on how Nordic co-operation and follow-up within this field may be done onwards.

Of importance in this respect is also to outline standards or particular matters that need to be further discussed and worked with on a Nordic level and within the NICE project.

## 2 Standardization of natural stone

### 2.1 Why standardize stone?

#### 2.1.1 Construction Products Directive and harmonized standards

As an introductory remark, one may ask this question, or perhaps find it surprising or even ridiculous that stone need to or can be standardized. For sure, it is a natural, heterogeneous material that varies – from its genetic nature, truly down to the smallest crystal.

Bringing stone into an application perspective, the topic of standardization may seem more understandable. Natural stone is truly an important building and construction material. To have buildings and other constructions that satisfy certain technical and safety requirements are obvious.

*To ease harmonization of technical requirements for product groups, EU developed directives following a so-called New Approach Method. This method has the objective of establishing a framework directive that includes essential requirements within Health, Safety and Environmental issues. All Nordic countries are comprised by these directives.*

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*Building materials and products are under the cover of The Construction Products Directive (CPD) - 89/106/EEC. The purpose of CPD is to remove technical trade barriers for building products between member countries within EEA. In order to achieve this, the CPD has introduced four main instruments:*

*A system for Harmonized technical specifications/standards  
A system for Attestation of conformity for each product family  
Technical Control Bodies  
CE-marking of products.*

By Harmonized standards is meant standards that fulfil the Essential requirements in the CPD. A building product that is in conformity with a harmonized European standard may be marked with a special CE mark and sent freely between all EEA countries. On the contrary, building products that not satisfy the requirements defined for CE marking is not allowed to be marketed.

CPD specifies different attestation systems for declaration of conformity with the harmonized standards (hENs), depending on the product's significance as for the finished building to satisfy the requirements within CPD, figure 2-1. Different attestation systems may be valid for the same product, depending on the final intended use.

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<b>system of attestation</b>	<b>task for manufacturer</b>	<b>task for notified body</b>
4	-initial type testing of product - factory production control	none
3	- factory production control	- initial type of testing of product
2	-initial type of testing of product - factory production control	certification of factory production control on basis of - initial inspection
2+	-initial type testing of product - factory production control -testing of samples according prescribed test plan	certification of factory production control on basis of - initial inspection - continuous surveillance, assessment and approval of production control
1	- factory production control -further testing of samples according prescribed test plan	certification of product conformity on basis of tasks of the notified body and the tasks assigned to the manufacturer -initial type-testing of the product -initial inspection of factory and of factory production control - continuous surveillance, assessment and approval of factory production control
1+	- factory production control -further testing of samples according prescribed test plan	certification of product conformity on basis of tasks of the notified body and the tasks assigned to the manufacturer -initial type-testing of the product -initial inspection of factory and of factory production control - continuous surveillance, assessment and approval of factory production control -audit-testing of samples taken at the factory

Figure 2-1 Systems for Attestation of Conformity. General overview.

Thus, each hENs states:

- Systems for attestation og conformity (AoC)
- Properties and/or classification that shall be declared
- Properties that may be declared
- Requirements for type testing and factory production control

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- Specification for and examples of CE marking.

*CPD harmonizes test methods, methods for declaration of performance values for products and the methods for evaluation of conformity. CPD is not aiming at harmonizing regulations. Public authorities in EEA-countries and those responsible for public or private purchases is free to establish own performance requirements for buildings and therefore also for building materials. It is in the hands of the national authorities to select which values that may be required for the intended use. Nevertheless, in many cases the technical specifications will include maximum- or minimum values. This element forms an important basis for further work within the NICE project to establish recommended requirements for natural stone in various applications. To day, practically now such requirements are established neither in Denmark, Sweden, Finland or Norway.*

### 2.1.2 Harmonized standards and CE marking. Important consequences for producers

It is the responsibility of the producer, or more correctly the supplier of the final natural stone product, to ensure that the properties of the product are documented before the product is sold or being used in a construction. It is illegal to sell a product without such documentation, as soon as the period allowed for national implementation of the standard is over. It is the responsibility of the buyer to evaluate whether the declared properties are satisfactory for the intended use.

The producer's documentation shall be available during trade and use, and shall be in accordance with the relevant product standard developed (and eventually also in national regulations). The basis for this documentation is initial type testing (ITT) and factory production control (FPC). Each standard specify the extent of type testing and FPC. On basis of ITT and FPC, the producer shall prepare a Conformity declaration based on a conformity evaluation, and he may affix the CE mark. The declaration document shall follow the product. For some products, like for natural stones, the producer may evaluate himself whether the product conforms with the requirements, see later. For other products it is required that this evaluation has to be done by an Approved Body, e.g. a Certification Body. CE marking is compulsory in many countries, but not all.

For the Nordic countries, CE marking is for the time being only compulsory in Denmark and here for natural stone products for cladding. In Norway CE marking will be mandatory in 2011. In Europe, CE marking is so far compulsory only in Germany, Spain and Portugal for natural stone products for roofing, cladding, flooring and exterior pavements. Nordic natural stone products exported to e.g. Germany must thus be affixed with the CE mark.

Stone products that are CE marked are considered to satisfy minimum requirements with respect to product properties pursuant to the prevailing regulations in each country.

Important to notice is nevertheless that the CE mark must not be regarded as a technical quality mark, and even though a product has a CE mark, this does not necessarily mean that all requirements valid in one country is fulfilled. As indicated above, different countries have implemented particular national requirements in addition to those stated in hENs, e.g. Germany has a National requirement of slip resistance. Exporters must be familiar with such national requirements. For export of natural stone products, there is so far no European co-ordination of such national amendments. This implies that there may be differences in which properties in each country that need to be declared. Exporters must be familiar with such national requirements. It has been a task within the NICE project to establish an overview of such national requirements important for export of Nordic stone products. So far, a whole overview of the situation has not been achieved, but through the NICE project, attempts has been made to coordinate this collection of important information from various countries through the established "Natural Stone Competence centre/Workshop on Natural Stone" encouraged by EUROROCK.

