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The Role and Place of the International Ship and Port Facility Security Code in the International Legal Mechanism for Ensuring Security in Maritime Transport

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ABSTRACT

One of the measures taken by the International Maritime Organization to prevent terrorist acts at sea was adoption of amendments to the International Convention for the Safety of Life at Sea, aimed at ensuring that ships and their cargo do not become targets of terrorist activities.

Complementing the amendments is the International Ship and Port Facility Security Code, which is reviewed in this article. The Code describes a specific mechanism for ensuring security in ports and related facilities, and establishes cooperation

between government agencies, the shipping and port industries in identifying security threats and preventing incidents affecting ships in ports or port facilities themselves. The document contains effective elements for preventing and deterring incidents against maritime security. In this capacity, the International Ship and Port Facility Security Code has undoubtedly influenced further development of international law in the field of security, safety and efficiency of international maritime transportation.

Keywords: water transport, SOLAS-74 Convention, ISPS Code, international maritime transport, maritime safety, safety levels, declaration of security.

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INTRODUCTION

After the events of September 11, 2001, at the 22nd session of the Assembly of the International Maritime Organization (hereinafter referred to as IMO) in November 2001, a unanimous decision was made to develop new measures for the security of ships and port facilities. In December 2002, at the Diplomatic Conference on Maritime Security, the International Ship and Port Facility Security Code (hereinafter referred to as the Code; ISPS Code) was adopted simultaneously with Chapter XI-2 of the International Convention for the Safety of Life at Sea (hereinafter referred to as SOLAS-74; SOLAS; Convention), which it entered into force on July 1, 2004.

The ISPS Code is the most advanced maritime safety document in decades and contains the most comprehensive provisions establishing international standards for maritime safety and security [1].

Since its entry into force in July 2004, participating states have been required to establish maritime safety levels in accordance with the provisions of Chapter XI-2 of SOLAS 74 and Part A of the ISPS Code [2, P. 34]. Flag State responsibilities are usually assumed by the relevant competent authority of each State, which is responsible for verifying that ships comply with the provisions of Chapter XI-2 of SOLAS 74 and Part A of the ISPS Code. In addition, the relevant flag state authority approves ship security plans and issues international ship security certificates.

The objective of the article is a detailed analysis of the provisions of the ISPS Code.

RESULTS

Historically, the port and shipping industries have always been subject to high crime rates [3, pp. 11–41]. That is why it is worth noting the importance of implementing the provisions of the ISPS Code on security measures, since increasing its level in the shipping industry has a positive effect on the state of the entire global economy.

In November 2001, two months after the terrorist attacks of September 11, the 22nd session of the IMO Assembly adopted a resolution entitled «Review of measures and procedures for the prevention of terrorist acts threatening the safety of passengers and crew and ships». Based on the results of an extraordinary meeting of the IMO Maritime Safety Committee (hereinafter

referred to as the MSC), also held in November 2001, it was decided to prepare amendments to SOLAS-74 in connection with the spread of the threat of maritime terrorism. Work continued through the MSC Intersessional Working Group in February 2002, which reported the meeting's conclusions to MSC 75 in May 2002, when an ad hoc MSC Working Group was established to further develop proposals. An MSC Intersessional Working Group met in September 2002, the results of which were reviewed at MSC 76 in December 2002, immediately prior to submission of the final ISPS Code to the Diplomatic Maritime Safety Conference held in London that same month [4].

The MSC and its associated Maritime Safety Working Group led the development of amendments to the existing Chapter XI of SOLAS 74. These amendments were adopted by the IMO Assembly and renamed Chapter XI-1 of SOLAS 74. At the Conference of Contracting Governments to the International Convention for the Safety of Life at Sea, 1974 (Diplomatic Maritime Safety Conference), held from 9 to 13 December 2002, IMO Member States adopted a number of resolutions and measures to amend SOLAS 74, which have been included in the new ISPS Code¹.

The negotiations were attended by 109 States Parties to the Convention, as well as representatives of numerous international, intergovernmental and non-governmental organizations. At the same time, the ISPS Code was developed and included as a new chapter of SOLAS 74 XI-2, dealing with special measures to enhance maritime security. The provisions of the ISPS Code came into force on July 1, 2004.

