

ÚSPORA ŽIVOTA S VYUŽITÍM ODDELENÝCH ZARIADENÍ

LIFE-SAVING WITH THE USE OF BREATHING APPARATUS

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Abstract – *The foremost task of a firefighter is, just as it was 100 years ago, to save human lives. Taking this into account those involved need to be prepared for the life-saving measures taken at an increasing distance with a breathing apparatus, possibly from underground or from several floors high. The appropriate equipment and practice are necessary for successful life-saving measures.*

Keywords – *firefighter, breathing apparatus, live-saving, practice.*

INTRODUCTION

Based on our experience gained as both volunteer and career firefighters, today, in Hungary we do not devote enough practice during the training of firefighters to the process of saving human lives with breathing apparatuses. There is no properly compiled subject matter on these procedures, thus the firefighters carrying out the procedures cannot react to a possible emergency with proper speed and efficiency, the risk of errors increases. We would like to draw attention to this problem via our experience and insight gained at foreign fire departments, our on-site experience as well as by presenting respiratory protection life-saving breathing apparatuses not used here in Hungary.

1. RESPIRATORY PROTECTION

Respiration protection devices can be divided into two large groups. The first group is the apparatuses dependent on air from the environment, these act as filters (eg: gas masks). The other group is independent of air in the environment, these are isolating system/self-contained apparatuses. The isolating system/self-contained apparatuses can be further divided into open-circuit devices, such as compressed air breathing apparatuses and closed-circuit so-called oxygen breathing apparatuses.

In the rest of this study, we would like to deal with open-circuit breathing apparatuses used by several volunteer fire departments in Hungary. We examined the Fábiansébestyén Volunteer Fire Department which uses

the Dräger factory's PSS 90 and PSS 100 compressed air breathing apparatuses. PSS is an abbreviation for the German Persönliche Schutz-System as well as the English Personal Safety System. The numbers 90 and 100 indicate the differences in the structure of the framework.

2. DOMESTIC PRACTICE

At present there is no established practice for the saving of human lives with breathing apparatuses. [1][2] Novice firefighters are not trained to use the rescue mask and in process of life-saving measures. According to general practice the firefighter carrying out the rescue must have a rescue mask attached to a breathing apparatus which means that the person to be rescued or the fellow firefighter in distress consume the air available to the firefighter carrying out the rescue and this means decreased time available for the lifesaving measures. A further problem is that once the mask is on the person to be rescued, the two people are tied together and cannot safely separate. It is a basic rule that there should be twice the amount of air left for retreat as for entry. Practically this means that if the firefighter began extinguishing the fire or the rescue operation with 300 bar pressure in the tank then retreat must begin at 200 bar at the latest. There are no written rules for possible life-saving measures, the possible surplus consumption of the person to be rescued is not factored in.

2.1 Experiences abroad

The fire departments we visited in the United States /Coral Springs Fire Academy/ and in different Europe-

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an countries /England, Denmark, Germany/ provide such trainings and have such devices. The practice of life-saving is done with a breathing apparatus placed in a bag, one that is independent of the breathing apparatus used by the firefighter carrying out the rescue.

Theoretical and especially practical education on emergency management with the breathing apparatus are given special emphasis in their training. After finishing their training, firefighters are kept proficient with frequent partner-rescue drills with a breathing apparatus done at their stations.

3. DEVELOPMENT POSSIBILITIES

3.1 Dräger RPS 3500

RPS is an abbreviation for Rettungspack-System (rescue package system). The company Dräger developed this rescue kit especially for fire departments.



Fig. 1.: Dräger RPS 3500.[3]

The system's components: 1 carrying bag, weight: 3,5kg size: length: 750mm, width: 170mm, height: 290mm, 1 composite bottle, pressure decreaser, pressure meter, Y-Piece, 1 extension tube with carabiner. Optionally can be supplemented with overpressure lung governed demand valve, mask and rescue hood.

The device is suitable both for the rescue of civilians as well as other firefighters on the scene. When rescuing civilians, the procedure is to have the person being rescued receiving air from a separate respiratory protection device while, thanks to the Y-Piece, this system enables firefighters to simultaneously escort two persons to be rescued.

3.2 Scot Safety's Rit Pak

In the United States, the devices used for rescue efforts will vary state to state. This is thanks to the large variety on the market and to the varying devices used in general practice throughout the states. The products are different in form only and may have extra functions

depending on the manufacturer. The basic function of the respiratory protection devices is the same.



Fig. 2.: Scot Rit-Pak [4]

Parts of the rescue package: 1 carrying bag, 1 composite bottle, pressure decreaser, pressure meter, high-pressure unit for directly filling the tank, medium pressure unit with lung governed demand valve, 1 mask.

The system used in the United States differs from the European version in that the devices here are foremost for the rescue of firefighters in distress. The rescue kit has a high-pressure connection device which allows the firefighter to fill their tank directly based on the principle of pressure compensation.

4. RESCUING INDIVIDUALS IN DISTRESS

The firefighter carrying out the rescue effort must first ensure that their own compressed air device is functioning and then check the rescue kit. If both respiratory protection devices are in order, they begin the rescue. The firefighter carrying out the rescue takes the rescue mask from the rescue kit and places it on the person. If necessary, both of the rescue masks available can be used.

After a successful rescue effort they should escort the person to a safe place. They must check the pressure in their own oxygen tank and the one in the rescue kit. If there is not enough air in either, they must notify the commanding officer and replace the tank.

4.1 The advantages of using the device

- The firefighter carrying out the rescue only has to calculate their own oxygen consumption. This allows for lengthened operational time and distance.
- The firefighter carrying out the rescue remains independent of the injured person.
- In the event of a long rescue process the device can be replaced an unlimited number of times.
- The firefighter already using a breathing apparatus is able to replace their apparatus without removing their mask.

- Smaller numbers of firefighters are enough for lifesaving measures.
- One firefighter can escort two people out of the danger zone.
- The apparatus can be handed in through narrow gaps or lowered with a rope.

4.2 The disadvantages of the apparatus

The only disadvantage of the system to speak of is the extra weight. This, however, is not more than the weight of the equipment necessary for extinguishing fires. Because the firefighter carrying out the rescue measures does not take part directly in extinguishing the fire, there is no real surplus weight.

SUMMARY

As an employee firefighters, my co-workers and I are often in situations where we have to save someone's life using the breathing apparatus. According to the current practice, life-saving measures are carried out by giving the person to be rescued oxygen from the rescuing firefighter's compressed air breathing apparatus through the so-called rescue mask.

This means that from the time the firefighter places the mask on the person being rescued, they are tied together as with an umbilical cord. However, this also means that the amount of air available to the firefighter carrying out the rescue decreases to at least half. Throughout our firefighter training in Hungary we have not come across any teaching materials which dealt with rescuing another firefighter or a civilian in distress with a breathing apparatus. These experiences spread only via word of mouth throughout the younger generation of Hungarian firefighters contrary to western fire departments where the proper training materials and practices on the procedure have been implemented.

Life-saving procedures can be made safer with the help of the rescue system we have described and this system is suitable for more complex rescue procedures. The system could be introduced with a minimal investment and could be implemented with equipment that is already in use. Western procedures could be a good source for designing educational material on the procedure.

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