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RISK OF EXPOSURE FOR WORKERS TO PROFESSIONAL VIBRATIONS

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Keywords: *vibrations, mathematic model, exposure, risk*
Abstract: *The study focused on the model of estimating the risk of exposure of workers to global occupational vibrations / with local action on the hand-arm system. In order to estimate the risk of exposure to occupational vibrations, we developed a generalized mathematical model for estimating the risk of exposure to mechanical vibrations transmitted to the whole body / with action on the hand-arm system. This model is based on the statistical function of probability with exponential decrease (Gumbel function), and its argument is expressed either by the values of the weighted acceleration parameter or in the form of exposure points.*

1. Introduction

European Directive 2002/44/EC was adopted at national level by GD 1876/2005 on minimum occupational safety and health requirements regarding the exposure of workers to the risks arising from vibration. The regulation sets ”the limit values for exposure to mechanical vibration (global and hand-arm)” and ”exposure values that trigger the action”, specifying at the same time, the obligations of employers regarding the determination and assessment of risks, the elaboration of measures to be adopted to reduce or avoid exposure, as well as the details regarding the provision of information and training of workers. Thus, for global mechanical vibrations / (hand-arm), the occupational daily exposure limit value, calculated over a reference period of 8 hours, must be 1.15 m/s²/(5 m/s²) and the value of the daily exposure from which the employer's action is triggered, calculated at a reference period of 8 hours, must be 0.5 m/s²/(2.5 m/s²) [1,2].

2. Mathematical models associated with the risk of exposure to occupational vibrations

In order to estimate the risk of exposure to occupational vibrations, we developed a generalized mathematical model for estimating the risk of exposure to mechanical vibrations transmitted to the whole body / with action on the hand-arm system. This model is based on the statistical function of probability with exponential decrease (Gumbel function), and its argument is expressed either by the values of the weighted acceleration parameter or in the form of exposure points. [3,4,5,6].

To quantify the exposure to different values of mechanical acceleration (global and hand-arm) in the work process, the following analytical relationships were used:

$$P_{Ei} = [A_i^*(8)]^2 100$$

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$A_i^*(8) = \frac{A_i(8)}{0.5}$, *for vibrations transmitted to the whole body*

$A_i^*(8) = \frac{A_i(8)}{2.5}$, *for vibrations transmitted to the hand-arm*

$A_i(8) = \frac{k_{a_{wi}}}{0.5}\sqrt{\frac{T_{ej}}{T_0}}$, *for vibrations transmitted to the whole body* (1)

$(ka_{wi})^2 = \alpha_i \frac{1}{T_{ej}}$, *for vibrations transmitted to the whole body*

$(ka_{hvi})^2 = \beta_i \frac{1}{T_{ej}}$, *for vibrations transmitted to the hand-arm*

where: A(8) - daily exposure to mechanical vibration, (m/s^2); P_E – exposure points that quantify the values of mechanical vibrations transmitted to the whole body or hand-arm system; k – multiplication factor (is equal to 1.4 for the x and y axes and 1.0 for the z axis); a_{wi} – weighted acceleration in the case of vibrations transmitted to the whole body, (m/s^2); a_{hvi} – the magnitude of the acceleration in the case of vibrations transmitted to the hand-arm system, (m/s^2); T_{ej} – daily duration of exposure to vibrations transmitted to the whole body or hand-arm system, (hours); T_0 – reference duration, (8 hours)

After applying mathematical relations $ka_{wi}=f(T_{ej})$ (in the case of global vibrations) and $a_{hvi}=f(T_{ej})$ (in case of hand-arm vibrations), value grids are obtained ka_{wi}/a_{hvi} corresponding to mechanical vibrations (global and hand-arm) for different levels of the acceleration parameter $A_i^*(8)$, respectively: Weighted acceleration values ka_{wi} (a_{hvi}) or parameter $A_i^*(8)$ which do not exceed the level of 0.5m/s^2 (2.5m/s^2), from which the employer's action is triggered, in case of exposure to global vibrations (hand-arm vibrations); Weighted acceleration values ka_{wi} (a_{hvi}) or of parameter $A_i^*(8)$ within the range (0.5;1.15) m/s^2 ((2.5;5) m/s^2), at which the action of the employer is triggered, in case of exposure to global vibrations (hand-arm vibrations); Weighted acceleration values ka_{wi} (a_{hvi}) or of parameter $A_i^*(8)$ exceeding the maximum permitted limit of 1.15 m/s^2 (5 m/s^2), in case of exposure to global vibrations (hand-arm vibrations).

Following the application of mathematical relations $P_{Ei}=f(ka_{wi},T_{ej})$ (in case of global vibrations) and $P_{Ei}=f(a_{hvi},T_{ej})$ (in case of hand-arm vibrations), grids of the exposure points are obtained P_E corresponding to mechanical vibrations (global and hand-arm) in the work process for different levels of the acceleration parameter $A_i^*(8)$, respectively: Exposure point values not exceeding 100 points, which quantifies the values of the weighted acceleration ka_{wi} (a_{hvi}) or of parameter $A_i^*(8)$ from which the action of the employer is triggered, in case of exposure to global vibrations (hand-arm vibrations); Exposure point values in the range (100;529) points, ((100;400) points) which quantifies the range of values of the weighted acceleration ka_{wi} (a_{hvi}) or of parameter $A_i^*(8)$ at which the action of the employer is triggered, in case of exposure to global vibrations (hand-arm vibrations); Exposure point values exceeding 529 points (400 points), which quantify the weighted acceleration values ka_{wi} (a_{hvi}) or of parameter $A_i^*(8)$ exceeding the maximum permissible limit in the event of exposure to global vibration (hand-arm vibration).

