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ASSESSMENT OF THE PROCEDURAL AND TECHNICAL CONDITIONS FOR THE HUNGARIAN FIRE INVESTIGATION SYSTEM IN LINE WITH INTERNATIONAL EXPERIENCES

A MAGYAR TŰZVIZSGÁLATI RENDSZER ELJÁRÁSI ÉS TECHNIKAI FELTÉTELEINEK NEMZETKÖZI ÖSSZEHASONLÍTÁSA

VARGA, Ferenc

(ORCID: 0000-0003-1584-3847)

ferenc.varga@katved.gov.hu

Abstract

“Fire investigation may rightly be claimed as one of the three pillars of fire safety. Its specialist consideration and regulatory framework show significant changes from time to time. The system of implementing fire investigation tasks has changed as a result of legal regulations having entered into effect as of 1 January.
In this publication, the author analyses and assesses the procedural law context of the fire investigation system in Hungary and the set of criteria for official fire investigations in line with international experiences."
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Keywords: *fire investigation, Hungary, fire safety, authorities, method*

Absztrakt

„A tűzvizsgálatot joggal említhetjüka tűzvédelem három alappillére egyikeként. Szakmai megítélése és a szabályozási környezet azonban időszakonként jelentős változásokat mutat. A tűzvizsgálati feladatok végrehajtásának rendszere legutóbb a 2018. január 01-én hatályba lépett jogi szabályozás eredményeként megváltozott.
Jelen közleményben a szerző elemzi és értékeli a hazai tűzvizsgálati rendszer eljárásjogi környezetét és a hatósági tűzvizsgálat feltételrendszerét nemzetközi kitekintéssel."
"A mű a KÖFOP 2.1.2-VEKOP-15-2016-00001 azonosítószámú, „A jó kormányzást megalapozó közszolgálat-fejlesztés” elnevezésű kiemelt projekt keretében, a Nemzeti Közszolgálati Egyetem felkérésére a Concha Győző Doktori Program keretében készült."

Kulcsszavak: *tűzvizsgálat, Magyarország, tűzvédelem, hatóság, eljárás,*

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INTRODUCTION

The three pillars of fire safety, *fire prevention*, *firefighting* and *fire investigation* are so intertwined in today's information societies emerging as a result of continually advancing civilization, such as in Hungary that has been shaped by responses given to risk factors and potential emergencies appearing un current societal, economic and social structures.

The trinity of fire safety fields, including the role of fire investigation is nonetheless a context recognised long ago. In 1788, Joseph II issued a fire security decree (patent) discussing a system of fire security responsibilities. The first part of this decree discusses "prevention of ignitions and methods hindering the attacking of fires", the second part thereof deals with "expedite discovering of fires attacked and order set for announcing it", its third part with "rapid extinguishing thereof", while the fourth part is on "preventing harmful consequences to fires extinguished, exploring the causes of fires". [1] The latter may be regarded as a precursor of today's fire investigation activities.

According to the definition of the term by the Fire Safety Act in effect: "*fire investigation: official activities aimed at revealing the time, place and cause of the fire occurring intended to gain fire prevention, firefighting intervention experiences and to draw conclusions suitable for enhancing fire prevention knowledge and for improving rescue intervention conditions."* [2] Such definition reflects that fire investigation activities go way beyond the clarification of the circumstances of certain fire incidents occurring whereby they provide experiences that may be utilised in fire prevention and firefighting-rescue fields. The perceived importance of fire investigation activities and the regulatory framework changed many times in recent decades, still, fire investigation managed to remain part of the fire safety system.

The subject remained current owing to, on the one hand, new and amended legislation entering into effect recently in Hungary having altered the procedural law and technical framework, while scientific, technological and IT developments demanding career disaster management agencies to fulfil their proceedings of proof at the highest level of standards in line with such changes, on the other hand. Nevertheless, they are required to establish ever closer collaboration with partner authorities having investigative powers in the area of security and justice, other authorities powers official (e.g. government office, work safety authority, etc.) and courts.

In Hungary, the scientific methodology of fire investigation has not been identified in exact terms. Foreign scientific methodologies (e.g. elaborated on the basis of the US – Anglo-Saxon legal system) may be adapted in the domestic system of law application in part only, considering that the aim and procedural law system of fire investigation diverges from our Continental law system. Researching the subject choice in an approach based on procedural law and set of technical conditions and specifying development directors aim to handle such challenges as the main scientific goal.

This publication, within the Hungarian fire investigation system, examines how fire investigation satisfies relevant specialist and methodological requirements towards within the current procedural law, IT and technical-technological framework; and furthermore, examines the efficiency of the set of personnel and technical conditions at disaster management agencies in ensuring the aim of official fire investigations. A further objective is to examine the domestic fire investigation system with an international outlook on the fire investigation practices of countries being parties to the CTIF Fire Investigation Working Group.

AN OVERVIEW OF TECHNICAL LITERATURE ON FIRE INVESTIGATION

Fulfilling the task identified as the objective has necessitated a review of technical literature on fire investigation and identification of the current status of scientific research with regard to fire investigation.

As research methods, I have conducted an analysis and a comparative analysis through studying and analysing the contents of national and international fire investigation technical literature, books, publications, national periodicals, methodological guides, fire safety codes, standards, official databases.

