

ANNEX 17

**RESOLUTION MEPC.355(78)
(adopted on 10 June 2022)**

**2022 INTERIM GUIDELINES ON CORRECTION FACTORS AND VOYAGE
ADJUSTMENTS FOR CII CALCULATIONS (CII GUIDELINES, G5)**

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38(a) of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee (the Committee) conferred upon it by international conventions for the prevention and control of marine pollution from ships,

NOTING that the Committee, at its seventy-sixth session, adopted, by resolution MEPC.328(76), the *2021 Revised MARPOL Annex VI*, which will enter into force on 1 November 2022,

NOTING IN PARTICULAR that the *2021 Revised MARPOL Annex VI* (MARPOL Annex VI) contains amendments concerning mandatory goal-based technical and operational measures to reduce carbon intensity of international shipping,

NOTING ALSO that regulation 28.1 of MARPOL Annex VI requires ships to which this regulation apply to calculate the attained annual operational carbon intensity indicator (CII) taking into account the guidelines developed by the Organization,

NOTING FURTHER that the in adopting resolution MEPC.336(76) on the *2021 Guidelines on operational carbon intensity indicators and the calculation methods (CII Guidelines, G1)*, the Committee agreed to consider substantiated proposals for CII correction factors for certain ship types, operational profiles and/or voyages with a view to enhancing, as appropriate, the CII Guidelines (G1), before entry into force of the aforementioned amendments to MARPOL Annex VI,

RECOGNIZING that the aforementioned amendments to MARPOL Annex VI require relevant guidelines for uniform and effective implementation of the regulations and to provide sufficient lead time for industry to prepare,

HAVING CONSIDERED, at its seventy-eighth session, the draft *2022 Interim Guidelines on correction factors and voyage adjustments for CII calculations (CII Guidelines, G5)*,

- 1 ADOPTS the *2022 Interim Guidelines on correction factors and voyage adjustments for CII calculations (CII Guidelines, G5)*, as set out in the annex to the present resolution;
- 2 INVITES Administrations to take the annexed Guidelines into account when developing and enacting national laws which give force to and implement requirements set forth in regulation 28.1 of MARPOL Annex VI;
- 3 REQUESTS the Parties to MARPOL Annex VI and other Member Governments to bring the annexed Guidelines to the attention of masters, seafarers, shipowners, ship operators and any other interested parties;

4 AGREES to keep the Guidelines under review in light of experience gained with their implementation, also taking into consideration that in accordance with regulation 28.11 of MARPOL Annex VI a review of the operational measure to reduce carbon intensity of international shipping shall be completed by 1 January 2026.

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1 Introduction

1.1 These Guidelines address the corrections factors and voyage adjustments which may be applied to the calculation of the attained annual operational carbon intensity indicator (CII_{ship}) of regulation 28 of MARPOL Annex VI, and as defined by the 2022 *Guidelines on operational carbon intensity indicators and the calculation methods (CII Guidelines, G1)* (resolution MEPC.352 (78)). It should be noted that the use of correction factors and voyage adjustments should in no way undermine the goal of reducing the carbon intensity of international shipping as set out in regulation 20 of MARPOL Annex VI.

2 Definitions

For the purpose of these Guidelines, the definitions in regulation 2 of MARPOL Annex VI, as amended, apply. In addition and for the scope of these guidelines, the following definitions apply.

2.1 *MARPOL* means the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocols of 1978 and 1997 relating thereto, as amended.

2.2 *IMO DCS* means the IMO Ship Fuel Oil Consumption Database referred to in regulation 27 and related provisions of MARPOL Annex VI.

2.3 A *voyage period* is a period of time where the ship meets the criteria to apply a voyage adjustment in these Guidelines.

2.4 A *voyage adjustment* deducts relevant fuel consumption, as well as the associated distance travelled from the calculation of attained CII for a defined period subject to certain threshold conditions being met.

2.5 A *correction factor* means a factor in the numerator or denominator of the CII formula which adjusts the calculation of the attained CII.

2.6 A *refrigerated container* is an intermodal shipping container that is refrigerated (including chilled and frozen containers) or heated for the transportation of temperature-sensitive cargo, which will receive its power from the ship's power supply.

