



# Comparative Analysis of Regulatory Requirements for Cargo Securing: Ukrainian and International Experience Based on the Practices of the United States and the European Union

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## ABSTRACT

The article presents a comparative analysis of regulatory approaches to cargo securing through the study of Ukraine and foreign experience. The scientific novelty of the research is due to the actuality of the topic set by the modern trends in the development of road freight transport, specifically, the permanent growth of the freight flows and escalation of requirements for road safety. Currently, cargo securing is considered as an essential contributor to emergency prevention, material losses reduction and risk minimization of any road transportation participants. The problem is also important for the reason of its harmonization with the European standards and requirements for foreign regulatory approaches to cargo safety, which is caused by the European integration. The article aims to make a comparative analysis of a regulatory approach to cargo securing in the three regulatory models: Ukraine, the United States and the European Union from the viewpoint of the regulation level, the techniques of technical rules and the control procedures. The materials of the research were the normative legal acts, technical standards and official methodological guides containing the rules for cargo securing requirements in the given jurisdictions. The methodological basis of the research rested on the comparative, legal, regulatory and documentary, systemic approaches that gave the possibility to compare the legal provisions according to the common criteria of analysis. The comparative analysis of Ukrainian and foreign standards of cargo securing reveals the existence of a common regulatory logic according to which the correct cargo securing is regarded as a prerequisite for road safety and the safety of cargo being carried by road. Nevertheless, considerable differences in methods of realization of this logic have also been identified, especially in terms of the level of regulatory elaboration, position of technical standards in the system of regulation and the structure of regulatory mechanisms, that manifests itself in the formalized federal US model, the standard-oriented EU one and the steady approximation of the Ukrainian system to European standards within the framework of European integration process.

## KEYWORDS

*cargo securing; road transport; road traffic safety; technical standards; EN 12195; FMCSA; European Union; United States; transport safety.*

## Introduction

The road transport freight occupies a key position in the activities of modern transport and logistics systems, as the state of preservation of material resources depends on its level, as well as the state of road safety and the stability of logistics processes in domestic and international aspects. Within this system, the condition of the load when the vehicle is moving and the prevention of its sliding or loss, are directly related to the method of securing cargo. Practice shows that deviation from the rules for fastening cargo leads to systemic consequences, thereby resulting in a rise in the number of road accidents, damage to cargo, and risks to the life and health of road users. Since the frequency of cargo flows and the complexity of logistic networks and international integration of the transport system are growing, the need for their regulatory administration is paramount.

An illustration can be taken from international practice, where the requirements for cargo securing in road transport are developed based on the implementation of directives and the combination of technical regulations and control procedures, thus enabling the development of appropriate road transport safety models. The Ukrainian model is itself adapting to and aligning with European practices. Thus, the requirement for analysis of currently taken regulatory decisions and their relationships with international standards becomes topical.

Also important is the relevance of the study with regard to the current state of the legal regulation of cargo transportation safety in accordance with modern requirements of road transport and cargo fixing. By comparison, we reveal several differences between Ukrainian and foreign models, level of their technical detail, the way of introduction of international norms into the system of state control. The results are sufficient for the correction of domestic practice and the establishment of unified positions to road transportation safety.

## Literature Review

From the analysis of regulatory sources and standards we can make the following conclusion that the issue of securing loads in the area of road transport is considered through various approaches: regulatory, technical, safety-related. In Ukrainian practice the relevant provisions are developed based on laws that determine the overall principles of operation of road transport and road safety, as well as subordinate acts, department and industry regulations designed to specify the rules of transportation of goods, set forth the rights and obligations of carriers and govern state control procedures. International experience represented by regulatory approaches of USA and EU is characterized by increased technicalization of requirements and integrated inclusion of standards into law enforcement processes. From the given above regulatory acts it can be stated that in the USA the law system establishes a comprehensive set of requirements that forms the universal method of their application. EU model includes directives of European Union as well as acts of the national level of member countries.

