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September 17, 2024

Company name: Hitachi Zosen Corporation  
Representative: Michi Kuwahara, President and COO  
(Securities code: 7004; Prime Market, Tokyo Stock Exchange)  
Inquiries: Hiroshi Miyazaki, Executive Officer,  
General Manager, Corporate Planning  
Department  
Telephone: +81-6-6569-0005

### (Progress of Disclosed Matters) Notice of Inappropriate Conduct in the Marine Engine Business of Hitachi Zosen Group

Hitachi Zosen Corporation (hereinafter the “Company”) hereby announces that today it submitted the “Investigation Report (1st Report/Interim Report),” a summary of the facts that have come to light at present in regard to the inappropriate conduct announced in “Notice of Inappropriate Conduct in the Marine Engine Business of Hitachi Zosen Group” dated July 5, 2024, to the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism.

The “Investigation Report (1st Report/Interim Report)” submitted as above is a compilation by the Company, Hitachi Zosen Marine Engine Co., Ltd., and IMEX Co., Ltd. of the findings of internal investigations carried out within each of the companies and the progress of the investigation reported by the Special Investigation Committee, which was established on July 17, 2024. The aforementioned internal investigations and investigation by the Special Investigation Committee are ongoing. Going forward, the entire Hitachi Zosen Group will work together to prevent recurrence of such incidents, based on the findings of the investigations.

We would like to express our sincere apologies once again to all of our stakeholders for the significant loss of trust and for causing considerable inconvenience and concern.

If any impact of this matter on the financial results is anticipated based on future investigation findings, the Company will immediately make an announcement.

#### **Attached material**

Investigation Report (1st Report/Interim Report) dated September 17, 2024.

End

September 17, 2024

To: Shipbuilding and Ship Machinery Division,  
Ocean Development and Environment Policy Division,  
and Inspection and Measurement Division,  
Maritime Bureau, Ministry of Land, Infrastructure, Transport and Tourism

Hitachi Zosen Corporation  
Hitachi Zosen Marine Engine Co., Ltd.  
IMEX Co., Ltd.

Investigation Report (1st Report/Interim Report)

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## 1. Background of the investigation

### 1.1 Background of the investigation

On April 24, 2024, the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism issued a reminder to marine engine manufacturers about the importance of thoroughly complying with environmental and safety regulations and the need for proper business operations related to the manufacturing of marine engines. In response, Hitachi Zosen Corporation (hereinafter “**Hitachi Zosen**”), and its consolidated subsidiaries, Hitachi Zosen Marine Engine Co., Ltd. (which succeeded Hitachi Zosen’s marine engine business as of April 1, 2023; hereinafter “**HZME**”), as well as IMEX Co., Ltd. (hereinafter “**IMEX**”), immediately commenced an internal investigation, during which it was discovered that inappropriate conduct concerning fuel consumption and other matters was being conducted at HZME and IMEX.

Hitachi Zosen, HZME, and IMEX have taken this situation seriously, conducted further internal investigations, and on July 17, 2024, Hitachi Zosen established a Special Investigation Committee by a resolution of the Board of Directors to conduct an investigation into such inappropriate conduct in order to ensure transparency and effectiveness (see 9 below).

This interim report has been compiled by Hitachi Zosen, HZME, and IMEX based on the results of the internal investigations conducted by Hitachi Zosen, HZME, and IMEX, as well as the progress of the investigation reported by the Special Investigation Committee up to September 10, 2024 (hereinafter the “**interim report preparation date**”).

As of the interim report preparation date, no issues that would raise safety concerns during test operations or actual use of the engines under investigation (defined in 2.2 below) have been identified. In addition, because both the internal investigation and the investigation by the Special Investigation Committee are ongoing as of the interim report preparation date, the contents of this interim report may be subject to change based on future investigations.

### 1.2 Main timeline

April 24	Reminder issued by the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism
From April 25	Internal investigation at HZME and IMEX
June 15	Report to Hitachi Zosen on inappropriate conduct concerning fuel consumption, etc. at HZME and IMEX
July 5	Report to the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism that inappropriate conduct concerning fuel consumption, etc. had been discovered.

