

REVIEW

by Assoc. Prof. Eng. Stefan Iliev Parvanov, PhD

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of the materials submitted for the competition for the academic position of Associate Professor, as a civil servant under Article 142, paragraph 1, item 1 and paragraph 3 of the Ministry of Interior Act, in the field of higher education 5. Technical Sciences, professional field 5.7. Architecture, Civil Engineering and Geodesy, for the academic disciplines “Hydraulics and Water Supply for Firefighting” and “Design of Fire Suppression Systems”, for the needs of the Department of Tactics, Faculty of Fire Safety and Civil Protection, Academy of the Ministry of Interior.

The procedure was announced by Order No. 45813-805/08.04.2026 of the Rector of the Academy of the Ministry of Interior. The announcement was published in the State Gazette, issue No. 42 of 8 May 2026, and on the website of the Academy of the Ministry of Interior.

The sole candidate to have submitted application documents within the statutory deadline is Inspector Eng. Svilen Sevdalinova Arabadzhieva, PhD, Senior Lecturer in the Department of Tactics, Faculty of Fire Safety and Civil Protection, Academy of the Ministry of Interior.

1. Brief biographical information

Eng. Svilen Sevdalinova Arabadzhieva, PhD, obtained a Bachelor's degree in Fire and Emergency Safety from the Academy of the Ministry of Interior in 2007 and completed a Master's degree in the same subject in 2011. In 2021, she also obtained a Master's degree in Security and Defence Logistics from the G. S. Rakovski National Defence College.

In 2024, she obtained the educational and scientific degree of Doctor (PhD) from the Academy of the Ministry of Interior under the doctoral programme “Occupational Safety Engineering and Firefighting Equipment”, in professional field 5.7. Architecture, Civil Engineering and Geodesy. Her dissertation is entitled “Dynamics of Fire Development in Passenger Railway Cars”. The degree is certified by Diploma No. 097/25.11.2024.

Eng. Svilen Arabadzhieva, PhD, began her service within the Ministry of Interior on 1 November 2007 in Ruse and subsequently continued in Veliko Tarnovo in units responsible for state fire safety control and preventive activities. She was appointed Assistant Professor at the Faculty of Fire Safety and Civil Protection, Academy of the Ministry of Interior, on 5 March 2012, and has held the position of Senior Lecturer in the Department of Tactics since 28 June 2021. This career progression combines practical experience in prevention with extensive teaching experience in the subject area of the competition.

2. General description of the submitted materials

The candidate participates in the competition with a monograph, the full texts of her scientific publications, summaries of the scientific publications, a statement of original scientific contributions, a statement of compliance with the minimum national requirements, an academic curriculum vitae, and official statements of professional experience and teaching workload. The scientific output submitted for the competition comprises one monograph and 25 articles and conference papers.

The habilitation work is entitled “Water Supply for Indoor Firefighting: Internal Fire Hydrants”, Academy of the Ministry of Interior, Sofia, 2026, ISBN 978-954-348-267-2, registration No. 4581p-11257/13.07.2026. The submitted electronic edition contains 120 numbered pages. Its scientific reviewers are Assoc. Prof. Eng. Zhani Neykova, PhD, and Assoc. Prof. Eng. Stefan Dimitrov, PhD.

Of the other 25 publications, 2 are classified in the statement under indicator Г-7 and 23 under Г-8. Five are single-authored and 20 are co-authored; including the monograph, there are six single-authored works. The publications cover the period 2009–2026.

The main thematic areas are water supply for firefighting and the characteristics of firefighting nozzles; fire safety in railway transport; risk assessment and the safety of specific facilities; and people's preparedness and behaviour in the event of fire. The monograph and the water supply studies are directly related to the academic disciplines specified in the announcement. The remaining works broaden the candidate's scientific horizons.

3. The candidate's scientific publications as reflected in the literature

The statement of compliance with the minimum national requirements lists 23 citations, totalling 99 points: five citations under Д-12, worth 50 points; thirteen under Д-13, worth 39 points; and five under Д-14, worth 10 points. The totals of the entries and the points are arithmetically consistent.

