

Safe operation of racking equipment based on the Quality Rack Service during the COVID-19 pandemic

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Abstract— The need for storage racking equipment is prompted directly by the search for operational and economic efficiency in companies with a logistics business orientation. The application of racking systems in logistics requires equipment manufacturers and users to meet high standards of quality and safety, which are directly determined by the design, production and assembly processes of the equipment and, above all, by its maintenance during its life span. The proliferation of logistics technologies involving the use of storage equipment, manufactured from perforated thin-walled cold-rolled profiles requires high safety standards to be sustained for the equipment throughout its life cycle. Introduced in 2010, the set of five harmonised standards valid within the EU includes the PN-EN 15635 standard, which, from a systemic perspective, treats all issues related to the issues related to high safety and performance standards for the operating equipment. The above-mentioned standard introduces a person responsible for the safe operation of racking equipment into the existing legal system under the name PRSES and defines this person's obligations. The set of five standards covers all issues related to the engineering design of equipment, methods of strength and deformation analysis, the selection of equipment and its technical characteristics in relation to the parameters of the loading units in the storage system. The standards include annexes that define the responsibilities of the functional persons in the process - PRSES and those involved in the design and use of equipment. This article is an attempt to systematise knowledge on the application of good practice in the management of the safe exploitation of racking equipment, and to answer the question on what duties and responsibilities are associated with the PRSES function to maintain the safe utilisation of racking equipment. This paper presents the results of an author's own research on the assessment of the technical state of racking equipment carried out during the COVID-19 pandemic.

Keywords— EN 15635, PRSES, Racking, Warehousing, Safety, COVID-19

I. INTRODUCTION SAFETY IN THE USE OF RACKING EQUIPMENT

Extensive omni-channel distribution systems, operating within global supply chains, create space for the transfer of risks associated with the use of warehouse racks. Racking equipment, in use since the first half of the 20th century, became widespread with the development of materials handling technologies. Improvements in the design of racking equipment and in the manufacturing technology resulted in the popularisation of these devices manufactured from ultralight, heavy-duty perforated cold-rolled profiles. The connector systems used in these constructions allow companies to adapt to changing standards of packaging and forming of load units in supply chains. Considering the above logistical and business determinants, it can be asked - to what extent racking equipment can be classified as safe and to what extent this equipment can influence the presence of risks in the supply chain.

Warehouse racks are manufactured from perforated cold-rolled profiles. They can handle heavy loads - a rack column profile with a unit weight of 4.5 kg/m can handle vertical loads of 7,000 kg. Thus designed and manufactured, the racking systems can be operated over a long period of time, with changing loads, not to mention the varying skills of the forklift operators.

Thus defined, the operating environment of racking



equipment makes it possible to identify risk factors and characterise them in terms of their impact on the safety of warehouse employees and the goods stored in the racks.

The Central Institute for Occupational Protection (CIOP) [13, 14], which is responsible in the national safety assurance system, carried out a study between 2010 and 2012 on work safety. The survey, published in 2013, presented results covering the total number of reported and registered work accidents, and the number of fatal accidents. It should be noted that the accidents registered and reported in the survey include all accidents that occurred in the economy, and not only those that are subject to notification by law, e.g. inability to work for more than 7 days.

Table 1 shows the accidents published by the Central Statistical Office (GUS) [15,16] covering the years 2019-2022. The study distinguishes a group of "logistics" enterprises for which the main activities include logistical processes related to the processing of material flows, goods and their storage. The following types of enterprises of the economy according to the GDP classification were classified in this group:

- 1) Industrial production
- 2) Wholesale and retail trade
- 3) Construction
- 4) Transport and warehousing

TABLE 1 - STRUCTURE OF ACCIDENTS AT WORK IN THE "LOGISTICS" GROUP OF COMPANIES ACCORDING TO THE GUS IN THE PERIOD 2019-2022

Pos	Division of the economy according to the GUS classification	Accident classification	2019	2020	2021	2022
1	Industrial production	Total	28	21	23	22
2		Lethal	121	624	654	185
3		Heavy	30	35	48	39
4	Wholesale and retail trade	Total	201	178	179	183
5		Lethal	10	8 218	9 085	8 623
6		Heavy	492	11	16	20
7	Construction	Total	37	31	30	25
8		Lethal	4 743	3 872	4 108	3 704
9		Heavy	44	39	53	41
10	Transport and warehousing	Total	41	58	64	49
11		Lethal	7 047	5 146	5 780	5 630
12		Heavy	27	40	37	19
13	TOTAL	Total	27	16	21	29
14		Lethal	83	62	69	66
15		Heavy	205	740	777	606
16	TOTAL	Lethal	184	190	218	180
		Heavy	396	378	374	369
		Total	28	21	23	22
			121	624	654	185

It is worth mentioning that the identified group of companies generates respectively from 54.71% of accidents at work in 2022 to 55.71% of accidents in 2020.