National technical literature:

Fire investigation manual: a three-chapter governing technical book being the first and continuing to be the benchmark in Hungary even today, that was produced in 1972 by the High Group for Studies and Propaganda at the Ministry of the Interior (hereinafter referred to as BM). The first chapter's findings on burning theory, thermodynamics, reaction-kinetics, fire spreading continue to be relevant until the present day. The physical and chemical laws described therein have not changed at all in the years since its publication. The second chapter scrutinises the role and importance of processes and ignition sources leading to fires by causes of fire. The set of knowledge described therein is still relevant and applicable today. The third chapter deals with fire investigation methodology with level of details and thoroughness in line with its time. Its description of photography and its part on on-the-scene inspections and interrogations are obsolete in part, while still featuring results of scientific value. The precluding method criticised by theoretical specialists appears in Hungarian scientific life for the first time as a fire investigation method. For practical fire investigation specialists, the proper application of the precluding method continues to form an integral part of fire investigation scientific methodology to this day. [3]

Preventive fire safety knowledge: the textbook published by the Ministry of Interior in 1985 devotes a 130-page chapter to the fire investigation activities of the state fire department while discussing the notion and purpose of fire investigation, the rules of procedures, the methods of on-the-scene inspections and the documents to be prepared in the course of fire investigations in line with the standards of its time. Its findings and conclusions described from a procedural and proof perspective are largely still relevant and adaptable. [4]

Fire investigation basics: the 130-page book produced in 2006 discusses a fire investigation methodology according to burning theory and fire occurrence causes in line with the standards of its time. This was the first book adapting NFPA 1-6. fire investigation educational materials published in the US for practical fire investigators. Its part on fire investigation procedures has become obsolete. [5]

Fire investigation tactics: the 203-page technical book published in 2010 by courtesy of the Budapest Fire Department offers methodological assistance to practical fire investigators from fire signals to fire investigation reporting. It was the first to adapt criminalistics crime scene investigation, witness interrogation and proof methods into fire investigations. Its parts on procedural methods have become obsolete, while remaining partly relevant to proof attempts and interrogations, still, additional research provided new elements to its descriptions. [6]

Applied fire investigation: a 363-page technical book compiled by 8 authors and published in 2014 by courtesy of the Budapest Firefighters Association and the Hungarian Security Bar featuring and processing independent research findings and studies, case studies. The scientific value of knowledge processed and described in its chapters written by different authors using their own researches and case studies to contribute to a book using an applied science method. [7]

Fire investigation study: a 93-page university notes published in 2013 by SzIE Ybl Miklós Faculty of Architectural Sciences (ISBN: 978-963-269-347-3), its scientific value is highlighted by the processing of in-house research results. Features methodological knowledge in line with the standards of its time, parts of which have already become outdated. [8]

Fire Investigation Code I-II: an 880-page two-volume monography published in the Years 2017 and 2018 by courtesy of the Budapest Firefighters Association and the Hungarian Security Bar strives to summarise and synthesise today's knowledge relevant to this topic. The publication deals with legal, disaster management administrative, burning theory, firefighting, fire prevention, fire investigation administrative knowledge. Moreover, explores the process of on-the-scene inspections, on-the-scene inspections conducted in collaboration with the police, the means of proof and the course of proof. [9] Its scientific value is stressed by its attempt at both a subjective and an objective classification of international fire investigation scientific methods. It makes an attempted comprehensive assessment of objective fire investigation methods with a view to their applicability and constraints, while trying to improve national fire investigation witness-interrogation methods and to explore interconnections between the crime scene investigation methods of fire and police departments in order to capitalise on synergies. [10]

International technical literature:

Publications in the US and German deserve particular attention in the subject matter.

As a result of ongoing researches for many decades, NFPA921-1-6 (National Fire Protection Association – Guide to investigating fires and explosions) standards series is available and updated continuously for practicing fire investigators featuring scientific novelties. It primarily defines and classifies subjective scientific methods of fire investigation. Virtually all CTIF member countries, including Hungary, have adapted its descriptions in their national fire investigation procedures. Its contents continue to provide a basis for fire investigation scientific research both in the US and in other countries. [11]

The 67-page publication "Revealing and examining the traces of fires and disasters" prepared by the German Police typically contains knowledge applicable in respect of crime scene investigation methodologies, investigation and measurement methods of ignition sources. [12]

PROCEDURAL CONDITIONS IN THE HUNGARIAN FIRE INVESTIGATION SYSTEM

Fire investigation within various procedural law frameworks

Fire investigation may essentially be conducted under three procedural orders in Hungary on the basis of the continental law system, such as public administration, criminal and civil proceedings.

The main differences between the three procedural laws are illustrated in the table below:

Fire investigation aspect	Public administration proceedings	Criminal proceedings	Civil proceedings
Subject of proceedings	official matter	classification and sanctioning of criminal actions	civil-law dispute
Purpose of proceedings	implementing public tasks	enforcing the penal power of the state	final decision of legal dispute between legal subjects
Actors of proceedings	authority empowered with public powers and client	counterparties	counterparties subordinated to one another

Table 1 Fire investigations within the Hungarian procedural law framework
(Prepared by the author, 4 May 2018)

The provisions of Hungary's Fundamental Law (hereinafter referred to as the Fundamental Law) specify the fundamental principles and guarantees ensuring the criteria of lawfulness in case of the various proceedings.

