



Macedonian Occupational  
Safety and Health Association



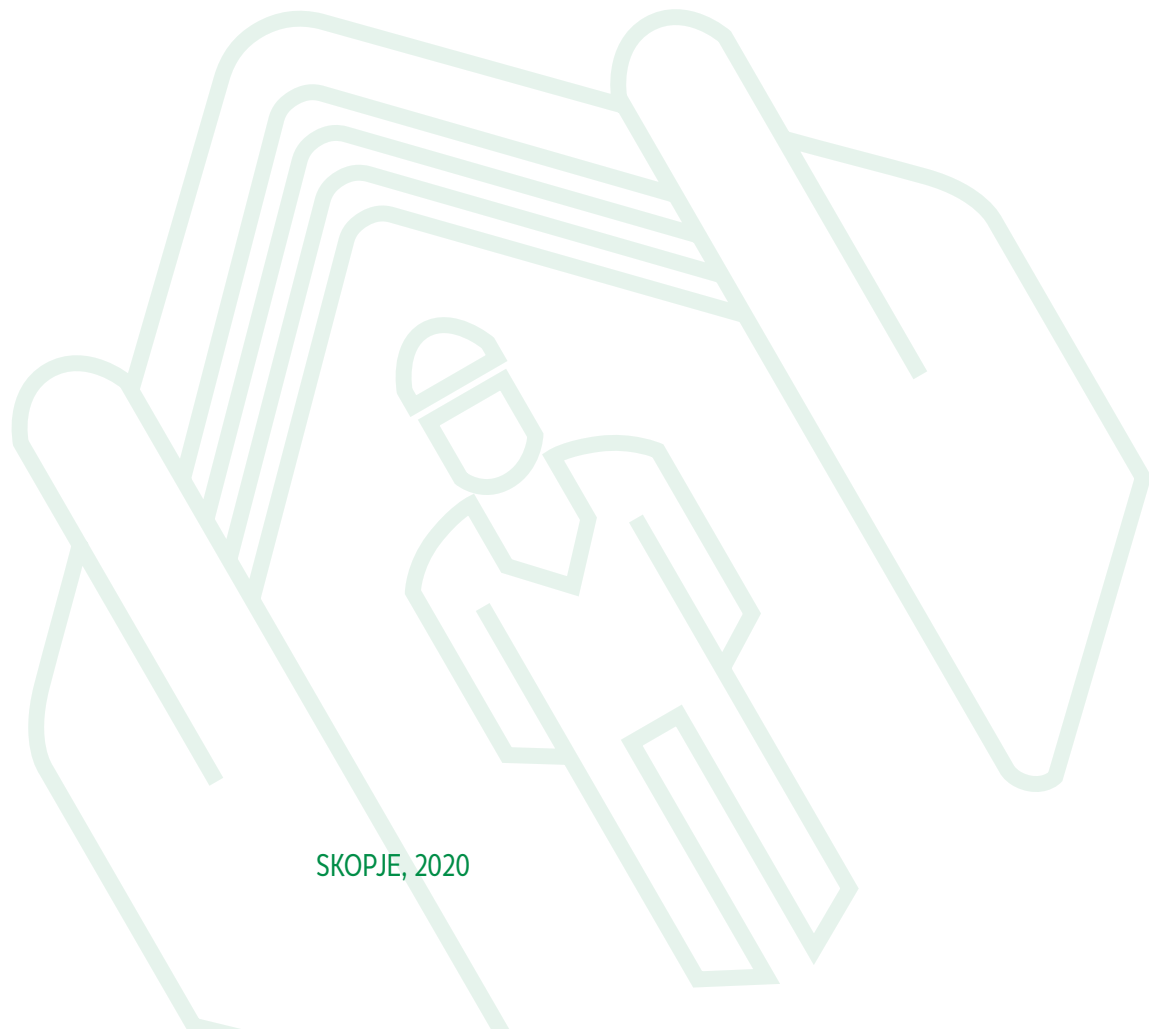
# WORKPLACE RISK ASSESSMENT IN THE CASE OF EXPOSURE TO SARS COV-2 VIRUS



This project is funded by The European Union



# WORKPLACE RISK ASSESSMENT IN THE CASE OF EXPOSURE TO SARS COV-2 VIRUS



SKOPJE, 2020

**Publisher:**



**Macedonian Occupational  
Safety and Health Association**

**Authors:**

**Prof. Elisaveta Stikova, PhD**

Specialist in Occupational Medicine

**D-r Iskra Kocheva,**

Specialist in Occupational Medicine

**Milan Petkovski, MSc**

Occupational Safety Engineer

**D-r Tanja Petrushevska Sinadinovska,**

spec. medicine rada

**Snezhana Jankova Petkovska, MSc**

Occupational Safety Engineer



**Project:**

“Increasing capacities and strengthening of the role of the regional CSOs for improvement of the labor conditions and dialogue with Public Institutions”

This publication has been prepared with support from the European Union. The contents of this publication are the sole responsibility of the authors and in no way can be considered to represent the views of the European Union.

## CONTENTS

INTRODUCTION.....	5
1. Constitutional, Legal and Expert Bases for Recognition of COVID-19 as a Professional Disease .....	7
2. Occupational Safety and Health in the Course of the COVID-19 Pandemics .....	8
2.1. Workplacerrisk assessment.....	10
2.2 What Does Professional Risk Represent as Regards the Outbreak of COVID-19 at the Workplace? ?.....	12
2.3 Assessment of the PROBABILITY for Professional Exposure to SARS-COV-2 Virus at the Workplace .....	13
2.3.1 Assessment of the Medical/Clinical Vulnerability .....	16
3. DETERMINATION OF WORKPLACE RISK ASSESSMENT .....	24
3.1 Matrix workplace risk assessment – version 1 .....	24
3.2 Matrix workplace risk assessment – Version 2 .....	25
4. PREVENTIVE/ CORRECTIVE MEASURES .....	29
5. RECOMMENDATIONS.....	31
6. literature and other sources.....	32



## INTRODUCTION

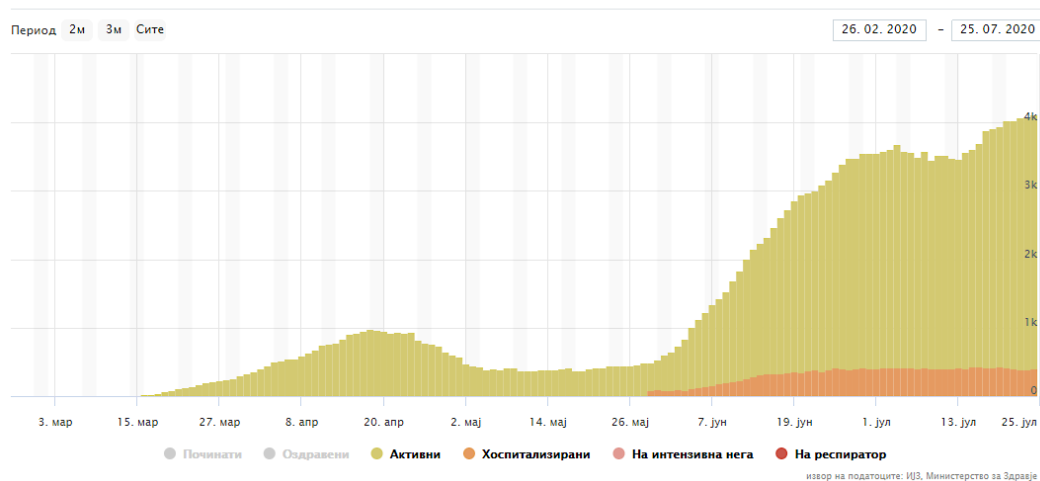
Since the outbreak of the first cases of COVID-19 in China up to present date (26.07.2020), a total of 16.310.454 cases of COVID-19 have been registered in global terms, out of which 5.682.719 are still active/infected cases, and approximately 1% are still in critical condition. A total of 650.165 fatalities have been registered, with a fatality rate of 83,4 cases per million inhabitants of the world population (83,4/1000000).

