UEIM Transport Safety Investigation Center

MARINE SAFETY INVESTIGATION REPORT

SHIP NAME	: FG SEVIL
IMO NO	: 9548665
FLAG OF THE SHIP	: Panama
CASUALTY EVENT	: Fire
LOCATION OF CASUALTY	: Southeast of İstanbul / Büyükada
DATE and TIME OF CASUALTY	: 31 October 2024 - 11:13 (GMT+3)
FATALITY / INJURY	: 2 / -
DAMAGE DEGREE	: The ship's engine room has caught fire.
ENVIRONMENT POLLUTION	: N/A

Board Decision No: 04 / D-01 / 2026	Date: 05 February 2026

The sole objective of this investigation is to make recommendations for the prevention of similar accidents and incidents within the framework of the By-Law for Transport Safety Investigation Center. This report neither has the value of judiciary and administrative investigation nor bears the purpose to apportion blame or liability.

LEGAL BASIS

This marine casualty has been investigated in accordance with the provisions of the "By-Law on the Investigation of Marine Casualties and Incidents" which entered into force upon its publication in the Official Gazette No. 30961 dated 27 November 2019.

The procedures and principles for the investigation were also applied in accordance with International Maritime Organization (IMO) Resolution MSC.255(84) Code of the International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident (Casualty Investigation Code), A.1056(27) Guidelines on Fair Treatment of Seafarers in the Event of a Maritime Accident and A.1075(28) Guidelines to Assist Investigators in the Implementation of the Casualty Investigation Code.

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DEFINITIONS & ABBREVIATIONS

GMT : Greenwich Mean Time
AIS : Automatic Identification System
VHF : Very High Frequency
SMS : Safe Management System
IMO : International Maritime Organization

MT : Metric Tons
SOLAS : International Convention for the Safety of Life at Sea

SOURCE OF INFORMATION AND REFERENCE LIST

- Port records
- FG SEVIL records
- Records of the ship's company
- Captain and crew

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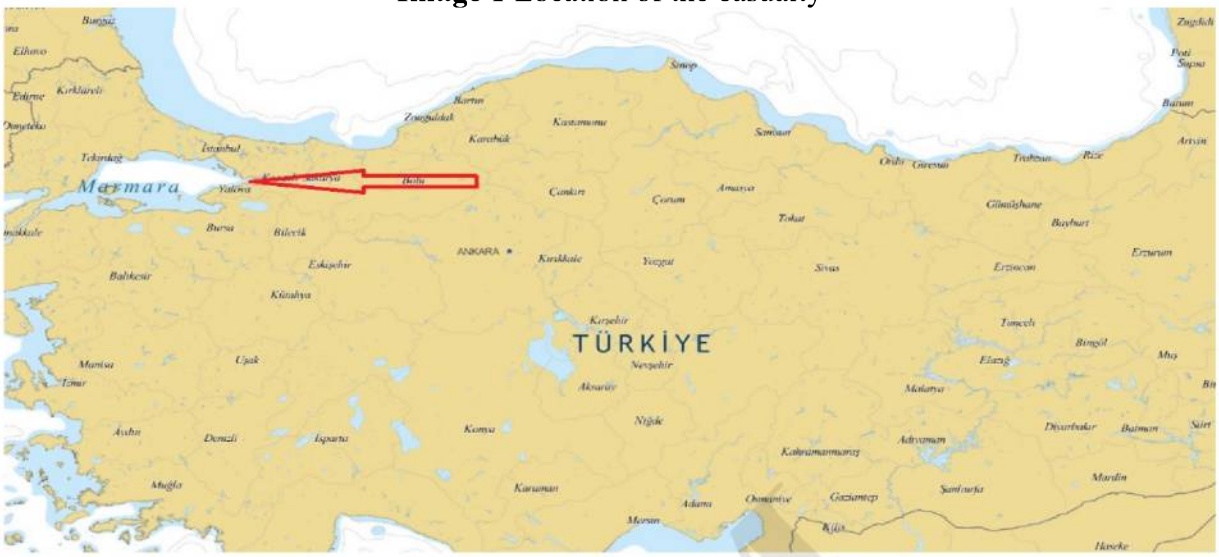
SUMMARY

Image 1 Location of the casualty



Source: Turkish Naval Forces "CAS Deniz[1]"

Note: All times used in the report are local time. (GMT +3)

FG SEVIL, after the main engine, propeller routine maintenance, side blasting and painting operations conducted by Aykın shipyard on 11 August 2024, arrived at Hicri Ercili shipyard located in Yalova shipyards region on 15 August 2024, to have 5-year Special Maintenance operations. Following the work, the operation and procedures carried out by Barem Gemi Bakım Onarım San. ve Tic. Ltd. during the period, the ship was certified with a class certificate dated 30 October 2024, issued by its classification society and, having obtained a Port Clearance Certificate, departed for the Port of Varna, Bulgaria, at approximately 09:00 on 31 October 2024. The ship reported that a fire broke out in the engine room when the ship arrived at Kartal Anchorage at around 11:13 on 31 October 2024 with a total of 21 people, including 17 crews and the company's maintenance & repair team of three people who measured the DPA and main engine temperature values and monitored its operation.

Subsequently, search & rescue and firefighting units responded to the casualty, and after the cooling processes, the bodies of two people from the maintenance & repair company were found on the floor of main engine.

[1] https://casdeniz.dzkk.tsk.tr/#

Based on the results of the marine safety investigation, recommendations have been made to the classification society, the maintenance & repair company, the Chambers of Shipping and the ship's company.

1. SECTION - FACTUAL INFORMATION

1.1. Ship Particulars

Flag State	: Panama
Call sign	: 3E3830
IMO number	: 9548665
Classification society	: CCS[2]
Type of ship	: General Cargo
Place and year of build	: China / 2009
Gross tonnage	: 4425
Length overall	: 104.2 m
Beam	: 17.2 m
Main engine and its power	: Daihatsu 8DK-28 / Diesel 2500 kW
Hull material	: Steel

1.2. Voyage Data

Port of departure	: Yalova Shipyard Area / Türkiye
Port of arrival	: Varna / Bulgaria
Type of cargo	: Empty
Number of crew on board	: 17
Minimum safe manning	: 9
Restrictions of voyage	: -

1.3. Casualty Data

Date & time of casualty	: 31 October 2024 - 11:13 (Deck Logbook record)
Casualty event severity	: Very Serious Marine Casualty
Casualty event	: Fire
Position of casualty	: 40°49.75’ North - 029°08.86’ East
Dead / injured	: 2 / -

[2] China Classification Society

Damage	: The engine room was damaged as result of the fire.
Pollution	: Not reported

1.4. External Environmental Data

Wind direction and force	: Northeastly wind force 3 on the Beaufort Scale
Sea state	: Calm
Visibility	: Good
Type of weather	: Overcast

1.5. FG SEVIL

FG SEVIL was built in 2009 at Weihai Donghai Shipyard in China. The ship has two holds, a single diesel-powered main engine and three electric cranes. (Image 2)

The ship certifications and class documentation for FG SEVIL were valid on the date of the casualty, and the survey period had not expired. The Safety Management Certificate was issued by the Phoenix Register of Shipping Organization, based in Piraeus / Greece, and inspections have been carried out annually. The Fire Control and Safety Plan of the ship is shown in Figure 1, and the General Arrangement is shown in Figure 2. (Pages 6 & 7)

The last two Port State Controls of FG SEVIL have been carried out on 19 March 2024, in Volos / Greece, under Paris Mou[3] and on 10 June 2024, in Alexandria / Egypt, under Mediterranean Mou[4] . No deficiencies or defects have been observed in either control.

[3] Paris Mou: It refers to the Memorandum of Understanding signed by 14 European countries in Paris, France in 1982 to establish port state control.
[4] Mediterranean Mou: It refers to a joint memorandum of understanding signed by 11 Maritime Authorities on the disposal of substandard ships to ensure the safety of navigation and pollution prevention in the Mediterranean region.

