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S U M A R

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Section
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C O N T E N T S

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QUALITATIVE ANALYSIS OF EVACUATION IN EMERGENCY SITUATIONS (I)

BY

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Abstract: Fire safety regulations in Romania are currently based on prescriptive regulations, which have to be respected by the decision-makers in the design, execution and operation of buildings. However, there are situations in which the compliance with the norms in force is not sufficient.

The paper presents the conclusions of studies on human behavior during emergency situations and how the evacuation is being influenced.

Keywords: evacuation; egress time; prescriptive regulations; human behavior.

1. Introduction

In order to avoid certain costs, in building design, there are often adopted limit situations which do not require the provision of fire safety measures provided by the prescriptive regulations.

This is a disadvantage of prescriptive design regulations. For example, in crowded areas (bars, clubs, discos), in order to avoid falling into the category of “crowded rooms”, designers foresee in the technical documentation a

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maximum number of users that do not fit into these categories or adopt surfaces within limits. Consequently the related security measures provided by the normative (minimum two distinct and judiciously distributed evacuation routes, equipping with the necessary installations and systems, etc.) are not adopted.

The fact that the classification in the category of crowded rooms is based on a mathematical calculation and what is most important - based on a minimum number of users (200 on the ground floor, 150 on the other floors) may lead to the adoption of less efficient solutions regarding evacuation, even if the prescriptive regulations are met.

If with regard to the criteria for equipping buildings with fire protection systems there are situations in which the prescriptive regulations are sufficient, in designing escape routes it is necessary to take into account people's behavior, the psychosocial profile, training level, etc. - a user profile.

2. Analyzing the Conditions of Prescriptive Regulations

In designing escape routes (determination of door's width and travel distance), according to the Fire Safety Buildings Regulations, P118-99 indicative, the following aspects (hypotheses) are taken into account:

- the average speed during evacuation is considered 0.4 m/s horizontally and 0.3 m/s vertically (stairs, slopes);
- evacuation is considered to be in an ordered manner, in streams (strings of persons placed one behind the other), which walk through the escape routes to the exterior of the building;
- the evacuation flow rate (C) is determined according to the type, destination and fire risk;
- travel time (travel distance) is determined according to the destination and building's fire resistance level;
- escape routes are used equally by all users.

Studies have shown that the normal horizontal travel speed for people without disabilities is between 1.2 m/s and 1.25 m/s and the vertical travel speed is between 0.85 m/s and 1.05 m/s. During evacuation, speed is influenced by density (number of users in relation to surface), the physical condition (users with disabilities), circumstance, sex and age.

The abstraction made in Fire Safety Buildings Regulations – P118-99 regarding travel speed (*e.g.* 0.4 m/s horizontally to the actual value of 1.2 m/s) leads to a higher travel time, which can ensure a safety margin in designing escape routes (may include detection time, alarm time, recognition time, and response time - pre-movement time).

In some cases, it may lead to undersized escape routes due to the fact that the prescriptive regulations does not take into account the detection time, alarm time, recognition time, and response time, the appreciation being rough. These times are influenced by several factors such as:

- the way of detecting the fire;
- how users are alerted;
- building's destination;
- complexity / building's architecture (if there are more rooms in which a fire can develop to active phase / flashover until it is detected by the users, compared to one-room buildings where users can detect the fire from the initial phase);
- user's physical condition;
- user's reaction in emergency situations (training level).

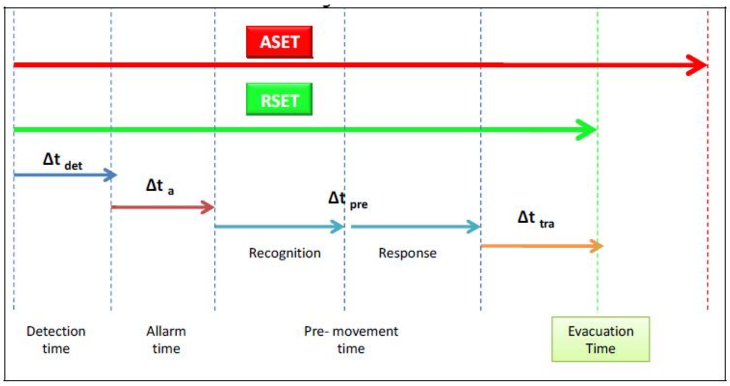

Fig. 1 – Egress process stages: ASET (Available Safety Egress Time) – calculated time available between ignition of a fire and the time at which tenability criteria are exceeded in a specific space in a building; RSET (Required Safety Egress Time) – calculated time required between ignition of the fire and the time at which the evacuation is completed.

The analysis of fires produced in crowded areas concludes that users do not evacuate one behind the other in strings. Density increases to the exit doors (funnel phenomenon), areas where the travel speed becomes null (congestion area). In panic, users push each other, with the risk of blocking the doors.

Fig. 2 – Pedestrians blocked into the exit door.

In a real situation, the travel time is higher than the one set in the regulation according to the destination of the building and the fire resistance degree. More than that, even taking into account a travel speed of 1.2 m/s, the egress time is higher than the one established in the normative. This egression time (maximum lengths of evacuation paths) do not take into account the behavior and real movement of people during emergency situations.

Studies have shown that before egress, there are distinguished the following main reactions of the users:

- the initial instinct is to feel safe inside the building during the fire initiation phase;
- people search for information (asking others, forming groups to discuss the situation, investigating the fire cause);
- people behave rationally and altruistically during fires (they help evacuating other users, search for missing persons, extinguish the fire);
- people prepare before evacuating (they get dressed, the take personal items, lock the doors etc.);
- once the egression process has started, people prefer known escape routes.

All these factors increase the pre-movement time, and therefore, the total time of egression.

The assumption that all escape routes are equally used does not take into account the fact that people have different reactions in case of a fire. From practice it is concluded that users who are constantly using and are familiar with the building, adhere to evacuation procedures and know that all exits are open (in many cases some exits are closed for functional reasons - to ensure certain traffic flows specific to building's destination) then escape routes may be used equally. However, in buildings where people's presence is only temporary and for short periods of time (hypermarkets, malls, clubs, bars, discos, etc.), some behavioral tendencies should be taken into account.

Regarding the choice of evacuation route, practice and studies have shown that:

- users tend to use the access / evacuation route they entered (they tend to respect the functional circulation flows of the building);
- building's complexity and architecture influence the choice escape routes;
- doors meant to be used exclusively for emergency are associated with something negative, and users are reluctant in using them;
- the percentage of alternative routes usage increases if there is staff present to guide pedestrians towards them;
- alternative escape routes (other than main access paths) are preferred if visual access is provided to the outside (*e.g.* if the doors are transparent).

3. Conclusion

In an engineering and pragmatic approach, the required safety egress time should be less than:

a) the time at which the temperature emitted by the evacuation paths endangers occupants' lives;

b) the time at which the fire's effluents makes it difficult to identify the escape routes;

c) the time at which the concentration of toxic gases endangers occupants' lives.

They can be determined by mathematical modeling of heat, smoke and toxic gases propagation for different fire scenarios.

It can be concluded that in designing escape routes, human behavior during emergency situations should also be taken into account. The prescriptive regulations of P118-99 are sufficient in most situations, but problems can occur during the evacuation process in buildings with a large number of people (malls, hypermarkets, clubs, discos, stadiums, churches / cathedrals, train stations, airports etc.) where people influence each other's decisions.

Starting from the above, in addition to ensuring the minimum prescriptive regulations, the cognitive and perceptual processes associated with the movement and behavior of users in emergency situations should be taken into account and there should be made an analysis of each adopted solution on the basis of different fire scenarios.

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ANALIZA CALITATIVĂ A EVACUĂRII ÎN SITUAȚII DE URGENȚĂ (I)

(Rezumat)

Reglementările pe domeniul securității la incendiu în România sunt în acest moment bazate pe norme prescriptive, pe care factorii decidenți în proiectarea, executarea şi exploatarea clădirilor sunt obligați să le respecte. Însă există situații în care respectarea normativelor în vigoare nu este suficientă.

Lucrarea prezintă concluziile unor studii referitoare la modul de comportare al utilizatorilor pe timpul situațiilor de urgență şi cum influențează acesta activitatea de evacuare.

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PRELIMINARIES ABOUT A METHOD OF CONTROL OF SOLIDIFICATION USING HEAT PIPES AS EXTERNAL COOLING DEVICES

BY

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Abstract: The paper aims to bring in a preliminary discussion the use of heat pipes for solidification control in view of fighting shrinkage, segregation and contraction flaw at the corners of castings and the steps of designing of improved thermal control moulds.