2.7 *Ice edge* is defined by paragraph 4.4. of the WMO Sea-Ice Nomenclature, March 2014 as the demarcation at any given time between the open sea and sea ice of any kind, whether fast or drifting.

2.8 A tanker should be considered in *Ship-to-Ship (STS)* operation when operating in accordance with regulation 41.2 of MARPOL Annex I and applying the best practices in accordance with the OCIMF Ship to Ship Transfer Guide for Petroleum, Chemical and Liquefied Gases. For the purpose of these guidelines, a tanker is engaged in an STS voyage if a voyage between cargo loading and cargo discharging locations, or a voyage between cargo discharging and cargo loading locations does not exceed 600 nautical miles and the time for each of these voyages (which does not include port or discharge time) is limited to 72 hours.

2.9 A *shuttle tanker* is a tanker which is equipped with dynamic positioning and specialized cargo handling equipment making it capable of loading crude oil at offshore installations.

2.10 A self-unloading bulk carrier is a bulk carrier with an onboard cargo handling system that is utilized to discharge dry bulk cargo via a boom conveyor or shipboard cargo pipeline equipment.

3 Application

3.1 For all ships to which regulation 28 of MARPOL Annex VI applies, the operational carbon intensity formula defined in section 4 should be applied when using voyage adjustments or correction factors.

3.2 Rating of ships according to the *2022 Guidelines on the operational carbon intensity rating of ships (CII Rating Guidelines G4)* (resolution MEPC.354(78)) should be carried out using the corrected attained annual operational CII.

3.3 Corrections factors for electrical related fuel consumption $FC_{electrical}$, boiler consumption FC_{boiler} , and other related fuel consumption FC_{others} should not be used for periods where voyage adjustments apply.

4 Attained annual operational CII (CII_{Ship}) formula for voyage adjustments and correction factors

Use of voyage adjustments and correction factors require changes to be made to the overall attained annual operational CII (CII_{Ship}) formula as follows:

$$\frac{\sum_j C_{Fj} \cdot \left\{ FC_j - \left(FC_{voyage,j} + TF_j + (0.75 - 0.03y_i) \cdot (FC_{electrical,j} + FC_{boiler,j} + FC_{others,j}) \right) \right\}}{f_i \cdot f_m \cdot f_c \cdot f_{VSE} \cdot Capacity \cdot (D_t - D_x)}$$

Where:

- j is the fuel type;
- C_{Fj} represents the fuel mass to CO₂ mass conversion factor for fuel type j , in line with those specified in the *2018 Guidelines on the method of calculation of the attained EEDI for new ships* (resolution MEPC.308(73) as amended by resolutions MEPC.322(74) and MEPC.332(76)), as may be further amended);
- FC_j is the total mass of consumed fuel of type j in the calendar year, as reported under IMO DCS, converted to grams;
- $FC_{voyage,j}$ is the mass (in grams) of fuel of type j , consumed in voyage periods during the calendar year which may be deducted according to paragraph 4.1 of these Guidelines;
- $TF_j = (1 - AF_{Tanker}) \cdot FC_{S,j}$ represents the quantity of fuel j removed for STS or shuttle tanker operation, where $FC_{S,j} = FC_j$ for shuttle tankers and $FC_{S,j}$ is the total quantity of fuel j used on STS voyages for STS ships. If $TF_j > 0$ then $FC_{electrical,j} = FC_{boiler,j} = FC_{others,j} = 0$;
- AF_{Tanker} represents the correction factor to be applied to shuttle tankers or STS voyages according to paragraph 4.2 of these Guidelines;
- y_i is a consecutive numbering system starting at $y_{2023} = 0$, $y_{2024} = 1$, $y_{2025} = 2$,

etc;