Image 2 FG SEVIL

The ship in question has no restrictions on the International Load Line or Class Certificate. As of 03 November 2025, both piping circuits, related components and other maintenance & repair and modification operations are ongoing onboard, FG SEVIL, in the Tuzla shipyards area.

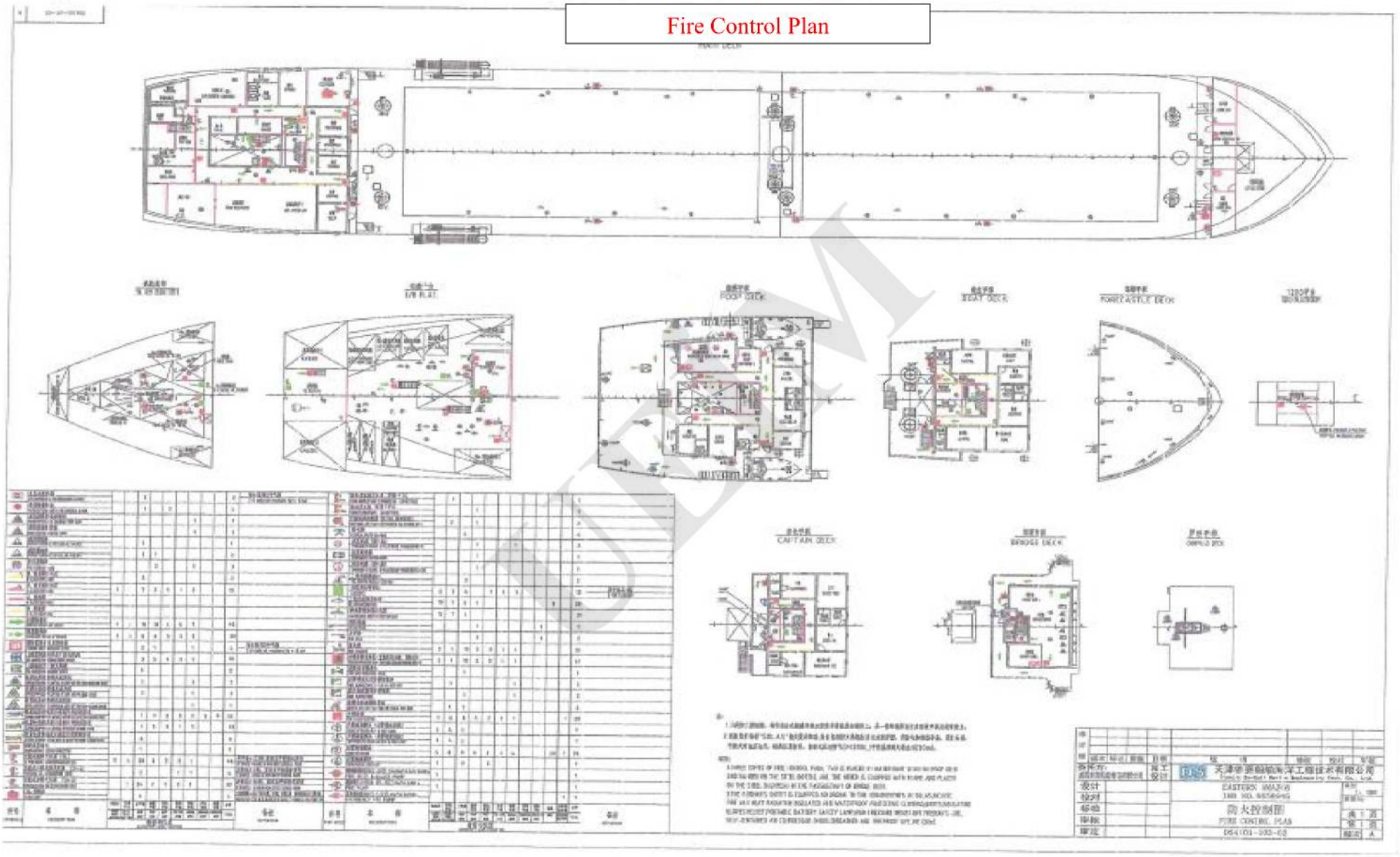


Figure 1 Fire and safety plan of FG SEVIL

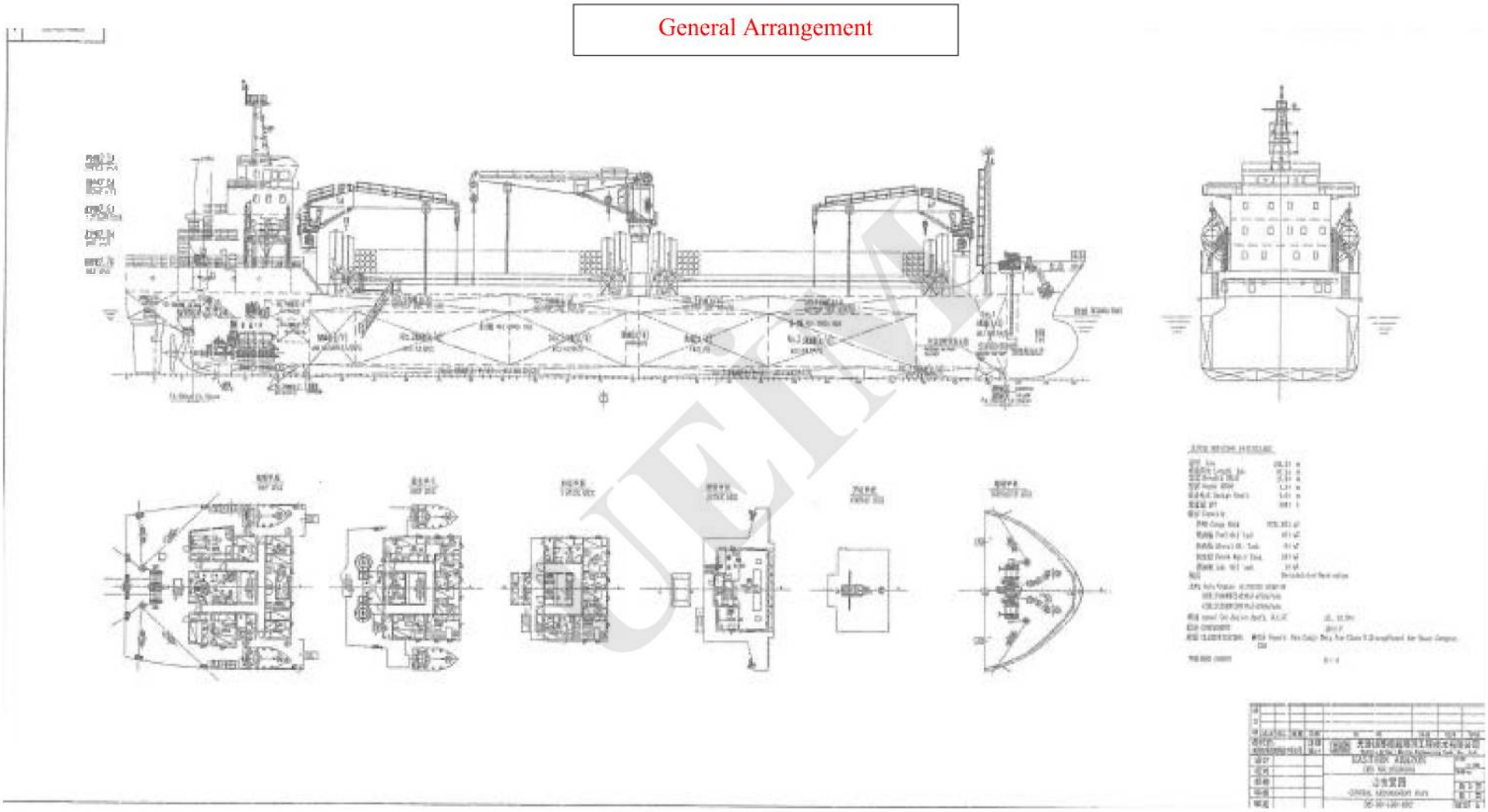


Figure 2 General arrangement plan of FG SEVIL

1.6. Manning of FG SEVIL

FG SEVIL should be manned by 11 crew members according to the Minimum Safe Manning Certificate issued under the International Convention for the Safety of Life at Sea (SOLAS 74) Rule V/14. On the day of the casualty, there were a total of 21 people on board, including 17 crews, 1 DPA[5] and 3 maintenance & repair personnel of the repair company. The ship was manned with an adequate number of qualified seafarers in accordance with the Minimum Safe Manning Document. Also, there were neither deck cadets nor passengers on board. The crew consists of 12 Azerbaijani citizens, 4 Turkish citizens, 1 Georgian citizen and the working languages of the ship are Turkish and English.