Keywords: solidification control; heat pipe; corner contraction flaw.

1. Introduction

Shrinkage and it's development on the vertical direction of an ingot is an unwanted phenomenon at the obtaining of semi-products destined mainly for rolling or forging, because this represents a serious lack of structural homogeneity: material discontinuity, segregations etc. that affect a multitude of parameters (Ioniţă, 1999; Ştefănescu *et al.*, 1986).

Among the affected parameters one mention the economic ones; the necessary cutting of a smaller shrinkage is wanted by comparison with ejecting an extended one. Segregations on the other hand can induce flaws that can be transferred without warning and sometimes very subtle in the final quality of the material obtained after rolling of forging. From this category we can

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mention the raw fiber structure with significant effects on some of the using properties of the material in the finite product (Ioniță, 1999).

For these reasons it is significant the effort that is made in practice for diminishing both effects: shrinkage and segregations.

For the parts obtained from plastics by injection, the control of cooling of metallic molds surfaces is also very important having in view the local contractions post solidification. This king of contraction flaw appears mostly at the corners of parts and has to be avoided for esthetic reasons.

2. Discussion

The ways to approach traditionally the shrinkage and segregations are linked to the control of solidification phenomenon.

The components by which one can act can be found in the sphere of influence on germination process, on fluidity on the melt material, on the dynamics of solidification front, all of them being fundamentally linked with heat transfer and temperature control during the technological process.

The germination process and germ growing depend on the variation of internal energy of the material that transforms, transformation, technological controlled by controlling the heat transfer (Ioniță, 1999; Ştefănescu *et al*., 1986).

The process of heat elimination is a very complex one, being influenced by the shape factors of the casting that solidifies, by rheological parameters – flowing in the casting pouring gate and flowing inside the mould and its filling up, by the heat transfer variable coefficients of radiation, convection and conduction.

In essence, the quantity of heat that must be eliminated "in control" during solidification can be computed if we know the latent heat of solidification of the material, parameter that can be determined rather easily from literature or even by experiment. Also we can compute the quantity of heat that must be eliminated during the casting cooling down to the environmental temperature by knowing the specific heat of the material and using the calorimetric equation.

The concrete way of elimination of heat from a casting depends on the heat transfer exchange surfaces: sizes and shapes; the nature and thermal characteristics of mould regarded as environment for heat transportation: gas, liquid or solid; thermal characteristics of the environment: temperature, humidity, air currents, presence of other heat sources etc.

From the technologic point of view, the solidification front control can be achieved by using internal or external coolers, feeder heads or even hot bricks, by using anodes for maintaining the liquid alloy longer in the superior section in the pouring position, the use of vibratory tables an vibratory bridges, electromagnets positioned in the pouring gate etc. (Ioniță, 1999; Ştefănescu *et al.*, 1986).

By these measures one aims to maintain the angle of the solidification front as close to 180 degrees as possible so the shrinkage to have the smallest extent possible by reporting to the total useful height of the ingot, the ideal being that the shrinkage to be entirely contained in the shrinkage head.

The interior coolers, used as germination support can have different sizes and shapes and can be positioned in well précised points in the mould, mainly in the thermal knots (Ioniță, 1999; Ştefănescu *et al.*, 1986).

All the interior coolers must be dimensioned and positioned taking into account the fact they are subject to thermal dilution. This means that after solidification of the alloy they cannot be the source of a lack of homogeneity in terms of chemical composition, situation in which they can be the cause of flaws (Ioniță, 1999; Ştefănescu *et al.*, 1986).

For the exterior elements of solidification control, shrinking head type we can associate, in certain conditions external coolers build using the principle of heat pipe or using the principle of Perkinson tubes (Bădărău, 2000, 2003; Chi, 1976).

This consideration is based on two relevant factors named by the literature: the heat pipe as heat accumulator and the heat pipe as heat exchanger. The Perkinson tube can also be used like an efficient heat sink at constant temperature (Bădărău, 2000; Chi, 1976).

Heat pipes are well known as high performance heat exchangers.

The construction of the device called heat pipe and its operation is simple from the theoretic point of view: an envelope that contains a wick positioned on the interior side of the envelope wall and a working fluid which by means of its vapors transports heat from a hot zone of the envelope to the cold zone of the envelope. The hot zone, in which the heat is accepted and implicitly where the evaporation of the working fluid take place is called evaporator. The cold zone in which the condensation of vapors take place and heat is rejected is called condenser. Between the two zones it exists an adiabatic zone, where heat transfer can be neglected. The wick has the role of transporting through capillarity the condensed working fluid back to the evaporator and thus closing the circuit enabling the continuous transport of energy between evaporator and condenser as long as a difference of temperature exists between the two active parts of the device (Bădărău, 2000; Chi, 1976).

As heat accumulator, the idea of using heat pipes in the industry of materials is not new. In the literature there are reports of heat pipe use in achieving furnaces for heat treatment characterized by an especially high uniformity of temperature inside the chamber, indicated for heating parts made by ultrasensitive materials at heat differences, at the treatment of quenching.

There are also reports for controlling temperature in very close limits of drawing dies used in synthetic fiber obtaining processes, control achievable by providing variable quantities of heat at constant temperature (Bădărău, 2000; Chi, 1976).

The principle of accumulation of heat in the heat pipe consists in he presence of heat as latent heat of vaporization-condensation at the saturation temperature of the working fluid in the given construction. For the heat pipe in classic construction and in this use, variables can be the evaporator temperature and condenser temperature, the local pressure of vapor and implicitly there speed of circulation, implicitly the heat flux between evaporator and condenser (Bădărău, 2000, 2003; Chi, 1976).

The literature mentions also situations of constructions and use for temperature control of heat pipes (Chi, 1976) with controlled working fluid accumulator, that demonstrates the better capacity of thermostat of the heat pipe, in a wider range of external temperature variation. “The thermostat” is achieved by the variation of the active volume of working fluid through the existence and the controlled accumulator. This is equivalent to the modification of the volume of heat pipe at the variation of inletting or extraction of heat in operation. The internal pressure remains constant, implicitly the saturation temperature of vapor and variables become the quantity of heat stored at a certain moment, the active fluid quantity, the accumulator control.

About the use of heat pipes in solidification control, the efforts made are less visible in the literature (Bădărău, 2003).

The authors consider that their potential in the solidification control of metallic alloys is an important one and after exploring from the theoretical point of view this could be better valued.

3. Principles of Designing of Controlled Temperature Casting Moulds Using Heat Pipes

The purpose of this paper is to establish at theoretic level the steps for achieving improvements in the control of temperature casting moulds and heat transfer using heat pipes.

For designing such a mould the following major steps are to be made:

– designing of the mould using the classic method and principles;

– establishing the points that require a better control of heat transfer at solidification;

– establishing the shapes and sizes of surfaces on which the control is needed;

– estimation of the necessary heat transfer in a certain zone and the sense of heat transportation;

– the preliminary choice of the variant of heat pipe that meats better the previous requirements;

– designing the heat pipe;

– redesigning the casting mould by including the heat pipe.

The first step can be achieved using the data from the specific literature and recommendations – experience is valuable to reach expected results as little segregation and little contraction or shrinkage (Ştefănescu *et al*., 1986). There can be also used a computer simulation dedicated software.

Experience accumulated in designing casting technologies is useful also to foresee the position of the thermal knots, the points that require a better control of heat transfer at solidification. In this case also one can use computer simulation dedicated software .

The sizes and shapes of shrinkage flaws can be estimated by comparing results of using of classic casting technologies. Usually this kind of data are available in casting workshops. The concrete case is decisive in this approach.

For example for eliminating the contraction flaw ar corners we must take into account the existent data concerning the occuring and the sizes of this type of flaw – and the surface on which the control of temperature must be improved will cover the potential flaw. Of course, in the context of various castings complementary measures must be taken too for avoiding the displacement of shrinkage inside the walls.

For estimation of necessary quantity of heat to be transferred, the direction and the speed of doing that, we can use average thermo-physic values of the alloy and the geometric sizes of the casting to be made. The simulation can be valuable too. The concrete case is also decisive.

The preliminary choice of the heat pipe means the choice of the working fluid, considering the saturation temperature.

The designing of the heat pipe can be made by the classic procedure (Chi, 1976; Ioniță, 1999).

