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EVOLUTION OF OCCUPATIONAL ACCIDENTS INDUCED BY RISKS IN TELECOMMUNICATIONS

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Abstract: *The paper presents work safety and health information as an essential element in the work carried out in any company, being a basic pillar to ensure at least 2 principles. Firstly, to enable any employer to ensure that the entire system of activities he carries out is carried out, on the one hand, in compliance with mandatory and necessary legislation, and, on the other hand, the profit, the benefit ensures maximum rates. Secondly, to ensure that every worker carries out his work safely without affecting his physical and mental integrity. The paper will present the two principles in detail, explained through some statistical analyses according to the gender of the workers and according to the risks they are exposed to.*
Key words: *Occupational safety, SSM, health legislation, risk.*

1. INTRODUCTION

The Occupational Safety and Health Administration (OSHA) considers that telecommunications a subset of the general construction industry. Whenever an injury or death is reported, an OSHA investigator may issue a citation to a telecommunications company under OSHA's Telecommunications, General Industry and Construction standards [1].

The use of subcontracting is a concern in the construction industry regarding accidents and injuries of workers, of which telecommunications is a subset [2, 3].

In the abstract were presented 2 principles and starting from the two principles presented in abstract, the authors observed that over time there has been a permanent concern to improve working conditions and to achieve integrated systems for the protection of workers to eliminate as much as possible the risks that can lead to injury or occupational disease.

Of course, there are a few areas of activity where risks cannot be eliminated, so the measures to be taken aim to minimize the possibility of accidents at work or occupational diseases.

However, it should be noted that societies evolve both humanly, economically, politically, and technically. These developments inevitably also lead to the fact that an even deeper analysis needs to be made regarding the risks of accidents and occupational diseases but correlated with them and the proper organization of activities considering the fundamental principles that also govern the activity of safety and health at work.

The first two authors are working in the field of risk assessment and the studies also highlight their years of experience in the field.

Thus, as it is known, even in occupational safety and health legislation, the fundamental law in the field of occupational safety and health (Law 319/2006) provides in Article 7 the general principles of prevention, as follows [4-6]:

- Risk avoidance.
- Assessment of risks that cannot be avoided.
- combating risks at source.
- Adapting work to humans, particularly as regards the design of workstations, the choice of work equipment, working methods and production methods, with a view to reducing monotony of work,

working at a predetermined pace and reducing their effects on health.
- Adaptation to technical progress.
- Replacing what is dangerous with what is not dangerous or with what is less dangerous.
- Developing a coherent prevention policy encompassing technologies, work organization, working conditions, social relations, and the influence of factors in the working environment.
- Adopting, as a priority, collective protection measures over individual protection measures.
- Providing appropriate instructions to workers.

As mentioned, in all areas of activity there has been an evolution of technical equipment, equipment that from the design stage has been built considering what risks they introduce and whether they meet the requirements for which they were created.

In the field of telecommunications, it was noticed a rapid increase in the technical level, by introducing new technical equipment that corresponds to the new generations, but we cannot fail to notice that this equipment can also generate some risks of injury and occupational disease [7 - 9].

2. EQUIPMENT USED IN TELECOMMUNICATIONS

Referring to the level of mobile telecommunications networks, it can be considered that it takes an average of 10 years to develop and implement a new generation of network, during which derivations from the classical model appear, necessary to cover as many of humanity's needs as possible.

If in the early '90s the 2G telephone network appeared, providing voice call and text message as functions, data transmission being in the form of "circuit exchange", nowadays just a few decades later, the lever of technology is very higher, such as 4G networks, 5G based on packet transmission, any file time can be transmitted electronically at exponentially higher speeds (current speed is about 150,000 times faster).

For this development to be possible, telecommunications workers needed, and still have, certain work equipment, which, unfortunately, its use also comes with numerous risks to which workers are exposed.

The paper will present an example of the risks arising from the use of the main equipment.

The first category of tools presented is the classic one, tools and equipment that are used in many fields, such as pliers, hammer, screwdriver, percussion drill, self-tapping drill. This equipment puts the worker at risk of puncture, cut, hit, electric shock, in case of incorrect use it can even lead to injuries on the limbs.

