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WORK PROGRAMME

Information on insurance related economic aspects associated with containership fires

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SUMMARY

Executive summary: This document provides information about the economic aspects of containership fires, indicating the need to review the regulations in SOLAS chapter II-2 for the avoidance of damage to containerships, as well as containerized cargoes stowed under deck and on deck of containerships

*Strategic direction,
if applicable:* 6

Output: Not applicable

Action to be taken: Paragraph 40

Related document: MSC 102/21/7

1 This document is submitted in accordance with paragraph 4.6 and 6.12.2 of the *Organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies* (MSC-MEPC.1/Circ.5/Rev.1), taking into account the *Application of the Strategic Plan of the Organization* (resolution A.1111 (30)).

Background

2 Cargo fires on board containerships have become a common occurrence. In the first half of 2019 alone, there were five such fires on containerships (**Yantian Express, APL Vancouver, Grande America, E.R Kobe and KMTC Hong Kong**). Fires on board containerships are a risk to the lives of seafarers and marine environment, and have caused numerous casualties. In any event, fires, in particular cargo fires, cause severe damage to the ship, containers and other type of cargo on board, as well as loss of hire, costs for external fire-fighting and towage, and cargo related business interruption. Between 2000 and 2015,

56 cargo fires on containerships caused damage and cost approximately \$20 million per incident on average, and more than \$1.037 billion in total (excluding hull damages).¹ Hull damages account for an average amount of at least \$6.5 million per cargo fire incident² and in total, costs of more than \$0.5 billion have been incurred between 2000 and 2019.³ The commonly expected growth of the total containership fleet and the larger average size of containerships will inevitably lead to a further increase in damages and costs if a fire breaks out.

3 The insurance industry is significantly affected by a fire on board containerships. Their insurance products cover loss and damage to the ship and its equipment, to the cargo on board and its packaging, as well as related consequential losses. Hence, the damage and costs of cargo fire incidents on board container ships are paid to a large extent by insurers, primarily by marine insurers. Based on the growth of the total container capacity, marine insurers have to calculate claims arising out of an average of five cargo fires per year. For 2019, this would imply that marine insurers will have to compensate an amount of approximately \$132.5 million for damages and costs caused by cargo fires on containerships. If no regulatory measures are introduced to locate, detect and fight fires more effectively, marine insurers might have to revise their underwriting strategy, taking into consideration the implications of covering the risk of cargo fires on board containerships.

4 Therefore, marine insurers support document MSC 102/21/7 (Bahamas et al.), which aims to enhance measures to locate, detect and fight fires on containerships. Marine insurers consider such measures necessary and they welcome a review of the fire protection requirements in SOLAS chapter II-2.

Introduction

5 Between 2000 and 2015, a total number of 56 incidents occurred due to fire on board containerships. Particularly well-known cases are **MSC Flaminia** in 2012 and **Hyundai Fortune** in 2006, amongst others. On average, approximately four, fully cellular containerships per year caught fire in the cargo area between 2000 and 2015.

6 The driver for the growth of the container fleet and its increasing capacity is the global economy and world trade. Many factors lead to the assumption that international trade will continue to grow, despite the current economic tensions.

7 The rapid growth of world trade volumes has generated large investments in the shipping industry, particularly for building new ships. As a result, the containership fleet has grown significantly, from approximately 2,600 units in 2000 to 5,200 units in 2019. With such a rapid growth set to continue, the likelihood of fire incidents increases.

8 In addition, the probability of severe damage to the ship and the cargo as a result of a cargo fire increases due to the increasing size of the ships themselves. In 2019, the entire containership fleet had a combined carrying capacity of close to 20 million TEUs, compared to 4.41 million TEUs in 2000. This means an average capacity of 5,000 TEUs per ship in 2019, compared to less than 1,000 TEUs in 2000. For new builds, the average capacity exceeded 8,000 TEUs in 2015.

¹ Analysis by Gesamtverband der Deutschen Versicherungswirtschaft (German Insurance Association).