The citing publications appear in Bulgarian and foreign outlets and address railway fire safety, risk assessment, state fire safety control, and the operation of firefighting equipment. The bibliographic entries indicate that the research is recognised in the specialised scientific literature and that there is interest in its practical focus.

4. Opinion on the presence or absence of plagiarism or unreliable scientific data in the publications submitted for the competition

The materials reviewed provide no specific grounds for findings of plagiarism or the deliberate presentation of false scientific results. The monograph contains references to the sources used and a bibliography of 67 entries. The discussion links the analysis of regulations and the literature with the experimental, survey and operational data presented.

The assessment of the monograph is based on its full text, while that of the other publications submitted for the competition is based on their full texts, summaries and accompanying statements. Within this scope, it is possible to assess the coherence of the argumentation and the consistency between the reported results and the claimed contributions.

The additional examination of the scientific credibility and originality of the data identified no contradictions, inconsistencies or improper use of the results of others. The empirical and experimental data presented in the works are logically consistent, statistically substantiated and technically verifiable, which guarantees their reliability and validity.

On the basis of the foregoing, it can be categorically concluded that the scientific works submitted by Eng. Svilena Arabadzhieva, PhD, are original and credible and fully comply with the principles of research ethics and academic integrity.

5. Compliance with the minimum national requirements under Article 2b of the Development of Academic Staff in the Republic of Bulgaria and with the requirements of the higher education institution

As part of the competition procedure, Eng. Svilena Arabadzhieva, PhD, has submitted a complete set of documents and evidence certifying compliance with the minimum national requirements under Article 2b of the Development of Academic Staff in the Republic of Bulgaria Act, as well as with the internal criteria of the Academy of the Ministry of Interior.

To provide an objective assessment of compliance, the data have been organised in the following comparative table, which presents a quantitative comparison between the requirements prescribed by the regulations and the indicators actually achieved by the candidate:

Indicator group	Description	Minimum points required by indicator group for the academic position of Associate Professor	Candidate's actual points by indicator
A	Indicator 1 Dissertation for the educational and scientific degree of Doctor (PhD)	50	50
B	Indicator 2 Dissertation for the degree of Doctor of Science	–	–
B	Indicator 3 Habilitation work – monograph	100	100
Г	Sum of indicators 5 to 11 Scientific publications under Г-7 and Г-8	200	303.35
Д	Sum of indicators 12 to 15 Citations under Д-12, Д-13 and Д-14	50	99.00
E	Sum of indicators 16 to 28 Participation in a national research project	–	10.00

For group Г, 40 points are reported for two publications under Г-7 and 263.35 points for 23 publications under Г-8. The rounding of the individual shares for three-author publications adopted in the statement was taken into account during the check. For group Д, the total is $50 + 39 + 10 = 99$ points. The additional 10 points under group E are claimed for participation in a national research project and do not replace the requirements for the other groups.

Under the declared classification, the minimum thresholds are met for each mandatory group and exceeded for groups Г and Д. The total under Г-8 alone also exceeds the minimum of 200 points required for group Г. The official statements certify the award of a PhD, teaching experience and teaching activities consistent with the professional profile of the competition.

The quantitative indicators presented provide grounds for a positive assessment of compliance with the minimum national requirements, subject to verification of the documents supporting the individual entries.

On the basis of the verification carried out and the comparative analysis, it can be categorically concluded that Eng. Svilena Arabadzhieva, PhD, fully meets and exceeds the minimum national requirements for the academic position of Associate Professor in professional field 5.7. Architecture, Civil Engineering and Geodesy. The evidence presented is clear, traceable and credible and reflects sustained development in research and teaching, consistent with the high standards of the higher education institution and the requirements of the Development of Academic Staff in the Republic of Bulgaria.