Another category of tools and work equipment used can be composed of devices used strictly in the field of telecommunications, such as cable crimping pliers, fiber optic welding machines, meter, soldering station, cable continuity tester [10],[11],[12].

If from the point of view of crimping pliers, the risk can be classified as a small risk, the consequences may be scratching or trauma to the fingers, the use of the fiber optic welding machine must be done with a high level of care, there is a risk of burns to the skin, or in cases of improper use for a long time, can lead to vision defects or even blindness.

At the same time, the activity carried out involves working at height, especially when it is necessary to mount, maintain and maintain GSM antennas.

And since we are talking about risks, we cannot neglect the risks due to radiation, which, over time, have generated a series of analyzes and studies, which highlight both their influence on the staff, as well as the prevention measures that must be provided by the employer and, where appropriate, the manufacturer of such equipment [13],[14],[15].

On the other hand, the work environment in which telecommunications technicians work is not an easy one, they are exposed to extreme temperatures, very high in summer and low in winter, rain, wind. In some situations, electrical discharges can be created from the atmosphere, antennas being placed at a high height, lightning having as an attraction the sites where they are mounted. To avoid the risk of electric shock, lightning protection is fitted [7],[8],[9].

3.TELECOMMUNICATIONS ACCIDENT STATISTICS - A SECONDARY DATA ANALYSIS

Telecommunications workers who have contact with transmission antennas are at risk of exposure to electromagnetic radiation, which can have both thermal and non-thermal effects. Thermal effects include tissue heating, blindness and burns and electric shock.

Communication and information technologies (ICT) are a key factor in risk reduction activities and management of disasters. Effective disaster management depends on the provision of resilient telecommunications infrastructure and services, as well as national strategies that enable communication and information sharing at all levels of government, within communities and between public and private organizations. Efficient and real-time information flow is important for decision-making, early warning, and alert, and for the effective coordination and articulation of response activities among all stakeholders working in disaster management, from first responders to senior officials.

The article aims to highlight the evolution of accidents in the last 10 years in the field of telecommunications in Romania and perhaps in the future, once the accidents from the field have been statistically highlighted, further studies will try to propose an OHS management system.

In the field of Telecommunications in Romania, between 2012 and 2022, a total number of 315 work accidents were registered, of these 300 victims were with temporary incapacity for work, 1 victim with disability and 14 victims fatally injured.

The victims injured in road work accidents were 61 workers, 29 workers were injured in traffic work accidents, and one fatally injured victim in traffic accident. Below we find the evolution of work accidents in the field of Telecommunications between 2012 and 2022.

The years with the most victims were recorded resulting in their deaths were as follows:

- Year 2017 – 3 fatal accidents.
- The years 2012, 2013, 2015 and 2020 have 2 fatally injured each one.
- The years 2014, 2019 and 2021 are only with 1 fatal injury each one.

Most work accidents have been followed by temporary incapacity of work for workers. For example, in 2019 has been registered 46 victims, followed by 2017 with 40 victims, 2015 with 36 victims, 2016 with 34 victims, and in 2020 there were 31 victims, in 2021 there were 17 victims and in 2022 there were 4 victims (Figure 2).

In 2020, a worker suffered an accident at work followed by his 2nd degree disability.

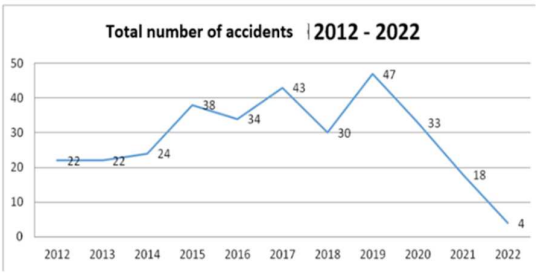


Fig. 1. Total number of accidents in period 2012- 2022

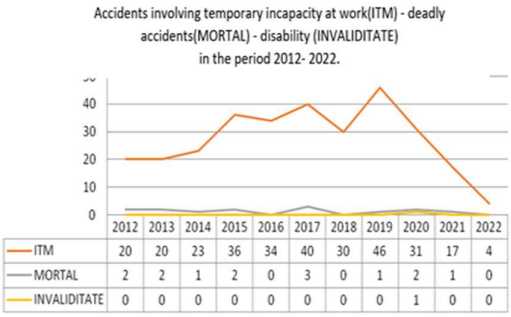


Fig. 2. Accidents involving temporary incapacity at work - deadly accidents - disability in the period 2012- 2022.

