

Why European Standardization is not Working as Predicted: Construction Sector

N D Cortiços

CIAUD - Research Centre for Architecture, Urbanism and Design, Faculty of Architecture, University of Lisbon, Department of Technology for Architecture, Urbanism and Design, Rua Sá Nogueira Pólo Universitário Alto da Ajuda, Lisbon, Portugal
E-mail: ncorticos@campus.ul.pt

Abstract.. The experience of the European market began with the abolition of border limitations for certifications based on non-harmonized standards by creating the CE¹ mark - impossible to circumvent and recognized around the World. This followed the steps of its global counterpart, ISO, although on a different scale. In reading the results achieved in the EU, the proposal is to replicate the ISO experience: through the design of legal mechanisms (supranational) for the definition of applicable principles, easily understood, validated by associated members and accepted by consumers, on a global scale. However, 17 years later, much remains to be achieved for the desired hegemony. The results remain below the expected. These are the possible findings based on the interpretation of the less successful results, arising from the identification of unimplemented or thwarted measures, in some countries. The treatment for each country was divergent — in the definition of (general) principles and legal framework; in the issuing of technical and legal mechanisms; in determining (or tampering with) exception tools; in establishing deadlines for responding to intervention requests — causing difficulty in understanding and implementation for manufacturers, dealers or importers.

1. Introduction

Products, resulting from an emerging global economy, do not know destination. They are produced in a location somewhere in the world, and used in another, distant and often different in character: cultural, technical, practical, geographic, among others.

It is recognized the difficulty in obtaining safe and reliable certification, under the yoke of rules resulting from protective policies and verified by bodies, responsible for the validation of manufacturing processes, logistics operations, use and performance. Many construction products (CP) present, under specific conditions, a lifespan below the expected, is the fault of the manufacturing chain and logistics processes [1].

Markets demand for construction products and services an expedited manufacturing and competitive pricing.

The standards are the basis of innovation and technological challenges. In synchronous, ensure the safety and health of workers and consumers and deal with a picky demand for products and solutions of construction. Those are essential tools of engineering and fundamental to the social cohesion of a world increasingly globalized [2].

¹ The letters "CE" are the abbreviation of French phrase "Conformité Européenne" which literally means "European Conformity".



The certifications that accompany raw materials, materials, products and construction solutions should — in today's world, as idealized for the European Space — comply with only one standard. Including ratings for each country, adjusted to different idiosyncrasies.

Normalization has proved critical to the industry's growth, more efficient and globally, based on the satisfaction of a larger number of consumers. That gained weight and visibility, taking advantage of the technological exhibition — such as the world wide web — in particular for stronger and experienced economic blocks, e.g., Federal Communications Commission (FCC) in the United States of America (EUA) or the Declaration of Conformity (CE) from the Economic Union (EU).

Reported conditions force a new paradigm. Inevitably the approach will have to arise from a coordinated action with the “International Standardisation Organisation (ISO)”, without the need for national standards in each country where it intends to operate.

This theme is essential for a globalized society that is to be based on the standards of manufacture and ensures, informed and safe, transactions of Goods and Services^{2,3} (G&S). In the case in point: Construction Products (CP).

In the current market, the commercial development of G&S lives a unique momentum. A high-tech product tends to be considered obsolete, even, during the first year. Seven to ten years is the expectation for the low-tech. Some reasons, common to both situations, that determine the longevity of G&S: industrial improvements (development and production); renewal of the design; and competitive strategies [3][4].

Markets, previously, delimited by strategic principles (cultural, political, economic, geographic, for instance), accepted the fundamentals of free competition⁴ [5]:

- increased competitiveness;
- compatibility and interoperability;
- control over the range and the efficient use of materials, energy and human resources;
- saving raw materials and production times, reducing waste;
- elimination of trade barriers;
- protection of consumers and community interests;
- expediting the entrance into new markets;
- reduction of market uncertainty level;
- reflect the research, development and innovation;
- safety, health, protection of life and the environment; and the
- simplification on the wide variety of products and procedures, in everyday life.

As a result, national markets see the offer of G&S grow beyond the capacity of the mechanisms of monitoring bodies⁵. By agreement, within the World Trade Organization (WTO), it was also decided to consider valid any standardization developed in origin / location of the applicant. This situation weakens the purposes of standardization, as it makes it impossible to compare methods and manufacturing characteristics between G&S.

At this time, the industry moves toward full globalization, supported by standard production and trade exchanges, between neighboring countries or antipodal points on the planet. However, on any imported product we can find the certification of origin, if implemented, according to the International Organization for Standardization (ISO), which defines rules, guidelines and features lines to both G&S themselves as to their expected performance, an optimized security for a given context⁶.

² “The WTO’s General Agreement on Trade in Services (GATS) (...) in January 1995 (...), negotiations on specific market access commitments to further liberalize trade in services were mandated to start five years later. Accordingly, in early 2000, member governments started these negotiations. (...)” in “PRESS PACK - briefing notes, World Trade Organisation, 5th Ministerial Conference, Cancún, Mexico, 10–14 September 2003”.

³ The “intellectual property commercial rights” because they are not directly involved, when comparing construction factsheets, will not be addressed in this article.

⁴ The openness of markets has the controlled by standards-based regulation.

⁵ The construction sector seeks, increasingly, less technology with traditional origins and based on the mastery of hand labor.

⁶ Each standard is supported by the work of a group of experts, the Technical Committee, specialized in a subject area and formed with a specific purpose.

1.1.Importance of data

“Our Studies in cost analysis show that between 15% to greater than 20% of companies operating revenue is spent on doing things to get around or fix data quality issues.”⁷.

