

ACT ON RISK ASSESSMENT FOR THE BUS DRIVER WORKPLACE WITH MEASURES OF HEALTH AND SAFETY AT WORK¹

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Abstract

By law on Health and Safety at Work, it is an obligation of each company and employee to develop a Risk Assessment Act for each workplace. The risk assessment is based on recording and determination of all the hazards and harmful effects in the workplace and working environment, which may cause injury, damage to health and illness of the employee. This paper presents the process of risk assessment for the bus driver workplace giving a risk assessment procedure description, identifying the hazards and harmful effects and presenting the risk assessment methodology, as well as measures for reduction of risk of hazards and harmful effects, i.e. healthy and safe work in the workplace.

Keywords – act on risk assessment; bus driver; measures of health and safety at work

INTRODUCTION

Risk assessment is an essential tool that allows employers a comprehensive insight into the health and safety at work, which is a very important part of the overall business.

OHSAS 18001 (Occupational Health & Safety Assessment Series) standard is a standard which defines the requirements for the health management system and safety at work.

The most widely used method in making assessment and managing OHSAS risks is the Kinny method. According to this method, fulfillment of a risk is regarded as an occurrence of danger and harmfulness. This way, by

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identification of potential danger and harmfulness, the potential risks to health and safety at work are also determined.

The objective of risk assessment for the bus driver workplace is getting familiar with the methods used by identifying the level of risk exposure due to identified hazards and harmful effects at work, as well as considering possible measures for risk elimination or reduction to acceptable levels.

ACT ON RISK ASSESSMENT FOR THE BUS DRIVER WORKPLACE

Tasks performed by a bus driver taken from the **Act on Organization and Systematization of duties** are:

- conducting inspection of the vehicle prior to the beginning and after the completion of the journey,
- taking an order for drive from the dispatcher after the vehicle has been inspected,
- justifying the completed journeys with a statement, and keeping records of the mileage (km),
- filling up the fuel tank of the vehicle,
- justifying consumption of fuel and other consumables,
- driving a bus,
- elimination of minor defects on the vehicle, including replacement of wheels, air cushion and the like,
- hygiene maintenance on the outside and inside of the vehicle, battery storage as well as the engine,
- receiving or discharging passengers,
- responsibility to dispatcher.

For the position of the bus driver, risk assessment was done based on the Kinney method.

This method establishes a system of evaluation of each danger and harmfulness at the workplace. OHSAS risks are changing over the time through three main categories that Kinney method is analyzing, which are:

- likelihood of danger and harmfulness;
- seriousness of the consequences that the employee suffers from the occurrence of danger and harmfulness;
- frequency of danger and harmfulness

The parameters of the analysis are numerically evaluated so that the final risk assessment at the workplace and the working environment is numerically expressed in the following way:

$$R = P * E * F$$

R – risk, P – Probability, E – Effects, F – Frequency (exposure to hazards).

In determining the data on hazards and harmful effects in the workplace and working environment, grouping of the hazards and harmful effects was performed according to the Regulation on the Manner and Procedure of Risk Assessment in the Workplace and Working Environment.

**DESCRIPTION OF THE WORKING AND AUXILLIARY SPACE,
WORK QUIPMENT INCLUDING MEANS AND EQUIPMENT FOR
PERSONAL PROTECTION AT WORK**

Units that are used as working and auxiliary space, as well as facilities in the open air with all associated installations: the job of the bus driver takes place in a vehicle on the ground, i.e. on the road while carrying out transport of passengers. Work equipment (machines, devices, systems, installations and tools): the means and equipment for the work of a driver of freight vehicles and buses include: a vehicle, spare parts, tools and accessories along with vehicle, forms and documents. Means and equipment for personal protection at work: based on the Review of hazards and harmful effects that require the use of the means and/or equipment for personal protection at work, the use of the following means and equipment for personal protection at work is prescribed: working clothes, sunglasses, protective shoes. Information on the workplace obtained from employees: based on the statements of employees, the pace of work is large and requires a lot of endurance and mental and physical strain.

Information obtained by observation and monitoring of the work process: the rhythm of work is combined and complex. The work mainly requires sitting. Terms of employment: the III degree of education, a driving license for C or E or D category, one-year work experience.

