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INTERNAL OSH REGULATION OF WORKING AT HEIGHT BY USING UTILITARIAN CLIMBING TECHNIQUES IN TELECOMMUNICATION OPERATIONS

Gabriel Bujor BĂBUȚ[1], Robert Alexandru DĂRĂMUȘ[2], Roland Iosif MORARU[3], Mihai POPESCU-STELEA[4]*

[1]University of Petroşani, Petroşani, Romania, gabriel_babut@yahoo.com
[2]University of Petroşani, Petroşani, Romania, daramusrobert@gmail.com
[3]University of Petroşani, Petroşani, Romania, roland_moraru@yahoo.com
[4]University of Petroșani, Petroșani, Romania, popescusteleamihai@yahoo.ro

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Abstract: *The modernization and expansion of telecommunications networks in Romania led to the explosive growth of the number of workers engaged in these activities. A determined role in the performance of these activities belongs to workers employed in the occupation of utility climber who face a risk with often fatal consequences, namely the risk of falling from a height. Carrying out work at height in safe and healthy conditions by using utilitarian climbing techniques in the field of telecommunications requires its internal regulation according to OSH, through the elaboration of OSH's own instructions. Unfortunately, the main operators in the field of telecommunications in Romania, who have the legal obligation to draw up these instructions, are currently facing multiple legislative and methodological gaps, as well as a lack of knowledge and information. In this context, this paper aims to contribute to the improvement of the safety and health of workers in the field of telecommunications in Romania, by elaborating a framework structure of the own OSH instructions for the activity of working at height by using utilitarian climbing techniques. The proposed framework structure is based on an exhaustive bibliographic documentation at the national level and has a modern and innovative character, while its content can be adapted to the particularities of the activities carried out by all operators in the field of telecommunications in Romania. With rigorous adaptations, its applicability can be successfully extended to all economic operators who carry out work activities at height by using utility climbing techniques.*
Keywords: *occupational safety and health (OSH), risk, utility climber, work at height, own OSH instructions, telecommunications networks*

1. Introduction

Globalization and the modern lifestyle have imposed an increase in the use of technologies for long-distance communication and have amplified the social, cultural and economic impact that the telecommunications industry has in Romanian society.

For the execution of design/installation, operation and maintenance works of telecommunications networks, within the companies that have as their object of activity *"Construction of utility projects for electricity and telecommunications - NACE Code 4222"* workers who were employed in the utility climber occupation carry out their activity.

In accordance with the provisions of the occupational standard for utility climber (COR Code 712920), this occupation *"requires the ability to use rope access (i.e. two independently anchored ropes) to safely reach and work efficiently in places located at height or with difficult access"* [1]. The mentioned occupational standard establishes that the utility climber performs the following activities: *"equips the ropes, executes knots, organizes the workplace, performs maneuvers in the rope, maintains equipment, manages documents, and performs simple and complex rescues"*.

* Corresponding author: Gabriel Bujor Băbuț, Assc.Prof. PhD. Eng., University of Petroșani, Petroșani, Romania, contact details (University street, no. 20, Petroșani, Romania, +40732971484, gabriel_babut@yahoo.com)

To perform his activities, the utility climber uses specific equipment and knows all rope access methods and all rescue methods. Considering that the workers employed in the occupation of utility climber carry out a highly specialized activity, in which they face a risk with lethal consequences, namely the risk of falling from a height (e.g. works performed on telecommunication towers or pylons), they must be physically and medically fit and must benefit both from a rigorous initial training (specialization course accredited by the National Authority for Qualifications - ANC) and from continuous training carried out through periodic training programs.

In order to carry out their activity under OSH conditions, workers employed in the occupation of utility climber must benefit, in addition to good professional training, from appropriate training for the prevention of occupational accidents specific to working at height by using utility climbing techniques.

A particularly important role in the training of workers is the knowledge, understanding and correct application in practice of the requirements contained in own OSH instructions specific to the activity carried out.