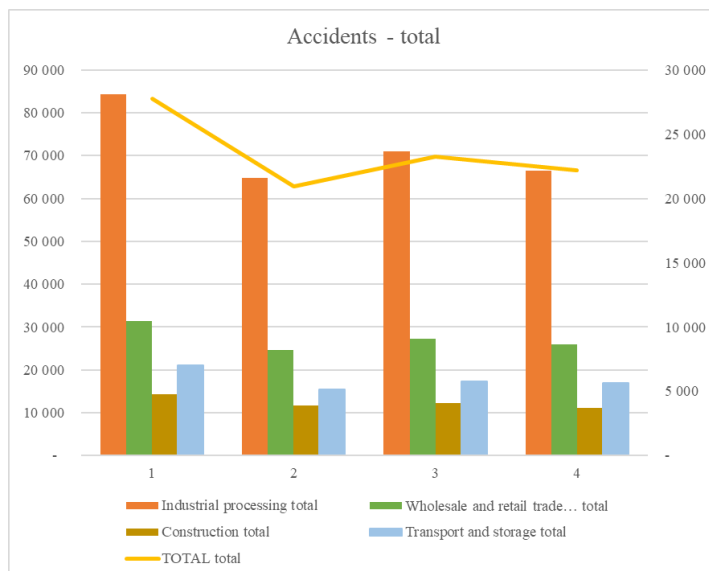
Detailed data on the accidents rate in the group "logistics" are presented in Table 2.

TABLE 2 - ACCIDENTS IN THE "LOGISTICS" GROUP OF COMPANIES ACCORDING TO THE GUS IN THE PERIOD 2019-2022

Pos	Division of the economy according to the GUS classification	2019	2020	2021	2022
1	Overall accidents in "logistics"	45 660	34 988	38 519	36 438
2	Share in total number of accidents	54,88 %	55,77 %	55,20 %	54,71 %
3	Total number of Lethal accidents in "logistics"	68	91	105	71
4	Share in the total number of accidents	36,96 %	47,89 %	48,17 %	39,44 %
5	Total number of severe accidents in "logistics"	265	225	230	237
6	Share in total number of accidents	66,92 %	59,52 %	61,50 %	64,23 %

The results of further studies of the incidents at work including their consequences are presented in the accompanying charts.

FIGURE 1- GRAPH ON THE NUMBER OF ACCIDENTS AT WORK ACCORDING TO THE GUS FOR INDUSTRIAL AND SERVICE COMPANIES FROM 2019 TO 2022



The study indicated that the working environment and working conditions in enterprises, a separate group of sectors of the economy comprising Manufacturing, Transport and Storage and Wholesale and Retail Trade, account for more than 58.95% of accidents at work, 42% of deaths and 54% of serious accidents at work. Taking into account the above-mentioned results of PIP and CIOP studies, it is also worth noting that, in addition to the social and human resources implications, these incidents may have also influenced the occurrence of disruptions in the activities of companies cooperating within supply chains. In a survey covering plastics processing plants conducted in 2021 by the PIP, "irregularities during storage and warehousing were found in more than half of the inspections, and deficiencies in improper transport in 37% of the inspections"(Report on the activities of PIP in 2021, report 2022, page 65). In the same report, the PIP found deficiencies in 54% of the inspected establishments only in the field of storage and warehousing of materials (Report on the activities of the PIP in 2021, report 2022, page 77). It is worth noting that the results of the inspections are limited only to the assessment

of the technical condition and documentation of the operation of forklift trucks, but do not indicate the impact on the safety level of storage equipment other than forklift trucks.

FIGURE 2 - GRAPH ON THE NUMBER OF FATAL ACCIDENTS AT WORK ACCORDING TO GUS FOR INDUSTRIAL AND SERVICE COMPANIES FROM 2019 TO 2022