**IDENTIFICATION AND DETERMINATION OF HAZARDS AND
HARMFUL EFFECTS IN THE WORKPLACE AND WORKING
ENVIRONMENT**

Table 1. List of possible hazards for the workplace: bus driver.

| No. | Determined list of hazards |
|------------|---|
| 1 | Hazard in public transport |
| 2 | Free movement of parts, materials or tools during small interventions on the ground |
| 3 | Internal transport and movement of working machines and vehicles |
| 4 | Use of dangerous substances which could produce an explosion or fire |
| 5 | Inability to timely leave the workplace |
| 6 | Sharp edges, rough surfaces, protruding parts, flooring, treads |
| 7 | Physical workplace instability |

| | |
|----|--|
| 8 | Risk of direct contact with live parts |
| 9 | Indirect contact voltage via live parts |
| 10 | Risk of thermal effects of the equipment and installations |

Table 2. List of possible harmful effects for the working position: bus driver.

| No | Determined list of harmful effects |
|----|--|
| 1 | Dust and fumes |
| 2 | Noise and vibrations |
| 3 | Harmful effects of microclimate |
| 4 | Working outdoors (harmful climatic impacts) |
| 5 | Non-physiological body position |
| 6 | Psychological burdens |
| 7 | Responsibility for the safety of passengers |
| 8 | Overtime work |
| 9 | Harmful effects caused by other persons (passengers, other traffic participants) |

ADOPTED MODEL OF RISK ASSESSMENT - KINNEY METHOD

Table 3. Categorization of Effects

| Effects – E | |
|-------------|--|
| 1 | Illness or injury that requires first aid and no other treatment |
| 2 | Substantial – medical treatment by a doctor |
| 3 | Serious – disability or serious injury |
| 6 | Very serious – individual accident |
| 10 | Disastrous – Multiple fatalities |

Table 4. Categorisation of probability

| Probability – P | |
|-----------------|--|
| 0.1 | Almost beyond comprehension |
| 0.2 | Practically unbelievable |
| 0.5 | There is, but only possibly |
| 1 | Low probability, but possible in limited cases |
| 3 | Little possible |
| 6 | Entirely possible |
| 10 | Predictable, expected |

Table 5. Categorisation of frequency (exposure to hazards)

| Frequency (exposure to hazards) – F | |
|--|--|
| 1 | Rarely (yearly) |
| 2 | Monthly |
| 3 | Weekly |
| 6 | Daily |
| 10 | Expected to happen permanently, continuously |

Table 6. Categorisation of the risk level

| Risk level – R | |
|-----------------------|--|
| 1 | $A \leq 20$ – Acceptable |
| 2 | $20 < R \leq 70$ – Low Caution required, to be resolved by regular procedure – operating instructions |
| 3 | $70 < R \leq 200$ – Moderate, Measures required, management liability shall be established |
| 4 | $200 < R \leq 400$ –High A quick reaction by the senior management needed, improvement required from the immediate superior |
| 5 | $R > 400$ – Extreme Discontinued activities, immediate action by senior management required |

GROUPING OF HAZARDS

Table 7. Mechanical hazards

| No. | Hazard name | Effects (E) | Probability (P) | Frequency (F) |
|------------|---|--------------------|------------------------|----------------------|
| 1 | Hazard in public transport | 6 | 3 | 6 |
| 2 | Free movement of parts, materials and tools that can cause injury to the employee | 3 | 3 | 3 |
| 3 | Internal transport and movement of working machines and vehicles | 6 | 0.5 | 6 |
| 4 | Use of dangerous substances which could produce an | 6 | 0.5 | 6 |

| | | | | |
|---|---|---|---|---|
| | explosion or fire | | | |
| 5 | Inability to timely leave the workplace | 6 | 1 | 6 |

Table 8. Hazards that occur in connection with the characteristics of the workplace

| No. | Hazard name | Effects (E) | Probability (P) | Frequency (F) |
|-----|---|-------------|-----------------|---------------|
| 1 | Sharp edges, rough surfaces, protruding parts, flooring, treads | 1 | 3 | 6 |
| 2 | Physical workplace instability | 6 | 0.5 | 6 |

Table 9. Hazards that occur using electricity

| No. | Hazard name | Effects (E) | Probability (P) | Frequency (F) |
|-----|--|-------------|-----------------|---------------|
| 1 | Direct contact with live parts | 6 | 0.5 | 6 |
| 2 | Indirect contact voltage via live parts | 6 | 0.5 | 6 |
| 3 | Risk of thermal effects of the equipment and installations | 6 | 0.5 | 6 |

GROUPING OF HARMFUL EFFECTS

Table 10. Harmful effects that arise or occur in the work process

| No. | Hazard name | Effects (E) | Probability (P) | Frequency (F) |
|-----|---------------------------------|-------------|-----------------|---------------|
| 1 | Dust and fumes | 2 | 1 | 6 |
| 2 | Noise and vibrations | 2 | 1 | 6 |
| 3 | Harmful effects of microclimate | 1 | 3 | 6 |
| 4 | Harmful climatic impacts | 6 | 1 | 6 |