The redesigning of the mould consists in integrating the heat pipe and eventually the control installations in the design of the classic mould.

Sometimes sizes cannot be managed and in this case the approach must be aborted.

4. Comments

It is obvious that the introduction of heat pipes in the construction of moulds must be seriously justified from many point of views because it represents a serious complication from the technological point of view.

Some examples of complications: growing of the sizes of the casting assembly by introduction the heat pipes and the elements of control; ensuring suplimentary installations for heat transfer to the environment – electrical installation, hydraulic, ventilating or pneumatic installations.

This kind of investments cam be justified in processing special parts made from special materials or even in mass production.

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PRELIMINARII ASUPRA UNEI METODE DE CONTROL A SOLIDIFICĂRII
UTILIZÂND TUBURI TERMICE CA RĂCITORI EXTERIORI

(Rezumat)

Lucrarea îşi propune aducerea într-o discuție preliminară a utilizării tuburilor termice pentru controlul solidificării în scopul combaterii retuşării, segregațiilor şi a defectelor de contracție la colțurile pieselor turnate şi paşii proiectării unei forme cu control al solidificării îmbunătățit.

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HEALTHY AGING THROUGHOUT PROFESSIONAL LIFE REFLECTED THROUGH A HEALTHY AVERAGE LIFE EXPECTANCY

BY

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Abstract: Healthy average life expectancy HLE is an indicator that measures how many years on average is expected to live in good health a person of a certain age, according to the specific rates of mortality, morbidity and disability risk for that year.

In the international practice, the HLE indicator(healthy average life expectancy) is used and promoted by World Health Organization – WHO as a tool for monitoring the health status of the population with a direct impact on supporting and actively encouraging a healthy aging throughout the professional life.

HLE indicator facilitates the analysis of the following aspects:

a) monitoring the general trends regarding the health of the population;

b) identification of health inequalities and differences in some sub-populations;

c) healthy aging during the professional life.

The paper analyzes the connection between the healthy average life expectancy and the healthy aging throughout the professional life.

Keywords: healthy average lifespan; healthy aging.

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1. Introduction

Improving the health of the population is a priority for the governments of the EU member states (Corăbieru *et al.*, 2015).

The improvement of health status of the population contributes to:

a) reduction of production losses caused by medical leaves;

b) reduction of premature mortality and maintaining the full human potential;

c) prevention of early retirement due to chronic illness or disabilities;

d) freeing the resources that should be spent on treatment of diseases.

The good health status of the population is a compensation mechanism for:

a) maintaining the economic growth in the context of workforce reduction as a result of demographic aging;

b) prolonging the work capacity;

c) increase of labor supply;

d) increase of productivity at work.

Currently, the scientific data support the idea of a correlation between the population health status and the economic development. Economic growth improves the health of the population and a healthy population contributes to economic growth. Also the improvement of the population health creates the premise of a healthy aging, respectively the assurance of the functional capacity and autonomy for a long time.

2. Current European Situation in Terms of Healthy Average Life Expectancy

The current situation at European level is characterized by the following aspects:

a) average life expectancy at birth exceeded 70 years;

b) chronic diseases prevail in the morbidity structure;

c) the risk of illness is no longer related to the risk of death.

Under these circumstances, the average life expectancy indicator is no more sufficient to monitor the health status of the population throughout their professional life.

The healthy average life expectancy – HLE, calculated by using Sullivan method (Sullivan, 1971) divides life expectancy into different lifetime health statuses. This indicator adds a qualitative dimension to the quantitative notion of average number of years lived. HLE measures how many years on average is expected to live in good health a person at a certain age, given the specific rates of mortality, morbidity and disability risk for that year. HLE is an indicator of health status that reflects the impact of mortality and morbidity

(INS, 2013; Sullivan, 1971). According to WHO recommendations for calculating the indicators that characterize the functional capacities of the population, the national surveys include three main questions concerning: self-assessment of health; existence of chronic diseases; limitation of activity.

3. Using HLE Indicator in Healthy Aging Analysis

The HLE indicator is closely related to:

– demographic variables;

– life expectancy at birth;

– indicators of human health;

– economic indicators as an integral part of the development.

The HLE indicator gives an overview of the following aspects:

– the living and working conditions of the population;

– accessibility and quality of healthcare services;

– impact of health on environment (which is an integral part of the development).

HLE is an indicator used by the decision-makers:

– to monitor the general trends in the health status of the population;

– to identify health inequalities or differences within some sub-populations;

– to monitor the functional changes of the elderly population with the purpose to ensure and promote an active aging.

The surveys carried out within the EU demonstrate that the average life expectancy – LE for the total population is in a slow but steady growth, while the healthy average life expectancy – HLE (including the assessment of very good, good and satisfactory health) prove a more intense growth.

These changes show that there is a compression of the morbidity (Sullivan, 1971; WHO, 2015), which consists of the following:

– compression of diseases to a shorter period;

– concentration of diseases in advanced age;

– reduction of mortality and increase of LE is accompanied by improved health.

The proportion of time spent in a very good, good and satisfactory health status is reduced with aging. There is a high proportion of time spent in bad or very bad health starting with the group aged 50-54 years (about 25%), which presents a barrier to prolonging the active life and active aging, namely the healthy aging.

Due to HLE indicator, the main objectives of EU health policies focused on the aspects below:

– increasing the accessibility of quality healthcare services for the vulnerable segments of population;

– reducing disparities in mortality and morbidity among different socio-demographic groups;

– fighting against cardio-vascular diseases by promoting health and education for health;

– increase of investments meant to improve the average health status by a multi-sectoral approach;

– additional allocation of resources for health, education, housing and working conditions.

4. Analyzing the Connection Between the Healthy Average Life Expectancy and Healthy Aging (Time Lived in Good Health)

With aging, the proportion of time lived in good health decreases. Women are the ones who live longer, but the proportion of time spent in good health is lower than in men. Although they have a worse health condition, women manage to live longer, mainly due to the following elements:

a) they are more attentive to the various symptoms of the disease;

b) they address more often to doctors for prevention purposes;

c) they are less involved in high-risk jobs;

d) they generally lead a more temperate life compared to men.

The residence environment is an important factor determining the average life expectancy – LE and the healthy average life expectancy – HLE. Thus, people living in villages live less and have a lower healthy average life expectancy than those in the cities.

For elderly people it is important to maintain the functional capacity and autonomy as much as possible. Current data reveal that the age group of 60-64 years will spent a significant part of time in bad and very bad health status. Thus, women belonging to this age group, with average life expectancy of about 20 years, will have a healthy average life expectancy of 11.56 years (very good, good and satisfactory health)and during 8.49 years they will live in bad and very bad health condition (42.3% of time). Men in this age group, with average life expectancy of 16 years approximately will also live 11 years in very good, good and satisfactory health (healthy life expectancy) and only 4.95 years in a bad and very bad health condition (31%) (http://ec.europa.eu/health/...; INS, 2013).

The results demonstrate the existence of a problem related to the disease burden in women, especially in older ages. Research supports the idea that women and men react differently to stressful events of the life: men through aggressiveness and alcohol abuse, women through psycho – emotional disorders.

Most European countries made significant progress in raising the average life expectancy and increasing the healthy average life expectancy - HLE due to the prevention of cardio-vascular diseases which is one of the main causes of population mortality in European area. At present, mortality and the incidence of cardio-vascular diseases are declining in the countries of the northern, southern and Western Europe, while in the central and eastern countries the situation does not have positive changes (WHO, 2015).

Most cardio-vascular diseases can be prevented by taking action against risk factors: smoking, unhealthy diet, obesity, lack of physical activities, alcohol harmful consumption. Even though the mortality rate by cardio-vascular diseases in the European countries is decreasing, currently the number of cardio-vascular patients (men and women) is increasing. This paradox is due to increased longevity and improved survival in people with cardio-vascular diseases.

At present, the main objectives of the health policies are the following ones:

i) increasing accessibility of quality healthcare services for vulnerable social segments;

ii) diminution of disparities in the mortality and morbidity among different socio-demographic groups;

iii) fighting against cardiovascular diseases by promoting health and education for health;

iv) increase of investments to improve health through a multi-sectoral approach;

v) supplementary allocation of resources for health, education, housing and working conditions.

5. Analysis of Healthy Average Life Increase

The healthy average life expectancy is determined on the basis of self-perception of health status and possibility to carry out the daily activities or on the basis of the chronic diseases suffered by the respondents.