### 2.2 CEN technical Committees (TC) on Natural stone. Organization

It is the European Standardization organization CEN that prepare European standards.



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In figure 2.2 the general procedure for standardization work is illustrated. At the Publication stage the standard is available in the three official languages English, German and French, but at this stage it is still not valid as a national standard in the member states. Each country has a time limit of 6 months to implement the standard as a national standard, and during the same time, conflicting standards (i.e. standards within the same area) must be withdrawn.

After implementation the standards may be revised at certain time intervals, or when requested. It is the secretariat for the actual TC that is responsible for such revisions. In general terms revisions may be scheduled at the shortest 5 years after the standard is officially published.

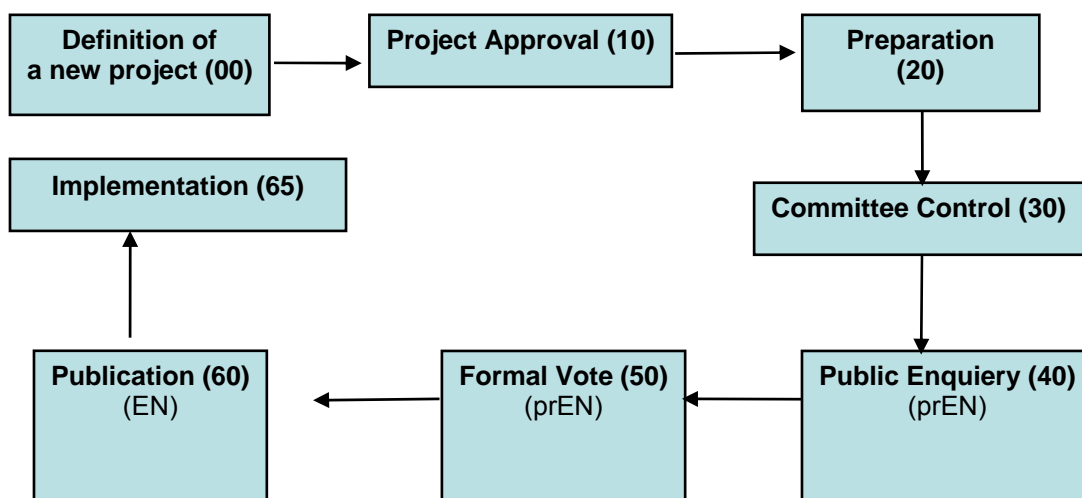


Figure 2.2 Procedure / stages for preparation of a European Standard (EN).

The following committees have been working with product standards, test methods and terminology standards for natural stone:

- CEN TC 246 - Natural Stone
- CEN TC 178 – Paving units and kerbs
- CEN TC 125 – Masonry
- CEN TC 128 – Roof covering products for discontinuous laying

CEN TC 154 – Aggregates has developed a standard for armourstone, but this will not be discussed further in the present report.

CEN TC 246 and TC 229 have worked jointly for preparing standards for agglomerated stones. These product standards and test methods will not be presented or discussed here.

(The reader may refer to <http://www.cenorm.be/cenorm/businessdomains/technicalcommitteesworkshops> for further information).

Figure 2.3 shows, in general terms, how the standardization work is organized, and in figure 2.4-2.7, the organization of the TCs of relevance for natural stone are shown.

While TC 246 and TC 125 have separated the product specifications and test methods in isolated standards, TC 178 has included the test methods in the three product specifications established<sup>1</sup>. TC 128 has developed one standard consisting of two parts, one with the product specification, and one with all test methods collected, see chapter 2.3.

<sup>1</sup> At present (november 2008), the product standards EN 1341, 1342 and 1343 are under revision. Through this revision, the product standards will refer to the test methods developed by CEN TC 246, thus not be included in the product standard from CEN TC 178.

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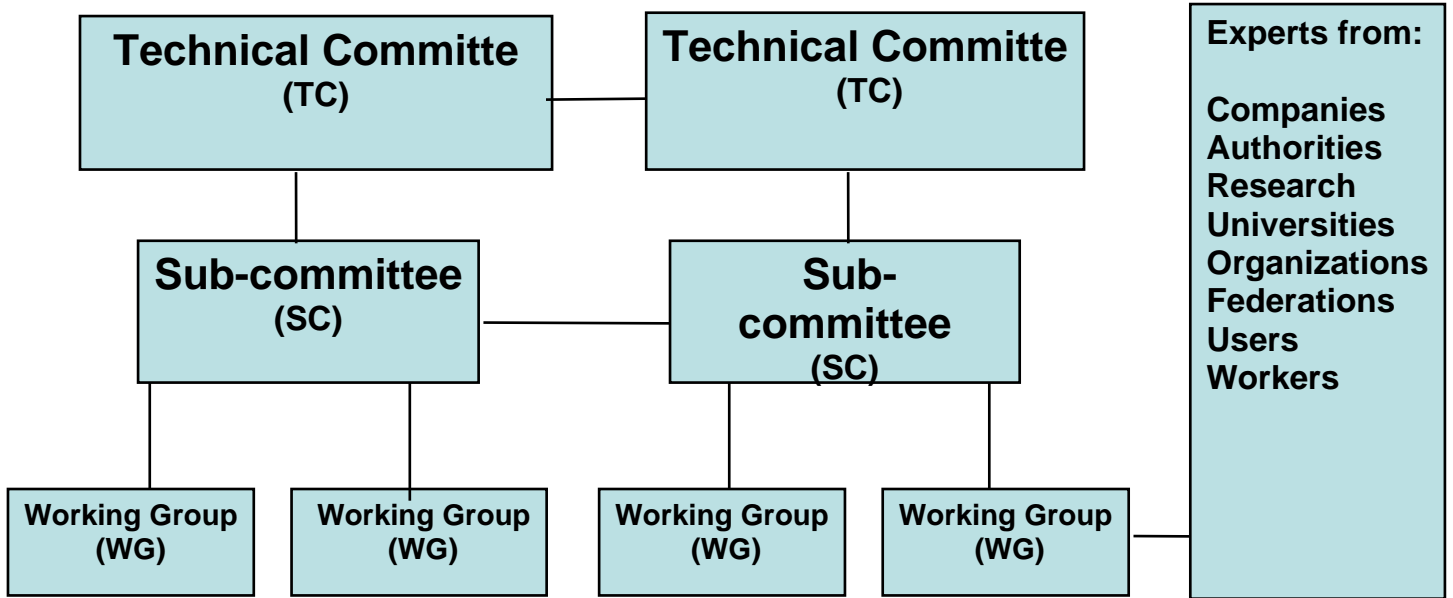


