

## SILESIA UNIVERSITY OF TECHNOLOGY STUDENTS' KNOWLEDGE OF FIRE REGULATIONS AND FIRST AID. RESEARCH REPORT

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### Abstract:

The following report is the result of the surveys conducted among students of Silesian University of Technology. Respondents provided answers to questions about fire regulations and how to react in case of fire. The questionnaire was meant to check students' knowledge in these particular areas. Every year thousands of people die or get burnt as a result of uncontrolled fires. Therefore, it is extremely important to know the fire regulations, to react properly in case of fire and to be able to give first aid when it is necessary.

**Key words:** fire protection, fire, first aid

### INTRODUCTION

Fire has accompanied man since ancient times, initially as a source of heat and light, as well as a dangerous predators repeller. Currently – despite its positive uses – it is also associated with the danger of uncontrolled fire, which may cause many side effects which are a threat to the human lives and may result in material losses. Every year people die or get seriously burned in fires.

By the end of 2012 there had been 183888 fires in Poland which was 10 thousand more than in the previous year. The first three include following provinces: Mazovia, Silesia and Lower Silesia and at the very end there is the Podlasie Province [4]. At which objects were there most fires and what was the cause?

Most of the fires, 42%, were reported at such objects as: garages, relics, garbage cans, garbage dumps, natural objects, grass and many others. In second place there are

crops and agriculture 29%, on the third – residential facilities 16%.

Among the objects on which there has been 5% of the fires or less are: forests, means of transport, public utilities, production facilities and at the end storage objects. The reasons for these arsons may be e.g. defects or poor maintenance of equipment, weather conditions including storms or droughts and inadvertent or deliberate human action [4].

Awareness and caution of people should increase so that each one of us knew what the causes and effects of fires are and what we should do when the threat occurs.

Do we, young students, know the fire regulations and the principles of first aid? In order to answer this question we interview 200 students: 64 women and 136 men of the 9 faculties of Silesian University of Technology within 01-30.04.2013 (Fig. 1).

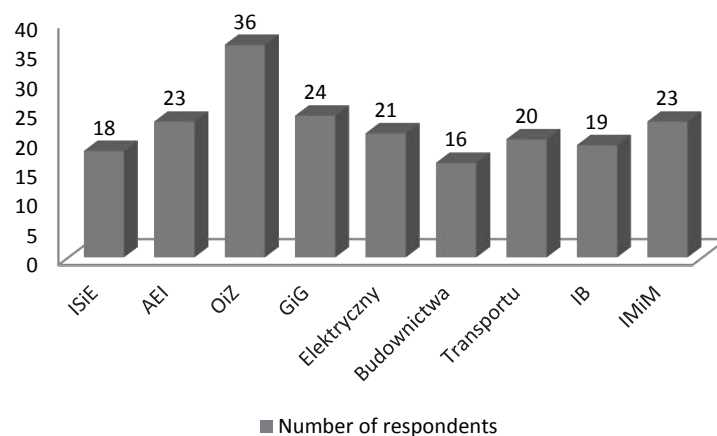
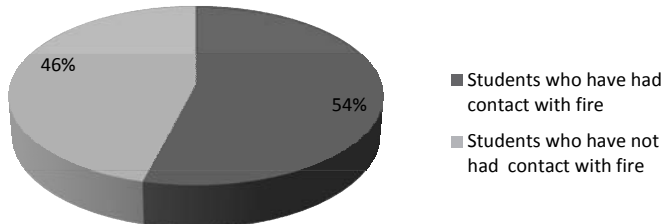


Fig. 1 Number of students surveyed on nine faculties of the Silesian University of Technology