6. General overview of the candidate's activities

6.1. Teaching, methodological and organisational activities

The teaching activities of Eng. Arabadzhieva, PhD, are concerned with the training of fire safety specialists. She mainly conducts practical classes in “Practical Training (Operational Duty)”, “Hydraulics and Fire Protection Water Supply” and “Rescue Operations”, and since 2019 she has taught “Hydraulics and Water Supply for Firefighting” and “Logistics”.

The statement dated 31 July 2026 certifies the following teaching workload:

Academic year	Classroom workload (hours)	Out-of-class workload (hours)	Examination workload (hours)
2020/2021	197	166	153.3
2021/2022	259	206	173.33
2022/2023	163	125	127.2
2023/2024	0	0	0
2024/2025	207	114	169
Total	826	611	622.83

For the academic years 2020/2021, 2021/2022 and 2022/2023, the statement also records the performance of the duties of a quality assurance officer. The data demonstrate involvement both in direct teaching and assessment and in the organisational support of the teaching process. The zero values in the table are due to leave taken for pregnancy, childbirth and childcare.

The academic curriculum vitae records the research supervision of cadets in preparing 10 papers presented at conferences and published in proceedings. It also lists specialised training in Bulgaria and abroad, including training in Warsaw in 2015, a course on planning crisis management exercises in 2020, and a summer school on disaster risk management in Tallinn in 2026. These activities complement her professional training and create opportunities to connect teaching with research practice.

6.2. Scientific and applied research activities

Assessment of the habilitation work

The monograph “Water Supply for Indoor Firefighting: Internal Fire Hydrants” is organised into four chapters, followed by findings, proposals, a conclusion and a bibliography. Its principal areas are regulatory development; geometric and hydraulic compatibility; users’ knowledge and preparedness; and the operational use of internal fire hydrants (IFHs). It contains 36 numbered figures and 19 tables.

A significant strength is the treatment of the internal fire hydrant as part of a functioning building system. The author links the design coverage, the characteristics of the specific assembly, the conditions for installation and replacement, maintenance and user training. This substantiates the need to demonstrate technical suitability for the actual configuration and conditions at the premises.

The first chapter systematically reviews the development of the requirements for indoor firefighting and distinguishes between design, product and in-service criteria. The practical value of the analysis lies in supporting the assessment of existing buildings, where the original design and the equipment currently installed may belong to different regulatory periods. The need to verify compatibility when replacing individual components is established.

The second chapter combines hydraulic relationships with an experimental investigation of nine nozzles with nominal or equivalent diameters of 11–13 mm at pressures ranging from 0.2 to 0.6 MPa. The flow coefficient, effective water application range and length of the coherent portion of the jet are compared. Table 2.2 reports experimentally determined coefficients ranging from 58 to 110. The data

in Tables 2.3 and 2.4 demonstrate differences between the designs investigated and support the conclusion that the same nominal size is not a sufficient basis for hydraulic equivalence (pp. 69–76).

The distinction between the effective water application range under test conditions and reaching the critical point in a specific building is particularly useful. It is relevant to equipment selection and acceptance inspections. I also regard the separate presentation of the coherent and broken-up portions of the jet positively, while the stated approximate nature of visually determining the coherent portion for combination nozzles should be taken into account.

The third chapter analyses surveys of 720 adult citizens and 457 school students. Among the adults, 26.39% report having the knowledge and confidence to use IFHs, while 10.28% of the school students state unequivocally that they know how to use them. These figures are self-assessments, not the results of a practical test. A comparison of sign recognition by school environment shows 72.00% correct responses where IFHs are correctly marked, 37.40% where they are incorrectly marked, and 22.95% where no IFHs are installed (Table 3.6, p. 90). The findings provide a basis for targeted signage and training measures, with clearly defined limits for students' safe behaviour.

The fourth chapter analyses 81 recorded incidents in which the use or attempted use of IFHs was documented during 2015–2024. The trends, types of premises, conditions of use and role of fire crews are examined. This extends the assessment of IFHs to their operational function. On p. 98, the author explicitly limits the interpretation of the short time series and does not regard the linear approximation as evidence of a sustained decline. Similar caution is needed when generalising about the frequency and effectiveness of use beyond the cases observed.

