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METHODOLOGY FOR QUANTIFYING THE RISK OF OCCUPATIONAL ACCIDENT AND / OR DISEASE SPECIFIC TO COMPLEX TECHNICAL SYSTEMS

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Abstract: *This paper presents a scientific research in the field of the risk assessment, in order to secure the activities carried out in the presence of specific hazards of industrial work systems. The methodology for quantifying the risk of occupational is an innovative tool which highlights the analytical solution for quantify the occupational risks with impact, both on the human component, as well as at the level of the other component elements specific to the work systems.*
Keywords: *accidents, industrial work systems, hazard, risk*

1. Technical aspects specific the process of occurrence of the injury phenomenon

The comprehensiveness of total risk makes the systemic assessment and management of risk tractable from many perspectives.

The expected value of risk is an operation that essentially multiplies the consequences of each event by its probability of occurrence and sum (or integrates) all these products over the entire universe of events [1]. This operation literally commensurate adverse event of high consequences and low probabilities with events of low consequences and high probabilities.

The mechanism of occurrence the working accident in the labour system is based on the work-specific risk generator and the time at which a certain lucrative activity takes place depending on the exposure to the risk factors. At any type of work activity there are risk factors associated to the potential hazards that can lead to accidents at work or occupational diseases.

2. Quantification of the global risk

Mathematically, the values of the level of global risk ($N_{\text{global risk}}$) can be calculated based on the rank of the risk factor ($r_{R_{i=\overline{1,9}00}^{j=1,4}}$) and the level of risk ($R_{i=\overline{1,9}00}^{j=1,4}$), as follows relation [2] (1):

$$N_{global\ risk} = \frac{\left(r_{R_{i=\overline{1,5}00}^{1}} \mathbf{R^{1}_{i=\overline{1,5}00}}\right)+\left(r_{R_{i=\overline{1,7}00}^{2}} \mathbf{R^{2}_{i=\overline{1,7}00}}\right)+\left(r_{R_{i=\overline{1,9}00}^{3}} \mathbf{R^{3}_{i=\overline{1,9}00}}\right)+\left(r_{R_{i=\overline{1,8}00}^{4}} \mathbf{R^{4}_{i=\overline{1,8}00}}\right)}{r_{R_{i=\overline{1,5}00}^{1}} + r_{R_{i=\overline{1,7}00}^{2}} + r_{R_{i=\overline{1,9}00}^{3}} + r_{R_{i=\overline{1,8}00}^{4}}} \quad (1)$$

- For risks generated by the work equipment available and the materials and substances used. These types of risks are generated by the endowment of the workplace in the basic location but also in other locations where the worker is occasionally or conjecturally:

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$$r_{\mathrm{R}^1_{\mathbf{i=\overline{1,5}}00}}\ \mathbf{R}^{\mathbf{1}}_{\mathbf{i=\overline{1,5}}00} = \begin{bmatrix} r_{\mathrm{R}^1_{1}00} \\ r_{\mathrm{R}^1_{2}00} \\ r_{\mathrm{R}^1_{3}00} \\ r_{\mathrm{R}^1_{4}00} \\ r_{\mathrm{R}^1_{5}00} \end{bmatrix} x \begin{bmatrix} \mathbf{R}^{\mathbf{1}}_{\mathbf{1}00} \\ \mathbf{R}^{\mathbf{1}}_{\mathbf{2}00} \\ \mathbf{R}^{\mathbf{1}}_{\mathbf{3}00} \\ \mathbf{R}^{\mathbf{1}}_{\mathbf{4}00} \\ \mathbf{R}^{\mathbf{1}}_{\mathbf{5}00} \end{bmatrix} = \begin{bmatrix} 1.00 \\ 1.00 \\ 1.00 \\ 1.00 \\ 1.00 \end{bmatrix} r_{risk\ factor}\ x \begin{bmatrix} \mathbf{R}^{\mathbf{1}}_{\mathbf{1}00} \\ \mathbf{R}^{\mathbf{1}}_{\mathbf{2}00} \\ \mathbf{R}^{\mathbf{1}}_{\mathbf{3}00} \\ \mathbf{R}^{\mathbf{1}}_{\mathbf{4}00} \\ \mathbf{R}^{\mathbf{1}}_{\mathbf{5}00} \end{bmatrix}$$

where:

$$\left[\mathbf{R}^{\mathbf{1}}_{\mathbf{1}00}\right] = \left[\mathbf{R}^{\mathbf{1}}_{\text{Technical equipment}}\right]$$
$$\left[\mathbf{R}^{\mathbf{1}}_{\mathbf{2}00}\right] = \left[\mathbf{R}^{\mathbf{1}}_{\text{Tools}}\right]$$
$$\left[\mathbf{R}^{\mathbf{1}}_{\mathbf{3}00}\right] =$$
$$= \left[\mathbf{R}^{\mathbf{1}}_{\text{Energy sources that put work equipment into operation,or from the place where the intervention is made or in the conjectural location}}\right]$$
$$\left[\mathbf{R}^{\mathbf{1}}_{\mathbf{4}00}\right] = \left[\mathbf{R}^{\mathbf{1}}_{\text{Materials and substances used in the work process or in connection with the work process}}\right]$$
$$\left[\mathbf{R}^{\mathbf{1}}_{\mathbf{5}00}\right] = \left[\mathbf{R}^{\mathbf{1}}_{\text{Other risks generated}}\right]$$