Figure 2.3 Organization of CEN standardization work. In addition, also Task groups (TG) and ad-hoc groups may be established.

**Secretariat UNI. Chairperson** Ms A.Frisa Morandini. **Secretary** Ms C.Miramonti

SC/WG	Title
CEN/TC 246/WG 1	Terminology, classification and characteristics
CEN/TC 246/WG 2	Test methods
CEN/TC 246/WG 4	Agglomerated stones (JWG 229/246)

Figure 2.4 Organization of TC 246. Comment: Also a WG 3 has been active, working with the Product specifications.

**Secretariat BSI. Chairperson** Mr R.Dudgeon. **Secretary** Mr D.I.Hyde

SC/WG	Title
CEN/TC 178/WG 1	Precast concrete products

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<b>CEN/TC 178/WG 2</b>	<b>Natural stone products</b>
CEN/TC 178/WG 3	Clay products
CEN/TC 178/WG 4	Test methods for simulation of ageing of pavers by polishing
CEN/TC 178/WG 5	Tactile Paving

Figure 2.5 Organization of TC 178 – Paving units and kerbs.

**Secretariat BSL. Chairperson** Mr J.C.Haynes. **Secretary** Mr D.I.Hyde

<b>SC/WG</b>	<b>Title</b>
<b>CEN/TC 125/WG 1</b>	<b>Masonry units</b>
CEN/TC 125/WG 2	Mortar
CEN/TC 125/WG 3	Ancillary components
CEN/TC 125/WG 4	Test methods
CEN/TC 125/WG 5	Application of external rendering in masonry
CEN/TC 125/WG 6	EN 1745

Figure 2.6 Organization of TC 125 - Masonry.

**Secretariat NBN. Chairperson** Mr P.Vitse. **Secretary** Mrs N.Lens

<b>SC/WG</b>	<b>Title</b>
CEN/TC 128/SC 2	Concrete roofing tiles
CEN/TC 128/SC 3	Clay roofing tiles
CEN/TC 128/SC 4	Fibre-cement products for roofing
CEN/TC 128/SC 6	Bitumen shingles and corrugated sheets for roofing
CEN/TC 128/SC 7	Roofing products from metal sheet
<b>CEN/TC 128/SC 8</b>	<b>Slate and stone products for roofing</b>
CEN/TC 128/SC 9	Prefabricated accessories for roofing
CEN/TC 128/SC 10	Gutters
CEN/TC 128/SC 11	Double skin metal faced insulating sandwich panels for roofing and cladding
CEN/TC 128/WG 1	Mandates - Preparation

Figure 2.7 Organization of TC 128 – Roof covering products for discontinuous laying and products for wall cladding.

**2.3 Organization and work at national level**

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It is the Standardization Bodies in each country that are responsible for organizing the standardization work and implementing European standards as national standards.

### 2.3.1 Finland

The Finnish Standards Association SFS ([www.sfs.fi](http://www.sfs.fi)) is an independent, non-profit making organization co-operating with trade federations and industry, research institutes, labour market organizations, consumer organizations, and governmental and local authorities. Members of SFS include professional, commercial and industrial organizations, and the state of Finland represented by the ministries.

SFS, the Finnish standardization body, has given the task of taking care of the standardization activity to RT, The Confederation of Finnish construction industry (Rakennusteollisuus RT ry). RT is a standards Writing Body of the Finnish Standards Association (SFS) and it is responsible for construction products and the domestic, European, and international standardisation concerning their use ([www.rakennusteollisuus.fi](http://www.rakennusteollisuus.fi)). The aim is to continue the use of safe and healthy construction products in Finland and thus to improve productivity throughout the construction process. Such action will increase the competitiveness of Finnish construction products and construction on internationalising markets. RT serves as an expert in matters concerning quality control and safeguards the interests of the industry by compiling guidelines and approving products. Thus, RT is in charge of taking care of the standardization in all the TCs of relevance for natural stone.