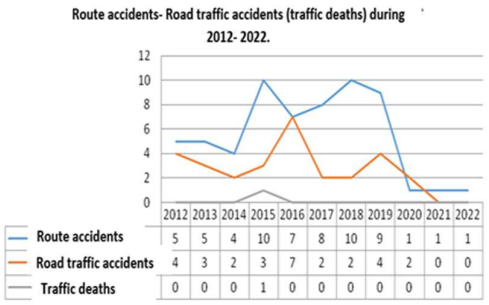
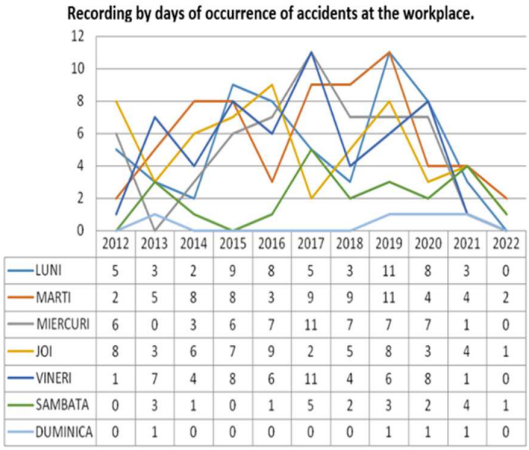


Fig. 3. Route accidents- Traffic accidents (traffic fatalities) in the period 2012-2022.

Figure 3 presents the statistical data evolution of the route accidents and the traffic accidents. Route accidents, respectively traffic accidents (fatal traffic) involving telecommunications workers, occurred in 2015 and 2018, with 10 victims each and one victim fatally injured in traffic accident. In 2019, there were 9 victims injured in road accidents, and 4 victims injured in traffic work accidents respectively. In 2020, only one road work accident and 2 traffic accidents were recorded, all the explanations are presented in Figure 3.

From the point of view related to the distribution by days of accidents at work, it can be observed that on Tuesday, most events occurred, namely 65, followed by Monday with 57, and Wednesday, Thursday, and Friday with 56 events. The fewest events took place on Saturdays with 22 and Sundays with four events (Figures 4 and 5).

Compensation claims were not evenly distributed through the working week. There were more injuries on Mondays (23.6% of the total) than on Tuesdays (21.8%), than on Wednesdays (20.3%), than on Thursdays (18%), than on Fridays (16.3%). There were more injuries in the mornings than in the afternoons for every day of the working week [17]. The situation in Romania is presented in Figure 5.



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
LUNI	5	3	2	9	8	5	3	11	8	3	0
MARTI	2	5	8	8	3	9	9	11	4	4	2
MIERCURI	6	0	3	6	7	11	7	7	7	1	0
JOI	8	3	6	7	9	2	5	8	3	4	1
VINERI	1	7	4	8	6	11	4	6	8	1	0
SAMBATA	0	3	1	0	1	5	2	3	2	4	1
DUMINICA	0	1	0	0	0	0	0	1	1	1	0

Fig. 4. Recording by days of occurrence of accidents at the workplace.

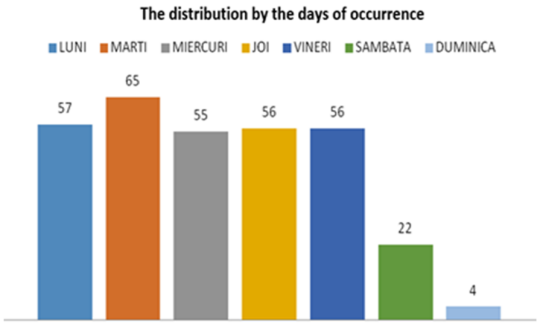


Fig. 5. The distribution by the days of occurrence.