The standard information, the basis for any contemporary and globalized society, serves the purpose of creating economic growth, sustained in the security of data reading, a fundamental principle for taking position/making decisions, concise and defensible. Like a summary of the information provided by the sender to the receiver, both equipped with the tools / rules for encoding and decoding of the 'message', respectively [6].

1.2.Standard data format

Companies, mostly national scale produce targeting domestic markets based on formatted information (harmonized standards) measured by local regulators. Some of them understand, by choice or imposition of the markets in which they operate, to accumulate more stringent national standards than the congener EC⁸ [7].

In order to create obstacles to the import and marketing of products, there have been attempts, by some countries, to override the EC with national standards, in the overall result they have been unsuccessful, but some managed to establish themselves, e.g., "VOC labelling", since Jan 1st 2012, construction products traded in France must be labelled with an emissions classification on the basis of a VOC emissions test (as stated in the Decree nr 2011-321).

The establishment of standards is entrusted of a member/(local) body associated with ISO, which only sets the 'bases'⁹ which tends to adjust to the demands of the internal market. The set of rules specifies efficiency and quality requirements for G&S based on the performance requirements applied to the product, considering the purpose of it. From that it is expected to promote and develop standards, ensuring the interrelation and framework for operators; to update the institutional legal acquis; to foster the adoption of other classifiable laws for the G&S, e.g. EU Directives, legislation [8].

1.3.Technical evaluation

Technicians, linked to the project and the construction work, appear at the end of the line, as decision makers relying on the certification documents. They understand the rules as the valences to the prerequisites of any construction. It is not surprising that a particular G&S features standards from various countries to evaluate different characteristics.

The non-normative alignment for G&S makes the work of the technical / makers (design and construction) harder, and require research and study by the proliferation of various standards, even if we exclude the aesthetic / artistic components, in parallel with the economy of use. This task requires a comparison methodology to realize the similarities or incompatibilities (local laws and regulations, technological framework and good practice), for different objectives and expected performance.

The theme is fruitful, target of several publications dedicated to the comparison of standards and documentation of their experience in the field.

2. Problem

2.1. Before standardization

By definition, convention and practicality, the International System of Units (SI) opted for the "metric" unit. Established after the Second World War, it was a crucial decision for the development of commercial trade. Systems based on other units feel a loss of influence, despite the dominance in

⁷ by Larry English, an internationally recognized speaker, consultant, and author on information quality improvement.

⁸ PC, not innovative: “Ü-Zeichen” (Ü-mark), German DIBt (German Institute for Construction Technology), Germany; “BBA certificate,” British Board of Agrément, United Kingdom; and, “AFAQ/AFNOR marque”, Association Française de Normalisation, France.

P, innovative: “Ü-Zeichen” (Ü-mark), German DIBt, Germany; LPC (loss prevention certification board), United Kingdom; and, “AFAQ/NF marque”, Association Française de Normalisation, France.

⁹ Standards developed by convention between ISO and local bodies to define the characteristics of a common orientative body, based on information — accurate, complete, updated, relevant, consistent ('validated') and reliable — suitable and accessible.

the domestic market (e.g., *Imperial*¹⁰ *System*: english, used in the Commonwealth [9], and the American¹¹, in USA [10]).

The American domestic market was severely affected by the decline of the construction industry, as a result of economic crises, which has conditioned the heavy industries, its entrepreneurs and investors, with the difficulty in trading their production. The necessity becomes an opportunity with the opening to international markets [11]. This option implied adopting the metric system, only to export, for the steel profiles which followed standardization ISO/IEC 80000^{12,13}. The 'external' demand for goods sized in imperial units is non-existent. Most US industries do not have G&S accredited for other economic areas, Europe for example, and if the option was to submit the products to tests and trials they would have to assume the costs. To these reasons we can add the logistical implications for transcontinental export.

2.2. Standardization is recommended not imposed

The standards serve as guides to the industry, references are impartial: not seeking private income only increased market dynamism, in the interests of manufacturers, operators and consumers. The use of standards is common in legislation — only in this case, and this case alone, it is mandatory — accreditation, certification, metrology, technical information and trade processes.

Certain sectors — such as food, safety, hygiene and health, environmental protection and quality management of G&S — are required, by regulation, to comply with norms for security standards imposed by legislation of consumer protection. Outside the scope, above, operators are free to certify or not the G&S, conditioned by the opportunities identified in the market to justify the decision. In both cases, certification or approval costs are added, either mandatory or optional — to others like: normative measurement, control inspection processes and the inherent bureaucracy.

2.3. Standardization and Business Revenue

Standards, certification and approval of G&S, are controlled by local public entities under the guidance of international standardization, ISO, the costs being charged to applicants. What configures a revenues market for entities and governments. System that inhibits, conditioned by income, the use of standards by small and medium-sized operators (importers, exporters, only the regulated field), especially the venturers.

The lack of control over production standards — globally, even by the ISO, meaning the not exclusivity of a rule attributed to a specific origin — can make it impossible to be compared to another, similar but not exactly the same. Situation which, in certain circumstances, may not be free of intentionality. Avoiding competition, established, by favoring the introduction of CP in the market. In stricter standardization situations, operators choose to slightly change the manufacturing processes and/or the performance qualities of the product, or even formalize the certification obtained in a third country, 'compatible' with the desired market.