*A national Mirror Group for following especially the work of TC 246 has been established. The mirror group is "flexible", and nearly everyone interested can participate. In the mirror group of CEN TC 246 nobody is payed. The following attend this mirror group at present:*

#### *Kiviteollisuusliitto*

*Tapio Turunen Pohjois-Karjalan ammattikorkeakoulu (Politechnic)*

*Lemminkäinen (construction company)*

*Juha Sivonen for Tulikivi Oy (Stone producer)*

*Pyy Hannu VTT - Rakennus- ja yhdyskuntatekniikka (research center of Finland)*

*Liisa Salparanta VTT Rakennustekniikka (Research center, construction sector)*

*Paljakka Mikko, Loimaan Kivi Oy (stone producer, a part of Palin granit)*

*Pekka Mesimäki Stonecon Oy*

*Pekka Särkkä Helsingin TKK (University of Tampere)*

*Pirjo Kuula-Väisänen Tampereen TKK (University of Tampere)*

*Tapio Laari Suomen Graniittikeskus Oy (Stone importer and manufacturer)*

*Vuento Aimo Etelä-Karjalan ammattikorkeakoulu (Technical university, politechnic)*

*Hannu Luodes GTK*

*Veli Suominen GTK*

*Nike luodes*

*The translation of the standards into Finnish -if done- is done by general translation offices, typically not experts within the natural stone field. This may cause incorrect or may be also improper use of technical terms etc. No money is given to the mirror group for checking the translations.*

### 2.3.1 Norway

Standard Norge ([www.standard.no](http://www.standard.no)) (SN) organize and co-ordinates the practical standardization work, including the Norwegian participation in CEN. SN is also responsible for implementing new standards as national NS-EN standards, and to withdraw existing national standards within the same area.

One expert person from SN have been appointed to be in charge of the standardization work at national level within each TC, and they are responsible for sending out drafts for national comment and to compile and re-direct these to CEN.

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Participation in the standardization work must in principle be financed by the individual participant/company or organization. In addition some funding is possible for various standardization projects in order to stimulate Norwegian participation and influence. Those parties interested may join the work.

During previous years (1992-95) a specific project with funding from the Norwegian Research Council (NFR) were established by SIL (Norwegian Natural stone Federation) (organized in the so-called Technology Pool for Natural Stone), with special emphasize on CEN work on natural stone. Persons from SIL and single Norwegian natural stone companies attended the work in TC 178 and TC 246, as did researchers from SINTEF, in a kind of informal "mirror group". When funding from NFR stopped, no further organized participation were active.

Nevertheless, SINTEF has from this time on internal bases tried to follow CEN work within the field of natural stone, and also have put effort in including SIL and other actors in order to give Norwegian comments on draft standards, in co-operation with Standard Norge.

In the last year, "Byggeteknisk komité" in SIL has been commenting standards, especially requested from SN. Translation comments have also been put forward. Typically translation is being performed by SN themselves. *In Norway, so far only NS-EN 1469 (see next chapter) has been translated into Norwegian. The initiative for this translation has come from SN themselves. All other standards are in English, but with the front page (title) translated into Norwegian.*

In 2005 and 2006, new discussions between Standard Norge and SIL has been made, and at present Standard Norge has prepared a draft for establishing a reference group (from SIL and other org.) for future natural stone standardization work, primary connected to CEN work, see figure 2.8. A proposal for a mandate for this reference group has been made by Standard Norge, but before eventual realization, it must be accepted formally within Standard Norge, and expert persons need to be allocated. Financing of the work must also be sorted out. This has not been realized so far (November 2008).

### 2.3.3 Sweden

*The stone industry represented by persons from SSF in Sweden has attended some meeting in various TCs (mainly 178 and 26) in the early years of the activities within these TCs. No formal mirror group has previously been established in Sweden, and no persons from industry/research has attended meetings or given comments to documents and draft standards.*

*A national mirror group directed towards TC 246 has been established during the period of the NICE project.*

### 2.3.4 Denmark

In Denmark, no industry or research org. has followed the CEN natural stone work, neither on an appointed basis nor on a more voluntary/interest basis.

### 2.3.4 Concluding remarks

*The involvement from industry and research in the Nordic countries has been, and is still humbly. Finland seems to have organized the work most structured, and being most active also on European level, at least within TC 246. Sweden has established a national mirror group directed towards TC 246 during the period of the NICE project. This lack of involvement is a paradox and further involvement both at national and joint Nordic level should be given priority for discussion within the NICE project.*

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*The availability and ease for applying the standards strongly request for especially the product standards to be available in our native languages.*

*Thus, the NICe project and participating partners have put effort in arguing for this back to the standardisation bodies, and this follow-up will also continue after the NICe-project has finished.*

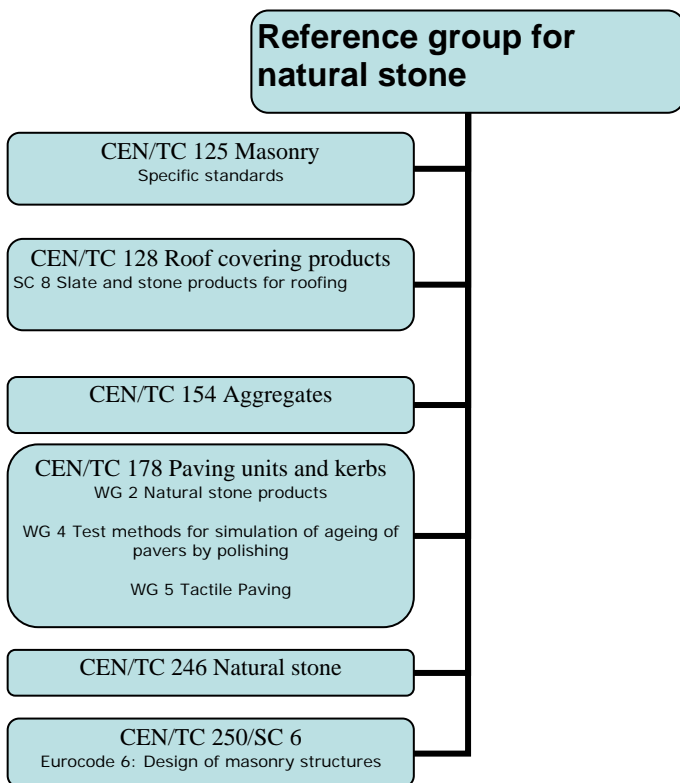


Figure 2.8 Possible reference group for CEN standardization work on natural stone in Norway.