In the following is presented how to use the differential equation that quantifies the risk of exposure to different levels of global mechanical vibration / hand-arm, which may occur during professional activity:

$$g(x_i) = G(x_i)' \tag{2}$$

$$g(x_i) = G(x_i)' = \left(e^{-e^{-\frac{x_i-x_0}{a}}}\right) = \frac{1}{a}e^{-\frac{x_i-x_0}{a}}e^{-e^{-\frac{x_i-x_0}{a}}} \tag{3}$$

which admits as a solution, the following distribution function $G(x_i)$:

$$G(x_i) = e^{-e^{-\frac{x_i-x_0}{a}}} \tag{4}$$

where: x_i - function variable that can be explicit in the form of values ka_{wi}/a_{hvi} or of exposure points $P_{Ei;}$ $g(x_i)$ - the probability density function of the variable values x_i; $G(x_i)$ - the function of distribution (of probability) of values x_i; μ - the average value of the variable values x_i; σ - standard deviation of variable values x_i; i – order index of the variable x_i.

Based on the distribution function G (xi), the expression of the average objective risk of exposure to different values of mechanical acceleration (global and hand-arm) is determined.

2.1 Elaboration of the mathematical model specific to the risk of exposure to vibrations transmitted to the whole body

To quantify the exposure to different values of mechanical acceleration transmitted to the whole body in the work process, we have the following analytical relations [6,7,8]:

$$A_i^*(8) = \frac{A_i(8)}{0.5} \quad (5)$$

$$P_{E_i} = \left(\frac{ka_{wi}}{0.5}\right)^2 \frac{T_{ej}}{T_0} 100 \quad (6)$$

$$(ka_{wi})^2 = \alpha_i \frac{1}{T_{ej}} \quad (7)$$

where: A(8) – daily exposure to vibrations transmitted to the whole body, (m/s²); P_E – exposure points that quantify the values of mechanical vibrations transmitted to the whole body; k – multiplication factor (is equal to 1.4 for the x and y axes and 1.0 for the z axis); a_w – weighted acceleration, (m/s²); T_{ej} – daily duration of exposure to vibrations transmitted to the whole body, (hours); T_0 – reference duration, (8 hours).

Following the application of mathematical relations $ka_{wi}=f(T_{ej})$ the grid of values is obtained ka_{wi} corresponding to the mechanical vibrations transmitted to the whole body generated in the work process for different levels of the parameter A(8).

Following the application of mathematical relations $P_{Ei}=f(ka_{wi},T_{ej})$, the grid of exposure points P_E is obtained corresponding to the mechanical vibrations transmitted to the whole body generated in the work process for different levels of parameter A(8)

In the following is presented the differential equation that quantifies the risk of exposure to different levels of mechanical vibration transmitted to the whole body, which are generated in the work process:

$$g(x_i) = G(x_i)' , \quad (8)$$

respectively

$$g(x_i) = G(x_i)' = \left(e^{-e^{-\frac{\sqrt{2\ln i}(x_j-\mu-\sigma\sqrt{2\ln i})}{\sigma}}}\right)' = \frac{\sqrt{2\ln i}}{\sigma} e^{-\frac{\sqrt{2\ln i}}{\sigma}(x_j-\mu-\sigma\sqrt{2\ln i})} e^{-\frac{\sqrt{2\ln i}}{\sigma}(x_j-\mu-\sigma\sqrt{2\ln i})} \quad (9)$$

which admits as a solution, the following distribution function $G(ka_{wi})$

$$G(x_i) = e^{-\frac{\sqrt{2\ln i}(x_j-\mu-\sigma\sqrt{2\ln i})}{\sigma}} \quad (10)$$

where: x_i - the function variable that can be explained in the form of values ka_{wi} or of exposure points P_{Ei}; $g(x_i)$ - the probability density function of the variable values x_i; $G(x_i)$ - the function of distribution (of probability) of values x_i; μ - the average value of the variable values x_i; σ - standard deviation of variable values x_i; i order index of the variable x_i

Thus, the explanation of the functions according to the parameter ka_{wi} or of the points P_{Ei} are reproduced below, respectively:

$$g(ka_{wi}) = G(ka_{wi})' \quad (11)$$

respectively

$$g(ka_{wi}) = G(ka_{wi})' = \left(e^{-e^{-\frac{\sqrt{2\ln i}(ka_{wi}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}}\right)' = \frac{\sqrt{2\ln i}}{\sigma} e^{-\frac{\sqrt{2\ln i}}{\sigma}(ka_{wi}-\mu-\sigma\sqrt{2\ln i})} e^{-\frac{\sqrt{2\ln i}}{\sigma}(ka_{wi}-\mu-\sigma\sqrt{2\ln i})} \quad (12)$$

which admits as a solution, the following distribution function $G(ka_{wi})$

$$G(P_{Ei}) = e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}} \quad (13)$$

or

$$g(P_{Ei}) = G(P_{Ei})' \quad (14)$$

respectively

$$g(P_{Ei}) = G(P_{Ei})' = \left(e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}}\right)' = \frac{\sqrt{2\ln i}}{\sigma} e^{-\frac{\sqrt{2\ln i}}{\sigma}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})} e^{-\frac{\sqrt{2\ln i}}{\sigma}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})} \quad (15)$$

which admits as a solution, the following distribution function $G(P_{Ei})$

$$G(P_{Ei}) = e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}} \quad (16)$$