The accomplishment of the legal requirements regarding the mandatory elaboration of own OSH instructions for the activity of working at height by using utilitarian climbing techniques by employers in the field of telecommunications was negatively affected by the multiple legislative and methodological gaps, as well as by the lack of knowledge and information which manifests itself at the national level. Unfortunately, the structure and content not adapted to the continuous evolution of scientific and technical knowledge of own OSH instructions led to inadequate training of workers, which was one of the main causes of work accidents due to falls from height. In this context, it should be mentioned that, according to the documentation carried out in the work, although the workers employed in the occupation of utility climber represent only 10-15 % of the total number of employees of the companies that provide telecommunication infrastructure services, the work accidents due to falling at height have a weight of 60 % of the total number of work accidents registered in these companies.

The previously mentioned considerations acutely imposed the need to carry out a theoretical-applicative study that would contribute to improving the security and health of workers in the field of telecommunications in Romania, by developing a framework structure of the own OSH instructions for the activity of working at height by using utilitarian climbing techniques, adapted to the current level of scientific and technical knowledge.

2. Materials and methods

Internal OSH regulation of the activities carried out in an enterprise/unit is achieved by fulfilling the employer's obligation to prepare *"own instructions for the completion and/or application of safety and health regulations at work"* (in short own OSH instructions), in accordance with the following legal provisions:

- provisions of article 13 (e) in Law no. 319/2006 regarding occupational safety and health [2], with subsequent amendments: *"In order to ensure safety and health conditions at work and to prevent work accidents and occupational diseases, their employers have the following obligations: ... e). to develop own instructions [...] for the completion and/or application of occupational health and safety regulations, taking into account the particularities of the activities and workplaces under responsibility";*
- provisions of article 15, paragraph 1 (3), in Government Decision no. 1425/2006 for approval of Methodological Norms for applying occupational safety and health Law no. 319/2006 [3], with subsequent amendments: *"(1) The prevention and protection activities carried out […] within the enterprise and/or the unit are the following: ... 3. the development of own instructions for completing and/or applying the safety and health regulations at work, taking into account the particularities of the activities and the unit/of the enterprise, as well as of jobs/jobs, and their dissemination in the enterprise and/or unit only after they have been approved by the employer".*

Unfortunately, the national legislation in force in the field of OSH contains only a few summary provisions regarding the role that own OSH instructions have in the work training process and does not deal at all with their elaboration methodology and the requirements that the structure and their content should fulfill.

In order to overcome these legislative and methodological deficiencies, an established research methodology was used in the work and has fully proven its viability [4, 5], which consisted in going through a logical sequence of stages. Table 1 presents for each stage the specific objective and the sources of documentation used.

The results obtained following the application of the research methodology described in table 1 are presented and discussed in the next paragraph.

Table 1. The specific objectives and documentation sources for each stage of the research methodology applied in the paper

Stage	Specific objective	Documentation sources
1	Identification and systematization of bibliographic references regarding fall from height risk management in telecommunication companies	• bibliographic and bibliometric databases websites: WoS - Clarivate Analytics, Scopus and Google Scholar; • social networking site for researchers: ResearchGate; • platform for sharing academic research: Academia.edu.
2	Identification of the methodologies used on a national level for the development of own OSH instructions	• Labour Inspection website (section "Guides"): https://www.inspectiamuncii.ro/ghiduri; • National Research and Development Institute for Labor Protection "Alexandru Darabont" Bucharest website (section "Publications/Guides"): http://www.inpm.ro/ro/oferta-noastra/publicatii/ghiduri.html; • European Agency for Safety and Health at Work (EU-OSHA) website (section "Tools and publications"): https://osha.europa.eu/ro/tools-and-publications; • European Commission website (Directorate-General for Employment, Social Affairs and Inclusion, section "Publications and documents"): https://ec.europa.eu/social/.
3	Inventory of the legal requirements that regulate the activities *"work at height"* and *"utilitarian climbing"*	• Ministry of Labor and Social Protection website (section "Legislation"): http://www.mmuncii.ro/j33/index.php/ro/legislatie; • Labor Inspection website (section "Legislation in the field of safety and health at work"): https://www.inspectiamuncii.ro/86; • Chamber of Deputies website (section "Legislative repertory"): http://www.cdep.ro/pls/legis/legis_pck.frame; • the legislative portal of the Ministry of Justice: https://legislatie.just.ro/; • the legislative portal Indaco Lege5.ro: https://lege5.ro/; • R.A. Official Monitor website (section "E-monitor"): https://monitoruloficial.ro/e-monitor/.
4	Inventory of standards regarding: • the personal protective equipment against falls from a height; • the equipment for climbing and mountaineering.	• Romanian Standards Association (ASRO) website: https://www.asro.ro/.
5	Establishing the framework structure of the *"Own OSH instructions for the activity of working at height by using utilitarian climbing techniques"*	-