The healthy average life expectancy is independent of the size and structure of the population but allows for direct comparisons with population groups, socio-professional categories as well as between EU countries. The European Union decided to include a set of questions regarding the health status in order to provide a set of indicators (ECHI) on:

– dimension and measurement of disabilities, limitation of activity respectively;

– dimension of chronic diseases;

– dimension of health status perceived by population by self-assessment.

The Minimum European Health Module (MEHM) formed of 3 general questions that cover these dimensions has been introduced in the Statistics of Income and Living Conditions (SILC) that improves the comparability of healthy average life expectancy between countries.

The average life expectancy and the healthy average life expectancy at 65 years and older for EU countries are based on the indicators regarding the activity limitation, the existence of chronic diseases and the self-assessment made by means of the data collected through SILC.

In 2011 at EU level the average life expectancy of women aged 65 years and older was of 21.3 years while for men it was 17.8 years. On the basis of SILC survey data, the healthy average life expectancy of women aged 65 years and older at EU level was of 8.6 years without any limitation of activities (40% of the life expectancy at 65 years and over), 7.7 years (36%) with moderate limitation of activities and 5.0 years (24%) with severe limitation of activity (OECD, 2014; WHO, 2015).

The healthy average life expectancy of men at the same age in EU was also 8.6 years, the same as the value registered for women (48% of the life expectancy at 65 years and over), 5.9 years (33%) with moderate limitation of activity and 3.3 years (19%) with severe limitation of activity. However, women aged 65 years and older live longer without chronic diseases (8 years) compared to men (7.2 years). The life expectancy of women aged 65 years and older is by 3.5 years higher than men aged 65 years and over but women live a longer period of their life with health problems.

6. Conclusions

A longer life in good health is an important objective for the societies with aging population. Healthy aging does not mean just the absence of disease; it is more important for people to maintain their functional capacity and autonomy. If the necessary policies are not implemented and the proper investments for population healthcare are not made to facilitate the increase of healthy average life expectancy - HLE, the losses to society will be large and hard to recover.

EHLEIS (European Health and Life Expectancy Information System) and EurOhex (site that provides access to research on healthy average life expectancy in Europe) have the role of coordinating the activity of analysis, interpretation and dissemination of average life expectancy and healthy average life expectancy in order to add the qualitative dimension to the quantitative dimension of the life of the populations in European countries. The HLE indicator highlighted less known phenomena such as:

a) the time spent in a bad health status starting with the age group of 50 – 54 years (about 25%) is the barrier to prolonging active life and healthy aging;

b) European paradox: mortality rate because of cardio-vascular diseases is decreasing but the number of patients with cardio-vascular diseases is increasing (due to increased longevity and improved survival).

The direct connection between the healthy average life expectancy, economic development and healthy aging has a common denominator: quality of life starting from the quality of air and food and ending with the diminution of stress at the workplace and diminution of the time spent at the workplace.

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ÎMBĂTRÂNIREA SĂNĂTOASĂ PE PARCURSUL VIEȚII PROFESIONALE REFLECTATĂ PRIN PRISMA SPERANȚEI MEDII DE VIAȚĂ SĂNĂTOASĂ

(Rezumat)

Speranța medie de viață sănătoasă SVS este un indicator care măsoară câți ani în medie este de așteptat să trăiască o persoană la o anumită vârstă în stare bună de sănătate, în conformitate cu ratele specifice de mortalitate, morbiditate şi riscul de invaliditate pentru anul respectiv.

În practica internațională a fost introdus indicatorul SVS – speranța medie de viață sănătoasă, care este utilizat şi promovat de Organizația Mondială a Sănătății – OMS în calitate de instrument pentru monitorizarea situației în domeniul sănătății populației cu impact direct asupra susținerii şi promovării unei îmbătrâniri sănătoase pe parcursul vieții profesionale.

Indicatorul SVS facilitează analiza următoarelor aspecte:

a) monitorizarea tendințelor generale privind starea de sănătate a populației;

b) identificarea unor inegalități şi diferențe cu privire la sănătate în cadrul unor subpopulații;

c) îmbătrânirea sănătoasă pe parcursul vieții profesionale.

Indicatorul SVS a focusat obiectivele principale ale politicilor UE în domeniul sănătății pe următoarele aspecte:

a) creşterea accesibilității serviciilor medicale de calitate pentru segmentele de populație vulnerabile;

b) reducerea disparităților în mortalitatea şi morbiditatea între diferitele grupuri socio-demografice;

c) combaterea bolilor cardio-vasculare prin promovarea sănătății şi educației pentru sănătate;

d) majorarea investiţiilor pentru îmbunătăţirea stării medii de sănătate printr-o abordare multisectorială;

e) alocarea suplimentară de resurse pentru sectorul de sănătate, educaţie, locuinţe şi condiţiile de muncă.

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THE CREW PROTECTION FOR SAFETY AND HEALTH AT WORK IN THE CASE OF CHEMICAL ACCIDENTS INTERVENTIONS

BY

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Abstract: Chemical, biological, radiological and nuclear risks, shortly named CBRN, can have major national and international effects by causing a large number of victims, giving a new dimension to the emergencies caused by natural disasters, accidents or terrorist attacks. Intervention operations for CBRN events take place in a different manner from case to case, depending on the specific deployment conditions: the area in which the event occurred, time of day, the materials involved, the weather conditions, the impact of teams that can intervene etc. For this reason, an Emergency Situation intervention mission on the CBRN protection direction should cover three main areas:

1) avoid contamination of the population and public interest objectives;
2) protection of the population in the affected area, of the intervention teams, of the equipment and materials;
3) decontamination of the affected area, of the population and intervention techniques.

It is clear therefore that there should be a special concern for the protection of intervention personnel executing CBRN missions, because they must always have operational capability for accurate and timely execution of necessary protective measures.

Keywords: CBRN; protection measures; risks; intervention.

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1. Introduction

Chemical, biological, radiological and nuclear risks(CBRN) give a new dimension to possible terrorist attacks, accidents, natural disasters and/or pandemics due to transnational effects and tocausing a large number of victims.

A proper reaction to such a threat not only includes intervention programs but must be anticipated much earlier in the framework of handling these materials, adequate storage, limited access and control.

The statement from the European Council in Ghent on October 19th 2001 (as a direct reaction to the attacks on September 11th 2001 in New York), kicked off the EU involvement in CBRN programs, focusing on fighting terrorism "in all its forms and everywhere in the world". The EU action plan in the CBRN field adopted by the Council of Europe in November 2009 is divided into three sections: prevention, detection,training and response.

It is essential to recognize the importance of all three of these aspects in the context of approaching CBRN materials in order to ensure the proper implementation of risk assessment studies, responses and countermeasures.

Accidents or the CBRN attacks pose serious threats to the security of European Union inhabitants and can disrupt vital infrastructures and normal functioning of companies in one or more Member States, regardless of borders.

CBRN protection should be carried out on two main directions:

1. ***intervention management:***the use of specific instructions, regulations, methods, guidelines and equipment to ensure the individual and collective protection of the population, material goods and environment, protection of personnel and their own equipment, implementation of medical measures and countermeasures of treatment and prophylaxis in order to maintain operational capabilities of its own structures and conduct normal social and economic life, in case of weapons of mass destruction use (WMD), other emissions than the attack (EADA) as well asattacks/terrorist bombings, which can result into radioactive, chemical or biologicalcontamination;

2. ***protection management of population, goods and environment*** is the attribute of management and intervention structures in emergency situations/civil protection situations, with the objective of survival in environments/CBRN conditions and reducing vulnerability to CBRN situations by: identifying, assessing, anticipating their production , organizing, endowment and preparation of intervention structures, ensuring CBRN training and protection of population, employees and intervention forces, asset protection, environmental factors.

The purpose of CBRN protection focuses on three general directions, specific to risks arising from CBRN incidents:

1. avoid contamination of thepopulation, of national/regional public interest objectives or elements of critical infrastructure;

2. protection ofthe population, intervention units/subunits, materials and equipment in the affected area;

3. decontamination of the population, land, personnel and intervention techniques in order to restore the operational intervention capacity.