3. Efficacy Analysis

3.1. European committee for standardization (CEN) and the European committee for electrotechnical standardization (CENELEC)

¹⁰ System adopted for market protection: “Eventually, the Weights and Measures Act of 1878 abolish the use of all measurement units, that is, units other than the Imperial Units or their multiples, by making their use in commercial transactions illegal. (41 & 42 Victoria C.49, 1878, Weights and Measures act.)”

¹¹ “Divergent standards peculiar to a nation or region, complex conformity assessment requirements, and a thicket of other standards-related barriers have been estimated to impede the sale of an additional \$20 billion to \$40 billion worth of U.S. goods and services.”

¹² The standard introduces the International System of Quantities (ISQ). It is a style guide for the use of physical quantities and units of measurement, formulas involving them, and their corresponding units, in scientific and educational documents for worldwide use.

¹³ “The change to metric steel sizes opens up a tremendous opportunity for USA industry to rationalize on fewer steel sheet, plate, wire, bar, tube and section sizes. Some companies have shown remarkably good results when rationalizing, steel plates, for example, from 19 inch sizes to 8 metric sizes” in K. Kverneland, METRIC STANDARDS for Worldwide Manufacturing, GO metric USA TM.org, Inc., Statesville, North Carolina, USA, 2012.

The European Space - a vast territory marked by diversity, transnational, multicultural and cosmopolitical is unified by memoranda of understanding, adjusted and updated in accordance with contemporary values of universality. Built on the idea of a single market, governed by a parliamentary system, for the regulation and development, with the power to set laws (directives) applicable in the various member countries, with national force of law: unmatched in international standardization systems. Has, today, the highest number of normalization policies. It takes some degree of knowledge and confidence to exchange G&S and share manufacturing methods. Within Europe there were many national standards for Construction Products (CP), derived from ISO, interpreted/replicated/repeated by each member state. In 1999, it was understood that those are at the heart of the commercial dysfunction between Member States. The confusion between the certifications that accompanied the CP forced a position by the EU through legal approvals, a measurement known as "Nando (New Approach Notified and Designated Organisations) Information System". National legislation, testing, certifications, approvals, et cetera, in short, the lack of specific and harmonized standards were the focus of the problem and prevented the cross-border market. Embryonic conditions for the design of the current legislative framework, that culminated in the founding of three standardization bodies supervised by the European Commission (EC) and European Free Trade Association (EFTA):

- 1961, European Committee for Standardization (CEN)¹⁴;
- 1973, European Committee for Electrotechnical Standardization (CENELEC)¹³; and,
- 1988 a European Telecommunications Standards Institute (ETSI).¹⁵

The entities, mentioned above, worked to establish bases for the harmonized standards, applied to the European single market, stimulating the growth of trade in goods, technological innovation and environmental protection through the European Standard (ENh). Those cooperated with the ISO (CEN) and the International Electrotechnical Commission (IEC) (CENELEC), and allowed to aggregate, in accordance to common principles, thirty-three national agencies (NB), with the overall objective, 'one standard, one test, accepted everywhere's, by 2020.

There are two channels for the production of standards, distributed as follows:

- 70% are requested to the Notified Body (NB), by operators and stakeholders, with the automatism of becoming effective and binding on other countries; this percentage holds also voluntary assessments by Technical Assessment Bodies (TAB) issued by the European Technical Assessment (ETA) — advancing to the DP and, if approved, the CE mark — which were valid for five years, until July 1st, 2013; after that date, indefinitely or until the development of another harmonized standard with power to revoke the evaluation; and,
- 30% by the EC as a technical component for the european legal framework; also mandatory, in this case: singular context on a global scale, the production of harmonized standards prevents the coexistence of similar documents.

NB (local standard setters) jointly with stakeholders (associations and companies), constitute themselves in Standardization Technical Committee (TC), organized in Subcommittees (SC) and/or Working Groups (WG), when justified, to prepare harmonized standards, documents and opinions to the study specific situations.

3.2. *'One standard, one test, accepted everywhere'*

Any country in Europe has a NB, accredited laboratory to perform, for example, testing, inspections, certifications, approvals. This may, in accumulation, set harmonized standards according to international, european and national criteria. When a rule is executed it receives an identification¹⁶. Or it can choose to adopt other standards, external and previously recognized, to which an identity is

¹⁴ Despite the separation, natural by the particularities of CEN and CENELEC, the (technological) the evolution of PC consolidated, in early 2010, and the reiterated collaboration, the host of both in the same premises, "CEN-CENELEC - Management Centre (CCMC)" in Brussels.

¹⁵ The three entities, described, form the European Standardization Organizations (ESOs).

¹⁶ In Portugal, e.g., there are: NP, NP ENh, NP ENh ISO, NP HD, NP ENV, NP ISO, NP IEC and NP ISO/IEC. Apart from these, were also assumed as portuguese standards all, ENh, ENh ISO, ENh ISO/IEC and ETS.

added, the intervention is limited to the translation of the information. In both situations, those shall be placed in the national legal collection.

Essential Requirements (ER) for construction, present in the Construction Products Directive (CPD)¹⁷, 89/106/EEC (revogada), (repealed), were the basis of the Harmonised technical rules or Harmonised standards¹⁸ (Euroclasses): applicable to the control of factory production based on best practices in manufacturing. Now established by methods and performance evaluation criteria (Declaration of Performance - DP) of the CP in the reading of the ER as Construction Products Regulation performance (CPR)¹⁹, EU 305/2011:

- Mechanical Resistance and Stability;
- Safety in Case of Fire;
- Hygiene, Health and the Environment;
- Safety in Use;
- Protection against Noise;
- Energy, Economy and Heat Retention; and,
- Sustainable Use of Natural Resources.