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### 3 Natural stone standards - Overview

#### 3.1 Published standards

As per 2006, 8 harmonized product standards for natural stone have been published (see next chapter for standards under development and revision of published standards), see table 3.1. The table inform also about the Attestation System for each product standard, and indicate whether revision has been done or is under present work. These 8 product standards are mandatory/compulsory and cover the following natural stone products and applications:

Slabs, setts and kerbs for exterior paving  
Slabs and tiles for interior floors, walls and stairs  
Slabs and tiles for exterior floors, claddings and stairs  
Slates for roofing and cladding.

This list indicates that there are overlaps both between the scope of work for each TC/WG (Working group) and between the product specifications.

In addition, product specifications for rough blocks, rough slabs and dimensional stone work have been published (see 3a), but these are mandatory, i.e. they are not harmonized standards and CE marking is not specified.

For testing of natural stone, nearly 30 separate standards have been published (in addition to those specified in the product standards prepared by TC 128), see table 3.2.

Two standards for terminology and denomination are available, see table 3.3.

Thus, this is the first time in history that all European countries have the same standards for natural stone products and natural stone testing. It is also the first time in history in Denmark and Norway, that national standards for testing of natural stone are available.

*From the overview in table 3.1 one can see that all natural stone products that have been the object of standardization work has been approved and applicable since September 2006 at the latest, and that some of them has been valid already since 2003. This implies that the requirements towards producers and suppliers pointed out in chapter 2.1.2 have been compulsory also for the Nordic natural stone industry since 2003 for exterior paving products and 2006 for roofing, cladding and flooring products.*

As can be seen from the table, some product standards and test methods are under present (November 2008) revision. Through the NICE project, comments have been put forward, and this work will also be followed up through several partners after the project has ended.

**Status for CEN standardization work on natural stone***Table 3.1 – Published Product standards for natural stone*

Year of publication: The year when the standard was officially published (in the three off. Languages)

DoA - Date of Applicability – Date for when CE marking is possible (new version).

DoW - Date of Withdrawal - Date when CE marking is compulsory).

All product standards where DoA and DoW are listed are mandatory and represents harmonized standards (hENs)

**(Bold text).**

CEN TC	Number	Title	Attestation of conformity system	Ed no. /Year of first publ.	First generation DoW	Current status Pr. Nov 2008	DAV
125	<b>EN 771-6</b>	<b>Specifications for masonry units – Part 6: Natural stone masonry units</b>	2+, 3,4	1-2005	01.08.07		
178	<b>EN 1341</b>	<b>Slabs of natural stone for external paving. Requirements and test methods.</b>	4	2-2001	01.10.2003	Under development	2010-11
178	<b>EN 1342</b>	<b>Setts of natural stone for external paving. Requirements and test methods</b>	4	2-2001	01.10.2003	Under development	2010-11
178	<b>EN 1343</b>	<b>Kerbs of natural stone for external paving. Requirements and test methods</b>	4	2-2001	01.10.2003	Under development	2010-11
246	EN 1467	Natural stone – Rough blocks – Requirements	-	1-2003			
246	EN 1468	Natural stone – Semifinished products (rough slabs) – Requirements	-	1-2003			
246	<b>EN 1469</b>	<b>Natural stone – Finished products, slabs for cladding – Requirements</b>	3,4	1-2004	01.07.2006		
246	<b>EN 12057</b>	<b>Natural stone – Finished products, modular tiles – Requirements</b>	3,4	1-2004	01.09.2006		
246	<b>EN 12058</b>	<b>Natural stone – Finished products, slabs for floors and stairs – Requirements</b>	3,4	1-2004	01.09.2006		
246	EN 12059	Natural stone – Dimensional stone work – Requirements	4	2008			
128	<b>EN 12326-1</b>	<b>Slate and stone products for discontinuous roofing and cladding – Part 1: Product Specification</b>	4 (3)	1-2004	01.05.2008		
154	<i>EN 13383-1</i>	<i>Armourstone - Part 1: Specification</i>	2+, 4	1-2002	01.06.2004	<i>Under approval</i>	2011-09



**Status for CEN standardization work on natural stone***Table 3.2 – Published Test Methods for natural stones*

Year of publication: The year when the standard was officially published (in the three off. Languages)

TC	Number	Title	Edn No.	Year of publ.	Revision (Rev) status
246	EN 1925	Natural stone test methods – Determination of water absorption coefficient by capillarity	1	1999	
246	EN 1926	Natural stone test methods – Determination of compressive strength	1	1999	Rev 2006
246	EN 1936	Natural stone test methods – Determination of real density and apparent density and of total and open porosity	1	1999	Rev 2006
128	EN 12326-2	Slate and stone products for discontinuous roofing and cladding – Part 2: Method of tests	1 And A1	1999 And 2004	
246	EN 12370	Natural stone test methods – Determination of resistance to salt crystallization	1	1999	
246	EN 12371	Natural stone test methods – Determination of frost resistance	1	2001	Rev under development
246	EN 12372	Natural stone test methods – Determination of flexural strength under concentrated load	1	1999	Rev 2006
246	EN 12407	Natural stone test methods – Petrographic description of natural stones	1	2000	Rev 2007
246	EN 13161	Natural stone test methods – Determination of flexural strength under constant moment	1	2001	Rev 2008
246	EN 13364	Natural stone test methods – Determination of breaking load at dowel hole	1	2001	
246	EN 13373	Natural stone test methods – Determination of geometric characteristics	1	2003	
246	EN 13755	Natural stone test methods – Determination of water absorption at atmospheric pressure	1 And A1	2001 And 1003	Rev 2008
246	EN 13919	Natural stone test methods – Determination of resistance to ageing actions by SO <sub>2</sub> in presence of humidity	1	2002	
246	EN 14066	Natural stone test methods – Determination of resistance to ageing by thermal shock	1	2003	
246	EN 14146	Natural stone test methods – Determination of dynamic elastic modulus	1	2004	
246	EN 14147	Natural stone test methods – Determination of resistance to ageing by salt mist	1	2003	
246	EN 14157	Natural stone test methods – Determination of abrasion resistance	1	2004	
246	EN 14158	Natural stone test methods – Determination of rupture energy	1	2004	
246	EN 14205	Natural stone test methods – Determination of Knoop hardness	1	2003	
246	EN 14231	Natural stone test methods – Determination of the slip resistance by means of the pendulum tester	1	2003	
246	EN 14579	Natural stone test methods – Determination of sound speed propagation	1	2004	
246	EN 14580	Natural stone test methods – Determination of static elastic modulus	1-	2005	
246	EN 14581	Natural stone test methods – Determination of thermal expansion coefficient	1	2004	

