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December 25, 2024

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(Progress of Disclosed Matters) Notice of Inappropriate Conduct in the Marine Engine Business of Kanadevia Group

Kanadevia Corporation (hereinafter the “Company,” which changed its name from Hitachi Zosen Corporation as of October 1, 2024) hereby announces that today it submitted the “Investigation Report” to the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism, regarding the inappropriate conduct announced in “Notice of Inappropriate Conduct in the Marine Engine Business of Hitachi Zosen Group” dated July 5, 2024 (hereinafter “this Matter”).

The “Investigation Report” is a revised compilation by the Company, Hitachi Zosen Marine Engine Co., Ltd., and IMEX Co., Ltd. of the facts, specific corrective measures, and efforts towards preventing recurrence regarding this Matter, taking into account the findings from various investigations conducted after submitting the “Investigation Report (1st Report/Interim Report)” dated September 17, 2024.

Regarding this Matter, as stated in item 8 of the attached material “Investigation Report,” our group is already working on preventing recurrence. Furthermore, based on the investigation results and recommendations for preventive measures that our group expect to receive in the future from the Special Investigation Committee, which was established on July 17, 2024 and is composed of external experts independent of our group, our group intend to implement more fundamental measures to prevent recurrence.

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 by the Special Investigation Committee, the Company will immediately make an announcement.

Attached material

Investigation Report dated December 25, 2024.

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End

December 25, 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

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

Investigation 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, Kanadevia Corporation (which changed its company name from Hitachi Zosen Corporation on October 1, 2024; hereinafter “**Kanadevia**” including the period prior to the change of the company name for easier reading), and its consolidated subsidiaries, Hitachi Zosen Marine Engine Co., Ltd. (which succeeded Kanadevia’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.

Kanadevia, HZME, and IMEX have taken this situation seriously, conducted further internal investigations, and on July 17, 2024, Kanadevia established a Special Investigation Committee which consists of external experts independent of the Kanadevia group by a resolution of the Board of Directors and the Special Investigation Committee started an investigation into such inappropriate conduct while ensuring transparency and effectiveness. In addition, Kanadevia, HZME, and IMEX submitted the Investigation Report (1st Report/Interim Report) (hereinafter the “**interim report**”) to the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism on September 17, 2024.

This investigation report is a revised compilation by Kanadevia, HZME and IMEX of the facts, specific corrective measures and efforts towards preventing recurrence regarding the inappropriate conduct concerning fuel consumption and other matters, taking into account the findings from various investigations conducted after the submission of the interim report. As of the date of this investigation report, 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.

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 Kanadevia 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 the interim report to the Maritime Bureau of the Ministry of Land, Infrastructure, Transport and Tourism
December 25	Submitted this investigation 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 Kanadevia 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 not only the fuel consumption rate but also the calculation of NOx (nitrogen oxides) emissions. Regulations on NOx emissions were introduced in January 2000 following the amendment of the Act on Prevention of Marine Pollution and Maritime Disaster. For HZME, engines that underwent official shop trials from July 1999 onwards, and for IMEX, engines that underwent official shop trials 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 official shop trials between July 1999 and June 2024 and for which NOx emission regulatory limits ^{*1} 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 official shop trials 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 Kanadevia 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	Kanadevia	Representative Director, President
Members	Kanadevia	Director Responsible for Corporate Planning Headquarters
	Kanadevia	Senior Managing Executive Officer Responsible for Quality Assurance Department
	Kanadevia	Executive Officer Responsible for General Administration Headquarters
	Kanadevia	Executive Officer Responsible for Corporate Planning Department, Corporate Planning Headquarters
	Kanadevia	Executive Officer Responsible for Carbon Neutral Solution Business Headquarters
	Kanadevia	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 and conducted the investigations and responded 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, since the fuel consumption rate affects the NOx emissions, EEDI or EEXI, 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 official shop trials^{*2} (hereinafter the “**submitted recorded values**”) and the actually measured values in internal verification trials^{*3} (hereinafter the “**internally measured values**”). With respect to the 88 units (including 3 Japan-flagged vessels) whose handwritten data temporarily recorded on paper by operations staff during the official shop trials or internal verification trials remained (hereinafter the “**handwritten data**”), we considered the handwritten data as internally measured values and investigated the consistency with the submitted recorded values.