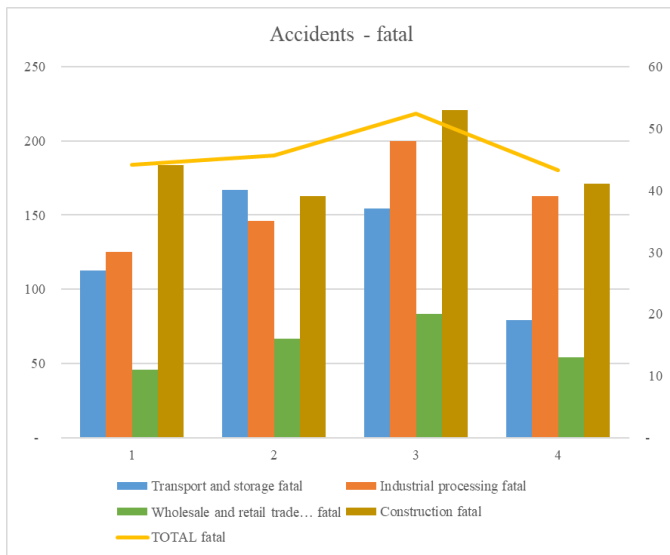
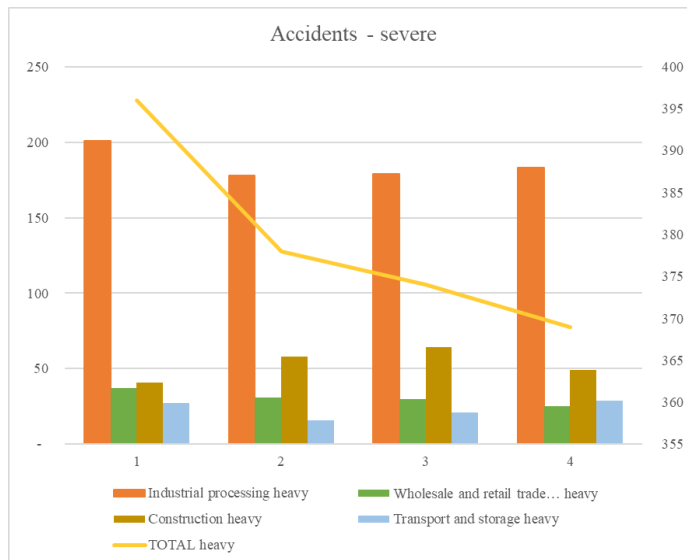


FIGURE 3 - GRAPH ON THE NUMBER OF SERIOUS ACCIDENTS AT WORK ACCORDING TO GUS FOR INDUSTRIAL AND SERVICE COMPANIES FROM 2019 TO 2022



Among the risk factors that PIP and CIOP surveys ignore are the risks arising from the operation of warehouse equipment - storage racks. This area of risk is subject, to a limited extent, to inspection, examination and evaluation by the PIP and CIOP inspectors, who carry out ongoing supervision of compliance with labour law and maintenance of appropriate occupational safety norms and standards in the working environment.

Storage equipment, as technical equipment, is subject to design, production and approval procedures. The process of design, permission to use and operation of racking equipment, since 2010, has been based on the application of harmonised European standards by designers, manufacturers, distributors and users, the aim of which is to create technical and technological standards to improve quality and safety in storage

processes. Although adherence to the above-mentioned standards is declarative, it should be noted that they are now being implemented into the legal market, through the introduction of references to standards in contracts, process sheets and technical and organisational requirements.

The creation of standards in the design of equipment and in the design of storage systems is at the core of the effective management of supply chains and manufacturing companies. Basic normative regulations, the application of which is essential for the efficiency and safety of enterprises cooperating in logistics chains, include:

- 1) EN-15512
- 2) EN-15620
- 3) EN-15629
- 4) EN-15635
- 5) EN-15878
- 6) ISO 28000
- 7) ISO 18001
- 8) ISO 31000

Carrying out a study on the factor's impact on safety required identifying factors and assigning ranks to them.

A summary of the risk determinants and the ranks assigned to them is presented in Table 3.

TABLE 3 - DETERMINANTS OF RISK IN THE USE OF RACKING EQUIPMENT AND THEIR RANKS IN THE ASSESSMENT.

Table 3. Determinants of risk in the use of racking equipment and their ranks in the QRS method for assessing technical state of racking equipment		
Risk factor	Rank in the safety impact assessment	
Poor state of technical equipment	Very high	5
Lack of protective elements	High	4
Routine and inattention of forklift operators	High	4
Technical incompatibility of equipment in terms of physical characteristics of load units	Very high	5
Rack overloading	High	4
Natural forces	Medium	3
Changes in the physical characteristics of the load units in the material flows	High	4

The ranks in the supply chain safety assessment were defined on the basis of the results of the QRS Quality Rack Service method.

The QRS method adopted the following ranks of risk determinants:

- 1) Very high
- 2) High
- 3) Medium
- 4) Locally restricted
- 5) Unspecified

The following factors, among others, were assumed in the safety evaluation:

- 1) Influence of the risk factor on the overall structural strength of racking equipment
- 2) Extent of impact - local impact or systemic impact
- 3) Mode of factor transmission within the supply chain - restricted, actively transferred, passive transfer

4) Influence of the factor on the static strength of racking equipment

The occurrence of risk resulting from the influence of a factor defined as the overall structural strength is a result of the design process of the storage system and, in particular, of the design of the equipment in accordance with the assumptions made in the design, which include the following measurements:

- 1) Physical characteristics of load units
- 2) Selection of load unit base
- 3) Selection of material handling equipment
- 4) Determination of the combinatorics of loads
- 5) Determination of the environmental conditions of the site for the installation and operation of the equipment

A factor defined as the extent of the impact of a risk is considered as an impact on the logistical system considered as a whole or as its impact measured by site-limited effects that do not affect the behaviour of the basic logistical functions related to the handling of streams of goods.