New security measures have created a framework for cooperation between governments and the shipping and port industries to contain and respond to security threats affecting international maritime trade [5]. States must provide the IMO with up-to-date information on the safety measures taken every five years. The main purpose of the ISPS Code is to prevent the potential use of a ship as a weapon or means of transport for persons intending to pose a security threat, as well as for terrorist financing activities. The ISPS Code

¹ Resolution 2 of the Conference of Contracting Governments to the International Convention for the Safety of Life at Sea, 1974 (adopted 12 December 2002). [Electronic resource]: <https://base.garant.ru/71516734/>. Last accessed 08.09.2023.



defines the respective roles and responsibilities of participants in international maritime transport and develops a methodology for governments and the private sector to assess the extent of threats and respond to them [6, pp. 378–385]. Relevant government agencies, officials of ships and port facilities, as well as personnel on shore and at sea play an integral role in ensuring transport security at sea [7].

The ISPS Code applies to ships on international voyages (including passenger ships, cargo ships of 500 tons and above, and mobile offshore drilling units), as well as port facilities serving such ships². Previously, SOLAS 74 did not apply to port facilities, but IMO States Parties have concluded that the inclusion of Chapter XI-2, within the meaning of the ISPS Code, in SOLAS 74 is the most expeditious method of introducing new safety requirements. In accordance with the ISPS Code, port facilities and ships are required to develop and comply with ship security plans, which are reviewed by the relevant government authorities.

National legislation will generally provide industry-specific rules for submission and approval of ship and port facility security plans and for amendments to approved plans. Specially designated authorised bodies and departments of flag states can be identified, or officials can be appointed to perform on their behalf the duties of inspecting port facilities or ships to assess compliance with maritime security measures. These powers include inspecting the port facility or ship for compliance with established requirements, inspecting technical security equipment, documents, records and plans, conducting interviews with port or ship staff, and organizing exercises to ensure the security of the port facility or ship and their assessment [8, pp. 42–47].

Verification activities may also include examination of documentation: Port Facility Statements of Compliance or verification of the International Ship Security Certificate or Interim International Ship Security Certificate, as well as any other activity to assess the compliance of the port facility or ship with maritime security measures. An International Ship Security Certificate is a certificate issued by or on behalf of the ship's administration and confirming the ship's compliance with the maritime security

² International Convention for the Safety of Life at Sea 1974 (SOLAS), Chapter XI-2: Special Measures to Enhance Maritime Security.

measures set out in Chapter XI-2 of SOLAS and the ISPS Code [2, pp. 68–80].

The Russian Federation is a state party to SOLAS-74 and the ISPS Code, which are reflected in the Federal Law «On Sea Ports in the Russian Federation and on Amendments to Certain Legislative Acts of the Russian Federation»³ and in the «Merchant Shipping Code of the Russian Federation»⁴. The Ministry of Transport of the Russian Federation coordinates the activities of the Federal Service for Supervision of Transport and the Federal Agency for Maritime and River Transport (hereinafter referred to as Rosmorrechflot) to fulfil the obligations of the Russian Federation arising from Chapter XI-2 of SOLAS-74 and the ISPS Code⁵. According to Rosmorrechflot, the following activities are regularly carried out aimed at strengthening systems for ensuring transport security (security) of ships flying the State Flag of the Russian Federation and port terminals, as part of the implementation of the requirements of Chapter XI-2 of SOLAS-74 and the ISPS Code:

- At port facilities located on the territory of the Russian Federation and handling ships flying a foreign flag, security assessments were carried out, security plans were developed and approved, according to IMO.

- International ship security certificates and Temporary international ship security certificates are issued.

- To carry out work to assess security, develop security plans and equip ships and port facilities with engineering and technical security equipment in accordance with the requirements of Order of the Ministry of Transport of Russia dated March 11, 2008 No. 42, authorised organisations in the field of security have been identified.