*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 official shop trial

4.1.2 Method of investigation for confirmation of NOx emissions

In confirming NOx emissions, values of NOx concentration in the exhaust gas, fuel consumption rate, other exhaust gas component concentrations (excluding NOx) and surrounding environmental conditions (such as temperature, humidity and atmospheric pressure) 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, scavenging air temperature, exhaust gas temperature, etc.) for the engines under investigation described above. As with 4.1.1 above, with respect to the fuel consumption rate, we consider the handwritten data as the internally measured values and investigated the consistency with the submitted recorded values. For exhaust gas component concentrations, an investigation was conducted on the consistency between the log data (concentration waveform) recording the actually measured values (and the measurement results received from external sources during the period when measurements were outsourced) and the submitted recorded values.

4.1.3 Method of investigation for impact on EEDI and EEXI

For vessels currently in operation and engaged in international voyages, the EEXI Regulation^{*4}, which came into effect in 2023, applies, and to vessels linked to shipbuilding contracts in 2013 and thereafter, the EEDI Regulation^{*5} 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, we are proceeding the assessment supported by the classification society. Furthermore, we plan to provide the relevant data to customers (shipyards, shipowners and ship management companies) for their verification. 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 CO₂ emission volume of new vessels that exceed 400 gross tonnage engaged in international voyages as “the number of grams of CO₂ estimated to be emitted in order to carry 1 ton for 1 mile under constant conditions” to differentiate the fuel performance of vessels.

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 Kanadevia and IMEX. The subjects of the interview investigation and the matters investigated were as follows.

(1) Subjects

A total of 84 people, consisting of a total of 69 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 NO_x emissions, fuel consumption rates, safety impacts, etc.

5. Results of the investigation

5.1 Content of the inappropriate conduct

Both HZME and IMEX committed the following forms of inappropriate conduct in connection with the official shop trial.

5.1.1 Fuel consumption

At the official shop trial, the inappropriate conduct was conducted such as 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. Through interviews with the involved parties, no tampering with the internally measured values including the handwritten data concerning the fuel consumption during internal verification trials have been found.

5.1.2 Exhaust gas component concentrations

At the official shop trial, 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, purposely altered values, erroneous values and so on 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 trials and official shop trials are carried out. The engine output is calculated based on the relationship between torque calculated based on 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 performance are adjusted so that the various performance values of the engine under each load*⁶ match the performance values set by the licensor (hereinafter the “**design values**”). During the engine performance adjustment operations, the displayed load value (torque) was adjusted using the water brake load measurement system’s function for purposes such as consistency with the design values. It was revealed through the investigation at this time that there were cases where the engine output was not correctly reflected in the measurement system due to the effect of calibration method of the water brake conducted by HZME and IMEX.

*⁶ Engine performance is verified for specified loads of 25%, 50%, 75%, 100%, etc.

5.1.4 General engine performance measurement data

During the official shop trial and internal verification trial, the measurement staff at the site first makes the handwritten data related to the measured engine performance, after which the performance department staff at HZME and the engineering department staff at IMEX input this handwritten data into calculation sheets. However, there were some general performance measurement data other than the fuel consumption, exhaust gas component concentrations, and water brake load displayed value on the calculation sheets which 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 whose data could not be identified	
	HZME	IMEX	HZME	IMEX	HZME	IMEX
Fuel consumption	959	412	0	4	0	0
Exhaust gas component concentrations	343	72	616	344	0	0
Water brake load displayed value*11	*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.

*11 Regarding the adjustment of water brake load displayed values based on engine performance values, as a result of investigation/verification including comparison with the engine performance values and calculated output, we have technically evaluated and confirmed the validity of the submitted recorded values, taking expert opinions into account.

5.2.1 Impact on the fuel consumption rate

Due to the inappropriate conduct mentioned in 5.1, the submitted recorded values of the fuel consumption rate calculated based on these values was inconsistent with the internally measured values. These values affect NOx emissions, EEDI or EEXI. The number of engines whose submitted recorded values of the fuel consumption rate value at the official shop trials were inconsistent with the internally measured values 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 whose fuel consumption rates are inconsistent with the internally measured values (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.