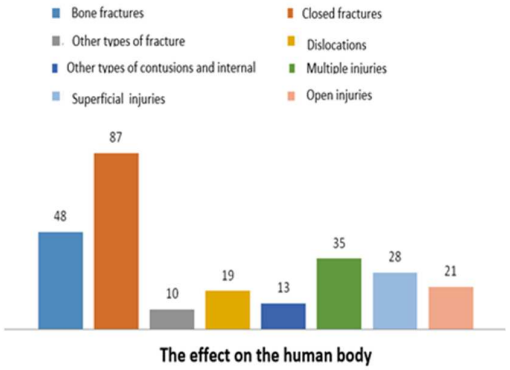


Fig. 6. The effect on the human body.

Related to the work environment, most events occurred in open public areas and involved 98 victims. In second place are Private residences - with 60 victims. In third place, work environments occurred in Areas at height (pillars, pylons, suspended platforms) - 52 victims, followed by Transport - private or public (all types: train, bus, car, other) - 24 victims and Offices, conference rooms, libraries, other - 20 victims.

When is made a statistically analysis regarding the part of the human body that was affected in an accident, it is needed to highlight very carefully the number of accidents and for this reason Figure 6 is very useful. As an effect on the workers' bodies, most of the victims had closed fractures – 87 victims, followed by bone fractures – 48 victims, and 35 victims had multiple injuries. 28 of the victims had only superficial injuries, and 21 victims had open wounds.

In terms of time of the events, at 10 o'clock most events occurred, 38 events respectively, followed by 14 o'clock with 34 events, and 11 o'clock with 33 events (Figure 7).

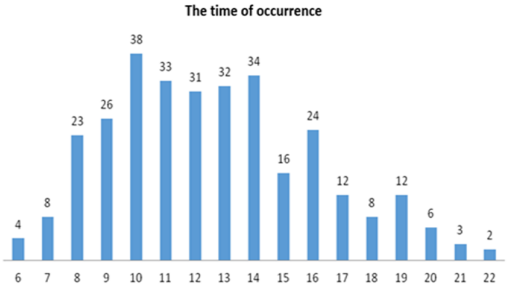


Fig. 7. The time of occurrence (from authors)

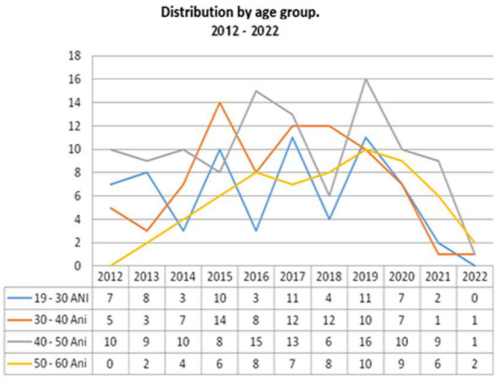


Fig. 8. Distribution by age group (from authors).

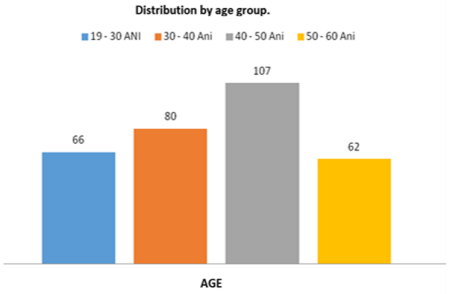


Fig. 9. Distribution by age group (from authors).

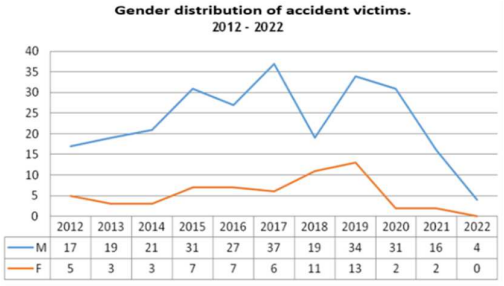


Fig. 10. Gender distribution of accident victims (from authors).

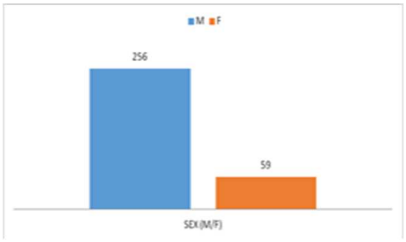


Fig. 11. Gender distribution (from authors)

As depicted in Figures 9 and 10, the distribution by age groups of victims of work accidents, we note that employees aged between 40-50 years hold the highest share of injured, respectively 107 victims, followed by employees aged between 30-40 years, being 80 victims. The age group between 19 and 30 years old has 66 victims, and in last place are employees aged 50-60 years with 62 victims.