Based on the distribution function $G(x_i)$ the expression of the average objective risk of exposure to different values of the mechanical acceleration transmitted to the whole body is determined, respectively:

$$\overline{R_i(x_i)} = \int x_i G(x_i) dx_i \;\; for\ a\ continuous\ range\ of\ values\ x_i$$

$$\overline{R_i(x_i)} = \sum x_i G(x_i), \;\; for\ a\ discrete\ range\ of\ values\ x_i$$

This risk can be explained as follows:

Depending on the parameter ka_{wi}:

$$\overline{R_i(ka_{wi})} = \int ka_{wi} G(ka_{wi}) dka_{wi} = \int ka_{wi} e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}} dka_{wi},$$

$$for\ a\ continuous\ range\ of\ values\ ka_{wi}$$

$$\overline{R_i(ka_{wi})} = \sum ka_{wi} G(ka_{wi}) = \sum ka_{wi} e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}},$$

$$for\ a\ discrete\ range\ of\ values\ ka_{wi}$$

Depending of the points P_{Ei}:

$$\overline{R_i(P_{Ei})} = \int P_{Ei} G(P_{Ei}) dP_{Ei} = \int P_{Ei} e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}} dP_{Ei},$$

$$for\ a\ continuous\ range\ of\ values\ P_{Ei}$$

$$\overline{R_i(P_{Ei})} = \sum P_{Ei} G(P_{Ei}) = \sum P_{Ei} e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}},$$

$$for\ a\ discrete\ range\ of\ values\ P_{Ei}$$

Considering the results obtained based on the application of the previous relations, we obtain the following grids to assess the risk of exposure to different values of mechanical acceleration transmitted to the whole body, in the work process, depending on its levels or the value of exposure points, thus (table 1):

Table 1

Values of mechanical acceleration transmitted to the whole body, k_{awi} m/s^2	**Estimation the exposure risk for the different values of mechanical acceleration transmitted to the whole body, k_{awi}*$G(k_{awi})$**	**Assess the risk of exposure to different values of mechanical acceleration transmitted to the whole body, in the work process**
$k_{awi} \leq 0.5$	$k_{awi} * G(k_{awi} \leq 0.5)$	Low
$0.5 < k_{awi} \leq 1.15$	$k_{awi} * G(0.5 < k_{awi} \leq 1.15)$	Medium
$1.15 < k_{awi}$	$k_{awi} * G(1.15 < k_{awi})$	High
The resulting value of the exposure points	**Estimation the exposure risk depending the resulting value of the exposure points**	**Assess the risk of exposure to different values of mechanical acceleration transmitted to the whole body, in the work process**
$P_{Ei} \leq 100.00$	P_{Ei}* $G(P_{Ei} \leq 100.00)$	Low
$100.00 < P_{Ei} \leq 529.00$	P_{Ei}* $G(100.00 < P_{Ei} \leq 529.00)$	Medium
$529.00 < P_{Ei}$	P_{Ei}* $G(529.00 < P_{Ei})$	High

2.2 Elaboration of the mathematical model specific to the risk of exposure to vibrations with action on the hand-arm system

To quantify the exposure to different values of the mechanical acceleration transmitted to the hand-arm system in the work process, we have the following analytical relations [6,7,8]:

$$P_{Ei} = \left[\frac{A(8)}{2.5}\right]^2 100, \tag{17}$$

$$P_{Ei} = \left(\frac{a_{hvi}}{2.5}\right)^2 \frac{T_{ej}}{T_0} 100, \tag{18}$$

$$(a_{hvi})^2 = \beta_i \frac{1}{T_{ej}}, \tag{19}$$

where: $A(8)$ – daily exposure to vibrations transmitted to the hand-arm system, (m/s^2); P_E – exposure points that quantify the values of mechanical vibrations transmitted to the hand-arm system; a_{hv} – vibration magnitude, (m/s^2); T_{ej} – daily duration of exposure to vibrations transmitted to the hand-arm system, (hours); T_0 – reference duration, (8 hours).

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Following the application of the mathematical relations a_{hvi}=f(T_{ej}) (provided in the last column of the table above), the grid of ahvi values corresponding to the mechanical vibrations transmitted to the hand-arm system generated in the work process for different levels of parameter A(8) is obtained.

Following the application of mathematical relations P_{Ei}=f(a_{hvi},T_{ej}), the grid of exposure points is obtained P_E corresponding to the mechanical vibrations transmitted to the hand-arm system generated in the work process for different levels of parameter A(8).

Next, we present the differential equation that quantifies the risk of exposure to different levels of mechanical vibration transmitted to the hand-arm system that are generated in the work process:

$$g(x_i) = G(x_i)' , \tag{20}$$

respectively

$$g(x_i) = G(x_i)' = \left(e^{-e^{-\frac{\sqrt{2\ln i}(x_i-\mu-\sigma\sqrt{2\ln i})}{\sigma}}}\right)' = \frac{\sqrt{2\ln i}}{\sigma} e^{-\frac{\sqrt{2\ln i}}{\sigma}(x_i-\mu-\sigma\sqrt{2\ln i})} e^{-\frac{\sqrt{2\ln i}}{\sigma}(x_i-\mu-\sigma\sqrt{2\ln i})} \tag{21}$$

which admits as a solution, the following distribution function G(ka_{wi})

$$G(x_i) = e^{-e^{-\frac{\sqrt{2\ln i}(x_i-\mu-\sigma\sqrt{2\ln i})}{\sigma}}} \tag{22}$$

where: x_i - the function variable that can be explained in the form of values ka_{wi} or of exposed points P_{Ei}; $g(x_i)$ - the probability density function of the variable values x_i; $G(x_i)$ - the function of distribution (of probability) of values x_i; μ - the average value of the variable values x_i; σ - standard deviation of variable values x_i; i – order index of the variable x_i