The CEN-CENELEC provides a platform for the development of European Standards and other technical specifications to various sectors, ensuring:

- the protection of consumers;
- facilitate cross-border trade;
- the interoperability of products;
- encourage innovation and technological development;
- include environmental protection; and,
- enable businesses to grow.

NB, in EU, work as an entity accredited by a Member State to ensure that a product meets the expected standards before being placed on the market.

The CE marking, Directive 93/68/EEC, is a mandatory conformity mark on many products placed on the single market in the European Economic Area (EEA) since 1985. The CE mark is the declaration by the manufacturer on the conformity of the production process (for products) with the EU directives, to ensure three principles [12]:

- Existence of a European Policy — if not available, to promote its implementation and adoption, with force of law, in the country(ies) concerned — member states have taken CPR as a national law, like the previous one that established the concept; its importance lies in the definition of ‘Basic requirements for construction works - Essential characteristics’ which must be present to ensure the CE mark;
- The process with a specific description of how the CPR was applied; named ‘European Assessment Document’;
- The publication of the documents produced²⁰.

The CE mark and the Technical Document that accompanies it do not indicate, e.g., any safety rules, the load capacity, functionality or aesthetics of a CP, only attest, to the supervisory bodies of the common market, their suitability for transaction within Europe - nevertheless indicate the qualities and classification performance obtained during the manufacture of the product, for information and control by regulators.

¹⁷ Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products, OJ N. °L 40 of 11 February 1989.

¹⁸ Fundamental technical details for the manufacture of the product: evaluation systems and performance verification.

¹⁹ Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC, OJ L 88 of 4 April 2011

The European Construction Products Regulation (CPR) describes the fundamental requirements on hygiene, health and environment protection.

²⁰ The CE mark is used to label a product or the accompanying documents: is not accompanied by any certificate or statement. There is, however, the obligation to support and expose.

DP²¹ requires the involvement of two entities for CE marking: the manufacturer and the NB. The process goes through articulated phases - with the progress of steps, the manufacturer's responsibility increases, gradually, in the same extent as it exonerates the NB, which will also decrease its level of control.

DP issued by NB:

- on-site verification of production, by the manufacturer; the NB may require additional assessment tests;
- the extraordinary inspection of production jobs;
- continuous monitoring; and,
- possible repetition of tests, without notice, to control the results, financially assumed NB.

DP issued by the manufacturer:

- initial inspections on products by NB; and,
- on-site verification of production, by the manufacturer.

Manufacturer, importer or distributor who places a product on the market, under his name or under a trademark, assumes responsibility for the technical document that holds the CE mark for the product, according to the DP or if an ETA (non-harmonized products) is issued by a TAB, or even another, concerning improved protection of users of the product, not covered by the Directive.

Stabilized products will be accepted, without testing ETA, for knowledge shown or if supported by technical data 'institutional', measured against empirical provision, as set out in the specifications, only to a certain level or class. Important measure for traditional and current products, which gain ground to maintain presence and usual performance.

If the manufacturer of a product, finds in the acquis the regulatory framework to certify the development of procedures can avoid the same overall costs, by simply requiring authorization for the use of standard(s) to third parties: this type of trading is valid. With this principle, there is the risk of creating a '(parallel) market' for standards.

If a producer intends to introduce a PC on the market, the CE mark is mandatory, which can be requested to the NB, according to applicable standards. If non-existent, the opening of a procedure standardization is requested to NB, which forms a labor committee, local/national, and the CEN another, to follow the work of the first. When a standard is effective all the same, prior to 1989, are repealed even in other countries.

When a Innovator Product of Construction (CPI) or Special Product of Construction²² (CPE) does not meet the harmonized standards or do not have pre-established and consolidated technical information on their performance, have to resort to a TAB to start a certification process. This allows the PCI / E can obtain the CE mark through a European Technical Assessment (ETA) or European Assessment Document (EAD), certification issued by TAB under European Organization for Technical Approvals (EOTA), parallel to NH, which is not obtained by procedure. The process focuses on the verification of the risks implicit in its use in construction. From risk analysis arises the technical criteria for assessing behavior and performance of the CPI / E, given the applicable national rules.

²¹ Compliance with the specific harmonized standards through the production system control.

²² A limited production for which does not compensate to set a standard.

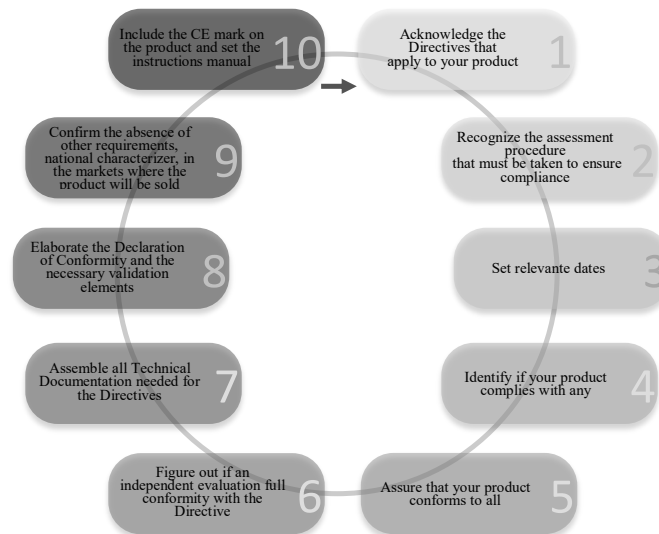


Figure 1. - European certification cycle.

