CEN TC 346 Conservation of Cultural Heritage-Update of the Activity After a Height Year Period

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Abstract
A specific European standardisation activity in the field of conservation of cultural heritage is essential to acquire a common unified scientific approach to the problems relevant to the preservation and conservation of the cultural property. A scientific approach is essential for the conservation of cultural heritage as a preliminary basis that will ensure effective planning of ordinary and extraordinary maintenance works, as well to assure their efficacy and durability. The scope of CEN TC 346 is to establish standards in the field of the processes, practices, methodologies and documentation of conservation of tangible cultural heritage to support its preservation, protection and maintenance and to enhance its significance. This includes standardization on the characterization of deterioration processes and environmental conditions for cultural heritage and the products and technologies used for the planning and execution of conservation, restoration, repair and maintenance. Up to now seventeen EN standards were published according to a matrix-based method in which three main topics have been developed. In 2014 seven more standards will be published.

Keywords
CEN TC 346 • Conservation cultural heritage • Standardization

3.1 Scope of CEN TC 346

The main objective of CEN/TC 346 is drafting European standards which will help conservation professionals in their conservation and restoration work. It will also ensure that European experts can exchange information on test and analysis methods for the conservation of cultural heritage. This standardization activity will harmonize and unify methodologies in the European area.

The initial scope of CEN/TC 346, as approved in 2002, was the standardization in the field of definitions and terminology, methods of testing and analysis, to support the characterization of materials and deterioration processes of movable and immovable heritage, and the products and technologies used for the planning and execution of their conservation, restoration, repair and maintenance (Many authors 1994; Many authors 2001; Many authors 2002).

Standardization in the field of conservation of cultural property will:

- improve methodology, protocols, guidelines to allow implementations of better practices or define equipment for preservation and conservation;
- improve the efficiency and pertinence of the diagnosis with a subsequent better management of funding for the conservation/restoration works and therefore increasing the number of conservation projects and spin-off economic benefits/opportunities for new investment, and consequent job creation;

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G. Lollino et al. (eds.), *Engineering Geology for Society and Territory – Volume 8*,
DOI: 10.1007/978-3-319-09408-3_3, © Springer International Publishing Switzerland 2015

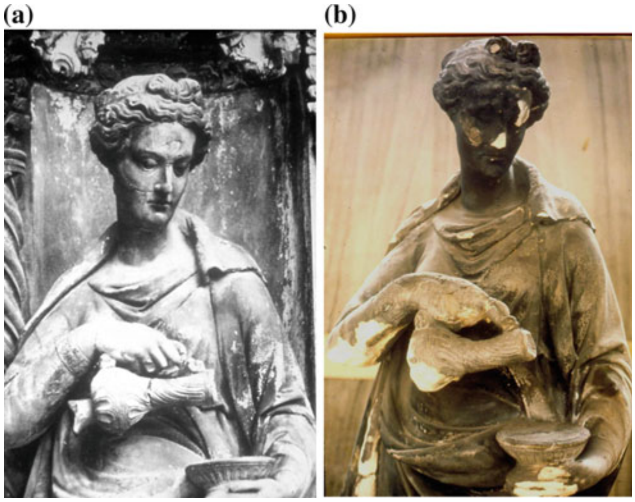

Fig. 3.1 **a**, **b**. Temperance statue, Carrara marble. In 1900 (*left*) the state of conservation was rather good, in 1976 (*right*) some missing parts are visible due to marble dechoesion after heavy atmospheric pollution exposure

- give precise and appropriate indication on the kind of diagnosis studies to be performed, promoting in this way conservation works on an increasing number of artifacts;
- increase longevity and reduce maintenance costs of conservation works, therefore reducing costs in the on a long-term range because conservation operations will be needed less frequently over time spaced out;
- facilitate professional mobility and international trade and increase the employment opportunities especially for young conservators, restorers, technicians etc…
- facilitate the exchanges between interested parties in Europe, respecting cultural identities, through the use of a common vocabulary.

3.2 Objectives of CEN TC 346 as Revised in the New Business Plan Approved in Venice in 2012

In 2012 a new Business Plan was prepared and it was decided to change the title from Cultural Property into Cultural Heritage and to prepare standards on a need-based approach. It was also specified the scope as following:

> standards will be established in the fields of the processes, practices, methodologies and documentation of conservation of tangible cultural heritage to support its preservation, protection, and maintenance and to enhance its significance. This includes standardization on the characterization of deterioration processes and environmental conditions for cultural heritage, and the products and technologies used for the planning and execution of its conservation, restoration, repair and maintenance (Many authors 2012).

In accordance with the objective of the revised BP the previous working structure composed by five WGs was changed into eleven WGs to cover the objectives in the period 2012–2015 described in the new BP.

3.3 Benefits Expected from the Work of CEN TC 346

To explain better the advantage of a good standardisation in the field of Cultural Heritage we report an example of a Venetian monument which was restored in 1976 as it was strongly decayed. The Porta della Carta, built in XIV century as the entrance door of Ducal Palace, was preserved in a rather good state for four centuries and the only damage observed were ascribed to the natural weathering agents. Comparison between two pictures taken at the beginning of XIX century and after seventy years respectively (Fig. 3.1a, b), shows a sharp increase in the marble decay, ascribed to the contemporary pollution increase occurring in the Venetian district as a result of the industrialization of Porto Marghera, the industrial area, created at the beginning of 1930s (Fassina 1994; Fassina et al. 2002).