In terms of gender of workers involved in accidents at work, 256 male and 59 female victims were involved (Figure 11).

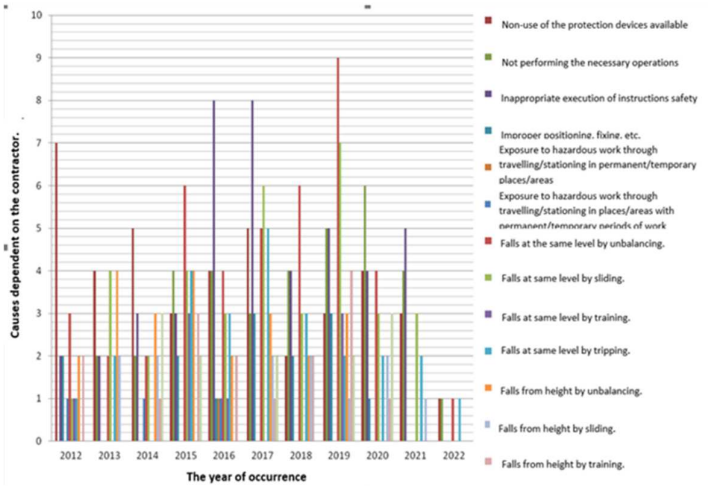


Fig. 12. The year of occurrence of accidents and their distribution by category- – causes dependent on the contractor.

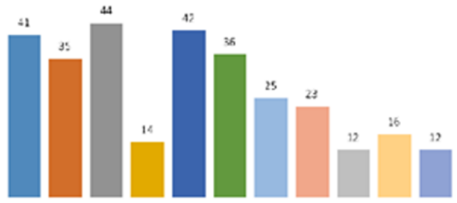


Fig. 13. The year of occurrence of accidents and their distribution by category

As seen in Figure 13, the events produced due to the cause's dependent on the contractor with the highest share are due to improper execution of orders, maneuvers – 44 victims; Another cause with a very high number of victims due to causes dependent on the contractor is falling to the same level by imbalance – with 42 victims, followed by not using the means of protection provided – 41 victims. Other causes dependent on the performer are falls at the same level by slipping – 36 victims; Failure to perform operations indispensable for work safety on time – 35 victims; Falls at the same level by tripping – 25 victims; Falls from height by imbalance – 23 victims. Falls from height by training – 16 victims; Improper positioning, consolidation, fixing, etc. – 14 victims; and falls from height by slipping, Falls from height due to inadequate spontaneous reactions in case of danger – with 12 victims each.

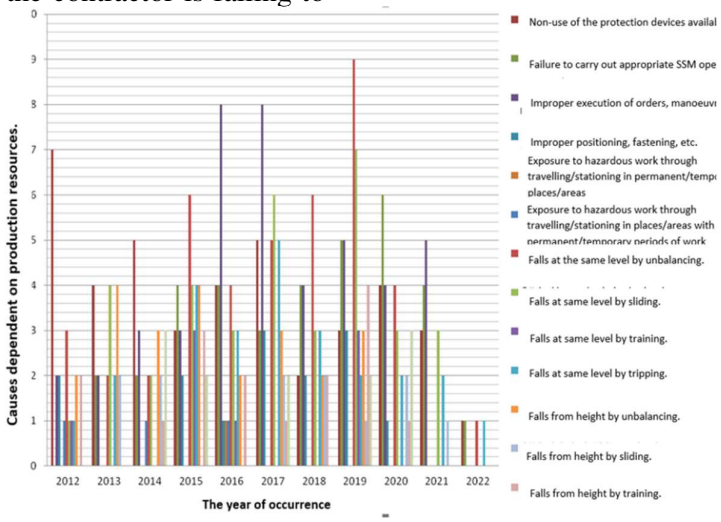


Fig. 14. The year of occurrence of accidents and their distribution by category (dependent on production resource).

