

I. évfolyam, 2. szám – 2016. június

Dr. Tollár Tibor tű. vezérőrnagy, mb. főigazgató

#### NEMZETKÖZI TŰZVIZSGÁLATI KONFERENCIA NYITÓBESZÉD

#### Tisztelettel köszöntöm a Nemzetközi Tűzvizsgálati Konferencia résztvevőit!

Az emberiség történetét végigkíséri a tűz. Őseink bizonyára féltek tőle, hiszen érintése fájdalmat okozott, megjelenése többnyire pusztulással járt, később viszont segített az életminőségük javításában. Ehhez viszont meg kellett ismerni a tűz természetét.

Talán ez volt az első kémiai folyamat, amelynek létrehozása, és fenntartása tudatos cselekedet volt.

A tűz hasznos volta mellett nagy károkat is okozott. A civilizáció, a városiasodás, iparosodás fejlődésével nőtt a tűzveszély lehetősége, a károk nagysága. A tűz keletkezési körülmények, az okok vizsgálata egyre fontosabbá vált. Az emberek felismerték, hogy ha a tűzek keletkezési okát megtalálják, akkor megelőző intézkedéseket hozhatnak az életük és a vagyonuk megőrzése érdekében. Ez lehetett a tűzvizsgálat "őse". A tűzvizsgálat során nyert tapasztalatokat felhasználták az építészet, az ipari technológiák műszaki feltételeinek meghatározásához. A szabályok a tűzmegelőzés létesítési, és használati szabályainak kialakításához vezettek.

A tűzmegelőzés szabályainak kialakulása mellett a tűzoltás szabályozásához is hozzájárult a tűzvizsgálat. A tűz természetének megismerését fel lehetett, fel lehet használni a tűzoltói beavatkozások szabályainak megalkotásához is.

A XIX. században a magyar tűzoltás tudományos alapjainak létrehozásában résztvevő Markusovszky Béla határozta meg elsőként a tűzvizsgálat fogalmát: "Felderítő vagy kutató tevékenységet, mely a veszély elmúltával, a tűz keletkezési okait iparkodik megállapítani, s az e végett folyamatba tett eljárás eredményéhez képest a jövőre nézve praeventive intézkedik, az elkövetett kihágásokat üldözteti, a constatált bűnös cselekményeket pedig megtoroltatja."

Ebből a korból származik a magyar állami tűzoltóság megszervezőjének Széchenyi Ödönnek a felismerése is melyben a tűzmegelőzés, tűzoltás, tűzvizsgálat szakmai egységét hangsúlyozta. Azaz a tűzvizsgálat a másik két szakterület irányában kontrolként működik, megállapításaival segítve azok hatékony működését.

Az elmúlt több, mint száz év alatt a tűzvizsgálat céljai nem változtak. A tűzvédelmi törvényünk a tűzvizsgálat célját hasonlóan határozza meg: *a tűzvizsgálat a tűz keletkezési idejének, helyének és okának felderítésére irányuló hatósági tevékenység, amelynek célja olyan tűzmegelőzési, tűzoltási beavatkozási tapasztalatok megszerzése, következtetések levonása, amelyek alkalmasak a tűzmegelőzési ismeretek bővítésére és a mentési beavatkozási feltételek javítására.* Ezzel a megfogalmazással a tűzmegelőzés-tűzoltás-tűzvizsgálat egységét, egymásra épülését kívánjuk megvalósítani.

A tűzvizsgálat megállapításait a szakma mellett a rendőrség is hasznosítja. Megállapításainkat szakértői véleményként veszik figyelembe. Ezért fontos, hogy kellően bizonyítottak legyenek megállapításaink, és azok a bíróság előtt is megállják helyüket. Mindezek mellett a lakosság felvilágosításában, a piacfelügyeleti munkában is hasznosítjuk a tűzvizsgálataink eredményeit.

A tűzvizsgálat céljainak eléréséhez szükséges, hogy az eljárást tapasztalt, felkészült tűzvizsgálók, megfelelő tárgyi eszközök, felszerelésekkel végezzék.

Célunk Magyarországon a tűzvizsgálat színvonalát tovább emelni, amelyhez saját tapasztalatainkat kiegészítve szeretnénk megismerni más országok tapasztalatát, bevált gyakorlatát. Ehhez kérem külföldi kollégáink segítségét, tapasztalataik ismertetését.

Meggyőződésem, hogy az EU országaiban a tűzvizsgálatot fejleszteni kell, és fórumot kell biztosítani a közös munkához, hozzájárulva a tűzoltás és a tűzmegelőzés fejlesztéséhez is. Ennek érdekében kezdeményezem a magyarországi konferencia végén egy közös szándéknyilatkozat megfogalmazását, melynek célja egy önálló munkacsoport létrehozása a tűzvizsgálati tevékenység színvonalának emelésére, a tapasztalatok egymás közötti megosztására.

Bízom benne, hogy a jövőben több alkalom is lesz, ahol a tűzvizsgálat szakemberei találkozhatnak és átadhatják egymásnak tapasztalataikat.

Kívánom, hogy nemzetközi konferenciánk jó hangulatban teljen és hasznos tapasztalatokkal szolgáljon a résztvevőknek.





Organisation of Deputy-Director General National Inspectorate General for Fire Services

# Structure, organization and duties of fire services in Hungary

Dr. László Bérczi PhD. Brigadier General





### **Integrated Disaster Management System**



Since 1 January 2012





Act No CXXVIII. 2011 stipulates: "Fire-fighting and technical rescue are governmental tasks."

Whole territory of Hungary is protected by **professional fire brigades**.









#### **Organisational system of rescue fire protection**



Tűzoltóságok úthálózatra vetített 25 perces ellátási területei - 2016



⊐km

Forrás: Országos Tüzoltósági Főfelügyelőség 2016. április 27.





#### Statistical data of interventions

#### Comparison of data 2011-2015





#### Ministry of the Interior

National Directorate General for Disaster Management "In the service of Hungary for security!"



#### Interventions

Interventions by alert degree		2015 (%)	2014 (%)	
Ι.	50143	58034	99,22	99,17
I. special	7891			
II.	36	375	0,64	0,72
II. special	339			
III.	1	57	0,1	0,09
III. special	56			
IV.	-	19	0.03	0.03
IV. special	19		0,05	0,03
V. special	7	7	0,01	0,01 9

(Forrás: BM OKF/T zoltósági F osztály)



#### Ministry of the Interior

National Directorate General for Disaster Management "In the service of Hungary for security!"



## **Technical equipments**

Fire engines	238
Water tenders (tankers)	95
Wildfire trucks	31
Small boats	40
Ladder trucks	78
Technical rescue trucks	17
Prompt intervention vehicles	41
Cranes	14
Container carriers	20
Technical containers	9

Chemical containers	9
Special containers	10
extinguishing agent containers	11
Special vehicles	22
Reserve vehicles	59







## **Central operations management**

≻ County operations management
≻ Geographic Information System
> ESR-112
> PAJZS, mini PAJZS
> DÖMI



2		Urscagasan masetaeto scenet		
Fővárosi Katacztvółavódalmi	Debrecon HT	Szainak HT	Sreged HT	Niskole HT
Igazyatóság	Debrecen/Eldel Dary (2.(5)	Saolnok/Bázis Duru (0 16)	Steped Sats Hab/Por [0 16]	Maxoolitika Dars (2.75)
E/842 (216)	Debreck of Debix Hat: Por (0 f6)	Sabinok/Saza Hab/Por (Ø f6)	Sosped/Konsener (2 86)	Makon Baris Hab Por (0 fb)
1///12 (2 f6)	Debrecenikomener (3 (5)	Szolnok/Konsiser (2.16)	Snepelikonsined (1.15)	Miskok/Kaniérer2 (0 16)
IV/D42 (216)	Debrecen/Kontener2 (1 fő)	Seolaok/Konteiser2 (0 fő)	Sceped/Secs Mintaks (0 f6)	Miskolo Bara Mústaki (0.66)
IX/TO1 (016)	Debrecen/Easis Müszaki (0 86)	Szokok/Bacie Müszek/ (D fő)	Szepet/Back Specials (0.16)	Miskoc/Back Yepyl (0 85)
12/102 (0 16)	Debreceni Easte schilles (O f6)	Szonsk/Baze Veg/ (0 fő)	Steped/Bins Vegil (0 fb)	
KOF/KAM (3 16)	Debroce VB lat V (cv/ (0 16)	Stokek/Bass Vealstrater (O		
MegyesERD (0.f6)	and the second s	fð)		
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TA TTALEK (2 16)		10.94		
TARTALEK (2.66)	Péice HT	Zalaegenszeg HT	Györ HT	Veszprém HT
TARTALEK (2 16)	PécsBána Daru (0 fő)	Epenzeg/Dáza Daru (O fő)	CrónBass Dary (2.15)	Vezepremiliazo Dara (0 fo)
V111,04# (2 f6)	Pela Bere Heb Pur (0 16)	Egenzeg/Kontener (2.16) [1]	GrörKonerer (1 16)	Vessprévillägis Heb/Por (@ Fb)
VIILGEN (1 fő)	Pécs Kominer (2.f5)	Egenzeg/Kontener2 (1 fb) [1]	Grérikoména (0.18)	Vestprem/Kontener (1.66)
75/DAR (9 f6)	Próss Kominerz (1 fél)	Eperato Bizo Miszaki (@ 16)	G1-5-18-ben Müsselv (10-55)	y asprés Kardinara (256)
x1/ERD (1 66)	PérziBéze Müszek (Ö.FE)	Provide Annual State of the State	(SychiBács Vegus (0 fá)	Vesprémilitzs Miszais (0 65)
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XOBEsts portab 3 (0 f6)		alaaalkula	VCUGLGIII	Pápa HE
(0 fé) (0 fé)	Autokarnin 111 -	Eastergom Tordő (1 fé)	Marcali Erol Specializ (1 fé)	Papa-Groo (1 fé)
OXEREAN weight ( 0 66)	Szélesfehénvár HT	Vác HT		
XOHORDI (0 fő)	Feberar Day (2.15)	VarEnts (2 fd)		
XC/HORDE (1 fé)	Patricial Path Americk ( 1 10)			
2000/0001/4 Feb	CONTRACTOR DE LA CONTRACTÓR DE LA CONTRACT			







## **Voluntary Firefighting Associations**

In 2015 the ,,white spot" reduced by 15 settlements with more than 19 thousand inhabitants;

 34 intervening VFA have already
 been working in 155 settlements, protecting 747 thousand inhabitants
 in an area of 5.694 km<sup>2</sup>



### **Fire inspections and Fires**

(2012 - 2015)



### New National Fire Safety Regulations, **Fire Protection Technical Guideline**



ORSZÁGOS KATASZTRÓFAVÉDELMI FŐIGAZGATÓSÁG Tűzvédelmi Műszaki Irányelv

BELÜGYMINISZTÉRIUM

**Fire Protection Technical Guideline** Azonosító: TvMI 2.1:2015.03.05.

Témakör: **Kiürítés** Evacuation

A tűz elleni védekezésről, a műszaki mentésről és a tűzoltóság-ól szóló 1996. évi XXXI. törvéry 24/A. § e) pontjában foglalt jogkörömnél fogva a kiűrítésről szóló Tűzvédelmi Műszaki Irányelvet kiadom. 2015. március "

> Dr. Bakondi György tüzoltó altábornagy föigazgató

A kiürítésről szóló Tűzvédelmi Műszaki Irányelvet a Tűzvédelmi Műszaki Bizottság dolgezta ki a tűz ellení védekezésről, a műszaki mentésről és a tázoltóságról szóló 1956. évi XXXI. törvény (a további akban: T:v.) 3/A. § (2) bekezdése alapján.