ETA, requested by the manufacturer, is a documented technical evaluation that measures the performance ability of a construction product, according to a European Assessment Document organized by TAB. Applies to innovative and complex products (for which there is not, nor is expected, in the medium term, the existence of harmonized European standard).

Every country in the EU has, through the contact points, to parameterize the different climatic, geological, geographical and other perceived as relevant and prevalent conditions, to consider when establishing the performance classes of CP/I/E. The characteristics are defined by limit levels of performance for a given basic requirement. Detected restrictions must be included in the harmonized technical specifications. It is interesting to consider that the NB can select levels or classes of performance, to respond to local conditions and peculiarities, within the national territory.

Micro enterprises, if proven the condition may require simplified procedures for performance assessment, for products that do not involve additional concerns but ensure benefits similar to those counterparts.

PC similar in design and production or of 'variable' series can use the same DP²³, by request and authorization for simplified performance assessment procedures and demonstrated compliance with the requirements by the Commission after consulting the Standing Committee on Construction.

Importers, distributors and support chain²⁴, will have to ensure compliance of the CP with the DP specific characteristics and requirements: included in the technical document of the product that allows its transaction in the EU.

Exceptions are foreseen for the compulsory DP, e.g., in the case of a prototype product, developed only to a specific situation/condition; products manufactured on site with the monitoring of responsible for security; or a specific product, made using traditional methods/techniques, for a recovery or conservation, preserving the architectural and historical value.

3.3. Before and after EN - model adjustment

The interpretation and implementation of legal procedures differs from country to country. For some, the CE marking process is not only the first but also the only regulation for CP, in compliance with the

²³ The market for construction products in the EU is around: manufacturers, 178 million / year to 2 million / year in DP - does not include document management, cost of time spent and time of printing; distributors (about 76.5000 euros / year in the EU), EUR 476 million / year to 5800 million / year in DP - does not include document management, cost of time spent, printing time and delays in transport.

Examples: DD by each product costs 2,000 euros, but if the color is different, it needs another, always in multiples of 2000; if a manufacturing company purchases the same natural stone from different explorers it has to pay 2000 euros (cross value to EU countries), for each of them.

According to information available on the website of ANIET - Extractive Industry National Association and Manufacturing, May 9, 2016.

²⁴ Small and medium sized enterprises (SMEs), by directive, can see their access to legislation facilitated in the Member State where they intend to sell or make available their products.

steps in Figure 1. For other countries it is an agreement at the lowest level, because so far construction has been (and still is) organized by a multiplicity of standards and directives, including approvals and regulations by authorities, associations and safety bodies.

In accordance with the European Union politico-economic concept, more and more national regulations should be abolished and construction should be left to its own devices. For some that even applies to the safety of buildings, true to the motto: ‘unsafe construction products (as those that collapse or fall down) will automatically disappear from the market if they are no good’.

This results in the state supervisory procedures and authorities being viewed with suspicion and their importance being reduced rather than being promoted. Voluntary checks on the basis of self-obligations e.g. at association level, are welcomed. Hence, in those countries in which construction had previously been state-controlled for reasons of safety, private quality organizations are being established that attempt to maintain the old high safety standards, preferably cross-border, on a voluntary basis.

The demand for (new) approvals in countries that had previously had no stipulated safety regulations (approvals or the like) is not in accord with the European goal of the free trade of goods, because new trade barriers are thereby erected. In particular, the demand for a European Technical Approval (ETA) when the CE mark, see Figure 2, is already borne due to a harmonized standard contradicts the construction product directive [13].

The safety of life and limb remains (for all products) a matter for the individual nations, because the CE mark does not give any indication about this. In order to meet these demands, obsolete normative or legal regulations exist in several countries (already for a long time in some cases), which are not (may not be) repealed by the CE mark, because this fundamental right of safety remains with the countries. Astoundingly, product approvals have nevertheless been withdrawn in at least one European country following the introduction of the CE marking obligation.

In order to maintain the safety of buildings, the compulsory approval remains in force, for example, in France, Germany, England and other countries too — as far as can be discerned up to now. Although the CE mark entitles a construction product to be freely traded in Germany, its use requires a Ü mark, which is only issued on the basis of a general building authority approval²⁵.

3.4.Space for criticism

The initial idea, which still stands, presupposed to boost the standards’ market. Some of the factors contrary to the intended dynamics are: the time required to produce new standards; the revision of old standards (national and established); and, when this happens the NB resist to change, procrastinating processes, sometimes for years. A fateful bureaucratic process, the creation of technical committees (NB) and monitoring (CEN), without any failure to pass, until today; on the other hand it allows any of its representatives to deliver view/opinion even without experience or tradition in this type of PC [14].

Obtaining a CE, through an ETA/ETD can take several years, resulting in processes with hundreds of pages and burden on the requestor. It is being discussed how to simplify and overcome this process, based on a shared methodology with other NB for quick approval: Common Understanding of Assessment Procedure (CUAP).

The Construction Product Directive (CPD) is at present being revised and is to be replaced by a regulation (CPR) of the European Parliament and Council. The reason for this is that a regulation does not permit so many interpretations in terms of time and content, but must be implemented more strictly. The six essential requirements of the CPD will be supplemented by a seventh: the sustainable use of natural resources. The new regulation is intended to strengthen the credibility of the system and

²⁵ In Germany, the approval principles for health-evaluation of construction products by the German Institute for Structural Engineering (DIBt) specify these, especially concerning emissions. So in Germany, for reasons of health and environment, the Ü mark of conformity on the basis of a national technical approval (abZ) is required for: since 2005, resilient, textile and laminate floor coverings (EN 14041); since 2011, parquet and wood flooring (EN 14342); since 2011, parquet adhesives and coatings; since 2012, floor covering adhesives and flooring underlays; and, since 2014 on wall coverings.

the acceptance of the CE marking. The way in which these goals are to be achieved is clear in principle, but the detailed measures are still very much under discussion.