6. NOx emissions and evaluation of EEDI and EEXI and future actions

6.1 Method of recalculation of NOx emissions

The inappropriate conduct indicated in 5.1 above affected the calculation of NOx emissions using the submitted recorded values from the official shop trial. Therefore, we needed to identify the values of the fuel consumption rate, etc. to be used for assessing the impact, recalculate NOx emissions based on those values and evaluate whether the emissions comply with the regulatory limit. We consider it is deemed appropriate to use the following values and recalculated NOx emission values.

- For the value of fuel consumption, after our evaluation that the performance values of engines measured in internal verification trials and in official shop trials are equivalent, the reevaluated fuel consumption values based on the measurement environment of the official shop trial, referring to that value in the internal verification trial, were used, since the measurement

environment can affect the fuel consumption. Through the interviews with the relevant parties, no tampering with the internal measured values, including handwritten data, concerning fuel consumption have been confirmed.

- For the engine output, the submitted recorded values were used. This is because the engine output is equivalent to the designed output if scavenging pressure, turbocharger outlet exhaust gas temperature, peak pressure and other various performance parameters (for electronically controlled engines, indicated mean effective pressure) are within the tolerance limits of the design values.
- For exhaust gas component concentrations, the log data (concentration waveform), in which the actually measured values in the official shop trial are recorded, and the measurement results received from outside for the period when the measurement was outsourced were used.

6.2. Evaluation of NOx emissions and future actions

Using the data described in 6.1, we recalculated the NOx emissions and checked compliance with the regulatory values for NOx emissions (hereinafter the "**NOx regulatory values**"). The results are shown in Table 6-1 below.

Please note that this evaluation of NOx emissions is independently recalculated by HZME and IMEX, and we will continue to discuss and coordinate with our customers and the classification society.

Table 6-1 Evaluation of NOx Emissions

Company name	Classification	Japan-flagged vessels	Foreign-flagged vessels	Total
HZME	A	52 (31)	899 (209)	951 (240)
	B	0 (0)	8 (4)	8 (4)
	C	0 (0)	0 (0)	0 (0)
IMEX	A	20 (13)	364 (79)	384 (92)
	B	0 (0)	13 (3)	13 (3)
	C	0 (0)	19 (8)	19 (8)
Total	A	72 (44)	1263 (288)	1335 (332)
	B	0 (0)	21 (7)	21 (7)
	C	0 (0)	19 (8)	19 (8)

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.

The content and future actions for each evaluation classification are as follows:

- Classification A: evaluated to be compliant with the NOx regulatory values.
- Classification B: There are still concerns about compliance with the NOx regulations, and further verification is needed.
- Classification C: The fuel consumption necessary for recalculating the NOx emissions has not been identified.

Future actions for the vessels in operation:

- For Classification A, modifications to certificates related to NOx emissions and accompanying technical documents (which may include corrections on the documents to reduce the permissible range of various engine settings, if any) are necessary. After careful explanations to our customers, we will promptly amend the certificates with the cooperation of the authorities and the classification society.
- For Classification B, if detailed verification confirms non-compliance with the regulations, we will provide careful explanations to our customers and promptly take measures to ensure compliance with the regulations, with the cooperation of the authorities and the classification society.
- For Classification C, we will conduct a technical evaluation through comparison with performance values of the same or similar engine models and reference to actual data from engines onboard to determine the fuel consumption necessary for recalculating NOx emissions and consider appropriate countermeasures.

6.3. Evaluation of EEDI/EEXI and future actions

We are continuing to investigate compliance with the EEDI regulations. So far, with the cooperation of the classification society, we have investigated 903 vessels, of which 372 are subject to the EEDI regulations. For all of these we have determined that there is a high possibility of compliance with the regulations. Additionally, 14 of the 72 Japanese-flagged vessels listed in Table 2-1 are subject to the EEDI regulations, and for all of these we have determined that there is a high possibility of compliance with the regulations.

