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Polish Proposal for Standardised Format of the Explosion Protection Document (EPD According to Directive 1999/92/EC so Called ATEX 137

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The Polish proposal for preparing a standardized version of the explosion protection document (EPD) has been presented. Such document is required by Directive 1999/92/EC and the Polish act of the Minister of Economy implementing this directive into national law system. Its standardized version may be very helpful for small and medium enterprises (SMS) which do not have highly qualified technical staff. Two Polish guides contain recommendations on EPDs: “Guide for employers. How to work out an explosion protection document at the workplace” and “Technical guidelines. Methods of hazard identification, explosion risk assessment and explosion protection measures” have been prepared and edited in the year 2012.

1. Introduction

To meet the requirements of Directive 1999/92/EC (Article 3) [1] and the Polish act of the Minister of Economy [2] implementing this directive into the national law system, employers should take technical and/or organizational measures appropriate to the nature of their operation, in order of priority and in accordance with the following three basic principles:

– the prevention of the formation of explosive atmospheres, or where the nature of the activity does not allow that,
– the avoidance of the ignition of explosive atmospheres, and
– the mitigation of the detrimental effects of an explosion so as to ensure the health and safety of workers.

Employers should also assess the specific risks arising from explosive atmospheres, taking into account at least (Article 4):

– the likelihood that explosive atmospheres will occur and their persistence,
– the likelihood that ignition sources, including electrostatic discharges, will be present and become active and effective (create a risk of explosion),
– the installations, substances used, processes, and their possible interactions,
– the scale of the anticipated effects.

Explosion risks should be assessed overall.

2. Explosion protection document (EPD)

Article 8 of the directive mentioned above says, that “carrying out the obligations laid down in Article 4, the employer shall ensure that a document, hereinafter referred to as the ‘explosion protection document’, is drawn up and kept up to date. The explosion protection document shall demonstrate in particular:

— that the explosion risks have been determined and assessed,
— that adequate measures will be taken to attain the aims of this Directive,
— those places which have been classified into zones in accordance with Annex I,

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— those places where the minimum requirements set out in Annex II will apply,
— that the workplace and work equipment, including warning devices, are designed, operated and maintained with due regard for safety,
— that in accordance with Council Directive 89/655/EEC [3], arrangements have been made for the safe use of work equipment.

The explosion protection document shall be drawn up prior to the commencement of work and be revised when the workplace, work equipment or organization of the work undergoes significant changes, extensions or conversions.

The employer may combine existing explosion risk assessments, documents or other equivalent reports produced under other Community acts".

The basic problem is that both the Directive 1999/92/EC (Article 3) [1] and the decree of the Polish Minister of Economy [2] do not present any frame pattern of an explosion protection document (EPD). The legislators did not give employers any example of an EPD's structure (format) as was done, for example, in regulations: 1907/2006/EC (REACH) [4] or 453/2010/EC (SDS) [5]. In the first of them in Annex I there is a Chemical Safety Report format given and in the second of them a detailed frame structure and contents of a Safety Data Sheet is given in Annex I, Parts: A and B. The "Non-binding guide of good practice for implementing Directive 1999/92/EC...." [6] also did not give any proposition of EPD format or step-by-step explanation of its detailed contents. There were also no tools for risk assessment recommended. That means the employers could prepare an EPD any way they like.

From a technical point of view, a situation described above is very dangerous. The EPD should show that the workplaces are safe and everything required by law has been done properly. Unfortunately, the majority of EPDs prepared during last few years in Poland did not meet all of the requirements of ATEX 137 Directive [1] and Polish national law [2]. They included mostly the parts of legal act and PN-EN 1127-1 copies and their explosion risk assessment was very poor.

3. Polish proposal for EPD elaboration

The authors of this paper proposed a three-part format of the EPD. Part 1 "General information" includes required employer's statements and deadlines relating to the EPD. Part 2 "Detailed information" include: the hazard identification, explosion risk assessment and ways of preventing and protecting against the effect of explosion. Part 3 "Information and supplementary documents" includes lists of reports, certificates, confirmations, procedures, etc. A correct explosion risk assessment is the most important part and the basis of a well-prepared EPD.