As regards the Macedonian case, exactly 5 months following the first registered case of COVID-19, the number of registered cases exceeded 10.000 (the exact number being 10.086) and additional 4.199 active cases. In the past period, a total of 460 fatalities have been registered. The infection rate amounts to 4.841/1000000, whereas the fatality rate amounts to 221/1000000 inhabitants. The average number of newly registered cases in the country is 758 per million inhabitants and referring to a 14-day-time period (14-day-incidence). For a period of more than one month ago, the daily number of hospitalized patients ranges to approximately 400.

The following graph indicates the trend of the total number of COVID-19 positive cases in the country and the total number of hospital treatments (hospitalizations) expressed on a daily basis and referring to the time period starting from 26.02.2020 until today.

**Graph 1. Number of COVID-19 positive cases and the number of hospitalizations for the period between 26.02.2020 and 26.07.2020**

### Confirmed cases



Source: <https://treker.mk/mk/stats>

Such data pose a serious concern particularly taking into consideration the fact that following the lifting of the restrictive measures and the commencement of operation of a number of industrial and catering facilities, organizations and institutions, there has been an increase in the number of employees that could potentially be infected with COVID-19. This is not only due to the type and scope of their work, but it is also conditioned by the external environment beyond their workplace as a consequence from a close contact with infected and/or asymptomatic persons, namely friends, family members, coworkers and

associates. The infection may also occur while commuting from/to work thus resulting in spreading among the coworkers and associates and in the families as well. Consequently, there is a daily increase in the number of infected health workers and others. At the beginning of May this year, the number of infected health workers was 235, whereas the number of infected employees from other professions remains unknown. Nevertheless, the number of clusters of infected persons, particularly in the textile industry, has an inclining daily trend. Currently, the number of COVID-19 clusters in textile factories amounts to 10. These clusters are distributed in Shtip, Sv. Nikole, Vevchani and Skopje.

This poses new and serious dilemmas as to whether all measures and activities have been undertaken in our country aimed at protecting workers' safety and health against the outbreak and spread of COVID-19 within the companies and whether they are duly implemented. Indisputably, the general anti-epidemic measures do function and in most cases the employers abide by the general measures pertaining to prevention and control over the spread of the disease as stipulated in the protocol applicable to all workplaces. What remains ambiguous is whether at the very outbreak of the pandemics the employers observed the legal obligations arising from the Law on Occupational Safety and Health (Official Gazette of RM, no. 92/07). There is another dilemma that prevails as well and as to whether it was necessary to define other, additional and specific occupational safety and health measures for the purpose of protecting and safeguarding workers' health and ability to work with reference to their specific workplaces. To this end, an overview of the legal obligations on the part of the employers is given hereunder in the case of occurrence of any novel hazard at the workplace, and in this specific case probability of SARS CoV-2 virus infection and onset of COVID-19.

### WHAT IS COVID-19?

COVID-19 is an acute viral infection caused by the SARS-CoV-2 virus. The disease mainly causes mild symptoms of infection of the upper respiratory tract. It is predominantly manifested with throat pain, cough and fever although it is possible not to have manifestation of any disease symptoms (an asymptomatic form). Some people may experience high temperature, severe cough and labored breathing and even severe pulmonary inflammation and a fatal outcome. The incubation period from the very infection up to the occurrence of symptoms lasts between 2 and 14 days.

The virus is primarily transmitted by human interaction in the event of close contact with an infected person and spreading of his/her respiratory secretions in the air in the form of tiny droplets when this person coughs, sneezes and speaks. Furthermore, the disease may be spread by touching previously contaminated surfaces and then touching the face and/or nose.

As for the contaminated surfaces that are frequently touched, the virus may remain infective for hours and days, depending on the type of material, humidity and air temperature.



## 1. CONSTITUTIONAL, LEGAL AND EXPERT BASES FOR RECOGNITION OF COVID-19 AS A PROFESSIONAL DISEASE

**The right to protection at work is a constitutionally enshrined right for each and every citizen** (Article 32 from the Constitution of the Republic of North Macedonia). This right is exercised by virtue of numerous laws and bylaws regulating different areas with the sole purpose of providing and ensuring the highest possible degree of occupational safety and health, eliminating and/or minimizing the specific professional risk and enabling promotion of the professionally exposed workers' health and preventing the outbreak of professional diseases and work-related injuries.

The Law on Occupational Safety and Health (Official Gazette of the Republic of Macedonia no. 92/07 and its amendments and modifications) is the principal legal act governing this right of the employees. Pursuant to Article 5 from the afore-stated Law, the **employer is obliged** to undertake respective occupational safety and health measures, including:

- Protection against professional risks at the workplace,
- Provision of accurate and timely information pertaining to occupational safety and health,
- Work-related training according to the identified workplace risk with an emphasis on the implementation of respective protection measures, including use of personal protective equipment,
- Proper work arrangement and organization.

Simultaneously, **the employer must adjust the work process to the employees' capacities and the working environment. Additionally, the work-related tools and instruments are to be safe and harmless with reference to workers' health.**

Provided that the employer fails to secure the employees' enshrined rights to safe and harmless work, the work conditions may be adversely affected as well as the workers' health and ability to work. In this sense, due to the COVID-19 pandemics, the workers may be exposed to the SARS CoV-2 virus at their respective workplaces and to outbreak of COVID-19. This exposure may be the result of:

- Workers' direct contact with infected and/or suspected cases of COVID-19 in the course of their work (contacts with patients, customers, clients),
- Close contact with a coworker/associate that is positive and/or infected due to improper work arrangement and organization and non-adherence to the recommended protection measures,
- Frequent contacts on the part of workers with a larger number of clients/ service users that may be infected with the SARS-CoV-2 virus, particularly in areas with wide-spread transmission of the disease within the community,
- Close contact with a positive passenger while commuting from/to work.

With reference to the COVID-19 pandemics protocols, close contact implies contact that lasts for more than 15 minutes at a distance that is shorter than 1 meter and without use of personal protective equipment:

(<https://www.who.int/publications/i/item/contact-tracing-in-the-context-of-covid-19>)

(<https://www.ecdc.europa.eu/en/covid-19/surveillance/surveillance-definitions>).

## 2. OCCUPATIONAL SAFETY AND HEALTH IN THE COURSE OF THE COVID-19 PANDEMICS

Pursuant to Article 58 paragraph 1 from the Law on Population Protection Against Infectious Diseases (Official Gazette of the Republic of Macedonia no. 66/04, 139/08, 99/09, 149/14, 150/15 and 37/16), the Government at its 60th session held on 02.06.2020 adopted a **Protocol for preventive measures applicable to all workplaces**.

[https://vlada.mk/sites/default/files/dokumenti/Protokoli\\_covid19\\_2020/protokol\\_za\\_preventivni\\_merki\\_za\\_site\\_rabotni\\_mesta.pdf](https://vlada.mk/sites/default/files/dokumenti/Protokoli_covid19_2020/protokol_za_preventivni_merki_za_site_rabotni_mesta.pdf)

The universal measures for prevention of COVID-19 transmission applicable to all workplaces refer to all workers, employers, managers, contractors, clients and visitors, and they encompass the following preventive measures:

- Hygiene of hands,
- Respiratory hygiene,
- Physical distance of at least 1 meter,
- Reduction in work-related organized travel,
- Regular cleaning and disinfection of the working environment,
- Risk communication, training and education,
- Management of COVID-19 affected persons and their contacts,

Indisputably, every employer, within the framework of one's capacities, undertakes the general measures defined in the protocol for preventive measures applicable to all workplaces. However, it is to be underlined that pursuant to Article 11 from the Law on Occupational Safety and Health (Official Gazette of RM no. 92/07), the MOST RELEVANT obligation on the part of the employer is to **draft and implement safety statements for each respective workplace by specifying the manner and the measures that are to be undertaken**. The term for this document used among the Occupational Safety and Health Experts is Workplace Risk Assessment. Based on the assessed risk and the defined preventive and corrective measures, the employer is obliged to undertake and implement the proposed measures concerning each workplace and guarantee the workers' occupational safety.

