

ENSURING TRAFFIC SAFETY THROUGH COMPLIANCE WITH TECHNICAL REGULATIONS IN RAILWAY TRANSPORT

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Abstract: This article discusses the role of technical regulations in the railway transport system and how compliance with these regulations ensures traffic safety. The analysis is based on international practices, normative documents, and existing technical standards. It also examines the consequences of non-compliance with regulations and explores effective implementation strategies.

Keywords: Railway, technical regulation, traffic safety, certification, international standards, monitoring.

Introduction

Railway transport is one of the sectors directly linked to traffic safety. Every technical, technological, and organizational decision in this field affects human lives and economic interests. Therefore, strict adherence to technical regulations and their requirements ensures not only the reliability of transport vehicles but also the safe operation of the entire transport system.

1. Concept of Technical Regulation and Its Legal Basis

A technical regulation is a legal document that establishes mandatory technical requirements for a product, process, or service. In the railway sector, these regulations cover the technical condition of rolling stock (locomotives, wagons, platforms), infrastructure elements (rails, bridges, stations), and operational rules.

In many countries, technical regulations are based on international standards such as ISO, IEC, and UIC. In CIS countries, the technical regulations of the Eurasian Economic Union apply (e.g., TR TS 001/2011 "On the Safety of Railway Rolling Stock").

2. Relationship Between Technical Regulations and Traffic Safety

Technical regulations are the main criteria for ensuring the safe operation of railway infrastructure and rolling stock. Through them:

The operability of rolling stock is determined;

Malfunctions are prevented;

Safety requirements are set for the introduction of new technologies;

Emergency and malfunction analyses are conducted.

For example, a minor fault in a train's braking system, if it contradicts the technical regulations, can lead to a major accident.

3. International Practice and Modern Approaches

In EU countries, railway safety is regulated based on Technical Specifications for Interoperability (TSI), developed by the European Union Agency for Railways (ERA). Each technical unit must be certified and permitted to operate only if it meets the regulatory requirements.

In Japan, technical regulations are continuously updated through the Total Quality Management (TQM) system and monitored with modern technologies.

4. Consequences of Non-Compliance with Technical Regulations

Failure to comply with technical regulations can result in:

Technical malfunctions of transport vehicles;

Infrastructure damage;

Threats to the life and safety of people and goods;

Significant financial losses for enterprises;

Damage to the reputation of the carrier.

According to statistics, over 60% of major railway incidents are related to violations of technical regulations.

5. Mechanisms for Ensuring Implementation of Technical Regulations

Compliance with technical regulations can be ensured through the following methods:

Regular technical inspections of rolling stock;

Automation of technological processes;

Introduction of independent inspection bodies;

Updating regulatory versions;

Improving the qualifications of specialists.

Additionally, the use of digital twin technology enables the identification and prevention of malfunctions in real time.

6. Content and Importance of Technical Regulations

Technical regulations govern the following aspects:

Construction and repair standards (rail tracks, bridges, signaling systems);

Technical specifications and service life of rolling stock;

Methods for detecting and preventing malfunctions;

Responsibilities of manufacturers and operators.

These serve as legal tools for ensuring safety.

7. Practical Case: Compliance in Uzbekistan

In Uzbekistan, the railway transport system operates under the Law "On Railway Transport", related government decrees, state standards, and internal regulations of major operators like "O'ztemiryo'lkonteyner".

In recent years, due to modernization efforts and the introduction of technologies from Siemens and Alstom:

Technical regulations are being updated;

Diagnostic trains and SMART monitoring systems are introduced;

Quality control is digitized.

However, in some regions, outdated infrastructure, lack of qualified personnel, and superficial approaches to regulations still exist.

8. Negative Outcomes of Non-Compliance

Violations of technical regulations may lead to:

Derailments;

Collisions due to signaling errors;

Infrastructure defects (e.g., rail cracks);

Suspension of transport operations and economic losses;

Tarnished international transport image.

9. International Experience: Europe and Asia

In the EU, ERA has introduced interoperability requirements for all technical units to operate across different countries. In China, the railway system is analyzed in real-time using big data, AI, and IoT. Technical regulations are automatically verified through algorithms.

These examples show that safety can be strengthened not only through legal and technical approaches but also through digital solutions.

10. Suggestions and Recommendations

To further improve compliance with technical regulations in Uzbekistan, the following measures are recommended:

Harmonizing regulations with international standards;

Expanding training centers for qualified engineers and inspectors;

Implementing digital audit and monitoring systems (IoT, GPS, drones);

Introducing a re-certification system for rolling stock and infrastructure;

Creating a unified database for systematic analysis and documentation of failures.

Conclusion

Traffic safety in railway transport is the result of a close integration of technical and organizational measures. Strict adherence to technical regulations remains the primary factor in ensuring safety. Through international experience, modern technologies, and quality control systems, significant progress can be achieved in this area.

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