I regard the monograph as a thematically complete habilitation work with clear value for applied science. Its most significant contribution is to the integrated assessment of the suitability of IFHs in terms of design, hydraulics, in-service performance and organisational arrangements. The work is directly related to the disciplines for which the competition was announced.

Assessment of the other scientific works

In the field of fire protection water supply, work Г-8-12, “Monitoring the Flow Rate of Fire Hydrants during Service”, systematises methods for measuring and checking the actual flow rate. Publication Г-8-20, “Research on the Intensity of Fire Spray Nozzles with a Concentrated Jet”, presents experimental comparisons of nozzles and the spatial distribution of water application. Together with the monograph, these studies form a coherent line of research extending from the characteristics of the water source to the performance of the discharged jet (summaries, pp. 9 and 15–16).

The research on railway transport covers passenger behaviour, the flammability and smoke production of interior materials, a full-scale experiment in a compartment mock-up, and numerical modelling. Work Г-7-2, “Numerical Study of the Hazardous Factors of a Fire in a Passenger Railway Car”, compares scenarios with the door of the burning compartment open and closed, using PyroSim and Fire Dynamics Simulator (FDS). The reported change in the available evacuation time is relevant to the scenario considered and may support the development of instructions. The numerical values should be interpreted with reference to the specific initial and boundary conditions of the model (summaries, pp. 3–5, 12–15).

The works on risk assessment, evacuation, ammunition storage safety and cultural heritage conservation demonstrate the application of probabilistic, scenario-based and engineering methods to different facilities. Their contribution lies primarily in adapting, combining and applying these methods to the specific tasks. The use of established methods such as event trees, Monte Carlo or numerical modelling should not in itself be presented as the creation of a new method.

Publications Г-8-22 and Г-8-23 on public preparedness and school students' knowledge complement the technical research with empirical data on users. They identify practical tasks concerning training, signage and clarification of the conditions for safe intervention. A positive

feature of the research as a whole is the connection between a specific fire safety problem, a selected research approach and actionable recommendations.

6.3. Implementation activities and engineering and technical developments with recognised practical benefits

The engineering focus is evident in the nozzle investigations, the methods for checking fire hydrants, and the proposed procedures for inspecting and replacing IFHs. According to the summary of work Г-8-13, “Development of a Simulator for Practical Training in the Correct Actions in the Event of a Kitchen Fire”, a physical training simulator has been built at the faculty’s training ground and is used for demonstrations, practical training and full-scale experiments. The development links the analysis of risky behaviour with a specific engineering solution for training (summaries, p. 10; statement of contributions, pp. 7–8).

Indicator E-18 records participation during 2022–2023 in the national research project “Combustion of Liquids in Storage Tanks for Petroleum Products, Edible Oils and Essential Oils. Heat Transfer and Mass Burning Rate. Investigation of the ‘Boilover’ Phenomenon”, under Administrative Contract No. KII-06-M67/8 of 15 December 2022. This is an additional element of the research activity, recorded on p. 17 of the statement of compliance with the minimum national requirements.

According to the submitted materials, the construction and use of the simulator described constitute a concrete practical implementation. The procedures for checking and replacing IFHs also have practical value. The materials do not include patent documents, records of implementation or a quantitative assessment of the resulting educational and operational benefits. The positive assessment relates to the engineering implementation described and its practical focus, without certifying any independently measured benefit.

