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### OCCUPATIONAL SAFETY AND HEALTH COORDINATION IN THE CONSTRUCTION INDUSTRY IN EUROPEAN UNION COUNTRIES

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## **Abstract**

The Construction Sites Directive (92/57/EEC) published by the European Union (EU) in 1992 introduced the new concept of safety and health coordination based on a new chain of responsibilities (including the owner and the designer), new safety and health documents (the prior notice, the safety and health plan, and the safety and health file) and new safety and health stakeholders (the safety and health coordinators for the design phase and for the construction phase). This new approach for the implementation and improvement of safety and health in construction comprises the design, execution and maintenance phases, representing a real challenge for all those involved in the construction process. At this moment, each of the 15 EU member states has brought this Directive into national law, interpreting and adapting this new approach to the reality of each country and taking into account the experience and particular environment of those who most apply them everyday. This document aims to discuss these issues together with this new concept of safety and health coordination and the way European Union countries have implemented it. The exchange and knowledge of the existing practices in each country will certainly benefit other countries to develop improvement strategies for the future. It is the author's belief that this exchange of information between countries should be strengthened, as this will certainly contribute significantly to improve safety and health on construction sites and reduce the number of occupational accidents and diseases in the construction industry in the European Union.

**Keywords:** Construction; European Union Construction Sites Directive (92/57/EEC); Safety and Health Coordination.

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### Abbreviations used in this document

CIB	– International Council for Research and Innovation in Building and Construction
CIB-W99	– CIB Working Commission on “Quality and Safety on Construction Sites”
CSD	– Construction Sites Directive n.º 92/57/EEC
EU	– European Union
GPP	– General Principles of Prevention
ILO	– International Labour Organization
ISO	– International Organization for Standardization
ISSA-CS	– International Social Security Association – Construction Section
OSH	– Occupational Safety and Health
PN	– Prior Notice, as defined in the CSD
SHC-C	– Safety and Health Coordination for the Construction phase
SHC-D	– Safety and Health Coordination for the Design phase
SHF	– Safety and Health File, as defined in the CSD
SHP	– Safety and Health Plan, as defined in the CSD

## 1. INTRODUCTION

The actual 15 countries of the European Union (EU)<sup>1</sup> occupies an area of about 3,2 millions square kilometres and have a total population of about 375 millions. The construction sector with a total production of 900 billions Euros (2002), employs about 8% of total working force (about 11 millions construction workers). From the total number of accidents at work in all economic activities, the construction sector represents about 18% (about 850 000 accidents at work with more than 3 lost days, each year) and concerning fatal accidents at work, it represents about 24% (about 1300 fatalities, each year). Having in mind the International Labour Organization (ILO) estimate of 60 000 fatal accidents at work on construction sites all around the world every year [Valcárcel, 2003], and the distribution of these by regions (64% to the Asia and Pacific region, 17% to the Americas, 10% to Africa and 9% to Europe), this means that the European Union countries are responsible for about 2% of all these fatal accidents at work.

These figures are indeed unacceptable from the social and human point of view. The recognition that the construction industry is a high hazardous industry, has lead the European Union to publish in 1992 a special directive changing the way safety and health in construction was being considered. This directive (92/57/EEC) is now known worldwide as the Construction Sites Directive (CSD). Since then, the construction industry has changed in all countries of the European Union and safety and health in construction is now an issue that most construction stakeholders are aware and take care of.

The high number of meetings, seminars, congresses and symposia organized since then in the EU countries, contributed significantly for this awareness. Despite this, there are still some stakeholders (namely, owners and designers) in some EU countries that continue to disregard their responsibilities for construction safety and health, especially some owners and designers that traditionally held the view that safety and health on construction sites was the sole responsibility of the contractors. The official entities (governments and, in particular, the labour inspections) should promote the awareness of these stakeholders through the intensification of seminars related to their specific duties.

Since its publication in 1992 each country of the EU brought into national law the provisions of the CSD. However, if some countries “worked” this Directive creating the mechanisms and means for an effective implementation, other countries have made a “simple” transposition with few adaptations to the reality creating in some cases confusion for those who must implement them or check their application every day. Other countries yet have changed or are changing their first transposition making revisions of their laws for clarification and/or detailing purposes (IRL, B). In spite of the common base introduced by the CSD, the fact is that each country of the EU has its own approach. It should also be referred that some occupational accident indicators (in particular the number of fatal accidents in construction per 100 000 workers, which is about 12 in the EU, about the same in USA and Japan) differs between the 15 countries, sometimes significantly, reaching differences of 1:5. The most frequent construction OSH accidents in the EU are those related to falls from height, struck between, cave in and electrocution.

An overview and discussion of the new approach of this Construction Sites Directive concerning occupational safety and health, is the main issue presented in this document, taking into account different approaches in EU countries. The role of the main stakeholders in the construction process is also discussed.

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<sup>1</sup> Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom. In May 2004, it is expected that the following 10 countries will also join the EU: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia. Then, the EU 25 will occupy an area of about 4 million square kilometres and a population of about 450 millions.

## Source of information

The source of information used in this document is presented in table 1. The reference to a “law” means any legal document independently of the name used in each country (decree-law, law, executive order, code of practice, order, etc.). Other reference documents are also referred, but the priority considered was given to what is established in the laws known in each country and which language the author could read and understand. For the other cases it was based in the information in both publications referred in to the same table (ISSA-CS, 2001 and CIB-W99, 1999).

It must be pointed out that some EU countries may have, in the meanwhile, changed their own laws for different reasons (be to better comply with the CSD or be just for clarification purposes). The discussion in this document is also based on the author’s experience and knowledge in his actual professional activity in the construction industry, including on the practical implementation of the CSD provisions and on the participation in many international meetings where this issue has been extensively discussed.

