

ELEMENTS OF THE EAF'S ENVIRONMENTAL MANAGEMENT

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Abstract: *In this paper are presented the main environmental performance indicators, which are used in the specific international regulations. The paper also deals with the indicators' functions, quality and basic categories of environmental performance indicators. The originality of the paper lies in establishing the correlation: Environment – Environment Performance Indicators (EPI) – Organization. From the point of view of reducing the impact over the environment, the main problem of the electric arc furnace is the optimization of the powder collecting from the process gases, both from the furnace and from the work – area. This optimization is both for the work conditions improvement and for the following of the limits imposed by the work and environment protection legislation. The paper deals with the best dependence between the aggregate's constructive, functional and technological factors, which are necessary for the furnace's ecologization and for its energetically-technologically performances increasing.*

Keywords: EAF, Management, Environment

1. Introduction

The environmental management and performance of organizations is helped by the selection and use of Environmental Performance Indicators (EPI) [1,2].

The guidance no. 2001/680/EC, included in the EMAS environment project, also contains regulations concerning the selection and use of Environmental Performance Indicators [6,7].

2. Environmental Performance Indicators: Functions, Quality and Basic Categories

The main functions of the environmental performance indicators are:

- Converting raw data into information that can be easily understood by the intended audience ;
- Summarizing extensive environmental data to a limited number of significant key information sets;
- Quantifying and reporting environmental performance;
- Assisting organisations in the management of their environmental aspects and impacts.

The quality of environmental performance indicators consists of:

- Being cost – effective;
- Being appropriate to the size and type of organization and its needs and priorities;
- Being sensitive enough to reflect significant changes in environmental impacts.

Environmental performance indicators should fulfil a dual purpose:

- Assisting the management of the organization;
- Providing information to stakeholders.

The most important categories of environmental performance indicators, which help at evaluating and reporting the environmental performance of an organization, are [3,4,7]:

- A. Operational Performance Indicators (OPI).
- B. Management Performance Indicators (MPI).
- C. Environmental Condition Indicators (ECI).

Below are presented the main correlations between these indicators.

3. The Correlation Environment – Environmental Performance Indicators (EPI) – Organisation

In figure no. 1 are presented the main correlations concerning these indicators.

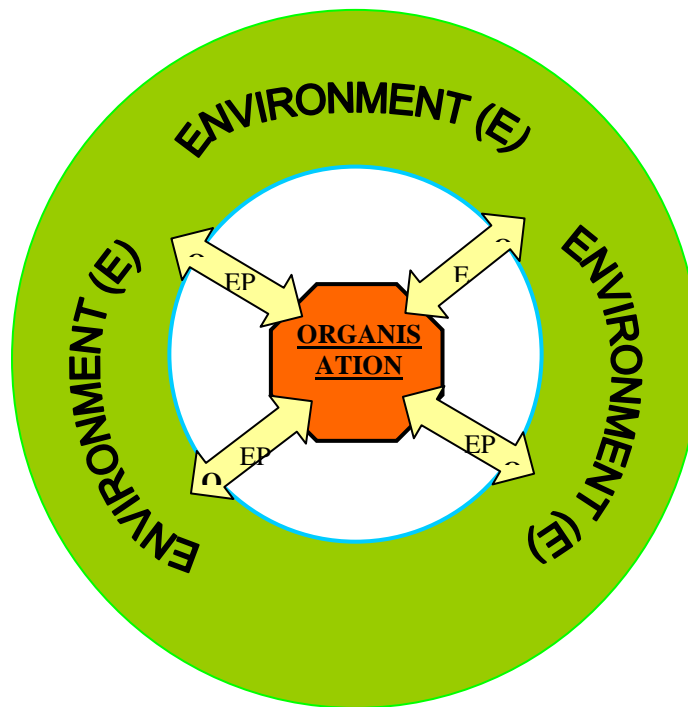


Figure 1: The correlation Environment – Environmental Performance Indicators (EPI) – Organization

EPI – Environment Performance Indicators; OM – Organization Management
OD – Offers Data

From the point of view of reducing the impact over the environment, the main problem of the electric arc furnace is the optimization of the powder collecting from the process gases, both from the furnace and from the work – area.

This optimization is both for the work conditions improvement and for the following of the limits imposed by the work and environment protection legislation.

The electric arc furnace is an important *polluting emissions* generator, having a strong impact over the environment.

The most important polluting emissions are [5]:

- *the powders* resulted during the technological operations of base material loading and steel melting, refining, alloying and evacuation which contain *heavy metals* (Cr, Ni, Zn, Pb, etc) and can reach values of 15 kg/t steel;

- *the gases* resulted from the melting and refining proceedings, which mainly contain CO, CO₂, SO_x and NO_x.