² Analysis by The Nordic Association of Marine Insurers (Cefor).

³ Analysis by Gesamtverband der Deutschen Versicherungswirtschaft (German Insurance Association).

9 In the period from 2000 to 2015, there were 56 known incidents of containership fires that started in the cargo area, with a total of 8,252 TEUs damaged, in addition to damage to the ship.⁴ In total, these incidents created a loss volume of \$1.037 billion (excluding the loss or repair of the ships), their loss of income during the fire-fighting operations, salvage costs (fire-fighting, towage, etc.) and the loss of containers, carried goods and, as a major factor, business interruption in the supply chain.⁵

10 Marine insurers enable business transactions and global trade. They cover both loss and damage to the ships, as well as to the cargo in addition to consequential losses. Thus, they are severely affected by the cargo fires on board containerships, which may induce them to take measures to better reflect the risks in their policies.

11 Thus far, the measures to tackle the issue of cargo fires on containerships are insufficient. The success of addressing mis-declaration, the mandatory equipping of ships with mobile water monitors and water mist lances appears questionable, in view of the enormous number of containers which will be carried by a growing fleet of ultra large containerships. To continue to meet clients' needs for comprehensive insurance cover for cargo fires, further measures including more effective systems to locate, detect and fight fires on containerships are urgently needed.

Economic growth and the impact on the container shipping sector

12 Since the end of the Second World War, industrialization and global trade accelerated continuously. Due to the opening of markets and the conclusion of numerous multilateral treaties and bilateral trade agreements, the volume of the cross-border transaction of goods, services and capital increased substantially.

13 OECD data shows that the world economy will continue to grow. According to the latest real GDP long-term forecast of the OECD, the total real GDP will be \$137,451,300 million in 2030, compared with \$99,585,286 million in 2019.⁶

14 In the future, customer needs will likely be more characterized by the expectation of guaranteed just-in-time or just-in-sequence delivery. Thus, a rising demand for a reliable supply chain is a key factor for future containerized transportation. E-commerce platforms and digital globalization will substantially drive opportunities for sales to a global customer base.

15 The growing need for containerized transportation has and will be addressed with a larger average containership capacity.

Container cargo shipping: fleet development

16 In the past, the growing need for containerized transportation by sea was met by building more ships. Since the year 2000, the total number of containerships and the total TEU-capacity has developed, as follows:⁷

⁴ Rath, Analyse von Bränden und Löscheinsätzen auf Vollcontainerschiffen im Zeitraum 2000-2015, Diplomarbeit, Bremen University of Applied Sciences, pages 9 to 10.

⁵ Analysis by Gesamtverband der Deutschen Versicherungswirtschaft (German Insurance Association).

⁶ OECD (2019), Real GDP long-term forecast (indicator). doi: 10.1787/d927bc18-en.

⁷ Institute of Shipping Economics and Logistics (ISL), Shipping Statistics Yearbooks 2000, 2005, 2010, 2015 and 2019.

Year	Total number of ships	Total capacity in TEUs
2000	2,437	4,279,000
2005	3,220	7,169,000
2010	4,706	12,851,000
2015	5,097	18,206,000
2019	5,255	21,991,000

Based on the figures above, a modest projection for 2030 would lead to an estimated number of ships of approximately 6,000 units, which together are likely to exceed a capacity of 30 million TEUs.

17 Theoretically, many more ships should have been built to carry the growing number of containers. However, in recent years, it is primarily the average cargo capacity of the ships which has increased significantly. The average capacity of operating ships in 2019 is 4,185 TEUs, compared to less than 1,000 TEUs in the year 2000. The average capacity of new builds reached a mean of 5,800 TEUs between 2009 and 2013, and approximately 8,000 TEUs since 2015.⁸ This trend indicates that these "economies of scale" are likely to continue as the governing principle for ship building and operation.