4. Conflict of Norms

The European standardization market tries, from the beginning, to prevent the formalization of constraints on, desired hegemony of, the CE mark (CPR's Article 8) through the DD. The fundamental idea seeks the elimination of technical barriers to free trade of PC, in accordance with the ENh and ETA, taking the essential characteristics as a response to basic requirements. As such, those are determined and 'static' to any geographical condition or safety issue, therefore, tend to be fitted by national/local regulations. There are, however, local manufacturers who can understand these differences in their interest, justified on technical issues in accordance with the CPR (Article 6): by means of an adjusted justification.

In 2008 and 2012, respectively, the Belgian and German governments were condemned by the European Court, for encouraging PC market operators to resort to national certification, in addition to the CE mark: BENOR, voluntary, and Ü, mandatory, in the same order. Many organizations are faced with such obstacles in countries with strong national values, standardization experience and pressure groups that influence decision-makers in favor of protection of the domestic economy, especially in markets that have industries with heavy production capacity and similar articles.

The German market is the most targeted by critics of the instigators of the PC free circulation. To these tests, in an institute recognized by DIBit, were required in order to be used in the construction sector. Thus, the applicant is subjected to administrative costs and, perhaps, in the production - investment in the repetition of tests and trials. In its defense the German government claimed concerns about the protection of health and the environment. In question was, in fact, the protection of three groups of domestic manufacturers dedicated to products: pipe joints seals made of thermoplastic elastomer, insulating materials made of mineral wool and gates, windows and exterior doors. Exposure was not accepted, October 16, 2014.

Sometimes, promoters impose and, even, require qualities greater than those indicated by the CPR, subordinating the CE to the national mark, for example, in UK, public roads are required to offer an asphalt with a minimum of two years durability, which can only be assured by AVCP System 2+, through the evaluation of the wear layer.

In some Member States, where the guarantee is assumed by the insurance companies, evaluations may be required to the constructed, six months after the entry into service of the building, with special interest in the parts considered 'sensitive'. These are, in the French case, the inspection targeted by independent entities, Centre Experimental de Recherches et d' Études du Bitiment et des Travaux Publics or int Rosenheim. Situation that induces the use of national standards, seen as more reliable by decision-makers and insurance companies, such as voluntary CEKAL certifications. This question, among others, is of the utmost importance to the insurance companies, which subject their actions to the existence of compliance with national standards, considered more demanding than similar EC. In particular, they tend to not consider or accept periods of more extensive warranty, as 10 years, and to inflate the value of the insurance premiums. To overcome the constraints created, stakeholders assume the resulting increase in costs for the necessary certifications and the delays in the commercialization of products, e.g.:

- in France, in particular, the insurance companies require, for more competitive conditions, the certificate Centre Scientifique et Technique du Bâtiment (CSTB) - 'third' party, regardless of the system AVCP (french NB) - based on Document Technique d'Application (DTA);
- for window manufacturers CEKAL standard is essential, because it facilitates the acceptance and marketing of products, especially those with high standards of insulation, tightness and durability;
- flooring manufacturers, in case of public use, are conditioned to NF UPEC and, in the same direction, Avis Technique (Atec);
- in Hungary and Poland, additional but volunteers requirements are suggested and, actually, carried out;

- in France and Spain in PC CE from other sources are required additional marks and testing, Asociación Española de Normalización y Certificación (AENOR) and Normalisation, Certification, Edition et Formation (AFNOR), respectively.

Sometimes, the co-existence with national rules leads to misunderstandings in favor of these. As a result, new processes are imposed, to stakeholders, using national standard taxes for alleged non-existence of equivalent ENh and outside the scope of ETA. An issue that limits the access to the single european market, e.g.:

- in the United Kingdom (UK), there is a predominance, in certain PC, of the British Board of Agrément (BBA) certificate, by the United Kingdom Accreditation Service (UKAS);
- also in the UK, it was decided to introduce three additional features to EN14351 in favor of a national rule, on Doors and Windows - in particular, air and water permeability and wind resistance —; an identical procedure was introduced in the Netherlands and Bulgaria for the same PC;
- in France, the NF228 in force for the tiles sector is considered an obstacle to market access, though that is at all similar to EN 12326 (adopted by the CE mark) is, however, regarded as inferior; in the UK, an early withdrawal of the British Standard BS 680 and the adoption of EN 12326 led the industry to hide behind the French standard NF228.

In parallel with the CE mark, the process of compliance with the National standard(s) tends to be, in such a way, so onerous and time consuming that many stakeholders end up abandoning their intent. The issues outlined in the previous section, are the example of the lack of effectiveness of European entities, despite the sanctions provided for in CPR, there is no record of such.

Sometimes, manufacturers and other interested parties, coming from a country inside or outside the EU, are conditioned to the use of additional markings (certifications). To access the fullness of the market — as double glazing and cements (as number 11 in the references) — it is required to some PC up to ten certifications, in as many Member States. Today, these situations tend to be accepted and even sought by the interested parties as if they were imposed obligations.

Ultimately, for the PC, there are national requirements that affect the decision of the designers and even consumers, in markets where national certification marks are, for many years, recognized by the performance of products. The products recently placed on the market with CE mark can not succeed, despite having qualities aligned with the others, there is a strengthening of the monopoly of local manufacturers, recognized by decision makers. There are consumers who devalue CE mark for the national equivalent. The imposed generalization, common to all kinds of products, from toys to complex hospital equipment, led to its trivialization and loss of importance in markets with local equivalents, with recognized and praised quality.