In 1976 the conservation work of the whole Porta della Carta started, thanks to a funding of the Venice in Peril fund, and it was completed in a three year period. In 2001 in the framework of the National Research Council Project finalized to the Safeguard of Italian Cultural Heritage in cooperation with the Venice Superintendence for Monuments Care a check of the durability of restoration materials used in 1976 restoration work and of the condition was carried out. The results obtained allow us to conclude that the decay processes, which has caused missing of pieces of marbles and disintegration of carved surfaces (as it is possible to observe from the comparison of Fig. 3.1a and 1b), since the industrialization until 1976, seems to be arrested or slowed down (Fassina et al. 2002; Favaro et al. 2005).

We believe that a good standardization process is a useful tool to increase the durability of conservation works therefore reducing costs on a long-term range because conservation operations will be spaced out.

Up to now seventeen EN standards were published according to a matrix-based method in which the following three main topics have been developed:

(a) general guideline, terminology and characterization of materials constituting cultural property;
(b) evaluation of methods and products for conservation works of inorganic porous materials;
(c) indoor/outdoor climate-Specifications and measurement

3.4 Relevant Standards for the Conservation of Inorganic Porous Materials

Some relevant standards for the conservation of stone materials have been developed and will be described and discussed one after the other.

EN 16096:2012- Condition survey and report of built cultural heritage. *This standard gives guidelines for a condition survey of built cultural heritage.* It states how the condition of the built cultural heritage should be registered, examined, documented and reported on. It encompasses evaluation of the condition of a building or other structure mainly by visual observation, together—when necessary—with simple measurements. The relevant data and documentation on the built cultural heritage should be collected and included in the report. This standard can be applied to all built cultural heritage such as buildings, ruins, bridges and other standing structures. Archaeological sites and cultural landscapes are not dealt with in this standard.

This standard does not specify how to carry out a diagnosis of the built cultural heritage. For listed/protected immovable heritage specific national rules for expert documentation and works may apply.

As feed-back since its publication it has been considered in many European countries as a useful guidance for the preliminary assessment of the condition of built heritage.

EN 16085:2012- Methodology for sampling from materials of cultural property-general rules. *This standard provides a methodology and criteria for sampling cultural property materials for their scientific investigation. It covers, for example, how to characterize the material(s), assess the condition, determine the deterioration causes and/or mechanism(s) and decide on and/or evaluate the conservation treatment(s).* Apart from sampling, this document also provides requirements for documentation, and handling of sample(s). This standard does not deal with the decision making process for taking a sample nor how the sample is to be used. Sampling requires people with manual skill and knowledge of the cultural property. This is a general standard for sampling of materials constituting cultural property in order to characterize them during all stages of conservation. The sampling procedure depends on the type and condition of the material to be sampled, the specific case under study and the type of investigation chosen. Sampling is invasive and invariably causes damage, however small. It should only be undertaken if there is strong justification for it and in the closest consultation with those having responsibility for the object and those who will be studying the samples. The consultation should consider whether the same information could be obtained by non-invasive methods.

Regarding issues dealing with the evaluation of methods and products for conservation works of inorganic porous materials an important general draft for the evaluation of water repellent treatments was developed by considering standardized measurements of appropriate parameters (single test methods) to assess the performance of the product.

prEN 16581: 2014 "Surface protection for porous inorganic materials-laboratory test methods for the evaluation of the performance of water repellent products" is a *standard specifying the methodology for laboratory evaluation of the performance of water repellent products.* It is based on the measurement of several parameters which assess the performance of the product using standard test methods before and after ageing. The main goal of a water repellent is to reduce the penetration of liquid water and soluble substances into porous materials by changing its surface properties through capillary action. A water repellent product when applied to the surface of a material decreases its surface tension and prevents wetting of the surface. Many deterioration mechanisms result from the presence of water and therefore the reduction of water absorption may positively influence the preservation of porous inorganic materials.

A water repellent should fulfil the following requirements:

(a) to reduce the absorption of liquid water in the material,
(b) to minimize change of water vapour permeability,
(c) to minimize change in colour and gloss of the substrate,
(d) to produce no harmful by-products after the application,
(e) to have a good chemical stability.

Water repellent products should be applied on the surface of heritage objects only after they have been tested on representative samples of porous inorganic materials in the laboratory.

In order to evaluate the durability and in service performance of a water repellent product applied on the substrate, ageing tests representing the environment in which the porous inorganic material is located must be carried out.

The following six standards applied to porous inorganic materials either untreated or subjected to any treatment or ageing have been already published.

(i) EN 15801:2010. Determination of water absorption by capillarity. *This standard specifies a method for determining the water absorption by capillarity.* The water absorption experiment provides information about the material's transport properties for liquid water. The draft is based on the process of water capillary rise to calculate the water absorption coefficient (AC) and to determine the amount of water absorbed (Qi) at different times. Capillarity measurements are carried out on untreated specimens and repeated after treatments and/

or ageing of treated material on the same specimen and measuring the amount of absorbed water at the same time intervals.