- $FC_{electrical,j}$ is the mass (in grams) of fuel type j , consumed for production of electrical power which is allowed to be deducted according to paragraph 4.3 of these Guidelines;
- $FC_{boiler,j}$ is the mass (in grams) of fuel type j , consumed by the boiler which may be deducted according to paragraph 4.4 of these Guidelines;
- $FC_{others,j}$ is the mass (in grams) of fuel type j , consumed by other related fuel consumption devices according to paragraph 4.5 of these Guidelines;
- f_i is the capacity correction factor for ice-classed ships as specified in the *2018 Guidelines on the method of calculation of the attained EEDI for new ships* (resolution MEPC.308(73) as amended by resolutions MEPC.322(74) and MEPC.332(76), as may be further amended);
- f_m is the factor for ice-classed ships having IA Super and IA as specified in the *2018 Guidelines on the method of calculation of the attained EEDI for new ships* (resolution MEPC.308(73) as amended by resolutions MEPC.322(74) and MEPC.332(76), as may be further amended);
- f_c represents the cubic capacity correction factors for chemical tankers as specified in paragraph 2.2.12 of the *2018 Guidelines on the method of calculation of the attained EEDI for new ships* (resolution MEPC.308(73) as amended by resolutions MEPC.322(74) and MEPC.332(76), as may be further amended);
- $f_{i,VSE}$ represents the correction factor for ship-specific voluntary structural enhancement as specified in paragraph 2.2.11.2 of the *2018 Guidelines on the method of calculation of the attained EEDI for new ships* (resolution MEPC.308(73) as amended by resolutions MEPC.322(74) and MEPC.332(76), as may be further amended), to be applied only to self-unloading bulk carriers;
- *Capacity* is deadweight or gross tonnes as defined for each specific ship type in the *2022 Guidelines on the reference lines for use with operational carbon intensity indicators (CII Reference lines Guidelines, G2)* (resolution MEPC.353(78));
- D_t represents the total distance travelled (in nautical miles), as reported under IMO DCS; and
- D_x represents distance travelled (in nautical miles) for voyage periods which may be deducted from CII calculation according to paragraph 4.1 of these Guidelines.

In case the above voyage exclusion or correction factors are applied, the ship should still report total fuel oil consumption (t) of each type of fuel, total hours under way (h) and total distance travelled (nm) to the Administration pursuant to regulation 27 of MARPOL Annex VI.

All relevant data should be recorded in the ship's logbook. Each parameter, if used, should also be reported to the Administration.

4.1 $FC_{voyage,j}$ for voyage adjustment

The parameter $FC_{voyage,j}$ is the total mass (in grams) of fuel of type j , consumed in voyage periods during the calendar year which may be deducted from the calculation of the attained CII in case the ship encounters one of the following situations:

- .1 scenarios specified in regulation 3.1 of MARPOL Annex VI, which may endanger safe navigation of a ship; and
- .2 sailing in ice conditions, which means sailing of an ice-classed ship in a sea area within the ice edge.

In cases where $FC_{voyage,j}$ is used:

- any associated distance travelled must also be deducted using D_x otherwise ships will benefit from distance travelled without any associated CO₂ emission.
- the ship should report data for the deductions associated with voyage adjustments to the Administration in accordance with appendix 2 of these guidelines.

4.2 AF_{Tanker} for corrections to shuttle tankers or STS voyages on tankers

Tankers engaged in STS voyages as defined above in paragraph 2.8 may apply the correction factor $AF_{Tanker,STS}$ to all fuel consumption relating to STS voyages, including cargo transfer at offshore location, voyage, cargo discharge and waiting periods at anchor or drifting during which the ship reports being part of an STS operation and voyage. The STS operation includes fuel consumption in port where the transferred cargo is discharged after such a voyage.

The correction is calculated as:

$$AF_{Tanker,STS} = 6.1742 \times DWT^{-0.246}$$

Where $AF_{Tanker,STS}$ is applied, $FC_{electrical}$, FC_{boiler} and FC_{others} should not be used.

Shuttle tankers equipped with dynamic positioning as defined above in paragraph 2.9 may apply the correction factor $AF_{Tanker,Shuttle}$ to total fuel consumption:

The correction factor is calculated as:

$$AF_{Tanker,Shuttle} = 5.6805 \times DWT^{-0.208}$$

Where $AF_{Tanker,Shuttle}$ is applied, $FC_{electrical}$, FC_{boiler} , FC_{others} and $AF_{Tanker,STS}$ should not be used.

4.3 $FC_{electrical,j}$ for corrections relating to electrical power

The parameter $FC_{electrical,j}$ is the mass (in grams) of fuel of type j , consumed for production of electrical power during the calendar year which may be deducted from the calculation of the attained CII for the following purposes:

- .1 Electrical consumption of refrigerated containers (on all ships where they are carried) using the calculation methodology specified in part A of appendix 1.