5. Some Technical Suggestions

Article 8, in its number 5, is vague and should be limited in a future revision of the CPR. In its writing, “(...) shall ensure that the use of construction products bearing the CE marking shall not be impeded by rules or conditions imposed by public bodies or private bodies acting as a public undertaking (...) when the declared performances correspond to the requirements”. This last section leaves open other class requirements, in short, if so understood by the NB, it limits the marketing of some products or force manufacturers to request new tests to understand the local "user requirements".

In number 33 of the 'considerations' of the CPR we have: “The CE marking should be the only marking (...) However, other markings may be used, provided that they help to improve the protection of users of construction products and are not covered by existing Union harmonization legislation.”. This is one of the anchors used by some Member States to impose other rules. Situations in some cases justified — e.g., the Dutch government has exposed the differences between the KOMO and EC, in the framework of the article mentioned — others are more difficult to accept, especially those which the implemented industrial capacity and high quality standards tend to protect the national economy.

In future CPR revisions the brand CE should be stratified — abandoning the idea of a ‘static’ quality brand — in levels of excellence: accurate and specific information for markets, of the PC efficiency, in order to replace or make redundant the national equivalents, understood as quality pillars. Like the efficiency rating for electrical household appliances, e.g., “D/C/B/A/A+/A++/A+++”, wherein the

above basic requirements of a particular class — provided for in the CPR, but with no clear distinction — would get a prominent ranking, as exemplified.

6. Conclusions

The EU aims to: protect the markets, protect operators and increase product safety, for interveners and users. Grounds for the creation of the CE mark²⁶: transversal/common to all commercial activities. The scope of the CE mark, makes this an unfocused answer the unique problems of the construction sector, only adjusted to the particularities.

By force of situation, the EU has tools that enables it to compose supranational legal frameworks with precedence over the Member States: despite the divisions between peoples and differences in construction methods. Nevertheless, the CP are increasingly more widespread worldwide and, in particular, in Europe: proving that all generated legislation stimulated the dynamism of the market with products that meet the standards, although basic. However, countries like France and Germany managed to pass laws that increase the control of CP, for the protection of the environment, in the first, and safeguard the 'good construction' in the second.

The use of ISO standardization, as a starting point for ENL, was essential to aggregate participants around a European ideal. The path was integrator since it allowed to adjust the various NB around common legislation. Position which compromised the legislative framework, especially in a sector as 'influential' (powerful), with existing structures and vested interests to defend its 'natural/traditional' space: compromise which did not allow a strong position in face of some situations, e.g., the high number of ETA to somehow circumvent the costs and procedures involved in setting up new standards or assumption of similar.

Unlike the rest of the world, in Europe the production of standards documentation (Harmonized) is unique, resembling copyright: the registration of a rule prevents the publication of other similar (for established criteria). Also, in order to avoid duplication of testing, the manufacturer of a CP may request permission to use third parties test(s) results free of costs. Peculiarities instituted in order to reduce costs and time: to accelerate the introduction of the PC in the market. On the other hand, there is the growth of informal standardization markets, contrary to the spirit of European legislation.

CE certification was imposed on CP but the same does not apply to Construction Services. Some entities/operators, who voluntarily seek to establish a standard of rigor performance, have opted for Certification ISO 9001:2008^{27,28}, those are, however, a minority. While PCs have basic requirements and are controlled by different entities, those who manipulate them are not bound to any rigor or specific principle, having as tip of the balance the yoke of a technician responsible, trained and experienced. With the exception of the requirements made by the Member States as, e.g., carbon dioxide emissions or risk of health and safety working conditions.

The lack of tools for the assessment of buildings (finished product) constitutes an antagonistic case to other consumer goods, with CE marking. PC are handled, and sometimes tampered with, during the construction process, so its characteristics are altered making it different what it was when granted the CE mark. It can be assumed that, therefore, the safety of a citizen, living in the building or surrounding space, is not regulated by the basic requirements of CPR, since that is only dependent on national regulations.

As above and to complete, there are 'interests', both public and private, that act as NB, when it comes to regulating the market. What it is not and never was the spirit of the CPD or, later, CPR.

7. Acknowledgment

²⁶ Today, the CE mark is a source of pride for manufacturers. It is recognized within the Europe, by both operators and consumers (in general), and across borders (e.g., Canada signed a protocol with the EU to the free marketing of CP with CE marking), like the FCC Declaration of Conformity (US), the Canadian Standards Association (CSA), Underwriters Laboratories (UL) of the Electromagnetic Compatibility (EMC), to name a few.

²⁷ ISO 9001 is by far the world's most established quality framework, currently being used over 1.5 million organizations in 191 countries. Fonte: <http://www.iso.org/iso/iso-survey.htm?certificate=ISO%209001&countrycode=AF>

²⁸ In Europe, in 2005, extrapolating from the Italian example only 42% of the construction companies had ISO9001 certification. Source: P. Sampaio, P. Scott, A.G. Rodrigues, ISO 9001 Certification Forecasting Models, International Journal of Quality & Reliability Management Vol 28 Nr 1, 2011 pp. 5-26, DOI 10.1108 / 02656711111097526 2010.

The author would like to thank the Fundação para a Ciência e Tecnologia (FCT – Portugal) for the financial support to the research project UID/EAT/04008/2013, through Centro de Investigação em Arquitetura, Urbanismo e Design (CIAUD — Portugal).