**Status for CEN standardization work on natural stone**

*Table 3.2 (continued) – Published Test Methods for natural stones*

Year of publication: The year when the standard was officially published (in the three off. Languages)

TC	Number	Title	Edn No.	Year of publ.	Revision (Rev) status
125	EN 772-1	Methods of test for masonry units – Part 1: Determination of compressive strength	1	2000	
125	EN 772-11	Methods of test for masonry units – Part 11: Determination of water absorption of aggregate concrete, manufactured stone and natural stone masonry units due to capillary action and the initial rate of water absorption of clay masonry units	1	2000	A1 2004
125	EN 772-16	Methods of test for masonry units – Part 16: Determination of dimensions	1	1999	A1 2004 A2 2005
125	EN 772-20	Methods of test for masonry units – Part 20: Determination of flatness of faces of aggregate concrete, manufactured stone and natural stone masonry units	1	2000	A1 2005
178	ENV 12633	Method of determination of unpolished and polished slip/skid resistance value	1	2003	

*Table 3.3 – Standards on terminology and denomination of natural stone*

Year of publication: The year when the standard was officially published (in the three off. Languages)

	Number	Title	Editi on No.	Year of publ.	Revision status
246	EN 12440	Natural stone - Denomination criteria	1	2001	Rev 2008
246	EN 12670	Natural stone - Terminology	1	2001	

**3.2 Standards under development**

In table 3.4, standards under development are listed. Some of these have been published earlier, but are now under revision.

*Table 3.4 Standards under development in CEN TC 246*

Work Item	Project reference	Title	Current status	DAV
00246069	prEN 12371	Natural stone test methods – Determination of frost resistance	Under Approval	2010-03
00246075	prEN 14066	Natural stone test methods – Determination of resistance to ageing by thermal shock	Under Approval	2010-05
00246076		Natural stone test methods – Determination of resistance to thermal and moisture cycles	Under Development	2011-06
00246077		Natural stone test methods – Determination of sensitivity to accidental staining	Under Development	2011-06
00246078		Natural stone products – Slabs for vanity and kitchen tops	Under Development	2011-06

## Status for CEN standardization work on natural stone

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### 3.3 Concluding remarks revisions

From the overview given, it is shown that some test methods, i.e. like the frost resistance are under development for revision.

It is of outermost importance for the Nordic countries to put special focus on this, and also other test methods that are under development for revision, or where the revisions are at an approval stage (time) that makes it possible for us to influence.

Through the NICE project, the partners have put forward Nordic comments to both product specifications and test methods in several occasions, both at CEN meetings, European workshops and conferences. A summary of comments are given in **Annex A**.

For the exterior paving products (En 1341, 1342, 1343), attempts has been made by BSI (TC 178 Secretariat) to revise these standards. Also SP, Sweden has especially argued for this. It has been a priority task for the NICE project to follow up this and this is followed up also after the project period of NICE.

A European initiative has been made to invite ENBRI members to join a new network aiming at optimizing the second generation of natural stone standards. Due the many problems identified when trying to implement the new standards, EUROROC ([www.euroroc.net](http://www.euroroc.net)) has set up a working group of testing laboratories with experience in the new standards. This is also of special importance and value for the NICE project, and several partners have attended meetings both in 2006 and 2007.

## 4 Product Standards. Specifications and requirements

### 4.1 Formats and applications. Overlaps

*In Table 4.1, a compilation is given about which formats/products and intended applications the various harmonized products standards are covering. In **Annex B**, dimensional tolerances and classification is given for product standards (Draft in Norwegian).*

*As for technical requirements, actually no specific requirements and very few classes are specified. The only exception is for roofing slates, where it is specified that slates for roofing should have a water absorption less than 0,6 %weight (if higher, frost test must be accomplished).*

#### 4.1.1 Comments

The fact that several TCs have been active in developing natural stone product standards has resulted in that there is an overlap between which formats and products are covered by the single standards.

As an example, the definition for formats given in EN 1341-1343 indicates a flexible transition between which formats that should be defined or specified as setts and slabs. Another example is that EN 1341 and EN 12058 both specifies slabs that may be used in paving exterior applications. This may cause confusion, for instance because there is specified different requirements (dimensional tolerances and technical properties). E.g. EN 12058 specifies somewhat stricter dimensional tolerances than EN 1341. This is also inconvenient for both producers when e.g. preparation of Attestation of conformity documents and CE marking, and for specifiers.

Thus, there is a need to look over all product standards in this respect (not only those within one specific TC). This has been discussed within NICE and work is in progress (nov.2008) to influence the CEN work and put forward Nordic comments.

## Status for CEN standardization work on natural stone

Table 4.1 Harmonized product standards. Specification of formats and intended use.