The Inspectorate for Emergency Situation missions on the CBRN protection line provide:

a) identifying, monitoring and managing the types of CBRN-related hazards in the competence area;

b) prevention actions by conducting risk analysis on CBRN threats on the competence area;

c) performing preventive checks at public institutions and economic operators that are a CBRN risk source;

d) implementing preventive measures to reduce risks in CBRN area;

e) participation with specialized resourceswhenperforming CBRN research and markingthe contaminated areas;

f) CBRN protection of structures belonging to Inspectorate for Emergency Situation by organizing and equipping the units/subunits and ensuring adequate training of the personnel in the field;

g) monitoring the contamination of personnel carrying out actions/tasks in CBRN-contaminated areas, as well as of personnel caught/exposed in such areas;

h) executing the decontamination of its own intervention personnel and of the contaminated persons other than its own intervention personnel as well as of the equipment and equipment used in CBRN environments;

i) coordinating categories of forces and provisioning specialized technical support in order to restore the areas affected by a CBRN incident;

j) assuring support functions during the execution of public order actions.

For intervention forces carrying out missions in the CBRN environments it is essential to maintain leadership and operational capabilities, equipping, training and their continuing cooperation for the proper and timely execution of CBRN protective measures.

Within this context, CBRN protection capabilities are designed to ensure the survival and operation of CBRN conditions/environments of intervention forces to accomplish the tasks in the field of CBRN protection.

One of the key equipment used in intervention actions is the CBRN ***First Assessmentand Research Fire Truck*** from the Inspectorate for Emergency Situation endowment, which thus ensures the CBRN Protection Concept within the National Management Emergency Situations System as well as the EU Directives.

It is used both prior to the intervention of the main forces which limit and eliminate the effects of emergency situations as well as during actual intervention actions in both the contaminated district and/or as support in decision-making, making it possible to ensure the planning uniformity, preparation, evaluation and execution of operations in the event of threats or CBRN risks. The capabilities and working possibilities of the fire truck are as follows:

1. chemical air monitoring from a potentially contaminated area through the AIR MONITORING process;
2. analysis of air, soil and liquid samples in steady state;
3. STL monitoring (RAID-M ionic mobility spectrometer);
4. monitoring of gamma radiation and neutron flux (SVG2 detector);
5. transport of biological samples (microbiological hood with protective class 3)

The crew of the CBRN intervention vehicle is basically composed of 4 members, as follows:

- Crew Commander and Dosimetrist;
- Driver and decontamination officer;
- Two specialty researchers and decontamination officers.

2. Case Study

Within this case studya computerized risk assessment was made using the simulation program A.L.O.H.A. based on a scenario of a SEVESO site (at Private company that produces drugs for human and veterinary use). The purpose of the risk assessments is to approximate and visualize the level of danger posed by the site for the population and the environment.

A.L.O.H.A. (Areal Locations of Hazardous Atmospheres) is a program designed to model chemicals leakage, mainly for emergency services.

The program is part of the CAMEO software set made by N.O.A.A. (National Oceanic Atmospheric Administration) and can estimate in real time how toxic a cloud can be when dispersed from chemical leakages and also some fire and explosionsscenarios. The result provided by the program takes the form of risk areas analyzing the main parameters such as: toxicity, flammability, and heat flux or overpressure flow reported to a maximum accepted level.

The program enables scenarios such as: jet fires, lake fires, vapor clouds explosions, toxic clouds, or BLEVE(boiling liquid expanding vapor explosion); BLEVE type explosions are considered the most serious accidents that may occur in the event of a fire. These are very dangerous because they occur unexpectedly, usually during the intervention (it takes a period of time that can take up to tens of minutes or hours from the involvement of a tank in the fire and until the explosion) and causing the release in a very short time of an enormous energy amount.

The limitations imposed by the program in the modeling of each scenario consist of the following:

 the program does not take into account chemical reactions that may occur in case of chemicals or during the scenario modeling;

 the program does not take into account landforms, buildings, etc .;

 the program does not take into account fragments that may arise from explosions or other phenomena during modeling;

 theprogram cannot shape mixtures of substances.

Scenario type:Dangerous substance leaked out of the tank forms a pond which evaporates in the surrounding environment.

Situation: A vertical cylinder, with a diameter of 4 m, a height of 10 m and a volume of 126 m 3 with methanol suffers in unknown conditions a circular crack of 15 cm in diameter at 1 m above the ground.

Run time of the scenario: 60 minutes.

Table 1

Input Data for Scenario no.1

Operative time (pictured)	20.08.201712:25
Dangerous substance	Methanol
Weather conditions	Wind speed 2 m / s
	Wind direction S-E
	Clear sky
	Air temperature 40 ^{o} C
	Relative humidity 5% (dry atmosphere)
	The temperature at ground level 45 ^{o} C
Physical state of the substance	Liquid at a temperature of 20 ^{o} C
The volume of liquid in the tank is 100 tons, a filling level of 79.6%.	
The liquid in the tank leaks on a concrete surface	

Data are entered into the program A.L.O.H.A. as shown in Fig. 1.

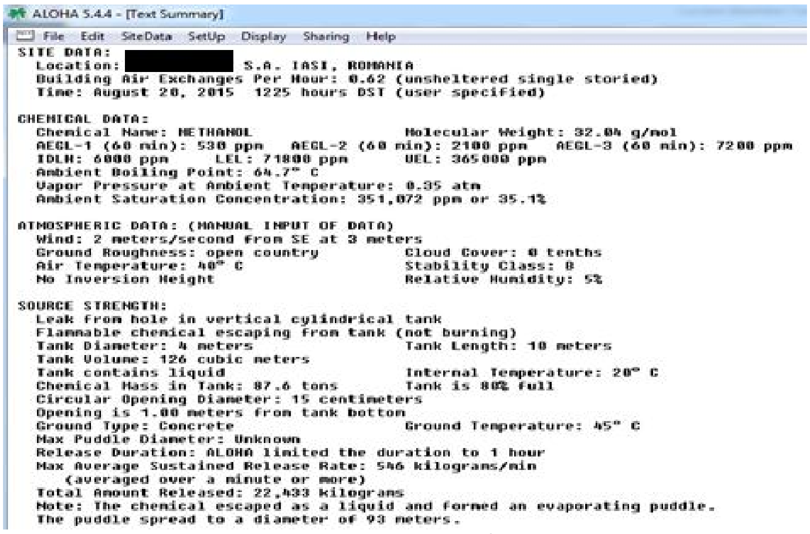
As a result of modeling the scenario introduced by ALOHA program,resulted as follows:

- the flow rate of the fluid (methanol) from the tank is 546 l/min;
- 22.433 liters of methanol ware drained in 60 minutes;
- the drained quantity formed a pond with a diameter of 93 meters that evaporates;
- the evaporation velocity of the liquid from the pond under atmospheric pressure is shown in Fig. 2.

Approximately 600 liters of methanol evaporate in 60 minutes to form a toxic cloud in the atmosphere. For the toxic cloud formed in the atmosphere, the program shapes three danger areas, as shown in Figs. 3 and 4:

1) the yellow area corresponding to a maximum accepted level of up to 200 ppm (concentration) of methanol in the air;

2) the orange area, which corresponds to a maximum accepted level of up to 1000 ppm (concentration) of methanol in the air;


ALOHA 5.4.4 - [Text Summary]
File Edit SiteData SetUp Display Sharing Help
SITE DATA:
Location: [redacted] S.A. IASI, ROMANIA
Building Air Exchanges Per Hour: 0.62 (unsheltered single storied)
Time: August 20, 2015 1225 hours DST (user specified)

CHEMICAL DATA:
Chemical Name: METHANOL Molecular Weight: 32.04 g/mol
AEGL-1 (60 min): 530 ppm AEGL-2 (60 min): 2100 ppm AEGL-3 (60 min): 7200 ppm
IDLH: 6000 ppm LEL: 71800 ppm UEL: 365000 ppm
Ambient Boiling Point: 64.7° C
Vapor Pressure at Ambient Temperature: 0.35 atm
Ambient Saturation Concentration: 351,072 ppm or 35.1%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)
Wind: 2 meters/second from SE at 3 meters
Ground Roughness: open country Cloud Cover: 0 tenths
Air Temperature: 40° C Stability Class: B
No Inversion Height Relative Humidity: 5%

SOURCE STRENGTH:
Leak from hole in vertical cylindrical tank
Flammable chemical escaping from tank (not burning)
Tank Diameter: 4 meters Tank Length: 10 meters
Tank Volume: 126 cubic meters
Tank contains liquid Internal Temperature: 20° C
Chemical Mass in Tank: 87.6 tons Tank is 80% full
Circular Opening Diameter: 15 centimeters
Opening is 1.00 meters from tank bottom
Ground Type: Concrete Ground Temperature: 45° C
Max Puddle Diameter: Unknown
Release Duration: ALOHA limited the duration to 1 hour
Max Average Sustained Release Rate: 546 kilograms/min
(averaged over a minute or more)
Total Amount Released: 22,433 kilograms
Note: The chemical escaped as a liquid and formed an evaporating puddle.
The puddle spread to a diameter of 93 meters.