³ Federal Law «On sea ports in the Russian Federation and on amendments to certain legislative acts of the Russian Federation» dated November 8, 2007, N 261-FZ. [Electronic resource]: https://www.consultant.ru/document/cons_doc_LAW_72390/. Last accessed 08.09.2023.

⁴ «Merchant Shipping Code of the Russian Federation» dated 30.04.1999, N 81-FZ. [Electronic resource]: https://www.consultant.ru/document/cons_doc_LAW_22916/. Last accessed 08.09.2023.

⁵ Decree of the Government of the Russian Federation of November 3, 2007, N 746 «On the implementation of the provisions of Chapter XI-2 of the International Convention for the Safety of Life at Sea, 1974 and the International Code for the Security of Ships and Port Facility». [Electronic resource]: <https://base.garant.ru/12156977/>. Last accessed 08.09.2023.

– Training centres provide training for specialists in the field of security at maritime transport facilities. All shipping and stevedoring companies have appropriately trained security officials, on each ship – security officers, all crew members have Certificates in accordance with section A-VI/6 of the International Convention on Standards of Training and Certification for Seafarers and watchkeeping 1978.

– Work is underway to implement security plans for ships and port facilities, which includes issues of equipping them with engineering and technical security equipment.

– Research and developments are underway to analyse and consider safety and security risks for the transport, taking into account the threats to security comprising terrorist acts [9], new UAV-technology [10].

Since October 2008, Rosmorrechflot, together with the command of the Navy of the Russian Federation, has been performing the function of organizing and implementing the safe passage of merchant ships through the pirate-prone waters of the Gulf of Aden [11].

Thus, measures to ensure maritime security were primarily taken to contain and counter terrorist threats in maritime transport [12; 13].

States parties to SOLAS 74 have committed to adapt national legislation to ensure the security of ships and ports in accordance with the ISPS Code⁶. States also have the discretion to extend the provisions of the ISPS Code to other ships and port facilities that are not subject to these measures, and at the same time, States Parties undertake not to enact legislation that imposes lower requirements or standards for international ships and port facilities than the ISPS Code.

The effectiveness of new measures depends on the extent to which these provisions are widely implemented and enforced. For example, the US Maritime Transportation Security Act of 2002 (MTSA) and its regulations have been aligned with SOLAS 74 and the ISPS Code maritime safety standards. At the end of the period of implementation by states of changes to SOLAS-74 and the ISPS Code into national legislation, the number of incidents threatening the safety of maritime transport has noticeably decreased. This included a reduction in the

number of crimes related to illegal entry into protected facilities, as well as a reduction in the number of deaths due to accidents at sea.

However, gaps in implementation and application of security measures remain for a variety of reasons. States implement different approaches to implementation of adopted maritime security measures, considering specific national constitutional and legislative procedures (it relates to transport security in wider aspects, e. g. [14–16]). Some states have not yet fully implemented these measures. Typically, states have integrated the security provisions of the ISPS Code by amending existing national port and shipping legislation [17]. However, in some cases it is necessary to adopt new laws, which is a serious problem from a financial point of view, since ensuring maritime safety and protecting the marine environment require large government expenditures.

Since the requirements of Part A of the ISPS Code are mandatory, the attention of States Parties is focused on implementation of these regulations. Part B is not mandatory, but many governments have also included the provisions of Part B in their national legislation [6, P. 383].

Due to many different types of ships and port facilities, the ISPS Code does not specify the individual measures that each port and ship must take. It sets out a universal framework for risk assessment and response. New security measures for ships include requirements for the maintenance of ship security plans, the introduction of a ship security officer, and requirements for certain equipment carried on board a ship. Similarly, port authorities are required to develop security plans, appoint security personnel and install certain equipment.

Chapter XI-2 of SOLAS 74 contains «special measures to improve maritime safety», which are included in parts A and B. These measures apply to port facilities within the jurisdiction of a state, including foreign territories of the state, to flag state ships subject to SOLAS-74, and ships sailing in its territorial sea [6, pp. 385, 386]. These measures should determine which organization within the government has the authority to ensure the security of port facilities and ships flying its flag.