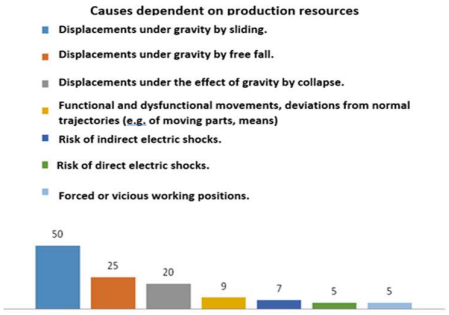


Fig. 15. Distribution by category.

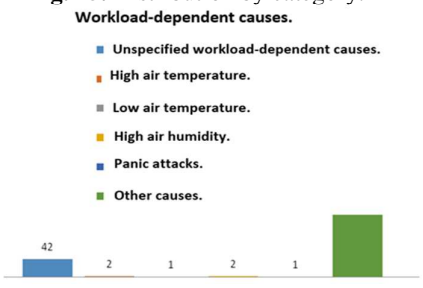


Fig. 16. Workload-dependent causes.

Most of the events had as a cause dependent on means of production – displacements under the effect of gravity by slipping – 50 victims (Figure 15). Due to displacements under the effect of gravity by free fall there were 25 victims. Displacements under the effect of gravity by collapse – 20 victims. Cause dependent on means of production, there was a danger of indirect electric shock there were 7 victims, and for 5 victims there was a danger of direct electrocution [16].

The largest share in terms of causes dependent on the workload is found in omissions in pre-establishing work operations – 47 victims involved in work accidents; Errors in the pre-establishment of labor operations have 28 victims, and 15 victims admitted to carrying out work with improper means of production; For

other work-dependent causes, there were 186 victims (Figure 16).

Due to non-specific environment-dependent causes 42 workers were involved, 2 workers due to high air temperature, and high air humidity. 266 workers were involved in accidents at work and other causes dependent on the work environment had other causes.

4. CONCLUSIONS

The application of risk assessment tools by those involved in the industry could reduce both human and financial losses from workplace hazards. Based on this premise and using a knowledge-based application, this paper presents a risk evaluation tool for occupational accidents that has as its main features the probability and severity of the consequences of the risks that may occur in the telecommunications industry.

Even though OSHA provides guidelines for employers across the nation, there is a sizable difference between the states when it comes to rates of injury and death for workers on the job. Based on the aspects mentioned in the introduction, the following conclusions can be drawn:

- Technical evolution in the field of telecommunications has led to a change both in terms of activities carried out, technical progress and in terms of reorientation of human resources and training required to carry out activities.
- Considering technical developments, the risks of injury and occupational disease have brought up to date new forms of risks and, where appropriate, a few of them have been eliminated.
- The prevention measures correlated with the identified risks have been and are constantly improving.
- Statistical analyses of accidents at work over a period of at least 10 years highlight the fact that no matter how many prevention measures are implemented, they can generate accidents or occupational diseases over time.
- The legislation in the field of occupational safety and health in our country, aligned with European legislation, establishes reference elements as well as measures by fields of activity and equipment, so that it is in a permanent adaptation and change.

The highest proportion of workload-related causes is found in the case of omissions in the pre-establishment of work operations (47 victims involved in accidents at work). Errors in the pre-establishment of work operations accounted for 28 victims, 15 victims admitted working with inappropriate means of production, and 186 victims were involved in other work-related causes.

The article aims to highlight the evolution of accidents over the last 10 years in the telecommunications sector in Romania and in the future, after the accidents in the sector will be statistically highlighted, further studies will probably provide a efficient management system of SSM.

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Evoluția accidentelor de muncă induse de riscuri în telecomunicații

Lucrarea prezintă informații legate de securitatea și sănătatea în muncă ca element esențial în activitatea desfășurată în cadrul oricărei companii, fiind un pilon de bază pentru asigurarea a cel puțin două principii. În primul rând, pentru a permite oricărui angajator să se asigure că întregul sistem de activități pe care le desfășoară se desfășoară, pe de o parte, în conformitate cu legislația obligatorie și necesară, iar, pe de altă parte, profitul, beneficiul asigură rate maxime. - În al doilea rând, pentru a se asigura că fiecare lucrător își desfășoară activitatea în condiții de siguranță, fără a-i afecta integritatea fizică și psihică. Lucrarea va prezenta cele două principii în detaliu, explicate prin câteva studii de caz.

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