It is worth noting that the materialisation of a risk factor even to a limited extent can result in even a temporary shutdown of a logistics facility, e.g. a fatal event, excessive uncontrolled deformation of equipment and loss of stability. In such cases, even a temporary shutdown of a logistics facility in the supply chain may significantly affect the operational performance of the supply chain considered as a whole and is classified as a systemic impact.

The standard EN-15635 [5] Application and maintenance of storage equipment, presents the requirements for the utilisation of racking equipment, the procedures for detecting damage and the conditions for assessing racking equipment in terms of safety repercussions.

The aforementioned standard also defines in its annexes the minimum requirements for the way the equipment is labelled, but also refers to the PRSES (Person Responsible for Storage Equipment Safety), whose primary duty is to ensure the safety of storage equipment.

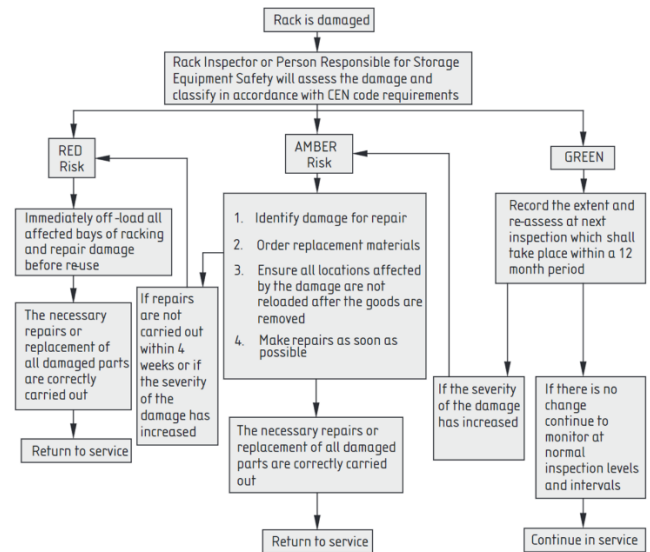
II. PROCEDURES AND PERSONS RESPONSIBLE FOR THE SAFE OPERATION OF STORAGE INSTALLATIONS

At the basis of the legal system of ensuring safety at work lies the Regulation of the Minister of Labour and Social Policy of 29.09.1997, which imposes specific obligations on the employer in the form of ensuring systematic inspections of the state of safety and hygiene at work, including the organisation of work processes and the technical condition of machinery and other equipment. The employer is obliged to establish methods of registration and methods of their removal.

The group of warehouse equipment such as racking is subject to these requirements, as are production machinery, lift trucks and cranes.

As far as the operation of racking equipment is concerned, from the point of view of user safety, the EN-15635 standard is fundamental. It also includes a procedure for assessing the technical condition of racking equipment, and rules for dealing with technically faulty equipment.

FIGURE 4 - DIAGRAM OF THE PROCESS FOR ASSESSING THE TECHNICAL CONDITION OF RACKING EQUIPMENT AND THE PROCEDURE FOR DEALING WITH INOPERATIVE EQUIPMENT ACCORDING TO EN 15635 [5].



In this case, it is worth mentioning that the aforementioned standard also contains annexes which refer to the responsibilities of the participants in the process involving the creation of the technical specifications for the equipment, the designers of the equipment, the manufacturer and the distributor in charge of bringing it into use, as well as the end user himself.

The inclusion in the aforementioned standard the responsibilities of those involved in the design, manufacture and use of the shelving units, ensures that mutual competences in the decision-making chain and responsibilities are established.