## Problem Statement

The purpose of the study is to compare the regulatory mechanisms of ensuring cargo securing in Ukraine, the USA and the EU on the basis of the depth of the law, the place of technical norms and the organization of the implementation of road transport safety standards. In accordance with this goal the following tasks were formulated:

1. Carry out a comparative analysis of methodological recommendations in relation to current Ukrainian normative and legal acts and the experience of US and EU;
2. Identify US federal regulatory and FMCSA cargo securing requirements
3. To investigate the European manner of cargo securing regulation, considering EU-directives, EN-standards, and engineering practice recommendations.
4. To carry out a comparative analysis of the above methods based on indicators of regulatory specificity and enforcement;

5. Summarize the outcomes that have been achieved to identify routes for continued national improvement in cargo securing.

## Methods and Materials

**M**aterials were regulatory legal acts, technical specifications and official methodical documents that established the requirements for the fastening of loads on road vehicles in Ukraine, USA and EU countries. The corpus of the sources were laws and subsidiary legislation of Ukraine in the sphere of road transport and traffic safety, federal rules of USA, directives and rules of the European Union and harmonized European norms EN 12195 series and engineering and applied recommendations VDI 2700, official analytical and methodological materials of responsible bodies and international organizations, which realize law enforcement and control in the area of safe load transport.

Methodological basis of the research is the comparative-legal method that provides a comparison the requirements in regulations to cargo securing, applied by the various bodies of regulation, according to single analytical standard. Methods of analysis and synthesis were applied to systemize norms and requirements, standard and structural-functional method (for determining the linkage of legal norms, technical regulations and procedures of monitoring), method of generalization (for defining the conclusions and recommendations). Regulatory analysis was used for the evaluation the details of the regulations and the implementation nature in transport practice, features of the system analysis allowed the consideration of cargo securing as part of the system of road transport safety.

The employment of such sources and methods enabled the research to gain a comprehensive nature, in the course of which a well-grounded comparison of regulatory approaches to cargo securing as followed in Ukraine, USA and EU can be performed and generalized conclusions on specific features and tendencies of development of regulatory regulation of cargo securing in a given field are formed.

## Results and Discussion

**U**krainian practice of securing cargo in road transport is formed at the intersection of general road safety requirements, industry regulation of the activities of road carriers and technical standardization, which establishes common approaches to the calculation and use of fixing means. A regulatory “framework” starts from the Rules of road traffic, according to which safe arrangement and reliable fixing of cargo are the direct responsibility of the driver both during preparation for travel and during movement (Cabinet of Ministers of Ukraine, 2001). Rules of road traffic defines a universal safety standard and draws attention to the possible danger to other road users, and the ways to prevent dropping or displacement of cargo when maneuvering or braking (Cabinet of Ministers of Ukraine, 2001). At the legislative level of road traffic regulation there are institutional and organizational principles for ensuring road safety, distribution of the competence of state bodies, general requirements for road users and vehicles, whereas ensuring the reliability of the securing of cargo may be considered one of the elements of the system for the prevention of road traffic accidents and minimizing the threat to life, health and property (Verkhovna Rada of Ukraine, 1993).

The fundamental normative-legal act that defines the order of application of specific provisions of special legislation on transport is the Law of Ukraine “On Road Transport” (regulating the legal grounds for the activities of road carriers, establishing general standards for the organization of transportation, traffic safety and regulatory requirements in road transport). As far as the topic of our research is concerned, it should be highlighted that, as per the Law, the responsibility of the actors of the transportation process (carrier/driver/other subjects) is established within the scope of the mandatory requirement to secure cargo appropriately as a part of correct transportation and traffic safety rules application (Verkhovna Rada of Ukraine, 2001).