3. Results and discussion

In the first stage, the query of bibliographic and bibliometric databases mentioned in table 1 allowed the identification of a small number of papers that address issues related to safety and health at work in companies that provide telecommunication infrastructure services. Most of these papers refer to the execution of maintenance work and take into account all the risks that can generate work accidents when performing work on telecommunication towers or pylons, with special attention being paid to the risk of falling from a height. It should be highlighted that no paper could be identified that was exclusively dedicated to the analysis and evaluation of OSH conditions for the activity of utilitarian climbing.

Among the studies carried out on a national and global level, only those relevant to the topic addressed in this work, namely those referring to fall from height risk management in telecommunication companies, were selected as valid sources of information. Thus, the studies that refer to the following aspects can be mentioned:

- fall from height risk assessment during the installation and maintenance of telecommunication networks [6];
- risk management during the maintenance of telecommunication towers [7];
- identification the causes of work accidents in antenna installation projects at telecommunication companies [8];
- safety and risk factor assessment in telecommunication industry [9];

- mitigation or minimization of existing risk conditions in the construction, operation and maintenance of fixed and mobile telephone towers [10].

The bibliographic research carried out within the work did not identify any standards or regulatory acts issued by international organizations or agencies to establish OSH conditions for the construction and maintenance activities of telecommunication towers. This lack of regulation is also valid for the vast majority of the world's states, including Romania. A notable exception to this quasi-general situation is the standard project *"Telecommunications Towers Preliminary Initial Regulatory Flexibility Analysis (PIRFA)"* [11] developed by the Occupational Safety and Health Administration (OSHA) from the USA. It should also be mentioned that, although the draft standard regarding the regulation of the construction and maintenance activities of telecommunication towers in the USA is relatively recent (2018), the development of OSH good practice recommendations regarding these activities has been a major concern since 2004 of the National Institute for Occupational Safety and Health (NIOSH). This prestigious institute published the document *"Preventing injuries and deaths from falls during construction and maintenance of telecommunication towers"* [12].

Along with national regulatory organizations and agencies, an important role in terms of improving OSH conditions in the field of telecommunications was played by professional organizations that noticed the need and acted in the sense of internal OSH regulation of activities with a high level of risk in this field of activity. A world reference in terms of ensuring the safety culture in companies that provide telecommunications infrastructure services is represented by The Communications Infrastructure Contractors Association (NATE) from the USA [13].

NATE has developed numerous resources for members to utilize in their own safety regimen, providing information on recognized best practices as well as regulatory compliance requirements. Some safety resources are available to the general public, while others are reserved for NATE Members only.

A significant number of resources are available on the NATE website that can be used to inform and educate workers who carry out activities of working at height by using utilitarian climbing techniques. These resources were integrated into the structure and content of own OSH instructions for the activity of working at height by using utilitarian climbing techniques, after they were adapted and customized to the requirements of national legislation and to the specifics of the activities carried out by workers who were employed in the occupation utility climber.

In the second stage, the following guide-type publications were identified that deal with the issue of own OSH instructions from a legal and methodological point of view:

- the guide *"Frequently asked questions regarding the own OSH instructions"* [14] developed by the Labor Inspection: summarizes and explains the legal requirements regarding the place and the role own OSH instructions;
- the guide *"Methodology for developing own OSH instructions at the level of economic agents"* [15] developed by a group of specialists from the National Research and Development Institute for Labor Protection "Alexandru Darabont" Bucharest: deals *in extenso* with all aspects of the methodology for developing own OSH instructions (meaning and necessity of development; principles and criteria for development; framework structure and content; stages of the development process; requirements regarding development).