## THE CONCLUSIONS OF THE CONDUCTED STUDIES

### *Fire – causes, phases and actions*

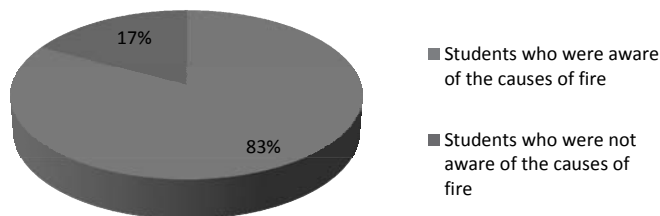
The first point to justify the validity of the tests performed regarding the knowledge of the fire code and first-aid was the question about the student's contact with fire. The students gave the following answers: 46% i.e. almost half had witnessed a fire or had been directly affected by the fire effects, whereas 54% of the respondents hadn't had any contact with such a situation (Fig. 2).



**Fig. 2** Contact that the students of the Silesian University of Technology had with fire

A large proportion of respondents who answered "yes" shows how extremely dangerous fire can be for people. It is important that everyone was familiar with fire code and, consequently, was able to respond properly in the situation of fire and if necessary give first aid to the burned. The results obtained confirm the validity of promoting and emphasizing the fire code trainings.

Preponderant share of respondents who had not had contact with fire indicates that the danger had never emerged in their environment. The result obtained also indicates the fact that the students behave well and carefully in different situations, which can inadvertently endanger their lives. This portion of people should increase, while their awareness and knowledge on fire prevention should be extended, leading to a decrease in the quantity of fire accidents (Fig. 3).



**Fig. 3** Knowledge of the causes of fire

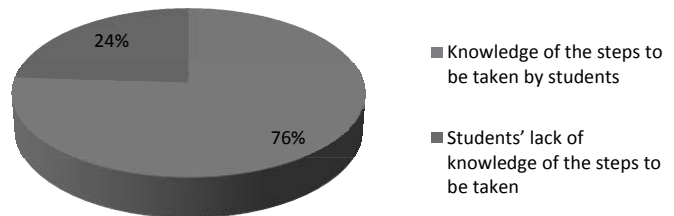
In the question concerning the causes of fire, 83% of students replied, while 17% of the interviewed individuals answered incorrectly or disregarded the question, leaving it without any response.

Interviewed students named about 50 different causes of fire. These figures attest to the large quantity of factors that can lead to ignition of fire. The result obtained also testifies that young people are fully aware of how easy actions, independent of human influence, or sometimes caused by human imprudence, can lead to a tragedy.

The three most common causes named by students include: electrical failure or damage to electrical wiring, arson i.e. setting the fire deliberately, which is subject to criminal penalties and finally stupidity, imprudence and carelessness. Unconscious, mindless human activities causing inflammation, named by respondents included all sorts

of cigarette and match ends, carelessness with lighting candles at home or fires caused by drunken people.

Most of the causes mentioned by respondents were the causes induced by man e.g. arson of forests as a result of throwing garbage, cigarettes or other flammable materials in forests and unextinguished campfires, Another cause given was misuse of household appliances like irons, gas stoves, etc. A large group of respondents indicated the droughts, storms, oxidation of gas or the presence of methane in mines as factors causing fires. Students also mentioned the use of fireworks, accidents at work and obstruction of the ducts in public buildings as causes of fire (Fig. 4).



**Fig. 4** Knowledge of the steps to be taken in case of fire

As far as fires are concerned, it is not only important to know the available extinguishing media, fire development phases, or the causes of the initiation of the fire, but, first and foremost, it is important to know how to act when in contact with fire. Essential are the first steps taken by a person, often life-and health saving.

76% of respondents granted the correct answer, but worryingly 24% of students have left the question unanswered or gave a wrong answer. It is important to be able to react instantly when it comes to fire. When a person can't or does not know what actions to take their life is threatened.

The most frequent priority activity mentioned by the students was to call the fire department to the place of the event. As the next action, most students mentioned trying to put out the fire using the available extinguishing media. In case of fire in buildings it is important to, when possible, cut off the electricity, gas and air e.g. by closing windows. The students wrote in their responses that the important thing is to keep calm and not to bring any panic among others so that the evacuation could take place as quickly and smoothly as possible.