The most “serious” regulation of the practice of cargo securing by Ukrainian authorities is embodied in the Rules of transportation of goods by road in Ukraine, adopted by the Order of the Ministry of

Transport No. 363, which determine the rights, obligations and responsibility of the subjects of carriage and lay down the requirements for the operations of preparing goods, placing, securing, providing the necessary documentation, as well as for the process of organizing the carriage. (Ministry of Transport of Ukraine, 1997). In order to familiarize oneself with the Ukrainian practice of using methods of cargo securing, one should highlight the fact that the Ukrainian system of regulation in this field is “hybrid”. This is to say that while it draws on imperative regulation, it also makes “correct fastening” concrete by making reference to technical regulations that contain models for calculation, parameters for fasteners, admissible forces, and criteria for security. This form of interaction is also clearly reflected in state control: in the lists of questions and documents applied in inspections on the road. This suggests that proper securing of cargo must be implemented using ropes, chains, stretchers, cables, shims, anchor rails/beams, nets, etc. According to national standards harmonized with European ones (DSTU EN 12195-1:2018 for calculation of fastening forces, etc.) (State Service of Ukraine for Transport Safety, 2025). Through this, the technical standard becomes part of the legal enforcement tool and is effectively employed to prove the appropriateness/inappropriateness of the fastening under real road conditions and inspection procedures.

On the basis of an analysis of standardization conditions, for Ukrainian practice, the central role is occupied by the DSTU EN 12195 complex. It contains the only methodological approach for calculating forces and selecting means of fastening; requirements for fastening means; and requirements for safe use of the equipment. In this regard, it is necessary to point out that application of harmonized standards represents movement from prescriptive regulations that prescribe what should be done “the cargo must be fastened” to those that describe what is repeatable and verifiable “the cargo must be fastened considering calculated forces, coefficients of friction, fastening scheme configuration and means of fastening” (State Service of Ukraine for Transport Safety, 2025). Moreover, it can be argued that Ukrainian control of cargo fastening suggests the existence of interrelated standards that indirectly influence how the cargo can be restrained by structural components of the vehicle body/superstructure, as in reality cargo restraint relies not only on belts/chains, but also on the state of fastening points, sides, partitions, floor, and the vehicle’s capability to carry the cargo according to its engineering parameters.

On the other hand, it should be noted that any requirement to secure cargo is also a function of other methodological recommendations, namely, the carrier policy, internal control, training of personnel, risk management, etc. For example, they might be directed at an organized arrangement of passengers and cargo road transportation, which should correspond to the existing legislation requirements and road safety, primarily through working out and implementation of such procedures that provide traffic safety and prevent accident rate and the workers of carriers and drivers, to ensure the disciplinary nature of work (Ministry of Transport of Ukraine, 2003). In this way, apart from fulfilling technical conditions for the securing of cargo, great attention is attached to the organization of the route, health control of the driver, briefing and special procedures related to the transport of overweight and oversize cargo, which necessitate some coordination and safe movement arrangements.

These materials are not a substitute for the technical rules in terms of securing, they are used to identify Ukrainian practices as “securing techniques” as a subsystem of management of road transport safety. The briefing, trip inspection and documenting checks for serviceability of securing devices and periodically risk assessments associated with the range of goods transported and road routes are referred to this subsystem. An additional means of regulation of cargo transport is incorporated in the practice of the State Service of Ukraine for Transport Safety as a state control body. From the publicly available material analysis (set of questions) used during the inspections on the road it can be established that demands to a correct cargo securing are part of an individual block of state control and do not relate to other subjects of state control and surveillance over the road transport. It can be assumed that inclusion of these demands into typical items of inspection proves that violations of road transport security legislation regulating correct cargo securing are regarded as of high importance with the purposes of control on the part of competent bodies (State Service of Ukraine for Transport Safety, 2025).