1.7. Key Personnel of FG SEVIL

1.7.1. Master

The master, a citizen of the Azerbaijan, was 59 years old at the date of the casualty and had signed on the ship 7 days ago at the shipyard. He was experienced as a Master for 12 years.

1.7.2. Chief mate

The Georgian citizen, chief mate, was 39 years old at the date of the casualty and had been serving onboard for approximately 3 months. He has been working as a chief mate for 14 years.

1.7.3. Chief engineer officer

The chief engineer officer, a Citizen of the Azerbaijan, was 62 years old at the date of the casualty and had signed on the ship on 19 October. He has 43 years of sea service and 20 years of a chief engineer officer's license. He has been working in the same company for 2 years. He has been working as the chief engineer officer for 4 years. FG SEVIL entered the shipyard for a 5-year shipyard maintenance period[6], repair, and has been launched from the dry dock on 27 October 2024.

[5] DPA: They are the designated person ashore in the Safety Management System (SMS) and one of the key roles in the company's proper implementation of the Safety Management System onboard.
[6] Shipyard maintenance & repair plays a vital role in ensuring the seaworthiness of ships and their compliance with national and international laws and regulations, demonstrating the maritime sector's safety, efficiency and excellence in protecting ships and crews on the high seas.

1.7.4. DPA

The ship's DPA, a citizen of the Turkish and holds an chief mate's certificate. He was 36 years old at the date of the casualty. After 12 years of sea service, he has been working for this company since July 2024. He has been DPA compliant for 4 years.

1.8. Shipyard Process, Ship Main Engine and Components of FG SEVIL

FG SEVIL has been planned to be taken to Yalova Aykın Shipyard on 11 August 2024 for the 5-year Special Survey[7], as required by the rules, and then to Hicri Ercili Shipyard on 15 August 2024 for the main engine overhaul[8] along with the necessary maintenance.

During this process, the necessary cleaning and modification works have been also planned to change the main engine fuel type from HFO to MGO. While BAREM is designated as the implementer of all required procedures, the supervision of the works carried out and the issuance of the approval certificate are under the responsibility of the classification society named China Classification Society (CCS).

The ship's main engine is a Daihatsu brand with eight-cylinders and 2500 kW power. Under load, service speed is 10 knots, fuel consumption IFO 8.0 mt/day - 380 cst[9] and 0.80 mt MGO. Ballasted, service speed is 10.4 knots, fuel consumption IFO 8.0 mt/day – 380 cst and 0.80 mt MGO. A fully equipped example of the main engine of the FG SEVIL is shown in Image 3 (Page 10).

[7] Special Survey: This is a form of inspection carried out periodically to ensure that the ship is fit for its intended purpose and complies with all applicable safety standards, resulting in the issuance of a new certificate.
[8] Overhaul: This is the process of inspecting, repairing, cleaning and, if necessary, replacing all parts of the ship's engine to enhance its performance, ensure its efficient operation and extend its service life.
[9] CST: This is unit of measurement of kinematic viscosity.

Image 3 Main engine twin of FG SEVIL

1.9. Vapor and Exhaust Circuits Insulation

Thermal insulation onboard is carried out to prevent condensation and limit heat transfer. Ship insulation is done in two-different types: sound and thermal insulation, according to the parts of the ship in general, ship insulation types are examined under three main headings: thermal insulation, waterproofing and fire insulation.

During normal operations, temperatures, especially on the main engine, may reach high temperatures, so insulation pads that may withstand temperatures of 1260 degrees are used for these places. Also, the following materials are used in steam and exhaust circuit insulation:

- Ceramic wire fabric,
- G1 fiberglass fabric or Flomat material,
- Stone wool or ceramic wool,
- Insulation springs,
- Insulation hooks (fasteners),
- Galvanized or stainless-steel wire

Stone wool or ceramic wool material is placed between the ceramic wire fabrics. Then sewing is carried out with special threads. The fixing process is carried out using galvanized wire so that the insulation, spring, and hook remain outside.

This type of insulation is used in the internal areas of the exhaust circuit expansion, expansion flanges, and engine exhaust manifold housings inside the ship.

During manifold insulation, manifold areas are covered with non-stick, fireproof insulation jackets.

Polyester-based insulation materials are used to coat circuit. The polyester insulation material is also supplemented with polyurethane foam.[10]

[10] https://www.izoguard.com.tr/post/gemi-izolasyonu-nasil-yapilir

1.10. Ship Certificates and Periods

Table 1 Ship certificates and periods

Class Special Survey for Hull	30.10.2024	Yalova	10.09.2029	11.06.2029~10.09.2029
Class Special Survey for Machinery	30.10.2024	Yalova	10.09.2029	11.06.2029~10.09.2029
BTS	27.10.2024	Yalova	26.10.2027	~

Notes: BTS means survey of the outside of the ship's bottom.

Screw Shaft Surveys

Survey Description	Last Survey Date	Place of Last Survey	Next Survey Date	Postponed Until
Screwshaft Survey	30.10.2024	Yalova	10.09.2029	

Statutory Certificates or Documents of Compliance

Certificate Description	Term [1]	Issue Date	Expiry Date	Extended Until	UTN	Remarks
International Tonnage Certificate	F	12.12.2022				Endorsed by Flag
Suez Canal Special Tonnage Certificate	F	11.09.2009				
PC/UMS Documentation of Total Volume	F	11.09.2009				
International Load Line Certificate(FB1915)	F	30.10.2024	10.09.2029		S024-453327	
Cargo Ship Safety Construction Certificate(FB1915)	F	30.10.2024	10.09.2029		S024-404105	
Cargo Ship Safety Equipment Certificate(FB1915)	F	30.10.2024	10.09.2029		S024-527194	
Cargo Ship Safety Radio Certificate	F	30.10.2024	10.09.2029		S024-193402	
International Oil Pollution Prevention Certificate(FB1915)	F	30.10.2024	10.09.2029		S024-446876	
International Sewage Pollution Prevention Certificate	F	30.10.2024	10.09.2029		S024-356968	
Statement of Garbage Pollution Prevention from Ships	F	30.10.2024			S024-452077	
International Air Pollution Prevention Certificate	F	30.10.2024	10.09.2029		S024-927498	
Document of Authorization for Carriage of Grain in Bulk	F	12.12.2022			S022-019186	
Certificate of Compliance for the Carriage of Solid Bulk Cargoes	F	30.10.2024	10.09.2029		S024-244246	
International Anti-Fouling System Certificate	F	12.12.2022			S022-920253	
Certificate of Inspection of Crew Accommodation Equipment	F	25.07.2023	11.12.2026			Issued by Flag State
International Ballast Water Management Certificate	I	30.10.2024	29.03.2025		S024-915695	
International Energy Efficiency Certificate(FB1915)	F	22.12.2023			S023-548560	
Document of Compliance (Special Requirement for Ships Carrying Dangerous Goods)	F	30.10.2024	10.09.2029		S024-205368	

Notes: Term Filling with "F" means Full Term. "I" means Interim. "C" means Conditional. "S" means Short Term.

It has been determined that the certificates of the FG SEVIL are complete and valid in terms of validity.

