

# **RISK AND PROTECTION OF FIRE FIGHTING VOLUNTARY FIRE BRIGADES IN SLOVAKIA**

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## **ABSTRACT**

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This paper deals with the intervention activities of voluntary fire brigades in municipalities in cooperation with professional fire brigades. It emphasizes the need of the voluntary fire activities their awareness towards dangerous situations. There are many risks sometimes underestimated during the fire attack or other fire brigade activities. Respecting the basic rules of work prevents the injuries and fatalities. The paper focus on most often dangerous situation and bad habits of the volunteers which are very risky in the sense of health safety. The paper states the types of interventions defined and the requirements for the necessary equipment. List of selected risks for intervening fire fighters and their causes is written. The last part describes firefighter injuries caused by their fault in sense of ignoring basic Health & Safety rules.

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## **INTRODUCTION**

Communities need to fulfill the tasks related to the implementation of a fire and rescue services to the local volunteer fire department. The voluntary fire brigades are included in the system nationwide deployment of man-

power and resources to the appropriate category, as required by the municipality. Conditions for inclusion in the relevant category is its technical and material support, the number of firefighters and the time of escape.

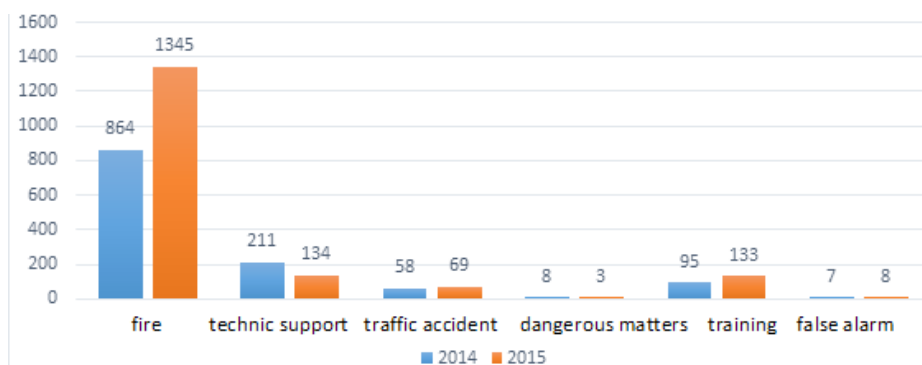
Voluntary fire brigades engage communities in particular by:<sup>1</sup>

- Fires in countryside,
- elimination of consequences of floods,
- removing the consequences of windstorms,
- support services to long-term professional interventions,
- simple technical interventions.

Following types of problems are connected to the effectivity of voluntary fire intervention, especially lack of knowledge and skills and equipment:<sup>2</sup>

- No vocational training is sufficient 40 hour courses for members of fire brigades,
- minimal or no experience of intervention activities,
- reduced requirements for personal protective equipment, and sufficient clothing (one-tier fighting clothes), safety shoes, work gloves, helmet,
- Inadequate equipment for interventions in difficult conditions (e.g. breathing apparatus),
- lack of communication tools (walkie-talkies).

FIGURE 1 FIRE ACTIONS OF FIRE BRIGADES IN COOPERATION WITH FIRE VOLUNTEER BRIGADES (DATA<sup>3</sup>)



<sup>1</sup> M. Dermek, *The use of voluntary fire brigades municipalities in intervention activities. Crises situations solution in specific environment*, University of Žilina, Žilina 2016, p. 55.

<sup>2</sup> M. Orinčák, *Modelovanie zásahovej činnosti záchranných brigád Hasičského a záchranného zboru s využitím metód sieťovej analýzy*, „Krizový manažment = Crisis management“, 5/1 (2006), p. 98.

<sup>3</sup> Ministry of Interior Slovak Republic. *Statistics intervention activities 2016*, <http://minv.sk/statistika>, p. 36.

Voluntary municipal fire brigades fighting activities carried out mainly in the municipality on the basis of the classification system nationwide deployment of forces and resources can be requested to implement an act outside the territory of the municipality. This is especially the interventions which need to deploy a large number of firefighters. In Figure 1, the number of joint operation of voluntary and professional fire brigades in 2014 and 2015. The year after year, the number of joint actions increased by 34%. From the above graph it shows that the greatest synergy is required in fires. Voluntary fire brigades communities are destined to interventions which need to deploy a large number of forces for destruction events, and is not required special skill and experience<sup>4</sup>.