Two Polish guides contain recommendations on EPDs: "Guide for employers. How to work out an explosion protection document at the workplace" [7] and "Technical guidelines. Methods of hazard identification, explosion risk assessment and explosion protection measures" [8] have been prepared and edited in the year 2012 (Figure 1).

The first guide [7] introduces step-by-step a methodology of working out the individual parts of the EPD according to its proposed frame structure and shows the principles of reviewing and updating it. The EPD's frame structure gives it a standardized form and sets in order all technical and organizational information required by Polish legal act [2]. This guide includes a vocabulary of used terms, legal acts and standards, forms and control list connected with explosion hazard as well as employer's statements proposals for correctly made EPD. It contains also an extensive set of figures and tables.

The second guide [8] describes burning and explosion phenomena. It presents the principles of classifying zones threatened with explosion. It also discusses in detail sources of ignition, and where and how explosive atmospheres are created. Technical and organizational methods of preventing the formation of explosive atmospheres, and avoiding their ignition are listed there, as well as requirements for explosion protection measures and devices. These technical guidelines give detailed descriptions of hazard identification methodology, different risk assessment methods and recommends for use by EPD elaboration some selected risk assessment methods.

They contains also a Polish proposal for explosion risk acceptance level of a limit value 10^{-4} fatalities / person / year at a work place [9] and a chapter explaining electrostatic discharge phenomena - very often met in the industry and also very effective ignition sources for explosive atmospheres, creating high level of explosion risk.

Figure. 1: Two Polish guides for employers [7,8] contain recommendations on EPD

Both guides have been worked out under the research and development project No. 5.R.07 within the framework of the Multi-annual Program "Improving safety and working conditions" [9] coordinated by the Central Institute for Labour Protection - National Research Institute in order to find a solution for this difficult situation. The first guide is entitled "How to work out an explosion protection document at the workplace"; and the second one is entitled" Technical guidelines. Methods of assessing the hazard and risk of an explosion and anti-explosion protection measures."

4. Recommended risk assessment methods

From the methods of explosion risk assessment at a work place presented in "Technical guidelines" [8], two groups of them were selected and recommended for practical use by elaborating an EPD. The first of them for simple installations at small and medium companies using flammable media - it is a group based on so called "risk matrix". This group contains simple expert methods like PHA, Risk Score and sets of tables. Such methods do not need a lot of time to realize and no probabilistic data of process equipment and safety measures failures. The second group is proposed for more complicated process installations in bigger companies. It is a group based on semi-quantitative methods like "Events tree" and "Layers of Protection Analysis" (LOPA). These methods need more time to realize, detailed process and equipment data and well educated technical staff. They give, however, more credible and accurate results of explosion risk level values than simple expert methods.

5. EPD's frame structure

The framework draft of the explosion protection document EPD (see below) [10] proposes for it three main parts which contain much arranged data and information according to regulation [2] that they make three compact thematic blocks:
- Part 1. General information (employer's statements and terms required for EPD by Polish law as well as a list of explosion hazardous places classified into zones (number and hazard level) and a short description of explosion prevention / protection measures used),
- Part 2. Detailed information (explosion hazard identification, explosion risk assessment and explosion prevention and protection measures - technical and organizational),
- Part 3. Supplementary information and documents (a specification of reports, inspections, delivery-acceptance acts, technical confirmations, certificates, safety procedures and the like).

