GDV Gesamtverband der Versicherer

POSITION PAPER

# Position Paper

issued by the German Insurers' Association
(Gesamtverband der
Deutschen Versicherungswirtschaft)
Lobby register No. R000774

on ways to effectively limit container losses at sea.

## 1. Introduction

In recent years, there has been a series of serious incidents even on large modern container ships, with considerable numbers of containers being lost overboard – for example in the case of the MSC Zoe (2019 – 342 containers), the ONE Apus (2020 – 1816 containers, including 64 hazardous goods containers) or the Maersk Essen (2021 – approximately 750 containers). According to information issued by the World Shipping Council, a total of 576 containers were lost at sea in 2024. On average, 1274 containers are lost each year. These results show that container losses constitute a serious risk for maritime safety, the maritime environment, transport logistics, and the insurance industry.

The GDV is therefore working to further develop international evaluation and computation standards that better reflect the true risk profile of modern container ships. The aim is to arrive at a more differentiated identification of the risk factors and to extend existing models by adding critical load scenarios. The Association

GDV
**Gesamtverband der Deutschen Versicherungswirtschaft e. V.**
**(GDV – German Insurance Association)**
Wilhelmstraße 43/43G, 10117 Berlin
Postfach 08 02 64, D-10002 Berlin
Phone: +49 30 2020-5000 · Telefax: +49 30 2020-6000
Lobby register No. R000774

Rue du Champ de Mars 23, B-1050 Brussels
Phone: +32 2 28247-30 · Telefax: +49 30 2020-6140
ID number 6437280268-55
www.gdv.de

**Contact**
Transport and aviation insurance team

**Email**
S1@gdv.de

considers that standardizing such procedures and anchoring them at the international level will make a significant contribution to improving safety at sea.

At the heart of the currently adopted position, it consciously addresses certain causes for which a noteworthy level of risk mitigation can be achieved at comparatively little cost and effort. In particular in cases requiring no fundamental structural modifications to vessels, economically feasible solutions that can be enacted in the short term and at the international level seem realistic. In addition to uniform individual evaluation and computation methods, this also applies to the use of standardized support and assistance systems for ships' masters.

This appraisal is based on detailed technical examinations undertaken by the Association. With the rise in the number of serious incidents, a large number of technical questions and potential solutions have been discussed. In addition to incorrect loading and inadequate cargo restraint, inadequately assessed dynamic loads and off-design states have been identified as particular sources of such incidents. At the same time, there are a number of other influencing factors that contribute to varying extents to the risk of container losses. An intermediate version is documented in the GDV discussion paper of 13th December 2021. Many of the considerations presented there have been incorporated in the TopTier project, supported by the EU and actively accompanied by the Association. The Association expressly supports the results of this project.

However, not all the potential causes are addressed in this paper. In order to set clear priorities, the Association concentrates on the aspects that have the greatest risk potential and that can also be addressed at the practical level. It is expressly stated that other evaluations may be conducted in the future, in particular in the light of future research results, new datasets and ongoing international developments.

## 2. Non-uniform standards as a safety risk

Current standards for evaluating the stability of ships are often based on idealistic operating profiles (“design point operations”). In commercial shipping operations, however, critical operating conditions also occur. Particularly relevant here are the so-called off-design states. These are situations in which a ship in real environmental and operating conditions operates outside of the originally assumed design parameters. These include, for example, loading states that deviate from the ship’s design, navigation in beam seas, travel in long-period seaways. These operating states are in no way rare – they regularly occur in everyday commercial operations.

Under such conditions, parametric or synchronous rolling may occur – rolling movements that are amplified by the resonance of the waves with the natural frequency of the ship. They often develop quickly and reach load levels that go far beyond the values taken into account during design. In such cases, even containers that have been stowed and secured in accordance with regulations may be damaged or lost overboard.

Despite their practical relevance, there is so far no internationally harmonized, transparent, traceable framework for the evaluation of critical vessel operating states, in particular in the case of off-design states. The employed simulation models, safety assumptions and parameters sometimes vary considerably between the classification societies. This results in differing safety-related evaluations of comparable situations – with potential consequences for safety.

Here are some examples of differing evaluation and computation methods:

- Differences in the simulation of dynamic effects during the verification of container stowage configurations.
- Limited integration of realistic, complex stowage arrangements in the computation of cargo securing and stability criteria, because the methods used to date have only been applied on the basis of a small number of differing assumptions.
- Different limits specified when considering critical roll effects, in particular in the case of parametric or synchronous rolling.
- Different levels of importance attached to the consideration of short-term extreme situations (e.g. diagonal swell with asymmetric load).

These differences impede consistent risk assessment and increase the risk of container losses – in particular in the case of off-design states. By contrast, uniform standards ensure a clear, robust basis for decision-making on the part of everyone involved in the transportation of containers.

## 3. Harmonization of the basis for evaluating off-design states

Against this background, the GDV is in favor of the binding harmonization of the basis used for evaluating stability and load safety in critical operating states, particularly off-design states. In particular, this includes:

- international agreement and standardization of the basis for calculating the

dynamic motion states of ships,
- harmonization of the underlying safety margins and load assumptions,
- consideration of the following sea state-induced rolling phenomena
  - parametric rolling
  - synchronous rolling
  - other sea state-induced rolling phenomena.

The aim is to sustainably improve the safety level in container shipping operations through internationally harmonized evaluation and computation standards and to significantly reduce container losses.