18 In 2015, the number of ships with capacities of 12,000 plus TEUs was 227 ships, with a joint capacity of 3.3 million TEUs. Ships with capacities of more than 12,000 TEUs represented a 17% share of the total fleet capacity. In 2015, the global order book contained 128 ships of greater than 12,000 TEU capacity and with a total of 2.1 million TEUs. These new orders represent 64% of the existing capacity of the 12,000 plus TEU fleet.⁹ This correlation indicates that the share of large ships will continue to increase extra-proportionally to the overall growth of the fleet.

19 It is likely that this trend will continue, due to the rising number of ultra large containerships which are able to carry more than 20,000 TEUs. The capacity of the current class of ships is likely to grow to a capacity of 22,000 TEUs. For ships with capacities of up to 24,000 TEUs, a ship length of 456 m and a width of 56 m are required. According to a credible scenario, 30,000 plus TEU ships may be constructed within 10 years from 2018.¹⁰

20 Beside the increase in ship size, the cascading effect must also be considered. The increasing ship sizes trickles down from major trade lanes, to subordinate trade lanes. Ships which are made redundant by very large new builds are far from being scrapped. They are deployed on lower level trade lanes. This cascading effect comprises all trade lanes and means that the entire maritime transport chain is affected by the increase in ship size.

Status quo: Economic loss caused by fire on board containerships

21 Fires on board containerships are a constant threat to their crews and as a result, too many lives have already been lost. Beside the tragedy of casualties, fires on containerships are a threat to the marine environment and have caused immense damage to property. This includes various consequential losses, such as the destruction of the ship's value, of containers and cargo, and recovery costs, as well as business interruption costs. An analysis of the period from 2000 to 2015 revealed that, in total, 56 cargo fires occurred on containerships with 8.252 TEUs damaged or destroyed and that an average of four containerships per year were affected

⁸ International Transport Forum at the OECD, The impact of Mega-Ships, 2015.

⁹ Rath, Analyse von Bränden und Löscheinsätzen auf Vollcontainerschiffen im Zeitraum 2000-2015, Diplomarbeit, Bremen University of Applied Sciences, pages 9 to 10.

¹⁰ TT Club and McKinsey & Company, Brave new world? Container transport in 2043, 2018.

by cargo fires.¹¹ Based on these figures, the total costs and damage caused by cargo fire incidents amounts to \$1.037 billion between 2000 and 2015 (excluding hull damage).¹² On average, each and every cargo fire yielded damage and costs of approximately \$26.5 million.¹³

22 The containership itself could suffer the severe damage of a total loss from a cargo fire. Partial damage leads to repair costs. A recent analysis of known claims caused by fires on board containerships, in the period from 2000 until 2019 shows that 29 cases resulted in hull damage of \$188.7 million (loss of hire and further costs related to hull compensation not included). The assessment was carried out by the Nordic Association of Marine Insurers (Cefor)¹⁴ which represents marine insurers from the Nordic countries. Based on these figures, on average, a hull compensation of \$6.5 million incurred per fire event. The above figure of \$188.7 million does not include an additional 42 fire incidents for which the costs and damages are unknown. Additionally, hull compensations of importance, which occurred in this period due to major fire incidents, such as **Hanjin Pennsylvania** (2005), **MSC Flaminia** (2012) and **Maersk Honam** (2018), are not included in this figure. Given the large-scale destruction caused by these incidents, the overall hull damages actually incurred will likely have exceeded \$500 million for 2000 to 2019.

23 Additionally, a fire on board a containership causes the ship to be out of operation and consequently results in a loss of income. Data from a 2016 analysis¹⁵ estimated an average downtime cost of \$20,000 per day, per incident. On average, the fire-fighting activity took more than 4 days per incident and with durations ranging from several hours up to 28 days.

24 To support the external fire-fighting and to tow the ship to a port of refuge, salvage tugs have to be mobilized. According to a 2019 analysis, costs for salvage and towage for 25 known incidents amounted to over \$3.3 million.¹⁶

25 During the period 2000 to 2015, 8,252 containers and their contents were destroyed or damaged by fires on fully cellular containerships (see Rath, above). Based on an estimated average value of \$25,000 per lost TEU, a total damage of \$206.3 million was incurred during that 15-year period. A fire will destroy approximately 150 containers, with a cargo value amounting to \$3.75 million per incident.