Fire investigation within the framework of public administration proceedings, official fire investigation

Official fire investigation qualifies as *public administration proceedings*. In case of (extraordinary) death due to an event of fire, the police shall also conduct public administration proceedings pursuant to Act CL of 2016 on general rules of public administration proceedings (hereinafter referred to as PAPA), in the course of which, the fire investigator and the police unit mutually assist each other's work. In such instances, the police adopt a resolution completing the proceedings incorporating the findings of the fire investigation. Legislation in the table below appear as sources of law in the course of official fire investigations:

Source of law	**Regulation affecting fire investigations**
Hungary's Fundamental Law	principles of law
Act CL of 2016	on general rules of public administration proceedings (general rules of proceedings)
Act XXXI of 1996	on protection against fire, technical rescue and the fire department (special rules of proceedings; fire safety standards)
Act C of 2012	on the penal code (criminal offences related to causing fires)
Act XIX of 1998	on penal proceedings (rules of penal proceedings)
Government Decree 351/2013 (X.4.)	on investigations of the deceased and on proceedings pertaining to the deceased (deaths related to fire incidents)
Government Decree 259/2011 (XII.7.)	on organisations fulfilling fire safety official responsibilities, on fire safety fines (rules of authority)
Government Decree 489/2017 (XII.29.)	general and particular rules of fire safety official proceedings
Government Decree 490/2017 (XII.29.)	on rules of proceedings governing the investigation of fire incidents (particular rules of proceedings governing the investigation of fire incidents)
BM Decree 43/2011 (XI.30.) of the Minister of the Interior	on areas of jurisdiction of disaster management branch offices (rules of jurisdiction)
BM Decree 44/2011 (XII.5) of the Minister of the Interior	on rules governing the investigation of fire incidents (fire investigation specialist rules)
BM Decree 39/2011 (XI.15.) of the Minister of the Interior	on general rules of firefighting and technical rescue activities of fire departments (fire investigation responsibilities of firefighting chiefs)
BM Decree 54/2014 (XII.5.) of the Minister of the Interior	on issuing the National Fire Safety Policy (fire safety rules)

Table 2 Sources of law of official fire investigations in Hungary
Prepared by the author, 4 May 2018

Role of firefighters engaged in the intervention in the course of official fire investigations

In the course of fire investigations, the most important task of intervening firefighters in addition to *professional firefighting* is to *prepare the securing of the scene*. The locations of fire incidents shall be regarded as a potential fire investigation scene in the course of firefighting. Already in the course of firefighting, attention shall be paid to preserving the scene since firefighting may cause alterations rendering the reconstruction of states before, during after the fire impossible.

Nonetheless, unauthorised access to the fire scene, intentional or negligent destruction, disappearance of evidence, entry or removal of objects must be prevented.

It shall be decided who may or must remain at the scene of a fire incident. The person noticing and/or signalling the fire, those with knowledge of the surroundings and potential witnesses must be kept on the scene.

When *securing an area,* attention must always be paid to those living and working in the vicinity of the fire incident, but most importantly, the success of fire investigation must be kept in mind. The scene should be secured as widely as necessary with a view to local conditions and possibilities. Such securing may go beyond the extent of the fire.

It is indispensable for a thorough and accurate identification of the circumstances of a fire occurrence to *hear those having participated in fighting the fire*. The traces left behind by the fire are altered if building structures are removed in the course of an intervention.

An intervention may alter the scene in other ways as well, such as

- the intervention "moving" flames in the opposite direction, towards unburned parts; thus, it may occur that the most damage appears elsewhere and not at the place of occurrence but where the fire was burning longer;
- the role of wind must be mentioned in case of open-air fires;
- the extinguishing agent may wash away traces left behind by smoke and smut or sudden cooling effect may detach plastering;
- in the course of follow-up works, firefighters turn over materials and object or move furniture from their original positions to reveal and extinguishing smouldering parts or to search for humans.

The following should be clarified with those taking part in the intervention:

- when they arrived on the scene, what they experienced and who they saw;
- where flames and smoke were, what was burning, what the extent of the fire was;
- in what time they commenced fighting the fire;
- in what direction the fire spread;
- whether doors and windows were open or closed upon their arrival;
- whether units entered the scene by force;
- whether building structures, doors and windows were deconstructed in the course of firefighting;
- what extinguishing agent they used, whether any circumstance hindering the intervention was present, what time fighting the fire took;
- what objects were removed from their original positions in the course of follow-up works;
- whether photographs were taken or video recordings were made of the initial stage of the fire.

Ensuring the execution of the above procedural actions (professional firefighting, preserving material evidence, commencing the securing of the scene, etc.) is essentially the responsibility of firefighting chiefs in charge.

In the course of official fire investigations, fire investigators consult the firefighting chiefs and staffs of career fire departments, municipal fire departments, facility fire departments and volunteer fire brigades as first responders. Often, they have such specific knowledge of the locality and information on similar fire incidents having occurred previously within their respective area of operation that may have a key impact on the outcome of the fire investigation; thus, their hearing is indispensable.

On-the-scene inspection

The most important procedural action, means of proof of official fire investigations is the fire investigation on-the-scene inspection. Its procedural law rules are defined by the PAPA, while its specialist rules by BM Decree 44/2011 (XII.5) of the Minister of the Interior *on rules governing the investigation of fire incidents* (hereinafter referred to as MI Decree).

During an inspection, proceeding members of the authority is entitled, in particular, to the following:

- access the area, building or other facility affected by the inspection;
- examine any document, object or work process;
- request information; and
- take sample(s).

With a view to the successful and secure completion of the inspection, the authority may request police assistance. If an on-the-scene inspection is necessary in a situation posing threat to life or of severe damage or with a view to an immediate procedural action or otherwise allowed by law, the authority may conduct an on-the-scene inspection by opening a closed area, building or premise, even in spite of the intention of people staying therein.

