

# METALLURGICAL PROCESSES SAFETY IN THE CONTEXT OF MACHINERY AND OTHER LEGAL REQUIREMENTS

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In the metallurgical processes, due to the amount and meaning of the workplace safety threats, there is a necessity of implementing the steps connected with their elimination or limitation. Undertaking the steps should be based on the identified legal requirements and the risk refraining from lack of the compliance. The most meaningful, within the mentioned scope, are the requirements concerning design, construction and use of the machines. The aim of the presented study was identification of the essential requirements stated to the machines' manufacturers, minimal requirements dedicated to the work equipment' users. One has pointed the potential risk of lack of compliance and described the ways of taking up such a risk depending on the identified legal requirements.

*Keywords:* metallurgy, safety, machinery, work equipment, risk

## INTRODUCTION

In the EU the main principles to ensure the safety of workers are included in Directive on the introduction of measures to encourage improvements in the safety and health of workers at work [1].

In accordance with the mentioned framework directive, the employer has the duty of ensuring for all the workers the safe work place. Within the scope, the employer should: perform the threat assessment, combat its sources, take advantage of the new technological solutions and replace the high risk operations with the less dangerous activities, apply the collective and individual protection steps [1].

Specification of the framework directive are individual directives, which are focused on specific aspects of safety and health at work and especially risk related to: workplace, work equipment, personal protective equipment, physical agents, explosive atmospheres, mutagens or carcinogens, manual handling.

One of the basic elements ensuring safety within the work environment is monitoring over the used machines. It refrains from both: "Work Equipment Directive" 2009/104/EC as well as the "Machinery Directive" 2006/42/EC [2-5].

The first one (2009/104/EC) requires from the employer taking up the actions ensuring that the working equipment is applied without any workers safety violation. It describes the minimal safety requirements which must be fulfilled by the working equipment as well as the regulations concerning its usage [4].

Meanwhile, the "Machinery Directive" puts the responsibility for the safety of machinery on their manu-

facturers, deliverers and importers. The machinery before entering the market should undergo the compliance procedures, which confirm fulfilment of the essential requirements, have the EC declaration of conformity as well as have the CE marking [5]. The manufacturer of the machine must perform the risk-associated in the frame of its users' safety. Its results are used in the safety triad concept, covering the risk minimising. Where it is proper, towards the machines are applied another directives of new approach.

The legal regulations are complex and full for the issues of ensuring the safe working conditions, pointing both: minimal – for the employers – requirements concerning the work safety, and – for the manufacturers – essential requirements concerning the safety of the products introducing on the market. It is of the exceptional importance in case of the machines.

The introduced for the turn "new" machines must be designed and built in a safe way and passed on to the user with the information concerning the residual risk [5]. The used "old" machines must fulfil the minimal safety requirements within the range of fittings and usage [4].

## METHODOLOGY

The reliable identification of the applicable legal requirements is the starting point in the risk assessment connected with ensuring the work safety. The results of the risk assessment – taken up both: on the phase of machines manufacture as well as their usage – lets for the complex risk undertaking, covering the following: its elimination during the design and construction process, minimising especially by applying the technical protective means as well as informing, trainings and the

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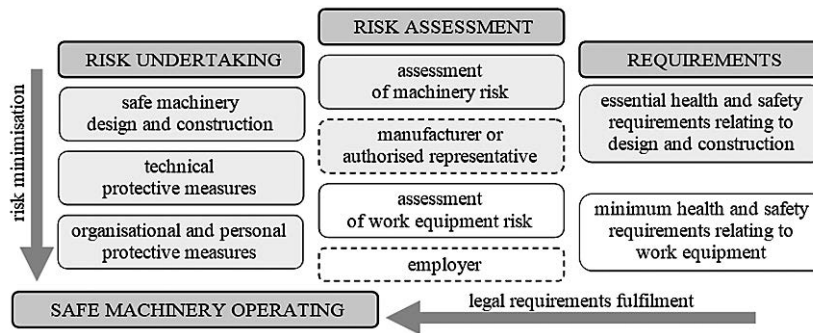


Figure 1 Concept of “safe machinery” by fulfilling essential and minimum safety requirements.

individual protection means within the residual risks. The basis for these actions is proper identification of the used working equipment together with defining the legal requirements adequate to the work and the environment connected with it – Figure 1.