Therefore, it can be argued that the Ukrainian cargo securing regulation model has features of multi-levelness. General safety and prudence requirements in traffic movement is provided by the Traffic

Rules, institutional principles of safety in the profile law, in the field of road traffic, subject-organizational aspects of the activity of the carrier, as specified in the Law on Road Traffic, and applied requirements on the process of freight, by the Rules of Cargo Carriage. The system for realizing these requirements from a technical point of view in the form of cargo securing is embodied by means of standards, which are directly integrated into checklists for the purpose of control, and practical use of examination processes (State Service of Ukraine for Transport Safety, 2025).

Being on equal terms with international experience of the transport of the European Union and the USA, at the legislative and juridical level of Ukraine, the stability of focus on standardized implementation, where legal norms work closely with methodological recommendations and regulations of their practical application. Thus, evaluating the national practice of the fixing of goods will be incomplete without analyzing only those juridically formalized responsibilities of transport operators; it would be fair if it considers the depth of the systematic working of technical standards in the inner practice of transport operators, a procedure for preparing a person, and a legal base for the practical use of standards when conducting roadside control.

The procedure of cargo securing in the USA is also quite detail-oriented and has a fairly rigid integration of technical standards within a system of legal regulation of road transport safety. The main regulatory framework here is federal rules adopted by the USA Ministry of Transport and approved by the Federal Highway Safety Administration. A notable legal document here is Volume 49 of the USA Code of Federal Regulations (specifically, the Part 393), which states mandatory requirements for preventing cargo shift and fall during commercial road carriage (Code of Federal Regulations, 2026). According to Section 393.100, the cargo must be fixed in such a way that during normal vehicle operation, it will neither shift, separate from the vehicle, nor become a danger to road safety; it reflects the fundamental concept of the American way of handling cargo securing - priority of operational safety over procedural formalization.

A remarkable fact that characterizes the regulations of cargo securing on the territory of the US is the inclusion of general universal conditions of cargo securing and at the same time, concrete recommendations for allowed methods and systems of cargo securing. Therefore, paragraph 393.104 claims that all devices and systems of cargo securing (belts, chains, cables, wires, anchor systems, etc.) must comply with standards on strength, usability and admitted working load, and prohibit the use of broken or worn components (Code of Federal Regulations, 2025). In that way, we can conclude that the American regulation is limited to just stating the need for "appropriate fastening" and specifies the duty of using specified technical and tested fixing elements that are provided with clear marks of exploitation characteristics.

It should be noted that a significant document analyzing the basic principles of cargo fastening in USA is The North American Cargo Securing Standard, which should be viewed as a prototype for further creation and systematization of current FMCSA requirements. This document provides uniform criteria for analyzing the danger of cargo shifting and for the selection of securing systems and devices and their usage based on the cargo specifics. From this viewpoint, it can be said that the American standard is not a national but rather a regional system that is created based on interstate consolidation of technical and safety parameters.

Equally significant in the scope of the regulation is the FMCSA's system of official interpretations of the FMCSA, which is designed to provide for the consistent interpretation and application of the implemented standards during the implementation of their requirements. Specifically, it states that the rules within 393.100 are not intended to be the exclusive rules but instead that "These rules should be read and used in conjunction with other rules in this subpart and with 392.9, which obligates the driver to verify the secureness of a load before beginning a trip and during the course of operation of the vehicle." (Code of Federal Regulations, 2025) It highlights that both the driver and carrier are responsible for the load's securement throughout the trip and not solely during the initial loading.

American interpretation of cargo securing requirements is characterized by a clear division between individual cargo categories, which are governed by special rules, thereby achieving a generalized linkage between cargo securing requirements and the geometrical, physical and operational properties of the cargo. In addition to general safety regulations, special requirements are imposed that focus on regulating individual categories of cargo, the securing of which by conventional

methods is insufficient and potentially hazardous. This includes transportation of rolled steel, lumber, pipes, containers, automobiles, etc., with variable dimensions, center of gravity, or mass. It demonstrates a bias of the American standard towards cargo securing safety with due consideration of specific properties of the transportation subject.