According to the requirements of the above standard, the user of the storage equipment represented by the PRSES responsible person is responsible for:

- 1) Safety of persons working in the racking area
- 2) Safe operating conditions for equipment in use

EN-15635, also specifies the requirements and conditions for the safe use of storage facilities, which include such obligations as:

- 1) Compliance with national and local regulations - Health, safety and fire protection
- 2) ensuring trained staff
- 3) Confirming that the working environment complies with the specification
- 4) ensuring that the overall dimensions and weight of the load unit do not exceed the specification limits
- 5) ensuring proper use of handling equipment
- 6) ensuring that load handling aids are in accordance with the design specification and in good condition
- 7) maintaining order in the space of the transport route served by the trolleys
- 8) ensuring that the equipment is used in accordance with the specification provided
- 9) recognising that any changes to the storage system have safety implications

- 10) establishing a management system
- 11) ensuring correct installation of storage equipment
- 12) considering the correct foundation of the racking
- 13) confirming that the location of the facility for wind, snow and seismic load calculations is correct
- 14) ensuring that the storage area is properly heated and lit
- 15) ensuring that bumpers are used wherever necessary
- 16) carrying out regular inspections of the racking equipment during its service life

PRSES's responsibilities also include the implementation of procedures for the safe operation of racking, but also for damage assessment, including:

- 1) development of specifications for storage equipment

- 2) Purchasing, assembling, approving and authorising the storage equipment
- 3) operation of storage equipment
- 4) Designation of PRSES (Person Responsible for Storage Equipment Safety) - the person responsible for the safety of the storage equipment
- 5) Conducting inspections
- 6) Post inspection service
- 7) Reduction of the number of damages.

The standard set out the responsibilities for forklift operators, competent persons for carrying out inspections, the method of recording hazards and damage and the principles for assessing the possible risks.

TABLE 4 - CRITERIA FOR EVALUATING RACKING EQUIPMENT BY STATUS AND THEIR INTERPRETATION

Reference to the norm	Scope of responsibilities of the shelf user according to PN-EN 15635:2010 standards
8.1.1	The user should indicate the person responsible for the security of the storage equipment (...) PRSES should be aware of the nature of activities in the warehouse and the related security (...)
8.1.3	Operators should be adequately trained in the use of storage and handling equipment
9.4.2.3	A technically competent person should carry out inspections at intervals of no more than 12 months. Written reports should be submitted to the person responsible for safe operation, together with observations and suggestions for necessary actions.
9.4.1	Records should be kept of all damage or other safety hazards encountered and assessments conducted as part of the damage reduction procedure
9.7.3	All damage to shelves should be subjected to an objective assessment by PRSES of the risk posed and the possibility of structure collapse as soon as possible after detecting the damage.

The requirements imposed on users of racking equipment to ensure safe working conditions, as well as the duties and responsibilities imposed on the person in the company's PRSES function, leave room for interpretation and the formation of business practices and legal custom.

In business practice, building awareness and good business practice in the field of warehouse rack safety management is the responsibility of the rack manufacturers, distributors, companies specialising in providing rack installation services, but also organisations of manufacturers and distributors such as PSTM - Polish Association of Warehouse Technology [18] and the portal Logistyka NET [17].

On the websites of the aforementioned organisations and companies, we can find information concerning the PRSES obligations weighed against the requirements of the standards and the qualifications of the persons who can perform the aforementioned duties.

According to the PSTM [18], the PRSES responsibilities and duties include:

- The PRSES should have knowledge of the construction of racks and their use, the guidelines of standards and the regulations governing the procedures to be followed in the event of unforeseen events and accidents.
- The PRSES carries out rack inspections using modern tools that guarantee the quality of the measurements and thus the correct assessment of damage, so he/she should have knowledge of how to use these tools.
- The person appointed to this post must therefore have the knowledge to carry out the tasks required by the standard and be able to assess the operational risks of storage and

racking systems.

- They must also be the point of contact for the warehouse staff in the event of a problem or anomaly in the use of the equipment.

Furthermore, according to the information available on sector portals, it can be noted that the PRSES person is also responsible for and executes the:

- PRSES is responsible for receiving information from warehouse employees regarding damage and other safety issues.
- The employee who notices the damage should be obliged to report it immediately to PRSES, which in turn should document the incident and plan appropriate remedial action.
- PRSES should periodically (preferably weekly) carry out its own visual inspections of the entire facility.
- PRSES is also responsible for organising annual expert inspections of the storage racks, carried out by authorised service technicians.
- PRSES documents in the service book of the storage racking the necessary actions to eliminate the risk.
- PRSES is obliged to enforce the planned corrective actions with the warehouse management.
- PRSES should analyse the hazards that have occurred, with a view to preventing their recurrence in the future.

The conclusions of the analyses may not only concern the racking itself, but the wider environment of the whole warehouse. Entities specialised in training and the creation of good business practices, provided basic information on the duties of PRSES functionaries, referring only to the

requirements of the standards in question. No information was found on the websites of the aforementioned organisations about training programmes, test results or methods for testing and assessing racking equipment.

This EN 15635 [5] standard is applicable to the testing and evaluation of a wide range of racking equipment working with forklift trucks, with a wide range of applications in the realisation of magazine processes and their working environment, e.g. a cold store.