Fig. 1 – Input data in ALOHA for the scenario.

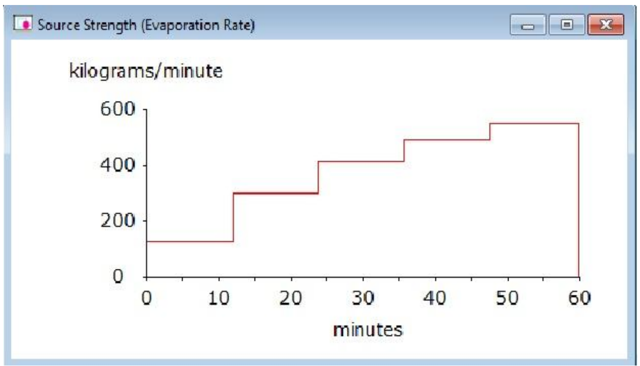


Fig. 2 – Evaporation rate of methanol.

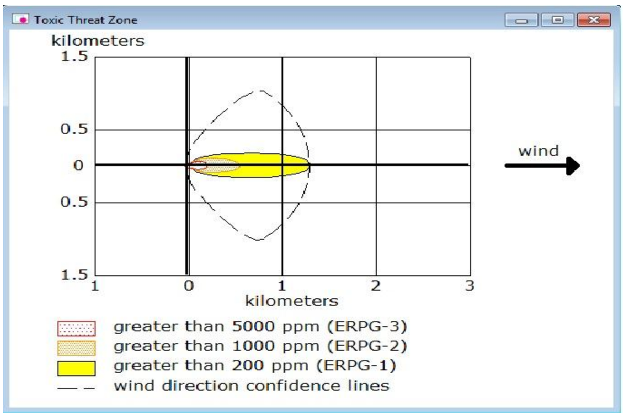


Fig. 3 – ALOHA Capture - Danger Areas.

3) the red area corresponding to a maximum accepted level up to 5,000 ppm (concentration) of methanol in the air.

The concentration that the program indicates for each danger area complies with the professional emergency services intervention guidelines for dangerous hazardous substances.

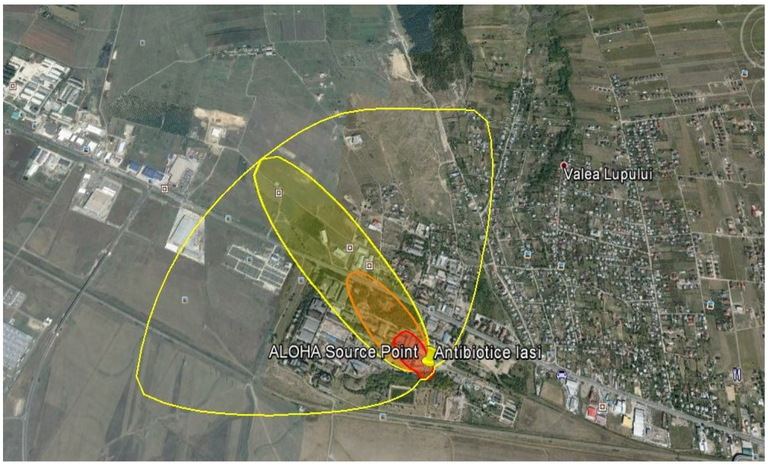


Fig. 4 – Designing danger areas on the locality.

Measures to be taken in case of incidents / events involving dangerous substances:

1) During the accident:

- notify alarm and evacuate the personnel from the workplace;
- inform competent authorities;
- ensure the first intervention;
- warn, alarm the population on an area of about 9 km² from the center in the place of the outbreak;
- ensure measures to start evacuation of the population, mainly in the wind direction;
- continuous track of wind speed and direction;
- provide a first aid and medical assistance point.

2) After the accident:

- establish identified concentrations anddegree of contamination;
- neutralize hazardous substance and limit its effects;
- relocate population and economic activity resumption.

3. Conclusion - Instructions for Safety and Health at Work in the Case of Chemical Accidents Interventions

- Special Equipment on the fire truck intended for intervention in case of a nuclear accident, biological, chemical and radiological (CBRN) intervention must be handled only by the fire truck crew;

- It is prohibited to join CBRN crew with workers who have suffered physical injuries of the skin, respiratory diseases or with poor health status;
- The CBRN crew commander is required to dispose the necessary measures to ensure against falling off the fire truck's equipment (measuring devices, control, warning, etc.) during the journey;
- The CBRN crew commander is responsible for verifying the existence of individual dosimeters for CBRN crew members;
- During the journey, the crew commander and the dispatcher should keep full contact with each other in order to provide new information or clarifications relevant to the safety of crews;
- At the intervention site, the driver places the CBRN truck taking into account the planimetric levels (high quotas), the predominant direction of air propagation and a safe distance from the source, in order to avoid contamination of intervention personnel and of the truck's equipment;
- During the recognition process, until the CBRN threat is identified, the individual Protective Equipment Level A is maintained. Prior to the above equipment, physical integrity is checked (the existence of cuts, perforations, stitching, loosening, etc.) and the tightness of the protective suit (by introducing pressurized air into the suit, using the compressed air cylinder);
- During recognition, the CBRN crew Commander must establish, on a priority basis, the potential risks for the personnel involved in the intervention, such as: the possibility of explosions, contamination, cracks in building elements; The presence of dangerous animals / unpredictable reactions, the existence of uncovered voids, etc.;
- Relevant information concerning the above mentioned risks can also be obtained from specialists from the target site (type, location, storage mode, quantity of substances involved, etc.);
- Intervention with extinguishing substances is prohibited until identification of the substance that produced the contamination;
- Only the forces and means strictly necessary for the intervention are concentrated in the contaminated area, and the presence of the personnel not directly related to the intervention action is forbidden;
- In the case of possible radioactive contamination, the CBRN crew commander shall designate a person responsible for the dosimetric control of the personnel involved in the intervention who will record radiation doses and the exposure times;
- CBRN crew members are forbidden to exchange materials between themselves (*e.g.* compressed air breathing apparatus, gas mask, full protection, etc.);
- In order to avoid CBRN contamination, it is necessary to establish contaminated rayon limits (using the means of marking specific to the contamination types), to reduce the displacements in the rayon and to achieve control of the movement in / from it;
- Decontamination points are provided with dedicated equipment, solutions and decontamination accessories;
- It is forbidden to consume fluids, food and smoking in the perimeters delimited by the intervention team personnel;

- It is mandatory to take all measures to prohibit the leave of the quarantine area of persons or animals as well as to remove contaminated objects (contaminated persons and animals are considered contaminated when consuming food or suspect water, have touched various contaminated objects or have come in direct contact with people and animals).

After completing the intervention, the equipment, accessories, work equipment or protective equipment, materials used in areas where contaminants or contaminated products are handled are cleaned, washed and disinfected in specially designed areas.

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PROTECȚIA PERSONALULUI DE INTERVENȚIE PE TIMPUL INTERVENȚIILOR LA ACCIDENTE CHIMICE

(Rezumat)

Riscurile chimice, biologice, radiologice şi nucleare, numite pe scurt CBRN, pot avea efecte majore naționale şi internaționale prin provocarea unui număr mare de victime, dând o nouă dimensiune situațiilor de urgență cauzate de catastrofe naturale, accidente sau chiar atacuri teroriste. Operațiile de intervenție în cazul evenimentelor CBRN se desfăşoară diferit de la caz la caz, în funcție de condițiile specifice de producere: zona în care s-a produs evenimentul, momentul zilei, materialele implicate, condițiile meteo, impactul, echipele ce pot interveni etc. Din acest motiv, o misiune de intervenție IGSU pe linia protecției CBRN trebuie să acopere trei direcții principale:

1) evitarea contaminării populației şi obiectivelor de interes public;

2) protecția populației din zona afectată, a echipelor de intervenție, a echipamentelor şi materialelor;

3) decontaminarea zonei afectate, a populației şi tehnicii de intervenție.