A JvMl alkalmazása onkéntes. A TvMl alkalmazást úgy kell tekinteni, hogy azzal az Országos Tűzvédelmi Szabályzat (továbbiakban: OTSZ) vonatkozó követelményei teljesülnek, az OTSZ által elvárt biztonsági szint megvalósul.

A TVMI és módosításai a RM Országos Katasztrófavédelmi Főigazgatóság (www.katasztrofavedelem.hu) honlapján ingyenesen meg:ekinthetőek és letölthetőek. A TvMI - tartalmának módosítása nélkül - terjeszthető, sokszorosítható

Az alkalmazás előtt győződjön meg arról, hogy a hatályos TvM-t használja-e.

Since 5. March 2015.



## **Activities of Fire Authorities**

Numbers of authoritative checks of fire authorities during 2012-2014.





#### Belügyminisztérium Országos Katasztrófavédelmi Főigazgatóság

"Magyarország szolgálatában a biztonságért!"



## **Chimney sweeper activity**

#### Since 2016.07.01.

Chimney sweeper organization

- residential sector
- public sector without a service provider

Chimney sweeper service provider

public sector
 (business organization )

Chimney sweeper public service provider

residential and public sector



#### **National Fire Prevention Commission**



#### creative contests



Országos Tűzmegelőzési Bizottság



The number of <u>fatal CO</u> pisoning cases decreasing



583 events





#### Belügyminisztérium Országos Katasztrófavédelmi Főigazgatóság

"Magyarország szolgálatában a biztonságért!"

## **Thank You for Your Attention!**







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# Fire investigation in the system of fire protection

## Fire investigation = III. pillar of fire protection



#### PREVENTION





#### FIRE FIGHTING



#### FIRE INVESTIGATION









## Legal background

- Law on fire protection (1996. évi XXXI. Tv.)
- Law on administrative procedures (2004. évi CXL. Tv.)
- Government decree ( 259/2011. (XII. 7.) Korm. r. )
- Decrees of the Minister of Interior

44/2011. (XII. 5) BM rendelet 43/2011. (XI. 30.) BM rendelet 54/2014. BM rendelet (OTSZ)

## Definition of fire investigation 🕅 🕮 🕅

• Fire investigation: an authoritative procedure to define the time and place of the in initiation of the fire, which aims at gathering experiences and drawing conclusions in prevention and fighting the fire, that contribute to the development of capacities in fire prevention and to the improvement of conditions for first responders;



## **Personell of fire investigation**

Fire investigation can be conducted by a fireman:

Having advanced fire protection degree,,
Having passed a fire investigation training,
And having at least 3 years professional experience,



## Equipments of fire investigation at the Directorate of the Capital







## **Equipments of fire investigation**





## **Equipments of fire investigation**







![](_page_28_Picture_0.jpeg)

![](_page_28_Picture_1.jpeg)

## CASE STUDY

## Fire at Kallós Kft.

#### Address: Soroksári út 162., Budapest Date: 29 December 2009.

![](_page_29_Picture_2.jpeg)

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 Beginning of fire: 15.00, 21 December 2009.

Fire alarm arrives: 15.38

![](_page_30_Picture_2.jpeg)

• Arrival at scene: 16.00

 Highest grade alert: 17. 28

![](_page_30_Picture_5.jpeg)

![](_page_30_Picture_6.jpeg)

![](_page_31_Picture_1.jpeg)

![](_page_32_Picture_1.jpeg)

![](_page_33_Picture_1.jpeg)

![](_page_34_Picture_1.jpeg)

![](_page_35_Figure_0.jpeg)
## Investigation

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## Tactics of investigation. (Parallel data collection)

**Interviews** 

Inspection of locality

Evaluation of data and experiences of fire security equipment (fire signal, securtiy cameras, thermal variation driven movement detectors)

Location of birth: <u>The room for</u> <u>fine cosmetics</u>







## Investigation tactics II.

Inventory of possible causes of fire:

.. Electric energy II-III. Smoking, Open fire

IV. Heat-producing equipment



Were excluded

## Investigation tactics III. Electric Energy: Could not be Could be

excluded:

Could be excluded:



Overload of cables

-short circuit, -increased temporary impedance

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## Investigation tactics IV.

## Indicators and data proving electric overload as the cause of fire:

- Local inspection dynamic part (thick bunch of electric cable found)
- Signs of technical malfunction on this bunch of cables
- Opinion of the technical expert/ inspector
- Mathematic computing
- Proof attempt

## Southern warehouse



## Northern warehouse I.



## Northern warehouse II.



# Entrance of the room for fine cosmetics



## Interior of room for fine cosmetics (part I. of dynamic inspection)



## Remains of the heater



## Remains of the oil heater



## Area of the entrance of fine cosmetics (stage II. dynamic part)



## Interior of fine cosmetics (stage III. dynamic part)



## Inflammable liquids explored (III. stage)



## Thick bunch of cables



# Trace of electric burn on the cables.



## Picture by digital microscope produced by technical expert



## Proof attempt: preparations









## Proof attempt: Shot by thermal camera



#### Proof attempt: Modelling of technical malfunction



#### <u>Result of proof attempt:</u> the trace of malfunction is identical with the one found at the location of fire



#### Lessons learnt:

A helystýn vátlatraj m:







- Fire sectors
- Deflector of heat and smoke
- Plan for fire alarm



relitérrész Déi raktárrész Méretarány: 1:120 Észak: Jelmagyarázat: Tüztészek A legnagyobb hőtethelésnek kitett. terület Közvetlen lángnak és hőnek kitett terület 🛄 Erős komozódás

inomkozmetika

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🍈 Kapcsolószekrény, biztosítótábla



#### Wall demolished during fire fighting





## Experiences of fire investigations of our Directorate

#### Fires of IKARUS buses



## Fire of a semi-high panel building in 2007



#### Investigation:

Fire advances through the ventilation system

#### **Preparation of studies**

#### Renovation application system of panel buildings



Aspects of fire protection to be guaranteed

#### Subway/Metro fire in 2011



Cause of fire: Soldering on power supply cable of a STORNO CQM 612 type radio was not adequate: temporary impedance increased

### Fire = ALERT OF ATTENTION ("God's providence?")

#### Established metro commission 2 pers. from each area + 10 pers. from management of travel company BKV





## **MOL-Warehouse in Csepel 2010**

#### Explosion of container 1 casualty

#### • Fire investigation:

violation of all rules pertaining to hazardous areas of explosion





## Static and dynamic stage of inspection









## Inflammation source of a lightguiding equipment



## 3D model







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## Thank you for your attention!

# Nemzetközi T zvizsgálati Konferencia International Fire Investigation Conference





### **Budapest**

2016. 05. 25-26. Danubius Health Spa Resort Margitsziget

Érces Gerg t . százados



- T zbiztonság
- Fire safety



Zárttéri tüzek

**Indoors fires** 









## Komplex t zvédelem Complex fire protection





#### Kritikus helyek és id pontok

**Critical places and times** 



### Kritikus helyek és id pontok

**Critical places and times** 



### Mérnöki módszerek eszközrendszere

**Equipment of engineering methods** 

Térbeli elrendezés Spatial orientation	Építészeti szerkezeti kapcsolatok Architectural structural connentions	Anyagjellemz k Material properties
Eurocode	Rekonstrukció Reconstruction	Szimuláció Simulation
Épületdiagnosztika Building diagnostocs	T zteszt-kísérlet Firetest-experiment	Épületinformáció Building informa <del>g</del> ion

### Innovatív mérnöki módszerek



### Innovatív mérnöki módszerek





### Innovatív mérnöki módszerek



### Innovatív mérnöki módszerek



#### Innovatív mérnöki módszerek a jöv ben

Innovative engineering methods in the future



T zvédelmi háló

**Fire protection net** 



#### Origó a t zvizsgálat

Fire investigation is the origin



### Felhasznált irodalom

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National Fire Protection Association: 1033 Standard for Professional Qualifications for Fire Investigation. Quincy, Massachusetts 2014

## Köszönöm a megtisztel figyelmet! Thank you for your attention!

Érces Gerg t zoltó százados kiemelt f el adó F városi Katasztrófavédelmi Igazgatóság doktorandusz hallgató Nemzeti Közszolgálati Egyetem Katonai M szaki Doktori Iskola ercesgergo@gmail.com +36-20-801-8104 Gerg Érces fireman captain spec. main instructor Disaster Management of Budapest PhD student National University of Public Service Doctoral School of Military Sciences ercesgergo@gmail.com +36-20-801-8104



## FIRE DEPARTMENT -

RULES FOR FIRE PROTECTION IN AUSTRIA



## INTRODUCTION

- Legal requirements for the protection of firefighters
  - Requirements of
    - Building Act
    - Fire Prevention Act
  - Technical Guidelines
    - OIB AUSTRIAN INSTITUTE OF CONSTRUCTION ENGINEERING
    - AS AUSTRIAN STANDARDS INSTITUTE
    - TRVB TECHNICAL GUIDELINES FOR PREVENTIVE MEASURES IN FIRE PROTECTION



## **Construction Products Regulation (CPR)**

- BASIC REQUIREMENTS FOR CONSTRUCTION WORKS
  - Mechanical resistance and stability
  - Safety in case of fire
  - Hygiene, health and environment
  - Safety and accessibility in use
  - Protection against noise
  - Energy economy and heat retention
  - Sustainable use of natural resources



## **Construction Products Regulation (CPR)**

## SAFETY IN CASE OF FIRE

The construction works must be designed and built in such a way that in the event of an outbreak of fire:

- the load-bearing capacity of the construction can be assumed for a specific period of time
- the generation and spread of fire and smoke within the construction works are limited
- the spread of fire to neighbouring construction works is limited
- occupants can leave the construction works or be rescued by other means
- the safety of rescue teams is taken into consideration



## **RULES IN AUSTRIA**

#### LEVEL 1

- Functional requirements
- Low or regulation of the state
- governs protection target

### LEVEL 2

- Technical requirements
- OIB Guidelines
- regulates the level of protection

### LEVEL 3

- Standardize (Austrian Standard Institute)
- Guidelines (TRVB)



## OiB – Guidelines

The OIB Guidelines serve to harmonise the construction engineering regulations in Austria.

They are issued by the Austrian Institute for Construction Engineering upon decision in the General Assembly.

The federal states may declare OIB Guidelines as binding in their building codes, which is already the case in the majority of federal states.

However, the OIB Guidelines may be deviated from in accordance with the provisions of the relevant regulations of the federal states, if it is demonstrated that an equivalent level of protection in compliance with the OIB guidelines is achieved.



## OIB – Guidelines

- flexibility for innovative architectural and technical solutions
- follow the concept of performance-oriented building requirements.
- organised according to the basic requirements for construction works of the EU Construction Product Directive.

No OIB Guideline exists only for the basic requirement "Sustainable use of natural resources"

## OIB Guidelines:

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- OIB Guideline 1 Mechanical resistance and stability
  - OIB Guideline 2 Safety in case of fire
- OIB Guideline 2.1 Safety in case of fire in operational structures
- OIB Guideline 2.2 Safety in case of fire in garages, roofed parking spaces and multi – storey car parks
- OIB Guideline 2.3 Safety in case of fire in buildings with a fire escape level in exess of 22 m
- OIB Guideline 3 Hygiene, health and preservation of the environment
  - OIB Guideline 4 Safety in use and accessibility
  - OIB Guideline 5 Protection against noise
- OIB Guideline 6 Energy saving an heat insulation



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## **OIB** – AUSTRIAN INSTITUTE OF **CONSTRUCTION ENGINEERING**

## □ OIB Guidelines:

FEDERAL STATES	<b>OIB GUIDELINES 1 TO 5</b>	OIB GUIDELINE 6
Burgenland	(OIB Guidelines 2011 in force)	27 May 2015
Carinthia	(OIB Guidelines 2011 in force)	(OIB Guideline 2011 in force)
Lower Austria	(OIB Guidelines 2011 in force)	15 April 2016
Upper Austria	(OIB Guidelines 2011 in force)	(OIB Guideline 2011 in force)
Salzburg		(OIB Guideline 2011 in force)
Styria	1 January 2016	1 January 2016
Tyrol	1 May 2016	1 May 2016
Vorarlberg	(OIB Guidelines 2011 in force)	(OIB Guideline 2011 in force)
Vienna	2 October 2015	2 October 2015



- Preliminary observations
- Definitions
- General requirements and load capacity in case of fire
- Spread of fire and smoke within the structure
- Spread of fire to other structures
- Escape and emergency routes
- **Firefighters**
- □ Special provisions for agricultures, hotels, schools and retail outlets.