Standard	Formats that are covered by the standard	Intended use
EN 771-6	Masonry units with Thickness above or equal to 80 mm, irregular or regular shape	In load bearing or non load bearing masonry for interior or exterior applications. Mechanical fixing or installation by the use of mortar, adhesives etc.
EN 1341	Slabs with width at least 2 x thickness and above 150 mm	Exterior paving
EN 1342	Setts with length, width and thickness between 50 - 300 mm. Plan dimension usually larger than 2 x thickness. Thickness above or equal to 50 mm	Exterior paving
EN 1343	Kerbs with length above 300 mm	Exterior paving
EN 1469	Slabs with thickness above 12 mm	Exterior and interior cladding. Mechanical fixing or fixing by mortar, glue etc.
EN 12057	Tiles with thickness less than or equal to 12 mm, square or rectangular in standard sizes, normally less than 610 mm	For floors, stairs, cladding and ceiling finishes (exterior/interior)
EN 12058	Slabs with thickness above 12 mm	For floors and stairs (exterior/interior)
EN 12326-1	Not specified	For roofing and external cladding

### 4.2 Requirements for Type testing, factory production control and CE marking

*In all harmonized product standards for natural stone it is stated that initial type testing shall be performed:*

*The first time the actual product standard is used*

*When production start on a new stone type / variety (e.g. within one quarry)*

*When marked variation in the material (visual or technical properties during FPC)*

*Nearly all products /intended uses for natural stone are in Attestation system 4 (or 3) (see table 3.1). Therefore the producer himself may perform and document initial type testing. For products falling in system 3, for initial type testing a notified test laboratory must be in charge evaluation/testing reaction to fire and dangerous substances (where relevant). For cladding (EN 1469), also flexural strength must be tested by a notified test laboratory.*

*In addition, all standards require that the producer has implemented a system for FPC, and that this always can be documented.*

*In table 4.2 an overview of properties that shall be tested during initial type testing and FPC of various natural stone products are listed. In table 4.3 an overview of the same situation for roofing slates is given. Which properties that shall be declared for CE marking of products are given in table 4.4 and 4.5.*

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*Table 4.2 Properties to be tested during Initial Type testing and FPC of natural stone products covered by EN 771-6, EN 1341, EN 1469, EN 12057 and EN 12058 (\*) The standard for masonry products define somewhat other properties (or test methods) than for the other products listed. (Status per January 2007).*

Properties that shall be tested	Test methods (*)	Masonry products		Slabs for exterior paving		Slabs for floors and stairs		Slabs for cladding		Modular tiles for floors, stairs and walls	
		EN 771-6		-EN 1341		EN 12058		EN 1469		EN 12057	
		Type-test	FPC	Type-test	FPC	Type-test	FPC	Type-test	FPC	Type-test	FPC
Dimensions	EN 13373	X	X (1)	X			X (1)		X (1)		X (1)
Appearance	Visual			X		X	X (1)	X		X	X (1)
Texture		X									
<b>FPC: (1) Properties that shall be measured regularly/ every production unit (as decided by the producer)</b>											
Compressive strength	EN 772-1	X	X (2)								
Flexural strength	EN 12372 or EN 13161	X	X (2)	X		X	X (2)	X	X (2)	X	X (2)
Bulk density and open porosity	EN 1936	X	X (2)			X	X (2)	X	X and/or (2)	X	X and/or (2)
Water absorption	EN 13755			X		X	X (2)	X		X	(2)
<b>FPC: (2) Properties that shall be measured at least once pr. 2.year</b>											
Shear strength	EN 998-2 and/or EN 1052-3	X	X (3)								
Flexural Bond strength	EN 1052-2	X	X (3)								
Frost resistance	EN 12371	X	X (3)	X		X	X (3)	X	X (3)	X	X (3)
Abrasion resistance	EN 14157			X		X	X (3)			X	X (3)
Slip resistance	EN 14231			X		X	X (3)			X	X (3)
Capillary water absorption	EN 1925	X	X (3)			X	X (3)	X	X (3)	X	X (3)
Petrographic description	EN 12407	X	X (3)	X		X	X (3)	X	X (3)	X	X (3)
Strength around fixing points	EN 13364							X	X (3)		
Resistance against thermal shock	EN 14066							X	X (3)	X	X (3)
Fire resistance (only when required)	EN 13501-1	X	X (3)			X	X (3)	X	X (3)	X	X (3)
Water vapour permeability	EN 12524 og/eller EN ISO 12572	X	X (3)			X	X (3)	X	X (3)	X	X (3)
Thermal properties	NS-EN 1745	X	X (3)								
<b>FPC: (3) Properties that shall be measured at least once pr. 10 year</b>											
Tactile properties						X	X (4)			X	X (4)
<b>FPC: (4) The property shall be described if this kind of information is requested</b>											

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*Table 4.3 Properties to be tested during Initial Type testing and FPC of roofing slates covered by EN 12326-1 (Status per January 2007).*

<b>Properties that shall be tested/documented</b>	<b>Type testing</b>	<b>FPC</b>	
Origin and petrographic name	The first time the standard is being used and for each new material/ vein in quarry etc.	Once per year	
Defects		Inspection level S-3 (as defined in ISO 2859-1)	
Flexural strength	The first time the standard is being used and for each new material/ vein in quarry etc.	Minimum once per year , or for each 25000 tons finished products	
Direction of lineation and influence on strength			
Water absorption			
Frost resistance			
Thermal test			
Carbonate content			
SO2-test			
Non-Carbonate carbon content			
"Packed" thickness			One per pallet
Single thickness			Inspection level S-3 (as defined in ISO 2859-1)
Length and width	The first time the standard is being used and for each new material/ vein in quarry etc.	Inspection level S-3 (as defined in ISO 2859-1)	
Deviation from squareness along arrisses			
Deviation from square shape			
Deviation from flatness			
Fire resistance	No test required		

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Table 4.4 Declaration of conformity. Properties to declare for CE marking for products covered by EN 771-6, EN 1341, EN 1469, EN 12057 and EN 12058. (Status per January 2007).