The aspect of the size of the racking system deserves attention in the context of the problem of the concentration of risks occurring in large warehousing facilities, in which the basis of the storage system is made up of storage racks with different characteristics, cooperating with internal transport devices, conveyor systems and also with automatic devices - stacker cranes and autonomous devices.

III. RESULTS OF TESTS OF THE TECHNICAL CONDITION OF SHELF DEVICES CONDUCTED WITH THE QRS METHOD

Since 2011, the QRS - QUALITY RACK SERVICE has been used on the European market, covering the assessment and evaluation of racking equipment in terms of the requirements of standard EN 15635. It is based on the use of IT technologies in the assessment of the technical condition of racking equipment, registration of damages and reporting of inspection results.

The scope of the conducted evaluation of racking equipment according to the QRS Quality Rack Service method includes:

- Documentation audit
- Conducting Expert QRS inspections and Periodic Checks
- Preparation of inspection reports
- Preparation of specifications

- Preparation of budget for implementation of recommendations for warehouse rack repairs
- Training "Safe use of the storage racks" and "PRSES".
- Restoration of DTR documentation of the shelving units
- Examination of the equipment including approval for operation

The requirements imposed by standards and legislation on users of racking equipment to ensure safe working conditions, as well as the scopes of duties and responsibilities imposed on the person performing the PRSES function in the company, leave room for interpretation and the formation of new business practices and the formation of legal custom in the adjudication of liability. The results of the research presented in this publication covered the period of the declared COVID 19 pandemic state falling in the four-year period 2019-2022. The presented results of the racking performance and assessment were carried out using the QRS method, with quantitative and qualitative data coming from the RQM application.

The basic elements of racking equipment were analysed and evaluated, among which are:

- 1) the amount of rack block status assigned in the evaluation
- 2) the amount of identified rack damages
- 3) the number of locations and the volume of the racks that are excluded from operation
- 4) number of racks with exceeded deviations and deformations

The results of the evaluation of the racking equipment are presented in relative values relating to the sample size of the racks studied of n=163.

The main objective of the racking equipment assessment process is to assess the fitness for use of the equipment expressed by the status assigned to the risk generation criteria in accordance with EN 15635.

TABLE 5 - CRITERIA FOR EVALUATING RACKING EQUIPMENT BY STATUS AND THEIR INTERPRETATION

No.	Status	Interpretation	Device suitability
	EFFICIENT	No damage was observed during the inspection, and the deviations in the shelf geometry are within the tolerances specified by the standards.	The rack can still be used
	GREEN	The green level of damage applies to deformations for which geometry deviations do not exceed the permissible values specified in the technical documentation of the shelf or the referenced standard.	The rack can still be used
	ORANGE	The orange status indicates a shelf in which deformations after damage do not exceed twice the permissible deviation value specified in the technical documentation of the shelf or the referenced standard.	The rack must be restored to working order within 28 days or removed from use after this period.
	RED	Very serious damage or damage. This status is granted when the deformation values exceed twice the permissible deviations specified in the technical documentation of the rack or the referenced standard.	The shelf must be absolutely removed from use

Figure 5 shows the results of the assessment and the number of statuses assigned in the n=163 rack sample.

In the survey carried out on the status assigned to racking equipment, 7% of the equipment was given red status, including the severity of the equipment being taken out of service.

In the remaining periods of the survey, the red status was not assigned to any equipment.

Another criterion for assessing the technical condition of the racking is the study of the amount of damaged structural

elements in the storage racks, which also examines the relationship between the total number of damaged elements and the number of elements classified as:

- 1) missing elements
- 2) damaged element to be monitored
- 3) damaged component to be repaired
- 4) damaged component qualified for replacement

FIGURE 6 - STATUS CHART FOR THE 2019-2022 RACKING EQUIPMENT SURVEY (SAMPLE N=163)