An essential aim of on-the-scene inspections is to provide data as to the original state of the scene, the occurrence and spread of fire. On-the-scene inspections are characterised by taking place in scenes altered (by damages caused by the fire, on the one hand, and by firefighting activities, on the other hand). The aim is to reveal the state prevailing at the moment of the fire occurring.

In the course of fire investigations, on-the-scene inspections are procedural actions constituting the basis for the investigation, specialist activities conducted within a legislative framework, which have the following characteristics:

- undelayable: should be commenced forthwith upon extinguishing of the fire, if possible;
- indispensable: there is no fire investigation without on-the-scene inspection;
- irreplaceable: any failure, inaccuracy or superficiality will render it impossible to be substitutes by anything else;
- objective (free from influence);
- detailed and complete (including both the place of occurrence of the fire and its immediate and more remote surroundings).

At an on-the-scene inspection, the fire investigator shall capture the state, situation and circumstances detected on the scene, reveal any traces, material residues and alterations in order to gather data, ascertain facts and demonstrate reality for the investigation. The *static* stage aims to explore the scene and capture an overall picture, i.e. visual observation, inspection, photographing, video recording and drawing up the scene. In the *dynamic stage*, the scene is altered. The scene is searched methodically, scrupulously, professionally, during which all things, phenomena, changes and evidence have significance that may have a causal relationship with the occurrence of the fire. This is when sampling is done or objects of the inspection are gathered.

An incomplete on-the-scene inspection, photographs not taken in a professional manner, superficial or vague description of on-the-scene experiences, non-standard handling of evidence may jeopardise a successful fire investigation.

Scientific methodology of on-the-scene fire investigations (Hungarian methodology)	
Objective methods: 1. Chemical examination (GC-MC, IR, NMR) 2. Identification electrical fault points (inspection of electrical fittings, node mapping, digital microscope, etc. 3. Technical aids capturing the scene (photographic and/or video camera, 3D software, drone, laser scanner, robot, etc.) 4. Burning/proof experiments (burning cells, fire containers, etc.) 5. Other methods (FDS, fire signal device, fire lab, intelligent buildings, CCTV cameras, etc.)	Subjective methods: 1. Identification, analysis, evaluation of burn traces (charring, melting, loss of materials, etc.) 2. Identification, analysis, evaluation of fire patterns (A, V, U, O-shaped fire patterns, etc.)

Table 3 *Scientific methodology of on-the-scene fire investigations*
Prepared by the author, 4 May 2018

Other means of proof

Means of proof are obtained pursuant to the proceedings act. If necessitated by the ascertainment of facts, the authority may summon the *client to make a statement*. Client statements are a peculiar kind of witness testimony; thus, it is substantially different from that as regards procedural law. Its object, development and assessment are rather close to that of a witness testimony. The hearing is rendered particular by the fact that the source of information is an individual having sustained material, physical and moral damage by the fire, whose right, justified interest or legal status was impaired or threatened by the fire incident.

An expert shall be heard or a specialist opinion shall be requested if specialist expertise is required for establishing a material fact or other circumstance in the matter, and the proceeding authority does not have the relevant specialist expertise, then the expert must be warned of the legal consequences to a false opinion prior to the provision of an opinion. In the course of official fire investigations, chemical and technical experts are engaged the most frequently. Facts may also be ascertained through a *witness testimony*. At the beginning of a hearing, the authority shall establish the identity of the witness and the authority shall invite the witness to give a statement as to his/her relationship with the client(s) and to any bias, while warning the witness of his/her rights, duties and the legal consequences to a false testimony. Any unheard witness may not be present at the hearing of the client, other witness(es) and the expert(s).

In the course of ascertaining the facts, the authority may invite the *client(s) to present public or other documents*, if necessary.

Material evidence shall refer to any object, material, residue assisting in identifying, demonstrating or indeed refuting the causal relationships of the fire occurring, such as odour traces of the evaporation of flammable liquids, glass pieces (glass of Molotov cocktails, window glass), tobacco, lighter, electric device, electric wire, distributor, extension cable or any other object rendering an intentional causing of fire likely (piece of clothing, benzine can,

strange documents and objects at the scene). Material evidence shall be taken into custody by the authority confiscated pursuant to the PAPA.

Demonstration

According to the PAPA, it is at the authority's discretion to choose the method of proof and to assess available evidence. This represents the principle of free proof in fire investigations. An act or government decree may render the application of some public or other document as means of proof mandatory upon a coercive reason based on public interest in specific cases. In fire investigations, this is the on-the-scene inspection. If available data is not sufficient to adopt a decision, the authority shall conduct demonstrating proceedings. Official proceedings may use all evidence suitable for ascertaining the facts while evidence obtained by the authority through any violation of the law may not be used as evidence.

The obtaining of means of proof shall be followed by the *analysis of information*, in the course of which the fire investigator shall analyse all information gathered in a logical and objective manner.

Based on such analysis, *versions (hypotheses) may be elaborated* with respect to the circumstances of the occurrence of fire. Such assumptions may only take into consideration facts demonstratable unambiguously through observation and experiments, where sources of ignition present at the scene of the fire incident, flammable material(s) having caught fire at first, spread fire and influencing effect of ventilation shall be identified among others.

Versions (hypotheses) may be verified to test the validity of assumptions made. The investigator shall compare hypotheses with all facts, which may be regarded as demonstrated if without a single element of doubt. If any element lacks demonstrability, a new hypothesis need to be elaborated. This should be reiterated until every essential element of the circumstances of the occurrence of fire become demonstrated, otherwise the circumstances of the occurrence of fire may not be regarded as demonstrated.