Thus, explaining the functions according to the parameter a_{hvi} or the points P_{Ei} are reproduced in the following, respectively:

$$g(a_{hvi}) = G(a_{hvi})' , \tag{23}$$

respectively

$$g(a_{hvi}) = G(a_{hvi})' = \left(e^{-e^{-\frac{\sqrt{2\ln i}(a_{hvi}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}}\right)' = \frac{\sqrt{2\ln i}}{\sigma} e^{-\frac{\sqrt{2\ln i}}{\sigma}(a_{hvi}-\mu-\sigma\sqrt{2\ln i})} e^{-\frac{\sqrt{2\ln i}}{\sigma}(a_{hvi}-\mu-\sigma\sqrt{2\ln i})} \tag{24}$$

which admits as a solution, the following distribution function G(a_{hvi})

$$G(P_{Ei}) = e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}} , \tag{25}$$

or

$$g(P_{Ei}) = G(P_{Ei})' , \tag{26}$$

respectively

$$g(P_{Ei}) = G(P_{Ei})' = \left(e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}}\right)' = \frac{\sqrt{2\ln i}}{\sigma} e^{-\frac{\sqrt{2\ln i}}{\sigma}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})} e^{-\frac{\sqrt{2\ln i}}{\sigma}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})} \tag{27}$$

which admits as a solution, the following distribution function G(P_{Ei})

$$G(P_{Ei}) = e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}} , \tag{28}$$

Based on the distribution function G(x_i) the expression of the average objective risk of exposure to different values of the mechanical acceleration transmitted to the hand-arm system is determined, respectively:

$$\overline{R_i(x_i)} = \int x_i G(x_i) dx_i \text{ , } for\ a\ continuous\ range\ of\ values\ x_i$$

$$\overline{R_i(x_i)} = \sum x_i G(x_i) \text{ , } for\ a\ discrete\ range\ of\ values\ x_i$$

This risk can be explained in this way:

Depending on the parameter a_{hvi}:

$$\overline{R_i(a_{hvi})} = \int a_{hvi} G(a_{hvi}) da_{hvi} = \int a_{hvi} e^{-e^{-\frac{\sqrt{2\ln i}(ka_{hvi}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}} da_{hvi} ,$$
$$for\ a\ continuous\ range\ of\ values\ a_{hvi}$$

$$\overline{R_i(a_{hvi})} = \sum a_{hvi} G(a_{hvi}) = \sum a_{hvi} e^{-e^{-\frac{\sqrt{2\ln i}(a_{hvi}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}} ,$$
$$for\ a\ discrete\ range\ of\ values\ a_{hvi}$$

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Depending on the points P_{Ei}:

$$\overline{R_i(P_{Ei})} = \int P_{Ei} G(P_{Ei}) dP_{Ei} = \int P_{Ei} e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}} dP_{Ei}\,,$$

$$for\ a\ continuous\ range\ of\ values\ P_{Ei}$$

$$\overline{R_i(P_{Ei})} = \sum P_{Ei} G(P_{Ei}) = \sum P_{Ei} e^{-e^{-\frac{\sqrt{2\ln i}(P_{Ei}-\mu-\sigma\sqrt{2\ln i})}{\sigma}}}\,,$$

$$for\ a\ discrete\ range\ of\ values\ P_{Ei}$$

Taking into account the results obtained on the basis of the application of the previous relations, the following grids for assessing the risk of exposure to different values of mechanical acceleration transmitted to the hand-arm system in the work process are obtained depending on its levels or value of exposure points, as follows (Table 2):

Table 2.

Values of mechanical acceleration transmitted to the hand-arm, a_{hvi} m/s^2	**Estimation the exposure risk for the different values of mechanical acceleration transmitted to hand-arm, a_{hvi}*G(a_{hvi})**	**Assess the risk of exposure to different values of mechanical acceleration transmitted to the hand-arm, in the work process**
$a_{hvi} \leq 2.5$	a_{hvi} * G($a_{hvi} \leq 2.5$)	Low
$2.5 < a_{hvi} \leq 5$	a_{hvi} * G($2.5 < a_{hvi} \leq 5$)	Medium
$5 < a_{hvi}$	a_{hvi} * G($5 < a_{hvi}$)	High
The resulting value of the exposure points	**Estimation the exposure risk depending the resulting value of the exposure points**	**Assess the risk of exposure to different values of mechanical acceleration transmitted to the hand-arm, in the work process**
$P_{Ei} \leq 100.00$	P_{Ei}* G($P_{Ei} \leq 100.00$)	Low
$100.00 < P_{Ei} \leq 400.00$	P_{Ei}* G($100.00 < P_{Ei} \leq 400.00$)	Medium
$400.00 < P_{Ei}$	P_{Ei}* G($400.00 < P_{Ei}$)	High

After applying mathematical relations $k_{awi}=f(T_{ej})$ the grid of values is obtained, k_{awi} from table 3, corresponding to the mechanical vibrations transmitted to the whole body generated in the work process for different values of the parameter A(8).

Following the application of mathematical relations $P_{Ei}=f(k_{awi},T_{ej})$, the grid of exposure points from table 4 is obtained, P_E, corresponding to the mechanical vibrations transmitted to the whole body generated in the work process for different values of parameter A(8).

Following the application of mathematical relations $a_{hvi}=f(T_{ej})$ the grid of values is obtained ahvi corresponding to the mechanical vibrations transmitted to the hand-arm system generated in the work process from table 5 for different values of parameter A(8).

Following the application of mathematical relations $P_{Ei}=f(a_{hvi},T_{ej})$, the grid of exposure points is obtained P_E corresponding to the mechanical vibrations transmitted to the hand-arm system generated in the work process from table 6 for different values of parameter A(8).