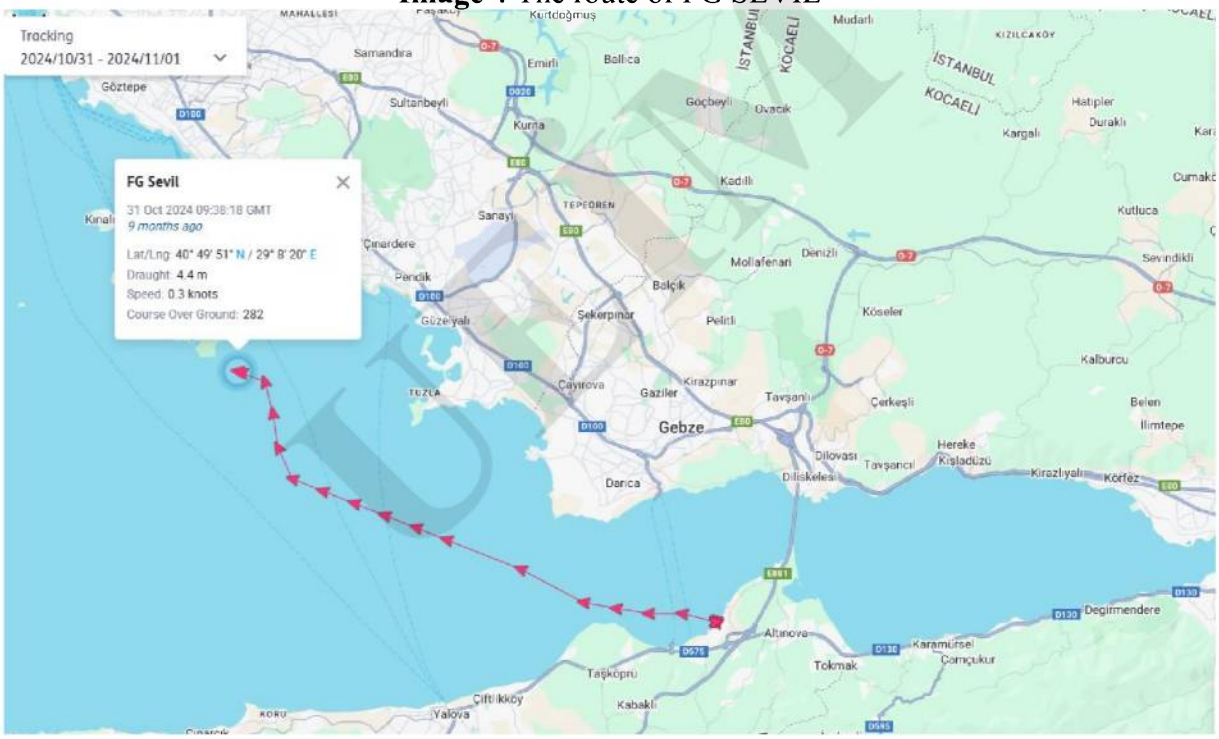
2. SECTION – NARRATIVE

The sequence and timing of the incident leading to the marine casualty under safety investigation, and the locations of the people, depend on eyewitness statements and interviews.

2.1. Voyage

Panama-flagged FG SEVIL departed from Hicri Ercili Shipyard in Yalova, located in the Yalova shipyards region, at 09:20 on 31 October 2024 in ballast, bound for Varna, Bulgaria, and headed towards Kartal Anchorage for materials and supplies required for the voyage. The map showing the route followed by FG SEVIL during this period is presented below.

Image 4 The route of FG SEVIL



2.2. FG SEVIL Ship Repair, Maintenance and Certification Process

The periodic maintenance and overhaul of the main engine, which is within the scope of the maintenance & repair operations carried out at the shipyard, has been carried out by the maintenance company.

In addition, at the owner's request, it was planned to convert the DAIHATSU main engine, model 8DK-28, which had been designed to operate on heavy fuel oil (HFO), to operate on

marine gas oil (MGO). The Survey Report issued by the ship's classification society on 30 October 2024, states in section 2.12 that "At the request of the Company, the boiler was not in operation, a sign indicating that it was not in use was posted, and the fuel oil inlet pipe was blinded." Furthermore, the recommendation section of the class certificate states: 'At the Company's request, the boiler on board the ship has been taken out of service. Before the boiler is put back into service, a boiler inspection shall be carried out by the attending surveyor. This statement also supports the Company's request.

In addition to the ship's crew, personnel from the maintenance & repair company remained on board FG SEVIL after the vessel departed from the shipyard. Their presence was intended to complete the remaining works, monitor the performance of the main engine, and rectify any deficiencies or defects identified during the voyage. It was also decided that the insulation operations, which had not been completed during the shipyard period, would be carried out in Kartal Anchorage while the ship was taking on fuel and provisions.

Subsequently, FG SEVIL was issued a Class Certificate dated 30 October 2024 (Annex 2) by the classification society, and following this, the ship departed from the shipyard on 31 October 2024, to continue her voyage.

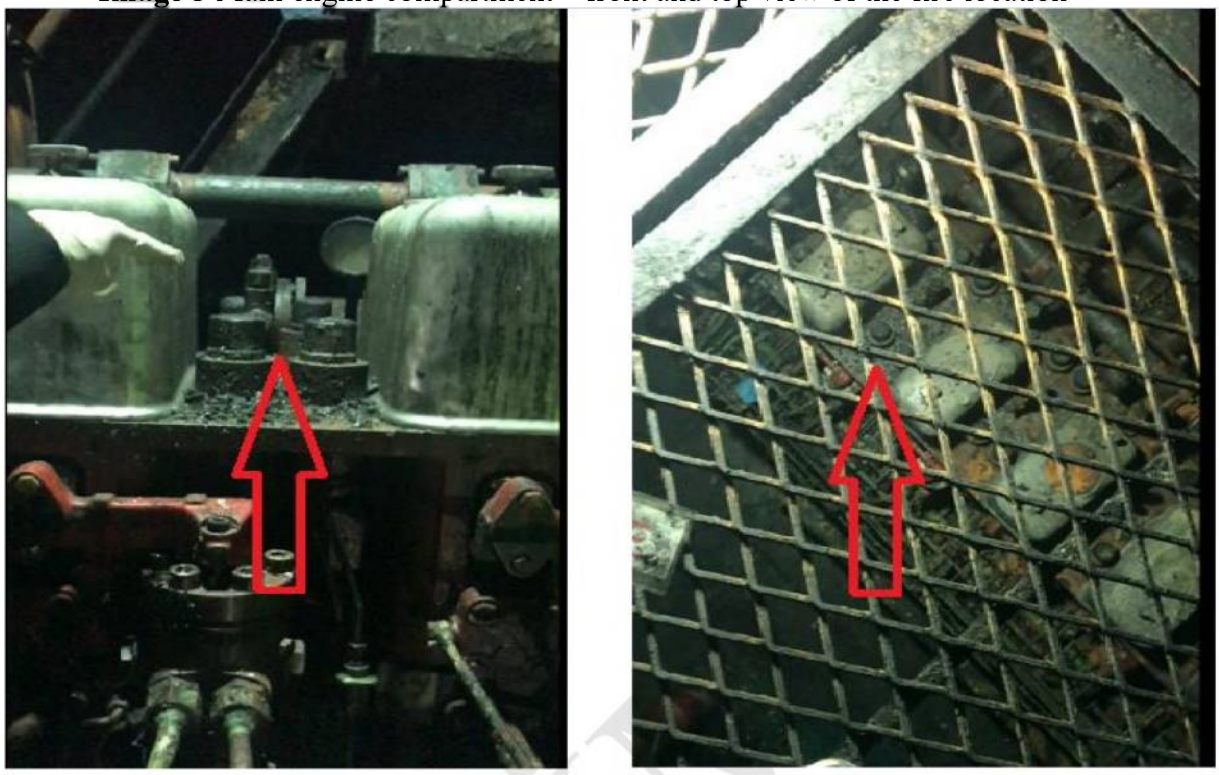
2.3. Start and Development of the Casualty

The pilot boarded the ship on 31 October 2025 at 08:50. At 09:10, all mooring lines were released, and the pilot disembarked from the ship at 10:00.