Fire investigation in criminal proceedings

Causing a fire may, in particular, constitute the following criminal offences:

- Violence against a person
- Occupational jeopardy
- Damages to the environment
- Damages to nature
- Act of terrorism
- Causing of a public threat
- Disruption of public utility
- Vandalism

The practice applicable in the course of criminal offences committed by causing a fire is to include the entire fire investigation documentation produced during the official fire investigation as documentary evidence among police investigation files and may also serve as documentary evidence as part of prosecutor or judicial criminal proceedings in case charges are pressed. A forensic fire investigation expert appointed in the course of criminal proceedings shall be entitled to request the entire fire investigation documentation from the fire safety authority in possession of an appointing verdict, which may be used in the formulation of his/her specialist opinion. This attests that official fire investigations play a key role in crime prevention and law enforcement.

The object of criminal proceedings is a past human behaviour already taken place, a criminal offence. Demonstration shall cover the explorational historical facts, the application

of criminal procedural and criminal legislation, and familiarisation with key facts relevant to the consideration of matters ancillary to the criminal proceedings.

The means of proof are listed inclusively by the act on criminal proceedings: witness testimony, specialist opinion, material means of proof, public document and testimony of the aggrieved party.

Anyone may be heard as a witness if being aware of a fact to be demonstrated. Material means of proof shall refer to any object (thing) suitable for demonstrating a fact to be demonstrated; thus, in particular, what carries traces of the offender committing a criminal offence or pertaining to the commission of a criminal offence or produced in connections with the commission of a criminal offence, used as means of committing the criminal offence, or in respect of which the criminal offence was committed. Public documents are means of proof designed to or suitable for demonstrating the authenticity of some fact or data or the occurrence of an event or the making of a statement.

An expert opinion is primarily required in the course of an investigation establishing the prosecutor's decision on the matter of pressing charges and preparing the judicial hearing, while its necessity often arises in judicial proceedings of the first instance deciding criminal law liability and conducting demonstration proceedings with a view thereto. In exceptional cases, expert demonstration may also be engaged in judicial proceedings of the second instance.

A specialist opinion prepared by a forensic fire investigation expert must comprise:

- data as to the object of the investigation, the investigative proceedings and means, and any alterations to the object of the investigation (findings);
- brief description of the investigative method;
- summary of specialist findings (specialist ascertainment of facts);
- conclusions drawn from specialist ascertainment of facts, including responses to questions put forward (opinion).

The opinion constitutes the most important part of an expert opinion, which features the conclusions drawn from the specialist ascertainment of facts, including responses to questions put forward by the appointing authority. An expert is entitled to ascertain facts and to draw conclusions of relevance deemed essential to the case by the expert. An expert, however, is not entitled to take a stance as to whether a criminal offence was committed or not and whether the criminal law liability of the accused may be established or not.

Practice shows that in preparing their specialist opinions, forensic fire investigation experts appointed in the course of criminal proceedings largely rely on data and facts captured during on-the-scene inspections conducted in the course of official fire investigations.

Fire investigation in civil proceedings

Clients may launch civil proceedings to enforce their rights after a fire incident. Typically, fire investigation experts, forensic experts are engaged in doing so. In such instances, fire investigation experts attempt to obtain fire investigation case files through the court.

The court conducts a demonstration in order to ascertain the facts required for deciding the case. Evidence in a suit refer to demonstrating fact suitable for demonstrating the reality of the fact to be claimed. By law, they include witness testimonies, specialist opinions, contents of public documents and material evidence. Individuals and objects through which evidence may be revealed are referred to as the sources of evidence, such as witnesses, experts, public documents and objects of inspections as physically existing things.

Conducting a demonstration in a civil suit refers to the presentation of facts, the submission of evidence substantiating such facts, the submission of motions for proof, which is the responsibility of the parties.

A court shall appoint a fire investigation expert if establishing or assessing any fact or circumstance material to deciding the legal dispute calls for particular specialist expertise. An expert must conduct an investigation to give a specialist opinion. The expert must file the specialist opinion with the court, and if so resolved in the court order, directly with the parties as well. If summoned by the court, the expert must appear at the hearing and answer questions put forward.

Fire investigation experts, forensic fire investigation experts participating in civil proceedings provide specialist opinions of different powers of proof in respect of judicial consideration depending on whether engaged in civil proceedings as private experts by either party or appointed by the court.

INTERNATIONAL OUTLOOK

Upon an initiative from the National Disaster Management Directorate General of the Ministry of the Interior (hereinafter referred to as BM OKF), the International Firefighters' Association (hereinafter referred to as CTIF) set up the CTIF Fire Investigation Working Group in 2016 by cooperation of some CTIF delegate countries with active participation from the following countries: Hungary (as initiating and founding member), Austria, Bulgaria, Croatia, USA, Great Britain, Czech Republic, Poland, Slovakia, Greece and Belarus. [13]

At the conference hosted as part of the working group's setting up, the participating countries and the members of the working group presented the fire investigation proceedings and methodologies of their respective countries, and the resolves further and shared efforts, closer collaboration with a view to the scientific advancement fire investigation. [14]

The fire investigation proceedings of presenting countries, similarly to Hungarian practice, aim at obtaining specialist experiences and at supporting criminal proceedings by fire safety experts. As regards the *description of the aim* of fire investigation, Hungary ranks among the top within Europe. Representatives of several countries expressed their desires to put more emphasis on summarising the experiences of the firefighting profession in addition to expert efforts assisting the police. [15] Taking advantage of the opportunity presented by this event, a questionnaire survey was conducted with a view to comparing experiences abroad with the domestic system. The evaluation of this survey allowed for the following findings:

Looking at fire investigation regulations diverging significantly from Hungarian practices in countries where fire investigations are not conducted by the fire department, the number of fire incidents and deaths related to fire incidents are high and the numbers of casualties show an increasing tendency. In such instances, fire investigations do not rely on specialist foundations; therefore, even if the outcome of fire investigations returns to the fire departments, they are unable to either gain specialist experiences from them or to utilise them in the areas of fire prevention or firefighting intervention.