3. Conclusions

The minimum requirements for the protection of workers against the risks to their health and safety, generated or which may be generated by exposure to mechanical vibration, are laid down in national legislation by GD 1876/2005 which takes over the European Directive 2002/44 / EC, and establish responsibilities of employers to ensure the elimination or minimization of the risks generated by professional vibrations.

In order to estimate and assess the risk of exposure to occupational vibrations, a generalized mathematical model for diagnosis and prognosis of exposure risk was designed, both for mechanical vibrations transmitted to the whole body and for mechanical vibrations with action on the hand system -arm. This model is based on the exponentially decreasing Gumbel distribution function, whose variables can be made explicit either by the values of the weighted acceleration parameter or in the form of exposure points.

Table 3. Grid of values $G(ka_{wi})$ calculated using the mathematical relationship associated with the distribution function

Tsi ore	G(kawi)																			
12,0	0,028549	5,98E-05	0,000337	0,00289	0,017517	0,065629	0,169294	0,319321	0,482958	0,633361	0,752862	0,798811	0,838396	0,898001	0,936777	0,961121	0,976429	0,985839	0,991493	0,994909	0,996968
11,5	0,007352	5,69E-05	0,000396	0,00336	0,020652	0,076361	0,188722	0,347448	0,514175	0,662478	0,775678	0,819738	0,856137	0,910715	0,945212	0,96695	0,980225	0,988199	0,993026	0,99588	0,997599
11,0	0,002625	5,73E-05	0,000422	0,004114	0,024233	0,087871	0,211291	0,377952	0,546702	0,689982	0,798811	0,839405	0,873381	0,922291	0,953049	0,97222	0,983568	0,99033	0,994374	0,996727	0,998097
10,5	0,001138	5,83E-05	0,000499	0,004902	0,028832	0,101681	0,238106	0,410535	0,579658	0,718551	0,820841	0,85857	0,88948	0,93321	0,960612	0,976876	0,986562	0,99219	0,995535	0,997434	0,998525
10,0	0,000564	5,99E-05	0,00058	0,005944	0,034697	0,117838	0,266374	0,445	0,613083	0,747762	0,842081	0,876893	0,904986	0,943475	0,96719	0,981055	0,989161	0,993821	0,996489	0,998019	0,998877
9,5	0,000308	6,5E-05	0,000711	0,007406	0,041421	0,137402	0,297436	0,482958	0,648026	0,775678	0,863182	0,894337	0,919085	0,952713	0,973102	0,98472	0,991427	0,995212	0,997313	0,998504	0,999169
9,0	0,000188	7,1E-05	0,367879	0,009317	0,050648	0,159871	0,331347	0,52192	0,683948	0,803059	0,883022	0,910715	0,93198	0,961401	0,97823	0,987966	0,993324	0,996324	0,997991	0,998899	0,999397
8,5	0,000122	8,17E-05	0,001135	0,011715	0,062155	0,187211	0,371838	0,563346	0,720088	0,830422	0,90155	0,925473	0,944191	0,968911	0,98292	0,990702	0,994948	0,997275	0,998537	0,999212	0,999574
8,0	8,44E-05	9,46E-05	0,001471	0,014932	0,076361	0,21832	0,414633	0,606118	0,755476	0,856137	0,918529	0,939319	0,955028	0,975546	0,986899	0,992972	0,996273	0,998034	0,998962	0,999452	0,99971
7,5	6,1E-05	0,00011	0,00183	0,019228	0,093427	0,253066	0,459061	0,649794	0,706014	0,879667	0,934048	0,951269	0,964512	0,981196	0,990063	0,994838	0,997334	0,998618	0,999288	0,999629	0,999808
7,0	4,6E-05	0,000134	0,002488	0,024494	0,115394	0,29553	0,510225	0,736038	0,82286	0,902746	0,947731	0,962339	0,972744	0,985946	0,992788	0,996353	0,998157	0,99907	0,999528	0,999762	0,99988
6,5	3,74E-05	0,000171	0,003439	0,032532	0,14311	0,343439	0,563346	0,738785	0,854445	0,922823	0,960096	0,97152	0,979809	0,989866	0,994987	0,997535	0,998781	0,999397	0,999702	0,999852	0,999928
6,0	3,29E-05	0,000226	0,004616	0,043299	0,178979	0,398319	0,619976	0,782527	0,884418	0,940762	0,970588	0,979296	0,985538	0,993026	0,996641	0,998391	0,999232	0,999629	0,999823	0,999915	0,99996
5,5	2,99E-05	0,000322	0,006471	0,059705	0,223617	0,461133	0,677834	0,824861	0,911317	0,956616	0,979141	0,985647	0,990198	0,995418	0,997599	0,99902	0,999543	0,999789	0,999902	0,999955	0,999979
5,0	2,92E-05	0,0004	0,009625	0,081437	0,277923	0,529747	0,694502	0,864786	0,934876	0,969495	0,986134	0,990631	0,993698	0,997186	0,998741	0,999441	0,999749	0,999889	0,99995	0,999978	0,99999
4,5	3,06E-05	0,000568	0,014789	0,114317	0,345441	0,604238	0,79344	0,900888	0,954704	0,980077	0,991309	0,994296	0,996243	0,998404	0,999319	0,999708	0,999875	0,999946	0,999977	0,99999	0,999996
4,0	3,44E-05	0,00087	0,023515	0,159871	0,428843	0,683948	0,847165	0,93198	0,970973	0,987966	0,995056	0,99685	0,997991	0,999186	0,999668	0,999865	0,999945	0,999978	0,999991	0,999996	0,999998
3,5	4,31E-05	0,001514	0,038276	0,225293	0,523945	0,763999	0,896184	0,95742	0,983148	0,993455	0,997515	0,998455	0,999051	0,999637	0,999861	0,999947	0,99998	0,999992	0,999997	0,999999	1,000000
3,0	5,98E-05	0,00289	0,065629	0,319321	0,633361	0,838396	0,936777	0,976429	0,991493	0,996968	0,998934	0,999365	0,999622	0,999866	0,999953	0,999983	0,999994	0,999998	0,999999	1,000000	1,000000
2,5	5,99E-05	0,005944	0,117838	0,445	0,747762	0,904986	0,96719	0,989161	0,996489	0,998877	0,999642	0,999798	0,999886	0,999963	0,999988	0,999996	0,999999	1,000000	1,000000	1,000000	1,000000
2,0	9,46E-05	0,014932	0,21832	0,606118	0,856137	0,955028	0,986899	0,996273	0,998962	0,99971	0,999919	0,999957	0,999977	0,999994	0,999998	0,999999	1,000000	1,000000	1,000000	1,000000	1,000000
1,5	0,000226	0,043299	0,398319	0,782527	0,940762	0,985538	0,996641	0,999232	0,999823	0,99996	0,999991	0,999995	0,999998	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
1,0	0,00087	0,159871	0,683948	0,93198	0,987966	0,997991	0,999668	0,999945	0,999991	0,999998	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
0,5	0,014932	0,606118	0,955028	0,996273	0,99971	0,999977	0,999998	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
Tsi	**0,1**	**0,2**	**0,3**	**0,4**	**0,5**	**0,6**	**0,7**	**0,8**	**0,9**	**1,0**	**1,1**	**1,15**	**1,2**	**1,3**	**1,4**	**1,5**	**1,6**	**1,7**	**1,8**	**1,9**	**2,0**
ore	**A(8), m/s²**																				