The development of the third stage allowed the identification of two normative acts dedicated exclusively to the regulation of *"work at height"* and *"utilitarian climbing"* activities, from the point of view of safety and health at work. These are the following:

- Order no. 235/1995 of the Ministry of Labor and Social Protection (MMPS) regarding the approval of the specific work safety norms for work at height [16];
- Order no. 664/1997 of the Ministry of Labor and Social Protection (MMPS) regarding the approval of the specific labor protection norms for utilitarian climbing [17].

Even if these normative acts are repealed and some of the legal requirements they contain are obsolete or out of date from a technical point of view, they can still provide useful information to all companies concerned with internal OSH regulation of working at height by using utilitarian climbing techniques.

Also, at this stage, the legal requirements were identified regarding:

- *"the provisions concerning the use of work equipment provided for temporary work at a height"* provided in point 4 of Annex 2 of Government Decision no. 1146/2006 regarding the minimum safety and health requirements for the use of work equipment by workers at work [18]; the requirements of Directive 2001/45/CE regarding *"work at height"* were detailed and explained in the publication *"Non-binding guide to good practice for implementing Directive 2001/45/EC (Work at a height)"* [19] developed by the European Commission;

- *"the preventive medical services detailed according to occupational exposure"* provided in *"Sheet 123. Work at height"* from Government Decision no. 355/2007 regarding the supervision of workers' health [20], with subsequent amendments;
- *"the personal protective equipment against falls from a height"* provided in Annexes 1-3 of Government Decision no. 1048/2006 regarding the minimum safety and health requirements for the use by workers of individual protective equipment at the workplace [21], with subsequent amendments;
- *"the list of Romanian standards that adopt harmonized European standards regarding personal protective equipment"* provided in the Annex of Order no. 594/2013 of Ministry of Labor, Family, Social Protection and the Elderly (MMFPSPV) for the approval of the list of Romanian standards that adopt the harmonized European standards regarding personal protective equipment [22], with subsequent amendments.

The inventory of the standards regarding personal protective equipment against falls from a height and equipment for climbing and mountaineering was carried out during the fourth stage and consisted in the identification of these standards with the help of the *"List of Romanian standards that adopt the harmonized European standards regarding personal protective equipment"* provided in the Annex of Order no. 594/2013 of MMFPSPV. Later, with the help of the website of the Romanian Standards Association (ASRO), the current version of each previously identified standard was established, noting notable inconsistencies between the information provided by Order no. 594/2013 of MMFPSPV and the information obtained by querying the database of the Romanian Standards Association. These inconsistencies are due to the failure to update the provisions of Order no. 594/2013 of MMFPSPV, in accordance with the evolution of standardization at the level of the European Union.

Table 2 presents the *"list of standards regarding the personal protective equipment against falls from a height"* and table 3 presents the *"list of standards regarding the equipment for climbing and mountaineering"*.

Table 2. List of standards regarding the personal protective equipment against falls from a height

No.	Standard
1	SR EN 353-1+A1:2018 - Personal fall protection equipment. Guided type fall arresters including an anchor line. Part 1: Guided type fall arresters including a rigid anchor line
2	SR EN 353-2:2003 - Personal protective equipment against falls from a height. Part 2: Guided type fall arresters including a flexible anchor line
3	SR EN 354:2011 - Personal fall protection equipment. Lanyards
4	SR EN 355:2003 - Personal protective equipment against falls from a height. Energy absorbers
5	SR EN 358:2019 - Personal protective equipment for work positioning and prevention of falls from a height. Belts and lanyards for work positioning or restraint
6	SR EN 360:2024 - Personal fall protection equipment. Retractable type fall arresters
7	SR EN 361:2003 - Personal protective equipment against falls from a height. Full body harnesses
8	SR EN 362:2005 - Personal protective equipment against falls from a height. Connectors
9	SR EN 363:2019 - Personal fall protection equipment. Personal fall protection systems
10	SR EN 364+AC:1996 - Personal protective equipment against falls from a height. Test methods
11	SR EN 365:2005 - Personal protective equipment against falls from a height. General requirements for instructions for use, maintenance, periodic examination, repair, marking and packaging
12	SR EN 365:2005/AC:2007 - Personal protective equipment against falls from a height. General requirements for instructions for use, maintenance, periodic examination, repair, marking and packaging
13	SR EN 795:2012 - Personal fall protection equipment. Anchor devices