In countries where great emphasis is put on the *training and extension training of fire investigator specialists*, devote sufficient time to conduct on-the-scene inspections of fire incidents by a team, the number of fire incidents and deaths related to fire incidents is lower, while the detection of causers of fire incidents related to criminal offences is more effective; thus, reducing the number of serial arsons and increasing public security, of which fire safety is an integral part.

It furthermore appears from the presentations that the *fire investigation proceedings, procedural orders of relevant countries vary, but save for a few exceptions, do not diverge substantially from Hungarian practice* with two extremities manifesting in specialist readiness and time expenditure devoted to fire investigations. [16]

As a result of our civilisation's progress, our world's developed nation states have and are transforming into highly organised networking information societies, which brings new

challenges to fire investigation stakeholders. Day by day, rapidly advancing digital advancement restructures and accelerates the rule of law and the administrative sector set at a slow place by default.

It must be admitted that public administration will only be capable of cooperating with such force striving at constant acceleration up to a certain point only, because owing to its structure (large organisational structure, strict hierarchy, long chain of reporting distorting information, etc.) its efficiency may only be improved to a certain point, beyond which it will not be able to cope with the requirements posted by regulation and professionalism anymore.

In terms of fire investigation, this means that over-regulation and further integration may deteriorate the success of proceedings. Automation, digitisation, robotization keep knocking on all aspects of life, which means that fire investigations must also follow modern technical progress. This calls for managing and implementing staffs of official fire investigations examining the applicability of and introducing new technical means.

In summary, it may be established that Hungary is able to take effective measures with a view to the advancement of the specialist field by elaborating a multilevel fire investigation system and improving training and technical conditions continuously based on international practices.

PREREQUISITIES OF OFFICIAL FIRE INVESTIGATION ACTIVITIES AND REFORM MEASURES

In accordance with a decision of the National Disaster Management Directorate General of the Ministry of the Interior, considering international practices [16] as well, solely for statistical purposes, data shall be gather in the widest scope possible on the circumstances of occurrence of fire incidents. It has been identified as an aim that more thoroughly founded fire prevention, firefighting and awareness campaign measures be put in place as a result of analyses.

It has been resolved that every fire incident must be investigated, and a *three-tier* fire investigation system has been introduced in the following form:

Tier 1: (presumed) data concerning the circumstances of occurrence must be completed on the Fire Incident/Technical Rescue Datasheet (TMMA) of every fire incident; such data shall not be part of the fire investigation documentation but will only be processed for statistical purposes;

Tier 2: fire investigation proceedings shall be conducted in line with the rules of procedure;

Tier 3: an inspection panel may be set up for investigating priority incidents through engagement of fire investigators in possession of outstanding expertise.

Personnel conditions

Conducting of fire investigation proceedings is organised by the metropolitan/county disaster management directorate with a view to available fire investigators and their readiness. This, in practice, means implementation of the following methods of execution:

1. Disaster Management Operations Service (KMSz) perform entire proceeding (68% of all cases);
2. On-the-scene investigation is conducted by KMSz, rest of the proceedings by the official division/service (32% of all cases). [18]

As regards participation in fire investigation, the relevant BM decree identifies criteria. Accordingly, the head of authority may appoint an individual to conduct fire investigation proceedings who is a member of the career staff of the authority with higher educational fire safety specialist qualifications, fire investigator training course qualifications and at least three (3) years of specialist experiences or a valid fire investigation expert licence.

Based on data supplied by metropolitan/county disaster management directorates, details as to the qualifications and years of experience of individuals conducting fire investigations have been analysed: in 2016, 148 and in 2017, 149 individuals took part in fire investigation proceedings. The number of fire investigations per individual was 5.8 in 2016 and 4.8 over 10 months in 2017. Distribution of investigation load was not even but varied territorially and by month. [17]

In order to raise the level of quality of specialist work continually, regular extension training of fire investigators is a priority, which takes place through modular training courses.

Module I is a 2-week fire investigator basic training by the Disaster Management Training Centre (hereinafter referred to as KOK) where participants enhance their knowledge with procedural law, fire investigation basics and photography skills and on-the-scene investigation practice. KOK has been organising fire investigator training courses since 2005, with 907 individuals having attended 37 training courses, of which 705 took examination.

Module II is a 2-week extension training at the Training Centre of the Police Educational and Training Centre's Specialist Extension Training Division in Dunakeszi for *fire incident on-the-scene investigators* offering training of knowledge and development in skills required for on-the-scene inspection. Currently, 110 fire investigators have this qualification.

Module III is a 1-week training offered by Security Vocational Secondary School of Miskolc in *criminalistics* enabling students to learn hearing methods and tactics. Currently, 67 fire investigators have completed this extension training.