With reference to the drafting of the Workplace Safety Statement in cases of exposure to biological agents (**risk assessment**), there are two bylaws defining the manner, contents, data and professional criteria that this assessment is to be based upon. Namely:

- Rulebook on the manner of drafting a Safety Statement, its contents and data based upon which the Risk Assessment is to be made (Official Gazette of RM no. 2/09)
- Rulebook on the minimum occupational safety and health requirements pertaining to employees at risk of exposure to biological agents (Official Gazette of RM no. 170/10).

These two generic documents stipulate and define all legal and professional aspects concerning any workplace risk assessment.

Pursuant to Article 15 from the Rulebook on the manner of drafting a Safety Statement, the document is to be amended whenever the previously undertaken measures do not correspond to the situation and when the data that the document is based on are no longer accurate and up-to-date. This implies that in circumstances when a new biological hazard arises, the employer is to update and adjust its risk assessment, and particularly in cases of potential professional exposure to the SARS CoV-2 virus (such as the areas of health, service sector and customer care, treatment of elderly people, education, etc.).

Pursuant to Article 5 from Rulebook on the minimum occupational safety and health requirements pertaining to employees at risk of exposure to biological agents, the employer is to provide for risk assessment pertaining to the exposed workers' occupational safety and health and define the measures that are to be undertaken. In the case of workplaces with an increased risk, pursuant to Articles 10 and 11 from the Rulebook such measures are undertaken by virtue of guidelines and information in writing, recurring training for the employees and by procurement of personal protective equipment.

With reference to SARS-CoV-2 virus as a novel professionally hazardous biological agent, on 03.06.2020, the European Commission adopted Directive 2020/739 in terms of amending Annex III to Directive 2000/54/EC of the European Parliament as regards the inclusion of SARS CoV-2 virus in the list of biological agents stipulated in the Directive of the European Commission 2019/1833. For clarification purposes, the basic Directive 2000/54/EC refers to biological agents present at the workplace and protection of workers against risks arising from exposure to biological agents. Three of the annexes of this Directive were amended in 2019 (Directive of the European Commission 2019/1833). Annex III was amended this June by adding SARS-CoV-2 virus as 'Severe Acute Respiratory Syndrome Coronavirus 2' to the Coronaviridae family. Within the framework of the same Annex, it is prescribed that the non-propagative activities in diagnostic laboratories are to be performed according to Level 2 for impact prevention (BSL-2) whereas propagative activities are to be in conformity with bio-safety Level 3.

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020L0739>.

Appendix 3 from our Rulebook on the minimum occupational safety and health requirements pertaining to employees at risk of exposure to biological agents has the family of 'Coronaviridae' classified in the list of classified biological agents (page 20 from the Rulebook) and a bio-security Level 2 has been established for the viruses from this family. In the light of the afore-stated, it could be inferred that with reference to the workplace risk assessment due to workers' exposure to SARS-CoV-2 virus, we have a legal

basis and legal solutions that are in force and that are compatible with the new and current European directives concerning workplace risk assessment and assessment of workers' health as regards exposure to the SARS CoV-2 virus.

Taking the afore-said in consideration, the employers are obliged to amend their respective risk assessments, revise and draft them. In conformity with the legally stipulated procedure, they are to draw up a specific document for each and every workplace within their company, and particularly if the possibility for workers' exposure in the respective business activity is higher than the exposure among the public at large.

In conformity with the legally stipulated procedure, the risk assessment is performed by authorized occupational safety legal entities in joint team work with:

- a doctor of occupational medicine from an authorized health institution and an
- occupational safety and health expert from the company/organization where the workplace risk assessment is made.

Nevertheless, it is to be highlighted that for the time being the drafting of this document (Workers' safety statement, i.e. risk assessment regarding SARS-CoV-2) is hindered due to the following two reasons:

Firstly, in the Republic of North Macedonia there is no occupational safety legal entity that meets the legal requirements based on which a risk assessment authorization for biological agents could be obtained.

Secondly, for the time being the occupational safety legal and physical persons, as well as the occupational medicine specialists do not have any specific knowledge obtained by virtue of certified training as regards dealing with COVID-19 at the workplace like they have it for other dangers and hazards (noise, vibrations, work at heights, exposure to non-ionizing radiation, etc.).

Hence, the purpose of the document is to fill in this gap and contribute to building the professional capacities of the experts engaged in the area of occupational safety and health in our country.

### 2.1. WORKPLACE RISK ASSESSMENT

In conformity with our national legislation, and based on the implemented procedure for professional risk assessment, workplaces are divided as follows:

- Workplaces with an increased professional risk, and
- Workplaces without an increased professional risk.

The degree of professional risk for each and every workplace depends on:

- The type and scope of the work-related duties and obligations performed at the specific workplace and the risk of infection with SARS CoV-2 virus in the course of work,
- The characteristics of the place/area where the work is performed and the undertaken preventive measures,
- The individual characteristics of the exposed worker (vulnerability).

Due to the afore-stated, it is impossible to be discussing a specific professional risk applicable to all workplaces or to specific groups of occupations (for example, doctors, nurses, baby minders, nursery schoolteachers, cashiers, guards, etc.). As regards the above-listed occupations, workers in different work organizations do not perform exactly the same work-related duties and obligations. There are also differences in terms of the working environment, organization of work, technical working conditions (ventilation, lighting, microclimate, etc). Additionally, workers that have different individual characteristics (such as gender, age, other prior and/or current health issues) may be working at the same workplace. This implies that the same risk may be affecting their health differently. For example, if dust is generated at the workplace, it will have a different effect on workers that have pulmonary related diseases recorded in their medical history as opposed to others who do not have them. When it comes to COVID-19, the disposable reference information indicates that elderly workers with other comorbidities (weight issue, hypertension, kidney diseases, etc.) are more likely to develop a severe clinical image and are more prone to fatal outcomes.

Hence, the workplace risk assessments in each and every company individually are a fundamental precondition for determination of any specific measures and activities that shall further on serve as a basis for preservation of workers' health and the ability to work on the part of every employee.

The determination of specific measures for elimination of the hazard (or its substitution with a less detrimental one), application and implementation of advanced technical/ technological and engineering measures, creation of a culture of prevention by raising the individual awareness and by applying preventive and corrective administrative and organizational measures, as well as compulsory use of personal protective equipment (PPE) as the last measure in the hierarchy provided that the hazard still sustains, are a constituent segment of every risk assessment for each individual workplace at every individual company/ organization/ institution from the public and private sector regardless of their business activity and the size of the enterprise. These are the key tools for minimization/ elimination of the workplace risk as regards the group of preventive measures. Provided that following the undertaking of all these preventive and corrective measures and the proper use of standardized PPE, an increased professional risk still prevails at the workplace, considerations are to be taken about termination of the professional exposure until the restoration of proper working conditions that do not jeopardize the life and health of the exposed worker.

However, this is not applicable to the so-called essential workers engaged in the critical sectors of any state (health, law enforcement, defense, water and electricity supply, food, drugs, telecommunications, banking, etc). Such exemptions are to be properly regulated within the framework of the national legislation.