(ii) EN 15803:2010. Determination of water vapour permeability (δp). *This standard specifies a method for determining the water vapour permeability (WVP).* It measures the amount of water vapour passing through the specimen over time in static conditions. A flux of water vapour through the specimen occurs when the partial pressure of water vapour differs between the two opposite surfaces of the specimen.

(iii) EN 15802:2010. Determination of static contact angle. *This standard specifies a method for the measurement of the static contact angle of a water drop deposited on the tested surface.* The draft is used to assess the degree of water-repellency of a surface. Determination of static contact angle is carried out on untreated specimens and repeated after treatments and/or ageing of treated material on the same specimens. The contact angle θ of a liquid on a surface is used to estimate the wetting properties of the material by calculating its solid-liquid-vapour surface tension.

(iv) EN 15886:2010. Colour measurement of surfaces. *This standard describes a test method to measure the surface colour of porous inorganic materials, and their possible chromatic changes.* No reference to the appearance of glossy surfaces is described. The measurement of the surface colour of a specimen is performed on untreated specimens and repeated after treatments and/or ageing of treated material on the same specimens. When the number of readings has been determined, the measuring points for the after-treatment colour measurement shall be localized by reference coordinates in order to ensure precise repetition of the measurement. A grid delimiting the measurement field may be useful for this purpose, depending on specimen size.

(v) EN 16302:2013. Measurement of water absorption by pipe method. *This standard specifies a method to measure the amount and rate at which water is absorbed through the test surface that is in contact with water.* Measurements are carried out on untreated specimens and the measurements repeated after treatment and/or ageing of treated material on the same specimens. The test is performed by measuring the volume of water absorbed through a defined surface under low pressure and within a specified time. This test can be performed in situ or in the laboratory and can be used to measure vertical and horizontal water transport. Penetration of driving rain into wall surfaces results in horizontal transport. Under actual conditions, the rate of rain penetration depends on prevailing wind conditions as well as on the composition and condition of the exposed surfaces.

(vi) EN 16322:2013. Determination of drying properties. *This standard specifies a method for the determination of the drying behaviour of porous inorganic materials.* The drying properties of materials can be calculated from a curve that indicates the weight loss of the mass of water inside the sample, as a function of time, during a drying experiment. Usually the drying of specimens saturated with water consists of two phases. The first drying phase is characterized by transport of liquid water to the surface followed by evaporation. The surface remains wet allowing evaporation at a constant rate, as water moves to the surface fast enough to compensate for the losses due to evaporation. The evaporation at the surface is determined to a large extent by the test boundary conditions. These are temperature, relative humidity and the flow velocity of the ambient air. The slope of the drying curve during the first drying phase therefore reflects these conditions.

The second drying phase starts when the amount of water brought to the surface becomes too small to keep the surface wetted and the rate of evaporation decreases. Transport of liquid water to the surface is no longer possible and only the less efficient vapour diffusion mechanism remains available.

Some materials, e.g. adobe or sandstones containing clay, do not dry in this typical two-phase drying curve. For example, in the case of material treated with water repellent, the first drying phase does not exist.

References

Many authors (1994) Community action plan in the field of cultural heritage, Council decision O.J. 94/C 235/01 Bruxelles

Many authors (2001) STOA (Scientific and technological Options Assessment), Technological requirements for solutions in the conservation and protection of historic monuments and archaeological remains, developed for the European Parliament, Directorate-General for European Panel on the Application of Science to Cultural Heritage, Bruxelles, October 2001

Many authors (2002) BT N 6732, Conservation of cultural property-New CEN/TC, Bruxelles, 19 December 2002

Many authors (2012) CEN TC 346-N0358, Business Plan—Final draft revised during the ninth plenary meeting in Venice, (29th–30th March, 2012), and approved with Resolution N 117/2012

Fassina V (1994) The influence of atmospheric pollution and past treatments on stone weathering mechansims of Venetian monuments. Eur Cultur Herit Newslett Res 8(2):23–35

Fassina V, Favaro M, Naccari A (2002) Principal decay patterns on venetian monuments, in natural stone, weathering phenomena, conservation strategies and case Studies. In: Siegesmund S, Volbrecht A, Weiss T (eds) The geological society, London, Special Publications, 205, 2002, pp 381–391

Favaro M, Menichelli C, Bassotto L, Fassina V (2002) Preliminary results on the behaviour of restoration materials used in the past on monuments in relation to their durability and to decay processes case study: Porta della Carta in Venice. In: Guarino A (ed) 3rd International congress on science and technology for the safeguard of cultural heritage in the Mediterranean Basin Alcala' de Henares, July 9–14, 2001, 2002, pp 204–209

Favaro M, Simon S, Menichelli C, Fassina V, Vigato P (2005) The four virtues of the Porta della Carta, ducal palace, venice-assessment of preservation state and re-evaluation of the 1979 restoration. Stud Conserv 50(2005):109–127