Table 1: Source of information (EU countries)

	European Union (EU)	Directive 92/57/EEC of 24 June 1992; Directive 89/391/EEC of 12 June 1989
	Austria (A)	(ISSA-CS, 2001) and (CIB-W99, 1999) based on law 37 of 1999
	Belgium (B)	Law of 1996-08-04 and Orders of 2001-01-25 and 2001-12-19
	Denmark (DK)	(ISSA-CS, 2001) and (CIB-W99, 1999) based on law 576 of 2001
	Finland (FIN)	(ISSA-CS, 2001) and (CIB-W99, 1999) based on Laws 629 and 977 both of 1994
	France (F)	Laws 1418-1993, 1159-1994, 2003-68 and Orders of March 1995 and Feb. 2003
	Germany (D)	(ISSA-CS, 2001) and (CIB-W99, 1999) based on the Construction Sites Order of 1998
	Greece (GR)	(ISSA-CS, 2001) and (CIB-W99, 1999) based on law 305 of 1996
	Ireland (IRL)	Law 138-1995 and the Guidelines to the Construction Regulations 2001 (n.º 481)
	Italy (I)	Laws 494-1996 and 528-1999
	Luxembourg (LUX)	Law 1104 of 1994
	Netherlands (NL)	(ISSA-CS, 2001) and (CIB-W99, 1999) based on law of 1994
	Portugal (P)	Law 273-2003
	Spain (E)	Law 1627-1997
	Sweden (S)	Law AFS 1999:3 of 1999
	United Kingdom (UK)	Law 3140-1994; HSE Construction Sheet n.º 40; Code of Practice (ACoP 2001)

## **2. THE NEW APPROACH ON OSH IN THE CONSTRUCTION SITES DIRECTIVE**

Traditionally and before the CSD was published in the European Union, the responsibility for the implementation of all prevention measures on construction sites were committed mainly (and in some countries, only) to the contractors based on the legislation and/or on the contracts established between the owners and these contractors. After the publication of this Directive in the EU countries, all those involved in the construction process have or continue to have responsibilities and obligations on occupational safety and health matters (owners, designers, managers and supervisors, contractors and subcontractors, workers).

In fact, the CSD introduced a new approach for the improvement of OSH in construction, aiming to relieve the importance of the application of prevention measures (managerial and material), which may contribute to the reduction of work related accidents and diseases in construction. It took into account somehow the provisions of the ILO Convention n.º 167 on “Safety and Health in Construction” of 1988, although only 5 of the EU countries (DK, FIN, D, I, S) have ratified it (Brazil, Japan and USA did not ratify this Convention until now).

In summary, this approach of the CSD is based on:

- (i) the principle that all those involved in the construction process have specific roles (responsibilities) concerning OSH, including the owner and the designer;
- (ii) the introduction of the new concept of safety and health coordination (for the design phase and for the construction phase), creating:
  - two new stakeholders in the construction process (the safety and health coordinators, for the design phase and for the construction phase) and;
  - three new documents of hazard prevention (the prior notice, the safety and health plan, and the safety and health file).

In 2.1 the roles on OSH of all those involved in the construction process are summarized and in 2.2 the new concept of safety and health coordination is presented and discussed, both for the design phase and for the construction phase.

The new documents of hazard prevention referred in to 2.2 are briefly described in 2.3, which supports the new concept of safety and health coordination.

### **2.1 Roles on OSH of all those involved in the construction process**

In a traditional construction project management system one can consider the following main stakeholders: the owner who owns the project; the supervisor (or sometimes called, the project or construction manager) who supervises it on behalf of the owner; the designer who designs it; and the contractor (including subcontractors and workers) who built it. All or part of these “functions” may also be done by the owner itself, depending on the resources and capability (human and material) he has in his structure to accomplish the tasks. Many other different (and more complex) organizational structures may also be considered, but this discussion is out of the scope of this document.

Each of these stakeholders has specific roles concerning OSH and their responsibilities are graduated according to the function and to the construction knowledge each of them will perform in the construction process.

### **2.1.1 The owner and OSH**

The owner (who, in general, has no construction knowledge) must perform simple and no technical obligations concerning OSH. His role on OSH, include:

- (i) appointment of one or more safety and health coordinators (for the design phase and for the construction phase);
- (ii) communication of the prior notice to the local competent authorities on OSH (Labour Inspectorate) before the work starts;
- (iii) ensure that prior to the setting up of a construction site, a safety and health plan is drawn up, which must set out the rules applicable to the construction site concerned.

Although the Directive does not specify when these coordinators should be appointed, it is the author's belief that the safety and health coordinator for the design phase should be appointed at the very beginning of the preparation of the design, preferably before the process of procurement of designers - in some countries (i.e. F) it is stated that this appointment should be done since the start of the preliminary design. As for the safety and health coordinator for the construction phase, he should be appointed before the process of procurement of contractors.

It should be mentioned that the European Commission published an answer to a written question (P-2836/01) related to the construction of private housing, clarifying that it is also covered by the provisions of the CSD and so an European Union Country cannot grant exemptions from the obligation to appoint a safety coordinator for the construction or renovation of private dwellings if several contractors are present on the site (Official Journal of the European Commission of 2002-05-16).

It must be pointed out that the owner may also accomplish the mission of the safety and health coordinators, or he can contract someone else to do it on his behalf as he usually does.

These coordinators (see below) become then the owner's experts on all matters concerning safety and health in the construction process (during both the design and construction phases). They are "agents" and advisers of the owner and so they are responsible also for the establishment of the main policies concerning safety and health on each construction project. The owner acts somehow like a "chief of an orchestra". He knows what he wants, he decides what to do, but he can not "play each instrument with the quality of each player". He is in the first line of the responsibility concerning OSH, as he has the power and authority over all the other stakeholders and should encourage them to take into account safety and health during all phases of the construction process, giving all means needed and bearing the respective costs.

Moreover, some countries state in their legislation that these safety and health coordinators must be "competent persons" defining the meaning in a broad way. It should be referred that the ILO Convention 167 defines a "competent person as a person possessing adequate qualifications, such as suitable training and sufficient knowledge, experience and skill for the safe performance of the specific work. The competent authorities may define appropriate criteria for the designation of such persons and may determine the duties to be assigned to them".