Maritime safety measures apply to ships subject to SOLAS 74 and the ports that serve them. Port States may also extend these measures to port facilities and ships not covered by SOLAS 74. However, the ISPS Code does not apply to

⁶ Guidance Relating to the Implementation of SOLAS Chapter XI-2 and the ISPS Code. – International Maritime Organization (IMO). [Electronic resource]: <https://www.wcdn.imo.org/localresources/en/OurWork/Security/Documents/MSC.Circ.1111.pdf>. Last accessed 08.09.2023.





<https://news.un.org/ru/story/2021/06/1405352>

ships possessing sovereignty, including warships, naval auxiliaries or ships owned or operated by the State and used for non-commercial purposes [2, pp. 26–28].

Tugs and other port vessels, offshore supply and support vessels, fishing vessels and pleasure craft, as well as facilities servicing these vessels, may also be subject to these measures in accordance with domestic law. However, it should be noted that security measures do not apply to the activities of foreign-flagged vessels operating off the coast of a coastal state outside the territorial sea. That is, these measures do not apply within a state's exclusive economic zone (EEZ) or continental shelf, even though SOLAS 74 involves ships sailing in these waters and operating offshore installations such as offshore drilling platforms and floating oil production systems or other ships, including ships not covered by SOLAS 74. Consequently, governments can develop bilateral or multilateral security regimes governing interactions in areas beyond the territorial sea. For example, States may agree that the interaction between a SOLAS vessel and an offshore installation, or a SOLAS vessel and a non-SOLAS vessel, involves the exchange of a Declaration of Security (DoS), hereinafter referred to as the Declaration, or a similar document [2, pp. 30–32].

A Declaration of Security is an agreement between a ship and the port facility or other ship with which it interacts, defining the security measures that each party respectively undertakes to take during the period of interaction. Depending on the risk of interaction between ships and ports, governments determine the need to issue

a Declaration for ships flying their flag and ports under their jurisdiction.

All officers, security personnel, ship's crew and ship's crew are required to undergo security awareness training. Various government agencies, port facility operators and authorities, as well as industry shippers and carriers are required to maintain security awareness in the supply chain [2, pp. 110–112].

A shipping company's staffing schedule must include at least one company officer responsible for security and one officer responsible for security for each of its ships. Governments are also responsible for establishing the level of security for their ports and ships flying their flag. Only government officials may establish the applicable level of security and approve port facility security assessments and security plans, identify port facilities that require the appointment of a port facility security officer, and implement compliance measures in accordance with Chapter 9 Regulation XI-2 of the Convention and determine the requirements for the declaration of protection.

The security measures taken must correspond to a certain level of threat. The Code provides a standard threat assessment system that allows States to set or change security levels depending on the vulnerability of ships and port facilities. Factors that should be considered when determining security levels include the degree of reliability, validity and specificity of information about a threat or the degree of imminence of a threat, as well as the potential consequences of such an incident [6, P. 387].

Competent government authorities collect and assess information about potential threats to

ports and ships flying their flag. Based on information about the threat, the administration of port facilities and ships establishes a security level that reflects the degree of threat and the likelihood of an incident, for example, an act of maritime piracy, terrorism or sabotage. According to the Code, there are three levels of security:

- Security level 1 – a normal level, where ships and port facilities are operated as normal and minimum appropriate security measures sufficient to counter most types of crime must be always maintained.

- Security level 2 – an elevated level declared for a period of time during which there is an increased risk of an incident and appropriate additional safety measures must be maintained.

- Security level 3 – an exceptional level declared for a period of time when an incident is likely or imminent and during which further special safety measures must be maintained, up to and including the suspension of activities [2, pp. 112–116].

Governments are free to establish a single level of security for all ships registered under their flag and all their ports and port facilities, or to differentiate levels between ships and ports or between different parts of a port or port facility. Likewise, governments may apply a single level of security throughout the territory within the boundaries of their territorial sea or establish different levels of security in different areas of their territorial sea.