- The fire protection requirements for buildings are defined in terms of building classes
  - BUILDING CATEGORY (GK 1)
  - maximum of three aboveground floors
  - fire escape level in excess not more than 7 m
  - 2 apartments or an operating unit
  - maximum 400 m<sup>2</sup> floor area
  - detached
  - On at least three sides for the Firefigherts from outside accessible





- The fire protection requirements for buildings are defined in terms of building classes
  - BUILDING CATEGORY (GK 2)
  - maximum of three aboveground floors
  - fire escape level in excess not more than 7 m
  - maximum 400 m<sup>2</sup> floor area
  - exlusive residential use
  - detached
  - maximum 800 m<sup>2</sup> floor area





- The fire protection requirements for buildings are defined in terms of building classes
  - BUILDING CATEGORY (GK 3)
  - maximum of three aboveground floors
  - fire escape level in excess not more than 7 m
  - regardless of the area





- The fire protection requirements for buildings are defined in terms of building classes
  - BUILDING CATEGORY (GK 4)
  - maximum of four aboveground floors
  - fire escape level in excess not more than 11 m
  - one apartment or operating unit without limitation
  - More apartments or operating units, each with maximum 400 m<sup>2</sup> area





- The fire protection requirements for buildings are defined in terms of building classes
  - BUILDING CATEGORY (GK 5)
  - fire escape level in excess not more than 22m
  - do not fall in the building class 1 to 4





## OIB Guideline 2 - Safety in case of fire

General requirements depending on the building class

- Facades
- Corridores and staircases outside apartment
  - claddings and coverings and ceiling suspended
- Staircases
  - claddings and coverings and ceiling suspended
- Roofs
- Not developed roof space


## OIB Guideline 2 - Safety in case of fire

- General requirements depending on the building class
   >> fire behavior
  - Facades
  - Corridores and staircases outside apartment
    - claddings and coverings and ceiling suspended
  - Staircases
    - claddings and coverings and ceiling suspended
  - Roofs
  - Not developed roof space



#### OIB Guideline 2 - Safety in case of fire

						GK 5			
	Gebäudeklassen (GK)	GK 1	GK 2	GK 3	GK 4	≤ 6 oberirdische Geschoße	> 6 oberirdische Geschoße		
1 Fa	ssaden								
1.1	Außenwand-Wärmedämmverbundsysteme	E	D	D	C-d1	C-d1	C-d1		
1.2	Fassadensysteme, vorgehängte hinterlüftete, belüftete oder nicht hinterlüftete								
1.2.1	Gesamtsystem oder	E	D-d1	D-d1	B-d1 (1)	B-d1 (1)	B-d1		
1.2.2	Einzelkomponenten	4				12			
	- Außenschicht	E	D	D	A2-d1 (2)	A2-d1 (2)	A2-d1 (3)		
	<ul> <li>Unterkonstruktion stabförmig / punktförmig</li> </ul>	E/E	D/D	D / A2	D / A2	D / A2	C / A2		
	- Dämmschicht bzw. Wärmedämmung	E	D	D	B <sup>(2)</sup>	B <sup>(2)</sup>	B <sup>(3)</sup>		
1.3	sonstige Außenwandbekleidungen oder -beläge	E	D-d1	D-d1	B-d1 (4)	B-d1 (4)	B-d1		
1.4	Gebäudetrennfugenmaterial	E	E	E	A2	A2	A2		
1.5	Geländerfüllungen bei Balkonen, Loggien u. dgl.	-	-	-	B <sup>(4)</sup>	B <sup>(4)</sup>	В		
2 Gá	inge und Treppen jeweils außerhalb von Wohnu	ngen: Bek	leidungen (	und Beläge	sowie abgel	nängte Decken			
2.1	Wandbekleidungen (5)								
2.1.1	Gesamtsystem oder	-	D	D	С	В	В		
2.1.2	Einzelkomponenten								
	- Außenschicht	-	D	D	C (4)	В	В		
	- Unterkonstruktion	-	D	D	A2 (4)	A2 (4)	A2 (4)		
	- Dämmschicht bzw. Wärmedämmung	_	С	С	С	A2	A2		
2.2	abgehängte Decken	-	D-d0	D-d0	C-s1, d0	B-s1, d0	B-s1, d0		
2.3	Wand- und Deckenbeläge	-	D-d0	D-d0	C-s1, d0	B-s1, d0	B-s1, d0		
2.4	Bodenbeläge	-	D <sub>fl</sub>	D <sub>fl</sub>	C <sub>fl</sub> -s1 <sup>(6)</sup>	C <sub>fl</sub> -s1	C <sub>fl</sub> -s1		

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## OIB Guideline 2 - Safety in case of fire

General requirements depending on the building class

- >> fire resistance
- Bearing components
- Partitions
- Fire walls and ceilings
- Ceilings
- Balcony panels



#### OIB Guideline 2 - Safety in case of fire

						GK 5					
	Gebäudeklassen (GK)	GK 1	GK 2	GK 3	GK 4	≤ 6 oberirdische Geschoße	> 6 oberirdische Geschoße				
1 tra	1 tragende Bauteile (ausgenommen Decken und brandabschnittsbildende Wände)										
1.1	im obersten Geschoß	-	R 30	R 30	R 30	R 60	R 60				
1.2	in sonstigen oberirdischen Geschoßen	R 30 <sup>(1)</sup>	R 30	R 60	R 60	R 90	R 90 und A2				
1.3	in unterirdischen Geschoßen	R 60	R 60	R 90 und A2	R 90 und A2	R 90 und A2	R 90 und A2				
2 Trennwände (ausgenommen Wände von Treppenhäusern)											
2.1	im obersten Geschoß	-	REI 30 El 30	REI 30 EI 30	REI 60 EI 60	REI 60 EI 60	REI 60 EI 60				
2.2	in oberirdischen Geschoßen	-	REI 30 El 30	REI 60 El 60	REI 60 El 60	REI 90 El 90	REI 90 und A2 EI 90 und A2				
2.3	in unterirdischen Geschoßen	-	REI 60 El 60	REI 90 und A2 EI 90 und A2	REI 90 und A2 EI 90 und A2	REI 90 und A2 EI 90 und A2	REI 90 und A2 EI 90 und A2				
2.4	zwischen Wohnungen bzw. Betriebseinheiten in Reihen- häusern	nicht zutreffend	REI 60 El 60	nicht zutreffend	REI 60 El 60	nicht zutreffend	nicht zutreffend				
3 brandabschnittsbildende Wände und Decken											
<mark>3.1</mark>	brandabschnittsbildende Wände an der Nachbar- grundstücks- bzw. Bauplatz- grenze	REI 60 EI 60	REI 90 <sup>(2)</sup> EI 90 <sup>(2)</sup>	REI 90 und A2 EI 90 und A2	REI 90 und A2 EI 90 und A2	REI 90 und A2 EI 90 und A2	REI 90 und A2 EI 90 und A2				
3.2	sonstige brandabschnittsbil- dende Wände oder Decken	nicht zutreffend	REI 90 EI 90	REI 90 EI 90	REI 90 EI 90	REI 90 EI 90	REI 90 und A2 EI 90 und A2				

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## OIB Guideline 2 - Safety in case of fire

#### Spread of fire and smoke within the structure

- Size of fire compartments
- Execution of fire compartments
- Facades
- Lifts
- Fire sites
- Exhaust systems
- Rooms with increased fire danger
- Fire extinguishers and fire hydrants
- Smoke detectors



### OIB Guideline 2 - Safety in case of fire

- Spread of fire and smoke within the structure
  - >> facades special provision for firefighters









### OIB Guideline 2 - Safety in case of fire

- Spread of fire and smoke within the structure
  - >> facades special provision for firefighters

In buildings of building classes 4 and 5 facades must be such that

- □ fire propagation through the facade on the second overlying the fire floor and
- □ the falling of large parts of the facade effectively restricted

becomes.



## OIB Guideline 2 - Safety in case of fire

#### Spread of fire and smoke within the structure

>> Smoke detectors

In apartments must lounges - except in kitchens -

and in hallways leading the escape routes of the stay - evacuate,

at least one non-crosslinked

smokedetector are arranged.





## OIB Guideline 2 - Safety in case of fire

#### □ escape routes

From any point of the room - except not developed roof spaces - must be available in more than 40 m walkway length:

- a.) direct exit to a safe place of the adjacent terrain outdoors, or
- b.) a staircase or an external staircase, each with an output to a safe place of the adjacent terrain outdoors according to Table 2a and 2b, or
- c.) two staircases or two outdoor stairs or a staircase and an external staircase to a respective output to a safe place of the adjacent terrain outdoors in Table 3.



## OIB Guideline 2 - Safety in case of fire

escape routes

In case c.) the escape route via a staircase or an external staircase can be replaced

- by a rescue firefighting equipment or
- by a fixed installation system escape routes to the building outer wall.



## OIB Guideline 2 - Safety in case of fire

- escape routes with firefighting equipement are permitted only if:
  - Accessibility of each apartment or operating unit on each floor on the facade,
  - Availability of suitable building openings,
  - Directions of the fire to the building of max. 10 km
  - Establishment of adequate entrances, driveways, installation and movement areas for the necessary rescue equipment of the fire department.



## OIB Guideline 2 - Safety in case of fire

#### Firefighters

- Buildings must be accessible to firefighting principle.
- The necessary access roads, installation and movement areas for fire engines must be adequately secured and stable.
- A sufficient accessibility is at GK 1 GK 3 anyway given when the building access is at a distance of not more than 80 m walkway length of the supporting surface for the fire trucks.
- In buildings of GK 4 and 5, the application possibilities of the firefighters also must be considered.



## OIB Guideline 2 - Safety in case of fire

□ Fire – Water

A sufficient fire water supply is in any case where, when a minimum extinguishing water rate

#### >> 1 I / m<sup>2</sup> min

based on the largest fire compartment area is available.

Residential buildings 800 I / min





# OIB Guideline 2.1 – Safety in case of fire in operational structures

Define security categories

- K1 no special measures
- K2 automatic fire detection system
- K3.1 automatic fire detection system and during the operating time of application ready, according to the applicable national laws recognized company fire brigade with a minimum group size



## AUSTRIAN INSTITUTE OF CONSTRUCTION ENGINEERING

# OIB Guideline 2.1 – Safety in case of fire in operational structures

- Define security categories
  - K3.2 automatic fire detection system and constant deployable, recognized company fire brigade with a minimum group size
  - K4.1 Advanced automatic extinguishing aid system
  - **K4.2** automatic fire extinguishing system



C (S	Number of overground floors of the building									
iecu ateç	1			2		3	4	> 4		
rity Jorie	Fire resistance of load-bearing and reinforcing components									
	R 0	R 30	R 30	R 60 <sup>(1)</sup>	R 90 / A2 <sup>(2)</sup>	R 90 / A2 <sup>(2)</sup>	R 90 / A2 <sup>(2)</sup>	R 907 A2		
K 1	1.800 <sup>(3)</sup>	3.000	800	1.600	2.400	1.800	1.500	1.200		
K 2	2.700 <sup>(3)</sup>	4.500	1.000	2.000	3.600	2.700	2.300	1.800		
K 3.1	3.200 <sup>(3)</sup>	5.400	1.200	2.400	4.200	3.200	2.700	2.200		
K 3.2	3.600 <sup>(3)</sup>	6.000	1.600	3.200	4.800	3.600	3.000	2.400		
K 4.1	5.000	7.500	2.000	4.000	6.000	4.500	3.800	3.000		
K 4.2	7.500	10.000	5.000	7.500	10.000	6.500	5.000	4.000		



# OIB Guideline 2.1 – Safety in case of fire in operational structures

#### Water requirement

Taking into account the areas of the fire zones, the Fire loads and technical fire safety equipment in coordination set with the fire brigade!