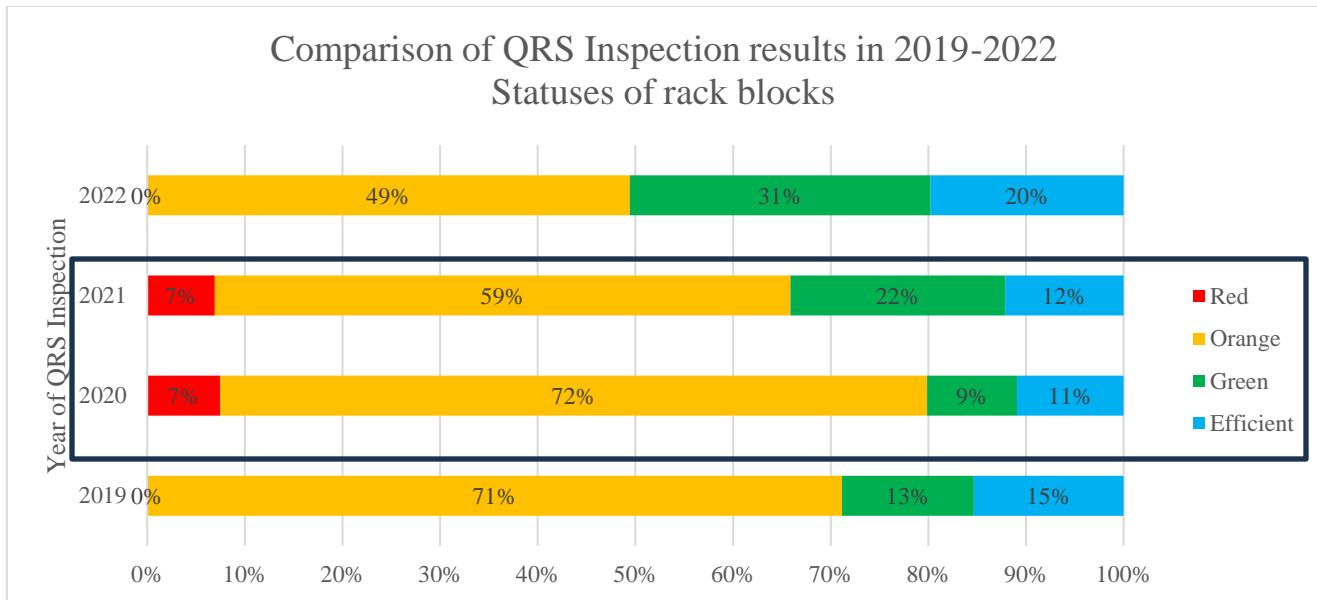


Table 6 shows the damage classification and interpretation.

TABLE 6 - CRITERIA FOR THE CLASSIFICATION OF DAMAGED ELEMENTS OF RACKING EQUIPMENT AND THEIR INTERPRETATION IN THE QRS METHOD

No.	Status	Interpretation
1	REPLACEMENT	Destruction or damage that requires replacement of the item with a new one.
2	REPAIR	Damage that does not require replacement of the element with a new one, only adjustment.
3	ELEMENT MISSING	An element has been found and needs to be completed.
4	MONITORING	The status applies to strains and deformations for which the deformation deviations do not exceed the values specified in the technical documentation of the shelf or the referenced standard.

Table 6 shows the damage classification and interpretation.

FIGURE 6 - STRUCTURAL ELEMENT DAMAGE GRAPH FOR 2019-2022 RACKING SURVEY (SAMPLE N=163)

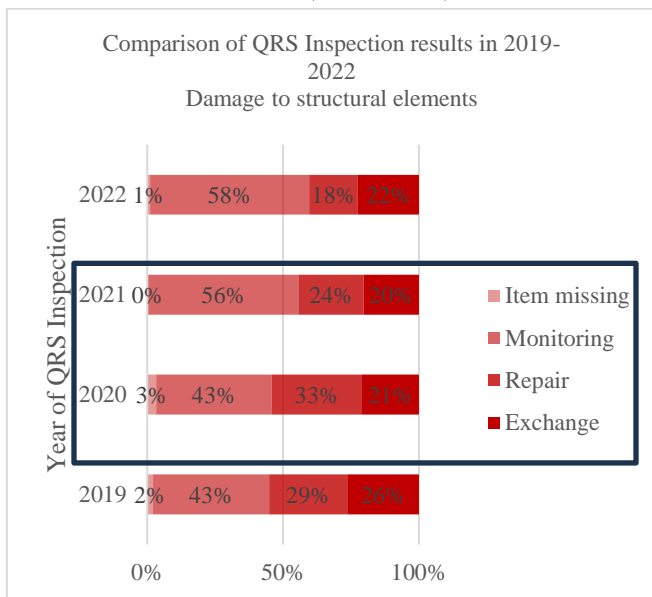


Figure 6 shows the results of the QRS component damage analysis.

During the COVID-19 pandemic, the proportion of damaged elements qualifying for monitoring increased, while the number of elements qualifying for repair decreased, with the proportion

of damaged elements qualifying for replacement unchanged.

Damages in the racking elements require an operation to take the faulty equipment out of service. The QRS method generates the damage report and list of locations to be shut down in the RQM application.

FIGURE 7 SHOWS THE DIAGRAM OF BLOCKED LOCATIONS DURING 2019-2022 SURVEY (SAMPLE N=163).