	Timely disclosure “Notice of Inappropriate Conduct in the Marine Engine Business of Hitachi Zosen Group” published
July 17	Special Investigation Committee established
September 17	Submitted this interim report to the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism

## 2. Scope of investigation

### 2.1 Locations under investigation

An internal investigation was conducted at HZME (Ariake Works, Kumamoto Prefecture) and IMEX (Innoshima Works, Hiroshima Prefecture), which manufacture marine engines in the Hitachi Zosen Group.

### 2.2 Engines under investigation

In the inappropriate conduct concerning fuel consumption, it was found that data related to fuel consumption was altered, and that such altering of fuel consumption data affected the calculation of NOx (nitrogen oxides) emissions. Regulations on NOx emissions were introduced in Japan in January 2000 following the amendment of the Act on Prevention of Marine Pollution and Maritime Disaster. For HZME, engines that underwent shop trial tests from July 1999 onwards, and for IMEX, engines that underwent shop trial tests from September 1999 onwards, were subject to the relevant regulations, and therefore the internal investigation was conducted on engines listed in the table below (hereinafter the “**engines under investigation**”).

HZME	Marine engines that underwent shop trial tests between July 1999 and June 2024 and for which NOx emission regulatory limits <sup>*1</sup> have been applied to vessels under construction since January 1, 2000 (959 units in total; 244 parent engines, 715 member engines)
IMEX	Marine engines that underwent shop trial tests between September 1999 and June 2024 and for which NOx emission regulatory limits have been applied to vessels under construction since January 1, 2000 (416 units in total; 103 parent engines, 313 member engines)

\*1 In May 2005, Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL) was entered into force for the purpose of preventing air pollution caused by the exhaust gas of vessels, and Tier I regulations regarding the emission of nitrogen oxides (NOx), sulfur oxides (SOx) and particulate matter (PM) commenced. Later, a revision to Annex VI of the same Convention was adopted at MEPC58 held in October 2008, according to which NOx emission regulatory limits that are 15.5 to 21.8% lower than the Tier I regulatory limits have been adopted since 2011 (Tier II regulations), and for specified marine areas related to NOx emission regulatory limits (NOx-ECA: Emission Control

Areas), emission regulatory limits 80% lower than the Tier I regulatory limits have been adopted since 2016 (Tier III regulations).

NOx emission volume is confirmed by NOx appraisal tests, in which in the event that multiple engines with the same design characteristics are to be built, the actual fuel consumption, shaft torque, exhaust gas concentration, etc. are measured on a test bed by a representative engine chosen from among the engines (called the “parent engine”), and NOx emission volume is calculated from those actual measurements. If the NOx emission volume thus calculated is below the emission limit, a certificate is issued for the parent engine. For the other engines (called the “member engines”), a certificate stating the same NOx emission volume as the parent engine is issued on the condition that they are configured identically to the parent engine. This practice is in conformity with the IMO NOx Technical Code.

Table 2-1 Engines under investigation (units)

Company name	Japan-flagged vessels	Foreign-flagged vessels	Total
HZME	52	907	959
IMEX	20	396	416
Total	72	1,303	1,375

### 3. Investigation system

On April 24, 2024, the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism issued a reminder about the importance of complying with environmental and safety regulations and the need for proper business operations, and HZME and IMEX began an internal investigation. The investigation was led by the Representative Director, Presidents of HZME and IMEX, and the officers in charge of the engine performance and quality assurance departments conducted interviews with operations staff, and also checked the storage status of related data and closely examined its contents. After announcing the inappropriate conduct on July 5, 2024, a Crisis Management Task Force led by the Representative Director, President of Hitachi Zosen was immediately established to investigate the facts, including compliance with regulations regarding NOx emissions, etc., identify the causes of the incident, formulate measures to prevent recurrence, and respond to related businesses.

#### Structure of Crisis Management Task Force:

Head	Hitachi Zosen	Representative Director, President
Members	Hitachi Zosen	Director Responsible for Corporate Planning Headquarters

Hitachi Zosen	Senior Managing Executive Officer Responsible for Quality Assurance Department
Hitachi Zosen	Executive Officer Responsible for General Administration Headquarters
Hitachi Zosen	Executive Officer Responsible for Corporate Planning Department, Corporate Planning Headquarters
Hitachi Zosen	Executive Officer Responsible for Carbon Neutral Solution Business Headquarters
Hitachi Zosen	General Managers of departments of Head Office
HZME	Representative Director, President (note)
IMEX	Representative Director, President (note)

(Note) HZME and IMEX have formed an internal working group to investigate and respond to related businesses.