Guideline: TRVB F 137 "Water requirement"





# OIB Guideline 2.1 – Safety in case of fire in operational structures

Location and accessibility
 Each such zone is min. one side lying on an outer wall
 fire attack ( except extinguishing system )

Guideline: TRVB F 134 "Fire brigade zones "





#### □ TRVB

The TRVB be developed by the Austrian Federal Association of Fire Brigade and the Austrian Fire Protection Boards.

The TRVBs regulate the implementation of fire protection equipment.

- TRVB 123 fire detection systems
- TRVB 125 smoke and heat exhaust systems
- TRVB 127 sprinkler
- TRVB 152 gas extinguishing systems

The guidelines regulate the installation, maintenance and operation.



#### **TRVB** – TECHNICAL GUIDELINES FIRE PREVENTION

## TRVB 123 – FIRE DETECTION SYSTEMS

These guidelines apply for fire detection systems installed in buildings using automatic detectors and/or non-automatic detectors.

They may apply accordingly also for other fire detection systems (e.g. tunnels, vessels).

This document does not apply for heat detectors, as described in ÖNORM EN 14604.

If the fire detection systems are controlling fixed fire extinguishing installations or other fire-fighting equipment, guidelines issued for this purpose will be also taken into account.

#### **TRVB** – TECHNICAL GUIDELINES FIRE PREVENTION

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Austrian Federal Association of Fire Brigades			Austrian Fire Protection	TRVB 123 S.en				
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	FIRE DE	TE	ECTION SYSTEMS		-			
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Approv	red in the 310 <sup>th</sup> Presidential Meeting of the ÖBFV or	n	Conving and reproducing only with the	Translatio	on of edition 2011			
17.5.2	2011 and the Austrian Fire Prevention Services on		the editor's written permission	(replacement	of edition 2003/ 2010)			
	10.6.2011			Translation by	Honeywell Life Safety			



The guidelines of ÖBFV rules as the training and the equipment of the fire department and the requirements and the equipment.



## 

The guidelines of the Austrian Insitutes of Construction Engineering (OiB) regulate the requirements for structures.

## □ TRVB

The TRVBs regulate the implementation of fire protection equipment.

## □ ÖBFV

The guidelines of ÖBFV rules as the training and the equipment of the fire department and the requirements and the equipment.



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## □ ÖBFV

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## THANK YOU FOR YOUR ATTENTION!







**METHODOLOGY AND APPARATUSES** 

## FOR CAUSE DETERMINATION OF FIRE

## **RISE IN CONSEQUENCE OF**

## **ELECTRICAL WIRING FAILURE**

#### **COMMISSAR ENG. HRISSIMIR DOCHEV**

**CHIEF DIRECTORATE "FIRE SAFETY AND CIVIL PROTECRION" - MOI** 









The analysis of statistical data shows that annually about 20-25% of the fires rise in consequence of electrical wiring failure. To rise such a fire it is necessary an availability of ignition source and combustible

The combustible could be available out of the electrical wiring or it should be the same electrical installation (for instance its insulation). The environment is the factor that keeps up the ignition caused by electricity.









## The reasons of fires caused due to electricity failure are the following break-down:



High transitional voltage
 Overloading
 Short circuit







The transitional voltage rise due to contact between two solids in area of the circuit passing from one contact to the other trough tangentional area.



That induce the heat release proportional to the circuit squaring in points of contact.













In that conditions the current runs into the electrical wires of the installations, machines and apparatuses a long time and over the admissible values.

In that consequence the wires are warmed up to high temperatures and that provoke subsequent insulation ignition.











The short circuit is a break-down rate into the electrical wiring. In these conditions a combination of different circuit parts under voltage through small resistance is growing up. Having a powerful thermal impulse, the short circuit is capable in many cases to ignite the electrical parts insulation and the near situated combustible materials.









In the figure is shown the relative part of the fires arose due to short circuit, overloading, transitional resistance and infringement of the fire safety requirements comparatively with the total number electricity originated fires .

Propotion of fires with elctricity origin







According the statistics the greatest part of the electricity originated fires is the fires induced by short circuit.

Due to this main reason section "Fire technical expertise" of department "Center for testing and expertise" by Chief Directorate "Fire Safety and civil protection" hardly works in the field to determinate the role of short circuit on the cooper wires.









In the process of electro technical expertise performance the most often question is given to the experts: "Is there short circuit in the electrical wiring and could it be the cause of the risen fire? " because the short circuit could be originated by the thermal effect of the fire. On that principle, depending the moment of the fire rise, the short circuit is two kinds

-*Primary* - arose before the fire and



-Secondary - arose after the fire.







#### Determination methods of short circuit kind

In accordance with the bibliographical reference there exist two methods:

metholografical analysis

> roentgen structural analysis

Our section uses the roentgen structural analysis. It is carried out according approved methodology. That methodology was created in 1980 with the assistance of scientists of Bulgarian Science Academy and Fire Safety Institute in Moscow, Russia







The methodology is designed to determinate the kind of the short circuit arose only on open space disposed conductors with cooper wires, independently of its section and wires number in the core

The method is based on the comparison of the cooper structure alteration and the formation of Cu oxides at place of the short circuit and at some distance out of it alongside the conductor wire




### THE SEQUENCE OF THE ROENTGEN STRUCTURAL ANALYSIS OPERATIONS:

1. Visual analysis



2. Treatment of the specimens



3. Adjustment of the specimens into the chamber and its loading by Roentgen film



- 4. Analysis performance by Roentgen apparatus
- 5. Develop and make out the Roentgen film



6. Determination the kind of the short circuit







The visual analysis is carried out by microscope. The purpose of this analysis is to be pointed out the cause of the melting on the presented Cu wires and to be selected the specimens for roentgen structural analysis roentgen structural analysis. The causes of the melting on the Cu wires are:

Fire temperature influence



Heat influence of the short circuit electricity





### The melting caused by the fire temperature

The melting caused by the fire temperature is allocated on the length of the wire and it has no clearly marked limits.









### The melting caused by short circuit

The melting caused by short circuit is local and has clearly marked limits. Its form can be spherical, oval or drop-shaped.











The testing of each melting due to short circuit includes two specimens:

one at the place of the melting (No 1)

other at the place distant 50-100mm from the specimen No1.

On each specimen are performed two roentgen structural analysis. The first specimen is immovable (static) in the chamber and the second is in rotation.









The performance of the roentgen structural analysis requires being used Roentgen apparatus type UPS -2.0 and Philips PW 1730

















After the performance of the roentgen structural analysis the got roentgen-grams have to be developed and dried.



They are made out by the aid of etalon roentgen-gram in order to determinate the kind of the short circuit.









The determination of the short circuit kind is performed by the comparison of the roentgen-grams photographed of specimens No1 and No2 and between them.

The short circuit is "primary" when:

≻Diffraction's stains of Cu on the No specimen roentgen-gram have smaller size then those of specimen No2 (by the static specimens).

> The intensity of the  $Cu_2O$  and CuO lines on the roentgen-gram of No1 specimen is greater than the intensity of No2 specimen (by specimen in rotation).









### The short circuit is "secondary" when:

≻Diffraction's stains of Cu on the No1 specimen roentgen-gram have greater size then those of specimen No2 (by the static specimens).

> The intensity of the  $Cu_2O$  and CuO lines on the roentgen-gram of No1 specimen is smaller than the intensity of No2 specimen (by specimen in rotation)

The intensity of Cu lines on the roentgen-gram of No1 specimen is grater than the intensity of No2 specimen.











The final conclusion if the short circuit would cause the fire when it is "primary" could be done in the process of the fire technical expertise. That is carried out after recognizing of the lawsuit materials and the comparison of all the circumstances and facts on time and spot









### Qualified Fire Investigator Training System of the Republic of Belarus

The State Educational Establishment "The Institute for Retraining and Professional Development" of the Ministry for Emergency Situations of the Republic of Belarus



Olga Gorovykh, Professor

## Fire Safety Act, Article 35

 the conduct of fire investigation in criminal cases is carried out by the State Fire Supervision by the inspector.



# The Role of State Fire Supervision Inspector

providing advice to the police investigator





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# Investigative Committee Investigator

Arson



Died people

### large-scale damage





# **Participating Specialists**



# **Training of Investigators**



# Training of Inspectors of the State Fire Supervision

Professional Development (once in 5 years)

Retraining (1 year 8 months)

MES Institutions (4 years of training)

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# **Specialized Laboratory**





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# Fire and Technical Expertise











International Fire Investigation Conference 25. – 26. 5. 2016 Budapest, Hungary

### **Fire investigation in Czech Republic**



Ministry of Interior General Directorate of Fire Rescue Service of Czech Republic Lt-Col. Jakub Škoda, Capt. Lukáš Hřebačka



### **Czech Republic**



Area: 78 866 km<sup>2</sup>

Inhabitants: 10 538 275

Density: 134 ob. / km<sup>2</sup>

Regions: 14

Capital city: Prague





### **Investigating the causes of fires**





### Fire investigation

- The service is provided by fire investigators all-day
- 2 types of fire investigators (FI):
  - 1) Basic fire investigator
  - 2) Doublers (other fire investigators)



**Fire investigation staff** 

- 326 members of Fire Rescue Service CZ securing fire investigation
- 106 basic FI + 220 doublers
- Sallary costs approx. 100 million of CZK/year (3.700.000 EUR)

### Length of practice for basic FI







•178



### Length of practice for other FI (doublers)





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**Fire investigators training** 

Research and Development

Technical Institute of Fire Protection in Prague (TÚPO)
Population Protection Institute in Lázně Bohdaneč

### Training centers

- Special Secondary School of Fire Protection and High Special School of Fire Protection in Frýdek-Místek
- School and Training Facility of Fire Rescue Service Czech Republic (Brno and Frýdek-Místek centres)


## System of education

- After acceptance to service relationship:
  - a) Novice course duration 3 weeks
  - b) Course of professional competence (prevention) duration 4 weeks, it is needed to restore each 5 years
  - c) Specialization course duration 1 week



Form of fire investigation

- Fire investigator goes to the scene of fire to:
  - Examine the scene
  - Collect data about fire (e.g. date of fire, start time of fire, who and when saw the fire for the first time, place of fire, identification of the building owner, building data, what happened before the fire started etc.)
  - Make photo and video documentation



## Form of fire investigation

o Communicate with police, witnesses etc.o Call up another assistance if needed:

- dog
- experts for other field
- Record of statements



## **Fire documentation**

- Report of action
- All needed documents (e.g. from police department, owner of building etc.)
- Collected data from "doubler"
- Photodocumentation
- Situation plan of the fire
- Report from expert examination, if present
- Expert opinion results from all processes within investigation of fire (evidence in the court)



**Procedure of processing the documentation of fire** 

- Basic F.I. processes the fire documentation in case of every fire, except:
  - o fire of waste
  - o fire of vegetation
  - o fire of cooked food
  - o fire of carbon blacks in chimney
- Necessary requirements for previous types of fire: no material damage, no fire deaths and injuries and no one was in danger during the fire



## **Other documentation**

- Responses to requests of:
  - o Insurance companies
  - Police department
  - Owner of damaged building
  - Other requests about fire and incidents



- Protective footwear Haix or equivalent
- Helmet GALLET
- Working uniforms PS II
- Fireman protective coat or equivalent
- o Safety gloves
- o Rechargeable flashlight
- o Breathing aparature
- o Multi-tool
- o Others













#### Using dogs in fire investigation

- Fire Rescue Service of the Czech Republic do not have any dogs trained for searching accelerants
- Therefore we use Police dogs, which are trained for searching accelerants
- They are not always used, only on investigator's request

   criminal offense
- 30 Police dogs trained for searching accelerants in Czech Republic





#### **Fires in Czech Republic**



2 % fires with damage > 1 mil. Kč



#### Killed by fire





International cooperation

- Exchange of Experts
  - o Belarus



o Estonia





#### **ANY QUESTIONS?**



# FIRE SERVICE HEADQUARTERS DIVISION OF COMBATING ARSON CRIMES



# **Forest Fire Investigation**

Lieutenant Colonel Kalogeropoulos Christos

## **Forest Fire Investigation**

•Firefighting period May1<sup>st</sup> –October31<sup>st</sup>

Assignment of the forest firefighting to the Fire Servi ceaccording to law
N 2612/1998.