According to the Ordinance regulating the type, manner, scope and pricelist of workers' medical examinations (Official Gazette of RM no. 60/13), every worker must undergo PREVIOUS medial examination provided that in the course of the workplace re-assessment it is ascertained that he/she was exposed to an increased risk of infection with a biological hazard (in this specific case SARS-CoV-2 virus) and likelihood of contracting COVID-19. This medical examination is to be in conformity with the Ordinance and refer to exposure to biological agents.

COVID-19 is a novel disease, which according to the speed intensity and severity of consequences, did not leave any time period for workplace risk (pre)assessment and

implementation of any prior examinations. Additionally, immediately upon the declaration of a state of emergency on the overall territory of the country, and for the purpose of more efficient management of the COVID-19 pandemics, the performance of any preventive medical examinations was postponed by adoption of a Decision by the Minister of Health no. 2614/1 dated 19.03.2020. Hence, the work of the occupational medicine specialists was practically terminated. Due to the afore-stated many of the activities related to the implementation of the Law on Occupational Safety and Health were postponed, ceased or delayed.

### 2.2 What Does Professional Risk Represent as Regards the Outbreak of COVID-19 at the Workplace? ?

According to WHO (1993), the risk is defined as a ratio between the probability of occurrence of any adverse effects on workers' health that regarding the frequency and severity of the biological and clinical changes are appropriate for the presence of hazardous factors in the working environment.

In this case, the notion of professional risk implies the probability of outbreak of COVID-19 as a result of the exposure to SARS-CoV-2 virus among the professionally exposed workers.

Having in mind that it is practically impossible to eliminate the probability of outbreak of COVID-19 among the workers, primarily due to the widely spread transmission of the disease within the community, it is clear that the risk of outbreak of this disease among the workers and its spread within the company is present at all times. Nonetheless, from a scientific aspect, it is necessary to ascertain the current and real degree of professional risk, i.e. to ascertain the probability that the worker could get infected at the workplace and could transmit the disease to his/her coworkers and associates that he is in contact with in the course of work as well as to ascertain the severity of the consequences to the exposed workers arising from such an infection.

To this end, a large number of methodologies have been developed for the purpose of assessing the professional risk and quantification of the degree of such a professional risk.

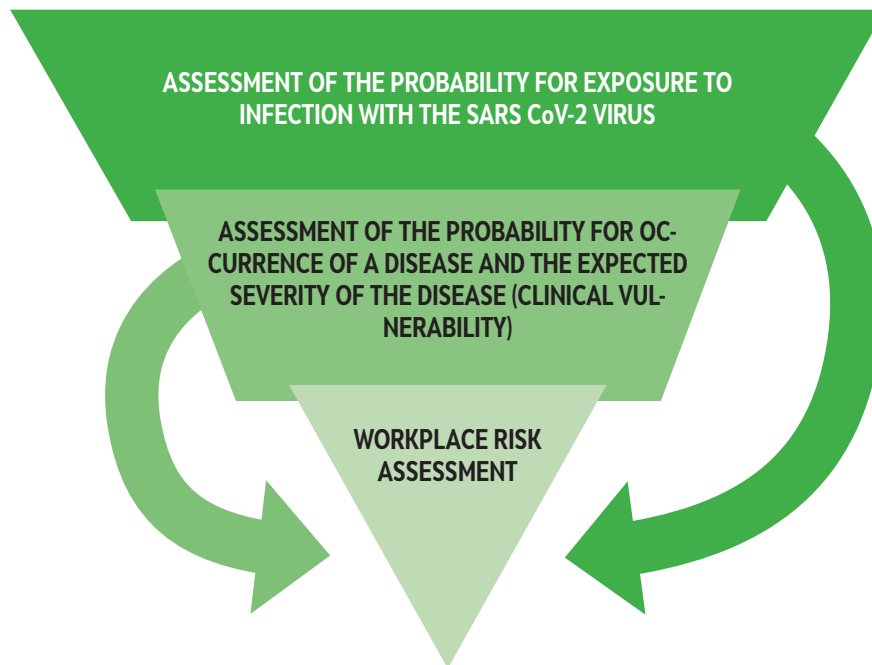
The workplace risk assessment represents a quantitative measure of probability that the virus SARS-CoV-2 shall occur at the workplace and shall lead to an outbreak of COVID-19 among the professionally exposed workers.

When it comes to the assessment of the risk exposure to the virus SARS CoV-2 (as well as the exposure to any other biological agents), it is characterized by certain specifics. The assessment of the total workplace risk in the event of exposure to SARS CoV-2 consists of three cause and effect mutually related processes. Namely:

- identification of the biological hazard (SARS CoV-2 virus) at the workplace,
- assessment of the probability for occurrence of a disease as a result of the exposure and assessment of the expected severity of the clinical image (medical/clinical vulnerability of the potentially exposed workers),
- risk categorization (quantitative measure of interconnection between the previous two probabilities).

The interconnection between these 3 processes is shown in the picture below. .

Picture 1. Interaction of the different phases/procedures in the process of workplace risk assessment in the event of exposure to the SARS-CoV-2 virus



### 2.3 Assessment of the PROBABILITY for Professional Exposure to SARS-COV-2 Virus at the Workplace

The probability that the workers at their respective workplaces could be exposed to SARS CoV-2 virus, which is caused by the COVID-19 disease, is related to the way of spreading the infection and it depends on:

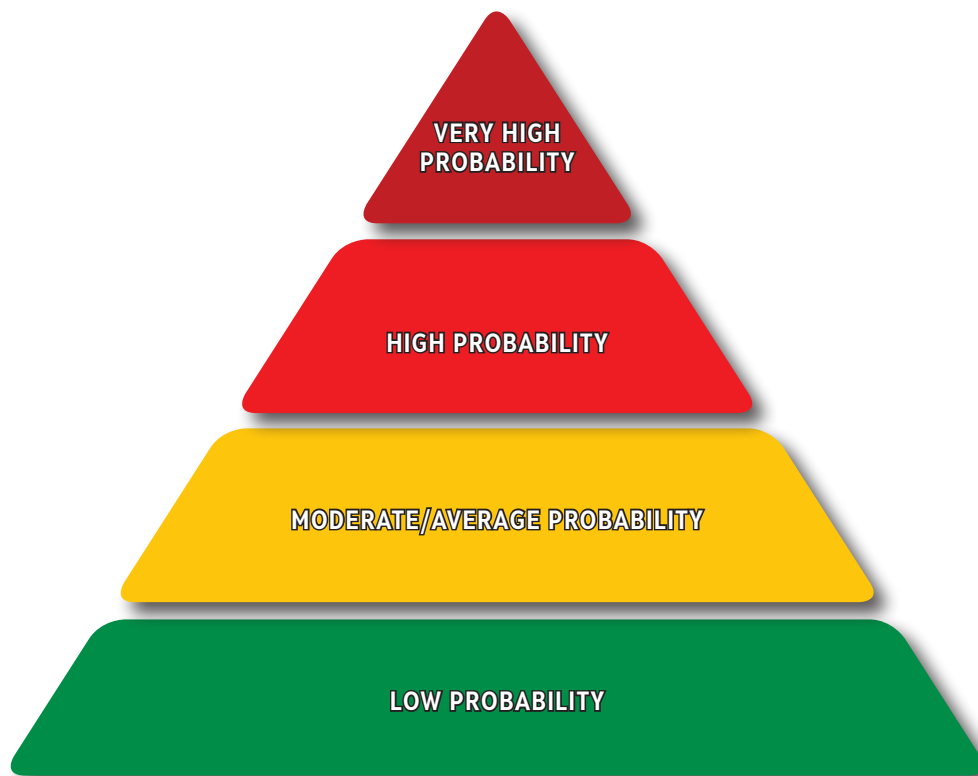
- The type and characteristics of the very work process,
- Whether at the workplace and in the course of the work, the worker is to have physical contact with patients, clients, associates and other persons that are suspected to be or are positive to COVID-19 at a distance that is shorter than 1 meter, and
- The duration and frequency of such contacts.