#### 4. Method of investigation

##### 4.1 Investigation of data

##### 4.1.1 Method of investigation for the fuel consumption rate

For the engines under investigation described above, an investigation was conducted to assess the consistency between the values recorded in the test reports submitted to the customer or the classification society as a result of shop trial tests<sup>\*2</sup> (hereinafter the “**submitted recorded values**”) and the values stored internally as a result of internal verification operations<sup>\*3</sup> (hereinafter the “**internally measured values**”). Where handwritten data temporarily recorded on paper by operations staff during the shop trial test or internal verification operations remained (hereinafter the “**handwritten data**”), the consistency between this handwritten data and both the submitted recorded values and internally measured values was also investigated. Based on these investigations, the value of the fuel consumption rate during internal verification operations will be compared with the value stated in the specifications agreed upon with the customer (hereinafter the “**guaranteed value**”).

\*2 Operation to check engine performance in the presence of the customer and the classification society

\*3 Internal operation to check engine performance prior to the shop trial test

##### 4.1.2 Method of investigation for confirmation of NOx emissions

In confirming NOx emissions, the fuel consumption rate and exhaust gas component concentrations (NOx, CO<sub>2</sub>, CO, O<sub>2</sub> and THC in the exhaust gas) values are used. For this reason,



an investigation was conducted to assess the consistency between the submitted recorded values and internally measured values for fuel consumption rate, exhaust gas component concentrations, and general performance measurement data (cylinder pressure, intake air temperature, exhaust gas temperature, etc.) for the engines under investigation described above. As with 4.1.1 above, where the handwritten data related to the fuel consumption rate recorded during the shop trial test or internal verification operations remained, the consistency between this handwritten data and both the submitted recorded values and internally measured values was also investigated. For exhaust gas component concentrations, an investigation was conducted on the consistency between the log data (concentration waveform), in which the actually measured values were recorded, and the submitted recorded values.

#### 4.1.3 Other methods (method of investigation for impact on EEDI, EEXI and engine safety)

For vessels currently in operation and engaged in international voyages, the EEXI Regulation<sup>\*4</sup>, which came into effect in 2023, applies, and to vessels linked to shipbuilding contracts in 2013 and thereafter, the EEDI Regulation<sup>\*5</sup> also applies. Because the calculation of EEDI and EEXI involves not only the fuel consumption rate and output value of the main engine but also the fuel consumption rate of auxiliary engines, propulsion efficiency improvement and energy-saving devices, cargo capacity, and ship speed, the presence and extent of any impact are currently being verified. The engines subject to this verification are those engines used for vessels engaged in international voyages (HZME: 954 units, IMEX: 398 units) out of the engines under investigation.

##### \*4 Energy Efficiency Existing Ship Index

A framework for evaluating the entire-vessel energy efficiency of specific types of vessels that exceed 400 gross tonnage engaged in international voyages.

##### \*5 Energy Efficiency Design Index

A method of indexing the CO<sub>2</sub> emission volume of new vessels that exceed 400 gross tonnage engaged in international voyages as “the number of grams of CO<sub>2</sub> estimated to be emitted in order to carry 1 ton for 1 mile under constant conditions” to differentiate the fuel performance of vessels.

Engines that have an impact on safety have currently not been discovered.

#### 4.2 Interview investigation

An interview investigation was conducted with executives and employees involved of HZME and IMEX, as well as former executives and employees of Hitachi Zosen and IMEX. The subjects of the interview investigation and the matters investigated were as follows.

##### (1) Subjects

A total of 47 people, consisting of 32 executives and employees and 15 retired executives and employees involved in engine test operation, recording of measurement data, performance evaluation, and preparation of test reports were subject to interviews.