- For risks generated by the work environment in which the worker is in the work process:

$$r_{\mathrm{R}^2_{\mathbf{i=\overline{1,7}}00}}\ \mathbf{R}^{\mathbf{2}}_{\mathbf{i=\overline{1,7}}00} = \begin{bmatrix} r_{\mathrm{R}^2_{1}00} \\ r_{\mathrm{R}^2_{2}00} \\ r_{\mathrm{R}^2_{3}00} \\ r_{\mathrm{R}^2_{4}00} \\ r_{\mathrm{R}^2_{5}00} \\ r_{\mathrm{R}^2_{\mathbf{6^{01},6^{03}}}} \end{bmatrix} x \begin{bmatrix} \mathbf{R}^{\mathbf{2}}_{\mathbf{1}00} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{2}00} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{3}00} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{4}00} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{5}00} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{6^{01},6^{03}}} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{7}00} \end{bmatrix} = \begin{bmatrix} 1.00 \\ 1.00 \\ 1.00 \\ 1.00 \\ 1.00 \\ 0.33 \\ 1.00 \end{bmatrix} r_{risk\ factor}\ x \begin{bmatrix} \mathbf{R}^{\mathbf{2}}_{\mathbf{1}00} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{2}00} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{3}00} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{4}00} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{5}00} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{6^{01},6^{03}}} \\ \mathbf{R}^{\mathbf{2}}_{\mathbf{7}00} \end{bmatrix}$$

where:

$$\left[\mathbf{R}^{\mathbf{2}}_{\mathbf{1}00}\right] = \left[\mathbf{R}^{\mathbf{2}}_{\text{Generators related to weather conditions,temperature,brightness,air pressure,relative humidity}}\right]$$
$$\left[\mathbf{R}^{\mathbf{2}}_{\mathbf{2}00}\right] = \left[\mathbf{R}^{\mathbf{2}}_{\text{Chemical agents}}\right]$$
$$\left[\mathbf{R}^{\mathbf{2}}_{\mathbf{3}00}\right] = \left[\mathbf{R}^{\mathbf{2}}_{\text{Biological agents}}\right]$$
$$\left[\mathbf{R}^{\mathbf{2}}_{\mathbf{4}00}\right] = \left[\mathbf{R}^{\mathbf{2}}_{\text{Dangerous animals and persons}}\right]$$
$$\left[\mathbf{R}^{\mathbf{2}}_{\mathbf{5}00}\right] = \left[\mathbf{R}^{\mathbf{2}}_{\text{Dangerous meteorological situations,geological et.al.}}\right]$$
$$\left[\mathbf{R}^{\mathbf{2}}_{\mathbf{6}00}\right] = \left[\mathbf{R}^{\mathbf{2}}_{\text{Hazardous situations generated by other jobs in the vicinity of the assessed job}}\right]$$
$$\left[\mathbf{R}^{\mathbf{2}}_{\mathbf{6^{01}}}\right] = \left[\mathbf{R}^{\mathbf{2}}_{\text{Noise}}\right]$$
$$\left[\mathbf{R}^{\mathbf{2}}_{\mathbf{6^{01}}}\right] = \left[\mathbf{R}^{\mathbf{2}}_{\text{Noise}}\right]$$
$$\left[\mathbf{R}^{\mathbf{2}}_{\mathbf{6^{02}}}\right] = \left[\mathbf{R}^{\mathbf{2}}_{\text{Vibrations}}\right]$$
$$\left[\mathbf{R}^{\mathbf{2}}_{\mathbf{6^{03}}}\right] =$$
$$= \left[\mathbf{R}^{\mathbf{2}}_{\text{Risk–generating lucrative activities,carried out in jobs in the immediate vicinity of the assessed workplace or in the vicinity of the workplace where the intervention takes place or in the vicinity of the conjunctural place}}\right]$$
$$\left[\mathbf{R}^{\mathbf{2}}_{\mathbf{7}00}\right] = \left[\mathbf{R}^{\mathbf{2}}_{\text{other environmental situations}}\right]$$

- Risks generated by the employer and other factors responsible internally and externally to the employer who according to the law have certain obligations and responsibilities in the field of OSH [3]:

$$r_{\mathrm{R}^3_{\overline{\mathbf{i=1,9}}\mathbf{00}}}\ \mathbf{R}^{\mathbf{3}}_{\overline{\mathbf{i=1,9}}\mathbf{00}} = \begin{bmatrix} r_{\mathrm{R}^3_{\mathbf{1}^{\mathbf{00}}}} \\ r_{\mathrm{R}^3_{\mathbf{2}^{\mathbf{01,2}^{\mathbf{04}}}}} \\ r_{\mathrm{R}^3_{\mathbf{3}^{\mathbf{00}}}} \\ r_{\mathrm{R}^3_{\mathbf{4}^{\mathbf{01,4}^{\mathbf{05}}}}} \\ r_{\mathrm{R}^3_{\mathbf{5}^{\mathbf{01,5}^{\mathbf{03}}}}} \\ r_{\mathrm{R}^3_{\mathbf{6}^{\mathbf{00}}}} \\ r_{\mathrm{R}^3_{\mathbf{7}^{\mathbf{00}}}} \\ r_{\mathrm{R}^3_{\mathbf{8}^{\mathbf{00}}}} \\ r_{\mathrm{R}^3_{\mathbf{9}^{\mathbf{01,9}^{\mathbf{04}}}}} \end{bmatrix} x \begin{bmatrix} \mathbf{R}^{\mathbf{3}}_{\mathbf{1}^{\mathbf{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{2}^{\mathbf{01,2}^{\mathbf{04}}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{3}^{\mathbf{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4}^{\mathbf{01,4}^{\mathbf{05}}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{5}^{\mathbf{01,5}^{\mathbf{03}}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{6}^{\mathbf{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{7}^{\mathbf{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{8}^{\mathbf{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{9}^{\mathbf{01,9}^{\mathbf{05}}}} \end{bmatrix} = \begin{bmatrix} 1.00 \\ 0.25 \\ 1.00 \\ 0.20 \\ 1.00 \\ 1.00 \\ 1.00 \\ 1.00 \\ 0.25 \end{bmatrix} r_{risk\ factor}\ x \begin{bmatrix} \mathbf{R}^{\mathbf{3}}_{\mathbf{1}^{\mathbf{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{2}^{\mathbf{01,2}^{\mathbf{04}}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{3}^{\mathbf{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4}^{\mathbf{01,4}^{\mathbf{05}}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{5}^{\mathbf{01,5}^{\mathbf{03}}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{6}^{\mathbf{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{7}^{\mathbf{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{8}^{\mathbf{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{9}^{\mathbf{01,9}^{\mathbf{05}}}} \end{bmatrix}$$