After departing from shipyard, testing of the main engine has been commenced whilst underway in the Sea of Marmara. During the test the master, the deck officer and DPA were on the bridge, while the chief engineer officer and oiler were in the engine control room. The second engineer officer and a company employee were positioned at the vessel's aft to observe the exhaust gases from the main engine funnel. Meanwhile, two deceased employees of the company were on the engine room bilge floor to check the main engine.

The engineer officer, returning to the engine room from the accommodation where they had gone to get drinking water, was on the stairs of the engine room at 11:13 when flames were observed coming from the area of cylinders 7 and 8 of the main engine.

Image 5 Main engine compartment – front and top view of the fire location



2.4. Response to the Casualty

The initial response to the fire was carried out by the engineer officer, chief engineer officer and oiler using portable fire extinguishers from the control room deck to the bilge deck, but the firefighting efforts were insufficient to control the fire. Therefore, a general alarm has been sounded, and the crew gathered at the emergency muster point. At the ship's emergency muster station, it has been confirmed that two of the company's employees were missing based on the count. However, the whereabouts of the individuals in question could not be determined at the first stage.

An attempt was made to extinguish the fire with seawater, but because the ship's generators were out of service, the emergency generator was started and the emergency fire pump was activated. Oiler and the deck officer, wearing firefighting suits, attempted to enter the engine room from the engine room entrance door located on the main deck in the accommodation, but were unable to do so due to heavy smoke.

Meanwhile, the master reported the fire on board to the Vessel Traffic Services (VTS) via radio.

The chief engineer officer remotely closed the emergency quick-closing valves, cutting off the fuel supply to the main engine and generators, while the crew has closed the engine room ventilation fans and dampers.

At approximately 12:15, following the master's instructions, the chief engineer officer activated the ship's fixed fire extinguishing system, releasing carbon dioxide (CO_2) gas with smothering properties, into the engine room.

Following the activation of the fixed fire-extinguishing system, entry was made into the engine room and as a result of the inspection: one of the two company employees who lost their lives was on the engine room floor, on the platform plate at the eighth cylinder line of the main engine head, the other one was on the platform plate near the main engine end reduction gear[11], both bodies were found intact.

Image 6 Approximate locations of the deceased subcontractor workers

[11] Reduction Gear: This equipment converts the main engine's output shaft speed into the speed required to rotate the propeller.

3. SECTION – ASSESSMENT

While assessing the marine casualty under investigation, it has been aimed to identify and determine the factors that caused the casualty by considering the sequence of events and data obtained during the safety investigation as well as to draw useful conclusions that lead to the safety recommendations on root causes.

3.1. Ship Maintenance & Repair Process and Certification of FG SEVIL

The most important indicator is the ships' class certificates to determine whether tasks and processes related to the repair, modification, overhaul, and maintenance have been completed or not, in accordance with customary and good maritime practices upon shipyard departure is the vessel's Class Certificate, issued as a result of the five-year special survey. Compliance with national and international regulations, as well as whether maintenance & repair, and overhauls meet the minimum standards, is verified through inspections conducted by the classification society on behalf of the flag state.

Class inspection and sea trials involve inspecting the ship in accordance with the regulations in force at the time of delivery to verify compliance with all applicable requirements.[12]

FG SEVIL was issued a Class Certificate by its own classification society on 30 October 2024 and commenced its voyage on 31 October 2024 after customs clearance.

However, it was understood that the certification of the ship in question, meaning that it is readiness for voyage, was carried out despite deficiencies even after departing from the shipyard and commencing the voyage, the failure to install the routine insulation of the main engine and its components, the inability of the maintenance company's employees to detect possible circuit leaks during the voyage, and the lack of supervision over the control and evaluation processes of the cylinder pressure (Pmax) and other indicators, and that, considering the sequence of events leading to the casualty.

[12] Misili, Sinan, Establishment of Shipbuilding Contract, Istanbul 2016, p.159. (Gemi İnşa Sözleşmesinin Kurulması, İstanbul 2016, s.159.)

Image 7 Example for fully equipped twin main engine of FG SEVIL

3.2. Engine Room Fire Main Engine Insulation of FG SEVIL

The risk of fire in the engine rooms of ships, expressed as a frequency ratio, is calculated as an average of 1/1000 ship-years, with fires related spontaneous combustion-in lubricating oil and diesel fuel systems accounting for 60% of the total[13]. Research indicates that the primary cause of spontaneous ignition is damage to system components resulting from vibration.

However, in accordance with the existing requirements of the International Convention for the Safety of Life at Sea (SOLAS 74), relevant Maritime Safety Committee (MSC) circulars and other applicable safety legislation of the International Maritime Organization (IMO), the 'Guidelines for Measures to Prevent Fires in Engine-Rooms and Cargo Pump-Rooms' issued for the protection of engine rooms, cargo pump rooms and fire-prone areas against fire has been published by the IMO in Circular MSC.1/Circ.1321.

[13] Liddiard, E., Failures of low-pressure fuel systems on ship's diesel engines MAIB MSA Research Project, London 1992. (Gemi dizel motorlarındaki düşük basınçlı yakıt sistemlerindeki arızalar MAIB MSA araştırma projesi, Londra 1992.)

The notes in question;

1.2.2 Heat control

Many hot surfaces and potential ignition sources exist in engine-rooms, cargo pump-rooms and other fire-prone spaces. To assist in preventing a fire originating as a result of flammable oil coming in direct contact with high temperature surfaces, these surfaces should be properly insulated.

Therefore, the SOLAS regulations require:

.1 insulation of high temperature surfaces;

.2 temperature sensing devices for cargo pumps, ballast pumps and stripping pumps installed in cargo pump-rooms and driven by shafts passing through the pump-room bulkhead;

.3 the surface of any insulation used in spaces where penetration of oil is possible (e.g., machinery spaces) to be impervious to oil or oil vapours. This applies equally in cases where the insulation is applied to meet shipyard practice or at the owner's request, for example to reduce heat loss or to protect the crew; and

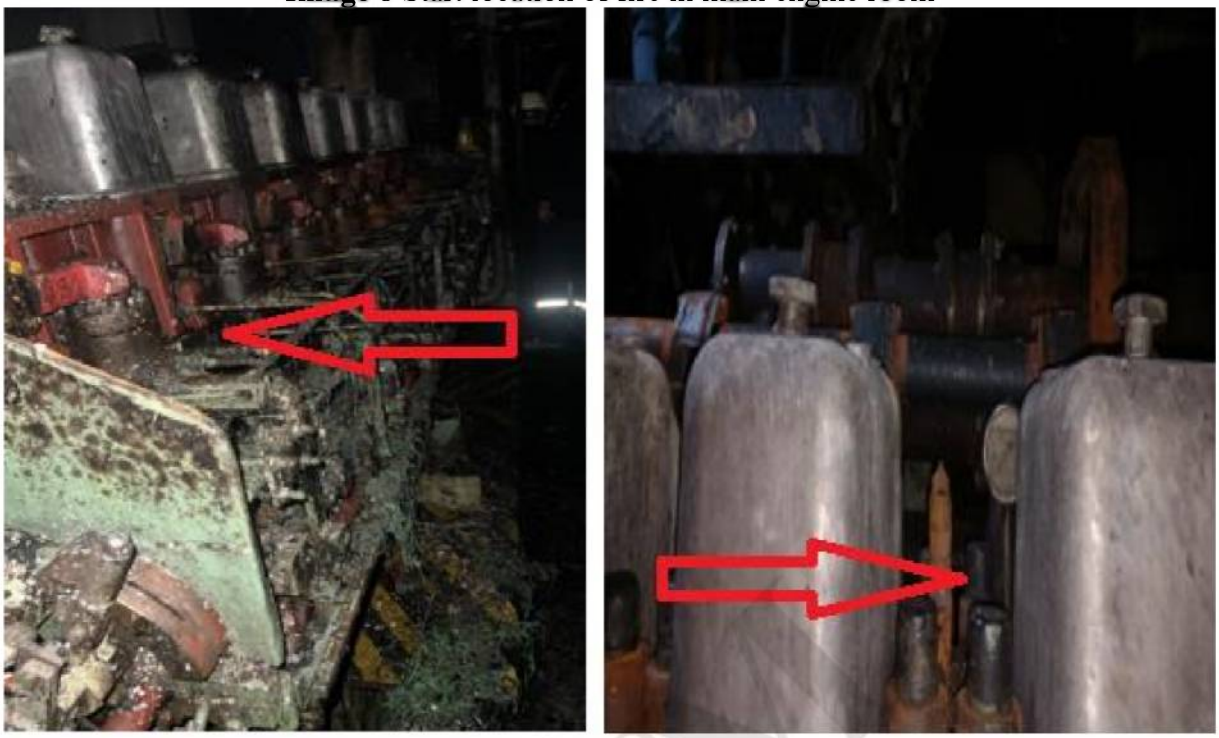
.4 spray protection of some electrical equipment.