Table 3. List of standards regarding the equipment for climbing and mountaineering

No.	Standard
1	SR EN 564:2023 - Mountaineering equipment. Accessory cords. Safety requirements and test methods
2	SR EN 565:2018 - Mountaineering equipment. Tape. Safety requirements and test methods
3	SR EN 566:2017 - Mountaineering equipment. Slings. Safety requirements and test methods
4	SR EN 567:2013 - Mountaineering equipment. Rope clamps. Safety requirements and test methods
5	SR EN 569:2007 - Mountaineering equipment. Pitons. Safety requirements and test methods
6	SR EN 892+A2:2021 - Mountaineering equipment. Dynamic mountaineering ropes. Safety requirements and test methods
7	SR EN 893:2019 - Mountaineering equipment. Crampons. Safety requirements and test methods
8	SR EN 958:2017 - Mountaineering equipment. Energy absorbing systems for use in Klettersteig (Via Ferrata) climbing. Safety requirements and test methods

9	SR EN 12270:2014 - Mountaineering equipment. Chocks. Safety requirements and test methods
10	SR EN 12275:2013 - Mountaineering equipment. Connectors. Safety requirements and test methods
11	SR EN 12276:2014 - Mountaineering equipment. Frictional anchors. Safety requirements and test methods
12	SR EN 12277+A1:2019 - Mountaineering equipment. Harnesses. Safety requirements and test methods
13	SR EN 12278:2007 - Mountaineering equipment. Pulleys. Safety requirements and test methods
14	SR EN 12492:2012 - Mountaineering equipment. Helmets for mountaineers. Safety requirements and test methods
15	SR EN 15151-1:2013 - Mountaineering equipment. Braking devices. Part 1: Braking devices with manually assisted locking, safety requirements and test methods

In the last stage, based on the analysis and processing of the information collected in the first four stages, the framework structure of the *"Own OSH instructions for the activity of working at height by using utilitarian climbing techniques"* was established. This framework structure is presented in table 4.

Table 4. The framework structure of the "Own OSH instructions for the activity of working at height by using utilitarian climbing techniques"

1.Common provisions applied to all structures
1.1.Terms and abbreviations
2.Conditions that workers must meet for admission to work at height
3.Access to (location) site location
4.OSH checking and analysis of the work area
5.Delimitation of the work area
6.Checking and equipping workers with PPE
7.Access to the work area
8.Pulley systems, for lifting materials and equipment at height
8.1.Construction of pulley systems
8.1.1.3 in 1 pulley system construction (3:1)
8.1.2.5 in 1 pulley system construction (5:1)
8.1.3.9 in 1 pulley system construction (9:1)
8.2. Tie down materials and equipment for lifting
9.Works on pylons
10.Climbing work on the pylons that is on the building or terrace (water tower, buildings, chimneys/cooling towers)
11.Working on the roof with classic or metal coverings
12.Working in the rope
13.Self-rescue or rescue
13.1.We assess the victim's condition: We try to talk to the victim
13.2.Situation assessment
13.3.Call 112
13.4.Preparing to climb the structure
13.5.Climbing to a height
13.6.Checking the victim's equipment and providing first aid
13.7.Creating a descent system using the rescue kit
13.8.Recovery of the victim from height
13.9.Victim descent
14.Disciplinary sanctions regarding the violation of OSH rules likely to cause work accidents

Within the work, it was not possible to fully present the content of *"Own OSH instructions for the activity of working at height by using utilitarian climbing techniques"*, considering that these have 41 pages. The full version of own OSH instructions can be provided to all those interested, by a simple request to this effect addressed to Mr. Dărămuş Robert Alexandru, at the following contact details: e-mail: daramusrobert@gmail.com; +40726675706.