## 1. SELECTED HAZARDS DURING INTERVENTION OPERATIONS

### DANGER OF PHYSICAL EXHAUSTION

There is at extreme single power or at the long-term load without sufficient recharge of man energy within the body, particularly with lack of physical fitness. The significant increase in the level of load for intervention affects the use of protective clothing for firefighters, mental strain and stress (anxiety, fear), temperature and humid environment are the main factors of physical exhaustion.

### RISK OF FALLING

- Loss of balance – changing the surface properties of rescue routes and assembly area extinguishing agent or the effects of weather, the effect of the blast wave or reactive power streamlines.
- Lack of fixing – is mainly an underestimation of the risk of falling, negligence or errors of fusing and ensuring inadequate or incorrect self-fixing, which can cause a fall in seizures of tearing down the breaker or disabling seizures fall.
- Loss of nerve-muscle coordination – because of fear or exhaustion.
- Overturning objects – for dismantling and removing structures hitting other people or objects entrained work with objects during strong winds.

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<sup>4</sup> Ministry of Interior, Presidium of Fire and Rescue Services. *Tactical implementation methodology of intervention – Methodological sheets no. 122–124*, p. 123.

- Weather conditions – a strong, especially gusty wind or wind direction changes, the creation of frost on the surface structures on fire equipment and material means for freezing.

#### **RISK OF LOSS OF ORIENTATION**

Disorientation – in poor visibility (e.g. in smoky) in unknown terrain or in very rugged terrain or indoors, unmarked obstacles, depressions, low feasible or narrow design for intervention routes.

#### **RISK OF BURNS**

- Annealed flames that threaten firefighters In the process smoky area near the Gaza burning, especially when opening premises in which a fire took place in the form of e.g. incomplete combustion.
- Radiant heat (infrared rays) emitted from the combustion zone; its intensity is proportional to the burn, type and calorific value combustible substance and distance from the combustion zone; similar nature may be laser burns or ionizing radiation.
- Touch or with hot hot hot object or substance; burns by touching can also occur with electric shocks.
- Inhalation of hot gases, thus defeating the mucous membranes of the airways.

#### **SCALDING**

When firefighters spray jet streams and fog creates large quantities of water vapor, which is very hot and is under pressure, which can cause the hot gases to penetrate all layers of protective clothing, including underwear and hood. The transformation of water into steam changing thermal conditions in the room so that it can lead to changes in the flow of hot gases from the ceiling to the floor of the room where they are firefighters and often disabled.

#### **DANGER OF HYPOTHERMIA**

In the natural environment in winter, at about 0 °C., by treatment with strong wind and frost. In high humidity, such as rain and drizzle, and at lower temperatures. In the original and to work on the water when it comes to long-term deployment at lower outdoor temperatures.

### **DANGER OF OVERHEATING**

Depending on the type of used clothing, the size and duration of the energy load and ambient temperature. Overheating risk, particularly at high ambient temperatures such as those caused by radiant heat or direct sunlight.

### **RISK OF ELECTRIC SHOCK**

Impaired electrical wiring, alternative sources of electricity, step voltage wires from power lines flow from the ground, static electricity, the residual charge induced voltage.

### **DANGER OF INTOXICATION**

For all fires inside the building and in the open outdoors, where the toxic substances formed as products of incomplete combustion, combustion gases and as a result of thermal decomposition of substances. In case of technical intervention with the presence of toxic substances.

## **2. CAUSES OF ACCIDENTS**

The various causes of accidents, can be summed up in the overall categories<sup>5</sup>:

1. The fault own fault.
2. The fault unpredictable risk.
3. The fault another person, animal.

Most attention should be given to accidents that were culpable own fault (negligence), carelessness or failure to comply with health and safety at work.

### **ACCIDENTS CULPABLE FAULT OF THEIR OWN**

Injuries culpable fault of their own can be further divided into the following chapters: The inability to use the necessary personal protective equipment (hereinafter 'PPE'). This is mainly to the control of incidents where individual firefighters are not provided with proper PPE<sup>6</sup> for this type of negotiation of an emergency. Often it is equipped with appropriate PPE in-

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<sup>5</sup> M. Orinčák, *Povodňová záchranná služba v Slovenskej republike, „Krizový manažment = Crisis management“*, 5/2 (2006), p.80.

<sup>6</sup> M. Orinčák, *Význam a postavenie Záchranných brigád HaZZ v integrovanom záchrannom systéme SR*, [in:] *Požárni ochrana 2009*, sborník prednášok XVIII. ročníku medzinárodnej konferencie, SPBI, Ostrava 2009, p. 555.

adequate, outdated or worn part with the possibility of imperfect protective function. Despite these shortcomings are DHZO need for larger ranges of emergencies where you need to deploy a large number of fire brigades.