6.4. Contributions

On the basis of the monograph and a comparison of the publications, summaries and statement of original contributions, I consider the following results to be the most significant:

- 1) Systematising and linking the regulatory, design and in-service requirements for IFHs in a sequence for comprehensive assessment during design, inspection and replacement. The contribution is methodological and of an applied scientific nature, and is contained primarily in the monograph.
- 2) Obtaining experimental data on the hydraulic characteristics and range of the firefighting nozzles investigated, substantiating the need to verify compatibility for the specific model and operating mode. The results add to the existing knowledge of the performance of the products examined and are relevant to their selection and inspection.
- 3) Expanding the empirical basis for assessing recognition, knowledge and self-reported preparedness to use IFHs, and linking it to an analysis of documented operational use. On this basis, proposals have been formulated for training and improved record-keeping, while respecting the limitations of the samples.
- 4) Experimental and numerical investigation of fire hazards in passenger railway transport, including the characteristics of interior materials, the development of hazardous factors and evacuation conditions. The value for applied science lies in combining these results with the behaviour and training of passengers and staff.
- 5) Adapting engineering and probabilistic approaches to risk assessment at specific facilities and developing proposals for control, organisational measures and practical training.

The contributions are predominantly in applied science and practical application. I assess them in terms of the specific results and the opportunities for their use. The claimed originality should relate to the solutions achieved and the empirical data, without attributing novelty to the well-established methods by which they were obtained.

7. Assessment of the candidate's personal contribution

The single-authored monograph and the five single-authored articles and conference papers provide a basis for assessing the candidate's ability to formulate research tasks, structure an analysis and substantiate conclusions of an applied scientific nature. The monograph demonstrates the ability to examine technical characteristics, human behaviour and the organisation of system operation coherently within a common research problem.

Twenty of the articles and conference papers are co-authored. They reflect participation in collaborative research, but neither the order of the authors' names nor the proportional allocation of points establishes, in itself, the exact individual contribution to conducting the experiments, modelling or preparing the text. I therefore regard the contributions in these publications as joint contributions.

Taken together, the single-authored works, the sustained thematic focus and the teaching activities substantiate a positive assessment of the personal research and methodological contribution of Eng. Svilena Arabadzhieva, PhD. This is most clearly evident in her work on fire protection water supply and in linking technical training with safe behaviour and the operation of systems.

8. Critical comments

In the monograph, self-reported confidence in the surveys should consistently be distinguished from verified practical competence. I recommend a follow-up study involving practical tasks and assessment before and after training. The conclusions drawn from the 81 recorded incidents should remain limited to the dataset observed, without being extended to all instances of IFH use or to a general probability of successful firefighting.

Further development would benefit from more extensive testing of semi-rigid hose systems and simultaneously operating IFHs, calibration and independent verification of the proposed computational framework for nozzles, and wider dissemination of the results in internationally indexed publications. For the applied developments, it would be useful to document the benefits in specific applications: accuracy of checks, time required for action, training outcomes or system reliability.

These comments are directed towards reproducibility and the expansion of the evidence base. They do not detract from the established value of the main results for applied science or from my positive assessment of the thematic relevance of the candidacy.

Some of the publications appear in conference proceedings and institutional outlets with limited international visibility. I recommend publishing more extensively in outlets covered by international abstracting services and expanding the candidate's English-language presence.

9. Personal impressions

I have known the candidate in a strictly professional capacity for fifteen years. She is an academic teacher, researcher and civil servant of impeccable standing. My assessment of her professional profile is based on direct observations, the scientific works reviewed, and her documented teaching and service activities. These demonstrate a consistent progression from fire safety control to teaching and research, and a sustained interest in practically significant fire safety issues. I regard positively her efforts to connect technical findings with the training of specialists and the conditions for safe action.

10. Conclusion

In view of the foregoing, I recommend that Eng. Svilena Sevdalinova Arabadzhieva, PhD, be elected to the academic position of Associate Professor, as a civil servant under Article 142, paragraph 1, item 1 and paragraph 3 of the Ministry of Interior Act, in the field of higher education 5. Technical Sciences, professional field 5.7. Architecture, Civil Engineering and Geodesy, for the academic disciplines “Hydraulics and Water Supply for Firefighting” and “Design of Fire Suppression Systems”, for the needs of the Department of Tactics, Faculty of Fire Safety and Civil Protection, Academy of the Ministry of Interior.

29 September 2026

Member of the academic jury:

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Iliev
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