where:

$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{1}^{\mathbf{00}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{Risks generated by the employer when framing with workers of the evaluated job}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{2}^{\mathbf{00}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{Risks posed by persons responsible for training workers in the assessed job}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{2}^{\mathbf{01}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{General introductory training}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{2}^{\mathbf{02}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{On-the-job training}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{2}^{\mathbf{03}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{Regular training}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{2}^{\mathbf{04}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{Return-to-work training}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{3}^{\mathbf{00}}}\right] =$
$= \left[\mathbf{R}^{\mathbf{3}}_{\text{Risks posed by persons who should ensure the proper functioning of the work equipment that is in the endowment of the assessed job,maintenance,repairs,service et.al.}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{4}^{\mathbf{00}}}\right] =$
$= \left[\mathbf{R}^{\mathbf{3}}_{\text{Risks posed by persons providing personal protective equipment (PPE) to workers at the assessed workplace}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{4}^{\mathbf{01}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{Purchase of PPE}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{4}^{\mathbf{02}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{PPE compliance}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{4}^{\mathbf{03}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{If the purchased PPE provides protection against the assessed risks}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{4}^{\mathbf{04}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{If the PPE has a service life correctly calculated}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{4}^{\mathbf{05}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{If PPE is replaced whenever necessary}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{5}^{\mathbf{00}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{Risks posed by persons who should monitor the health of workers}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{5}^{\mathbf{01}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{Medical control at employment}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{5}^{\mathbf{02}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{Periodic medical check-up}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{5}^{\mathbf{03}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{Medical examination at the request of the worker}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{6}^{\mathbf{00}}}\right] == \left[\mathbf{R}^{\mathbf{3}}_{\text{Risks posed by people who should do special checks and do not do them at the assessed workplace}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{7}^{\mathbf{00}}}\right] =$
$= \left[\mathbf{R}^{\mathbf{3}}_{\text{Risks posed by persons who should provide OSH signalling in the workplace whether or not they provide staff training}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{8}^{\mathbf{00}}}\right] = \left[\mathbf{R}^{\mathbf{2}}_{\text{Risks posed by people who should provide first aid at the assessed workplace}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{9}^{\mathbf{00}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{Risks posed by job leaders for the assessed job}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{9}^{\mathbf{01}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{If they are or not professionally trained}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{9}^{\mathbf{02}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{If the selection is made on the principle of competence}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{9}^{\mathbf{03}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{If they know how to formulate,transmit work tasks and control how they are accomplished}}\right]$
$\left[\mathbf{R}^{\mathbf{3}}_{\mathbf{9}^{\mathbf{04}}}\right] = \left[\mathbf{R}^{\mathbf{3}}_{\text{If they know how to properly manage the situations at the evaluated workplace}}\right]$

- Risks generated by the employee:

$$r_{\mathrm{R}^4_{\mathrm{i}=\overline{1,8}00}}\ \mathbf{R}^{\mathbf{4}}_{\mathbf{i}=\overline{\mathbf{1,8}}\mathbf{00}} = \begin{bmatrix} r_{\mathrm{R}^4_{1}00} \\ r_{\mathrm{R}^4_{2}00} \\ r_{\mathrm{R}^4_{3}00} \\ r_{\mathrm{R}^4_{4}00} \\ r_{\mathrm{R}^4_{5}00} \\ r_{\mathrm{R}^4_{6}00} \\ r_{\mathrm{R}^4_{7}00} \\ r_{\mathrm{R}^4_{8}00} \end{bmatrix} x \begin{bmatrix} \mathbf{R}^{\mathbf{4}}_{\mathbf{1}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{2}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{3}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{4}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{5}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{6}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{7}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{8}}\mathbf{00} \end{bmatrix} = \begin{bmatrix} 1.00 \\ 1.00 \\ 1.00 \\ 1.00 \\ 1.00 \\ 1.00 \\ 1.00 \\ 1.00 \end{bmatrix} r_{risk\ factor}\ x \begin{bmatrix} \mathbf{R}^{\mathbf{4}}_{\mathbf{1}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{2}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{3}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{4}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{5}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{6}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{7}}\mathbf{00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{8}}\mathbf{00} \end{bmatrix}$$

where:

$\left[\mathbf{R}^{\mathbf{4}}_{\mathbf{1}}\mathbf{00}\right] = \left[\mathbf{R}^{\mathbf{4}}_{\text{If he knows the hierarchical structure – direct bosses and the immediate bosses}}\right]$
$\left[\mathbf{R}^{\mathbf{4}}_{\mathbf{2}}\mathbf{00}\right] = \left[\mathbf{R}^{\mathbf{4}}_{\text{If he knows the significance of the existing signs and signals at the workplace}}\right]$
$\left[\mathbf{R}^{\mathbf{4}}_{\mathbf{3}}\mathbf{00}\right] = \left[\mathbf{R}^{\mathbf{4}}_{\text{If he knows how to use,maintenance and replacement of PPE}}\right]$
$\left[\mathbf{R}^{\mathbf{4}}_{\mathbf{4}}\mathbf{00}\right] = \left[\mathbf{R}^{\mathbf{4}}_{\text{If he knows how to remedy any non−conformities that may occur at work}}\right]$
$\left[\mathbf{R}^{\mathbf{4}}_{\mathbf{5}}\mathbf{00}\right] = \left[\mathbf{R}^{\mathbf{4}}_{\text{If there are working procedures available to the worker and if he knows them}}\right]$
$\left[\mathbf{R}^{\mathbf{4}}_{\mathbf{6}}\mathbf{00}\right] =$
$= \left[\mathbf{R}^{\mathbf{4}}_{\text{If the workers in the evaluated job have physical,mental,moral,intellectual,professional qualities corresponding to the evaluated job}}\right]$
$\left[\mathbf{R}^{\mathbf{4}}_{\mathbf{7}}\mathbf{00}\right] =$
$= \left[\mathbf{R}^{\mathbf{4}}_{\text{If the workers in the assessed job have had disciplinary offenses,occupational diseases,accidents at work or incidents}}\right]$
$\left[\mathbf{R}^{\mathbf{4}}_{\mathbf{8}}\mathbf{00}\right] = \left[\mathbf{R}^{\mathbf{4}}_{\text{Other risks generated by the executor in the work process}}\right]$

Starting from the risks listed above, we define the domains of definition of the risk function R, as follows:

$$R = f(R^1_{i=\overline{1,5}00}, R^2_{i=\overline{1,7}00}, R^3_{i=\overline{1,9}00}, R^4_{i=\overline{1,8}00}), \quad (2)$$

In the case of a normal 8-hour work schedule, the values of the risk factor correction coefficient ($k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{1,9}}$) depending on the exposure for different scenarios ($m = \overline{\mathrm{I,VIII}}$) are shown in Table 1:

Table 1

Time (h)	1 (h)	2 (h)	3 (h)	4 (h)	5 (h)	6 (h)	7 (h)	8 (h)
Scenario m	I	II	III	IV	V	VI	VII	VIII
Exposure (h)	$1.3x10^{-1}$	$2.5x10^{-1}$	$3.8x10^{-1}$	$5.0x10^{-1}$	$6.3x10^{-1}$	$7.5x10^{-1}$	$8.8x10^{-1}$	$10.0x10^{-1}$

If we take into account the quantitative ratio that exists at group and subgroup level, transforming the weighting result into a scaled value that constitutes the momentary value of the range of values corresponding to the rank of the risk factor, results the following mathematical relation [4, 5]:

- For risks generated by the work equipment available and the materials and substances used, according to the Table1 ($m = \overline{\mathrm{I,VIII}}$):

$$r^{m}{}_{\mathrm{R}^{1}_{\mathbf{i=\overline{1,5}}00}}\,\mathbf{R^{1}_{i=\overline{1,5}00}} = \begin{bmatrix} r^{m}{}_{\mathrm{R}^{1}_{1}00} \\ r^{m}{}_{\mathrm{R}^{1}_{2}00} \\ r^{m}{}_{\mathrm{R}^{1}_{3}00} \\ r^{m}{}_{\mathrm{R}^{1}_{4}00} \\ r^{m}{}_{\mathrm{R}^{1}_{5}00} \end{bmatrix} x \begin{bmatrix} \mathbf{R^{1}_{1}00} \\ \mathbf{R^{1}_{2}00} \\ \mathbf{R^{1}_{3}00} \\ \mathbf{R^{1}_{4}00} \\ \mathbf{R^{1}_{5}00} \end{bmatrix} = \left[k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{1,5}}\right] r_{risk\ factor}\ x \begin{bmatrix} \mathbf{R^{1}_{1}00} \\ \mathbf{R^{1}_{2}00} \\ \mathbf{R^{1}_{3}00} \\ \mathbf{R^{1}_{4}00} \\ \mathbf{R^{1}_{5}00} \end{bmatrix}$$

$$\left[k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{1,5}}\right] = \begin{bmatrix} k^{\mathrm{I}}_{i=\overline{1,5}} \\ k^{\mathrm{II}}_{i=\overline{1,5}} \\ k^{\mathrm{III}}_{i=\overline{1,5}} \\ k^{\mathrm{IV}}_{i=\overline{1,5}} \\ k^{\mathrm{V}}_{i=\overline{1,5}} \\ k^{\mathrm{VI}}_{i=\overline{1,5}} \\ k^{\mathrm{VII}}_{i=\overline{1,5}} \\ k^{\mathrm{VIII}}_{i=\overline{1,5}} \end{bmatrix} = \begin{bmatrix} 1.3\mathrm{x}10^{-1} \\ 2.5\mathrm{x}10^{-1} \\ 3.8\mathrm{x}10^{-1} \\ 5.0\mathrm{x}10^{-1} \\ 6.3\mathrm{x}10^{-1} \\ 7.5\mathrm{x}10^{-1} \\ 8.8\mathrm{x}10^{-1} \\ 10.0\mathrm{x}10^{-1} \end{bmatrix}$$