### **BAD USE OF PPE**

The cause of the evil use of PPE is imperfect acquaintance with the instructions for use incompatibility used various parts of PPE or reckless underestimation of the potential hazards associated with intervention activities.

**FIGURE 2 FIREMAN HAS LEFT THE COCOON OF THE NECK THEREFORE NOT PROTECTED. FIREFIGHTERS AT RIGHT HAS DEPLOYED EMERGENCY CLOTHING (PHOTO BY AUTHOR)**



The most common causes of accidents wrong use of personal protection equipment (PPE) can be classified wrong size emergency clothing or gloves, unstretched premium loops through the thumb, which prevents

ejection of emergency clothing, bad tension neck collar or insufficient securing mask breathing apparatus.

### FAILURE TO USE PPE

The most serious violation of the principles of safety and health at work is not using the appropriate PPE. Due to non-use of PPE injuries to firefighters and endanger the whole unit during intervention activities. Suddenly, from the current intervention has become an event during which firefighters must save his own member use.

FIGURE 3 LEFT IN USE FIREFIGHTER RESPONSE COAT OR GLOVES. FIREFIGHTERS DO NOT USE THE RIGHT-CONTAINED BREATHING APPARATUS FOR FIRE FIGHTING. (PHOTO BY AUTHOR)



The most frequently observed cases where the underestimate of using PPE:

- Catching and controlling wasps, bees and hornets (no use of beekeeping helmets, overalls),
- firefighting: non-use of helmets, gloves Failing intervention, non-use or misuse of the intervention coats (especially during the summer months), non-use autonomous breathing apparatus<sup>7</sup>,
- Technical interventions: failing to wear gloves, non-use of helmets, failing to wear a shield.

### 3. INJURIES CULPABLY UNPREDICTABLE RISK

Unforeseen risk is the risk that during the intervention, emergency unpredictable, especially one random interplay of processes, non-adjacent. Firefighters who became an unforeseen accident fault risk, does not infringe any procedures or methodologies basic principles of health and safety at work. Examples fault accidents unpredictable risks<sup>8</sup>:

- uneven ground,
- drop in depth,
- a fall from a height,
- move around the snow-covered, frozen surface,
- injuries from falling objects,
- bad,
- recovering persons from a crashed car.

### ACCIDENTS CULPABLE OTHER PEOPLE, ANIMALS

It is mainly accidents caused by animals or people stressed out during repairs. Impossible behavior of persons or predict the game, especially in game, which is very sensitive to changes in the external environment conditions (shock, flames, smoke, noise, etc.)<sup>9</sup>. Accidents caused by persons who are especially when recovering from a car accident. Great risk caused

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<sup>7</sup> Decree 611/2006 Coll. the Fire Brigades.

<sup>8</sup> L. Bendáková, *Injuries firefighters during emergency operations*, VSB – TU Ostrava, Faculty of Safety Engineering, 2015, p. 75.

<sup>9</sup> M. Orinčák, *Využitie záchranných brigád HAZZ pri mimoriadnych udalostiach v zabraní, [in:] Riešenie krízových situácií v špecifickom prostredí: 15. medzinárodná vedecká konferencia: Žilina, 2.-3. jún 2010. 2. Časť, Žilinská univerzita v Žiline v EDIS, Žilina 2010. p. 557; Act. 124/2006 Coll. safety and health at work, p. 48..*



by infestation of firefighters rescuing people is disorientation in space, Stress and Panic conduct.

#### CONCLUSION

Voluntary fire brigades municipalities have their importance, particularly for interventions, which need to deploy large numbers of forces, such as forest fires, floods or storms. When intervention activities are volunteer firefighters exposed to a number of threats. Adequate knowledge and skills of firefighters can prevent the occurrence of accidents firefighters.<sup>10</sup> Injuries culpable fault of their own may not have been the situation as firefighters will use the necessary PPE and are sufficiently educated about the potential dangers and cause of their formation at the event. Injuries have been culpable unforeseen risks cannot be assumed, but appropriate training and exercises can be prevented. It is also important after the occurrence of such an event to analyze it and take measures in the future it eliminated or removed completely. Recent accidents are caused by others and birds that are foreseeable, but can never be accurately determined their behavior. It is therefore necessary to take extra care and foresight.

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