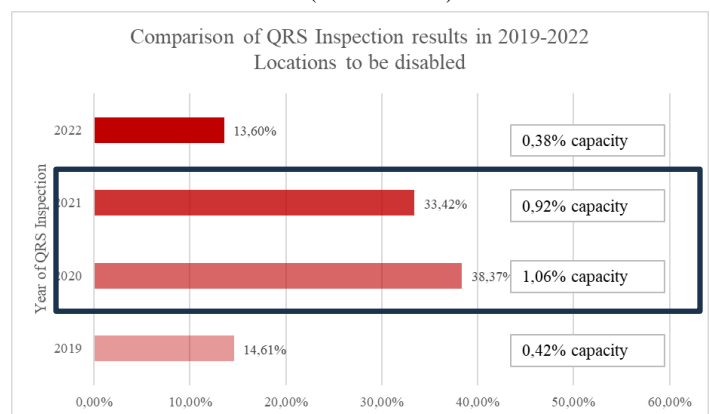


Figure 7 shows the results of the study on the number of locations to be blocked.

During the COVID-19 pandemic, the number of blocked locations increased, reaching 1.06% of the total capacity of the inspected equipment. When examining and assessing the

technical condition of storage racks using the QRS method, deviations from the tolerances specified in EN 15635 are also considered. The QRS assessment process involves taking measurements, recording them in the RQM application, and evaluating them according to the requirements of PN-EN 15635. The results of the rack vertical deviation examination and assessment are presented in Figure 8.

FIGURE 8 COMPARISON OF QRS INSPECTION RESULTS IN 2019-2022. DEVIATIONS IN THE SHELF GEOMETRY

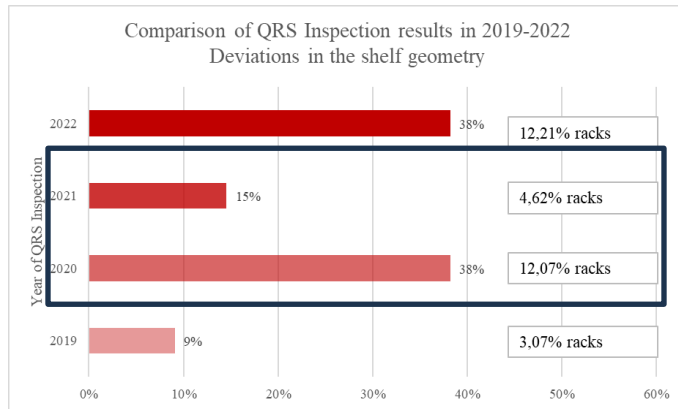


Figure 8 shows the graph of geometry deviations in the 2019-2022 racking equipment survey, based on a sample size of 163.

The COVID-19 pandemic led to a rise in the number of rack blocks that exceeded the allowable tolerances for rack geometry.

IV. CONCLUSIONS

The study of work accidents in the 'logistics' sector shows a high proportion of accidents in the overall economy.

The QRS study of the technical condition of storage racks used in the logistics group is characterised by a high susceptibility to damage and deformation of their geometry, with a consequent reduction in safety.

The two areas of research presented in this publication, which are focused on logistics enterprises, complement each other. However, due to limited access to GUS data, they cannot be correlated.

It is worth noting that the COVID-19 pandemic has led to a significant increase in fatal work accidents, while the level of serious injury accidents has remained unchanged.

During the COVID-19 pandemic, there was a significant decrease in the number of accidents at work with minor injuries.

Research conducted during this period indicates that the technical condition of racking equipment has deteriorated significantly according to the QRS method and the EN 15635 standard.

Based on the research conducted, it can be concluded that PRSES function holders bear significant responsibility for the safety and condition of technical equipment in the working environment of logistics enterprises. However, the scope of their responsibility and competence is undefined, and there is no established legal custom. The PRSES function is within the scope of regulation of the Labour Law, Civil and Criminal Codes.

The QRS method of racking technical condition assessment relies on IT solutions and a process approach to management, indicating that it falls under the category of research methods involving Risk Management.

The research and analysis of the duties and responsibilities of personnel involved in the process of using racking equipment leads to the conclusion that PRSES dutyholders should have the following competencies:

- - Knowledge and experience of business management including health and safety
- - Knowledge and experience of steel construction
- - Knowledge and experience of storage system design
- Knowledge and experience of risk management, including decision making in risk identification and impact assessment.

The employer should transfer responsibility for safety in the workplace to the PRSES. This transfer should include defining the PRSES's function within the organization, establishing responsibilities, and defining the scope of responsibility in accordance with relevant legal regulations.

V. REFERENCES

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- EN-15629 Steel static storage systems - Specification of storage equipment
- EN-15635 Steel static storage systems. Application and maintenance of storage facilities
- ISO 28000:2022, Security and resilience – Security management systems – Requirements
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- PN-N-18002 Systemy zarządzania bezpieczeństwem i higieną pracy. Ogólne wytyczne do oceny ryzyka zawodowego
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