Este clar astfel că trebuie să existe o preocupare specială pentru protecția personalului din forțele de intervenție ce execută misiuni CBRN, deoarece acestea trebuie să aibă oricând capabilitate operațională pentru executarea corectă şi oportună a măsurilor de protecție necesare.

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TECHNICAL AND ORGANIZATIONAL MEASURES OF SAFETY WORK IN ELECTRICAL INSTALLATION FOR YOUNG ELECTRICIANS (I)

BY

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Abstract: The paper it’s the result of the studies and researches based on the courses and programmes for qualification or/and improvement for persons from companies and from partnership between EON Romania and Technical College “Dimitrie Leonida”, Iași , where the future electricians take contact with work conditions and the task of the work.

For young electricians who have no practical experience in the field, it is necessary to know the technical and organizational measures of safety and health in the basic work for the execution of works in electrical installations.

The main technical and organizational measures for safety and health at work are related to electrical separation, identification of the electrical installation or the part of the installation to be removed from power supply, verification of the lack of voltage, delimitation of the working area and, of course, the insurance against non-electrical accidents .

These technical and organizational measures for safety and health at work have emerged as a necessity, which together with the specific and the revised ones align with the standards of the companies in question.

Keywords: safety work; electrical installation; electriciens.

1. Introduction

The paper with the title “Technical and Organizational Measures of Safety Work in Electrical Installation for Young Electricians (II)” it’s the result

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of the studies and researches based on the courses and programmes for qualification or/and improvement for persons from companies and from partnership between EON Romania and Technical College "Dimitrie Leonida", Iaşi, where the future electricians take contact with work conditions and the task of the work.

For young electricians who have no practical experience in the field, it is necessary to know the technical and organizational measures of safety and health in the basic work for the execution of works in electrical installations.

2. Duty Work

2.1. Mandatory Technical Measures for Tasks in Electrical Installation in Exploration with Power Off

(1.1) Mandatory technical measures for tasks in electrical installation in exploration with power off, are:

a) Electricalseparation of the installation, like:

- power off the voltage and visible separation of the installation or part of her, who follow to work and canceling automation;
- to block in open position all actionary devices from switching equipments used to visible separated the electrical installation or part of her and to put safety signs who forbid the acces on this devices;

b) to identify the electrical installation or part of her where must to work;

c) to verify the lack of voltage and imediatelly to pull to earth and in shortcircuit;

d) material delimitation of the work area;

e) to assure against nonelectrical accidents.

(1.2) Necessary maneuvers to realize the technical measures must to be made by one or two electricians.

(1.3) Electrical separation of electrical installation must to be follow by close of the Earthing knives (CLP-ro., EK-engl) if them exist, for primary electrical installation or part of her where must to work.

(1.4) Sheets of maneuver approved for retry from exploitation for works, must to contain including the operations for grounding (link to earth) by close the earthing knives where that exist.

(2) – (2.1) For this kind of operation must to be power off:

a) Active parts who are under voltage where must to work;

b)Active parts who are under voltage where isn't work, but are sittuated at a lower distance then limit deviation (neighborhood distance) where electricians or work instruments (tools, machinery, etc.) could approach and are be indicated into specific technical documentation;

c) Active parts who are under voltage where isn't work, but are sittuated at a lower distance then limit deviation (neighborhood distance), but because of the work distance must to be power off.

(2.2) The dimension of the limit deviation (neighborhood distance) are according the nominal value of voltage from electrical installation who are under voltage and from the types of electrical installation.

(2.3) In case of lower voltage electrical installation (including Overhead Power Lines), the neighborhood distance is not estabilished, but it's strictly forbidden to touch directly parts of her who are under voltage.

(2.4) In case of parts or electrical installations who have solids, liquids or gas electrical isolation, covered by screens (metallic coatings), linked to the earth (cables, bus ducts, equipment with hexafluoride, etc.) or who have electrical insulated boards, specially designed for this cause, limit deviation is not fixed, creens who are link to the earth (grounding) or electrical insulating borads could be touch in time to work.

(3) Work area must to be assured after electrical separation with follow oredered technical measures:

- to identify electrical installation or part of her where must to work;
- to verify the lack of voltage, followed by link to earth (grounding) and in shortcircuit of the electrical installation;
- material delimitation of the work area;
- to assure against accidents of non-electrical nature.

3. Electrical Separation

3.1. Power of Voltage and Visible Separation of Electrical Installation or Part of Her

(4) – (4.1) Power of voltage must to be realize after the cancellation of automation who could go to reconnect the switches, by manipulating the commutation devices (switches, splitters, fuses, etc.) who separate installation or part of her from the rest of electrical installations who are under voltage.

(4.2) After power off the voltage, in case of manipulate the switching devices isn't made also the visible separation, must to be realized this separations from all parts who could be appear the voltage, in case of work.

(5) – (5.1) Visible separation must be realized by open the splitters, by removing the support of the fuses, disconnecting switches, loosening the cords to overhead power lines or by unmount the active parts from electrical installation (bars, conductors), unplug the cables from the device.

(5.2) Exceptionally it's allowed in low voltage installations, when part of electrical installation where must to work it's protected only by undrawable breaker like switching element or contact breaker wich could not see if is open, electrical separation it's made only with close the breaker and to verify isn't under voltage in the nearest point from output.

(5.3) Visible separation in case of embedded equipment (SF6, vacuum, etc.) it's considered made based on the own indications of the equipment by blink of this position.

(5.4) Visible separation in case of remote equipment it's considered made based on the signs frome central remote system or by sign of position to display.

(5.5) To avoid reverse voltage (from low to high voltage) into measuring transformers, this must to be electrical separate including on the low voltage part by undrawable breaker, by removing the support of the fuses or disconnecting undrawable breaker.

(6) At electrical installation who power electrical machines, pumps, cooler, compressors, or who are connected with generators or compensators, who couldn't be visible separate, must to take additional measures:

a) To lock devices to start the primary engines to avoid to product power voltage by generator or compensator, including at low speeds;

b) to lock the way against fluids to pumps, coolers and compensators to avoid to function in generator mode of electrical machines.

3.2. Locking in Open Position the Devices for Operating the Devices Through which the Visible Separation of the Installation or Part of the Installation Was Made and the Installation of the Security Banners

(7) Locking in open position of the actionary devices through which visible separation of electrical installation or part of her has taken place, where must to work, must to be realize the follow operations:

a) Directly blocking, as appropriate, using one of the following procedures:

- lock of manually devices from separators with lock or other means specifically designed for this purpose;

- lock-out of push-button cartridges for cells with disconnectable switches without separators. If the cell doesn't have door, the cartridge made himself the close of the cell when breaker it's switching, after the cartridge is pull out will be mount in front a mobile screen / mobile barrier (or colorful lane) and security signpost;

- installing electrically insulating caps, colored in red, instead of the low voltage fuses;

- mounting of mechanically resistant electrically insulating boards or sheaths between or on open contacts of separators or breakers when are accesible or remain under voltage;

b) Indirect blocking, as appropriate, using one of the following procedures:

- removing the fuses or disconnecting the circuit breaker from the motor supply circuit that drives the actionary device from separator, respectively, at the low voltage of the circuit breaker;

- closing off the compressed air supply valve of the pneumatic actuators from separators and circuit breakers and drop off the pressure from circuit after the tap;

- other processes: electronic procedures - software, etc.

(8) On the blocked actuators of the separators and at the points where the blocking of the devices through which the electrical separation was made was done by the other mentioned processes at (7-b) must to be put security banners with inscriptions „DO NOT CLOSE! WORKING" (or „DO NOT OPEN! WORKING", in case of compressed air taps which feed pneumatic actuators).

(9) Separators of overhead lines that are at a distance from the working area and which have an open position in the normal operating circuit may be locked in this position. The responsible of the tasks may request the electricians to view of this position, locking the actuator and installing signal panels.

Identify the installation or part of the installation to be worked on:

(10) The purpose of the identification is to be sure that the technical measures to be taken to achieve the work area will be applied to the plant in which must to work and to which it is seen or confirmed by message that the installation has been removed from the power supply or only separately electric.

(10.1) To identify the electrical installation must to be made visualy, at the place of work based on the follow elements:

a) electric scheme of the station, transformer station, etc.;

b) electric scheme of the route of electrical line (air or cable);

c) electrical circuit diagram of wiring (circuits);

d) book markings and labels;

e) inscriptions, numbers, names;

f) plans, maps, plans and the confrontation with the layout of the installations;

g) detection devices or installations;

h) measuring equipments;

i) other elements.