(2) Matters investigated

- i) Perceptions of the inappropriate conduct
- ii) When the inappropriate conduct began
- iii) Involvement in the inappropriate conduct
- iv) Whether or not the inappropriate conduct was discussed with or pointed out to a supervisor or coworker
- v) Specifics of the inappropriate conduct
- vi) Causes and prevention methods of the inappropriate conduct
- vii) Knowledge, awareness, etc. of NOx emissions, fuel consumption rates, safety impacts, etc.

5. Results of the investigation (as of the interim report preparation date)

5.1 Content of the inappropriate conduct

Both HZME and IMEX were found to have committed the following forms of inappropriate conduct in connection with the shop trial test.

5.1.1 Fuel consumption

During internal verification operations, if the fuel consumption rate did not meet the guaranteed value, or even if it did meet the guaranteed value, there was a possibility that the measured values might not fall within a certain range during the shop trial test due to factors such as changes in the engine testing environment (ambient temperature and humidity) and other factors. For this reason, inappropriate conduct was conducted by displaying a pre-set fuel consumption on the fuel weight meter with a setter device with the function of displaying any set value for the fuel consumption on the operational indicator externally connected to that fuel weight meter. As a result of the above, the actual fuel consumption during the shop trial test is not available as data. Through interviews with the involved parties, it was confirmed that no inappropriate conduct concerning the fuel consumption was conducted during internal verification operations.

5.1.2 Exhaust gas component concentrations

During the shop trial test, exhaust gas component concentrations were measured using an exhaust gas analyzer, and NOx emissions were calculated based on the values of these exhaust

gas component concentrations. However, it was revealed that purposely altered values or erroneous values of exhaust gas component concentrations were entered into the calculation sheet for NOx emissions.

#### 5.1.3 Water brake load displayed value

After the engines are assembled, they are connected to the water brake, and then the engine performance adjustment operations, internal verification operations and shop trial tests are carried out. The engine output is calculated based on the relationship between the load values of the load cell attached to the water brake and the rotational speed of the shaft.

In the engine performance adjustment operations, the parts that affect the opening and closing timing and the performance of the fuel and exhaust valves are adjusted so that the various performance values of the engine under each load\*<sup>6</sup> match the respective design values (performance values set by the licensor).

In addition, for the performance curves based on the design values and for electronically controlled engines, the performance is confirmed using the indicated mean effective pressure. However, due to the impact of measurement errors, the precision in connecting the engine and other factors, there were cases where the output was not correctly reflected in the measurement system and the displayed value was adjusted using the water brake load measurement system's function in order to be consistent with the engine performance values.

\*<sup>6</sup> Engine performance is verified for specified loads of 25%, 50%, 75%, 100%, etc.

#### 5.1.4 Other general engine performance measurement data

During the shop trial test and internal verification operations, the measurement staff at the site first recorded the measured data related to engine performance on paper as handwritten data, after which the performance department staff at HZME and the engineering department staff at IMEX input this handwritten data into calculation sheets. However, it was found that some general performance measurement data other than the fuel consumption, exhaust gas component concentrations, and water brake load displayed value on the calculation sheets were inconsistent with the handwritten data. This content includes cases other than purposeful alteration, such as erroneous input and re-measurement without revising the handwritten data of the former measurement.

#### 5.2 Impact of the inappropriate conduct

A breakdown of the inappropriate conduct described in 5.1 above is shown in Table 5-1. Accordingly, the following impacts on the fuel consumption rate and NOx emissions were identified.

Table 5-1 Number of engine units involved in the inappropriate conduct (units)

Inappropriate conduct	Number of units for which it was confirmed that there was inappropriate conduct		Number of units for which it was confirmed that there was no inappropriate conduct		Number of units for which it could not be confirmed whether there was inappropriate conduct	
	HZME	IMEX	HZME	IMEX	HZME	IMEX
Fuel consumption	959	412	0	4	0	0
Exhaust gas component concentrations	343	57	616	359	0	0
Water brake load displayed value	*7 569	*7 52	248	118	*9 142	*9 246
General performance data	*8 111	*8 189	0	0	*10 848	*10 227

\*7 Number of engine units for which the displayed value was adjusted.

\*8 Number of engine units for which there were differences between the handwritten data and the values entered into the calculation sheet.

\*9 Number of engine units for which there are no remaining data on displayed-value adjustment.

\*10 Number of engine units for which there are no remaining handwritten data.