Module IV comprises special training courses. 9 individuals have completed the fire investigator training course, 6 individuals have completed training course on investigation methods following explosion acts offered by the International Law Enforcement Academy (ILEA) operating within the International Training Centre, and 2 individuals have completed crime scene investigator training offered by the Central European Police Academy (KERA). In 2017, 4 individuals attended the 3-week extension training at the Training Centre of the Police Educational and Training Centre's Specialist Extension Training Division in Dunakeszi for crime scene inspection panel heads.

With a view to implementing three-tier fire investigations, BM OKF organised two *one-day seminars for 27 senior fire investigators engaged in inspection panels* in May 2017 and in May 2018 offering an insight into the system and future aims of fire investigation, handling of priority incidents and practical experiences from case studies.

BM OKF *trains fire investigation experts* as well. This year's extension training on investigating fires caused intentionally was attended by 28 experts in May.

In addition to extension training courses offered by the BM OKF's Inspectorate General for National Fire Department, *county extension training courses* also contribute to enhancing the knowledge of fire investigators. In 2018, several county directorates have already offered one-day extension training courses independently or regionally for fire investigators with engagement of police force taking part in on-the-scene inspections. [16]

Technical conditions

Devices and equipment required for fire investigations, including the capturing of the scene, have been mounted on off-road vehicles operated by county disaster management directorates conducting fire investigation proceedings. Such assets may be classified as follows:

Transport, communication:	Personal protective equipment:	Scene documentation:
Vehicle (off-road)	Firefighting helmet	Photo camera (mirror-reflex)
GPS with maps	Firefighting jacket and trousers	Photo bag
Mobil telephone	Firefighting boots	Photo camera battery
TETRA radio (built-in)	Firefighting hood	Tripod for photo camera
TETRA radio (handheld)	Firefighting gloves	Laptop
Sampling	Breathing apparatus	Portable printer
Sampling shovel	Healthcare gloves	Inverter (12V-230V)
Sampling kit	Disposable shoe sleeves	Document bag for forms
Sampling pipes	Dust mask, protective mask	A4-size notepad
Ziploc bags (3 sizes)	TIVEK protective gear	Grid paper (A4 mm paper)
Paper bags	Work safety gloves	Voice recorder
Self-adhesive labels (10 sheets)	Rubber gloves	
Tricolour strings		
Lighting, metering, marking	**Tools**	**Other**
Led torch	Toolbox	Cordon tape
Battery-operated Led torch w/ stand	Screwdriver set	Buoy
Robbanásbiztos kézilámpa	Hammer	Fire extinguisher
3-meter tape	Metal cutter	Plastics box
Laser distance meter	Wood chisel	Universal articulated ladder
Digital multimeter	Scraper	Binoculars
Voltage detector	Metal knife with adjustable blade	Healthcare kit
Gas sensor instrument	Pocketknife	Photocopier
Metering wheel	Metal saw with extra plate	Calculator
Vernier calliper w/ depth meter	Wood saw (single-hand)	Mobile Internet modem
Ruler (2 m collapsible)	Combined spanner	
Perpendicular ruler	Scissors	
Compass	Technician’s tongs	
Numbers 0-9 and arrows	Pliers	
	Shovel	
	Hack	
	Spreader bar	
	Handheld magnifier	

Table 4 Material conditions of on-the-scene fire investigations [18]

According to feedback received from the directorates, such vehicles may be utilised well, the mounted gear and assets are adequate for fulfilment of fire investigation tasks.

Based on experiences drawn so far, the directorates proposed solutions for protecting and cleaning photo cameras and metering instruments exposed to extensive wear and tear due to extreme conditions prevailing at fire incident scenes, and for procuring endoscopic cameras, hollow examining mirrors to view locations difficult to access. [19]

EXPERIENCES, CONCLUSIONS, PROPOSALS

In the course of my research, I have analysed and assessed national and international technical literature on fire investigation. I have concluded that national technical literature published on fire investigation is outdated in part; thus, more or less suitable for constituting the basis for quality work performed in line with legislative requirements, IT environments and state-of-

the-are technology. International technical literature was written for implementing fire investigations pursuant to different procedural law considerations and objectives; thus, may only be adapted in the course of fire investigations in Hungary only in part and in a limited manner.

I have examined the national fire investigation legislative framework and procedural law criteria. In the course of which I have found that both civil and criminal proceedings closely rely on fire investigation on-the-scene inspections of official proceedings conducted by disaster management agencies in the course of public administration proceedings. Capturing of experiences from fire investigation inspections commenced simultaneously with or nearly in time with firefighting may not be substituted or repeated subsequently; therefore, its significance is paramount. Fire investigation and forensic fire investigation experts most often come across a particular fire incident only after months or years; thus, are in no position to give a responsible specialist opinion without a fire investigation inspection and photographs taken therein.

The Fire Safety Act identifies fire investigation as the third pillar of fire safety. In practice, however, it only appeared as an independent field of expertise only in the periods 1978-1990 and 2000-2012 within the organisation of fire departments and territorial disaster management, after which it was integrated into other fields (authority, fire prevention, firefighting) as mandatory tasks. Consequently, the readiness, routine and specialisation of staffs dealing with official fire investigations has not been able to evolve in every case.

Recent regulatory decisions aim at the demand for thorough fire investigation proceedings capable of eliciting sufficient legal impacts. In order to improve the personnel and technical conditions of fire investigations, substantial achievements were made in the last two years within career disaster management agencies in my opinion. Introducing three-tier fire investigation and four-module training system, annual extension training courses for county fire investigators, fire investigation experts, equipping of county directorates with fire investigation vehicles and enabling county-level regulation of fire investigation tasks may become the motors driving a dynamic advancement of the field.