The general information contained in Part 1 of an EPD shows a first general view of potential hazards and safety measures existing in given enterprise. Its Part 2 gives a detailed representation of those hazards as well as preventive and protective measures used. It identifies dangerous substances used, gives a short description of running processes, indicates hazardous places (zones) and presents all factors needed for explosion risk assessment. Many other important information and supplementary documents are collected

(listed) in EPD's Part 3. An employer should analyze thoroughly who in his enterprise is able to prepare and who to verify an EPD.
According to Rydzyński A. and Żuczek R. [11] "it should be a person (or persons) who has at least a basic knowledge about explosion safety and process safety. The EPD's author should know a technological process - substances (media) used, their properties, unit operations and process parameters, apparatuses, devices, possible ignition sources and the like. If it is a person not employed in given enterprise, such a person should cooperate closely with technological services and production management." The same criteria should be used while selecting a person (or persons) giving opinion or verifying an EPD's draft.
The employer should get to know an elaborated and confirmed EPD to all of his employee working in dangerous places (zones) as well as technical supervising staff in his company.

6. The framework draft of the explosion protection document (EPD)

PART 1. GENERAL INFORMATION

1. THE EMPLOYER'S STATEMENT THAT THE WORKPLACES, WORK EQUIPMENT, INCLUDING WARNING DEVICES, ARE DESIGNED, OPERATED AND MAINTAINED WITH DUE REGARD FOR SAFETY (§ 7.3 CLAUSE 3a OF THE POLISH REGULATION)
2. THE EMPLOYER'S STATEMENT THAT WORK EQUIPMENT CONFORMS TO THE PROVISIONS OF SEPARATE REGULATIONS ON MINIMUM REQUIREMENTS FOR THE SAFETY AND HEALTH PROTECTION REGARDING THE USE OF MACHINES BY THE WORKERS DURING NORMAL OPERATIONS (§ 7.3 CLAUSE 3b OF THE POLISH REGULATION)
3. THE EMPLOYER'S STATEMENT ON ASSESSING THE RISK OF POTENTIAL OCCURRENCE OF THE EXPLOSIVE ATMOSPHERE (§ 7.3 CLAUSE 3c OF THE POLISH REGULATION)
4. THE LIST OF POTENTIALLY EXPLOSIVE ATMOSPHERES AND THEIR CLASSIFICATION INTO ZONES ON THE BASIS OF THE LIKELIHOOD AND DURATION OF THE OCCURRENCE OF EXPLOSIVE ATMOSPHERES (§ 7.3 CLAUSE 2 OF THE POLISH REGULATION)
5. INFORMATION ON DEADLINES FOR REGULAR INSPECTIONS OF APPLIED PROTECTION MEASURES REFERRED TO IN PART 2 POINT 4 OF THIS DOCUMENT (§ 4.3. OF THE POLISH REGULATION)
6. THE EMPLOYER'S STATEMENT ON ENSURING SAFETY AND ADEQUATE SUPERVISION OVER THEIR WORKERS AND CONCISE DESCRIPTION OF MEASURES THAT HAVE BEEN TAKEN IN ORDER TO FULFIL THE PROVISIONS OF THE DECREE AND TO LIMIT DETRIMENTAL EFFECTS OF THE EXPLOSION (§ 7.3 CLAUSE 1, § 4.1 AND § 4.6 OF THE POLISH REGULATION)

PART 2. DETAILED INFORMATION

1. EXPLOSION AND FIRE RISK ASSESSMENT

1.1. IDENTIFICATION OF USED FLAMMABLE SUBSTANCES
AND THEIR PHYSICAL AND CHEMICAL PROPERTIES

Basic phys-chem properties including flammability and explosive properties in the mixture with air as well as the classification of used substances and mixtures according to the REACH and/or CLP regulations (tabular form).

1.2. THE CONCISE DESCRIPTION OF THE PROCESS IN WHICH THE EXPLOSIVE ATMOSPHERE MAY OCCUR WITH USED FLAMMABLE SUBSTANCES

1.3. THE CONCISE DESCRIPTION OF THE WORKPLACE
WHERE THE EXPLOSIVE ATMOSPHERE MAY OCCUR

The description of installations, apparatuses, and equipment, unit operations, substances used, processes and their interaction.

2. EXPLOSION RISK IDENTIFICATION

2.1. THE DEFINITION OF REPRESENTATIVE EXPOSURE SCENARIOS
Exposure scenario No. X for working people (own workers, subcontractors) as well as for consumers, visitors, students, apprentices, inspectors, etc.