For these vessels, though they comply with the EEDI regulatory values, modifications to the certificates are necessary. We will request shipyards to apply for re-certification of certificates to the flag state and the classification society. In this process, HZME and IMEX will provide necessary

support including presenting relevant data to the shipyards and seeking cooperation from the flag states and the classification society. For the remaining vessels subject to the EEDI regulations and those subject to the EEXI regulations, we will continue evaluations with the cooperation of the classification society, shipyards and shipowners. If the evaluations indicate a possibility of non-compliance, we will strive to promptly implement measures to ensure compliance with the regulations, such as engine power limitations.

7. 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 date of this investigation report, 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).

7.1 Direct causes

7.1.1 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 in many cases of improper rewriting of fuel consumption 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.

7.1.2 Improper rewriting of exhaust gas component concentration measurement data

- (1) The objective of retaining the maximum NO_x emissions within the regulatory value applied during the normal operation

There were some cases where the maximum NO_x emissions, voluntarily calculated by HZME and IMEX based on values from normal operation (during measurement) in consideration of the margin of fluctuation in engine performance values, exceeded the regulatory value applied during the normal operation. Many of the improper rewritings of exhaust gas component concentration were conducted in such cases.

- (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.

7.1.3 Adjustment of water brake load displayed values

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, the displayed value on the load cell was adjusted so that the displayed load value of the water brake load measurement system aligned with the engine output, etc. During this investigation, we found that the primary reason for which the output was not correctly reflected on the water brake load measurement system display was that in some cases eccentric parts, etc. equipped on the engine caused a deviation in the load on the load cell from the standard load value (torque), making the displayed values smaller than the actual load values (torque), due to the calibration of the water brake being performed after it was connected to the engine.

7.1.4 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, etc., 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.

7.2 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: 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 licensor; even in these situation, the guaranteed value specified in contracts with customers had to be satisfied; and failure to allow sufficient leeway in the manufacturing process.

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

8. Measures to prevent recurrence

8.1 Measures to prevent recurrence regarding measurement systems and processes

8.1.1 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 official shop trials 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.

Based on the advice of the technical advisors, we will improve the structure of the fuel oil supply lines and return lines, as well as the procedures for fuel consumption measurement, in order to reduce variations in fuel consumption measurement.

8.1.2 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.

8.1.3 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. A third-party confirmed that the software modification was performed properly.

In addition, a new indicator was installed and load cell load values (torque) 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 procedure manual for the calibration of the water brake has been revised to clearly state that the calibration should be conducted before the water brake is connected to the engine and we make sure the record of such calibration is kept. We verify that the calibration value is maintained during official shop trials 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.

8.1.4 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 a digital automated system which prevent a tampering by an external influence during a time from measurement to output is under consideration for the

measurement, and the record and storage of such measured data. In that consideration, we have reviewed the fuel consumption measurement method and instruments in relation to the inappropriate conduct identified this time and will introduce digital measuring instruments with tamper-proof functions in FY 2025. Additionally, we will automate the exhaust gas analyzer and the output measurement system using the water brake in FY 2025, and gradually automate the general performance data as well.

8.2 Radical measures to prevent recurrence

We will implement measures to prevent recurrence, starting with the measures listed below. In addition to these efforts, we will also consider and proceed to any other necessary measures.

8.2.1 Strengthening efforts to prevent quality fraud

- (1) Since the discovery of the inappropriate conduct, from the perspective of preventing quality fraud, HZME has launched an initiative to have one-on-one meetings between the president of the company and the leaders of the various divisions in order to quickly identify issues and difficulties that the organizations and individuals are facing. In the future, the management of the company will hold regular interviews with employees to gather their real opinions and reflect them in the initiatives necessary to prevent quality fraud. IMEX is planning to establish a new group within the quality assurance department, separate from the inspection group, in order to shift its focus from the product inspection to improving the quality of operations to review its quality system and strengthen monitoring function. As in the case of HZME, IMEX are also promoting efforts to have regular interviews with employees by the management of the company in order to quickly identify issues and difficulties that organizations and individuals are facing from the perspective of preventing quality fraud.
- (2) Kanadevia, on October 1, 2024, the quality assurance department was re-organized under the direct control of the president of the company, consolidating each quality assurance department that had previously belonged to each business unit, in order to strengthen the quality control system for the entire Kanadevia group. By putting the quality assurance department under the direct control of the president, the authority of the quality assurance department will be strengthened, and cross-organizational responses will be realized, so that this department will lead radical measures to prevent quality fraud throughout the Kanadevia group.
- (3) Kanadevia will create a system that makes it easy for employees of the Kanadevia group to raise their voices, such as setting up a contact point where employees of the Kanadevia group can easily consult with about questions and concerns regarding quality fraud.
- (4) In addition, Kanadevia quality assurance department takes the lead in holding regular meetings with the Kanadevia group company's quality assurance departments to share

information and work together to raise compliance awareness including the prevention of quality fraud in the Kanadevia group.