### *Extinguishing media*

Extinguishing media are generally available and widely used. Currently on the market it is possible to purchase all sorts of media intended to extinguish the fire. The most popular are portable fire extinguishers. Among the fire extinguishers we can name the following types: liquid carbon-dioxide extinguisher, dry powder fire extinguisher, filled with nitrogen and halocarbon extinguisher filled with a very low temperature substance. Apart from the regular fire extinguishers there are also fire blankets and trolley fire extinguishers used in order to extinguish the fire [5].

Analysis of the data received from the survey shows that 79% of the students answered the question correctly while 21% left the question unanswered, which is quite worrying (Fig. 5). Extinguishing media should be known, as well as their usage in the event of an accident. This information is essential and often human health and life depend on it.

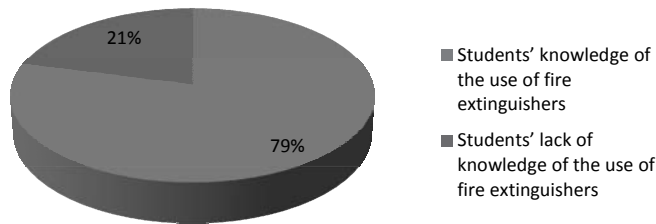


Fig. 5 Knowledge of the use of fire extinguishers

Among extinguishing media known to them, students most often mentioned: fire extinguishers, water, and fire blankets. They also gave such answers as: sand and powder extinguisher.

*Maintenance of fire alarm system, portable fire extinguisher and smoke extraction equipment, smoke dampers, fire doors*

In order to check students' knowledge in the field of fire code they were asked a question about the frequency of maintenance of fire alarm system, portable fire extinguishing equipment and smoke extraction equipment, smoke dampers, fire exits etc. 71% i.e. a significant part of the respondents answered correctly (Fig. 6). Only 29% marked an incorrect answer.

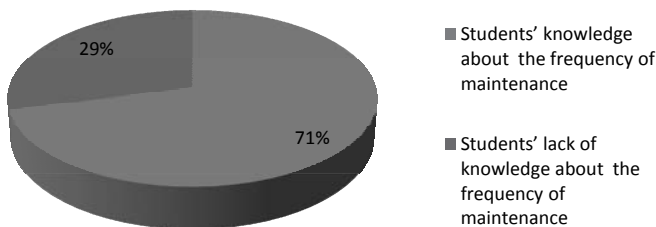


Fig. 6 The frequency of maintenance of fire alarm systems, fire extinguishers and smoke extraction equipment, smoke vents, emergency exits

Everyone should be aware that the absence of maintenance is related to the fact that in case of fire, available means may fail and cause damages. It will not be possible to take firefighting action or report the fire because without proper equipment the alarm will not go off. Smoke extraction equipment is used for discharging fumes, which arose as a result of the fire, and are dangerous to human health. It is important that at the time of the evacuation one could leave it without any problems, so it is vital to insist and ensure that maintenance was carried out at least once a year.

A large number of correct answers to this question indicates that the students are familiar with the regulations and comply with the maintenance. Almost 1/3 of the people did not know the correct answers, which means that at the time of the fire, there may be problems with evacuation or extinguishing the fire.









*Safety Signs [7]*

From the results obtained it can be concluded that the fire marking is largely known to students. Only 3 signs were problematic, there was not a slightest problem with the rest of the signs. Knowledge of fire signs is important because they are standardized and placed in all the buildings such as museums, restaurants, schools and other public facilities (Table 1).