### **2.1.2 The safety and health coordinators and OSH**

The safety and health coordinators may be any natural or legal person entrusted by the owner and/or project supervisor to perform the provisions of safety and health coordination referred in to below for the design phase and for the construction phase. These two roles may be fulfilled by one or more different individuals on the same project. They are appointed by the owner to coordinate the construction project on all

matters concerning safety and health, and there is no obstruction to appoint some of the actual stakeholders (in special the project manager or supervisor) who may accumulate this mission, since it is assured their independence and that there is no conflict to the duties they are already committed in the project, i.e., who have to do, may not supervise. In some countries (i.e., F) and for some projects (i.e., with a cost over a certain amount) it is stated that the safety and health coordinator must be someone not in charge of any other mission related to the same project. Whoever is appointed as safety and health coordinator, the important is to assure the efficient implementation of safety and health coordination, and the author's believe that each case must be analyzed and decided in conformance to its nature, size and complexity.

Although the CSD refers that these coordinators may be any natural or legal person, some EU countries imposes that they must be only natural persons (e.g. Spain, Italy), while others impose that they must be legal persons (e.g. Sweden, UK). Some countries consider that when a legal person is in charge of the coordination, this legal person must include in their team, natural persons qualified as safety and health coordinators. According to the author's experience, this is an important issue as, for an important or complex project, it seems difficult for a natural person to fulfil all the duties referred in to safety and health coordination. A team (where all persons are dependent of the same legal person) with distributed tasks and responsibilities, seems to be more appropriate.

Moreover, most countries adopted the CSD designation of safety and health coordinators, but some of them have considered different names (other names that are not the translated equivalent). This is the case of UK where the duties of the safety and health coordinator for the design phase (SHC-D) are committed to the called "planning supervisor" who have duties until the completion of the project (e.g. the safety and health file). The duties of the safety and health coordinator for the construction phase (SHC-C) are committed to the so called "Principal Contractor", who must be a contractor and may be any person that undertakes, does carry out or manage construction work. The expression "so far is reasonable practical" is used in many circumstances "smoothing" the duties of these stakeholders concerning safety and health.

In Ireland the duties of the SHC-D are committed to the called "project supervisor appointed for the design stage" and those of the SHC-C are committed to the called "project supervisor appointed for the construction stage". In both cases these supervisors may appoint safety and health coordinators to perform their duties.

According to the CSD, the appointment of these coordinators is related solely to the number of contractors that is foreseen to be present simultaneously on the construction sites. In most countries in the computation of this number of contractors, it is also clearly stated that the subcontractors and/or any employer or self-employed person should be considered for this purpose. Derogations for these appointments of coordinators are allowed, except where the works involve particular risks (see definition and discussion in 2.2) or a prior notice is required (see conditions in 2.3).

A final issue that should be pointed out is the difference between the safety and health coordinators' roles that usually are implemented in specific construction projects and those stated in the law. In most cases they are applied in important construction projects and the duties go beyond the minimum requirements in the law.

### **2.1.3 The designer and OSH**

The designer shall take account of the general principles of prevention referred to in the EU framework directive (see 2.2) when architectural, technical and/or organizational aspects are being decided and when estimating the period required for completing the project or project phases. It should be referred that in the CSD, this obligation is



committed to the owner or the project supervisor appointed by him, but in most EU countries this obligation is committed by law to the designers. The knowledge and interpretation by designers of these general principles of prevention is a very important issue as they influence significantly safety and health, not only of the construction workers during the execution phase, but also the workers that will intervene during the maintenance stage. In 2.2 some considerations on these principles and their interpretation are presented.

The issue is to know how designers are performing these duties. Do they know and have preparation / qualification for the application of these principles? The answer may vary from country to country, but it is the author's believe that in most cases there is a lot to do and improve in this field.

#### **2.1.4 The contractors and OSH**

The contractors must accomplish with all rules on OSH stated in the legislation and in the contract with the owner. The subcontractors, labour suppliers, equipment suppliers with labour, and their successive subcontracting chain, must also follow the same rules on OSH and in the contracts established with the contractors. In these cases, they must also follow the rules included in safety and health plan and safety and health file established for the specific project under consideration, documents that must be included in a clear way in each of these contracts. The contractors have the duty to coordinate all subcontractors and these have also the duty to cooperate with the contractor. The contractor must yet implement and make to be implemented by his subcontractors, the general principles of prevention (the same referred to in above, but now applicable during the execution of the works). An important issue that should be enlighten refers to the responsibilities of contractors (as they are employers), which were not reduced with the new approach on OSH introduced by the CSD.

#### **2.1.5 The workers and OSH**

The construction workers have also duties on OSH, namely to comply with the provisions of the legislation and of the safety and health plan. They must also use the personnel protective equipment (PPE) according to the instructions of the employer, maintaining it in good conditions and encouraging other workers to use their own PPE. They must yet inform any non safety situation on performing the work they have to perform and they may also suggest the implementation of new safety measures. Training of workers on OSH is of utmost importance for this objective, as they are the main beneficiary of all these measures.

#### **2.1.6 Final note**

Independently of the roles of each stakeholder, it is important to assure and clarify that OSH is an issue of all those involved in the construction process. Each individual is responsible for their duties and by the safety and health of other than can be affected by the absence of his action. It must be thus required the commitment and the effort of all involved in the construction process and one should avoid to stimulate the idea that OSH is an issue that concerns only to the safety experts who have specific education and qualification on safety and health matters.

## 2.2 Occupational Safety and Health Coordination

The Construction Sites Directive considers two stages for safety and health coordination during the construction process<sup>2</sup>. They are:

- Safety and health coordination during the design phase (hereafter referred, SHC-D);
- Safety and health coordination during the construction phase (hereafter referred, SHC-C);

The first (SHC-D) is to be performed by the safety and health coordinator for the design phase, who should be appointed by the owner, preferably before the process of selection of the designer, and the SHC-C is to be performed by the safety and health coordinator for the construction phase, who should be appointed before the start of the tender process for selection of contractors.

In both cases, compliance with the so called “General Principles of Prevention” (GPP, for short) is of utmost importance for successful safety and health coordination during the design and construction phases. They should be applied by the designers during the design process and by the contractors during the construction phase, and be followed up by the safety and health coordinators.

These stakeholders must know, understand and interpret these principles in the light of the construction design (concerning the SHC-D) and the construction process (concerning the SHC-C) for each construction project.

The nine GPP are shown in the following table 2 together with some comments, considerations or examples on each. In some cases the GPP should be included in the specifications as mandatory so that all designers and contractors will address them in the tender process.