3. EXPLOSION RISK ASSESSMENT

3.1. THE PERFORMANCE OF THE COMPREHENSIVE RISK ASSESSMENT OF THE POTENTIAL EXPLOSIVE ATMOSPHERE THAT MAY OCCUR AT THE WORKPLACES

- Assessing: the likelihood, quantities and duration of the explosive atmosphere, the occurrence and activation of the ignition sources, including the electrostatic discharges, the impact of the installations and used substances, processes and their mutual interactions as well as the scale of the anticipated effects of the explosion.
- Assessing the workplaces which are or can be connected via openings to other places in which the explosive atmosphere may occur.
- Calculating/assessing the level of the explosion risk and accepting/reducing the level of the explosion risk.

4. EXPLOSION PREVENTION AND PROTECTION

4.1. TECHNICAL MEASURES

- The description of preventive measures against the formation of the explosive atmosphere, methods of avoiding the ignition of the explosive atmosphere, mitigating the detrimental effect of the explosion, along with the description of the personal protection measures in order to provide the safety and health protection of working people as well as supplementary measures against the propagation of the explosion.
- The employer's information on deadlines for regular inspections of applied measures against the explosion and protective measures against its effects.

4.2. ORGANISATIONAL MEASURES

- Internal regulations, safety policy of the company, quality policy, etc.
- Written instructions: general technical instructions, the Health and Safety at Work, subject instructions for normal operations performed in potentially explosive atmospheres.
- Written permits to perform particularly hazardous activities in potentially explosive atmospheres.
- Appointing a person responsible for issuing the permits to perform particularly hazardous activities.
- Training in the safety and health protection concerning the protection against the explosion.
- The co-ordination of operations performed by the subcontractors – appointing a person in charge
- Verifying the general level of safety at the workplace where the explosive atmosphere may occur, in the scope of the protection system against the explosion before it is used for the first time - appointing the verifier.
- The inspection of devices and the supervision over the equipment and performed activities.

PART 3. INFORMATION AND SUPPLEMENTARY DOCUMENTS

- The reports on classification, site plans of the potentially explosive zones, marking the zones and escape routes, the inspections of appliances (reviews, maintenance, start-up, standstill) and the supervision over the equipment and performed activities.
- Confirmation of completing training and courses- statements signed by the workers.
- Certificates of competence and professional licenses of the workers.
- Other supplementary documents (e.g. change cards to the documentation, checklists, etc.).
- Procedures and escape plans containing hazard warning signals or signs.

7. Final remarks and Conclusions

The authors of this paper worked out some EPD-s for Polish industrial enterprises according to presented proposal. They met with a favourable acceptation of the employers as well as the inspectors of Polish

National Labour Inspectorate. Some other EPD-s prepared by the employers themselves or for them by expert offices were analysed and verified by the authors. Their experience on this area shows that proposed framework draft of the explosion protection document (EPD) is a real help for Polish small and medium enterprises (SME) in independent elaboration of EPD.
The authors noticed a significant interest in their EPD framework proposal of such Polish governmental institutions like: National Labour Inspectorate, State Fire Service which duty is to control the EPD-s and to have precise information about possible hazards in industry as well as of expert companies for explosion protection which may work out the EPD-s on employer's order.
The real gains of presented proposal are: an arrangement of EPD's contents, an improvement of the EPD's merits as well as a standardization of its official format.
The authors' experience on the area of explosion hazard prevention, protection and mitigation in industry (particularly chemical industry) let them present the following conclusions:

- A lack of official EPD-s frame structure and contents creates many troubles for employers, especially in small and medium enterprises,
- The framework draft of the explosion protection document (EPD) is a great help for SME-s in independent work out of such technical document required by EU and Polish technical law,
- Directive 1999/92/EC should include an Annex 2 defining accurately an EPD-s frame structure and contents, so it should be amended,
- The proposal presented in this paper is a good starting point for such amendment.

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