According to the afore-stated elements, the risk for the workers' exposure to the virus SARS-CoV-2 at the workplace may be classified with the following 4 levels:

- Very high exposure probability
- High exposure probability
- Moderate/average exposure probability
- Low exposure probability.



Picture 2. Pyramid of the probability exposure to the SARS CoV-2 virus



### **VERY HIGH EXPOSURE PROBABILITY**

Professions with very high exposure probability are the ones with a high potential for exposure to a known or suspected source of COVID-19 in the course of certain medical procedures, post-mortem or laboratory examinations. The following categories of workers fall under this group:

- Health workers (doctors, nurses, dentists, medical technicians) that perform and/or assist in the course of aerosol-generating procedures (AGPs) (such as intubation, procedures that are likely to induce coughing, bronchoscopy, certain dental interventions and examinations, spirometry, sampling invasive procedures for examination purposes) from any known and/or suspected COVID-19 patients,
- Health and laboratory workers that are in charge of handling material/cultures from known and/or suspected COVID-19 patients,
- Workers in mortuaries performing autopsy that involves aerosol generating procedures on diseased persons that were either infected with and/or suspected of COVID-19 infection at the time of their death.



### **HIGH EXPOSURE PROBABILITY**

These are professions that involve frequent and close contact with patients exposed to a known and suspected source of COVID-19. The following categories of workers fall under this group:

- Health and other workers that support health care service provision (doctors, nurses and other hospital staff that enter hospital rooms/wards with confirmed and/or suspected cases of COVID-19)
- Health workers that are engaged in medical transport of confirmed and/or suspected cases of COVID-19
- Mortuary workers engaged with the handling of diseased persons' bodies who at the time of the death were confirmed and/or suspected as COVID-19 cases (burial and cremation procedures).

### **MODERATE/AVERAGE EXPOSURE PROBABILITY**

Moderate/average probability for professional exposure is present at workplaces where the work process presupposes maintaining frequent and close contacts (distance that is shorter than 1 meter or contacts with persons that may be affected with SARS CoV-2 but have not been confirmed and/or suspected to have been infected with COVID-19).

In areas that are not characterized by widespread transmission within the community, these workers might be persons that have frequent contact with passengers coming from areas with widespread transmission within the community.

As regards areas characterized by widespread transmission of the disease within the community, these are workers:

- that have frequent contacts with the general public (schools, work environment with highly concentrated worker population in a relatively small space where general anti-epidemic measures may not be implemented),
- workers employed in major retail points of sale, and
- any other workers that have contacts with the general public including workers returning from areas characterized by high transmission of COVID-19.

### **LOW EXPOSURE PROBABILITY (CAUTION REQUIRED)**

Professions that are characterized by a low risk of exposure concern workers that do not necessarily have contacts with persons that have been confirmed and/or suspected of COVID-19 infection and who do not have frequent or close contacts (at a distance that is shorter than 1 meter) with the general population. At their respective workplaces, these workers have a minor professional contact with the general public or with other associates.

Categorization of the infection probability may be made taking into consideration these criteria for establishment of the probability of exposure to the SARS CoV-2 virus, which are based on the necessity of having frequent and close contacts with patients that have been infected with and/or are suspected of COVID-19 infection and their frequency, as well as the necessity of establishing contacts with persons that have not been confirmed as infected and/or suspected of having been infected with COVID-19. This categorization of the infection probability encompasses four levels as presented in Table no. 1.

Table 1 Categorization of the probability exposure

PROBABILITY OF EXPOSURE TO SARS-COV-2 VIRUS				
	Very high infection probability (IPS-4)	High infection probability (IPS-3)	Average infection probability (IPS-2)	Low infection probability (IPS-1)
DEFINITION	There is a very high exposure potential to a confirmed or a suspected source of COVID-19 in the course of specific medical procedures, post-mortem or laboratory examinations	Necessity of having frequent and close contacts with patients exposed to a known or suspected source of COVID-19.	Necessity of having frequent and close contacts with persons that may be infected with COVID-19, but have not yet been confirmed, and/or exposed to suspected cases	No necessity of having contacts with confirmed and/or suspected cases of COVID-19
INDIVIDUAL VALUE/SCORE	4	3	2	1

### 2.3.1 Assessment of the Medical/Clinical Vulnerability

The next step in the workplace risk assessment is determination of the cause and effect interconnection between the probability of exposure to the SARS CoV-2 virus and the severity of the consequences arising from the potential exposure. More precisely, in the course of this second step, prior to the final workplace assessment, the probability of any potential disease outcome is to be assessed:

- Very severe clinical image with a high probability of a fatal outcome
- Severe clinical image with a high probability of hospitalization and permanent (irreversible) consequences affecting one’s health situation
- Moderately severe clinical image without any consequences affecting one’s health situation
- mild clinical image and/or asymptomatic cases .

To this end, data about determination of what is known as the Covid-age could be found in reference literature. This age could serve as a practical tool in foreseeing the severity of the COVID-19 clinical image or the likelihood of fatality among the infected persons primarily due to their comorbidities (existence of other prior diseases that are not related to COVID-19).

## WHAT IS A COVID-AGE?

**Covid-age** is a simple, easy to use tool that helps assess an individual's vulnerability to Covid-19. It is based on published evidence for the main risk factors. That evidence indicates that vulnerability to Covid-19 increases exponentially with age; for example, in comparison with a healthy person aged 20, a healthy person aged 60 has more than 30 times the risk of dying if they contract Covid-19.

**Covid-age** summarises vulnerability for combinations of risk factors including age, sex and ethnicity and various health problems. It works by "translating" the risk associated with each risk factor into years which are added to (or subtracted from) an individual's actual age. This then gives a single overall measure of vulnerability. It can be used in people with no underlying medical conditions or multiple medical conditions. One measure combines all of an individual's risk factors with their actual age.

**Covid-age** does not provide an exact measure, so when it is used to calculate vulnerability from medical conditions, and particularly multiple medical conditions, clinical judgement must be applied by a suitably qualified health professional. It is intended as part of an occupational health assessment of fitness for work. It is not intended for use in clinical treatment pathways. As new scientific evidence becomes available, its estimates of vulnerability may change.

To calculate Covid-age, take the worker's actual (biological) age and add any additional years that are specific for any given medical risk factor as indicated in Table 2.

Example:

- a) A healthy woman, aged 40, has a Covid-age of 35 years.
- b) A healthy man, aged 40, has a Covid-age of 40 years.
- c) A man aged 45, BMI 35 with severe asthma, has a Covid-age of  $(45+5+3) = 53$  years.
- d) A woman aged 45, BMI 35 with severe asthma has a Covid-age of  $(45-5+5+3)=48$  years.

The 45-year-old man in the example above is estimated to have the same medical/clinical vulnerability as a man aged 53 years, whereas the woman from the example above who is at the same age as the man and who has the same clinical state as the man (weight and presence of asthma) has a medical/clinical vulnerability of a woman aged 48 years which implies that her risk of fatality and development of a severe COVID-19 clinical image is lower.