Table 4. Grid of exposure points $ka_{wi}*G(ka_{wi})$ calculated using the mathematical relationship associated with the objective average risk function $\overline{R_i(ka_{wi})}$

Tsi ore	kawi*G(kawi)																			
12,0	0,002	9,75E-06	8,21E-05	0,0009	0,0071	0,0320	0,0966	0,2085	0,3544	0,5168	0,6760	0,7492	0,8207	0,9527	1,0707	1,1764	1,2752	1,3683	1,4565	1,5431	1,6270
11,5	0,0006	9,45E-06	9,89E-05	0,0011	0,0086	0,0381	0,1100	0,2317	0,3856	0,5525	0,7112	0,7861	0,8561	0,9872	1,1030	1,2096	1,3076	1,4002	1,4905	1,5774	1,6639
11,0	0,0002	9,74E-06	0,0001	0,0014	0,0103	0,0449	0,1259	0,2577	0,4193	0,5878	0,7492	0,8226	0,8934	1,0218	1,1369	1,2434	1,3415	1,4349	1,5263	1,6146	1,7017
10,5	9,9E-05	1,01E-05	0,00013	0,0017	0,0125	0,0531	0,1454	0,2865	0,4550	0,6265	0,7880	0,8611	0,9312	1,0582	1,1738	1,2787	1,3772	1,4714	1,5639	1,6537	1,7424
10,0	5,02E-05	1,07E-05	0,00015	0,0021	0,0155	0,0631	0,1667	0,3181	0,4929	0,6684	0,8277	0,9014	0,9710	1,0963	1,2109	1,3155	1,4154	1,5106	1,6033	1,6956	1,7859
9,5	2,8E-05	1,19E-05	0,00019	0,0027	0,0189	0,0755	0,1909	0,3544	0,5346	0,7112	0,8709	0,9435	1,0119	1,1356	1,2494	1,3549	1,4554	1,5525	1,6465	1,7403	1,8334
9,0	1,76E-05	1,34E-05	0,029	0,0035	0,0238	0,0903	0,2183	0,3935	0,5799	0,7564	0,9156	0,9872	1,0540	1,1777	1,2902	1,3969	1,4979	1,5961	1,6935	1,7890	1,8838
8,5	1,19E-05	1,59E-05	0,0003	0,0045	0,0301	0,1089	0,2524	0,4371	0,6286	0,8055	0,9619	1,0319	1,0990	1,2217	1,3348	1,4414	1,5441	1,6445	1,7434	1,8415	1,9391
8,0	8,44E-06	1,89E-05	0,0004	0,0059	0,0381	0,1309	0,2902	0,4848	0,6799	0,8561	1,0103	1,0802	1,1460	1,2682	1,3816	1,4894	1,5940	1,6966	1,7981	1,8989	1,9994
7,5	6,28E-06	2,27E-05	0,0005	0,0079	0,0482	0,1566	0,3314	0,5367	0,6092	0,9078	1,0610	1,1291	1,1950	1,3167	1,4306	1,5410	1,6475	1,7525	1,8576	1,9612	2,0646
7,0	4,87E-06	2,86E-05	0,0007	0,0104	0,0616	0,1894	0,3816	0,5937	0,7915	0,9650	1,1135	1,1827	1,2470	1,3694	1,4852	1,5971	1,7068	1,8153	1,9230	2,0305	2,1377
6,5	4,12E-06	3,77E-05	0,0011	0,0144	0,0792	0,2283	0,4371	0,6553	0,8527	1,0234	1,1713	1,2386	1,3041	1,4273	1,5452	1,6598	1,7728	1,8838	1,9954	2,1066	2,2178
6,0	3,78E-06	5,2E-05	0,0015	0,0199	0,1032	0,2756	0,5009	0,7222	0,9189	1,0856	1,2326	1,2995	1,3649	1,4905	1,6105	1,7292	1,8455	1,9612	2,0776	2,1928	2,3089
5,5	3,59E-06	7,76E-05	0,0023	0,0287	0,1348	0,3333	0,5720	0,7951	0,9887	1,1536	1,2983	1,3661	1,4328	1,55982	1,6639	1,8072	1,9281	2,0495	2,1697	2,2908	2,4119
5,0	3,68E-06	0,0001	0,0036	0,0411	0,1756	0,4015	0,6513	0,8742	1,0638	1,2254	1,3717	1,4403	1,5074	1,6393	1,7677	1,8959	2,0224	2,1497	2,2758	2,4029	2,5289
4,5	4,07E-06	0,00015	0,0059	0,0609	0,2300	0,4827	0,7402	0,9603	1,1446	1,3064	1,4532	1,5242	1,5929	1,7302	1,8647	1,9984	2,1327	2,2658	2,3989	2,5329	2,6659
4,0	4,85E-06	0,0002	0,0099	0,0903	0,3031	0,5799	0,8378	1,0540	1,2350	1,3969	1,5473	1,6208	1,6935	1,8365	1,9783	2,1207	2,2618	2,4039	2,5449	2,6869	2,8279
3,5	6,51E-06	0,0004	0,0173	0,1360	0,3955	0,6929	0,9481	1,1575	1,3370	1,5011	1,6588	1,7353	1,8122	1,9642	2,1157	2,2668	2,4179	2,569	2,720	2,871	3,023
3,0	9,75E-06	0,0009	0,0320	0,2085	0,5168	0,8207	1,0707	1,2752	1,4565	1,6270	1,7940	1,8758	1,9582	2,1217	2,2858	2,4489	2,6119	2,775	2,938	3,102	3,265
2,5	1,07E-05	0,002	0,0631	0,3181	0,6684	0,9710	1,2109	1,4154	1,6033	1,7859	1,9662	2,0565	2,1457	2,3249	2,5039	2,6829	2,8619	3,041	3,219	3,398	3,577
2,0	1,89E-05	0,005	0,1309	0,4848	0,8561	1,1460	1,3816	1,5940	1,798132	1,9994	2,1998	2,2999	2,3999	2,599	2,799	2,999	3,200	3,400	3,600	3,800	4,000
1,5	5,2E-05	0,019	0,2756	0,7222	1,0856	1,3649	1,6105	1,8455	2,078	2,3089	2,5399	2,6549	2,7709	3,002	3,233	3,464	3,695	3,925	4,156	4,387	4,618
1,0	0,0002	0,090	0,5799	1,0540	1,3969	1,6935	1,9783	2,261	2,544	2,827	3,111	3,252	3,394	3,676	3,959	4,242	4,525	4,808	5,091	5,374	5,656
0,5	0,005	0,484	1,1460	1,5940	1,9994	2,3999	2,7999	3,200	3,600	4,000	4,400	4,600	4,800	5,200	5,600	6,000	6,400	6,800	7,200	7,600	8,000
Tsi	**0,1**	**0,2**	**0,3**	**0,4**	**0,5**	**0,6**	**0,7**	**0,8**	**0,9**	**1,0**	**1,1**	**1,15**	**1,2**	**1,3**	**1,4**	**1,5**	**1,6**	**1,7**	**1,8**	**1,9**	**2,0**
ore	**A(8), m/s²**																				