• Establishment of the Division of combating arson crimes ( $\Delta$ .A.E.E) - Presidential Decree ( $\Pi$ . $\Delta$ .)3/2000.

# **ORGANIZATIONAL CHART**

## FIRE SERVICE HEADQUARTERS

DIVISION OF COMBATING ARSON CRIMES ( $\Delta$ .A.E.E)

1<sup>st</sup> Department Investigation– Operations 2<sup>nd</sup> Department Secretariat – Archive

13 FIRE BRIGADE ADMINISTRATION DISTRICTS

13 Δ.A.E.E ECHELONS

**108 FIRE BRIGADE INVESTIGATION BUREAUS** 

#### DIVISION OF COMBATING ARSON CRIMES (Δ.Α.Ε.Ε)

Staffing (specialized Officers - non commissioned officers)
Cooperation (Hellenic Police, Forest Service etc)

Special Training (Hellenic Police - Directory of Confronting Arson Crimes – U.S.A. Forest Service etc)
Organizing educational seminars for the Fire Sevice interrogation offices employees



# Statistics of Fire Causes during the period 2010–2015

## Fire Distribution per year

YEAR	AGRICULTURAL	URBAN	FORESTIAL	SUM
2010	6.758	13.638	1.779	22.175
2011	9.420	15.854	2.543	27.817
2012	8.462	14.991	2.886	26.339
2013	8.801	15.775	2.117	26.693
2014	5.802	12.941	1.564	20.307
2015	6.311	15.189	1.757	23.257
SUM	45.554	88.388	12.646	146.588

## Fire extent distribution

Fire extent distribution	Fires	%
<1 are	42.451	80,40
1 – 10 ares	9.090	17,22
11-100 ares	1.119	2,12
101-500 ares	102	0,19
> 500 ares	38	0,07

# Fire distribution per month (%)



## Fire events per hour (%)



## Human factor - activity

- Agricultural areas (agricultural work, burning of brunches & crop remaining etc)
- Forests woodland (lumbering , apicultural work, home made barbeques, creating pastures, electricity conductors etc)
- Plots (use of equipment (work with tools of high temperature– welding– electric cutting wheels), burning of dry grass – rubbish etc)
- Roadside (burning cigarettes disposal etc )
- Grassland areas (pasture improvement)

## Human factor - Activity

Use of equipment – electric cutting wheel

Grass Burning

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## Human factor - activity

Agricultural work -Burning brunches

**Apicultural work** 

# **CAUSE CHARACTERIZATION**

YEAR	ΤΥΡΕ	UNKNOWN	NEGLIGENCE	INTENTIONAL	RANDOM	NATURAL
2010	AGRICULTURAL	18,19	40,51	36,97	3,81	0,52
	URBAN	9,4	44,54	33,9	11,38	0,77
	FORESTIAL	16,81	24,06	47	2,97	9,16
2011	AGRICULTURAL	14,58	36,39	45,75	2,68	0,6
	URBAN	7,83	43,53	38,27	9,96	0,4
	FORESTRY	13,72	21,74	54,89	2,31	7,34
2012	AGRICULTURAL	11,35	36,41	49,43	2,4	0,42
	URBAN	6,98	46,06	36,13	10,35	0,47
	FORESTIAL	11,42	22,25	58,24	1,87	6,23
2013	AGRICULTURAL	9,16	41,22	45,90	3,31	0,42
	URBAN	5,47	50,47	34,24	9,36	0,47
	FORESTIAL	11,03	26,29	51,37	3,46	7,85
2014	AGRICULTURAL	9,11	33,97	53,07	3,29	0,56
	URBAN	5,84	47,89	35,53	10,21	0,53
	FORESTRY	10,74	22,08	51,66	4,19	11,33
2015	AGRICULTURAL	7,74	32,17	56,45	2,77	0,87
	URBAN	5,58	45,76	38,38	9,67	0,62
	FORESTIAL	10,01	24,93	53,18	3,38	8,49

## Spatial distribution of fires

AREA DESCRIPTION	FIRES(%)
AGRICULTURAL AREAS	40,01
FORESTS-WOODLANDS	23,12
PLOTS OF LAND	12,17
ROADSIDES	10,16
WASTE DISPOSAL AREAS	7,76
GRASSLAND	4,13
REED -SWAMPS	2,32
SMALL WOODS	0,33

# Burnt areas distribution (%)

TYPE OF AREA	(%)		
Forests	22,51		
Woodland	29,09		
Grassland	14,26		
Crop remaining	12,99		
Agricultural areas	19,1 <sup>J</sup>		
Reeds- Swamps	1,58		
Small woods	0,03		
Waste disposal areas	0,43		



Source: Division of Informatics F.S.

# Fires due to negligence and intention per month and hour



Source: Δ.A.E.E

## Arsonists per year

YEAR	2010	2011	2012	2013	2014	2015
NEGLIGENCE	254	281	303	525	215	272
INTENTION	82	52	42	121	55	66
SUM	336	333	345	646	270	338
Caught in the act	102	134	111	214	150	121
Detentions	2	3	3	1	5	1

## Arsonists' age (negligence and intentional fires)



#### **NEGLIGENCE (%)**



PERPETRATORS' AGE	NEGLIGENCE(%)	INTENTION(%)	IN TOTAL %
<18	0,56	9,34	1,74
19 – 35	14,14	36,54	17,22
36-60	51,66	38,46	49,91
>60	33,64	15,66	<b>31,13</b> 233

#### INTENTION (%)

Source: Δ.A.E.E

## PERPETRATORS' SEX

SEX	NEGLIGENCE	INTENTION
MEN	92,4	97,0
WOMEN	7,6	3,0



## PERPETRATORS' OCCUPATION

PERPETRATORS' OCCUPATION	<mark>(%</mark> )
FARMERS-LIVESTOCK BREEDERS	26,76
PENSIONERS	23,35
PRIVATE SECTOR EMPLOYEES - CIVIL SERVANTS	16,08
FREELANCERS	13,27
WORKERS	13,23
DOMESTIC HOUSEHOLD	3,20
UNEMPLOYED	2,77
STUDENTS	1,34

## Negligence-Intention per occupation(%)



ΕΠΑΓΓΕΛΜΑ	NEGLIGENCE	INTENTION	
FARMERS-LIVESTOCK BREEDERS	28,87	17,59	
PENSIONERS	24,51	18,29	
PRIVATE SECTOR EMPLOYEES -		0.26	
CIVIL SERVANTS	17,64	5,20	
FREELANCERS	14,83	6,48	
WORKERS	9,19	30,79	
DOMESTIC HOUSEHOLD	3,51	1,85	
UNEMPLOYED	0,96	10,65	
STUDENTS	0,49	<b>5,09</b>	
#### **INVESTIGATION FOR THE FOREST FIRES CAUSES**



 The size of the circle reflects the investigator's uncertainty in relation to the exact spot of the initial focal point of the fire.

- a) Nothing can be taken for granted.
  b) Keep an open mind.
  c) Direct contact with the witnesses.
- d) Notebook.
- e) Quiet environment.
- f) Respect.
- g) Trust.
- h) Specific questions.i) Behavior.









**MOTIVES FOR** ARSON a)Person with low self esteem/pyromaniacs (way/means). b)Employees who have complaints or they have been notified for dismissal. c)Person who is jealous of the owner of the property. d) Businessmen who try to cheat the insurance companies.





e) Impotent or remorseless businessmen whom their opponents thrive. f) People who want to cover evidence of a graver crime such as murder. g) Political organizations. h) Declassification of forest areas. i) Grassland improvement.



#### REASONS FOR SUSPICION OF ARSON.

- a) Simultaneous start of fires without natural cause.
- b) There is no possibility of self-ignition and the fire risk is low.
- c) The fire started from a highly improbable place.
- d) The materials are burning in an unusual way and initially the fire is very intense.
- e) There is an intense smell of flammable liquid.
- f) Inactive firefighting measures.
- g) Presence of the same person in many fires.





- h) Series of fires that occurred in the same building in a small period of time or if they have been similar fires in the area.
- i) The burnt merchandise was of low quality, while the owner claims that the quality was the best.
- j) Beginning of a small fire without an obvious cause which destroys bills, archives, etc.
- k) Removing objects of great value before the fire begins.
- 1) Removing animals from the area before the fire begins.



# FOREST ARSONIST

#### **Forest Arsonist Definition**

Anyone who intentionally and without jurisdiction causes fire in wood, bushes, grass or any other flammable material in public area. *≻Inflammatory device* 

1. Object which is thrown (such as cigarette).

- 2. Object of ignition (match).
- **3.** Components with a connection.





> Motives for forest

#### arsons.

- 1. Vandalism.
- 2. Emotionally
- disturbed arsonists.
- 3. Crime
- concealment.
- 4. Culture (local
- habits).
- 5. Vanity.
- 6. Revenge/ Grudge.
- 7. Profit.





**Common characteristics of Organised** Arsonists **Characteristics of the** beginning of the fire : 1.Use of a ignition component. 2. Preparation. 3. Selection of the place of ignition. 4. Designed fire intensity. 5. Access attempt is necessary. **6.Unlimited movement** (transportation).





- Characteristics of behavior <u>personality.</u>
- 1. Conscious indifference for the society.
- 2. Selfishness.
- 3. Ability of affecting the others.
- 4. He/She lives in a small distance from the place of the fire.
- 5. "Chameleon" personality.
- 6. Methodical way & cunning.





<u>Common</u>
 <u>Characteristics of</u>
 <u>Non Organised</u>
 <u>Arsonists.</u>

Characteristics at the location of the event: 1. Spontaneous, impulsive behavior. 2. Big flame. 3. Random targets.

4. Available material.

5. Non predesigned intensity .

6. Easy access.

7. Limited movement.





Characteristics of

 Behavior

 Personality

- 1. Lonely.
- 2. Feeling of rejection.
- 3. Few friends.
- 4. Without treachery.
- **5. Starts a fire near to his house.**
- 6. Nocturnal.
- 7. Addicted to alcohol.