Table 11. Hazards arising from psychological and psychophysiological efforts

| No. | Hazard name | Effects (E) | Probability (P) | Frequency (F) |
|-----|---|-------------|-----------------|---------------|
| 1 | Non-physiological body posture | 2 | 6 | 10 |
| 2 | Psychological burdens - stress | 2 | 3 | 6 |
| 3 | Responsibility for safety of passengers and goods | 2 | 3 | 6 |

Table 12. Hazards related to work organization

| No. | Hazard name | Effects (E) | Probability (P) | Frequency (F) |
|-----|---------------|-------------|-----------------|---------------|
| 1 | Overtime work | 6 | 1 | 6 |

Table 13. Other hazards

| No. | Hazard name | Effects (E) | Probability (P) | Frequency (F) |
|-----|---------------------------------|-------------|-----------------|---------------|
| 1 | Hazards caused by other persons | 6 | 0.5 | 6 |

RISK ASSESSMENT FOR THE BUS DRIVER WORKPLACE

Table 14. Assessment of identified risks

| No. | Recognized identified risks | Risk assessment | | | |
|-------------------------|--|-----------------|-----|---|------------------|
| | | E | P | F | E*P*F |
| Risks of hazards | | | | | |
| 1 | Hazard in public transport | 6 | 3 | 6 | 108 Moderate |
| 2 | Free movement of parts, materials and tools | 3 | 3 | 3 | 27 Low |
| 3 | Internal transport and movement of working machines and vehicles | 6 | 0.5 | 6 | 18 Acceptable |
| 4 | Use of dangerous substances which could produce an | 6 | 0.5 | 6 | 18 Acceptable |

| | | | | | |
|---------------------------------|--|---|-----|----|------------------|
| | explosion or fire | | | | |
| 5 | Inability to timely leave the workplace | 6 | 1 | 6 | 36 Low |
| 6 | Sharp edges, rough surfaces, protruding parts, flooring, treads | 1 | 3 | 6 | 18 Acceptable |
| 7 | Physical workplace instability | 6 | 0.5 | 6 | 18 Acceptable |
| 8 | Direct contact with live parts | 6 | 0.5 | 6 | 18 Acceptable |
| 9 | Indirect contact voltage via electrical appliances | 6 | 0.5 | 6 | 18 Acceptable |
| 10 | Risk of thermal effects of the electrical equipment and instalations | 6 | 0.5 | 6 | 18 Acceptable |
| Risks of harmful effects | | | | | |
| 1 | Dust and fumes | 2 | 1 | 6 | 12 Acceptable |
| 2 | Noise and vibrations | 2 | 1 | 6 | 12 Acceptable |
| 3 | Harmful effects of microclimate | 1 | 3 | 6 | 18 Acceptable |
| 4 | Harmful climatic impacts | 6 | 1 | 6 | 36 Low |
| 5 | Non-physiological body position | 2 | 6 | 10 | 120 Moderate |
| 6 | Psychological burdens - stress | 2 | 3 | 6 | 36 Low |
| 7 | Responsibility for the safety of passengers | 2 | 3 | 6 | 36 Low |
| 8 | Overtime work | 2 | 1 | 6 | 12 Acceptable |
| 9 | Harmfulness caused by other persons | 6 | 0.5 | 6 | 18 Acceptable |

**ESTABLISHING MEASURES FOR COMPLETE ELIMINATION OR
REDUCTION OF HAZARDS/HARMFUL EFFECTS**

Table 15. Measures for elimination and reduction of identified hazards/harmful effects

| No. | Hazard/Harmful effect | Type of Risk | Measures |
|-----|---|--------------|--|
| 1 | Hazard in public transport | Moderate | Compliance with regulations on public transport Vehicle proper condition maintenance Checking the qualifications of employees for safe and healthy work |
| 2 | Free movement of parts, materials and tools that can cause injury to the employee | Low | Use of protective equipment |
| 3 | Internal transport | Acceptable | In addition to using protective equipment, train employees for communication and correct conduct when carrying out internal transport and displacement of tools and work materials |
| 4 | Use of dangerous substances which could produce an explosion or fire | Acceptable | Working with these agents may only be performed by a professional and trained person |
| 5 | Inability to timely leave the workplace | Low | Ensure sufficient free space needed for the fastest possible release of employees from the danger zone |
| 6 | Sharp edges, rough surfaces, protruding parts, flooring, treads | Acceptable | Provide sufficient passage width near sharp edges Protect sharp edges mechanically |
| 7 | Physical workplace instability | Acceptable | Compliance with regulations on public transport and vehicle proper condition maintenance |
| 8 | Direct contact voltage with live parts | Acceptable | Properly implemented system of protection against direct |