Table 2. Medical-clinical vulnerability with reference to existing risk factors expressed as equivalence of added years of age depending on the actual comorbidity of workers (revision dated July 2020)

Risk factor	Relative risk	Equivalence of added years of age
<b>Female sex</b>	0.6	-5
Body mass index (BMI) (Kg/m <sup>2</sup> )	0.6	-5
30-34.9		
35-39.9	1.3	3
≥40	1.6	5
≥40	2.4	9
<b>Asthma</b>		
Mild (no oral corticosteroids in the course of the past year)	1.1	1
Severe (used oral corticosteroids in the course of the past year)	1.4	3
<b>Diabetes</b>		
Type 1		
HbA1c≤58 mmol/mol in past year	2.0	7
HbA1c>58 mmol/mol in past year	2.7	10
HbA1c unknown	3.3	12
Type 2		
HbA1c≤58 mmol/mol in past year	1.5	4
HbA1c>58 mmol/mol in past year	2.0	7
HbA1c unknown	2.3	8
Heart failure	2.2	8
Chronic heart disease	1.3	3
Cerebrovascular disease	2.2	8
Chronic respiratory disease (without asthma)	1.9	6
Chronic kidney disease*		
Estimated GFR 30-60 mL/min	1.5	4
Estimated GFR<30-60 mL/min.	3.0	11
History of dialysis and end-of-stage renal disease	3.7	13

Risk factor	Relative risk	Equivalence of added years of age
Non-haematological cancer		
Diagnosed <1 year ago	1.7	5
Diagnosed 1-4.9 years ago	1.2	2
Diagnosed ≥5 years ago	1	0
Haematological malignancy		
Diagnosed <1 year ago	2.8	10
Diagnosed 1-4.9 years ago	2.5	9
Diagnosed ≥5 years ago	1.6	5
Liver disease	1.8	6
Chronic neurological disease other than stroke or dementia*	2.6	9
Organ transplant	3.6	12
Spleen diseases†	1.4	3
Rheumatoid/ lupus/ psoriasis	1.2	2
Other immunosuppressive condition‡	1.8	6

Source: (*Alama.org, 2020*)

\*GFR<60mL/min/1.73m<sup>2</sup>, during the latest examination of serum creatinine

\*\*Chronic neurological disease other than stroke or dementia includes motor neurone disease, myasthenia gravis, multiple sclerosis, Parkinson's disease, cerebral palsy, quadriplegia, hemiplegia and progressive cerebellar disease.

†Spleen diseases include splenectomy, or spleen dysfunction (e.g. from sickle cell disease).

‡Other immunosuppressive condition includes HIV, conditions inducing permanent immunodeficiency (ever diagnosed), aplastic anaemia, and temporary immunodeficiency recorded within the past year.

By adding a certain number of years to the biological age of the worker and by using the values set out in Table no. 2 for each and every comorbidity, the so-called 'calculated years' are obtained. The risk of disease occurrence and the expected severity of the clinical image are established based on the calculated Covid-age as indicated in the table below.

Table 3. Degree of calculated probability of fatality and/or severe clinical form of disease according to

“calculated “ Covid-age	Clinical-medical vulnerability level	Definition	Workplace considerations
<b>&gt;85 and above</b>	<b>Very high</b>	<p><b>High risk of death if infection occurs</b></p> <p>Those workers who must work must take care when they leave the security of their own home</p>	<p><b>Ideally work from home</b></p> <p>If attending work, the risk should not be significantly greater than the risk within their own home</p> <p>Ensure low likelihood of anyone breaching social distancing. Ensure they can maintain good personal hygiene with low likelihood of contacting contaminated objects and surfaces.</p>
70-85	High	<p>High risk of becoming hospitalized and seriously ill if infection occurs.</p> <p>These workers can leave their home to go shopping or for a walk in the park, and associate freely with other members of their household.</p>	<p>OK to attend work if the risk of doing so is no greater than the risk of shopping in the local supermarket, or social distancing of at least 1 meter in the streets, parks and countryside.</p> <p>Keep the risk in the workplace as low as reasonably practicable by applying administrative and engineering preventive measures and/or using PPE.</p> <p>Clinical work, care work and working closely with others (such as teaching, sharing a vehicle, using public transport) may be possible with the use of face shield and PPE.</p> <p>Some individuals in essential roles may be asked to accept a higher risk and agree to do so where this can be justified and is in compliance with the law.</p>

“calculated “ Covid-age	Clinical-medical vulnerability level	Definition	Workplace considerations
50-70	Moderate	Those who are much less likely to develop severe disease if infection occurs	<p>A moderately increased risk of infection may be accepted where there are no reasonably practicable means of reducing it further</p> <p>Includes clinical work with higher hazard and risk levels, or roles where physical control or restraint is required, or where additional risk has to be accepted and can be justified/minimized .</p>
Below around 50	Low	Those who are very unlikely to develop serious clinical form of disease.	Increased risk of infection may be accepted where there are reasonably practicable means of reducing it further/minimizing it .
	Pregnancy	No current evidence of significantly increased risk to mother or baby unless mother has significant medical problems .	Current advice is to minimize the risk to pregnant women.

Pursuant to the data from the previous table, categorization/quantification of the probability of a respective disease outcome is performed, depending on the ‘calculated years’ of the Covid-age. Namely,;

- When the calculated years of Covid-age are above 85, the estimate is a very high probability of developing a very severe clinical image and/or a probable fatal outcome,
- When the calculated years of Covid-age are between 70 and 85, the estimate is a high probability of developing a severe clinical image with a high probability of hospitalization and further development of permanent consequences to the worker’s health,
- When the calculated Covid-age is between 50 and 69, the estimate is a moderate probability of developing a severe form of the disease and a moderately severe clinical image is expected without any permanent consequences to one’s health,
- When the calculated Covid-age is below 50, the estimate is a low probability of developing a severe form of the disease which is expected to pass asymptotically or by developing a mild clinical image without any consequences to one’s health.

The above-stated is presented in Table no. 4 below.

Table 4. Quantification of the probability of developing a clinical image with a different severity and occurrence of fatality (medical/ clinical vulnerability)

PROBABILITY OF DEVELOPING A CLINICAL IMAGE WITH A DIFFERENT SEVERITY		
Covid-age	Severity of the clinical image/ consequences	Definition
>85	Very severe with a high probability of fatality	Very high probability of developing a very severe clinical form of disease and/or fatality
70-85	Severe, with a high probability of hospital treatment (T-2)	High probability of developing a severe form of disease, high probability of hospitalization and development of irreversible health consequences
50-69	umereno / srednje teška (T-3)	Lower probability of developing a severe clinical form of the disease
<50	laka (T-4)	Very low probability of developing a severe clinical form of disease

Even though there is no practical knowledge concerning the total probability assessment for fatal outcomes, hospital treatment and development of different severity of the clinical manifestation to COVID-19, the following additional table presents the estimated relative risk for fatal outcomes and the estimated fatality rate per 1000 infected persons with respect to the COVID age.



Table 5. Relative risks of mortality from Covid-19 and estimated case fatality rates per 1000 infected persons

COVID age	Estimated risk relative to that at age 47 years (healthy males)	Estimated case-fatality rate per 1000 in cases of Covid-19 infection (healthy males)
20	0.1	0.1
25	0.1	0.2
30	0.2	0.3
35	0.3	0.6
40	0.5	1.0
45	0.8	1.6
47	1.0	2.0
50	1.4	2.7
52	1.7	3.3
54	2.1	4.1
56	2.5	5.1
58	3.1	6.2
60	3.8	7.6
62	4.7	9.4
64	5.8	11.5
66	7.1	14.1
68	8.7	17.4
70	10.7	21.3
72	13.1	26.2
74	16.1	32.2
76	19.8	39.6
78	24.3	48.6
80	29.9	59.7

### 3. DETERMINATION OF WORKPLACE RISK ASSESSMENT

#### 3.1 Matrix workplace risk assessment – version 1

Having performed an assessment of the probability of SARS-CoV-2 virus exposure and having ascertained the probability of disease occurrence/fatal outcome in the case of the exposed worker, and having estimated the expected severity of the clinical image, a final workplace risk assessment is to be made with reference to each and every specific job position.