As referred above (see 2.1), during the design phase, most countries have committed the general principles of prevention to the designers and the role of the coordinators is mainly coordination of the application of these principles.

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<sup>2</sup> It should be mentioned that on November 2001, the European Commission published an answer to a written question (P-2836/01) related, among other issues, to the construction of private housing, clarifying that it is also covered by the provisions of the CSD and so an European Country cannot grant exemptions from the obligation to appoint a safety and health coordinator for the construction or renovation of private dwellings if several contractors are present on the site (Official Journal of the European Commission of 2002-05-16).

Table 2: The 9 General Principles of Prevention

<p>1. <i>Avoid risks</i></p> <p>Construction is inherently dangerous, but many risks can be avoided. For example, to avoid risks of falls on a building project, construct scaffolding as the building grows in height. Consider planning the project by avoiding simultaneous and incompatible construction operations (worker distractions are responsible for many occupational accidents). Carefully consider the appropriate amount of time to be allotted for the performance of different tasks to minimize the pressure that might otherwise accompany an unrealistic work goal. ...</p>
<p>2. <i>Evaluate the risks which cannot be avoided</i></p> <p>Consider the preparation of Inspection and Monitoring Plans for all relevant construction operations in terms of risks involved. Consider the technical maintenance, pre-commissioning checks and regular checks on installations and equipment with the objective of correcting any faults which might affect the safety and health of workers; ...</p>
<p>3. <i>Combat the risks at source</i></p> <p>Consider ways of confining and neutralizing the risk at the source. Reduce the noise equipment by selecting equipment that has been engineered to generate less noise. Consider also the sound-proofing of the engine's compartment. Consider air conditioning the driver compartment on earthmoving equipment so that the work can be performed with closed windows without exposing the driver to noise and other environmental hazards as dust and fumes. ...</p>
<p>4. <i>Adapt the work to the individual, especially as regards the design of work places, the choice of work equipment and the choice of working and production methods, with a view, in particular, to alleviating monotonous work and work at a predetermined work-rate and to reducing their effect on health</i></p> <p>To reduce hazards consider the use of ergonomic equipment and perform risk analysis when choosing equipment and construction methods. Avoid undue pressure in project scheduling, by accurately allotting adequate time to perform each construction operation. Also, perform regular health inspections of workers. ...</p>
<p>5. <i>Adapt to technical progress</i></p> <p>Use only certificated equipment according to the regulations and standards. Prepare a procedure to organize a database on all relevant regulations and standards and keep the database current by including all recent changes. Avoid the non intentional use of obsolete technical documents. ...</p>
<p>6. <i>Replace the dangerous by the non-dangerous or the less dangerous</i></p> <p>Reduce hazards by using vegetal based oil for forms instead of dangerous oils; replace materials based on dangerous asbestos with other equivalent and non dangerous materials; be aware of the conditions under which the hazardous materials are to be removed (e.g. existing dangerous asbestos); consider the demarcation and laying-out of areas for the storage of various materials, in particular where dangerous materials or substances are concerned; and plan the storage and disposal or removal of waste and debris. ...</p>
<p>7. <i>Develop a coherent overall prevention policy which covers technology, organization of work, working conditions, social relationships and the influence of factors related to the working environment</i></p> <p>Consider a formal safety and health (prevention) policy provided by each contractor on site; assure the cooperation between employers and self-employed persons; consider the interaction with industrial activities at the place within which or in the vicinity of which the construction site is located; choose the location of workstations bearing in mind how access to these workplaces is obtained, and determine ways or areas for the passage and movement of equipment; keep the construction site in good order and in a satisfactory state of cleanliness; consider the conditions under which various materials are handled; and implement periodic safety and health audits and inspections. ...</p>
<p>8. <i>Give collective protective measures priority over individual protective measures</i></p> <p>Consider, for example, safety nets and/or guardrails for fall protection, and complementary safety harnesses (together with all other protective personnel equipment that are mandatory, including hardhats and safety shoes). Use the appropriate shoring systems or slope the walls of excavations, whenever the soil is not pure rock; ...</p>
<p>9. <i>Give appropriate instructions to the workers</i></p> <p>Instruction should be simple and only as detailed as needed; consider visual communications; consider different languages for these instructions according to the origin of workers on site, and promote safety and health meetings. ...</p>

In general terms, the safety and health coordination (during both design and construction phases) is based on the following question for each construction project and each main construction element<sup>3</sup> considering any possible or alternative solutions on architectural, technical or organizational principles:

How will it be built and maintained?

For each construction project (a building, a bridge, a road, etc.), this question can be expanded in different ways as follows.

How will each construction element be build without putting workers under a dangerous situation that might compromise their safety and health? Is there any other solution which is less dangerous without compromising the architectural or technical requirements?

How will this construction element be maintained during the life of the construction project, without putting the maintenance workers at risk? How will the façade be cleaned (for example, windows may be cleaned from the inside if the windows are small or they can be opened into the interior, or should a platform be installed on the exterior)?

How will maintenance workers get access to equipment if it is placed in a particular position (for example, air conditioning equipment placed in a very high position in a store building)?

How will access be provided to the roof of the building (having in mind also the slope)? For future maintenance, should some points of anchorage be left in place to accommodate “life lines” or safety harnesses or for the attachment of platforms on the ridge of the roof? Could the parapet in the roof be 1,00 - 1,20 meter high to avoid the need of complimentary guard-rails and so the workers during the construction phase and those of the maintenance phase, may perform their work on the roof safely?

These are just some of the questions that should be always kept in mind, especially by designers (during the design of the construction project), by contractors (during the execution of the construction project) and by safety and health coordinators during both the design and construction phases.

From the above mentioned, it must be emphasized that, although safety and health coordination is to be implemented starting at the very early phases of the design to the completion of the project, it concerns also with safety and health of all workers that will be involved in the maintenance period until the demolition of the construction project. For this purpose, the safety and health file should be used and updated during all this maintenance period.

Moreover, it is the author’s belief that safety and health coordination (in both phases) should be implemented in all construction projects, graduating the requirements taking into account the size (project cost) and complexity and, independently of the size, for all those involving particular risks as defined by the CSD.