The aim of the carried out analysis was to identify the legal requirements being applied in order to ensure the safety in the processes, including the metallurgical processes. The chosen work safety requirements refraining from the framework directive and its individual directives [1,4] as well as the directives of the new approach

and the harmonised norms, which should be taken into consideration to ensure safe work conditions [5] for the metallurgical production, have been presented on Figure 2.

RESULTS

Such a complex approach towards the risk identification, assessment and undertaking (Figures 1,2) brings the possibility of determination of the incompatibilities with the legal requirements, and as a result defining the actions aiming at minimising the risk – Table 1.

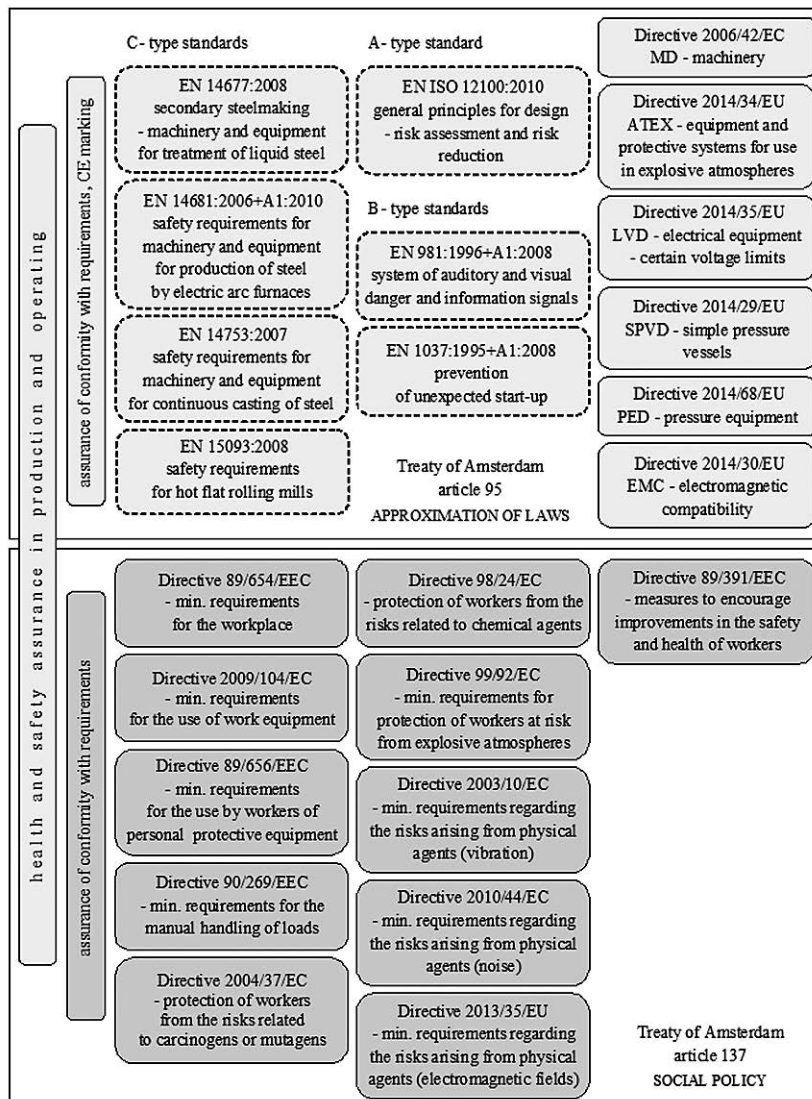


Figure 2 Some legal requirements identified to ensure the safety in the metallurgical processes [1,4,5].

Table 1 Summary of the exemplary legal risks and actions undertaken to eliminate it.