### 5.2.1 Impact on the fuel consumption rate

Due to the inappropriate conduct mentioned in 5.1, the fuel consumption rate calculated based on these values was also not correct. The engines that did not have a correct fuel consumption rate value were all 959 units at HZME and 413 units out of 416 units at IMEX, and a breakdown is shown in Table 5-2 below.

Table 5-2 Engines that did not have a correct fuel consumption rate value (units)

Company name	Japan-flagged vessels	Foreign-flagged vessels	Total
HZME	52	907	959
IMEX	19	394	413
Total	71	1,301	1,372

### 5.2.2 Impact on NOx emissions

Due to the inappropriate conduct mentioned in 5.1, the NOx emissions calculated based on these values were also not correct. The engines that did not have a correct NOx emissions value were all 959 units at HZME and all 416 units at IMEX, and a breakdown is shown in Table 5-3 below.

Table 5-3 Engines that did not have a correct NOx emissions value (units)

Company name	Japan-flagged vessels	Foreign-flagged vessels	Total
HZME	52 (31)	907 (213)	959 (244)
IMEX	20 (13)	396 (90)	416 (103)
Total	72 (44)	1,303 (303)	1,375 (347)

The number in parentheses ( ) indicates the number of cases where the NOx emissions were confirmed.

However, in cases where foreign-flagged vessels have members that are Japan-flagged vessels, the number is included in the number of cases for Japan-flagged vessels.

### 5.2.3 Data used for assessing the impact

This inappropriate conduct affected the NOx emissions calculated using the submitted recorded values from the shop trial tests. Therefore, we will quickly identify the correct values for the fuel consumption rate, etc., and recalculate the NOx emissions based on those values in order to evaluate whether the emissions comply with the regulatory limit.

With respect to the method for recalculating the NOx emissions, while we are considering the following proposal, we will proceed appropriately in consultation with the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism.

#### Method for recalculating the NOx emissions

- For the fuel consumption, the internally measured values from the internal verification operations will be used. (For four of the 416 units at IMEX, the submitted recorded values will be used.) Regarding the internally measured values, although inappropriate conduct was not found based on the interview investigation as of the interim report preparation date, the reliability of these values as data will be further verified from a technical standpoint. In this verification, we will conduct a comparative analysis of the submitted recorded values, other than the fuel consumption, and the various performance values (exhaust gas temperature, cylinder pressure, etc.) of the internally measured values. Regarding engines for which there were no internally measured values related to the fuel consumption from the internal verification operations, we will consider a separate evaluation method.
- For the engine output, the submitted recorded values will be used. This is because we determined based on an analysis that, for scavenging pressure, turbocharger outlet exhaust gas temperature, peak cylinder pressure and other various performance parameters and for electronically controlled engines, the engine output is equivalent to the designed output if the measured values related to indicated mean effective pressure are within the tolerance limits of the design values. Regarding errors related to the water brake measurement system,

we believe that measurement errors, the precision in connecting the engine and other factors may have had an impact. Going forward, we will verify the extent of the impacts of those measurement errors, etc.

- For exhaust gas component concentrations, the log data (concentration waveform), in which the actually measured values from the shop trial tests were recorded, will be used for the engines for which there was inappropriate conduct.

## 6. Cause of inappropriate conduct

The causes of the inappropriate conduct mentioned in 5 above are described below based on the facts known as of the interim report preparation date, which include the direct causes of (1) the improper rewriting of fuel consumption measurement data, (2) the improper rewriting of exhaust gas component concentration measurement data, (3) the adjustment of water brake load displayed values, and (4) the improper rewriting of data concerning general engine performance, as well as organizational causes of the failure to correct the inappropriate conduct (1) through (4).

### 6.1 Direct causes

#### 6.1.1 Improper rewriting of fuel consumption data

##### (1) Difficulty obtaining consistent measurements satisfying the guaranteed value

Depending on factors such as the engine model, testing environment (ambient temperature and humidity), and performance of the test equipment, the results of engine fuel consumption measurement varied, and it was sometimes impossible to consistently obtain measurement results that satisfied the fuel consumption rate set by the licensor and the guaranteed value set based on this rate. Therefore, in order to prevent delivery delays to customers, data on fuel consumption, which is one of the bases for calculating fuel consumption rate, was improperly rewritten.