The International Labor Organization (ILO) having the basic definition :

**Risk = possibility of infection occurrence x severity of the expected clinical image**

as a starting point, has developed a semi-quantitative and color-based matrix assessment to be applied for the overall workplace risk assessment. This matrix assessment of ILO may make use of the previously explained tools (probability of exposure and Covid-age) even though the experts may modify it according to scientifically accepted principles. This matrix assessment is presented in Table 6 below.

*Table 6. Definitions of the workplace risk degree according to the probability of infection occurrence and the expected severity of the clinical image in the event of COVID-19 outbreak*

Workplace risk	Probability of infection	Severity of consequences
Very high	4 – very probable	4 –very high probability of developing a very severe clinical form of disease and/or fatality
High	3 – probable	3 – high probability of developing a severe form of disease, high probability of hospitalization and development of irreversible health consequences
Moderate	2 – moderately probable	2 – lower probability of developing a severe clinical form of the disease
Low	1 – slightly probable	1 – very low probability of developing a severe clinical form of the disease

Based on such numerically quantified values and color-identified levels of probability of infection and the expected severity of the disease, the final matrix pertaining to final workplace risk assessment has been created.

Similar to the other risk assessment methodologies developed for other hazards here, a combination of different exposure probabilities and a severity of the clinical image are used as indicated in Table 7.

Table 7. Total workplace risk assessment according to the methodology of ILO

	1	2	3	4
1	Low risk	Low risk	Low risk	Moderate risk
2	Low risk	Low risk	Moderate risk	High risk
3	Low risk	Moderate risk	High risk	High risk
4	Moderate risk	Moderate risk	High risk	Very high risk

Source: [https://www.ilo.org/wcmsp5/groups/public/ed\\_dialogue/lab\\_admin/documents/projectdocumentation/wcms\\_744686.pdf](https://www.ilo.org/wcmsp5/groups/public/ed_dialogue/lab_admin/documents/projectdocumentation/wcms_744686.pdf)

### 3.2 Matrix workplace risk assessment – Version 2

The matrix workplace risk assessment may be modified and amended in a number of ways so that it becomes more precise and applicable. Hence, we have pursued with development of a matrix score scale according to which a specific number of index points are determined for each and every individual workplace. Such an individualized approach in the workplace risk assessment may be disputable having in mind our occupational safety and health legislation. Nevertheless, the latest verified scientific knowledge was taken into consideration, i.e. that COVID-19 demonstrates exceptional selectivity with reference to age and existence of certain comorbidities, i.e. weight issues and cardio-vascular diseases. Hence, the general phrase of ‘individual sensitivity’ as a prognostic factor in the expected detrimental effects arising from professional exposure, was substituted with a practical and easily applicable tool for individual assessment of the medical/clinical workers’ vulnerability to COVID-19 and embedded in the complex approach for workplace risk assessment.

A different number of index points have been established as a basis for the integrated approach to an overall assessment of the workplace risk assessment:

- Every level of probability of exposure to the virus, and
- Every level of probability of development of a certain level of severity of the clinical image and/or probability of fatality

Based on the sum of these index points, the final score is determined as well as the total workplace risk assessment according to the criteria set out in tables 8 and 9.

Table 8. Quantification of the probability of infection occurrence and the probability of disease occurrence with a different severity of the clinical image presented in a color score system

Probability of infection occurrence (index points)	Severity of the consequences Clinical/ medical vulnerability (index points)			
	Low (asymptomatic and/or mild clinical image)	Moderate (moderately severe clinical image)	High (severe clinical image)	Very high (potential fatal outcome)
Little probable	2	3	4	5
Moderately probable	4	6	8	10
Probable	6	9	12	15
Very probable	8-12	12-15	16-20	>25

Pursuant to the distribution of the total number of index points referring to different levels of infection probability and the severity of the clinical image, a summary score is obtained according to which the level of workplace risk is defined. The final summary of scores as a basis for the quantitative workplace risk assessment is presented in Table 9 below. According to this table, if the total score is:

- More than 12, the workplace risk assessment is estimated as HIGH
- Between 8 and 11, the workplace risk assessment is assessed as MODERATE/ AVERAGE
- Less than 7, the workplace risk assessment is estimated as LOW/SMALL

Table 9. Quantification of the workplace risk assessment using a color score system

Total score	Level of risk	Measures
>12	High	Unacceptable, the work process is to be terminated
8-11	Moderate/ average	Acceptable/ preventive/corrective measures are required
<7	Low/small	The level of safety is to be maintained

### Conclusion:

- Provided that in the final matrix applicable to workplace risk assessment, the established score for the respective workplace is higher than 12, then this workplace is assessed as a workplace with a HIGH risk. As far as these workplaces are concerned, the recommendation is to temporarily cease the work process until the risk is reduced to a lower category by application of respective preventive and/or corrective measures. The essential workers in the critical sectors are exempted from this due to the fact that these sectors are essential in terms of maintaining the continuity of the functioning of the community. Despite the high risk, the suggestion might be that these workers are to remain at their respective workplaces which must be set out in the national legislation. The proposal is that these workers are IMMEDIATELY referred to a pre-scheduled medical examination for the purpose of ascertaining their specific health condition and ability to work and to ascertain the existence of any functional-technical and medical work-related contraindications.
- Provided that in the final matrix applicable to the workplace risk assessment, the established score for the respective workplace is within the range of 8 and 11, then this workplace is assessed as a workplace with a MODERATE/AVERAGE risk. As far as these workplaces are concerned, the recommendation is to have continuity of the work process with due observation of the situation regarding adherence to the proposed preventive and/or corrective measures. Following the final assessment of the total workplace risk, these workers are to be subject to PRIOR medical examinations. They are to be followed by periodical examinations within the legally stipulated interval. The purpose is to ascertain whether there have been any changes to the health condition prior to and in the course of the work performance and whether they are functional-technical and/or medical contraindications for further operation at the specific workplace. It is to be noted that upon returning to work at workplaces with a moderate/average risk (due to the lifting of the imposed emergency measures banning work in given sectors, due to (self)isolation or due to disease) the workers are to be referred to TARGETED preventive examinations. Indications referring to their conducting are presented in more detail in the next publication from the same series focusing on the criteria and conditions pertaining to return to work in COVID-19 pandemics conditions.
- Provided that in the final matrix applicable to the workplace risk assessment, the established score for the respective workplace is below 7, then this workplace is assessed as a workplace with a LOW/SMALL risk. As far as these workplaces are concerned, the recommendation is to have continuity of the work process and control the implementation of the protection related measures so that no changes that would increase the workplace risk would take place. The workers assigned to these positions are to be subject to regular and continuous monitoring of their health condition within the framework of the compulsory CHECK-UP medical examinations.

According to the legislation pertaining to the area of occupational safety and health, the workplaces are divided into two categories:

- Workplaces with an increased risk, and
- Workplaces with no increased risk.