Authorised authorities responsible for ensuring maritime safety operate at the national, regional or municipal levels. As a rule, at the national level, coordination is carried out with various structures to develop comprehensive approaches to ensuring maritime safety, which is a difficult task in the context of fragmented inter-agency communication. To overcome bureaucratic barriers, states create specialized departments or agencies that act as a liaison for development and implementation of national maritime security policies. Such a department, as a rule, should work jointly with other relevant ministries and departments to formulate a national security concept, a list of threats and vulnerabilities, national security priorities, develop initiatives to ensure maritime security based on the national strategy, develop coordinated positions on international treaties, resolving jurisdictional issues between departments and implementing policies at the national level.

The 2004 Practical Guidelines of the International Labor Organization and the International Maritime Organization on Port Security invite each state to develop its own port security policy document [15]. It appears that such a document would define the scope and importance of the country's maritime industry and infrastructure, identify key maritime threats, as well as define the responsibilities and responsibilities of various security and law enforcement agencies, the application of the level of national security to ports and ships, sectoral responsibilities and delimitation of powers government. An example of this kind of document in the Russian Federation is the «Maritime Doctrine of the Russian Federation»⁷.

CONCLUSION

Thus, the International Ship and Port Facility Security Code is a comprehensive program to improve the overall level of security in international maritime transport. The provisions of the Code describe methods that state governments can use to ensure the safety of navigation if they have a certain infrastructure for uninterrupted and safe maritime transport communications. The Code is also a supporting document that highlights vulnerabilities in states' transportation systems that put critical safety elements at risk. By identifying vulnerabilities, the ISPS Code provides direction for development, approval and implementation of appropriate security plans that eliminate or mitigate the impact of these vulnerabilities and can prevent known or suspected threats.

However, the ISPS Code should not be viewed as a unique and absolute source in the field of international ship and port security [17] but should be viewed as a document containing a set of standards and best practices that offer national governments or authorised bodies a basis for developing their programs and national strategies for ensuring port security, giving them the ability to make changes and additions as conditions or threats change over time. The ISPS Code should be viewed as a dynamic document that will adapt to the changing reality, activities and infrastructure of ports and ships, as well as the nature of the threats to which they are exposed.

⁷ Decree of the President of the Russian Federation dated July 31, 2022, No. 512 «On approval of the Maritime Doctrine of the Russian Federation». [Electronic resource]: <http://publication.pravo.gov.ru/Document/View/0001202207310001>. Last accessed 08.09.2023.



An analysis of the content of the International Ship and Port Facility Security Code demonstrates both the advantages and disadvantages arising from the application of this document. First, the ISPS Code is aimed at increasing the safety and security of the ship and, consequently, minimizing risks, better control over cargo flow, improving documentation procedures, and ensuring safe working conditions that make the work of seafarers and port workers easier. On the other hand, this entails additional work for both ship crews and port authorities, as security-related tasks are added, which negatively affects the speed of work. It is also inevitable that the operating costs of a vessel will increase when the provisions of the Code are introduced into national legislation, for example, an increase in port costs (longer stay in port when the security level changes/increases in accordance with paragraphs 7, 8 of part A of the ISPS Code).

In conclusion, it is worth noting that the International Ship and Port Facility Security Code may not have been able to completely prevent and eliminate incidents related to the safety of international maritime navigation, but it has undoubtedly created a strong foundation for ensuring the safety of maritime transport throughout the world. The measures described in the Code will only be effective if all actors in the maritime shipping industry implement and effectively apply the developed regulations and elements specified in the document.

REFERENCES

1. Mensah, T. A. The place of the ISPS Code in the legal international regime. *WMU Journal of Maritime Affairs*, 2004, Iss. 3, pp. 17–30. DOI: <https://doi.org/10.1007/BF03195047>.
2. To shipowners and captains: Series: International ship and port facility security (ISPS) code / Transl. by Strelkov V. P. et al. St. Petresburg, CJSC TsNIIMF, 2003, 279 p.
3. Frittelli, J. Port and maritime security: background and issues for congress. In: Vesky, J. Port and maritime security, 2008, New York, Nova Science Publishers, 70 p.
4. Kupriyanovich, M. S. International Code for the Security of Ships and Port Facilities: Analysis of Modern Safety Standards in Maritime Transport // State and Law of Russia in the Modern World: Collection of Reports. XXII International Scientific and Practical Conference of Moscow State Law University named after O. E. Kutafin (MSAL). XXIII International Scientific and Practical Conference of the Faculty of Law of Lomonosov Moscow State University, Moscow, November 23–25, 2022. Part 3.