26 Business interruption (BI) cost is another major damage category, caused by fire on board containerships. BI refers to the interruption of business operations due to the physical loss of property and of supply parts. Due to modern fragmented production methods, supply parts are shipped on a large-scale, as containerized cargo.

¹¹ Rath, Analyse von Bränden und Löscheinsätzen auf Vollcontainerschiffen im Zeitraum 2000-2015, Diplomarbeit, Bremen University of Applied Sciences.

¹² Analysis by Gesamtverband der Deutschen Versicherungswirtschaft (German Insurance Association).

¹³ Analysis by Gesamtverband der Deutschen Versicherungswirtschaft (German Insurance Association) and The Nordic Association of Marine Insurers (Cefor).

¹⁴ <https://cefor.no/globalassets/documents/statistics/nomis/focus-analyses/2019-fires-on-container-vessels.pdf>

¹⁵ Rath, Analyse von Bränden und Löscheinsätzen auf Vollcontainerschiffen im Zeitraum 2000-2015, Diplomarbeit, Bremen University of Applied Sciences.

¹⁶ Research conducted by Gesamtverband der Deutschen Versicherungswirtschaft (Germany Insurance Association).

27 The potential BI damage greatly exceeds the value of destroyed or lost cargo, which forms an integral part of a tight supply chain. Supply parts are made for integration into a final product and, thus, generate added value. From experience with damage to supply parts caused by fires in storage facilities, the ratio between affected supply goods and the risk of interruption can be estimated, with a range between 1:20 to 1:50. Assuming that supply parts-TEU (with an estimated average value of 50,000 \$) is destroyed by fire, the potential BI damage ranges from \$1 million to \$2.5 million ($50,000 \times 20$ up to $50,000 \times 50$) per TEU.

28 Goods carried on board containerships are heterogeneous. Based on conservative estimates within the marine insurance industry, 10% of containerized cargo falls into the category of supply goods. Based on the above-mentioned figure of 8,252 lost or destroyed TEU, 825 TEUs containing supply parts were destroyed or lost between 2000 and 2015. This may have caused business interruption costs of up to 825 million \$ ($825 \text{ TEU} \times 50,000 \times \text{ratio } 50$).

29 In further applying these BI assumptions, one can easily exemplify the potential BI cost for a major incident, comparable to the **Maersk Honam** in 2018. This fire caused destruction of 2,000 units. Given that an estimated 200 of these units contained supply parts, the BI cost could range from \$200 million to \$500 million for a single incident.

Impact of fires on board containerships to marine insurers

30 The insurance sector is central to the economic development of modern economies. Protection against risk enables financial planning, provides forecast and is essential for entrepreneurial action. For the cover offered, the insurers assess risks and set prices for the assumption of risk. With their specialized expertise, insurance companies also play an important role in the prevention of damage, e.g. by advising their policy holders or by providing risk information systems.

31 With globalization, global trade volume is steadily growing. To meet the growing demand for transport, haulage companies adapt their transport capacities and the handling speed to new developments. For insurance companies writing marine business, it has the following implications: on the one hand, the share of marine insurance in their portfolio may be growing, in correlation with growing trade volumes; on the other hand, they are exposed to new accumulation of risks, as a result of the greater value concentration. In this context, cumulative risks mean that a single incident triggers an avalanche of claims on insurance companies. The payment entitlements cumulate.

32 In the event of a cargo fire, it may also be the case that risks accumulate. If the ship and the cargo suffer damage caused by fire, one and the same marine insurer may need to compensate not only their share of the damage to the ship, (hull insurance usually operates on the basis of co-insurance, i.e. the spreading of risk among multiple insurers) but also the cargo damage and costs of business interruption.