4. Conclusions

The unprecedented modernization and expansion of the telecommunications infrastructure has generated a new challenge for specialists in this field of activity, represented by the need to ensure appropriate OSH conditions for workers, against the background of the increase in the number of work accidents generated, in particular, by the fall of at height. Unfortunately, internal OSH regulation has so far failed to adapt to the dynamism and continuous innovation that characterizes the telecommunications industry, the main causes of this state of fact being represented by the multiple legislative and methodological gaps, as well as the lack of knowledge and of information that manifests at the national level.

In this context, the stated objective of the paper was internal OSH regulation of working at height by using utilitarian climbing techniques in telecommunication operations, which involved the development of own OSH instructions for this activity, in accordance with the requirements of national legislation and existing best practices worldwide.

In order to achieve this objective, a proven research methodology was used in the paper, which consisted of going through a logical sequence of five stages and which allowed obtaining relevant results from a theoretical and practical point of view for the field of study.

The main theoretical contribution is represented by the establishment of a general methodological framework for the elaboration of own OSH instructions, which can be used for internal OSH regulation of any activity in the national economy. In the paper, this general methodological framework was successfully used to develop the frame structure and content of own OSH instructions for the activity of working at height by using utilitarian climbing techniques.

Even if the bibliographic research highlighted the lack of information in the field addressed in the paper, it still allowed the identification of the most relevant sources of information, as well as the regulations and good practice recommendations issued by some of the most prestigious organizations and agencies worldwide. As already mentioned, regulations and examples of good practice issued by federal institutions (OSHA, NIOSH) and professional associations (NATE) from the USA were integrated into the structure and content of own OSH instructions for the activity of working at height by using utilitarian climbing techniques.

The paper aimed to have a pronounced practical and applied character, by proposing concrete solutions adapted to the current level of scientific and technical knowledge. In this context, it should be mentioned that the bibliographic research was doubled by a thorough documentation on the ground, carried out at the largest national provider of telecommunications infrastructure services. Even though during the documentation we received all the support from the management and staff of this company, however, due to an exacerbated safety culture, we did not receive permission to mention the name of the company in the paper.

The own OSH instructions for the activity of working at height by using utilitarian climbing techniques are currently used within the previously mentioned company, they will be revised periodically and whenever necessary, as a result of legislative, normative or technical changes.

In order to facilitate the understanding and practical application of the concepts presented in own OSH instructions for the activity of working at height by using utilitarian climbing techniques, an important number of photographs and graphic representations have been inserted, which is their strong point. Also, special attention was paid to the most explicit and detailed presentation of how to use and check personal protective equipment against falls from a height, considering that the most common causes of accidents caused by falling from telecommunication towers or pylons a utility climbers are represented by the lack, improper use or failure of fall protection equipment.

The elaboration of the paper created the opportunity to capitalize and combine, at a higher level, the theoretical knowledge and academic rigor of the three teaching staff co-authors of the paper, with the professional experience and practical skills of the fourth co-author. He practices the occupation of utility climber, being internationally certified in Belgium, he carries out the training and professional verification of utility climbers in the company where the documentation for the elaboration of the paper was carried out, and in the future he will perform the function of coordinator of the training and practice center for utility climbing in within this company. The use of own OSH instructions for the activity of working at height by using utilitarian climbing techniques in the training of utility climbers and the periodic field verification of their strict compliance with the provisions of own OSH instructions will contribute to reducing the number and severity of work accidents in companies that provides telecommunications infrastructure services, with beneficial effects on the social and economic level.

Even if the own OSH instructions presented in the paper were developed taking into account the particularities of the activities carried out in the companies that provide telecommunications infrastructure services, they can be a particularly useful methodological tool and informative support for other companies that carry out activities working at height using utility climbing techniques.

References

[1] **National Authority for Qualifications (ANC),** 2005
Occupational Standard for the Occupation "Utilitarian Climber" - COR Code 712920 (in Romanian), National Authority for Qualifications, Bucharest, Romania,
http://intern.anc.edu.ro/virtualanc/crud/standarde/standarde_ocupationale/brain/ upload/alpinist.pdf (accessed on 05 August 2024).