The results of extensive studies of causes for accidents involving heavy-duty vehicles provide evidence that occurrences of load shift or inadequate tie-down correlate with increased accident rates. This type of study offers support for stricter regulations and confirms that the cargo tie-down practices of the United States are rooted not only in regulations but in the systematic application of empirical data. (Federal Motor Carrier Safety Administration, n.d.).

Overall, the American system can be described as a layered complex of universal security requirements, technically rigorous standards, the specific obligations of the carrier, and particular rules for specific cargo types. It guarantees the high certainty of legality and repeatability of fastening conditions under real transportation. It is efficient within the control framework.

Unlike in America, in the EU Member States, the rules of securing the load, are decided based on a combination of supranational legal regulations, directives, signed up to European norms and legal provisions at the national level (a multi-layered road transport safety system).

High degree of standardization, which directly corresponds to high efforts towards risk elimination due to displacement or loss of cargo while moving a vehicle, is a property of the European regulation system. Legal basis of this system is established by EU directives and regulations that give the mandatory scope on the technical state of the vehicle, roadside checks and carrier liability, while technical basis on cargo securing requirements is prescribed in harmonized CEN (European Committee for Standardization) standards and established technical recommendations, primarily in German VDI norms.

The fundamental technical document concerning cargo securing in Europe is standard EN 12195-1:2010+A1:2021 "Load securing systems on road vehicles - Safety - Part 1: Calculation of lashing forces", defining a standard method for the calculation of lashing forces based on load mass, friction coefficients, the geometry of the lashing arrangement and the dynamics imposed by the movement, braking and maneuvering of the vehicle (European Committee for Standardization, 2000). It is essential in European practices as it converts the term of "correct lashing" from qualitative to quantitative level, allowing the possibility of reproduction and verification of a load securing concept. Other parts of the EN 12195 family define the required technical parameters for individual fastening means, namely straps (EN 12195-2), chains (EN 12195-3) and wire ropes (EN 12195-4), which allows to link the forces calculated by means of the above standard with the specific technical properties of the equipment.

Concurrently, the engineering and practical recommendations for ensuring safety, where the VDI 2700 standard "Load securing on road vehicles", developed by the Association of German Engineers, holds a significant position. Although VDI 2700 is not legally binding within the EU, it is acknowledged in the member states as an accepted norm (a de facto standard of good practice), which is frequently referenced by control agencies, courts of law and experts when evaluating conformity of the securing with safety requirements (Verein Deutscher Ingenieure, n.d.). An important contribution of VDI 2700 is the detail with which it specifies the provisions of EN 12195, providing specific technical solutions, examples of securing methods, recommendations concerning account of friction, and personnel qualifications and test procedures for means of securing.

To regulate the legislation in the area of cargo securing within the EU a system of directives is used with the intention of standardization of control and responsibility procedures. Especially it is worth highlighting Directive 2014/47/EU which specifies a procedure of inspection of the vehicle's technical state with regard to its operational fitness; on cargo securing and its condition it states that these two factors have to be evaluated during a roadworthiness test (European Parliament and Council of the European Union, 2014). Within the meaning of this directive faulty cargo securing is defined as a dangerous (serious) defect of the vehicle and it is a subject to prohibit vehicle use. Apart from this regulation, a system of regulations relating to the overall weight parameters of the vehicle (Directive 96/53/EU) is of importance, as they indirectly influence the practice of securing of the cargo since

their exceedance or improper distribution may contribute to loss of stability of the vehicle and to movement of cargo.

For the European practices, the most significant from methodological point of view are the recommendatory documents of European Commission, especially 'Recommendations on the Securing of Cargoes in Road Transport', which collate all applicable provisions of engineering rules and EN-norms in readily usable manner for practical work (Council of the European Union, 1996). They are generally applied as methodological and educational tool, and as a basis for co-ordination of national practices of control, which supports the integrity of the European law enforcement practices. It may be argued that in the EU-wide level, the European model of cargo securing legislation not only operates through imperative legal norms, but also through the use of "soft law" principles.