	Risk connected with legal requirements fulfilment	Actions to undertake the risk
Directive 2006/42/EC	Lack of EC declaration of conformity and there is suspicion that essential requirements related to the construction of machinery are not fulfilled.	Finding the lost EC declaration of conformity (1), preparing the duplicate by the machine manufacturer or the authorised agent (2), machine modernisation, performing the full conformity assessment including the CE marking and EC declaration of conformity (3).
Directive 2009/104/EC	Work equipment of high risk is not equipped with control emergency stop what means that general minimum requirements applicable to work equipment are not fulfilled.	Equipment of the place with the device for the emergency stop, enabling disconnection of the machine from the electric supply till the manual reset, with the stop-function category 0 (uncontrolled stop with the immediate energy disconnection from the drive), easy to start, with the red start elements placed on the yellow background.
Directive 2003/10/EC	Noise exposure value for a nominal eight-hour working day is equal to 89 dB what is higher than upper exposure action value (85 dB) and means that minimum requirements for the protection from risks arising from exposure to noise are not fulfilled.	Establishment and implementation of programme of technical and/or organisational measures – developed after the consultancy with the workers – aimed at reducing the exposure to noise and in particular: change in the work place layout, noise level reduction in the air and building elements by implementing the technical solutions, change in the work organisation resulting in the shortening the time of the exposure to the noise (1), choosing and provision of the individual hearing protection and taking up the actions aiming at ensuring that the workers will use them (2).
Directive 99/92/EC	Explosion protection document is not prepared and there is suspicion that the risk connected with explosive atmosphere hasn't been assessed and minimum safety requirements connected with protection of workers from explosives are not fulfilled.	Preparation of the explosion protection document considering the results of the carried out risk assessment and the up-taken actions as the effect (1), risk assessment, classification of the explosive area, fulfilment of the minimal requirements in the scope of workers' health protection endangered to the explosion, including applying the organisational steps and anti-explosion protection and preparing the explosion protection document (2).
Directive 90/269/EEC	Lack of documentation confirming the consultancy and co-operation of the workers in the scope of the manual replacement of the items, which means minimum safety requirements connected with manual handling are not fulfilled.	Planning and organising workers consultancy within the range of avoiding the musculoskeletal afflictions, and especially: possibility of applying the mechanical devices eliminating the manual relocating the heavy items (1), applying additional facilities for manual relocating items (2), planning the trainings concerning proper techniques of pushing, lifting and pulling and considering them within the planning, preparing and realising the tasks (3).
Directive 89/656/EEC	Incompatibility connected with the loss of property of the individual protection means or lack of the CE marking, which has been identified during the periodic inspection of these means, which means that personal protective equipment doesn't fulfil safety requirements.	Ensuring proper work of the individual protective measures by: organising the trainings concerning proper overhaul the technical condition of the individual protective measures, being realised by the workers themselves (1), planning the warehouse control, where may be stored obsolete individual protective measures missing the CE label (2), periodical training dedicated to the person authorised to the periodical control over the individual protective measures, concerning both: keeping the measures in the perfect conditions, indispensable maintaining activities, manufacturer documentation and CE marking (3).

Risk being identified within the metallurgical processes, and resulting from the legal regulations, concerns the improper working equipment, being endangered with the influence of the physical and chemical agents, application of improper protective measures as well as documentation confirming the compliance with the requirements.

## CONCLUSIONS

The metallurgical processes – due to the applied technologies, among which especially the applied work equipment, used materials and the ways of performing the works – accompany various work safety threats. Therefore, in case of these processes the identification and undertaking the risk involved is of high importance [6,7].

In the metallurgical processes the risk can be identified in the context of two groups of legal regulations: directives of new approach, especially the “Machinery directive” and the framework directive and its second individual directive – “Work equipment directive”.

In the first case, with the supposition of ensuring by the manufacturer the safety of the machines in design and construction, minimising such a risk can require ap-

plying the means pointed and suggested by the manufacturer. There also may be the risk connected with the EC declaration of conformity and the CE marking. Taking up such a risk, at first glance omitted, may have catastrophic consequences – meaning – withdrawal of the machine from usage.

In the second case, the risk refrains from unfulfilled minimal requirements concerning the working equipment as well as its usage. Similarly like in case of other health and safety minimal requirements, lack of the conformity concerns planning, realising and documentation of the activities covering: protection against the threats considering their elimination or limiting their influence, informing and training dedicated to the workers and consultancy with their representatives. Minimising the risk is connected with the application of the technical protection, organisational measures and collective and individual protection.

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**Note:** The professional translator responsible for English language is Dominika Wnukowska, Katowice, Poland.