For risks generated by the work environment in which the worker is in the work process, according to the Table 1 ($m = \overline{\mathrm{I,VIII}}$):

$$r^{m}{}_{\mathrm{R}^{2}_{\mathbf{i=\overline{1,7}}00}}\,\mathbf{R^{2}_{i=\overline{1,7}00}} = \begin{bmatrix} r^{m}{}_{\mathrm{R}^{2}_{1}00} \\ r^{m}{}_{\mathrm{R}^{2}_{2}00} \\ r^{m}{}_{\mathrm{R}^{2}_{3}00} \\ r^{m}{}_{\mathrm{R}^{2}_{4}00} \\ r^{m}{}_{\mathrm{R}^{2}_{5}00} \\ r^{m}{}_{\mathrm{R}^{2}_{6}01} \\ r_{\mathrm{R}^{2}_{6}02} \\ r_{\mathrm{R}^{2}_{6}03} \\ r_{\mathrm{R}^{2}_{7}00} \end{bmatrix} x \begin{bmatrix} \mathbf{R^{2}_{1}00} \\ \mathbf{R^{2}_{2}00} \\ \mathbf{R^{2}_{3}00} \\ \mathbf{R^{2}_{4}00} \\ \mathbf{R^{2}_{5}00} \\ \mathbf{R^{2}_{6}01} \\ \mathbf{R^{2}_{6}02} \\ \mathbf{R^{2}_{6}03} \\ \mathbf{R^{2}_{7}00} \end{bmatrix} = \left[k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{1,7}}\right] r_{risk\ factor}\ x \begin{bmatrix} \mathbf{R^{2}_{1}00} \\ \mathbf{R^{2}_{2}00} \\ \mathbf{R^{2}_{3}00} \\ \mathbf{R^{2}_{4}00} \\ \mathbf{R^{2}_{5}00} \\ \mathbf{R^{2}_{6}01} \\ \mathbf{R^{2}_{6}02} \\ \mathbf{R^{2}_{6}03} \\ \mathbf{R^{2}_{7}00} \end{bmatrix}$$

$$\left[k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{1,7}}\right] = \begin{bmatrix} k^{\mathrm{I}}_{i=\overline{1,5},7} \\ k^{\mathrm{II}}_{i=\overline{1,5},7} \\ k^{\mathrm{III}}_{i=\overline{1,5},7} \\ k^{\mathrm{IV}}_{i=\overline{1,5},7} \\ k^{\mathrm{V}}_{i=\overline{1,5},7} \\ k^{\mathrm{VI}}_{i=\overline{1,5},7} \\ k^{\mathrm{VII}}_{i=\overline{1,5},7} \\ k^{\mathrm{VIII}}_{i=\overline{1,5},7} \end{bmatrix} = \begin{bmatrix} 1.3\mathrm{x}10^{-1} \\ 2.5\mathrm{x}10^{-1} \\ 3.8\mathrm{x}10^{-1} \\ 5.0\mathrm{x}10^{-1} \\ 6.3\mathrm{x}10^{-1} \\ 7.5\mathrm{x}10^{-1} \\ 8.8\mathrm{x}10^{-1} \\ 10.0\mathrm{x}10^{-1} \end{bmatrix}, \left[k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{6^{01},6^{03}}}\right] = \begin{bmatrix} 4.125\mathrm{x}10^{-2} \\ 8.250\mathrm{x}10^{-2} \\ 12.375\mathrm{x}10^{-2} \\ 16.500\mathrm{x}10^{-2} \\ 20.625\mathrm{x}10^{-2} \\ 24.750\mathrm{x}10^{-2} \\ 28.875\mathrm{x}10^{-2} \\ 33.000\mathrm{x}10^{-2} \end{bmatrix}$$

- For risks generated by the employer and other factors responsible internally and externally to the employer who according to the law have certain obligations and responsibilities in the field of OSH, according to the Table 1 ($m = \overline{\mathrm{I,VIII}}$):

$$r^{m}{}_{\mathrm{R}^{3}_{i=\overline{1,9}00}}\,\mathbf{R}^{\mathbf{3}}_{\mathbf{i=\overline{1,9}00}} = \begin{bmatrix} r^{m}{}_{\mathrm{R}^{3}_{1^{00}}} \\ r^{m}{}_{\mathrm{R}^{3}_{2^{01}}} \\ r^{m}{}_{\mathrm{R}^{3}_{2^{02}}} \\ r^{m}{}_{\mathrm{R}^{3}_{2^{03}}} \\ r^{m}{}_{\mathrm{R}^{3}_{2^{04}}} \\ r^{m}{}_{\mathrm{R}^{3}_{3^{00}}} \\ r^{m}{}_{\mathrm{R}^{3}_{4^{01}}} \\ r^{m}{}_{\mathrm{R}^{3}_{4^{02}}} \\ r^{m}{}_{\mathrm{R}^{3}_{4^{03}}} \\ r^{m}{}_{\mathrm{R}^{3}_{4^{04}}} \\ r^{m}{}_{\mathrm{R}^{3}_{4^{05}}} \\ r^{m}{}_{\mathrm{R}^{3}_{5^{00}}} \\ r^{m}{}_{\mathrm{R}^{3}_{6^{00}}} \\ r^{m}{}_{\mathrm{R}^{3}_{7^{00}}} \\ r^{m}{}_{\mathrm{R}^{3}_{8^{00}}} \\ r^{m}{}_{\mathrm{R}^{3}_{9^{01}}} \\ r^{m}{}_{\mathrm{R}^{3}_{9^{02}}} \\ r^{m}{}_{\mathrm{R}^{3}_{9^{03}}} \\ r^{m}{}_{\mathrm{R}^{3}_{9^{04}}} \end{bmatrix} x \begin{bmatrix} \mathbf{R}^{\mathbf{3}}_{\mathbf{1^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{2^{01}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{2^{02}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{2^{03}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{2^{04}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{3^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4^{01}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4^{02}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4^{03}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4^{04}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4^{05}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{5^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{6^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{7^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{8^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{9^{01}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{9^{02}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{9^{03}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{9^{04}}} \end{bmatrix} = \left[k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{1,9}}\right] r_{risk\ factor}\ x \begin{bmatrix} \mathbf{R}^{\mathbf{3}}_{\mathbf{1^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{2^{01}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{2^{02}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{2^{03}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{2^{04}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{3^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4^{01}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4^{02}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4^{03}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4^{04}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{4^{05}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{5^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{6^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{7^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{8^{00}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{9^{01}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{9^{02}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{9^{03}}} \\ \mathbf{R}^{\mathbf{3}}_{\mathbf{9^{04}}} \end{bmatrix}$$