The works involving particular risks as defined by the CSD are: (1) Work which puts workers at risk of burial under earth falls, engulfment in swampland or falling from a height, where the risk is particularly aggravated by the nature of the work or processes used or by the environment at the place of work or site; (2) Work which puts workers at risk from chemical or biological substances constituting a particular danger to the safety and health of workers or involving a legal requirement for health monitoring; (3) Work with ionizing radiation requiring the designation of controlled or supervised areas; (4) Work near high voltage power lines; (5) Work exposing workers to the risk of drowning; (6)

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<sup>3</sup> A construction element is a part of the construction project as piles, façade, covering, etc..

Work on wells, underground earthworks and tunnels; (7) Work carried out by drivers having a system of air supply; (8) Work carried out by workers in caisson with a compressed-air atmosphere; (9) Work involving the use of explosives; (10) Work involving the assembly or dismantling of heavy prefabricated components.

However, related to the first group of works involving particular risks referred in to above, it does not seem reasonable, for example, to consider as involving particular risks all fallings from height independently of the working height and all excavations independently of the working deep. Actually, the CSD refers that each country has the option of setting figures for individual situations and indeed some countries have indeed done it. For the works that put the workers at risk of burial under earth falls, some countries consider a deep of more than 1,20 meters (B) while others consider 1,50 meters (I). As for the risk of falling from height some figures include 2 meters (I, S), 3 meters (F) or 5 meters (B). Some countries yet, have established other figures for other works involving particular risks, as is the case of France that included also works of demolition or deconstruction involving a volume of more than 200 cubic meters of the product to be carried out of the construction site, and works involving the need of lifting equipment with a capacity over 60 t/m as for mobile or tower cranes.

### **2.2.1 Coordination of Safety and Health during the Design Phase**

The safety and health coordination during the design phase (SHC-D) aims to assure the identification and assessment of potential hazards that may be avoided during the early stages of the design process by adopting, whenever possible, alternative solutions on a prevention basis. This should be done by assuring the implementation of the general principles of prevention which should be applied by the designers as referred in to above.

According to the European Union Construction Sites Directive, this coordination implies basically the following 3 items:

- Coordination of the implementation of the general principles of prevention (GPP) when architectural, technical and/or organizational aspects are being decided, and when estimating the period required for completing the project or project phases;
- Drawing up, or cause to be drawn up, a safety and health plan (SHP) setting out the rules applicable to the construction site concerned;
- Preparation of a file appropriate for the characteristics of the project containing relevant safety and health information to be taken into account during any subsequent works – the safety and health file (SHF).

Based on these main elements, some countries adapt some of them to take into account their own reality and/or for clarification purposes. Other countries added some more items with the same purposes. Some of these adaptations include the following, where it is referred between round brackets (see symbols in table 1 above) examples of countries that introduced them.

Related to the GPP, some countries consider included in the safety and health coordination for the design phase to watch over (ensure) that the GPP are applied (F), other added also the coordination of the activities of other persons engaged for the design (IRL), while others yet specify that safety and health coordination should ensure that designers comply with their duties and ensure co-operation between designers (UK).

As for the SHP, some countries adapted the designation of the safety and health plan, although the contents of this document does not differ significantly, as for: the safety and health general coordination plan (F, I), preliminary safety and health plan (IRL), pre-tender stage health and safety plan (UK) or safety and health study (E).

Concerning the SHF, different designations and approaches were also considered by some of the countries, as for: open the maintenance safety and health file (B); constitute a file for post construction intervention (F); provide the project supervisor for the construction stage with all information needed to be included in the SHF (IRL); ensure that a safety and health file is prepared and is delivered to the client at completion of the project (UK).

Moreover, items that were introduced by different countries as part of the safety and health coordination during the design phase include the following: adapt the SHP when there are changes in the design (B); open, update and complete the safety and health logbook (coordination journal) (B, F); advise who appoint the safety and health coordinator for the design phase on what relates to OSH (B) or advise the client when requested to do so (UK); give the safety and health documents to who appointed the safety and health coordinator for the construction phase (B) or ensure the delivery of all documents to the safety and health coordinator for the construction phase when this is a different person (F); ensure the notification of the project to the authority (UK); define the conditions for the application and use of collective protections, and other (F); take into account the interferences with the activities of exploration on the site or near it (F); chair the inter-enterprises committee, when required (F); take the necessary measures so that only authorised persons may enter onto the construction site (F).

In general terms, it can be said that most of the countries seems to be complying, in general, with the provisions of the CSD concerning safety and health coordination for the design phase, although it is not clear in some cases (e.g. the safety and health file in Spain). Other countries have extended the concept of safety and health coordination for the design phase, clarifying the position of those who have to assure it – the safety and health coordinators.

In view of the above mentioned, the author believes that a safety and health coordination for the design phase should include, namely, the following:

- Owner's advise on all matters concerning OSH, including the preparation of the safety and health policy for the construction project under consideration;
- Coordination of the implementation of the GPP that the designers must apply during all the design process;
- Drawing up the SHP which should include all rules related to OSH to be implemented during the execution of the works;
- Drawing up the SHF which should include all relevant OSH information as well as the prevention and protection measures to take into account during any subsequent works, namely those related to maintenance of the final product;
- Preparation of the OSH requirements to be included in the award process, participation in the assessment of contractors' selection and in the contract formulation, when applicable;
- Transmission to the safety and health coordinator for the construction phase of all relevant OSH information, namely the SHP and SHF, whenever the person responsible for the safety and health coordination for the construction phase is different.

## 2.2.2 Coordination of Safety and Health during the Construction Phase

The safety and health coordination during the construction phase (SHC-C) aims also to assure the identification and assessment of potential hazards that may be avoided during the construction phase for prevention purposes. This should be done by the contractors (and their subcontractors), followed up by the safety and health coordinator for this phase and by the supervisors.