Source: MSC.1/Circ.1321 Annex Part 2 Page 6

These above-mentioned articles elaborate on the issue.

Considering, in particular, the burnt and damaged condition of the main engine and eyewitness statements, it was understood that the fire originated in cylinders the 7th and 8th of the main engine and spread to other components, ultimately developing into a general fire in the engine room.

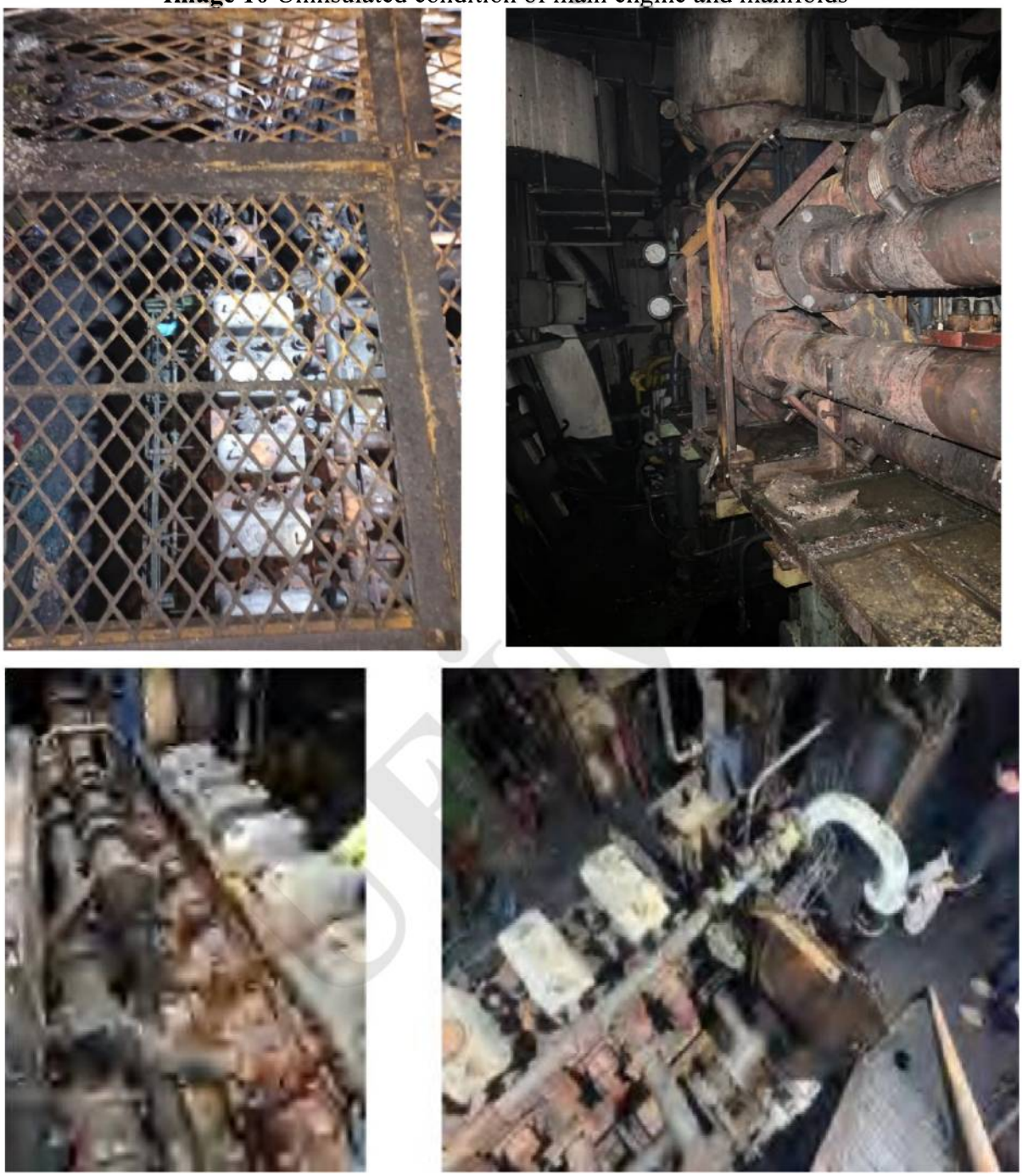
Image 8 Start location of fire in main engine room



However, it was determined that the exhaust circuit insulation of the main engine, of the ship, which was proceeding its normal voyage, had not been installed at all, the exhaust pipe circuits were completely exposed, and the manifold guard plates that should have been present on the exhaust circuits were also missing.

Image 9 Example for insulated twin main engine of FG SEVIL

Image 10 Uninsulated condition of main engine and manifolds



Considering the location and progression of the fire, as well as the condition of the maintenance crew, the ship had proceeded on its voyage without fully verifying the results of the work and procedures carried out during the overhaul, repair, and maintenance of the main engine. A record of possible oil/fuel transfer pipes that were not properly seated or tightened during voyage, along with fractures or leaks in pulsed fuel lines around nuts or fuel splashing onto exhaust manifold components during removal of circuits and pipes in uninsulated and unenclosed conditions, is considered to be the root cause of the fire, accounting for its origin and subsequent propagation.

3.3. Engine Room Fire Intervention of FG SEVIL

During the investigations carried out as a result of the engine room fire of FG SEVIL, it was observed that the quick closing valve system[14] located near the entrance door of the accommodation, engine room, was activated. The CO_2 system in the fixed fire extinguishing installation was also activated, and the cylinders have exploded.

As is well known, CO_2 is neither toxic nor flammable. Due to the fact that it is 1.53 times heavier than the current air, gas accumulations occur on the ground, in deep and dead-spaces, and especially in closed areas, where excessive CO_2 concentrations may lead to smothering.

In this framework, during the investigation of the engine room of the ship in question, it was observed that there were CO_2 system nozzles on the floor of the generator compartment located one above the main engine floor, and that the floor of the generator compartment consisted of a metal sheet with grating. It was understood that the system was designed this way, considering that CO_2 gas would also reach the main engine compartment on the lower deck through the nozzles in the generator room.

In accordance with SOLAS Chapter II-2, the procedures and principles for actions to be taken following the detection of a fire have been established. Similarly, firefighting operations should be carried out in accordance with the procedures defined in the ship's Safety Management System (SMS).

According to the interviews and investigations made with the crew, it was understood that the fire spread rapidly after ignition, and the ship's lighting was disabled. It is understood that the CO_2 system, which was activated with the aim of fully extinguishing the fire on board, was applied approximately one hour after the fire started, without confirming that the engine room was clear of personnel.