$$\left[k^{m=\overline{\mathrm{I,VIII}}}_{i=1,3,\overline{5,8}}\right] = \begin{bmatrix} k^{\mathrm{I}}_{i=1,3,\overline{5,8}} \\ k^{\mathrm{II}}_{i=1,3,\overline{5,8}} \\ k^{\mathrm{III}}_{i=1,3,\overline{5,8}} \\ k^{\mathrm{IV}}_{i=1,3,\overline{5,8}} \\ k^{\mathrm{V}}_{i=1,3,\overline{5,8}} \\ k^{\mathrm{VI}}_{i=1,3,\overline{5,8}} \\ k^{\mathrm{VII}}_{i=1,3,\overline{5,8}} \\ k^{\mathrm{VIII}}_{i=1,3,\overline{5,8}} \end{bmatrix} = \begin{bmatrix} 1.3\mathrm{x}10^{-1} \\ 2.5\mathrm{x}10^{-1} \\ 3.8\mathrm{x}10^{-1} \\ 5.0\mathrm{x}10^{-1} \\ 6.3\mathrm{x}10^{-1} \\ 7.5\mathrm{x}10^{-1} \\ 8.8\mathrm{x}10^{-1} \\ 10.0\mathrm{x}10^{-1} \end{bmatrix}, \left[k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{2^{01},2^{04}},\overline{9^{01},9^{04}}}\right] = \begin{bmatrix} k^{\mathrm{I}}_{i=\overline{2^{01},2^{04}},\overline{9^{01},9^{04}}} \\ k^{\mathrm{II}}_{i=\overline{2^{01},2^{04}},\overline{9^{01},9^{04}}} \\ k^{\mathrm{III}}_{i=\overline{2^{01},2^{04}},\overline{9^{01},9^{04}}} \\ k^{\mathrm{IV}}_{i=\overline{2^{01},2^{04}},\overline{9^{01},9^{04}}} \\ k^{\mathrm{V}}_{i=\overline{2^{01},2^{04}},\overline{9^{01},9^{04}}} \\ k^{\mathrm{VI}}_{i=\overline{2^{01},2^{04}},\overline{9^{01},9^{04}}} \\ k^{\mathrm{VII}}_{i=\overline{2^{01},2^{04}},\overline{9^{01},9^{04}}} \\ k^{\mathrm{VIII}}_{i=\overline{2^{01},2^{04}},\overline{9^{01},9^{04}}} \end{bmatrix} = \begin{bmatrix} 3.125\mathrm{x}10^{-2} \\ 6.250\mathrm{x}10^{-2} \\ 9.375\mathrm{x}10^{-2} \\ 12.500\mathrm{x}10^{-2} \\ 15.625\mathrm{x}10^{-2} \\ 18.750\mathrm{x}10^{-2} \\ 21.875\mathrm{x}10^{-2} \\ 25.000\mathrm{x}10^{-2} \end{bmatrix},$$

$$\left[k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{4^{01},4^{05}}}\right] = \begin{bmatrix} k^{\mathrm{I}}_{i=\overline{4^{01},4^{05}}} \\ k^{\mathrm{II}}_{i=\overline{4^{01},4^{05}}} \\ k^{\mathrm{III}}_{i=\overline{4^{01},4^{05}}} \\ k^{\mathrm{IV}}_{i=\overline{4^{01},4^{05}}} \\ k^{\mathrm{V}}_{i=\overline{4^{01},4^{05}}} \\ k^{\mathrm{VI}}_{i=\overline{4^{01},4^{05}}} \\ k^{\mathrm{VII}}_{i=\overline{4^{01},4^{05}}} \\ k^{\mathrm{VIII}}_{i=\overline{4^{01},4^{05}}} \end{bmatrix} = \begin{bmatrix} 2.500\mathrm{x}10^{-2} \\ 5.000\mathrm{x}10^{-2} \\ 7.500\mathrm{x}10^{-2} \\ 10.000\mathrm{x}10^{-2} \\ 12.500\mathrm{x}10^{-2} \\ 15.000\mathrm{x}10^{-2} \\ 17.500\mathrm{x}10^{-2} \\ 20.000\mathrm{x}10^{-2} \end{bmatrix}$$