##### (2) The objective of consistency with measurement results submitted to customers in the past

We further engaged in improper rewriting of measurement results because we believed that failure to submit results that were consistent with the measurement results we had submitted to customers for the same type of engines in the past could lead to the customers' complaints, refusal to accept the engines or detection of the improper rewriting of measurement results in the past.

#### 6.1.2 Improper rewriting of exhaust gas component concentration measurement data

- (1) The objective of reducing the impact of changes in the measured values

In cases where the measured values of exhaust gas component concentrations had changed since the internal verification operations due to the impact of the testing environment during the shop trial tests (ambient temperature and humidity) and other factors, the recorded values of the component concentrations were sometimes rewritten in order to suppress the impact of that change.

- (2) There was no system, other than the appointed measurement personnel, to check measurement results

The measured and recorded values of exhaust gas component concentrations were handled only by the on-site measurement staff, and the appointed personnel of the performance department at HZME, and of the design department at IMEX, and there was no system by which the quality assurance department checked the accuracy of each value or the consistency between the values.

#### 6.1.3 Adjustment of water brake load displayed values

Due to the impact of errors and other factors, it is believed that there were cases where the engine output was not correctly reflected in the displayed value of the water brake load measurement system. In such cases, after confirming consistency with the engine performance values, the displayed value on the load cell was adjusted so that the displayed value of the water brake load measurement system aligned with the engine output.

#### 6.1.4 Improper rewriting of data concerning general engine performance

- (1) The objective for the measured values to approximate the design values

In cases when there was a difference between the measured values and the design values of exhaust gas temperature, etc. or irregularity in various temperatures and pressures for each cylinder for the general performance of the engine, it was possible that it could lead to the customers' complaints or refusal to accept the engines, so the measured values were sometimes improperly rewritten to approximate the design values.

- (2) There was no system to verify the consistency between the measured values and the inputted values

The measured values for engines' general performance and values input when creating the calculation sheet were handled only by the on-site measurement staff, and the appointed personnel of the performance department at HZME, and of the engineering department at

IMEX, and there was no system by which the quality assurance department verified the accuracy of each value or the consistency between the values.

## 6.2 Organizational causes of failure to correct inappropriate conduct

According to the results of the investigation to date, the reasons for the failure to correct the inappropriate conduct include: (i) in some cases, the fuel consumption rate varied depending on factors such as the engine model, testing environment, and performance of the test equipment, and it was difficult to consistently achieve the setting value of the licenser; (ii) even in the situation described in (i), the guaranteed value specified in contracts with customers had to be satisfied; and (iii) failure to allow sufficient leeway in the manufacturing process.

Organizational causes of those problems include: (i) each department's work was specialized, and the closed nature of the vertically siloed organization could not be avoided; (ii) inappropriate conduct was integrated into the business process and persisted, and functions to identify and correct such risks were weak; (iii) training and efforts for spreading awareness regarding laws and regulations concerning environmental regulations were insufficient; and (iv) organizational efforts for fostering compliance awareness were insufficient.

## 7. Measures to prevent recurrence

### 7.1 Measures to prevent recurrence regarding measurement systems and processes

#### 7.1.1 Improper rewriting of fuel consumption data

The externally connected setter device that could rewrite the results of fuel consumption measurements to any desired value has been removed, and the function of displaying any setting value on the operational indicator has been deleted.

The process has been amended so that the calibration and the modifications of the fuel weight meter is conducted by a third-party, which has made it possible to verify that the calibration value is maintained during shop trial tests in the presence of customers and ship classification surveyors. In addition, operations have been revised to confirm before and after measurement that the measured value of the load cell and the value displayed on the operational indicator are in agreement, and to record this information in a photograph.

#### 7.1.2 The processes of measuring the exhaust gas component concentrations and general performance

Because the processes for measurement operations were not set forth with clarity and did not have clear written guidelines, these processes have been clarified and clear documentation has been



written, including the addition of a process enabling the measured values to be reliably recorded. Specifically, revisions have been made to the series of processes involved in the measurements and creating input data based on those measurements that were previously carried out by the on-site measurement staff, and the appointed personnel of the performance department at HZME, and of the design department or engineering department of IMEX, and now, the new process has been adopted in which the appointed personnel of the quality assurance department confirms the consistency between the measured value and input data and ensures evidence of such confirmation remains.