It is assessed that the deceased may have experienced fear and anxiety due to the shock and panic they felt in the dark environment, and were unable to find an exit of the engine room. Consequently, it is evident that the rapid spread of the fire caused damage to the polycarbonate and plastic materials in the engine room, and that toxic fumes from the burning cables filled the

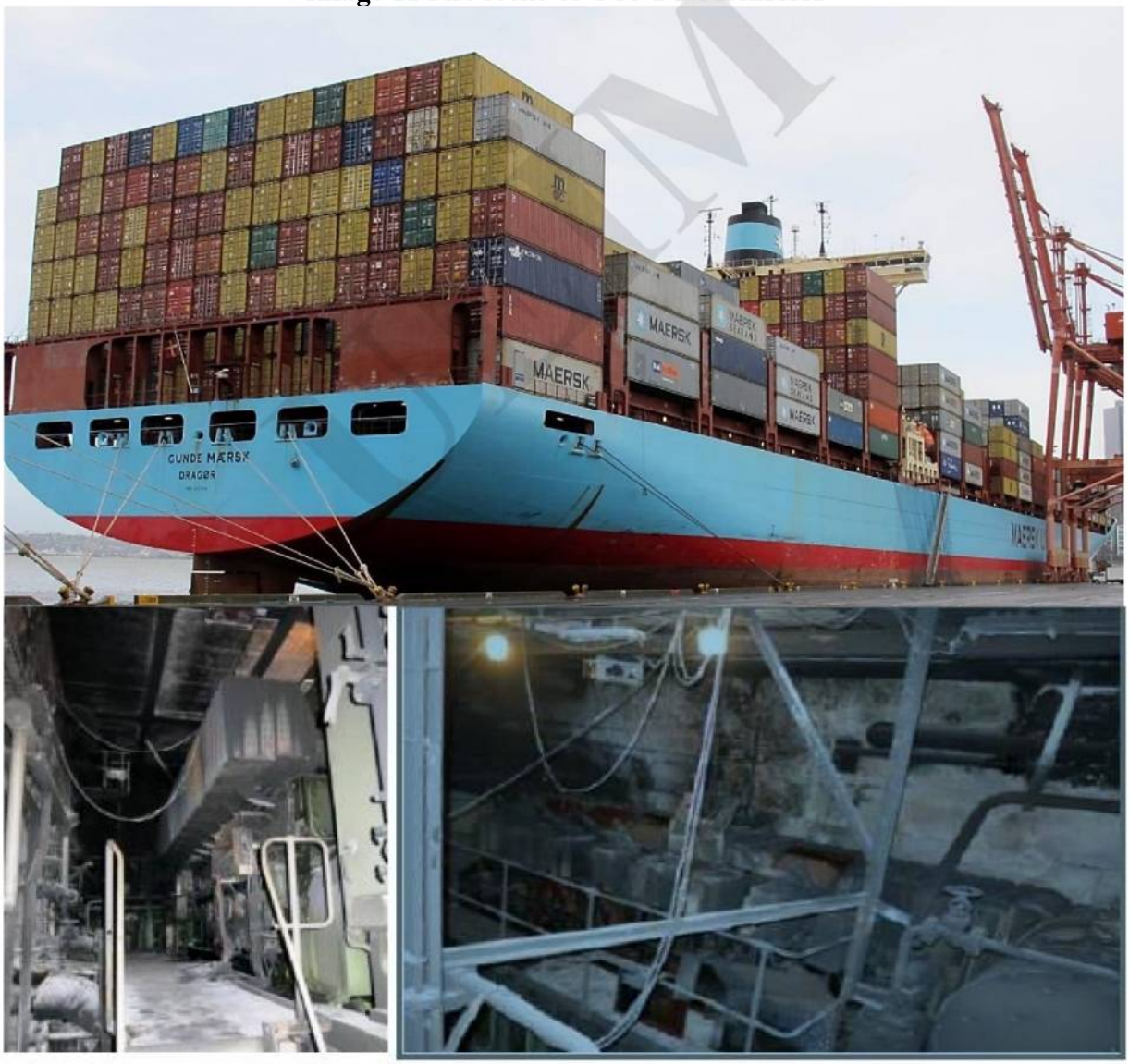
[14] Quick Closing Valves: These are systems used to control/cut off the flow of fuel onboard to important locations such as the main engine, diesel generator and boiler.

victims' lungs through inhalation. Although the forensic reports indicate that the definitive causes of death were carbon monoxide poisoning and smothering, the manner and method of firefighting using CO_2 gas reinforces the view that the crew's approach and actions in response to the incident was inadequate and flawed, and not effectively managed.

3.4. Similar Casualties

The container ship, GUNDE MAERSK, departed from Terminal 46 in Seattle, Washington, at 05:09 local time on 08 December 2015. Shortly thereafter, a fire broke out in the No 1 auxiliary engine room. The fire was quickly extinguished by the ship's high-pressure water mist system, resulting in a loss of propulsion and the ship anchoring off berth.

Image 11 Fire scene of GUNDE MAERSK



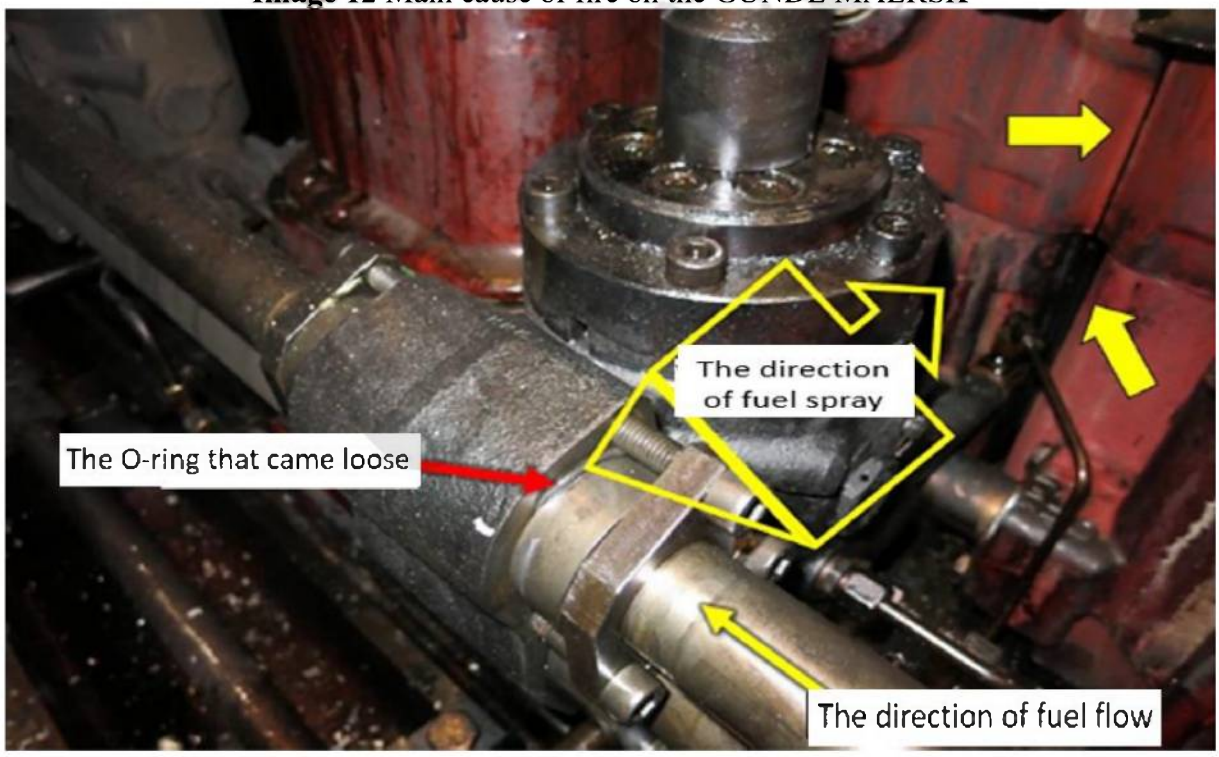
Source: National Transportation Safety Board (NTSB), Marine Accident Brief, Fire Aboard Containership Gunde Maersk[15]

[15] https://www.ntsb.gov/investigations/AccidentReports/Reports/MAB1624.pdf

Investigations determined that the fire was caused by fuel leaking from a 1.5-inch diameter O-ring that had become loose in the fuel feed line leading to the No 3 cylinder fuel injection pump, located near the top of the No 1 generator, in the investigations conducted. Fuel in the feed line, at a pressure of 87 pounds per square inch (psi), sprayed around the O-ring, some of the sprayed fuel hit the blockers designed to prevent pulverized fuel from splashing into the engine room, while the rest entered the engine exhaust side through the gap between the cylinder heads.