# **Categories of Indicators**

- 1.Protection
- 2.Grass line
- 3.Freezing
- 4.Destruction differences
- 5. Depth of carbonization
- 6. Angle of carbonization
- 7.Rock breaking
- 8.Wrinkles
- 9.Stain with smoke
- 10.Stains
- 11. Ash deposition
- 12.Cup-shape
- 13. "V" Patterns
- 14. Fading Patterns

# 1. Indicators of Protection



# 2.Grass line indicator



# 3. Freezing leaves indicator





# 4.Indicators of different kind of destruction



# 5.Indicator of deep carbonization



## 6.Indicator of the carbonization angle









# 7.Indicator of fragmentation



Fragmentation with smoke

# 8.Wrinkle Indicators

-The green leaves bent inwards, towards the source of the heat

-Microscopic indicator





## 9. Stain with ash indicators









# 10.Stains





# 11.Ash Indicator



## 12.Indicators of the Cup-shaped fire

Carbonization is in a shape of a cup.

The cup shows where the fire started

Areas in the front

The exposed side is either blunted or surrounded . Carbonized pieces on the ground. Non exposed side – cup shaped





# 13.Indivators of the "V" Type



V Type Indicators: Error possibility

It can be a very reliable indicator. Aerial perspective. Exceptions :

- Rolling material
- Weather change
- Change of fuel type
- Staining
- Repression activities

# **14.Fading Indicators**



Areas with low fire intensity leave unburnt or partially burnt fuels in a shape of :

> "Fingers" "Islands"



# **INFLAMMATORY DEVICES**




















## **MOTIF ANALYSIS**

Motif categories

 Chronologically
 Geographically
 Action method
 Selection of targets

#### Analysis DAY OF THE WEEK

JUNE

#### JULY

SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7			1	2	3	4	5
8	Х 9	10	11	12	13	14	6	7	8	9	10	11	12
		Х	Х					XX				Х	
15	16	17	18	19	20	21	13	14	15	16	17	18	19
-	XX					Х							Х
22	23	24	25	26	27	28	20	21	22	23	24	25	26
	Х		Х			Х		XX		Х			XX
29	30						27	28	29	30	31		
	X									X			
							0	9	1	4	0	1	5

#### Analysis DAY OF THE WEEK

- Based on this analysis, Monday, Saturday and Wednesday are the most potential days
- The non appearance of Thursday and Sunday may be important

MONDAY	9
TUESDAY	1
WEDNESDAY	4
THURSDAY	.0
FRIDAY1	
SATURDAY	.5
SUNDAY	.0

### Day of the month analysis

	JUNE											
<u>SN N</u>		Μ	ΤW		TH F		ST					
	1	2	3	4	5	6	7					
		Х	7 days gap									
	8	9	10	11	12	13	14					
	(7)		Х	Х	4							
	15	16	17	18	19	20	21					
	(4)	XX	8 days gap									
	22	23	24	25	26	27	28					
			(8)	x								
	29	30										
	(11	)										

Every 4<sup>th</sup>

Wednesday

Fires on the

1<sup>st</sup> και 3<sup>d</sup>

Monday

#### <u>JULY</u>

SN M T W TH F ST									
		1	2	3	4	5			
		11 da	ays o	of an	omaly	,			
6	7	8	9	10	11	12			
(11)	хх	3 da	ays g	Jap	X	(5)			
13	14	15	16	17	18	19			
5 da	ys g	ар		Χ	1 dy	X			
20	21	22	23	24	25	26			
1 dy	XX	1 dy	Χ	2 day	XX				
_27	28	29	30	31					
3 da	ays	gap	Х						

Pay attention to the increase of the fire frequency













# Motifs of the method of action

#### • The method of action shows:

- Possible actions of the perpetrator before, during and after the crime
- Physical evidence that connect the perpetrator with the fire
- Possible motive
- Means of transportation and access
- Risk acknowledgement level
- Means of protection
- Age, weight, sex, history, criminal philosophy

## Targets selection motifs

- The analysis of the target selection searches for similarities in the type of the targets that the perpetrator chooses.
- This can be a vast analysis which includes the following :
  - Entrance-Exit motif
  - Motif of the risk of discovery
  - Damage maximization /minimization
  - Fuel type
  - Jurisdiction
  - Motif of the victim



# ACTIONS THAT SHOULD BE TAKEN

- Increase of the environmental consciousness of the civilians in the case of protection of the forestial wealth of our country from young age.
- Inform professional and social groups which are activated in agricultural- forestial outdoor work.

#### BECAUSE

The use of fire without fire safety & prevention measures causes:

- destruction of the natural environment,
- waste of economical and human resources and
- unfortunately sometimes the loss oh human lives

# **THANK YOU**

# EIRD INVESTIGATION PRACTICE IN LIGHUANIA





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#### Fire statistics based on objects in 2015



#### Causes of fires in 2015



Careless people handling of ire - 4347 (36,2 proc.)

Outside fire source - 2315 (19,3 proc.)

Burning of grass, stubble, crop waste - 858 (7,1 proc.)

Electrical equipment and installation failures - 659 (5,5 proc.)

Deliberate human activity- 549 (4,6 proc.)

#### Fire research in Lithuania is done by:

- Fire and Rescue Department (FRD) under the Ministry of the Interior of the Republic of Lithuanina and subordinate institutions' officers;
- If the latter determine identication of deliberate human activity, the research is conducted by police officers (pre-trial investigation is being started).

#### Subjects who participate in fire research:

- FRD and police officers;
- Police criminalists;
- Other areas specialits;
- Court experts.

# **Forensic institutions** (where expert research related to fires is conducted):

- Fire and Rescue Department under the Ministry of the Interior of the Republic of Lithuanina (MI) Fire Research Centre;
- Forensic Science Centre of Lithuania (FSCL);
- Also, in Lithuania, fire forensics can be carried out by private forensic experts.

Main document which determines the actions of forensic experts:

# THE REPUBLIC OF LITHUANIA FORENSIC LAW

#### The Republic of Lithuania Forensic experts

- Forensic experts who work in forensic institutions (state forensic experts);
- Private forensic experts.

#### The qualification of forensic experts

- Forensic expert qualification can be provided by the qualification committee which was created by the head of forensic institution (can provide forensic expert qualification, which allows to conduct only the type of expertise, which is conducted in that institution);
- > The candidate has to pass forensic expert qualification and theoretical knowledge exams;
- Forensic expert qualification is provided for 5 years.

### Fire and Rescue Department under the Ministry of the Interior of the Republic of Lithuanina Fire Research Centre





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# FRD under MI Fire Research Centre conduts4 (forensic) expertise types:

- 1. Fire expertise;
- 2. Charred wood expertise;
- 3. Building material and other production's ignition expertise;
- 4. Buildings, building parts, premises and their projects' fire safety expertise.

# FIRE EXPERTISE

Determines the place of fire source, technical cause of the fire, fire circumstances, technical measure (technical process) correspondence with the regulations of fire safety legislations

# CHARRED WOOD EXPERTISE

Determines the intensiveness of charred wood ignition process ( ignition process duration and temperature)

# BUILDING MATERIALS AND OTHER PRODUCTION'S IGNITION EXPERTISE

- Determines building materials and production's flammability;
- Determines and evaluaters building materials and production's flame spread index;
- Determines hard materials with organic supplements ignition and self-ignition temperatures;
- Evaluates the ignition of clothing materials;
- Evaluates the ignition of soft furniture when the source of fire is a burning cigarette;
- Evaluates the ignition of soft furniture when the source of fire is a matche's fire analogue;
- > Determines the boundaries of ignition tempertures of flammabe fluids;
- > Determines the temperature of self-ignition of flammable fluids

# BUILDINGS, BUILDING PARTS, PREMISES AND THEIR PROJECTS' FIRE SAFETY EXPERTISE

- Determines building, building parts and premises correspondance with the regulations and regulatory building's technical documents of fire safety;
- Determines building, building parts and premises correspondance with regulatory building's technical documents of fire safety ;
- Determines building, building parts and premises correspondance with regulatory documents of fire safety.

FRD under MI Fire Research Centre employees also perform the functions of specialists

- According to Criminal Procedure Code (CPC) FRD under MI Fire Research Centre specialists participate in the inspection of incident place;
- ▶ We had 152 inspections in 2015.

FRD under MI Fire Research Centre special (FRC) vehicle designed to carry out fire research





- Purpose: to go to fire (incident) inspection place and using the equipment in the vehicle to conduct a detailed fire (incident) inspection and to record and take material evidence.
- Actions which can be done using the equipment in the vehicle:
- The lighting of the fire area;
- Detection of flammable fluids;
- Charred wood sample gathering;
- Material evidence recording (photographing, filming)
- Local communication assurance
- Supply of electricity (using a generator)
- Demolishion works.
## Methods used in FRC

Laboratory methods

Outside methods

## Laboratory method

X-ray diffractometer is used for investigating copper electric installment vires and cables



Determines if in the electric installation fragment, which was given to conduct an expert investigation, was a short circuit and whether it happened before or during a fire





Difraktogramų analizės rezultatai

Atkarpos A integralinis plotas		Cu <sub>2</sub> O/ <u>Cu</u> santykis	Atkarpos B integralinis plotas		Cu <sub>2</sub> O/ <u>Cu</u> santykis	Atkarpos A/Atkarpos B santykis
Cu <sub>2</sub> O	Cu	1 17	Cu <sub>2</sub> O	Cu	2 71	(Cu <sub>2</sub> O/Cu)/(Cu <sub>2</sub> O/Cu)
11194	9538	1.17	12913	4770	2.71	0.43



1 pav. Elektros instaliacijos laidų fragmentų Nr. 2 vaizdas 2. pav. Bandinio Nr. 2.1. vaizdas.

## Laboratory method

**COERCETIMETER** is used for determining fire source zone in metal construction buildings or determining fire source zone from metal construction waste taken from the fire inspection place



### Laboratory examination

**Charred wood examination determines fire source zone in wooden buildings** 





- 1 Multi voltmetras,
- 2-press forma,
- 3 grūstuvė,
- 4 presas.

4

## Laboratory examination

**Thermogravimetric (TGA)** is used for identification of the material



## Outside method

**Gas detector** helps to detect flammable fluid traces (this instrument determines the concentration of flammable fluids in the air)







## Accredited ignition trials

- Building production flammability trials;
- Outside fire impact on roofs and roof material trials;
- Other production, soft furniture, clothing material, electric vires and cables fire trials;
- Non-magnetic covering thickness measurement;

## **Complies with LST ISO/IEC 17025:2005**

## Accredited fire resistance trials

- Building production's fire resistance trials;
- Fire extinguisher continuity of operational features evaluation and trial procedures;
- Polymer thermogravimetry;
- Window and door resistance to repeated opening of operational features evaluation and trial procedures;
- Door and slot protection from smoke trials

## **Complies with LST ISO/IEC 17025:2005**

## FSCL conducted expertise (related to fire research)

Oil product expertise

Metallographic expertise

FRD under MI Fire Research Centre organises training for law enforcement institution employees related to fire research

180 people attended the training in 2015.









## FRD under MI Fire Research Centre statistics related to fire research

The year 2015					
Incident place investigation	152				
Expert trials	97				
Court attendance	23				



# FIRE INVESTIGATION IN POLAND actual situation and possible trends

Presented by: Daniel MALOZIEC Seweryn BRZOZOWSKI

International Fire Investigation Conference Budapest, 24-26 May, 2016

#### THE STATE FIRE SERVICE

- The State Fire Service, supervised by the Ministry of Interior, is one of the basic parts of the National Firefighting and Rescue System (NFRS) - an integral part of the internal safety structure of the state.
- The Chief Commandant of the State Fire Service is the central authority responsible for the organization of fire protection and the NFRS.
- National Headquarters of the State Fire Service (KG PSP) is placed on the top of the organisational structure of the State Fire Service of Poland, consisting of the National Headquarters of the SFS, 16 Regional Headquarters of the SFS, 353 District (Municipal) Headquarters of the SFS and 499 Fire and Rescue Units.