8.2.2 Improvement of business processes

- (1) Following the discovery of the inappropriate conduct in this matter, HZME and IMEX have changed the shop trial period to allow for more time than before, in order to prevent a situation where undue emphasis on schedules could lead to misconduct.
- (2) To enable the quality assurance department to exercise a check function against the performance department in the business processes, the quality assurance department and the performance department will review the current business processes, and the quality assurance department monitors the business processes and provides feedback to the performance department to improve the business processes.

8.2.3 Reform of corporate culture and awareness

- (1) Following the discovery of the inappropriate conduct in this matter, HZME and IMEX have been working to raise awareness of compliance by, for example, a speech from the president on several occasions to foster a corporate culture that values compliance and is free from concealment.
- (2) The Kanadevia group as a whole will continue to provide education on the significance and importance of data integrity, education on quality fraud by outside experts, and education focusing on raising awareness of one's own roles and responsibilities, in order to foster a corporate culture that does not tolerate inappropriate conduct and to change the mindset of each and every employee.
- (3) We will consider and implement measures to activate personnel rotations in order to avoid organizational silos and the dependence on specific individuals for tasks.

8.2.4 Implementation of recurrence prevention measures based on the investigation results of the Special Investigation Committee.

As of the date of this investigation report, we are fully cooperating with the investigation conducted by the Special Investigation Committee, which is composed of external experts, to identify the root causes and formulate and implement radical recurrence prevention measures. 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 7.2.

9. Responses to customers

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

In addition, we have received approximately 473 inquiries from customers as of December 20, 2024, and we are taking these inquiries seriously. Inquiries mainly concern the impact on the current operation of vessels and the impact on the shipment and delivery of engines. We will continue to provide honest and conscientious customer service, including reconfirming the status of compliance with the regulations of NOx emissions and EEDI and EEXI values.

10. ISO9001

In response to this inappropriate conduct, HZME received a notice of certification cancellation from the ISO 9001^{*13} certification body on November 26, 2024, following a special audit. We are fully committed to preventing recurrence by reviewing our operational management system and restoring trust, and we will work towards promptly reacquiring the certification.

IMEX received a suspension of certification on July 30, 2024, following an temporary investigation by the ISO 9001^{*13} certification body. Subsequently, as a result of a special audit, the suspension was lifted on November 12, 2024.

*13 An internationally recognized standard for quality management systems

11. Investigation by the Special Investigation Committee

On July 17, 2024, Kanadevia 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 Kanadevia, 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 regarding this inappropriate conduct (conducted with 70 persons as of December 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 conducted on-site investigations for both IMEX and HZME in October and November 2024, performing technical verifications of engine operating conditions, measurement equipment, engine performance data, and other related aspects. Going forward, we plan to proceed with specific investigations and verifications while continuing to receive the Special Investigation Committee's advice and cooperation from a technical standpoint.

Technical Advisor Minoru Tsuda (Doctor of Engineering, Tokyo University of Marine Science and Technology, First Grade Maritime Officer (Engineering) National Fisheries University, Professor)

Technical Advisor Kazuyuki Maeda (Doctor of Engineering, Kyushu University, First Grade Maritime Officer (Engineering) National Fisheries University, Professor Emeritus)

(Note) Attorneys from Nagashima Ohno & Tsunematsu are assisting in the investigation

The investigation by the Special Investigation Committee is ongoing; however, as of the date of this investigation report, no discrepancies have been identified in the contents of this investigation report regarding the facts.

We have asked that the Special Investigation Committee 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 Kanadevia, we will also construct a system to implement thorough measures.

End