From the total polluting emissions, over 90% are generated during the technological operations of melting and refining. These emissions have a high content of iron, manganese, aluminum and silicium oxides, as well as heavy metals oxides (Ni, Cr, Cd, Pb, Cu). The chemical composition of these emissions is extremely variable and directly dependent on:

- the composition of the base materials that make up the loading;
- the melting managing way;
- the refining process that is used (with gaseous oxygen or ore);
- the period the melting and refining last;
- the grade of the elaborated steel.

From the point of view of reducing the impact over the environment, *the optimization of the powder collecting from the process gases*, both from the furnace and from the work-area. This optimization is both for the work conditions improvement and for the following of the limits

imposed by the work and environment protection legislation.

The factors determined by the previous demands, along with *the furnace's performances increasing*, involves the following:

- *the gases' collecting extension*;
- the increasing of the separation rang or the *reducing of the gases' powder content*;
- the reducing of the functioning costs by *reducing the energetical consumption*;
- *the reducing of the maintenance costs* and of the investment costs;
- *noise protection*;
- *the work conditions improvement*.

For the polluting emissions not to get into the work bays' atmosphere and into the environment, the electric arc furnaces had to be equipped with *efficient captivation and purification equipment*.

In figure 1 there is presented the main scheme of the environment polluting system through the EAF.

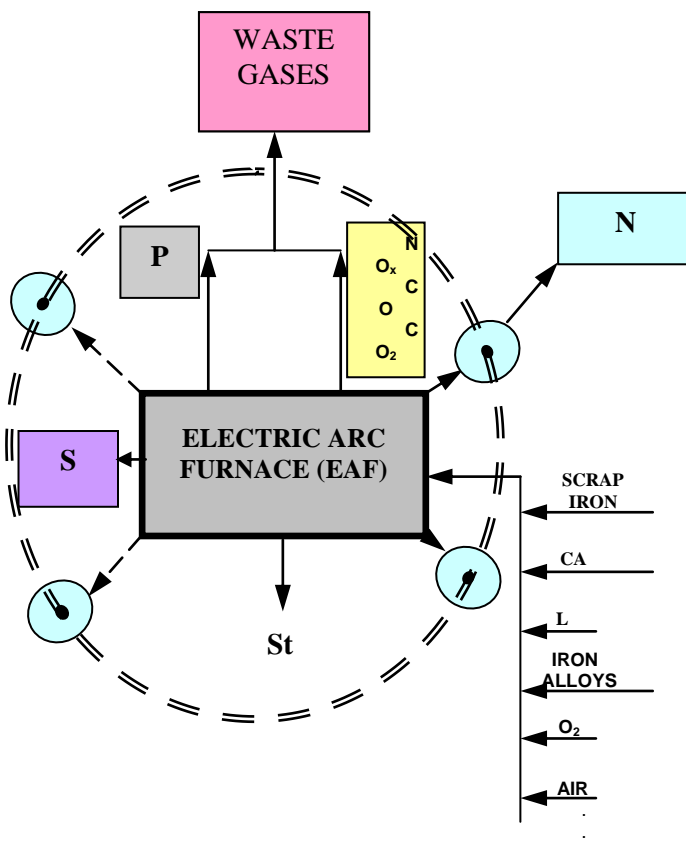


Figure 2: Scheme of the environment polluting system through the EAF

P – Powder; *S* – Slag; *N* – Noise; *CA* – Carburizing Agents; *L* – Lime; *St* – Steel

4. Conclusions

These three categories of environmental indicators have become widely accepted and organizations should consider a combination of these indicators in order to be able to demonstrate, that:

- They understand the environmental impacts associated with their activities, products and services (ECI)
- They are taking appropriate measures to ensure the management of environmental aspects associated with the environmental impacts (MPI)
- The results of the management of environmental aspects are improved environmental performance of their operations (OPI).

It is recognized however that for organizations with less significant environmental impacts and a less complex environmental management system the most important indicators will be those relating to operational performance.

For *the removal of burnt gases* that are evacuated from the electric arc furnace is needed the successive realization of 2 categories of processes:

- the burnt gases *captivation*;
- the burnt gases *removal*.

The burnt gases caption can be achieved with:

- *hoods*;
- *exhausting pipe* in the arch (through the fourth orifice in the furnace's arch);
- *mixed* (hood + the fourth orifice in the arch).

The burnt gases removal system can be:

- *wet*, through the gases' washing;
- *centrifugal*, with the help of the cyclones;
- *filter type* with filters with bags (textile materials) or electrofilter.

The decision must be one of a best management.

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