National Firefighting and Rescue System (NFRS) has been created to protect population, property and environment within the territory of the Republic of Poland by the following activities:

- Extinguishing fires
- Fighting against the local threats
- Chemical and ecological rescue operations
- Technical rescue operations
- Rope rescue operations
- Urban Search and Rescue operations
- Water and diving rescue operations
- First medical aid



#### THE STATE AUTHORITIES WHICH ARE RESPONSIBLE FOR INVESTIGATION CASES OF FIRES:

- POLICE within the investigation opened or transferred by the prosecutor
- **PROSECUTOR** within the perform of the investigation
- **COURT** within the proceedings procedure



#### **COURT EXPERT**

Court expert - A person who has professional experience of their field of activity, established in court proceedings in order to present expert opinion, which is important for the result of the court case.

Court expert may be:

- The person on the list of court experts at the presidents of provincial courts (ie. Expert from the list)
- Another person who has knowledge in the field of science (ie. Expert ad hoc)
- Scientific institution or specialized (ie. Expert institutional).

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#### **COURT EXPERT**

Court expert can be a person who:

- 1. Has civil rights.
- 2. Is 25 years old at least.
- 3. A person who has both theoretical and practical knowledge in the field of science, technology, arts and so on.
- 4. Guarantees the fulfillment of the duties of a court expert.
- 5. Agrees to the establishment of the court expert.





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#### FIRE acc. Criminal Law (art. 163 § 1)

Art. 163. [Causing dangerous events]

§ 1. Who causes an event, which threatens the life or health of many persons or property in large sizes, that is:

1) fire,

•••

can be convicted to prison from one year to 10 years:

#### FIRE acc. Criminal Law (art. 164 § 1)

Art. 164. [Causing direct dangerous events]

§ 1. Who causes direct danger of the events referred to in article. 163 § 1, could be convicted to prison from 6 months to 8 years.

§ 2. If the perpetrator acted unintentionally, can be convicted to prison up to 3 years.

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#### FIRE acc. Criminal Law (art. 163 § 1)

Fire, referred in article 163 § 1 point 1, we understand the fire spread with the force of natural disaster. Fire with huge range, which threatens the life or health of many persons or property in large sizes.

Definition of fire concerns spread of flames to several objects (buildings, material compositions, cars, forest), or even one object, but the large sizes (eg. Apartment block).

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#### FIRE acc. Criminal Law (art. 288 § 1)

Burning a small objects or things, even great value (eg. valuable documents, money, equipment, etc.), if there are no conditions for the further spread of flames – **It's not a fire.** 

In this case, the perpetrator can be convicted on the basis of Art. 288 § 1 - damage to property (eg. by burning).



#### FIRE acc. Criminal Law (art. 288 § 1 i 2)

Art. 288

§ 1. Anyone who destroys, damages or makes unusable, can be convicted to prison from 3 months to 5 years.

§ 2. In the case of less damages, the perpetrator can be convicted to financial punishment, restriction of freedom or imprisonment for a one year.

•••

§ 4. Prosecution of the crime which is specified in § 1 or 2 at the request of the victim.

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#### The competences of the State Fire Service

In relation to fires, the **State Fire Service** is responsible for:

- Fire hazard identyfication
- Organization and management of fire-rescue operations
- Supervision of compliance with fire regulations
- Preliminary determination of fire causes



#### The competences of the State Fire Service

State Fire Service doesn't have authorizations to perform following process:

- 1. Inspecting fire area
- 2. Examinating of witnesses
- 3. Collecting traces
- 4. Protecting evidences

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#### The competences of the State Fire Service

**State Fire Service** is not leading organization in relation to the fire investigation. Therefore, causes of fire which were determined, will be always **preliminary/propable causes of fire.** 

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#### **EFFICIENT FIRE INVESTIGATION SYSTEM – necessity?**

## FIRE STATISTIC IN POLAND

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#### Fig. 1 Number of fires in Poland (2004 – 2013)

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Fig. 2 The average number of fires in Poland per province per year.

(values per 100 000 inhabitants)

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Fig. 3 Number of victims in fires (2004 – 2015)

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Fig. 4 Number of injured in fires (2004 – 2015)

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#### Fig. 5 Preliminary fire causes (2004 – 2013)

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Data from the statistical analysis:

- increasing number of fires
- increasing of fire damage
- high number of fire victims
- high percentage of fires caused by arson
- increasing proportion of fires of unknown cause
- low rate of punished records for fire crime

#### It is necessary to initiate changes in the organization fire investigations in Poland

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#### **EFFICIENT FIRE INVESTIGATION SYSTEM – need or necessity?**

CHANGES OF THE ORGANIZATION FIRE INVESTIGATIONS SHOULD BE BASED ON THE:

**IMPLEMENTATION OF THE SCIENTIFIC BASIS** 

**COOPERATION BETWEEN OTHERS INSTITUTIONS** 

**CREATION OF LEGAL THEORY** 

**ORGANISATION OF TRAINING SYSTEM** 

**ORGANISATION OF SUPPORT SYSTEM** 

**ORGANISATION OF INSPECTION SYSTEM** 

SYSTEM VERIFICATION

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#### **RESEARCH PROJECT**

This project was supported by the Polish National Centre for Research and Development (NCBiR) Grant No DOBR-BIO4/050/13009/2013



Narodowe Centrum Badań i Rozwoju

"Development of system solutions to support the execution of fire investigations based on cutting-edge technologies, including technical and IT tools"

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#### **Executors of the project:**

- The Main School of Fire Service
- Scientific And Research Centre For Fire Protection National Research Institute
- Central Forensic Laboratory of the Police
- The Fire Service College of the State Fire Service in Poznan
- Cybid Company


### The main tasks of the project:

- •Economic and functional analysis of fire investigations in Poland with the diagnosis of the major problems in the area
- Analysis of the effectiveness and efficiency of the proceedings
- Preparation and publication of Red Book of Fires
- Preparation of innovative tools which improve the efficiency of fire investigations
- Preparation of the guidance in the field of fire investigations
- •Developing the concept of system solution based on a partnership approach in the determination of the causes of fires and to disclose their perpetrators



### **RESEARCH PROJECT**

#### **Red Book of Fires (RBF)**

RBF presents the social and economic influence of fires over human life and the country's economy.

The paper presents selected consequences of the fires for the state, local communities and human being as an individual.



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### Red Book of Fires (RBF)

The RBF presents among other issues related to:

- Statistical analysis of fires in Poland and in the world
- Penal aspect of fires
- The effects of fires
- Social and economic costs of fires
- Fire prevention
- Determination of fire causes (organization, methods and problems)
- Fire risk and prevention in nowadays and forecast for the future



One of the tasks of the project was to develop the concept of system solution based on a partnership approach in the determination of the causes of fires and indication of perpetrators.

There were prepared three proposals of changes in the organization of fire investigations in Poland.



### Proposal no I – the minimum

The first option is the easiest and fastest solution for implementation, without making major changes to the current legal organization of fire investigations.

Such changes will have little effect on the determination of the causes of fires quality. In the first variant, each of the parties currently involved in the determination of the causes of fires, performs its tasks in the unchanged way governed by the laws, but on a higher level of preparation.

This proposal concerns the changes in the scope of training and cooperation (exchange of information) of all participants involved in determining the causes of fires.



### Proposal no II – the optimum

This option requires a change of the system of organization investigations in cases of fires.

It assumes implementation of changes which provide the **State Fire Service** competences allowing to participate in proceedings in these cases.

The changes should include:

- Granting the State Fire Service legal instruments for the fully professional determination of the initial causes of fires,
- Creation (together with the Police) special teams supporting determining causes of fires.



### Proposal no II – the optimum

The legislative changes allowing:

- Granting the State Fire Service legal instruments for the full and active participation in the preparatory proceedings in cases of fires,
- Creation the basis for organizational and legal establishment and operation of teams supporting determining causes of fires,
- Preparation uniform principles of cooperation mixed teams (mentioned above) and partnership in these matters between the State Fire Service, police and public prosecution.



### Proposal no II – the optimum

The organizational changes allowing:

- Coordination of the system at the central and regional level,
- Creation of training centers for members of teams supporting determining causes of fires, preparation of training and improvement programs,
- Creation of the database for monitoring and analyzing the causes of fires and fire crime.



#### Proposal no III – the radical

It is the radical change in the actual legal situation of the State Fire Service in determining the causes of fires. According to this proposal only the State Fire Service lead cases of fire – it means it is their own investigation.

This proposal requires the inclusion the State Fire Service in the Regulation of the Minister of Justice, as authorized next to the Police, to conduct investigations and to prosecute in the criminal court. There are also a lot of changes which should be done in the Act on the State Fire Service.



### THE STATE FIRE SERVICE

### THANK YOU FOR YOUR ATTENTION

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### FIRE INVESTIGATION IN THE UNITED KINGDOM

### National leadership and areas of influence



UK Fire & Rescue Services (FRS) <u>do not</u> have specific duty to investigate fires, but we do have a legal power to if we choose.

So why do we?

- To prosecute arsonists
- To improve community safety
- To improve firefighter safety
- To improve product safety
- To reduce the number of fires so we can respond quickly to them when needed
- To influence local and national policy



Chief Fire Officers' Association (CFOA) Fire Investigation Strategic Group

Chair – CFOA Lead Officer for Fire Investigation (me)

- Members Regional FRS representatives across UK
  - Police representative
  - UK Association of Fire Investigators
  - Institute of Fire Engineers
  - Building Research Establishment
  - Legal Advisor
  - Academics
  - Forensic Scientists



### NATIONAL ISSUES WE ARE WORKING TO INFLUENCE

- Standards for Fire Investigation
  - Fire Professional Framework (competency)
  - Forensic Science Regulator (ISO 17020)
- Product safety & product recalls
- Information / intelligence management and sharing
- Understanding of 'upstream' causes of fire deaths and injuries in an ageing population, through multi agency panels
  - Dementia Social Isolation Mobility issues Medication Smoking - Alcohol
- Understanding of human behaviour in fires



# WHO WE ARE TRYING TO INFLUENCE

- UK Government (Home Office, Department of Health, Department of Business Innovation and Skills)
- Coroners (inc Chief Coroner)
- Manufacturers
- Health and Social Care partners
- Forensic Science Regulator



# OUTCOMES WE ARE HOPING FOR

- FRS FI's at all levels working to agreed standards, and competencies, and under Police forensic accreditation at crime scenes.
- Improvements to UK product safety & recall arrangements
- Fire Prevention activities focused on the most vulnerable and in partnership with Health & Social Care partners because the at risk people are the same
- Positive human behaviour relating to fire (using "nudge theory" and operational call handling changes)



Fire Investigations showed that entanglement in fallen electrical cables had contributed to firefighter deaths in two incidents

- Stevenage (Jeffrey Wornham and Michael Miller)
- Southampton (Alan Bannon and James Shears)

Changes resulting from the investigations

- Firefighter Training
- Firefighter equipment Insulated wire cutters
- Modified Breathing Apparatus Cylinder cover attachments
- Change to Building Regulations (BS 7671) to require fire retardant cable clips in escape routes





### **Any Questions?**







NATIONAL FIRE PROTECTION ASSOCIATION The leading information and knowledge resource on fire, electrical and related hazards

# NFPA® Fire Investigation Highlights and the Standards that Support Your Industry!

May 25, 2016 | Donald Bliss VP, Field Operations Michael Wixted Emergency Services Specialist

DBliss@nfpa.org MWixted@nfpa.org

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# Agenda

Purpose of NFPA Fire Investigations Fire Investigation Samples NFPA 921, *Guide for Fire and Explosion Investigations* NFPA 1033, *Standard for Professional Qualifications for Fire Investigator* 

# **Purpose of NFPA Fire Investigations**

Gives a forensic analysis from a code perspective, beneficial to local, state and national bodies