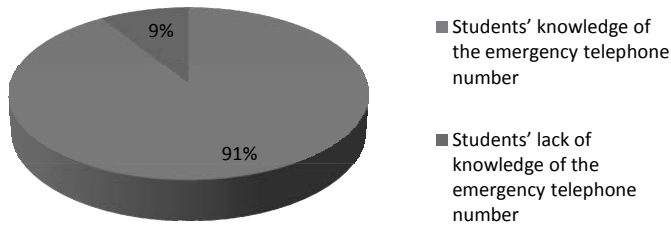
*Emergency services – fire department*

In the question concerning the fire department emergency number most students: 91% chose the correct answer, only 9% of the respondents gave the wrong answer (Fig. 7). Knowledge of the emergency telephone number is a basic information that everyone should know. In case of a fire, you must dial the toll-free number 998 or 112, which is picked up by the police or the fire department. The opera-

Table 1 Students' knowledge of the selected safety signs

Signs	What mean ?	Number of correct answers
	Fire extinguisher	189
	Fire hose reel	189
	Do not extinguish with water	181
	Fire fighting equipment	37
	Fire extinguisher	35
	Danger highly flammable	147
	Fire alarm	76
	Emergency exit	164

tors of that number, depending on the event being notified, direct conversation to the competent emergency services.



**Fig. 7 Telephone number to fire-fighters**

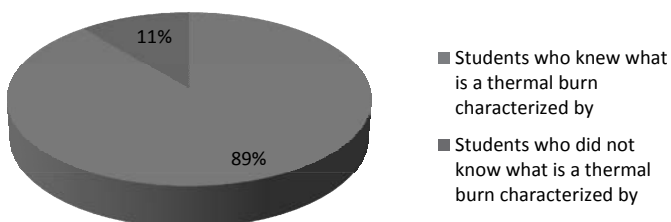
Choosing the right number is one of the first things that a person should do, that is why their knowledge is very important. A small percentage of students who did not choose the correct answer, i.e. they did not know the emergency number for the fire department, is worrying. This may be due to the fact that so far they have never had contact with fire and did not have to call the emergency services or they were not informed about it in previous years.

After dialing the fire department emergency number one has to provide their personal information i.e. name and phone number, address and the name of the object on fire, and whether there is a threat to human life and health. After providing this information, one should not hang up, until the confirmation of accepting the report.

More than half of the students responded correctly to this question, only a small part was unable to answer. Young people are aware of the dangers which might occur, which is why those who have had contact with the fire know the information that should be provided. In addition, most respondents are familiar with this information from trainings or simply from school or the media. People who did not know, or only partially replied to the questions, should find more information as soon as possible. Young people should know what to do in case of fire.

#### *Thermal burns and first aid*

Thermal burn is characterized by skin and tissue changes (Fig. 8). The causes of such burns are different from hot fluids to steam or an object which is hot after contact with a flame. The most common symptoms of such burns are skin redness, pain, blisters, swelling and in case of airway burns there are also difficulties in breathing and even loss of consciousness [6].

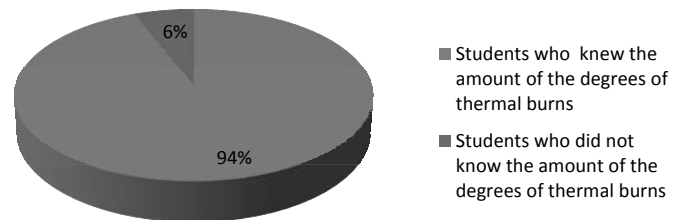


**Fig. 8 Thermal burns**

A very large number of respondents answered the question "What is a thermal burn characterized by". This is due to the fact that we are very often exposed to all kinds of burns. The most common answers were: redness, pain or blisters. These responses suggest that most of the interviewees have been in contact with 1 or 2 degree burns. In other words, these symptoms occur when we get burned with a liquid or electric device. During a fire the symptoms are the same, but they are usually of the 3rd or 4th degree.