Table 5. Grid of values $G(P_{Ei})$ calculated using the mathematical relationship associated with the distribution function

T_{si} ore	$G(P_{Ei})$																				
12,0	0,993113	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
11,5	0,996675	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
11,0	0,998099	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
10,5	0,997876	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
10,0	0,995991	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
9,5	0,990114	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
9,0	0,998289	1,000000	0,367879	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
8,5	0,998905	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
8,0	0,998975	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
7,5	0,998446	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
7,0	0,98363	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
6,5	0,962332	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
6,0	0,997202	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
5,5	0,994987	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
5,0	0,997573	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
4,5	0,998577	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
4,0	0,998289	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
3,5	0,998804	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
3,0	0,998699	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
2,5	0,995991	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
2,0	0,998975	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
1,5	0,997202	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
1,0	0,998289	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
0,5	0,998975	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000	1,000000
T_{si}	**0,1**	**0,2**	**0,3**	**0,4**	**0,5**	**0,6**	**0,7**	**0,8**	**0,9**	**1,0**	**1,1**	**1,15**	**1,2**	**1,3**	**1,4**	**1,5**	**1,6**	**1,7**	**1,8**	**1,9**	**2,0**
ore	**A(S), m/s²**																				

Table 6. Grid of values $P_{Ei}*G(P_{Ei})$ calculated using the relationship associated with the objective average risk function $\overline{R_i(PEi)}$