According to the European Union Construction Sites Directive, this coordination implies basically the following 6 items:

- Coordinate the implementation of the general principles of prevention and safety when: (i) technical and/or organizational aspects are being decided; (ii) estimating the period required for completing such work or work phases;
- Coordinate the implementation of the relevant provisions in order to ensure that employers and, if necessary for the protection of workers, self-employed persons: (i) apply the principles (specific on construction sites)<sup>4</sup> in a consistent manner; (ii) where required, follow the safety and health plan;
- Make, or cause to be made, any adjustments required to the safety and health plan and the safety and health file to take account of the progress of the work and any changes which have occurred;
- Organize cooperation between employers, including successive employers on the same site, coordination of their activities with a view to protecting workers and preventing accidents and occupational health hazards and reciprocal information as provided in the framework Directive (89/391/EEC)<sup>5</sup>, ensuring that self-employed persons are brought into this process where necessary;
- Coordinate arrangements to check that the working procedures are being implemented correctly;
- Take the steps necessary to ensure that only authorized person are allowed onto the construction site.

As for the coordination during the design phase above presented, some countries adapt some of these elements to take into account their own reality and/or for clarification purposes. Other countries added some more items with the same purposes. Some of these adaptations include the following, where it is referred between round brackets (see symbols in table 1 above) examples of the countries that introduced them.

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<sup>4</sup> These principles are: (1) keeping the construction site in good order and in a satisfactory state of cleanliness; (2) choosing the location of workstations bearing in mind how access to these workplaces is obtained, and determining routes or areas for the passage and movement and equipment; (3) the conditions under which various materials are handled; (4) technical maintenance, pre-commissioning checks and regular checks on installations and equipment with a view to correcting any faults which might affect the safety and health of workers; (5) the demarcation and laying-out of areas for the storage of various materials, in particular where dangerous materials or substances are concerned; (6) the conditions under which the dangerous materials used are removed; (7) the storage and disposal or removal of waste and debris; (8) the adaptation, based on progress made with the site, of the actual period to be allocated for the various types of work or work stages; (9) cooperation between employers and self-employed persons; (10) interaction with industrial activities at the place within which or in the vicinity of which the construction site is located.

<sup>5</sup> The framework Directive states "... Where several undertakings share a work place, the employers shall cooperate in implementing the safety, health and occupational hygiene provisions and, taking into account the nature of the activities, shall coordinate their actions in matters of the protection and prevention of occupational risks, and shall inform one another and their respective workers and/or workers' representatives of these risks".

Related to the SHP, some main particularities of the adaptation made by some of the countries on the provisions above mentioned refers to the case of Spain where the SHP is to be drawn up by the contractor and the safety and health coordinator should approve it. In spite of having the “safety and health study” this may mean some kind of deviation of the provisions of the directive as for the way it is done. Moreover, other countries adapt their legislation including provisions to ensure that every contractor and every employee complies with the SHP (UK). Other, uses expressions like develop the safety and health plan (IRL) or actualize and adapt the general coordination plan and watch over its application (F), that seems more appropriate.

Concerning the SHF, some countries specifies that the safety and health coordinator for the construction phase should complete the file for post construction intervention (F), while other consider the preparation of SHF (IRL) when this was not considered in the safety and health coordination during the design phase.

Moreover, items that were introduced by different countries as part of the safety and health coordination during the construction phase include the following: chair and organise a Safety and Health Committee, for construction sites with more than 3 employers and 5000 person-days or more than 2.500.000 € (B); complete the SHF taking into account the elements of the SHP with interest for the execution of ulterior works (B); co-ordinate the implementation by the contractors for the appointment of safety officers (IRL); keep available copies of information provided (IRL); provide appropriate information to the site safety representative (IRL); coordinate arrangements for checking implementation of safe working procedures (IRL); coordinate arrangements which facilitate the provision and the maintenance, in an appropriate condition of site welfare provisions to all persons at work on the construction site (IRL); coordinate consultation (IRL); facilitate the appointment of a site safety representative (IRL); inform the site safety representative when an inspector arrives on site (IRL); take account of representations made by the site safety representative (IRL); watch over the correct application of the coordination measures defined (F); take into account the interferences with the activities of exploration on the site or near it (F); chair the inter-enterprises committee, when required (F); ensure that the particulars (refers to the Prior Notice) are displayed in readable condition in a position where they can be read by any person on the construction site (UK); provide the planning supervisor with any information relevant to the planning supervisor, including information for the SHF (UK).

In general terms, it can be said that some countries have just transposed (translated) the European Union Construction Sites Directive into the national law with no or few adaptations (P, LUX). Other countries have extended, modified or clarified the provisions of the CSD in a detailed way (B, F, IRL, UK). However, the author has some doubts about the efficiency of some of the adaptations made by some of the countries.

In view of the above mentioned, the author believes that a safety and health coordination for the construction phase should include, namely, the following:

- Owner’s advise on all matters concerning OSH, including the revision of the safety and health policy for the construction project under consideration which should be clearly displayed on the construction site;
- Coordination of the implementation of the GPP that those involve in the construction process (namely supervisors, contractors, subcontractors) should apply during the execution of the works;
- Preparation and updating of the prior notice to be sent by the owner to the competent authorities on OSH matters (Labour Inspectorate), when applicable;



- Coordination of the adjustments and developments of the SHP and SHF, which should be required to the contractors taking into account the construction processes and methods they will use (concerning the SHP) and the works effectively done (concerning the SHF), as well as the respect for the prevention and protection rules established in these documents (a planning for the development of the documentation should be also required to the contractors, including a schedule for delivering them to the supervisor or to the owner);
- Implementation and coordination of a OSH Committee, which should include all relevant responsible persons involved in the construction project under consideration as well as the workers' representatives;
- Coordination of the supervision of the obligation on OSH of the contractors, subcontractors and self-employed persons that are simultaneously or successively present on the construction site;
- Participation in the analysis and investigation of any accidents at work to be carry out by the contractors including those of the subcontractors;
- Carrying out of OSH audits, on behalf of the owner, on the construction site under consideration;
- Coordination of the delivery by the contractor at the completion of the works of all relevant documentation related to OSH, including records generated namely the SHP and SHF.

### **2.3 The new documents of hazard prevention**

As stated above, the CSD introduced the following three new documents of hazard prevention, which are briefly described (a detailed explanation of their contents is out of the scope of this document):

- Prior Notice (PN);
- Safety and Health Plan (SHP);
- Safety and Health File (SHF).

In brief, the PN aims to announce the opening of a new construction site, while the SHP and the SHF aims to identify and prevent hazards, the first during the construction phase and the last during the maintenance phase.