There are four degrees of burns. The more severe the damage to the skin, the higher the degree of the burn. The

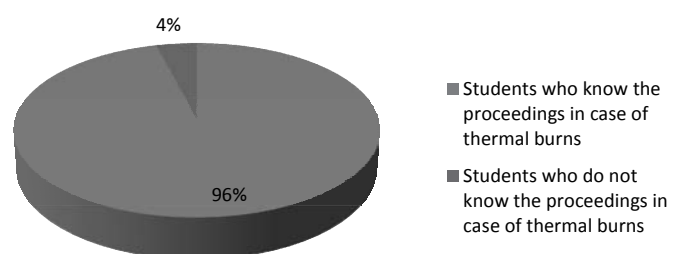
first degree includes only the epidermis, the skin is reddened, it hurts or it is swollen, but after a few days the symptoms subside and there is no scarring. The second degree is characterized by similar symptoms and it is accompanied by blisters. The skin gets damaged along with the blood vessels walls, which causes the pain and sensitivity to touch of the injured area. In the third degree, the burns can be traced back even to the bones [6]. Wounds are extensive, and the dead tissues are usually snow white, sometimes also brown red. In the fourth degree it comes to tissue necrosis, i.e. charring of the body, which is caused by long contact with fire.



**Fig. 9 Degrees of thermal burns**

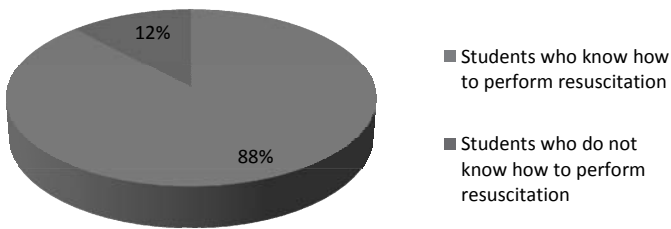
94% of students know the degrees of burns (Fig. 9). This is connected with the fact that in their lives they have already had various types of burns, and as we know each degree is characterized by different symptoms and ways to deal with burns. A lot can be learned from television or information on the Internet or newspapers, that is why the awareness of the burn degrees is very widespread. Only 6% gave wrong answer. It can be stated that those people have never had any burns or they were of a small degree. In addition, their knowledge about burns is very small; therefore these students should fill their knowledge gaps in the subject.

After a thermal burn, the burned person should be provided with help. In such case, the burned area should be cooled as quickly as possible with water for 15-20 minutes, and if there is no access to water it should be replaced with cooling dressings. Do not pluck the clothes, because they could have stuck to the body. Do not break blisters or lubricate the body with any ointments or other substances. If these actions do not help or wounds are extensive you should go to your doctor or call the ambulance. In this case, when the wound is not too extensive, doctors will use painkillers and then create the dressing. In case of extensive and deep burns skin graft or amputation is [6].



**Fig. 10 Proceedings in case of thermal burns**

According to the respondents, the injured area should be cooled with water, the dressing should be made or an ambulance called, which proves a good knowledge of the first aid rules. A small part of the people – only 4% – did not answer this question which implies that in case of a burn, they will not know how to behave, and consequently, if a person has extensive burns they can die without help (Fig. 10).



**Fig. 11 Resuscitation**

The vast majority of respondents: 88% know how to perform resuscitation in case of loss of consciousness of a person as a result of the fire (Fig. 11). Those people will be able to give first aid. Their duty is to maintain the injured person alive and not to allow any further complications until the arrival of the ambulance. In this case, it is important to take care about the safety of both the victim's and one's own safety, to check whether the injured person responds, call for help, open the airway and check breathing, call 112 and perform resuscitation, i.e. 30 tribulations of the chest, followed by 2 breaths, until the arrival of the ambulance.

### CONCLUSIONS

Knowledge of the fire regulations and first aid is essential. The analysis of the survey proves that students of Silesian University of Technology are familiar with these regu-

lations and rules. Almost half of the students witnessed or was a victim of a fire. This information is disturbing because it shows that uncontrolled fires are a very common phenomenon. The students know all the available extinguishing agents and are able to use them properly. They are also familiar with safety signs and thus, well-prepared to help in case of fire. They are fully aware what causes an uncontrolled fire and they can perform efficiently evacuations and provide first aid to the injured in the fire.

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