[2] **Romanian Parliament,** 2006
Law no. 319/2006 regarding occupational safety and health (in Romanian), the Official Journal of Romania, Part I, no. 646/26.07.2006, Bucharest, Romania.

[3] **Romanian Government**, 2006
Government Decision no. 1425/2006 for the approval of the methodological norms for applying occupational safety and health law no. 319/2006 (in Romanian), the Official Journal of Romania, Part I, no. 882/30.10.2006, Bucharest, Romania.

[4] **Băbuț, G.B., Moraru, R.I., Popescu-Stelea, M., Fraitag, D.N.,** 2020
Understanding and Managing Worker's Exposure to Specific Risks, MATEC Web of Conferences, Volume 305, Article Number 00086, eISSN 2261-236X, https://doi.org/10.1051/matecconf/202030500086, https://www.matec-conferences.org/articles/matecconf/abs/2020/01/matecconf_sesam20_00086/matecconf_sesam20_00086.html (accessed on 05 August 2024).

[5] **Băbuț, G.B., Moraru, R.I.,** 2021
Improving the Occupational Safety and Health Management in Military Structures and Public Bodies Employing Civil Servants with Special Status. A Romanian Perspective in the COVID-19 Pandemic Context, Quality - Access to Success, Volume 22, Issue 182, pp. 164-173, pISSN 1582-2559, eISSN 2668-4861.

[6] **Rosu, S.M., Rosu, L., Dragoi, G., Pavaloiu, I.B.,** 2015
Risk Assessment of Work Accidents during the Installation and Maintenance of Telecommunication Networks, Environmental Engineering and Management Journal, Volume14, Issue 9, pp. 2169-2176, ISSN 1582-9596, eISSN 1843-3707, http://doi.org/10.30638/eemj.2015.231, http://www.eemj.icpm.tuiasi.ro/pdfs/vol14/no9/16_112_Rosu_14.pdf (accessed on 05 August 2024).

[7] **Ribeiro, R.F., Junior, B.B., Lago, E.M.G., Martins, A.R.B., da Cruz, F.M., Zlatar, T.,** 2021
Occupational Safety Risks during Maintenance of Telecommunication Towers, Production, Volume 31, pp. 1-16, ISSN 0103-6513, eISSN 1980-5411, http://doi.org/10.1590/0103-6513.20200108, https://www.prod.org.br/journal/production/article/ doi/10.1590/0103-6513.20200108 (accessed on 05 August 2024).

[8] **Priatin, W., Wijaya, D.I., Yulianto, H.D.,** 2023
Innovative Management for Occupational Safety and Health: A Tower Engineering Project, E3S Web of Conferences, Volume 426, Article Number 02064, eISSN 2267-1242, https://doi.org/10.1051/e3sconf/202342602064, https://www.e3s-conferences.org/articles/e3sconf/pdf/2023/63/e3sconf_icobar23_02064.pdf (accessed on 05 August 2024).

[9] **Olawale, K., Aigbavboa, C.,** 2018
Safety and Risk Factor Assessment by Telecommunication Mast Riggers and Technicians in Nigeria, In: Advances in Safety Management and Human Factors. AHFE 2018. Advances in Intelligent Systems and Computing; Arezes, P. (eds); Springer: Cham, Switzerland, Volume 791, pp. 431-437, Print ISBN 978-3-319-94588-0, Online ISBN 978-3-319-94589-7, https://doi.org/10.1007/978-3-319-94589-7_42, https://link.springer.com/chapter/10.1007/978-3-319-94589-7_42 (accessed on 05 August 2024).

[10] **da Fonseca Marques, H., de Carvalho, P.V.R.,** 2019
Safety Management in the Assembly of Telecommunication towers, In: Advances in Safety Management and Human Factors. AHFE (2019) International Conference. AHFE Open Access; Arezes, P., Carvalho, P.V.R. (eds); AHFE International: USA, 2019; Volume 5, pp. 338-348, ISBN 978-1-4951-2100-5, http://doi.org/10.54941/ahfe100179, https://openaccess.cms-conferences.org/publications/book/978-1-4951-2100-5/article/978-1-4951-2100-5_36 (accessed on 05 August 2024).