T_{si} ore	$P_{Ei} \cdot G(P_{Ei})$																				
12,0	3,909	15,941	35,721	63,765	99,878	143,472	195,624	255,845	323,253	399,513	483,842	527,906	575,064	675,432	783,869	898,905	1023,381	1155,926	1294,776	1443,360	1598,054
11,5	3,948	15,844	35,937	63,761	99,986	143,750	195,436	255,811	323,437	399,944	483,511	528,816	575,000	675,657	783,086	899,875	1023,244	1154,536	1295,475	1442,707	1599,778
11,0	3,966	15,895	35,763	63,954	99,811	143,616	195,368	255,818	323,558	399,247	483,914	528,220	575,590	675,215	782,786	899,712	1023,272	1154,780	1295,923	1443,420	1598,863
10,5	3,965	15,894	35,763	63,945	99,800	143,602	195,993	255,782	323,518	399,201	483,840	528,154	575,509	675,126	783,974	899,577	1023,128	1154,626	1295,721	1443,206	1598,638
10,0	3,944	15,842	35,912	63,724	99,904	143,648	195,938	255,612	323,208	399,618	483,144	528,392	575,664	675,122	783,752	899,140	1023,880	1155,200	1294,440	1443,300	1598,472
9,5	3,894	15,907	35,921	63,977	99,637	143,687	195,777	255,909	323,296	399,422	483,588	528,686	575,795	674,910	783,111	899,353	1023,636	1155,960	1294,755	1443,073	1599,431
9,0	3,969	15,904	1,033	63,958	99,828	143,651	195,426	255,832	323,596	399,313	483,916	528,775	575,622	675,281	782,892	899,728	1023,328	1154,881	1295,914	1443,456	1598,951
8,5	3,994	15,995	35,989	63,981	99,970	143,957	195,942	255,924	323,904	399,882	483,857	528,370	575,830	675,801	783,769	899,735	1023,699	1155,660	1295,619	1443,575	1599,530
8,0	3,995	16,000	36,000	64,000	100,000	144,000	196,000	256,000	324,000	400,000	484,000	529,000	576,000	676,000	784,000	900,000	1024,000	1156,000	1296,000	1444,000	1600,000
7,5	3,972	15,913	35,805	63,963	99,846	143,685	195,481	255,853	279,288	399,384	483,936	528,363	575,670	675,361	783,009	899,77538	1023,414	1155,009	1295,955	1443,541	1599,084
7,0	3,868	15,879	35,840	63,815	99,804	143,808	195,826	255,858	323,905	399,966	483,218	528,654	575,233	675,262	783,305	899,36315	1023,435	1155,521	1295,621	1443,736	1599,865
6,5	3,784	15,873	35,822	63,780	99,747	143,723	195,707	255,699	323,701	399,711	483,730	528,328	575,757	675,793	783,837	899,8912	1023,953	1154,798	1294,805	1442,820	1598,845
6,0	3,956	15,870	35,914	63,756	99,878	143,659	195,859	255,578	323,856	399,514	483,870	528,278	575,467	675,900	783,436	899,9472	1023,422	1154,833	1295,425	1442,774	1599,444
5,5	3,940	15,972	35,838	63,889	99,992	143,750	195,892	255,556	323,736	399,969	483,525	528,273	575,797	675,259	783,569	899,93228	1023,286	1155,687	1294,947	1443,387	1599,879
5,0	3,959	15,876	35,910	63,756	99,856	143,641	195,806	255,530	323,761	399,424	483,720	528,529	575,322	675,684	783,225	899,65225	1023,132	1155,625	1295,044	1443,602	1598,960
4,5	3,974	15,920	35,820	63,920	99,800	143,640	195,860	255,680	323,460	399,800	483,560	528,770	575,280	675,740	783,440	899,10023	1023,680	1155,320	1294,920	1443,620	1599,200
4,0	3,969	15,904	35,955	63,845	99,969	143,820	195,624	255,832	323,596	399,879	483,605	528,775	575,961	675,648	783,288	899,7282	1023,328	1155,843	1295,405	1443,993	1599,516
3,5	3,985	15,960	35,911	63,842	99,754	143,963	195,888	255,794	323,680	399,546	483,974	528,612	575,854	675,714	783,554	899,37558	1023,176	1155,857	1295,672	1443,467	1599,242
3,0	3,980	15,941	35,868	63,961	99,878	143,766	195,967	255,845	323,694	399,513	483,842	528,469	575,652	675,432	783,869	899,64015	1023,381	1155,926	1295,658	1443,360	1599,033
2,5	3,944	15,931	35,912	63,903	99,904	143,916	195,938	255,970	323,610	399,618	483,636	528,906	575,664	675,703	783,752	899,81113	1023,880	1155,960	1295,245	1443,300	1599,366
2,0	3,995	16,000	36,000	64,000	100,000	144,000	196,000	256,000	324,000	400,000	484,000	529,000	576,000	676,000	784,000	900	1024,000	1156,000	1296,000	1444,000	1600,000
1,5	3,956	15,939	35,914	63,894	99,878	143,866	195,859	255,855	323,856	399,861	483,870	528,676	575,883	675,900	783,921	899,9472	1023,976	1155,421	1295,425	1443,432	1599,4443
1,0	3,969	15,961	35,955	63,958	99,969	143,990	195,822	255,832	323,851	399,879	483,916	528,775	575,961	675,648	783,684	899,7282	1023,781	1155,843	1295,914	1443,993	1599,5168
0,5	3,995	15,941	36,000	64,000	100,000	144,000	196,000	256,000	324,000	400,000	484,000	529,000	576,000	676,000	784,000	900,000	1024,000	1156,000	1296,000	1444,000	1600
T_{si}	**0,1**	**0,2**	**0,3**	**0,4**	**0,5**	**0,6**	**0,7**	**0,8**	**0,9**	**1,0**	**1,1**	**1,15**	**1,2**	**1,3**	**1,4**	**1,5**	**1,6**	**1,7**	**1,8**	**1,9**	**2,0**
ore	**A(S), m/s²**																				

By applying the analytical relations within the mathematical model, the databases specific to the value grids were obtained, which constitute the results of the statistical functions that quantify the risk of exposure to professional vibrations. Thus, the assessment of the risk of exposure to occupational vibrations can be achieved both by using the value grid that quantifies the objective average risk, based on weighted acceleration values and their associated probabilities, and by using the value grid obtained according to exposure point values and corresponding probabilities.

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