Moscow, Moscow State Law University named after O. E. Kutafin (MSAL), 2023, pp. 355–358.

5. Kholikov, I. V., Milovanovich, A., Naumov, P. Yu. Dynamics of Functioning of International Law in the Conditions of Transformation of Modern World Order: Post Non-Classical Approach. *Journal of Russian Law*, 2022, Vol. 26, Iss. 11, pp. 132–148. DOI: 10.12737/jrl.2022.122. – EDN ABBLLM
6. Kraska, J., Pedrozo, R. International maritime security law. Brill / Nijhoff Publishers, 2013.
7. Klein, N. Maritime security and the law of the sea. Oxford, 2011.
8. Mejia, M. The ISPS Code, security culture, and the campaign against piracy and other crimes at sea. *BIMCO Bulletin*, 2009, Vol. 104, Iss. 4.
9. Zemlin, A., Pishchelko, A., Kharlamova, Yu. Problems of Realisation of Public Oversight in the field of Transport Counterterrorism Policy. *Kutafin University Law Review*, 2020, Vol. 7, No. 1 (13), pp. 67–78. DOI: 10/17803/2313-5395.2020.1.13.067-078.
10. Zemlin, A. I., Matveeva, M. A., Gots, E. V., Torshin, A. A Problem Issues of Legal Regulation of the Operation of Cars with an Automated Driving System. *World of Transport and Transportation*, 2022, Iss. 20 (4), pp. 117–122. DOI: <https://doi.org/10.30932/1992-3252-2022-20-4-11>
11. Implementation of the provisions of Chapter XI-2 of the SOLAS-74 Convention and the ISPS Code // Federal Agency for Maritime and River Transport. [Electronic resource]: https://morflot.gov.ru/deyatelnost/transportnaya_bezopasnost/solas_74/ Last accessed 27.07.2023.
12. Kholikov, I. V. Countering criminal attacks on international maritime security [*Protivodeistvie prestupnym posyagatelstvam na mezhdunarodnyuyu morskuyu bezopasnost*]. Crime in XXI century. Priority areas of counteraction / Institute of State and Law of the Russian Academy of Sciences. Moscow, Limited Liability Company Publishing House «Unity-Dan», 2020, pp. 431–459.
13. Kholikov, I. V., Okocha, V. A. The Use of Armed Force by Private Maritime Companies: Dynamics of Boundaries and Specifics of Legal Regulation in the Modern World. *Journal of Russian Law*, 2020, Iss. 12, pp. 147–158. DOI: 10.12737/jrl.2020.154.
14. Kholikov, I. V. Current issues of legal support for forces and means of defense and security of Russia in the context of modern challenges and threats [*Aktualnie voprosy pravovogo obespecheniya sil i sredstv oborony i bezopasnosti Rossii v usloviyakh sovremennykh vyzovov i ugroz*]. *Law in the Armed Forces – Military Legal Review*, 2021, Iss. 12 (293), pp. 116–120. EDN: VBEXDG.
15. Klyonov, M. V., Kholikov, I. V. Legal and Organization Issues of Transport Occupational Health and Medical Assistance to Passengers in Russian Federation. *World of Transport and Transportation*, 2019, Vol. 17, Iss. 3 (82), pp. 180–191. DOI: 10.30932/1992-3252-2019-17-3-180-191.
16. Zemlin, A., Kholikov, I., Mamedova, I. Current Issues of Metro Safety Technical Regulations. In: Proceedings of the XIII International Scientific Conference on Architecture and Construction 2020. Lecture Notes in Civil Engineering, 2021, Vol 130, pp. 236–247. DOI: https://doi.org/10.1007/978-981-33-6208-6_24.
17. Security in ports. ILO and IMO code of practice. Geneva, International Labour Office/London, International Maritime Organization, 2004. ISBN 92-2-115286-3. ●

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