- .2 Electrical consumption of cargo cooling/reliquefaction systems on gas carriers and LNG Carriers.
- .3 Electrical consumption of discharge pumps on tankers.

4.4 $FC_{Boiler,j}$ for corrections relating to boiler fuel consumption

The parameter $FC_{Boiler,j}$ is the mass (in grams) of fuel of type j , consumed by the oil-fired boiler during the calendar year which may be deducted from the calculation of the attained CII, for the purposes of cargo heating and cargo discharge on tankers. The calculation methodology for $FC_{Boiler,j}$ is specified in part B of appendix 1.

4.5 $FC_{others,j}$ for corrections relating to other related fuel consumption devices

The parameter $FC_{others,j}$ is the mass (in grams) of fuel of type j , consumed by standalone engine driven cargo pumps during discharge operations on tankers which may be deducted from the calculation of the attained CII.

4.6 EEDI and EEXI Correction factors

The EEDI correction factors as defined above in paragraph 4 may be applied, provided they are included in the ship's EEDI Technical File or EEXI Technical file.

APPENDIX 1

CORRECTION FACTORS FOR USE IN CII CALCULATION

Part A. $FC_{\text{Electrical}}$ for Corrections relating to electrical power

1 Refrigerated containers

For ships carrying refrigerated containers, the correction factor $FC_{\text{Electrical}}$ may be applied as follows:

- .1 For ships that have the ability to monitor reefer electrical consumption, the ship may calculate reefer container kWh consumption as follows:

$$FC_{\text{electrical_reefer},j} = \text{Reefer kWh} \times SFOC$$

where:

- $FC_{\text{electrical_reefer},j}$ (Reefer fuel oil consumption) represents the estimated fuel consumption attributed to in-use refrigerated containers carried.
- Reefer kWh is measured on the ship by the kWh meter counter on the ship.
- $SFOC$ represents the specific fuel consumption in g/kWh as a weighted average of the engines used to provide the electrical power, as per the EEDI/EEI Technical File or the NO_x Technical File. In the case of ships without a Technical File, a default value of 175 g/kWh for 2 stroke engines and 200 g/kWh for 4 stroke engines may be applied. In the case of waste heat recovery systems as defined under Category C1 in MEPC.1/Circ.896 the SFOC to be used will be at the discretion of the Administration.

Alternatives such as derivation of fuel consumption or kWh from auto-logged data may be used subject to approval by the Administration. Note that ship reefer kWh consumption should not include consumption during voyage adjustment periods.

- .2 For ships that do not have the ability to monitor reefer electrical consumption, the ship may calculate reefer kWh consumption as follows:

$$FC_{\text{electrical_reefer},j} = Cx \cdot 24 \cdot SFOC_{\text{avg}} \cdot \left(\text{Reefer_days}_{\text{sea}} + \sum \text{Reefer_days}_{\text{port}} \right)$$

where:

- Cx represents a default reefer consumption of 2.75 kW/h.
- $\text{Reefer_days}_{\text{sea}}$ represents the number of in-use reefer-days over the declared period and may be derived using the number of reefer containers as recorded in the BAPLIE file multiplied by the number of days at sea.
- $SFOC_{\text{avg}}$ represents the specific fuel consumption in g/kWh as a weighted average of the engines used to provide the electrical power, as per the EEDI/EEI Technical File or NO_x Technical File. In the case of ships without a Technical File, a default value of 175 g/kWh for 2 stroke engines and 200 g/kWh for 4 stroke

engines may be applied. In the case of waste heat recovery systems as defined under Category C1 in MEPC.1/Circ.896 the SFOC to be used will be at the discretion of the Administration.

In ports where shore-power is not used, the number of in-use reefers at port should be calculated as:

$$Reefer_days_{port} = \frac{No_c\ Arrival + No_c\ Departure}{2} \times Days_{port}$$

where:

- $Days_{port}$ represents number of days in port.
- $Reefer_days_{port}$ represents the number of in-use reefer days while at port.*
- $No_c\ Arrival$ represents number of reefer containers on arrival.
- $No_c\ Departure$ represents number of reefer containers at departure.

In all cases, the actual number of in-use reefers carried is documented in the BAPLIE file.

Note that ship reefer kWh consumption should not include consumption during voyage adjustment periods.