The preparation of the SHP and the SHF should be started during the design process and, if it is the case, be included in the tender process so that all competitors (namely, contractors) may take them into account in the budget when preparing their proposals. They should be adapted and complemented after awarding of the contract (before any work starts) and during all the construction phase according to the rules they should include.

Both are dynamic documents which should be followed up during all the construction period. If the SHP has to be updated, adapted and applied during the construction phase, the SHF should be updated during and after the works ends being applied during the maintenance stage for hazard prevention in any subsequent works during this phase. However, during the maintenance stage, any significant rehabilitation or changes to the existing construction product must be managed as a "new" construction project and so safety and health coordination during the design and the "construction" phase should apply.

### 2.3.1 Prior notice

The Prior Notice (PN) aims to inform the competent authorities (Labour Inspectorate) that a construction site will start and so it should be prepared before any work. It must be clear displayed on the construction site and be periodically updated, if necessary.

This document is mandatory whenever the works are scheduled to last longer than 30 working days and on which more than 20 workers are occupied simultaneously (in any moment), or on which the volume of work is schedule to exceed 500 person-days. This means, for example, that in a construction project employing every day 10 workers during 6 months (this could be a small single home), the prior notice is necessary, as it involves a volume of 1200 person-days (assuming 20 working days per month and that there are, theoretically, the same number of workers all the days), although the first condition is not fulfilled.

According to the CSD the contents of the PN must include those referred in to the following table 3.

The author believes that it should be also attached to this prior notice of a written declaration of acceptance by all those included in it, in special, those parties that are external to the owner' structure, namely the safety and health coordinators and, where appropriate, this declaration should refer also to the feasibility of the time established for the project to be executed. This last reference to the time is important to be addressed namely by supervisors, designers and safety and health coordinators, due to the influence (or relation) it has on safety and health (a short time means concentration of workers and eventually the incompatibility of simultaneous works, favouring the occurrence of accidents at work).

Table 3: Contents of the Prior Notice according to the CSD

(1) Date of forwarding to the authorities;
(2) Exact address of the construction site;
(3) Client(s) including name(s) and address(es);
(4) Type of project;
(5) Project supervisor(s) including name(s) and address(es);
(6) Safety and health coordinators(s) during the project preparation stage (design phase), including name(s) and address(es);
(7) Coordinator(s) for safety and health matters during the project execution stage (construction phase), including name(s) and address(es);
(8) Date planned for start of work on the construction site;
(9) Planned duration of work on the construction site;
(10) Estimated maximum number of workers on the construction site;
(11) Planned number of contractors and self-employed persons on the construction site;
(12) Details of contractors already chosen.

### **2.3.2 Safety and health plan**

The Safety and Health Plan (SHP) is the main document of hazard prevention aiming to the identification and assessment of OSH hazards and their corresponding preventive measures to be taken during the execution of the works on the construction site under consideration. It should be available before any work on the construction site starts and it must include all the rules to be followed by all those involved in the construction process. It should be made available to all these parties, namely the safety and health coordinator for the construction phase, supervisors, contractors, subcontractors, self-employed persons and workers' representatives.

These rules should be done in a way so that the SHP be dynamic to be expanded during all the construction process, requiring to the contractors its adaptation and development according to the construction processes and methods to be effectively used. Demonstrative records of the actions and measures implemented should also be required. The requirement of SHP for the design phase and another for the construction phase (followed by at least one EU country - Spain), leads in general to static documents and the author has doubts about its efficiency.

The SHP is required for all construction projects in some of the EU countries independently of their size and complexity. In other countries, it is required for construction projects where a Prior Notice is also required (see conditions above) or for those involving particular risks (see definition and comments in 2.2). In these last cases, a simplified version of the SHP is required and some different names are used as referred in to 2.2 above. Other countries, yet, exclude the requirement of the SHP (with or without simplification) for small works when they are to be done inside a private home, in spite of the clarification of the European Commission in November 2001 that seems do not allow this exclusion (see note in 2.2).

In some of the EU countries the minimum contents of the SHP is also included. Table 4 shows an example of the contents organized in as structured way that the author has been using in many construction projects. This structure and contents must of course be adapted (reduced or added) according to the characteristics of each construction project under consideration.

Table 4: Example of structure and contents for the SHP

Promulgation (by the owner's representative)
1. Introduction
1.1 Scope and application (construction project under consideration and any boundaries)
1.2 Identification of main and general hazards and prevention measures
1.3 Objectives and action plan
1.4 List of legislation and standards applicable to the construction project under consideration
2. Organizational and general procedures
2.1 Distribution of the SHP
2.2 Delivery of the SHP at the start of the works and at the end (reception)
2.3 Changes to the SHP
2.4 Adapting and complementing the SHP
2.5 Technical archive for records
2.6 Control of signatures and rubrics
3. Procedures related to general, social and training policy
3.1 Functional chart and definition of roles
3.2 Prior notice and its updates
3.3 Safety and health policy
3.4 Timetable / Working hours
3.5 Insurance against accidents at work
3.6 Personal protective plan (identification of workers, PPE)
3.7 Information and training plan
3.8 Health plan
3.9 Visitors' plan
4. Planning and management procedures
4.1 General characteristics of the construction site
4.2 Construction phases
4.3 Existing local conditionings
4.4 Planning of the works (general analysis and list of relevant works to be performed)
4.5 Planning of labour resources
4.6 Control of construction equipment (updated revisions, noise, dust or fumes emissions, etc.)
4.7 Control of materials and equipment involving specific hazards
4.8 Works involving particular hazards
4.9 Control of subcontractors and successive chain of subcontracting
4.10 Emergency plan, including evacuation
5. Work instructions and hazard prevention
5.1 Construction processes and methods (relevant construction elements)
5.2 Collective protective plan
5.3 Monitoring and prevention plan
5.4 Construction site design and layout (including access and internal circulation and signalisation)
5.5 Temporary signalisation plan (public area, in special in road construction)
5.6 Scaffolding plan for assembly, use and dismantling
5.7 Excavation prevention plan
5.8 ... (other specific prevention plans according to the construction project)
6. Follow up and assessment procedures
6.1 Monitoring
6.2 Record of non-conformities and corrective and preventive actions
6.3 Record of accidents and indices, including accident investigation records
6.4 OSH committee for the construction site
6.5 Auditing (internal and external)
6.6 Notifications and reports of the authorities related to the construction site
Annexes
Annex 1 – List and models to be used
Annex 2 – Extracts of the most relevant legislation and standards applicable
Annex 3 - List of relevant works to be performed in the construction site
Annex ? – (to be created during the construction phase as needed)

### 2.3.3 Safety and health file

The Safety and Health File (SHF) is the main document of hazard prevention during all interventions after the conclusion of the works, i.e., during the maintenance phase. It should contain all relevant OSH information to be taken into account during any subsequent works. In the EU countries, this document is required in general for all construction projects, but there are some exceptions as it is the case of Spain (see 2.2 above). In some of the EU countries the minimum contents of the SHF is also included.