| | | | |
|----|--|------------|--|
| | | | contact voltage |
| 9 | Indirect contact voltage via live parts | Acceptable | Properly implemented system of protection against indirect contact voltage |
| 10 | Risk of thermal effects of the equipment and installations | Acceptable | Application of fire protection during refueling and oil change |
| 11 | Dust and fumes | Acceptable | Maintenance of the ventilation system in the vehicle in good working condition |
| 12 | Noise and vibrations | Acceptable | Use of protective equipment |
| 13 | Harmful effects of microclimate | Acceptable | By application of measures, reduce the adverse impact of microclimate |
| 14 | Harmful climatic impacts | Acceptable | Reduce harmful climate impacts to a minimum |
| 15 | Non-physiological body position | Moderate | Occasional stretching exercises Correct redistribution of working hours and rest periods Application of appropriate ergonomic measures |
| 16 | Psychological burdens-stress | Low | Correct redistribution of working hours and rest periods |
| 17 | Responsibility for the safety of passengers and goods | Low | Education according to anti-stress therapy program |
| 18 | Overtime work | Low | Correct redistribution of working hours and rest periods |
| 19 | Harmful effects caused by other persons | Acceptable | Education for work with clients |

**SAFETY MEASURES AND PROTECTION AT WORK FOR THE BUS
DRIVER WORKPLACE**

Table 16. Measures and deadlines for elimination or reduction of identified risks for the bus driver workplace

| Measures | Deadline |
|--|-----------------|
| Compliance with regulations on public transport and vehicle proper condition maintenance | Permanently |
| Occasional stretching exercises Correct redistribution of working hours and rest periods Application of appropriate ergonomic measures | Permanently |
| Ensure sufficient free space needed for the fastest possible release of employees from the danger zone | Permanently |
| Use of protective equipment | Permanently |
| In addition to using protective equipment, train employees for communication and correct conduct when carrying out internal transport and displacement of tools and work materials | Permanently |
| Provide sufficient passage width near sharp edges Protect sharp edges mechanically | Permanently |
| Properly implemented protection system against direct and indirect contact voltage | Permanently |
| Application of fire protection during refueling and oil change | Permanently |
| Use of protective equipment for protection against noise and vibrations | Permanently |
| By application of measures, reduce the adverse impact of microclimate | Permanently |
| Reduce harmful climate impacts to a minimum | Permanently |
| Occasional stretching exercises Application of appropriate ergonomic measures | Permanently |
| Education according to anti-stress therapy program | Permanently |
| Correct redistribution of working hours and rest periods | Permanently |
| Maintenance of the ventilation system in the vehicle in good working condition | Permanently |
| Education for work with clients | Permanently |
| Checking the qualifications of employees for safe and healthy | Every 3 |

| | |
|------|-------|
| work | years |
|------|-------|

CONCLUSION

Assessing risks in the workplace of the bus driver it was found that the risks levels are acceptable, low and moderate.

By detailed identification and analysis of danger and harmfulness of the working position of a bus driver while driving the bus, it can be concluded that the Kinny method and the methodical procedure for assessment of the OHSAS risk have fulfilled the purpose and provided the results on the basis of which the mechanisms of control of the estimated OHSAS risks can be determined.

For the working position of a bus driver, an acceptable, small and moderate risk is present, with the intention to reduce it even further by applying the priorities in eliminating the risks (Table 17).

Table 17. Priorities in risk elimination

| No. | List of priorities |
|-----|---|
| 1 | Regular periodic checks for drivers (every three years) |
| 2 | Compliance with regulations on public transport and vehicle maintenance in proper condition |
| 3 | Occasional stretching exercises Correct redistribution of working hours and rest periods Application of appropriate ergonomic measures |
| 4 | Ensure sufficient free space needed for the fastest possible release of employees from the danger zone |
| 5 | Properly implemented protection system against direct and indirect contact voltage |
| 6 | Application of fire protection during refueling and oil change |
| 7 | Use protective equipment, i.e. steel-toe shoes (safety shoes) |
| 8 | In addition to using protective equipment, train employees for communication and correct conduct when carrying out internal transport and displacement of tools and work materials |
| 9 | Provide sufficient passage width near sharp edges Protect sharp edges mechanically |
| 10 | Use of protective equipment for protection against noise and |

| | |
|----|--|
| | vibrations |
| 11 | By application of measures, reduce the adverse impact of microclimate |
| 12 | Reduce harmful climate impacts to a minimum |
| 13 | Maintenance of good working condition of the ventilation system in the vehicle |
| 14 | Education for work with clients |
| 15 | Checking the qualifications of employees for healthy and safe work |

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