<b>CE- marking – Declaration of Conformity</b>										
Declaration of technical properties	Masonry products (*)  EN 771-6	Slabs  EN 1341	Modular tiles  EN 12057				Slabs for floors and stairs EN 12058		Slabs for cladding (Exterior) EN 1469	
			Interior Floor	Exterior Floor	Interior wall	Exterior wall	Ext.	Int.	Ext.	Int.
Dimensions and dimensional tolerances	X	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Flexural strength EN 12372		X (1)	X (2)	X (2)	X (2)	X (2)	X (2)	X (2)	X (2)	X (2)
Frost resistance EN 12372	X	X (3) (48)		X (48)		X (12)	X (48)		X (12)	
(48) Flexural strength after 48 freeze-thaw cycles (12) Flexural strength after 12 freeze-thaw cycles										
Compressive strength EN 772-1	X									
Shear strength EN 1052-2	X									
Flexural Bond strength NS-EN 1052-3	X									
Capillary water absorption EN 1925/NS-EN 772-11	X									
Abrasion resistance EN 14157		X (4)								
Slip resistance EN 14231		X (5)	X (5)	X (5)			X (5)	X (5)		
Strength around fixing points EN 13364									X (2)	X (2)
Resistance against thermal shock EN 13364				X (6)		X (6)	X (6)		X (6)	
Fire resistance (7) EN 13501-1	X		X		X	X		X	X	X
Water vapour permeability EN 12524 and/or EN ISO 12572	X				X	X			X	X
Sound insulation EN 1936	X				X	X			X	X
Thermal conductivity EN 1936 or EN 12524 (8)	X		X		X	X		X	X	X
Tactility (9)			X	X			X	X		

- (1) Lowest expected value
- (2) Lowest expected value, mean value, standard deviation
- (3) As an alternative to document flexural strength after frost is to report frost resistance class: F0 (no requirement) or F1 (≤ 20 % reduction in flexural strength after 48 cycles)
- (4) Highest expected value
- (5) Depends on kind of surface processing. Coarse textures surfaces are considered slip resistant (surface roughness over 0,5mm).
- (6) After 20 cycles: weightloss and reduction in dynamic E modulus!
- (7) Natural stone classifies acc. To CPD in Class A1 (no test required). Fire test required for natural stone containing more than 1 %weight or vol% asphalt or artificially included organic matter.
- (8) Bulk density are used to calculate this property, alternative data is given in EN 12524
- (9) Only if this information is requested
- (0) The products should/shall be classified according to existing dimensional classes defined

## Status for CEN standardization work on natural stone

Table 4.5 Declaration of conformity. Properties to declare for CE marking for roofing products covered by EN 12326-1.

<b>CE- marking – Declarasjon of Conformity</b>	
Properties that shall be tested for CE marking	
Dimensions – dimensional tolerances	X
Flexural strength	X
Water absorption	X
Frost resistance	X
Thermal test	X
Carbonate content	X
SO <sub>2</sub> -test	X
Non carbonate carbon content	X
Fire resistance	Class A1 Testing not necessary
Test methods specified in EN 12326-2	

### 4.3 Comments

#### 4.3.1 General

As can be seen from the tables, there is a remarked difference especially in requirements for factory production control between the products. In EN 1341, -42 and 43, no specification about frequency is given, while as for roofing slates, a quite severe (and for producers expensive) testing programme and frequency is specified (about NOK 70.000 each year). This has been felt as one very important matter to discuss further between the Nordic countries, and has been given high focus. The work is continued through a separate project in Norway.

*No further guidance for the FPC itself is given, so this also needs to be discussed.*

#### 4.3.2 Specific comments – Examples

SP, Sweden has prepared an article for the ENBRI Newsletter, and this is in whole enclosed as **Appendix C**. This article shows examples of flaws both with respect to existing product standards and test methods.

SINTEF, Norway has pointed to some special matters that need to be discussed more in detail connected to the product standard and test methods for roofing slates. This is enclosed in **Annex D**.



## Status for CEN standardization work on natural stone

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### 5 Standards on Terminology and denomination - comments

EN 12670 gives recommended terminology and classification systems for petrographical rock names, and lists also various scientific and technical terms and explanations to such. The standard can be regarded as a simplified reference book for terms of relevance within the natural stone business.

The objective of EN 12440, as stated in the standard itself, is “.. to unify the designation criteria of natural stone varieties, maintaining the traditional names and introducing terms related to its petrologic nature, typical colour and place of origin”.

By this is meant that all natural stones shall be denominated by giving the following information:

<i>Denomination information to be given</i>	<i>Comment</i>
1. Traditional, i.e. commercial (marketing) name	Geological names not related with the actual place of the stone and company names shall be avoided.
2. Petrological family	To be specified according to EN 12670
3. Typical colour	To indicate natural variations that can be expected. The various product standards give further specifications about reference samples etc.
4. Place of origin	As minimum, the city/village, municipality/community, county, province or department and country.
5. Other information	If available or agreed between buyer and seller, e.g. surface processing, natural features.

For producers or suppliers of natural stone, trade and delivery of natural stones should be followed by the above mentioned denomination information about the actual stone. This shall also be accomplish CE marking documents and should also be given on general product data sheets etc.

Specifiers, buyers and users should ask for this information in tender documents etc.

In the informative Annex A in EN 12440, a list of 168 Natural stone varieties from Denmark, Finland, Norway and Sweden are listed. This list should be looked over during eventual revisions of this standard, and necessary changes be made.

### 6 Test methods - Comments

All test methods published have been looked through within the NICE project, with first priority being the frost resistance tests developed for the various products (one for roofing slates and another for natural stone in general), second priority all those requested for CE marking.

**Annex C and D** gives some discussion, but more emphasize has been put on this in 2007/2008 within the NICE project.