#### 7.1.3 Adjustment of water brake load displayed values

The software program responsible for the function that allowed the load value to be adjusted to any desired value has been modified and this function was removed to prevent such adjustment. We plan to have a third-party confirm that the software modification was performed through the proper processes.

In addition, a new indicator was installed and load cell load values are displayed on the indicator to confirm that there is no difference from the values displayed on the control panel touch panel.

With respect to improving the measurement accuracy, the procedures for the calibration and the modifications of the water brake have been written down and amended so that they are conducted by a third-party, which has made it possible to verify that the calibration value is maintained during shop trial tests in the presence of customers and ship classification surveyors. In addition, operations have been revised to take a photographic record of the respective displayed value before and after measurement as part of the control process.

To improve the precision in connecting the engines, the work procedures and specified values will be reviewed and written down and thorough management will be conducted. We will verify the effect of the improvement by confirming the engine output using a shaft output meter or other instrument.

#### 7.1.4 Automation of measurement and data record-keeping

In order to eliminate the risk of inappropriate conduct as a result of operations being performed by a person, the construction of an automated system is under consideration for the measurement, and the record and storage of such measured data. In that consideration, priority is given to construction of such automated system for the fuel weight meter, exhaust gas analyzer, and water brake related to the inappropriate conduct revealed in this incident.

## 7.2 Toward radical measures to prevent recurrence

We will implement measures to prevent recurrence, including revising the quality control system of Hitachi Zosen.

In addition, a Special Investigation Committee consisting of outside experts has been established to identify root causes and formulate and implement radical measures to prevent recurrence, and we are fully cooperating with the committee's investigation. Going forward, we will take effective preventive measures to address the root causes based on the findings of the Special Investigation Committee, including the "organizational causes of failure to correct inappropriate conduct" mentioned in 6.2.

## 8. Responses to customers

HZME and IMEX customers (shipyards, shipowners, shipping companies, etc.) have been informed of inappropriate conduct concerning fuel consumption and other matters and provided explanation.

In addition, we have received approximately 280 inquiries from customers as of September 10, 2024, and we are taking these inquiries seriously. Inquiries mainly concern the impact on the navigation of vessels in operation and the impact on the shipment and delivery of engines. We will continue to provide honest and conscientious customer service.

## 9. Investigation by the Special Investigation Committee

On July 17, 2024, Hitachi Zosen decided to establish a Special Investigation Committee to ensure a transparent and effective investigation into the matter. The Special Investigation Committee is proceeding with its investigation independent of Hitachi Zosen, HZME and IMEX, through a close examination of documents (internal regulations, organization charts, minutes, measurement record data, process charts, etc.), site visits (HZME (conducted on August 1, 2024) and IMEX (conducted on August 6, 2024)) and interviews with relevant personnel (conducted with 18 persons as of August 20).

### Special Investigation Committee Members

Committee Chair	Toshihiko Itami	(Attorney at Law, Nagashima Ohno & Tsunematsu)
Committee member	Tetsuya Sogi	(Attorney at Law, Nagashima Ohno & Tsunematsu)
Committee member	Daisuke Fukamizu	(Attorney at Law, Nagashima Ohno & Tsunematsu)

In addition, the Special Investigation Committee has appointed the following two technical advisors and, going forward, the committee plans to proceed with specific investigations and verifications while receiving advice and cooperation from a technical standpoint.

Technical Advisor	Minoru Tsuda	(Professor, the National Research and Development Agency, Japan Fisheries Research and Education Agency, National Fisheries University)
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Technical Advisor	Kazuyuki Maeda	(Visiting Researcher, the National Research and Development Agency, Japan Fisheries Research and Education Agency, Professor Emeritus, National Fisheries University)
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(Note) Attorneys from Nagashima Ohno & Tsunematsu are assisting in the investigation

We have asked that they continue to conduct a thorough investigation into the matter and its causes and make recommendations regarding measures to prevent recurrence of such inappropriate conduct. For Hitachi Zosen, we will also construct a system to implement thorough measures.

End