- For risks generated by the employee:

$$r^{m}{}_{\mathrm{R}^{4}_{i=\overline{1,8}00}}\,\mathbf{R}^{\mathbf{4}}_{\mathbf{i=\overline{1,8}00}} = \begin{bmatrix} r^{m}{}_{\mathrm{R}^{4}_{1}00} \\ r^{m}{}_{\mathrm{R}^{4}_{2}00} \\ r^{m}{}_{\mathrm{R}^{4}_{3}00} \\ r^{m}{}_{\mathrm{R}^{4}_{4}00} \\ r^{m}{}_{\mathrm{R}^{4}_{5}00} \\ r^{m}{}_{\mathrm{R}^{4}_{6}00} \\ r^{m}{}_{\mathrm{R}^{4}_{7}00} \\ r^{m}{}_{\mathrm{R}^{4}_{8}00} \end{bmatrix} x \begin{bmatrix} \mathbf{R}^{\mathbf{4}}_{\mathbf{1}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{2}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{3}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{4}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{5}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{6}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{7}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{8}00} \end{bmatrix} = \left[k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{1,8}}\right] r_{risk\ factor}\ x \begin{bmatrix} \mathbf{R}^{\mathbf{4}}_{\mathbf{1}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{2}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{3}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{4}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{5}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{6}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{7}00} \\ \mathbf{R}^{\mathbf{4}}_{\mathbf{8}00} \end{bmatrix}$$

$$\left[k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{1,8}}\right] = \begin{bmatrix} k^{\mathrm{I}}_{i=\overline{1,8}} \\ k^{\mathrm{II}}_{i=\overline{1,8}} \\ k^{\mathrm{III}}_{i=\overline{1,8}} \\ k^{\mathrm{IV}}_{i=\overline{1,8}} \\ k^{\mathrm{V}}_{i=\overline{1,8}} \\ k^{\mathrm{VI}}_{i=\overline{1,8}} \\ k^{\mathrm{VII}}_{i=\overline{1,8}} \\ k^{\mathrm{VIII}}_{i=\overline{1,8}} \end{bmatrix} = \begin{bmatrix} 1.3\mathrm{x}10^{-1} \\ 2.5\mathrm{x}10^{-1} \\ 3.8\mathrm{x}10^{-1} \\ 5.0\mathrm{x}10^{-1} \\ 6.3\mathrm{x}10^{-1} \\ 7.5\mathrm{x}10^{-1} \\ 8.8\mathrm{x}10^{-1} \\ 10.0\mathrm{x}10^{-1} \end{bmatrix}$$

In the case of a total or partial exposure, we obtain the results that obtained by used the above mathematical relations and Table 2.

Table 2

Group of risks		The fact of multiplying the rank of the risk factor, associated with the risk group according to the hourly exposure		Risk subgroup	The fact of multiplying the rank of the risk factor, associated with the risk subgroup		Rank value based on exposure $k^{m=\overline{\mathrm{I,VIII}}}_{i=\overline{1,9}}$
		The value of the multiplication fact	Exposure time m=I÷VIII		The value of the multiplication fact	Exposure time m=I÷VIII	
$\mathbf{R}^{\mathbf{1}}_{\mathbf{i=\overline{1,5}00}}$	$\mathrm{R}^{1}_{\mathrm{i=1}^{00}}$	1.00	$1.3\mathrm{x}10^{-1}$				$1.3\mathrm{x}10^{-1}$
		1.00	$2.5\mathrm{x}10^{-1}$				$2.5\mathrm{x}10^{-1}$
	$\mathrm{R}^{1}_{\mathrm{i=2}^{00}}$	1.00	$3.8\mathrm{x}10^{-1}$				$3.8\mathrm{x}10^{-1}$
		1.00	$5.0\mathrm{x}10^{-1}$				$5.0\mathrm{x}10^{-1}$
	$\mathrm{R}^{1}_{\mathrm{i=3}^{00}}$	1.00	$6.3\mathrm{x}10^{-1}$				$6.3\mathrm{x}10^{-1}$
		1.00	$7.5\mathrm{x}10^{-1}$				$7.5\mathrm{x}10^{-1}$
	$\mathrm{R}^{1}_{\mathrm{i=4}^{00}}$	1.00	$8.8\mathrm{x}10^{-1}$				$8.8\mathrm{x}10^{-1}$
		1.00	$10.0\mathrm{x}10^{-1}$				$10.0\mathrm{x}10^{-1}$
	$\mathrm{R}^{1}_{\mathrm{i=5}^{00}}$						
$\mathbf{R}^{\mathbf{2}}_{\mathbf{i=\overline{1,6}00}}$	$\mathrm{R}^{2}_{\mathrm{i=1}^{00}}$	1.00	$1.3\mathrm{x}10^{-1}$				$1.3\mathrm{x}10^{-1}$
	$\mathrm{R}^{2}_{\mathrm{i=2}^{00}}$	1.00	$2.5\mathrm{x}10^{-1}$				$2.5\mathrm{x}10^{-1}$
		1.00	$3.8\mathrm{x}10^{-1}$				$3.8\mathrm{x}10^{-1}$