[11] **Occupational Safety and Health Administration (OSHA),** 2018
Telecommunications Towers Preliminary Initial Regulatory Flexibility Analysis (PIRFA), Occupational Safety and Health Administration, OSHA Small Business Advocacy, Washington, USA, https://www.osha.gov/sites/default/files/TelecommunicationsTowersPIRFA.pdf (accessed on 05 August 2024).

[12] **National Institute for Occupational Safety and Health (NIOSH),** 2004
NIOSH Alert: Preventing Injuries and Deaths from Falls during Construction and Maintenance of Telecommunication Towers, DHHS (NIOSH) Publication No. 2001-156, National Institute for Occupational Safety and Health, NIOSH-Publications Dissemination, Cincinnati, USA, https://www.cdc.gov/niosh/docs/2001-156/pdfs/2001-156.pdf (accessed on 05 August 2024).

[13] **Communications Infrastructure Contractors Association (NATE),** 2024
NATE Safety Resources, Communications Infrastructure Contractors Association, Watertown, USA, https://natehome.com/safety-education/safety-resources/nate-safety-resources (accessed on 05 August 2024).

[14] **Labor Inspection,** 2018
Frequently asked questions regarding the own OSH instructions (in Romanian), Labor Inspection, Bucharest, Romania, https://www.inspectiamuncii.ro/documents/632396/632784/FISA+ANGAJATOR++INSTRUCTIUNI_2018.pdf/c8c63c0c-0b9b-4bb4-a261-685bdc7b69c5 (accessed on 05 August 2024).

[15] **Pece, Ş., Hionis, C., Ciocîrlea, V., Smîdu, E.,** 2013
Methodology for developing own OSH instructions at the level of economic agents (in Romanian), National Research and Development Institute for Labor Protection "Alexandru Darabont", Bucharest, Romania, http://www.inpm.ro/files/publicatii/2013-01-metodologia.pdf (accessed on 05 August 2024).

[16] **Ministry of Labor and Social Protection (MMPS),** 1995
Order no. 235/1995 of the Ministry of Labor and Social Protection regarding the approval of the specific work safety norms for work at height, the Official Journal of Romania, Part I, no. 217/22.09.1995.

[17] **Ministry of Labor and Social Protection (MMPS),** 1997
Order no. 664/1997 of the Ministry of Labor and Social Protection regarding the approval of the specific labor protection norms for utilitarian climbing, the Official Journal of Romania, Part I, no. 272/09.10.1997.

[18] **Romanian Government,** 2006
Government Decision no. 1146/2006 regarding the minimum safety and health requirements for the use of work equipment by workers at work, the Official Journal of Romania, Part I, no. 815/03.10.2006.

[19] **European Commission,** 2007
How to choose the most appropriate work equipment for performing temporary work at a height - Non-binding guide to good practice for the application of directive 2001/45/EC of the European Parliament and of the Council concerning the minimum safety and health requirements for the use of work equipment by workers at work, European Commission, Directorate-General for Employment, Social Affairs and Equal Opportunities, Unit F.4, Office for Official Publications of the European Communities, Luxembourg, https://op.europa.eu/en/publication-detail/-/publication/cc6a1e5c-023c-4747-9a06-e9f155c5101c (accessed on 05 August 2024).

[20] **Romanian Government,** 2007
Government Decision no. 355/2007 regarding the supervision of workers' health, The Official Journal of Romania, Part I, no. 332/17.05.2007.

[21] **Romanian Government,** 2006
Government Decision no. 1048/2006 regarding the minimum safety and health requirements for the use by workers of individual protective equipment at the workplace, the Official Journal of Romania, Part I, no. 722/23.08.2006.

[22] **Ministry of Labor, Family, Social Protection and the Elderly (MMFPSPV),** 2013
Order no. 594/2013 of the Ministry of Labor, Family, Social Protection and the Elderly for the approval of the list of Romanian standards that adopt the harmonized European standards regarding personal protective equipment, The Official Journal of Romania, Part I, no. 209 and 209 bis/12.04.2013.[1] *** * ***, 2014