33 The present circumstances, i.e. misdeclaration of goods, continuous growth of the container fleet and a trend towards larger ships have magnified the challenges for the marine insurance industry. Recent measures taken regarding fire-fighting systems are deemed to be inadequate for sufficiently tackling the actual and future risk exposure of ships and containerized cargo. Insurers can thus be induced to re-think underwriting strategies, excluding certain risks or, by other means, to amend insurance policy terms.

Measures taken for fire protection on cargo ships

34 In 2014, the fire-fighting regulations within the SOLAS Convention were amended. From 2016 onwards, new build ships must carry two or four (depending on the ship size) mobile water monitors and a water mist lance.

35 However, these measures will not sufficiently address the risk of damage caused by cargo fires on containerships. The fire-fighting regulations in SOLAS were originally established for general cargo ships, on which cargo is stored in individual pieces, openly in the holds. Containerized cargo is stowed on and below deck. The existing regulations for fire-extinguishing systems is limited to the cargo compartments below deck. On deck, no comparable extinguishing system is expected. However, today, up to 50% of cargo is stowed on deck. Fire detection systems that use air extraction for smoke monitoring are only expected to be sited below deck and not on deck. Thus, marine insurers maintain that the mandatory fire-fighting systems that are currently in place are inadequate and do not reflect the characteristics of today's containerized cargo shipping operations.

36 Another important measure which should be pursued in parallel is the fight against the mis-declaration of cargoes. The risk caused by improper packing, loading, labelling and shipping of hazardous cargoes increases with the size and capacity of containerships. Due to the large volume of loading capacity, large containerships are more likely to be affected by mis-declaration. Initiatives put in place by ship owners, carriers and freight forwarders, as well as regulatory approaches in the CCC Sub-Committee (CCC 6/6/17 (Liberia et al.) and CCC 6/10/1 (New Zealand and ICHCA)) are initial steps to tackle this issue. In addition to these initiatives, this issue needs to be addressed across the entire supply chain, by competent UN and national authorities. However, even if all initiatives proved to be successful, mis-declaration of cargoes will still remain a problem, as a root cause of several cargo fires on board containerships. This is due to the vast quantity of units shipped at present, plus the expected future growth. Initiatives for fighting mis-declaration will equalize the increased risk caused by further growth, at best. However, the initiatives are unlikely to substantially reduce the risk exposure for both the ship and the cargo. Thus, marine insurers maintain that measures should be taken to significantly improve fire detection and fire-fighting equipment on board, including more sophisticated fire-fighting systems, which can directly apply water to burning containers.

Conclusion

37 Given the further growth of the containership fleet, average ship capacities and the increase of the fire risk exposure of both ship and cargo, there is a compelling need to amend the existing SOLAS regulations. As a consequence of containerization, ship operators and crews have lost control over the content and the condition within the ship's cargo compartment, at least to some extent. Marine insurers are challenged by the rising costs and damage that is caused by cargo fires on board containerships. Initiatives to fight mis-declaration are welcome and, on the way, but will not suffice. The 2014 amendments to fire-fighting regulations in SOLAS are also not sufficient to address the growing risk of fire on containerships.

38 Therefore, marine insurers are of the view that systems should be established to quickly detect and locate fires, as well as to section cargo compartments into controllable units, by direct water application. This will facilitate immediate action on board and substantially decrease the probability of fire spreading to other units. This approach is in line with the safety objectives that are set out in SOLAS regulation II-2/2.1.1.

39 Such enhanced detection, location and water application methods will save lives and property more effectively. An impact analysis of containership fires was conducted in 2018 and 2019 (MSC 102/INF.3). The analysis found that the loss and destruction would have been restricted if the fire-fighting systems mentioned above had been available. In particular, ship sectioning and direct water application could have completely avoided the serious consequences resulting from the fires on board **Yantian Express**, **Grande America**, **SSL Kolkata** and **Maersk Honam**.

Action requested of the Committee

40 The Committee is invited to note the information provided in this document in relation to the proposed review of SOLAS chapter II-2 when considering document MSC 102/21/7.