(10.2) During the identification, it is forbidden to open or remove any type of enclosure or to check, by action, any component of the installation.

Check for a lack of voltage immediately followed by grounding and short-circuiting (This is the only safe measure of preventive protection of personnel against electrical risks, the existence or accidental occurrence of tension in the work area !)

(11) Verification of the absence of voltage and grounding and short-circuiting must be done at all phases of the installation, including on all extinguishing air lines on the canopy plus the null. In the case of circuit breakers, checking the absence of voltage must be made at all six accessible terminals.

(12) Verification of the lack of voltage in low-voltage installations must be done by means of portable voltage measuring devices or by means of voltage detectors. In high-voltage installations, the verification must be done by means of voltage detectors, corresponding to the rated voltage of these installations.

(13) Verification of voltage drops with voltage detectors is not permitted during atmospheric precipitation in outdoor installations unless permitted by the manufacturer's instructions for the use of detectors and electrically insulating pads.

(14) In case of captive or protected equipment and elements, to which the voltage detectors can not be used, the voltage check must be made according to the instructions of the suppliers of the respective equipment or components.

(15) Verification of the lack of voltage to close the earthing knives mounted on the aerial power lines is allowed to be replaced by visual inspection of the open position of the separator through which the electrical separation has been made.

(16) (16-1) Prior to each use of the voltage detector and immediately afterwards, it is necessary to check the proper operation of the voltage detector, using the method indicated by the manufacturer, in the operating and use instructions (technical book).

(16-2) In all installations, the proximity to them of the voltage detector is taken slow, and direct touch is only made after detecting the lack of voltage by light and sound of the detector.

(17) (17-1) Verification of the lack of voltage must be carried out considering the installation is under voltage.

(17-2) If it is necessary to check the absence of voltage, must to open the cell door or to remove the inlays, it is forbidden to overcome with any part of the body to the plan bounded by them.

(18) (18-1) Grounding and short-circuiting applies to all phases of the installation or part of the installation, as well as to the null conductor of low-voltage overhead lines, by mounting the mobile short-circuiting and earthing devices (short-circuits) or by closing the binding knives down.

(18-2) Short-circuit mounting operations must be carried out by two electricians. The sequence of operations must be the following:

a) grounding of the short circuit breaker;

b) checking the absence of voltage, according to the above provisions;

c) mounting the short-circuit clamps on the null and each phase.

(18-3) The choice of the earthing point must be done with the following priority:

a) the artificial outlet of the power grid installation or pillar;

b) the natural outlet of the electrical power pole;

c) the short-circuit switch.

(18-4) Unmounting the short-circuit is done in the reverse order of mounting.

(18-5) In the case of low-voltage overhead lines, checking the absence of voltage or mounting the short-circuit clamps is done starting with the null conductor, except when the null conductor is mounted on the top of the crown.

(19) Earthing (grounding) and short-circuiting of 110 to 400 kV electrical installations will be done in the following order:

a) the monopolar short-circuit clamp is connected to the ground;

b) check the lack of voltage on one phase;

c) mount the monopolar short circuit clamp on that phase;

d) the above operations are repeated in the same way for the other phases.

(20) (20-1) In electrical stations and transformer stations, the short-circuit clamps must be secured to the terminals, the parts or the specially designated points (marked) for this purpose (fixed connection points). It is forbidden to connect the short-circuit conductor by twisting or any other process that does not ensure proper contact.

(20) (20-2) In electrical stations, the earthing installation must also bind the metallic parts of cars, work platforms and machinery in the work area, bringing them to the same potential, who preventing the occurrence of dangerous induced voltages. Earthing is done by the work responsible together with the electrician, using the short-circuit devices and the parts provided by the equipment.

(20) (20-3) In case of high-voltage installations with separate or distant phases more than the neighbouring distance (admissible limit), it is permissible to make the earthing only at the phase at which it will work.

(21) (21-1) Check for a lack of voltage immediately followed by grounding and short-circuiting from above must be achieved with the cumulative observance of the following conditions:

a) As close as possible to the work area, on the one hand and the other, except for electric cables;

b) To overhead electrical line branches that are connected to the work area, except for low-voltage electrical connections;

c) At least one ground and short-circuit connection to be visible from the work area (this condition does not apply to work in stations, built-in posts and electrical wiring and isolated electrical lines).

(21) (21-2 In the working area, the part of the plant in which it is being operated must be permanently ground and short-circuited, except when measurements and samples are taken.

(22) (22-1) Electricians who perform technical measures to remove power from installations (electrical separation, voltage check, grounding and short-circuiting) must use, as appropriate, the following individual protective equipment: head protector with face protection visor, electrically insulating gloves, hand guard with hand guard for handling low voltage MPR type fuses, thermosetting jacket suit with insulating shoes or electro-insulating carpet, electrically insulating screed;

(22) (22-2) In the case of electrical equipment where the manufacturer specifies in the instructions the specific personal protective equipment, these provisions shall be observed.

3.3. Material Delimitation of the Work Area

(23) The material boundary of the work area must ensure that the members of the workforce, as well as those who may accidentally enter the work area, are prevented from being injured. Material delimitation is accomplished by moving temporary reinforcements that clearly highlight the work area. Movable temporary reinforcements will be securely fastened in order not to fall over the live parts of the plant. Mobile signboards shall be fitted with signaling panels**.**

(24) (24-1) Movable temporary insulations must be mounted at a distance equal to or greater than the permissible limit, with respect to the live parts. If these distances can not be made, the parts of the installations located at smaller distances will be disconnected.

(24) (24-2) Movable temporary insulations of insulating materials may be located at distances lower than the permissible limit (proximity), even in direct contact with the live parts, under the following conditions:

a) The rated voltage of the installation is no more than 27 kV;

b) The parts of the installation are located inside and, if they are located outside, the installation, dismantling and use of the equipment is done on a dry time;

c) Assembly and disassembly is carried out under the supervision of an electrician - work supervisor.

Technical measures to work safety in the work area to avoid accidents of a non-electrical nature

(25) These measures are designed to avoid the non-electrical nature of the members of the workforce and other people who may accidentally enter the work area by applying the specific instructions, by type of works and installations.

(26) (26-1) To avoid traffic accidents (where applicable), the work area must be marked with security signposts or special grading, observing the traffic rules.

(26) (26-2) The technical measures of work safety in the working area for avoiding accidents of non-electrical nature are provided by the chief of work.

4. Conclusion

For young electricians who have no practical experience in the field, it is necessary to know the technical and organizational measures of safety and health in the basic work for the execution of works in electrical installations. In this way the paper "Technical and Organizational Measures of Safety Work in Electrical Installation for Young Electricians (I)" is a necessity for future electricians to familiarize with the terms like: electrical separation, identification of the electrical installation or the part of the installation to be removed from power supply, verification of the lack of voltage, delimitation of the working area and, of course, the insurance against non-electrical accidents .

Also, young electricians must to know the way and the measures required to control electrical installations depend of risk area, emplacement, the time when it's execute the tasks and atmospheric conditions.

This measures will be always reviewed and completed, depend of the appear of new risks, tehnological evolution of individual protection equipment and internal safety work rules from companies.

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MĂSURI TEHNICE ŞI ORGANIZATORICE DE SECURITATE ŞI SĂNATATE ÎN MUNCĂ LA LUCRĂRILE ÎN INSTALAŢIILE ELECTRICE PENTRU TINERI ELECTRICIENI (I)

(Rezumat)

Lucrarea este rezultatul studiilor realizate în baza cursurilor şi programelor de calificare sau/şi perfecţionare a personalului din companii pe care le-am susţinut în ultimii ani.

Pentru tinerii electricieni care nu au o experienţă practică în domeniu este necesar să cunoască măsurile tehnice şi organizatorice de securitate şi sănătate în munca de bază la executarea lucrărilor în instalaţiile electrice.

Principalele măsuri tehnice şi organizatorice de securitate şi sănatate în muncă se referă la separarea electrică, identificarea instalaţiei electrice sau a părţii din instalaţie care urmează să fie scoasă de sub tensiune, verificarea lipsei tensiunii, delimitarea zonei de lucru şi bineînţeles asigurarea împotriva accidentelor de natură neelectrică.

Aceste măsuri tehnice şi organizatorice de securitate şi sănătate în muncă au apărut ca o necesitate, care împreună cu cele specifice şi cu cele revizuite se aliniază la standardele companiilor de profil.