## 4. Transparent communication of the basis for evaluation

Alongside the harmonization of evaluation and computation standards, another vital step in increasing the safety of container shipping is to ensure that these standards are communicated transparently. At present, neither the principles applied by many classification societies during evaluation nor the individual computational approaches are fully traceable or comparably documented. This hinders independent verification, delays progress in the area of safety and makes it difficult to learn effectively from earlier loss events.

In particular when validating container stowage configurations, the underlying dynamic load assumptions should be traceable and should take account of realistic and unfavorable sea state scenarios. Only in this way is it possible to ensure that evaluations of stability and cargo securing concepts will remain applicable under real operating conditions. Only if this level of transparency is present, is it possible to ensure that ships' masters will become familiarized with the assumed threshold conditions.

For this reason, the GDV recommends:
- that the disclosure of the employed evaluation and safety assumptions should be a binding obligation,
- that the computational procedures and employed parameters should be documented and traceable,
- and that authorities, shipowners, insurers and other legally impacted stakeholders should have standardized access to the decision-making criteria relating to stability.

Transparency concerning the evaluation criteria is not only a prerequisite for consistent safety-related decisions, but also an important basis for preventive measures, better training and the further development of technical standards.

## 5. Minimum requirements for verifications of dynamic stability

In the past, verifications of stability have often been limited to idealized operating conditions and have not taken sufficient account of dynamic loads. Given the increasing frequency of extreme meteorological events and the complexity of ship dynamics, this is no longer adequate.

The GDV therefore recommends the introduction of binding minimum requirements for verifications of dynamic stability that take account of realistic sea conditions and off-design situations. In the GDV's view, the results of these minimum requirements should be incorporated in stability and cargo-securing software, which should be able to support ships' masters in their decision-making.

In particular, these requirements should take account of the following points:

- Rolling behavior in longitudinal and beam seas,
- Effects of the asymmetrical loading of container ships,
- The need for uniform safety margins for dynamic loads that go beyond static tipping forces.

The verification procedure should combine numerical procedures based on real physical behavior with practical load tests. The aim is to permit reliable conclusions regarding rolling behavior and stability under real conditions – including in short-term extreme situations.

The introduction of binding minimum standards for the verification of dynamic stability will ensure that the harmonization of the basis used for evaluation and computation will go beyond the theoretical level and lead to a higher, more reliable level of safety in practice.

## 6. Extension of the risk profile to design and operation

Modern container ships now reach lengths of 400 meters and have capacities of over 20,000 TEU. These dimensions bring with them heightened requirements regarding the structural strength, dynamic behavior and operating safety of ships, in particular under extreme conditions. From the insurers' point of view, the risk of losses increases significantly with the size of the vessels.

The GDV therefore recommends the binding integration of an extended risk and load profile within the overall lifecycle of container ships, i.e. from design, through classification and on to operation. This profile must reflect real maritime load scenarios and systematically allow for appropriate safety margins.

In concrete terms, the following measures are proposed:

- Consideration of real changes in load and sea state-related load during design,
- Introduction of harmonized computation criteria for dynamic motion states,
- Integration of dynamic risk parameters in the classification process,
- Internationally harmonized minimum standards in verifications of stability and strength,
- Operating thresholds based on current scientific knowledge,
- Uniform international safety margins that go beyond computational load limits and that are taken into account as early as the development process.

A particular focus should be placed on structural resilience to loads induced by sea states as well as on effective safety management in the event of critical rolling. Only through a forward-looking, realistic risk assessment can container shipping be made robust, reliable and fit for the future.

## 7. Recommendations for regulations

To increase long-term safety in container shipping, the GDV proposes the following extensions and adaptations to international regulations:

- Extension of the Intact Stability Code (IS code) to include a binding requirement to take account of dynamic effects, in particular at the level of the ship-cargo combination and including the effects of parametric and synchronous rolling,
- Consideration of realistic parameters that can lead to extreme stability conditions,
- Harmonization of the IS code and the Code of Safe Practice for Cargo Stowage and Securing (CSS-Code) with regard to the definition of limit values for critical motion states in the ship-cargo combination,
- Review of the SOLAS regulations (International Convention for the Safety of Life at Sea), with a focus on simulation-based verifications of stability under realistic conditions,
- Further development of the IMO Guidelines MSC.1/Circ.1228 and 1229, e.g. by validating computational models against real sea state data,
- Introduction of binding risk profiles in the classification process for large container ships,
- Development of a uniform, internationally applicable computation method for cargo securing on container ships and implementation of this method in the CSS code in a way analogous to the existing Annex 13. Until this new Annex takes effect, Annex 13 of the CSS code should, contrary to the original intention, also be applicable to container ships,
- Implementation of a uniform computer-assisted solution to support ships' masters, which combines stability, cargo securing and navigation parameters.

## 8. Conclusion

Container losses at sea are not just an economic concern but also affect the safety of humans, ships and the environment. The non-uniform way that dynamic loads have been evaluated in the past and the limited consideration of off-design states make realistic risk assessments difficult. This results in uncertainties in planning, operation and accident prevention – with potentially serious consequences.

The GDV therefore argues in favor of a consistent further development of international standards that goes beyond the integration of isolated technical measures. A consistent, realistic safety assessment of container ships requires:

- a uniform evaluation of dynamic risks,
- transparent, traceable verifications of stability,
- and the forward-looking integration of load-related risks during design,

classification and operation.

Only through this systematic approach is it possible to adequately reflect the actual risk profile of modern container ships. More specifically, the aim of these measures is to increase the resilience of the maritime supply chain, harmonize the safety level in international maritime transport and effectively reduce damage and loss resulting from sea conditions.

Berlin, October 22, 2025

Contact:
Transport/aviation department

Email:
S1@gdv.de