Table 5 shows an example of the contents organized in as structured way for the case of a building, similar to that of the SHP, but with different contents. This structure and contents must of course be adapted (reduced or added) according to the characteristics of each construction project under consideration, being certain that there will be significant differences for different types of projects (buildings, roads, bridges).

Table 5: Example of structure and contents for the SHF for a building

Promulgation (by the owner's representative)
1. Introduction
1.1 Scope and application (construction project under consideration)
1.2 Identification and addresses of all those involved in the construction process
1.3 Details related to the construction process (dates of starting and ending, costs involved, etc.)
1.4 List of legislation and standards applicable to the construction project during the maintenance phase
1.5 Regulation for the use of the project, including insurances needed (as for fire insurance)
2. Organizational and general procedures
2.1 Distribution of the SHF at the end to the responsible of the project during the maintenance phase
2.2 Changes to the SHF and adapting and complementing the SHF
2.3 Organization of the technical archive of all documents related to the SHF
3. Project characteristics
3.1 Technical data (construction areas, number of floors below and over the entrance floor, etc.)
3.2 Brief description of the project (relevant structural aspects, type of external walls, type of cover, etc.)
3.3 Project "As built"
3.4 Details on the connection of internal to external infrastructures (water, sewage, electricity, etc.)
3.5 List of hazardous materials used in the project and prevention measures (asbestos, etc.)
3.6 Relevant quality records (assurance certificates of materials and equipment, results of tests, etc.)
3.7 Relevant OSH records (accidents and indexes during the construction phase)
4. Hazard prevention plans
4.1 Signalization plan (interior and exterior)
4.2 Information and training plan of all those involved in the maintenance phase
4.3 Security plan
4.4 Fire safety plan
4.5 Emergency plan, including evacuation
4.6 Demolition plan (relevant aspects to take into account)
5. Maintenance procedures
5.1 Interior maintenance (cleaning, painting, etc.)
5.2 External maintenance (cleaning, painting, waterproof, etc.)
5.3 Cover maintenance (substitution of elements, waterproof, etc)
5.4 Maintenance of electrical installations (lights, electrical equipment, etc.)
5.5 Maintenance of mechanical installations (air conditioning, ventilation, heat, water, sewage, etc.)
5.6 Maintenance of elevators and similar equipment
6. Monitoring
6.1 Periodic inspections (based on checklists)
6.2 Record of non-conformities and corrective and preventive actions
6.3 Record of accidents including accident investigation, during the maintenance phase
Annexes
Annex 1 – List and models to be used (namely checklists)
Annex 2 – Extracts of the most relevant legislation and standards applicable

### 3. CONCLUSIONS

The Construction Sites Directive was the driving force for most European Union countries to develop their own legislation for the improvement of working conditions on construction sites. Today, many construction professionals are aware of the importance of this issue much better than before. It is now part of their activity, although many improvements need to be done, as for the clarification of the legislation in some countries, or the need for the development of technical solutions of safety and health equipment and related issues.

From this document, it seems clear that some EU countries have done a simple transposition of the provisions of the Directive, while others have “worked” in some detail these provisions, extending the concept of the safety and health coordination during the design phase and construction phase, and clarifying it in an appropriate way according to the reality of the construction process of the country. Still other countries have committed some or most of the safety and health coordination to other parties (e.g. designer for the SHC-D and contractor for the SHC-C) in a way that the author has some doubts about the suitability of some of these procedures, namely having in mind the independence and conflict of interests involved. In some of these cases doubts also arise concerning the compliance with the provisions of the Directive.

The knowledge and recognition of the best practices implemented in each European Union country surely helps other countries to learn from them and to profit these positive experiences to adapt and improve their own legislation on safety and health coordination. For this purpose, there is a need to strengthen the discussion between construction professionals of the various European Union countries. This was indeed the objective of this document.

Moreover, it is the author’s belief that contractors (starting with the main ones) should implement an effective safety and health management system, which surely contribute also for the improvement of the working conditions for all construction workers, who are the most valuable resource in any Organization. This system based on the European Union safety and health coordination concept, both during the design and construction phase, if properly designed and implemented and supported in an incentive schema for the contractors, have a significant positive impact in reducing the number of occupational accidents and professional diseases in the construction industry.

### REFERENCES

- Alves Dias, L. M. & Coble, R. (Editors) (1999): “Construction Safety Coordination in the European Union”. CIB – W99. Rotterdam. The Netherlands.
- Alves Dias, L. M. e Fonseca, M. (1996): “Safety and Health Plan in Construction” (Portuguese version). Edited by IST-IDICT. Lisbon, Portugal.
- Alves Dias, L. M. (2003): “Coordination of Safety and Health Measures in Construction Work from Designing stage to maintenance stage in European Countries”. Japan Construction Safety and Health Association (JCSHA). Tokio, Japan.
- European Union Directive 89/391/EEC (1989): “Introduction of measures to encourage improvements in the safety and health of workers at work”. JOCE n.º L 183.
- European Union Directive 92/57/EEC (1992): “Implementation of minimum safety and health requirements at temporary or mobile construction sites”. JOCE n.º L 245.
- ISSA – Construction Section (2001): “International Survey on Coordination of Safety and Health at Temporary or Mobile Construction Sites”. Paris, France.
- Valcárcel, Alberto (2003); “Occupational safety and health management systems in the construction industry: The ILO approach (ILO-OSH 2001)”. CIB-W99. São Paulo, Brazil.