Upon Hungary's initiative, CTIF has set up its Fire Investigation Working Group aiming at participating countries sharing their fire investigation experiences with and assisting each other and the advancement of fire investigation activities. The sharing of experiences internationally, the joint consideration of and seeking solutions to issues arising raises the specialist field to a new, ever higher level, the level of an independent science, in my opinion.

BIBLIOGRAPHY

[1] HADNAGY I. J.: *A tűz gyulladásának eltávoztatása.* (Tampering with the ignition of fire) Tűzoltó Múzeum Évkönyve 9. 2008 (Budapest)

[2] *1996. évi XXXI. törvény a tűz elleni védekezésről, a műszaki mentésről és a tűzoltóságról*
A tűzvédelemi törvény és végrehajtási rendelkezései. (Act XXXI of 1996 on Protection against fires, technical rescue and fire departments. Fire Protection Act and implementing regulations thereof). PRO-SEC Kft. Budapest, 1997. pp. 10-30. ISBN 963 58453 3X

[3] CSABA GY.-DÉKÁNY I. - HETÉNYI F. - HUSZÁR I. - KOVÁCS JÓZSEF - KOVÁCS I. - PAPP S. - RÁCZ F. - SZAFIR GY. - SZALONTAI I. - VÁGVÖLGYI J.: *A tűzvizsgálat kézikönyve.* (Fire Investigation Manual) BM Tanulmányi és Propaganda Csoportfőnökség, Budapest, 1972.

[4] DURUCZ J.-NÉMETH J. : *Megelőző Tűzvédelmi Ismeretek*. (Preventive Fire Safety Knowledge) Belügyminisztérium, Budapest, 1985. ISBN 963 03 1070 8,

[5] BARTHA I., FENTOR L.: *A tűzvizsgálat alapjai.* (Fire Investigation Basics) Fővárosi Tűzoltóparancsnokság, Budapest, 2006.

[6] NAGY L. Z.: *Tűzvizsgálat taktikája*. (Fire Investigation Tactics) Fővárosi Tűzoltóparancsnokság, Budapest, 2010.

[7] HAJÓSI P., ÉRCES G., KIRÁLY A., KISS R., KISS P., MARTON F., NAGY L. Z., SZILÁGYI C.: *Alkalmazott Tűzvizsgálat*, (Applied Fire Investigation) Magyar Rendvédelmi Kar- Budapesti Tűzvédelmi Szövetség, Budapest, 2014.

[8] DR. BEDA L., CSEPREGI CS.: *Tűzvizsgálattan*. (Fire Investigation Study) Szent István Egyetem, Budapest, 2013. ISBN 978-963-269-347-7,

[9] NAGY L. Z.: *Tűzvizsgálati kódex I.* (Fire Investigation Code I)Magyar Rendvédelmi Kar- Budapesti Tűzvédelmi Szövetség,Budapest, 2017. ISBN: 978-615-00-0919-3,

[10] Nagy L. Z.: *Tűzvizsgálati kódex II.* (Fire Investigation Code II) Magyar Rendvédelmi Kar- Budapesti Tűzvédelmi Szövetség, Budapest, 2018. ISBN 978-615-00-0920-9,

[11] *National Fire Protection Association 921 1– 6.*

[12] [n.n]: *„Tűz és Katasztrófák nyomainak felkutatása és vizsgálata (Exploring and investigating the traces of fires and disasters)* – fordította. Bónusz János". Német Népi Rendőrség, dn. Q.[s.d.]

[13] *Tűzvizsgálat Európában és a tengerentúlon.* (Fire investigation in Europe and overseas) http://www.katasztrofavedelem.hu/index2.php?pageid=szervezet_hirek&hirid=4328 (downloaded: 2018.04.20)

[14] *Nemzetközi körben is osztatlan sikert aratott Kabos, a drótszőrű tűzvizsgáló vizsla* http://www.katasztrofavedelem.hu/index2.php?pageid=szervezet_hirek&hirid=4330 (downloaded: 2018.04.20)

[15] *Budapesten tartja alakuló ülését a CTIF tűzvizsgálati munkacsoportja.* http://www.katasztrofavedelem.hu/index2.php?pageid=szervezet_hirek&hirid=5097 (downloaded: 2018.04.20)

[16] BÉRCZI L.–VARGA F..: *Nemzetközi tűzvizsgálati gyakorlat elemzése*, (An analysis of international fire investigation practices) VédelemTudomány, I 3 pp. 28-45. (2016)

[17] BÉRCZI L.: *Structure, organization and duties of fire services in Hungary*, VédelemTudomány: Katasztrófavédelmi Online Tudományos Folyóirat I. (2) pp. 3-18. (2016)

[18] A BM Országos Katasztrófavédelmi Főigazgató 56/2016. számú Intézkedése http://www.katasztrofavedelem.hu/index2.php?pageid=szervezet_jogszabaly (downloaded: 2018. 05. 10.)

[19] ÉRCES G. – BÉRCZI L.. *A 2017. évi tűzvizsgálati eljárások tapasztalatainak összegzése a mérnöki és kriminalisztikai alapokon nyugvó módszerek értékelésével*, (Summary of experiences from fire investigations in the Year 2017 through an assessment of engineering and criminalistics methods) VédelemTudomány, III. évfolyam 1 szám. pp. 3-17(2018)