Therefore, the conditions of cargo fastening in the practice of the European Union are structured on a multi-layered level, on which binding control and responsibility are carried by the supra-national regulations, a standard technical method of calculation and selection of fastening means is given by harmonized EN standards, and specific details of applied practice are given by engineering standards such as VDI 2700 and recommendations of the EC. This integrated model enables us to look at the European practice as structured and justified, on which reliable grounds can be developed comparative study with the related practices of USA and Ukraine (Table 1.).

**Table 1. Comparative analysis of regulatory legal acts and methodological recommendations on cargo securing.**

Comparison criterion	Ukraine	USA	European Union
<b>Level of legal regulation</b>	National	Federal	EU + national
<b>Basic regulatory legal acts</b>	Law of Ukraine "On Road Traffic"; Law of Ukraine "On Motor Transport"; Road Traffic Rules; Rules for the Transportation of Goods by Motor Transport (Order No. 363)	49 CFR Part 393, Subpart I (DOT/FMCSA); §392.9 (Driver Responsibilities)	Directive 2014/47/EU; Directive 96/53/EC; regulations and national acts of the Member States
<b>Nature of cargo securing requirements</b>	General mandatory requirements with reference to standards	Detailed mandatory requirements with clear technical criteria	Mandatory legal requirements + technical detailing through standards
<b>Key fastening standards</b>	DSTU EN 12195-1, -2, -3; DSTU EN 12642	North American Cargo Securement Standard (as a methodological basis for FMCSA regulations)	EN 12195 (series); VDI 2700
<b>Requirements for fastening means (straps, chains, etc.)</b>	Determined through harmonized DSTU	Clearly regulated (WLL, condition, marking)	Defined by EN 12195-2, -3, -4
<b>The driver's role in securing the vehicle</b>	Obligation to check before starting and during movement	Directly Enforced Personal Liability (Paragraph 392.9)	Determined by national legislation within the framework of EU directives
<b>Control system</b>	Raid inspections of Ukrtransbezpeka	FMCSA Roadside and Stationary Inspections	Roadside checks in accordance with Directive 2014/47/EU
<b>Consequences of violating requirements</b>	Administrative liability; prohibition of movement until the violations are eliminated	Fines, regulations, prohibition of further movement	Classification of violations as serious or dangerous; prohibition of movement

Source: Compiled by the author based on the reviewed literature

A comparative review of cargo securing practices in Ukraine, the United States of America and countries of the European Union, revealed the existence of the underlying common concept: the integrity of cargo securing is perceived as a pre-condition to road safety and road transport safety. However, application of this concept in various models can vary considerably in terms of the scope of regulation, involvement of technical regulations and structure of regulatory mechanisms. Thus, the American model demonstrates an integrated and rigidly defined structure of regulatory requirements, in which technical regulations directly form part of the federal law regulations, which leads to the unambiguous interpretation of requirements and clear distinction between participants in the transport process. The European approach is characterized by the integration of the transnational

law-making acts of the EU and European standards, combined with engineering and applied guidance, which creates an adequate system of regulations adaptable to diverse types of cargo and respective practices in particular states. The Ukrainian model shows an evolutionary approach to approximation with European standards by the integration of a series of DSTU EN 12195 standards into the legal framework, applied in practice by state supervisory agencies and correlating with the national European integration policy, although it's not so detailed and differentiated as in the EU practices.

## Conclusion

From the generalization of the research findings we can conclude that the effectiveness of the legislation regulating cargo securing is determined not by their existence, but also the level of technical detailing, conformity of standards to the requirements of EU Directives, the certainty of regulation role of all participants of traffic. It is in the area that further improvement of national regulation must be considered in conjunction with an increased level of implementation of the European standards, the improvement of the tools of regulation control and assurance the conformity to the European regulation model of national standards within the European integration processes of Ukraine.

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