	$R^{2}_{i=3^{00}}$	1.00	$5.0x10^{-1}$				$5.0x10^{-1}$
	$R^{2}_{i=4^{00}}$	1.00	$6.3x10^{-1}$				$6.3x10^{-1}$
	$R^{2}_{i=5^{00}}$	1.00	$7.5x10^{-1}$				$7.5x10^{-1}$
		1.00	$8.8x10^{-1}$				$8.8x10^{-1}$
	$R^{2}_{i=7^{00}}$	1.00	$10.0x10^{-1}$				$10.0x10^{-1}$
	$R^{2}_{i=6^{00}}$			$R^{2}_{i=6^{01}}$ $R^{2}_{i=6^{02}}$ $R^{2}_{i=6^{03}}$	0.33	$1.3x10^{-1}$	$4.125x10^{-2}$
						$2.5x10^{-1}$	$8.250x10^{-2}$
						$3.8x10^{-1}$	$12.375x10^{-2}$
						$5.0x10^{-1}$	$16.500x10^{-2}$
						$6.3x10^{-1}$	$20.625x10^{-2}$
						$7.5x10^{-1}$	$24.750x10^{-2}$
						$8.8x10^{-1}$	$28.875x10^{-2}$
						$10.0x10^{-1}$	$33.000x10^{-2}$
$\mathbf{R^{3}_{i=\overline{1,9}^{00}}}$	$R^{3}_{i=1^{00}}$	1.00	$1.3x10^{-1}$				$1.3x10^{-1}$
	$R^{3}_{i=3^{00}}$	1.00	$2.5x10^{-1}$				$2.5x10^{-1}$
	$R^{3}_{i=5^{00}}$	1.00	$3.8x10^{-1}$				$3.8x10^{-1}$
	$R^{3}_{i=6^{00}}$	1.00	$5.0x10^{-1}$				$5.0x10^{-1}$
	$R^{3}_{i=7^{00}}$	1.00	$6.3x10^{-1}$				$6.3x10^{-1}$
	$R^{3}_{i=8^{00}}$	1.00	$7.5x10^{-1}$				$7.5x10^{-1}$
		1.00	$8.8x10^{-1}$				$8.8x10^{-1}$
		1.00	$10.0x10^{-1}$				$10.0x10^{-1}$
	$R^{3}_{i=2^{00}}$			$R^{3}_{i=2^{01}}$ $R^{3}_{i=2^{02}}$ $R^{3}_{i=2^{03}}$ $R^{3}_{i=2^{04}}$	0.25	$1.3x10^{-1}$	$3.125x10^{-2}$
						$2.5x10^{-1}$	$6.250x10^{-2}$
						$3.8x10^{-1}$	$9.375x10^{-2}$
						$5.0x10^{-1}$	$12.500x10^{-2}$
						$6.3x10^{-1}$	$15.625x10^{-2}$
						$7.5x10^{-1}$	$18.750x10^{-2}$
						$8.8x10^{-1}$	$21.875x10^{-2}$
						$10.0x10^{-1}$	$25.000x10^{-2}$
	$R^{3}_{i=4^{00}}$			$R^{3}_{i=4^{01}}$ $R^{3}_{i=4^{02}}$ $R^{3}_{i=4^{03}}$ $R^{3}_{i=4^{04}}$ $R^{3}_{i=4^{05}}$	0,20	$1.3x10^{-1}$	$2.500x10^{-2}$
						$2.5x10^{-1}$	$5.000x10^{-2}$
						$3.8x10^{-1}$	$7.500x10^{-2}$
						$5.0x10^{-1}$	$10.000x10^{-2}$
						$6.3x10^{-1}$	$12.500x10^{-2}$
						$7.5x10^{-1}$	$15.000x10^{-2}$
						$8.8x10^{-1}$	$17.500x10^{-2}$
						$10.0x10^{-1}$	$20.000x10^{-2}$
	$R^{3}_{i=9^{00}}$			$R^{3}_{i=9^{01}}$ $R^{3}_{i=9^{02}}$ $R^{3}_{i=9^{03}}$ $R^{3}_{i=9^{04}}$	0.25	$1.3x10^{-1}$	$3.125x10^{-2}$
						$2.5x10^{-1}$	$6.250x10^{-2}$
						$3.8x10^{-1}$	$9.375x10^{-2}$
						$5.0x10^{-1}$	$12.500x10^{-2}$
						$6.3x10^{-1}$	$15.625x10^{-2}$
						$7.5x10^{-1}$	$18.750x10^{-2}$
						$8.8x10^{-1}$	$21.875x10^{-2}$
						$10.0x10^{-1}$	$25.000x10^{-2}$
$\mathbf{R^{4}_{i=\overline{1,8}^{00}}}$	$R^{4}_{i=1^{00}}$	1.00	$1.3x10^{-1}$				$1.3x10^{-1}$
	$R^{4}_{i=3^{00}}$	1.00	$2.5x10^{-1}$				$2.5x10^{-1}$
	$R^{4}_{i=5^{00}}$	1.00	$3.8x10^{-1}$				$3.8x10^{-1}$
	$R^{4}_{i=6^{00}}$	1.00	$5.0x10^{-1}$				$5.0x10^{-1}$
	$R^{4}_{i=7^{00}}$	1.00	$6.3x10^{-1}$				$6.3x10^{-1}$
	$R^{4}_{i=8^{00}}$	1.00	$7.5x10^{-1}$				$7.5x10^{-1}$
		1.00	$8.8x10^{-1}$				$8.8x10^{-1}$
		1.00	$10.0x10^{-1}$				$10.0x10^{-1}$

3. Interpretation of the results obtained

This methodological tool for quantifying risk parameters has been developed for risk estimation and assessment, in order to diagnose and predict the probabilities of the injurie phenomenon that can manifest itself at the level of a complex work system.

For the purpose of this paper, risk is defined as a measure of the probability and severity of harm (adverse effects) because measuring risk is an empirical, quantitative, scientific activity. The premise that risk assessment must be an integral part of the overall decision-making process necessitates following a systemic, holistic approach to dealing with risk. Such a holistic approach builds on the principals and philosophy upon which system analysis and safety system engineering are grounded.

Applying this method, for the same type of different activity evaluated, at the same time, for the same work point, many evaluators, independent of each other, finally obtain approximate equal results. At the same time, the method is flexible, allowing its adaptation to any work system with activity in the normal or potential explosive environment and to any organizational structure where the human component is analysed in the work process.

4. Conclusions

For determining the risk, this methodical tool is a modern technique used to identify and assess occupational risk factors for quantifying the risk indicators was developed, in order to make the diagnosis and the plausible forecast of the mechanism of occurrence of an undesirable event.

This method is flexible allowing its adaptation to any work system for different types of activities for which specific risk categories and subcategories and to any organizational structure where the human component is analysed in the work process.

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