- Identifies legislative gaps where NFPA Standards can provide guidance
- A mechanism for revising or addressing core topics in existing NFPA Standards
- Can be a starting point for suggested advocacy or outreach initiatives





# The Station Nightclub – W. Warwick, RI 2/20/2003



- 100 Fatalities
  <u>Ignition</u>
- Indoor Pyrotechnics

### **Contributing Factors**

- Indoor Pyrotechnics
- Combustible Interior Finish
  - Egress









Figure 5-54. West Warwick Police Department Victim location diagram

# Warehouse Fire – 4000 Buechel Bank Road 3/4/2015



### <u>Total Loss</u>

- \$50 Million on Structure
- \$60 Million on Contents
  <u>Potential Cause</u>
  - Something in the Photovoltaic System

### **Contributing Factors**

- Change of use to plastics, higher heat release rate
  - Manual start for pumps for water supply
    - Water damage 402







### NFPA 921 & NFPA 1033

### NFPA 921, Guide for Fire and Explosion Investigations NFPA 1033, Standard for Professional Qualifications for Fire Investigator







# What is NFPA 921?

Methodology of fire & explosion investigation – the how

- Systematic investigation & analysis
- Based on scientific principles
- Removes junk science
- What do the facts point to?
- <u>Not</u> I have seen this before, it has to be this
- Raises the bar for the industry
- Like an encyclopedia





# Methodology (the how)

NFPA 921 - Chapter 4 Basic Methodology

- 4.2 Systematic Approach. The systematic approach recommended is based on the scientific method, which is used in the physical sciences. This method provides an organizational and analytical process that is desirable and necessary in a successful fire investigation.
- Organized, Analytical & Repeatable
- What's the Systematic Approach for a fire per NFPA 921?
  - 1st Origin, 2nd Cause



# **Scientific**



**Method** 



# What is NFPA 1033?

Sets out the job performance requirements (JPRs) for fire investigators

- Duties or responsibilities
- What's required to successfully perform that duty
- 1)Task, 2)Tools, equipment, or materials, 3) Evaluation parameters and performance outcomes
- Requisite knowledge & skills





### JPR Example 4.4.4 Chain of Custody



# 1.3.7 Basic knowledge

- Minimum Knowledge beyond high school level
- 1) Fire science
- 2) Fire chemistry
- 3) Thermodynamics
- 4) Thermometry
- 5) Fire dynamics
- 6) Explosion dynamics
- 7) Computer fire modeling
- 8) Fire investigation
- 9) Fire analysis

- 10) Fire investigation methodology
- 11) Fire investigation technology
- 12) Hazardous materials
- 13) Failure analysis and analytical tools
- 14) Fire protection systems
- 15) Evidence documentation, collection, and preservation
- 16) Electricity and electrical systems



### **Chapter 4 Fire Investigator**

4.1 General – Shall meet JPRs in sections 4.2 through 4.7

- 4.2\* Scene Examination
- 4.2.1 Secure the fire ground (Task from our JPR flowchart)
- 4.3 Documenting the Scene
- 4.4 Evidence Collection/Preservation
- 4.5 Interview
- 4.6 Post-Incident Investigation
- 4.7 Presentations


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# Information & Knowledge

# You are our stakeholders

- What information do you want?
- How do you want it?
- What else can NFPA do for you?



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# Questions

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# **Thank You**

Contact us anytime Donald Bliss VP, Field Operations (DBliss@nfpa.org) Michael Wixted Emergency Services Specialist (MWixted@nfpa.org)



# THE FOREST AND WILDFIRE SEASON IN CROATIA

(preventive measures, preparedness, international cooperation)

Author: Slavko Tucaković

Budapest, 25-26 May 2016



### **BASIC DATA:**

- Area 56,594 km<sup>2</sup> (land) 87,661 km<sup>2</sup> (land and sea)
- 1246 islands (67 inhabited)
- Coastline land 1777 km islands 4058 km
- 21 counties (regional division)
- Population: 4,284,889 (2011 census)



Capital: Zagreb – 790,017 inhabitants (2011 census)418











At the national level, this Sector monitors the situation and events in the field of fire protection, drafts strategies and tasks, trains and equips firefighting units, as well as other participants in firefighting activities.

When a fire incident spreads over two or more Counties, this Sector commands and coordinates the response; it also coordinates more demanding operations that involve both land and air forces.

This Sector directly manages National Emergency Response Units and coordinates activities of all participants in firefighting operations.















- professional fire units
- part of important volunteer firefighting associations
- NIU cover area

- 65 professional fire units with
  2300 professional firemen
- 1891 volunteer fire units with 40,000 volunteer firemen
  - (536 Central volunteer fire units)
- A National Intervention Units (NIU) with 80 professional firefighters
   42



**FOR FIGHT WITH FORREST FIRES WE HAVE FIRE PROTECTION PROGRAM** – activities related to the preparation for the summer fire protection season

- **1.** Training and education of firefighters from continental Croatia
- 2. Relocation of firefighters and vehicles
- 3. Preparation of temporary Firefighting Bases (in summer season)
- **4.** Employment of additional (seasonal) firefighters (about 1100)
- 5. Preparation of aircrafts (Canadairs, Air Tractors and helicopters)
- 6. State Plan for firefighting (in the case of big fires)
- Program is implemented by state authorities, public institutions and firefighting organizations
- Program is adopted every year by Croatian Government





### **THE STATE PLAN DEFINES :**

- Participants and their organization
- Scope of work and responsibilities
- System of action coordination, management and command (Command organization at all levels)
- Informing the public

FINANCING FOR FIRE PROTECTION PROGRAM (State Budget):

425

- National Protection and Rescue Directorate (NPRD)
  - approximately 3.3 million €
- Ministry of Defence (MoD)
  - approximately **11.2** million €



## PREPARATION FOR SEASON

- Check activity (terms and execution phase)
- Organize meeting with executor (reports)
- Prepare lists of forces for relocation to Coast
- Execute Training and additional education of firefighters (from continental Croatia)

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- Organize Aerial Firefighting Conference
- Organize Exercise with Firefighting Forces
- Prepare Firefighting Operations Centre



# PREPARATION FOR SEASON























#### **PREPARATION FOR SEASON (2015)**

**AERIAL FIRE FIGHTING CONFERENCE** ORGANIZED IN ZADAR, 29–30 April 2015 •••







**AFF Europe** 

National Protection and Rescue Directorate

#### **EXERCISE WITH FIREFIGHTING FORCES** ORGANIZED IN ZADAR, 30 April 2015







### **CROATIAN FIREFIGHTING AIR FORCES** (2016)





#### **CROATIAN FIREFIGHTING AIR FORCES** (2016)









- 3 pcs. AT 802A FireBoss
- 1 pcs. AT 802 F FireBoss
- 1 pcs. AT 802 A
- 1 pcs. AT 802 F







### **CROATIAN FIREFIGHTING AIR FORCES** (2016)



National Protection and Rescue Directorate

## 4 pcs. Mi-8 MTV-1 (helicopters):

- For work with FLORY (capacity 2250 l)
- For work with Bambi Bucket (cap. 2400 l)
- For work with Rubber tank (cap. 1400 l)

We also use them for air drops













## Unmanned Aerial Vehicle (UAV) for 2016



Flight duration:	15–20 min
Operational range:	1 km
Max. speed:	50 km/h
Min. speed:	0 km/h
<b>Operational ceiling:</b>	300 m

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# FIREFIGHTING OPERATIONS CENTRE



(Divulje, near Split)





#### **TASKS:**

- Coordinate land and air forces
- Integrate actions in major fires
- Analyse activities
- Make Reports





#### Waiting for videoconference with ERCC (BRUSSEL)





#### FIREFIGHTING OPERATIONS CENTRE – DIVULJE (near Split)

- Firefighting Operations Centre is located in Divulje during the fire season (23 June – 14 September) and coordinates firefighting actions
- Firefighting Operations Command, which runs the Centre, is additionally joined by the members of the Armed Forces and Ministry of Interior



#### **METEOROLOGICAL CONDITIONS 2015**



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### 584 fires between January and October 2015 that were 5 or more hectares in size or involved air forces



#### Number of Fires and Affected Area on Croatian Coast

2012-2015

Croatian Coast								
Year	2012	2013	2014	2015	Relationship 2015 / 2014			
Number of fires	3619	1286	820	3153	3.84 times more (284.5 % increase)			
Area (hectares)	41,263	4246	2033	23,717	11.67 times more (1066.6 % increase)			
Burned area Index (ha / fire)	11.40	3.30	2.48	7.52	<b>3.03 times more</b> (203.4 % increase) 438			

## Analysis of the number of fires and affected area for the period of 2006–2015



439

Number of fires Area (ha)

#### Number of fires by area affected,

### in coastal and karst regions during the fire season

#### (June-September)

Month	< 5 ha		5–10 ha		10–100 ha		> 100 ha		Total	
	Month	number	%	number	%	number	%	number	%	fires
	June	159	96.36	3	1.82	3	1.82	0	0.00	165
2015	July	444	86.38	23	4.47	38	7.39	9	1.75	514
	Aug.	317	86.85	16	4.38	29	7.95	3	0.82	365
	Sept.	196	88.29	12	5.41	13	5.86	1	0.45	222
	June-Sept.	1116	88.15	54	4.27	83	6.56	13	1.03	1266

## Number of fires relative to the duration of intervention, in coastal and karst regions (time from report until extinguishment)

	< 4 hours		4–12 hours		> 12	Total fires		
	Worth	number	%	number	%	number	%	Total fires
	June	154	93.33	11	6.67	0	0.00	165
2015	July	417	81.13	60	11.67	37	7.20	514
	Aug.	289	79.18	44	12.05	32	8.77	365
	Sept.	197	88.74	13	5.86	12	5.41	222
	June-Sept.	1057	83.49	128	10.11	81	6.40	1266

#### Coast, 1 June – 30 September 2015

Total number of fires	Number of wildland fires	Area (hectares)	Number of air force interventions	Note
2710	1266	10,220	162	Cumulatively: 269 CL, 144 AT, 27 Mi8MTV

#### Mainland, 1 June – 30 September 2015

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Total number of fires	Number of wildland fires	Area (hectares)	Number of air force interventions	
1524	515	826	0	



#### AIR FORCES INVOLVEMENT, 1 January – 31 October 2015

Counties	No officer	Air attacks			
Counties	No. of fires	Flights	Hours of attacks		
Dubrovnik-Neretva	37	3208	356		
Istria	12	596	85		
Split-Dalmatia	44	1915	232		
Šibenik-Knin	63	1847	288		
Zadar	47 968		146		
Total	203	8534	1107		

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#### Fires and burned green area along the Coast, 2009–2013

PERIOD	2009		2010		2011		2012		2013			
	Fires	Area (ha)	Fires	Area (ha)	Fires	Area (ha)	Fires	Area (ha)	Fires	Area (ha)		
1/1 – 31/10	2,287	10,765	1,496	3,969	3,621	37,135	3,647	41,294	1,322	4,321		
1/6 – 31/10	1,290	7,139	1,041	2,422	1,769	16,714	1,745	22,891	1,073	3,848		
2014					Average for 2009–2013							
PERIOD	Fires	Area (ha)	ЮР		ЮР		Fir	es	Burned	area (ha)	IC (ha /	)P Fire)
1/1 – 31/10	884	2,346	2.65		2.65 2,475		14,497		7.88			
1/6 – 31/10	444	625.4	1.41		1.41		1,55	53-4	10,	603	7.	66

AIR FORCES WERE ACTIVATED FOR ONLY 10 FIRES (seven times from 1 June to 31 October) 4



#### IF WE'RE LUCKY THIS SUMMER... THIS WILL BE THE WORST WILDFIRE





# THANK YOU FOR YOUR ATTENTION

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