8. Appendix A World Trade Organization

Was funded on five principles: 1. “Trade without discrimination”; 2. “Freer trade: gradually, through negotiation”; 3. “Predictability: through binding and transparency”; 4. “Promoting fair competition”; and, 5. “Encouraging development and economic reform”; to achieve the “Comparative advantage” through available goods.

Appendix B CE mark

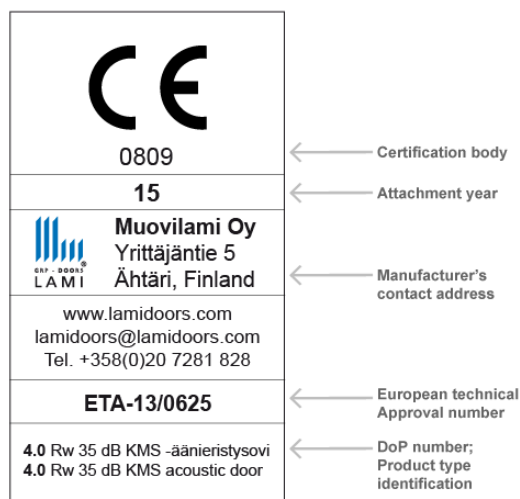


Figure 2. - CE mark (e.g.).

Appendix C European Committee for Standardization (CEN)

The CNE is composed of 30 national standards bodies (ONN): IQ - Instituto Português da Qualidade (Portugal); ON - Österreichisches Normungsinstitut (Austria); IBN - Institut Belge de Normalisation (Belgium); BDS - Bulgarian Institute for Standardisation (Bulgaria); CYS - Cyprus Organization for Standardisation (Cyprus); CNI - Cesky Normalizační Institut (Czech Republic); DS - Danish Standards (Denmark); EVS - Estonian Centre for Standardisation (Estonia); SFS - Suomen Standardisoimisliitto r.y. (Finland); AFNOR - Association Française de Normalisation (France); DIN - Deutsches Institut für Normung (Germany); ELOT - Hellenic Organization for Standardization (Greece); MSZT - Magyar Szabványügyi Testület (Hungary); IST - Stadlard Islands (Iceland); NSAI - National Standards Authority of Ireland (Ireland); UNI - Ente Nazionale Italiano di Unificazione (Italy); LVS - Latvian Standards Ltd (Latvia); LST - Lithuanian Standards Board (Lithuania); SEE - Service de l'Energie de l'Etat (Luxembourg); MSA - Malta Standards Authority (Malta); NEN - Nederlands Normalisatie-instituut (Netherlands); SN - Standardiseringsen i Norge (Norway); PKN - Polish Committee for Standardization (Poland); ASRO - Asociația de Standardizare din România (Romania); SUTN - Slovenský ústav technickej normalizácie (Slovakia); SIST - Slovenian Institute for Standardization (Slovenia); AENOR - Asociación Española de Normalización y Certificación (Spain); SIS - Swedish Standards Institute (Sweden); SNV - Schweizerische Normen-Vereinigung (Switzerland); and, BSI - British Standards Institution (United Kingdom).

9. References

- [1] Analysis of implementation of the Construction Products Regulation, Risk & Policy Analysts Limited, London, Norfolk, UK, 2015.

- [2] O. Ilvonen, "Assessing release of hazardous substances from construction products – Review of 10 years of experience with a horizontal approach in the European Union," *Build. Environ.*, vol. 69, pp. 194–205, 2013. <https://doi.org/10.1016/j.buildenv.2013.08.010>
- [3] S. Mills, *International Standards in the Emerging Global Economy*, OpenStand publication, 2012.
- [4] *Economic benefits of standards*, International Organization for Standardization, Genève, 2014.
- [5] S. Vogel, *Freer Markets, More Rules: Regulatory Reform in Advanced Industrial Countries*, Cornell University Press, Cornell, 1996.
- [6] Mallett, Robert L. "Why Standards Matter." *Issues in Science and Technology* 15, no. 2 (Winter 1999).
- [7] R. Tricker, "3 - Structure of the CE conformity marking directive (93/465/EEC) BT - CE Conformity Marking," Oxford: Butterworth-Heinemann, 2000, pp. 55–96. <https://doi.org/10.1016/B978-075064813-4/50015-1>
- [8] Regulation(EU) N. °305/2011 of the European Parliament and of the Council, *Official Journal of the European Union*, Strasbourg, 2011.
- [9] A. Velker, *Markets and Measurements in Nineteenth-Century Britain*, Cambridge University Press, Cambridge, 2012. <https://doi.org/10.1017/CBO9781139151030>
- [10] A. Kylili and P. A. Fokaides, "Policy trends for the sustainability assessment of construction materials: A review," *Sustain. Cities Soc.*, vol. 35, pp. 280–288, 2017. <https://doi.org/10.1016/B978-075064813-4/50015-1>
- [11] K. O. Kverneland, *Metric Standards for Worldwide Manufacturing*, 2012 Edition, "GO metric USA™.org", Inc., Statesville, North Carolina, 2012.
- [12] *CE mark now! - Mandatory CE marking of construction products*, Swedish National Board of Housing, Building and Planning, Boverket inhouse, Boverket, 2013. ISBN 978-91-87131-78-3
- [13] *The CE mark and European Technical Approval*, Kalzip GmbH ·Part of Tata Steel Europe Ltd, Kobenz, 2010.
- [14] T. Nwaogu, S. Marshall, *Analysis of Implementation of the Construction Products, Risk & Policy Analysts Limited*, London, United Kingdom, 2015.