It was determined that the probable cause of the fire on the container ship, GUNDE MAERSK, was an incorrectly fitted connection piece on the fuel line supplying the fuel injection pump for No 1 generator.

Image 12 Main cause of fire on the GUNDE MAERSK



Source: National Transportation Safety Board (NTSB), Marine Accident Brief, Fire Aboard Containership Gunde Maersk[16]

[16] https://www.ntsb.gov/investigations/AccidentReports/Reports/MAB1624.pdf

4. SECTION – CONCLUSIONS

4.1 The work and procedures to be performed on the main engine of the FG SEVIL undergoing maintenance & repair and overhaul at the shipyard were the responsibility of the subcontractor appointed for this purpose. However, the supervision of the work performed and the issuance of the approval certificate remained the responsibility of the classification society.

4.2 The valid class certificate was issued on 30 October 2024, for a period of 5 years until 2029. Considering the points specified in the 'Memorandum for Owner & Surveyor' section of the class survey status report, it is understood that the work and procedures performed in the context of the main engine overhaul had been completed in full and without omission, and that the status was reflected in the certificate accordingly.

4.3 According to the Deck Logbook, the fire in the engine room of the FG SEVIL started at 11:13 on 31 October 2024.

4.4 It was determined that the main engine exhaust circuit isolations are missing, and the manifold guard plates that should have been present on the engine circuits are also missing during the investigation conducted onboard after the casualty. The probable cause of the fire was a fuel leak and insufficient insulation of the main engine's exhaust manifold. The fire most likely caused by fuel leaking onto the uninsulated exhaust manifold.

4.5 Portable fire extinguishers were used to extinguish the fire that started in the engine room, but the fire could not be extinguished. As the main fire pump was not operational, the emergency fire pump was activated to respond to the fire but entry into the engine room was not possible due to heavy smoke.

4.6 Approximately 1 hour after the fire started, CO_2 gas was applied to the engine room.

4.7 At the ship's emergency muster station, despite confirming that two company employees were missing following a headcount, CO_2 gas was used to extinguish a fire that had started in the engine room without definitive information on the whereabouts of the two individuals.

4.8 Following the firefighting operation, the bodies of two victims were found in the engine room.

5. SECTION – RECOMMENDATIONS

The following recommendations are made based on the analysis and results obtained from the safety investigation.

to the Ship's Company:

01/01-26 In accordance with international regulations, personnel should be alerted to ensure continuous monitoring of the conditions included in the Firefighting Operations section of the Safety Management System required on boards,

02/01-26 Development of Safety Management System procedures for ships emerging from the shipyard maintenance & repair process,

to the Maintenance & Repair Company:

03/01-26 The requirements set out in MSC.1/Circ.1321 dated 11 June 2009, concerning measures to prevent fires in engine rooms and cargo pump rooms, should be strictly adhered to in the design, installation, operation, functioning and inspection of fuel systems,

to the Classification Society:

04/01-26 At the end of the five-year special survey periods, particularly during the shipyard process and afterwards, once maintenance & repair, overhauls and alterations have been fully completed and without omission, inspections and certifications shall be conducted and this safety investigation report shall be communicated to the surveyors,

to Istanbul and Marmara, Aegean, Mediterranean and Black Sea Regions Chamber of Shipping (Turkish Chamber of Shipping [TCS]):

05/01-26 Circulating the report to your members in order to minimize or prevent similar accidents,

to Mersin Chamber of Shipping:

06/01-26 Circulating the report to your members in order to minimize or prevent similar accidents,

is recommended.

Annex 1 Class survey report

Name of Ship: FG SEVIL Report No.: TR24SSS00050 Form RA (3/4)

SMG020 was given based on this survey.

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2.6 Regarding the slight deformation of port side shell plating located from Fr134 to Fr135 and around 5.5 m above the baseline, the structure near the deformation had been inspected, and no further damage or deterioration had been found. Periodic inspection to the deformation should be conducted by the crews during navigation and the memo was remained to be kept.

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2.7 Upon this survey, the arrangement of the in-use fuel oil sampling points was verified to meet the requirement of MEPC.324(75) and MEPC.1/Circ.864/Rev.1. The Form AIR was updated and issued accordingly.

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2.8 According to COMSAR.1/Circ.32/Rev.2, the requirements of the SOLAS IV/10 for the MF radio installation of the basic equipment was substituted by those for the MF/HF radio installation of the duplicated equipment. The Cargo Ship Safety Equipment Certificate (Form CSE) and the Record of Equipment for Cargo Ship Safety Equipment Certificate (Form E), the Cargo Ship Safety Radio Certificate (Form CSR) and the Record of Equipment for Cargo Ship Safety Radio Certificate (Form R) were issued with the updated version according to the MERCHANT MARINE CIRCULAR MMC-334, and the memo in survey status was maintained in proper.

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2.9 Requested by the company, the incenirator together with the incenirator sludge tank were removed this time. The on site operation was witnessed and checked with satisfaction. The left pipeline was blocked in proper. The weight and LCG was calculated and reviewed with satisfaction which the result was within the limit and not necessary to make a modification on the stability. The garbage management plan was revised.The oil residues(sludge) tank capacity was calculated according to the marpol requirement and the on board oil residues tank capacity can meet the requirement so that the Form A/AIR were updated and the CAP/COP/CGP were issued accordingly.

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2.10 Requested by the management company, the lifting appliance/ cargo gear on board was not in used any more and the CG survey was not requested, the RLA ,CLA and CLG were withdrawn accordingly. The survey status was maintained in normal.

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2.11 Informed by the management company, the IHM cert will be applied from flag via other RO. The survey status was maintained accordingly.

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2.12 Requested by the company, the boiler on board was not in used. The mark for not in used was made and the inlet pipe for fuel oil was blocked.
Upon the verification on site with satisfaction,the survey status for boiler was maintained and the class memo CMG002 was given in survey status.

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Annex 2 China class certificate

China Classification Society

Form CLS(E)
No. TR24SSS00050

Classification Certificate

This Certificate is issued to: FG SEVIL

Class No. 09V0156

IMO Number 9545665

Date of Build September 11, 2009

Shipbuilder Weihai Donghai Shipyard Co., Ltd., China

Gross Tonnage 4425

THIS IS TO CERTIFY that the above-mentioned ship has been surveyed by China Classification Society's surveyor(s) and found to be in compliance with the requirements of Society's Rules, and the ship has been assigned the class and entered in the Register of Ships with the following Classification Character(s) and Class Notation(s):

★CSA General Dry Cargo Ship; Strengthened for Heavy Cargoes; Ice Class B

★CSM

This certificate is valid until September 10, 2029 subject to continued compliance with the requirements of the Society's Rules.

Issued at Yalova

Issued on October 30, 2024

中国船级社 C2 11 CHINA CLASSIFICATION SOCIETY

(Chen Yu)
Designated Surveyor to
China Classification Society

Notes: 1.To establish the classification status or the main characteristic particulars and details of the ship, the Register of Ships uploaded on the Class official website can be consulted. Access to Class official website is available via http://www.ccs.org.cn

Declarations: 1.This Certificate is issued under the applicable Classification Rules of this Society, and solely reflects the condition of the vessel at the time of the survey.Nothing contained in this Certificate shall be deemed to relieve any designer, builder, owner, seller, supplier, repairer, operator or other entity of any obligations express or implied. The general terms and conditions in the applicable Rules of this Society govern this Certificate. Unless otherwise agreed with this Society, any dispute arising from or in connection with the services provided by this Society shall be submitted to China Maritime Arbitration Commission for arbitration which shall be conducted in accordance with the commission's arbitration rules in effect at the time of applying for arbitration. The arbitral award is final and binding upon both parties. The laws of the People's Republic of China apply.
2. This certificate and relevant information cannot be used in connection with the sale of ship without permission of the Society.