*The proposal of the taskforce working on designing the national risk assessment methodology referring to workplaces with an established high and moderate/average risk, is to have these workplaces classified as workplaces with an INCREASED RISK, whereas the workplaces with an established low/small risk categorized as workplaces with NO INCREASED RISK.*

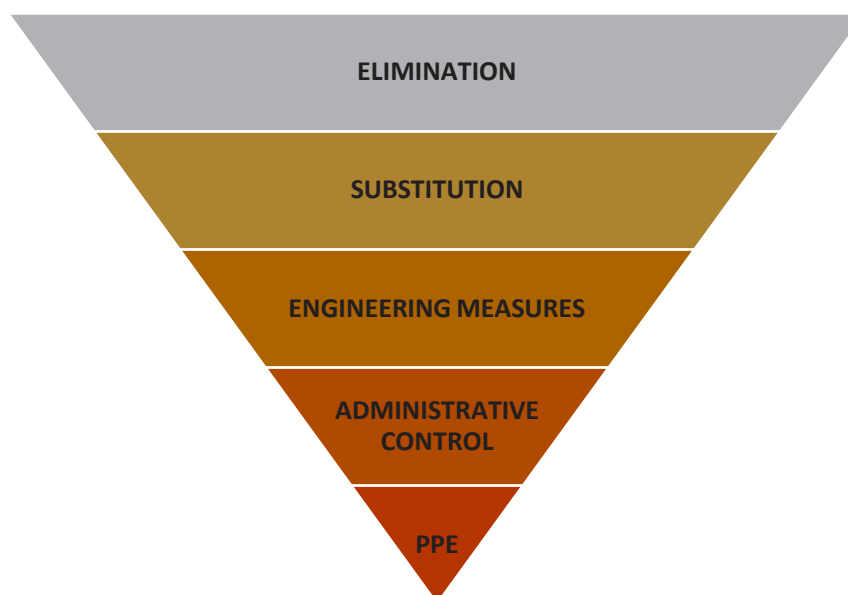
## 4. PREVENTIVE/ CORRECTIVE MEASURES

The preventive and corrective measures are a constituent part of each and every risk assessment. They include the preventive aspect from the occupational safety and health system. Their hierarchical structure provides for prioritization of the activities and is to secure prevention of diseases and preservation of the health and ability to work on the part of the professionally exposed workers. These measures are as follows:

- Elimination or minimization of the presence of the hazardous agent in the working environment (elimination),
- Substitution of the more hazardous agent with a less hazardous agent in the working environment (substitution),
- Isolation of the workers that have been in contact with the hazardous agent at the workplace (engineering measures),
- Modification of the manner the work is performed at the specific workplace (administrative control),
- Personal protective equipment (PPE).

The hierarchical framework of these measures in the so-called preventive measure pyramid is presented hereunder.

*Picture 3. Hierarchical structure of the preventive measures*



In COVID-19 pandemic conditions, some activities are feasible, but some others are practically not feasible. Nevertheless, prevention and control over COVID1-19 at the workplace remains a priority for the occupational safety and health experts. Their task is to establish the most efficient and most effective protection measures for the purpose of protecting the health and the ability to work on the part of the professionally exposed

workers, their coworkers and associates, clients, families and the wider environment. More on this subject matter is presented in the second publication from this series – Returning to Work in COVID-19 Pandemics Conditions. .



## 5. RECOMMENDATIONS

1. The Ministry of Labor and Social Policy is to adopt a Rulebook applicable both to employers and to employees containing preventive measures against COVID-19 further spread,
2. The afore-stated Rulebook is to impose an obligation on the employers to revise and update the Safety Statements and compile a risk assessment pertaining to the occupational safety and health of workers in the case of exposure to the SARS CoV-2 virus. Such risk assessments are to be drawn up for each and every workplace,
3. Pursuant to the newly compiled risk assessment in the case of exposure to the SARS CoV-2 virus, the employers are to draft a Plan on implementation of preventive measures for safe and healthy work and for the purpose of preventing the outbreak and spread of COVID-19 at each and every place within their companies,
4. The Plan is to consist of the following as a minimum:
  - a. Preventive measures and activities aimed at preventing COVID-19 outbreak and spread within the company,
  - b. Instructions in writing in terms of how to act in compliance with the preventive measures and the obligation for notification and training of all employees,
  - c. Defined procedures aimed at provision of higher hygiene level and regular disinfection of premises as well as ensuring workers' personal hygiene including an option for disinfection of hands and work surfaces/tools/objects that they have contact with,
  - d. Instructions in writing in terms of how to act in the event of occurrence of an infected/suspected case of COVID-19 within the company,
  - e. Instructions in writing in terms of how to act pertaining to workers returning to work (due to the lifting of the imposed restrictive measures and returning to work, following disease recovery, ending of (self)isolation, following a prolonged sick leave due to another disease, etc.),
  - f. Obligation for regular control over the implementation of measures (daily check-up list) on the part of the OSH assigned employee within the company,
  - g. Obligation for compulsory certified training for the OSH assigned employee and with reference to handling COVID-19 at the workplace,
  - h. Keeping daily records about the state concerning the implementation of measures and regular reporting to the State Labor Inspectorate and EPI-COVID Centre within the Public Health Institute of the Republic of North Macedonia,
  - i. Obligation for adherence to the preventive measures by the workers.

## 6. LITERATURE AND OTHER SOURCES

1. CoViD-19 Treker. Available from: <https://treker.mk/mk/stats>
2. European Centre for Disease Prevention and Control (ECDC). Rapid Risk Assessment: Coronavirus disease 2019 (COVID-19) in the EU/EEA and the UK– ninth update. Stockholm: ECDC; 2020 [23 April, 2020]. Available from: <https://www.ecdc.europa.eu/sites/default/files/documents/covid-19-rapid-risk-assessment-coronavirus-disease-2019-ninth-update-23-april-2020.pdf>
3. Институт за јавно здравје на Република Северна Македонија. Состојба со COVID-19 во Република Северна Македонија – 30.05.2020. Скопје: ИЈЗ на РСМ; 2020 (20.04.2020). Достапно на: <http://www.iph.mk/sostojba-so-covid19-3052020/>
4. Occupational Safety and Health Administration. Worker Exposure Risk to COVID-19. Available from: <https://www.osha.gov/Publications/OSHA3993.pdf>
5. EU-ILO Project: Towards safe, healthy and declared work in Ukraine. Webinar for Labour Inspectors - COVID-19 pandemic: how OSH at workplaces mitigates consequences. Available from: [https://www.ilo.org/budapest/what-we-do/projects/declared-work-ukraine/WCMS\\_744589/lang-en/index.htm](https://www.ilo.org/budapest/what-we-do/projects/declared-work-ukraine/WCMS_744589/lang-en/index.htm)
6. ALAMA. Covid-19 Medical Risk Assessment: Covid age. Available from: <https://alama.org.uk/covid-19-medical-risk-assessment/>
7. Stikova E. Disaster Preparedness. In: Laaser, U. and Beluli, F. (2016) “Special Volume 2016, A Global Public Health Curriculum (2nd Edition)”, *South Eastern European Journal of Public Health (SEEJPH)*. doi: 10.4119/seejph-1828, p.121. Available from: <https://www.seejph.com/index.php/seejph/issue/view/178>
8. Cummings CE, Stikova E, editors. Strengthening National Public Health Preparedness and Response to Chemical, Biological and Radiological Agent Threats. IOS Press; 2007.
9. Koh D. Occupational risks for COVID-19 infection. *Occupational medicine (Oxford, England)*. 2020 Mar;70(1):3.
10. Cirrincione L, Plescia F, Ledda C, Rapisarda V, Martorana D, Moldovan RE, Theodoridou K, Cannizzaro E. COVID-19 pandemic: Prevention and protection measures to be adopted at the workplace. *Sustainability*. 2020 Jan;12(9):3603.
11. Carver PE, Phillips J. Novel Coronavirus (COVID-19): What You Need to Know. *Workplace Health & Safety*. 2020 May;68(5):250-.
12. Stikova E. Risk and risk analysis. *Medical Ecology*. 2008:33-43.
13. Stikova E, Milevska N, Bulat P, Jovic N, Donev D. Workplace Risk Assessment. In: Zaletel-Kragelj L, Bozиков J. *Methods and tools in public health. A handbook for teachers, researchers and health professionals*. Lage: Hans Jacobs Publishing Company. 2010.
14. Прирачник за третман и превенција на Covid- 19, The First Affiliated Hospital, Zhejiang University School of Medicine, Асоцијација на специјализанти и млади лекари и Македонско здружение за заштита при работа Достапно на: <http://>





**Macedonian Occupational  
Safety and Health Association**

[www.mzzpr.org.mk](http://www.mzzpr.org.mk)