* The number of reefers on board while in port should be calculated to equal the number of reefers at arrival and at departure as calculated above. Same calculation applies for Reefer days_{sea} in port.

2 Cargo cooling systems on gas carriers and LNG carriers

For gas carriers and LNG carriers with electrical cargo cooling systems or reliquefaction plants, the correction factor $FC_{\text{electrical}}$ may be applied as follows:

- .1 Gas carriers and LNG carriers may calculate cargo cooling kWh consumption as follows:

$$FC_{\text{electrical_cooling},j} = \text{Cooling kWh} \times SFOC$$

where:

- $FC_{\text{electrical_cooling},j}$ (cargo cooling fuel oil consumption) represents the estimated fuel consumption attributed to cooling of gas cargoes.
- *Cooling kWh* is measured on the ship by the kWh meter counter on the ship.
- *SFOC* represents the specific fuel consumption in g/kWh associated with the relevant source of electrical power as per the EEDI/EEXI Technical File or NO_x Technical File. In the case of ships without a Technical File, a default value of 175 g/kWh for 2 stroke engines and 200 g/kWh for 4 stroke engines may be applied. In the case of waste heat recovery systems as defined under Category C1 in MEPC.1/Circ.896 the SFOC to be used will be at the discretion of the Administration.

Alternatives such as derivation of fuel consumption or kWh from auto-logged data may be used subject to approval by the Administration. Note that cargo cooling kWh consumption should not include consumption during voyage adjustment periods.

3 Electric cargo discharge pumps on tankers

For tankers with directly or indirectly electrically powered discharge pumps, the correction factor $FC_{\text{electrical}}$ may be applied as follows:

- .1 Tankers may calculate cargo discharge kWh consumption as follows:

$$FC_{\text{electrical_discharge},j} = \text{discharge kWh} \times SFOC$$

where:

- $FC_{\text{electrical_discharge},j}$ (cargo discharge fuel oil consumption) represents the estimated fuel consumption attributed to use of cargo discharge pumps.
- *Discharge kWh* is measured on the ship by the kWh meter counter on the ship.
- *SFOC* represents the specific fuel oil consumption in g/kWh associated with the relevant source of electrical power as per the EEDI/EEXI Technical File or NO_x Technical File. In the case of ships without a Technical File, a default value of 175 g/kWh for 2 stroke engines and 200 g/kWh for 4 stroke engines may be applied. In the case of waste heat recovery systems as defined under Category C1 in MEPC.1/Circ.896 the SFOC to be used will be at the discretion of the Administration.

Alternatives such as derivation of actual fuel consumption from auto-logged data may be used subject to approval by the Administration. Note that cargo cooling kWh consumption should not include consumption during voyage adjustment periods.

Part B. FC_{Boiler} and FC_{Others} for corrections relating to cargo heating and discharge on tankers

1 FC_{Boiler} for cargo heating and discharge pumps on tankers

For tankers with fuel fired boilers used for cargo heating or steam driven cargo pumps, the following correction factor may be applied for the period that the cargo heating or discharge pumps are in operation:

- .1 In the case of boilers used for cargo heating, the amount of fuel used by the boiler (FC_{Boiler}) should be measured by accepted means, e.g. tank soundings, flow meters.
- .2 For tankers which use steam driven cargo pumps, the amount of fuel used by the boiler (FC_{Boiler}) should be measured by accepted means, e.g. tank soundings, flow meters.

Some amount of fuel consumed by the boiler during cargo heating or discharge operations may be attributed to other purposes, e.g. calorifiers. It is not necessary to split these out from reporting.

Note that boiler consumption should not include consumption during voyage adjustment periods.

2 FC_{Others} for discharge pumps on tankers

For tankers with discharge pumps powered by their own generator, the amount of fuel used for the period that the discharge pumps are in operation (FC_{Others}) should be measured by accepted means, e.g. tank soundings, flow meters.

Note that fuel deducted under FC_{Others} should not include consumption during voyage adjustment periods.

APPENDIX 2

GUIDANCE ON REPORTING OF FUEL OIL CONSUMPTION AND DISTANCE TRAVELLED FOR VOYAGE PERIODS WHERE THE SHIP MEETS THE CRITERIA TO APPLY ANY VOYAGE ADJUSTMENT

In this appendix guidance is given for reporting and verification of fuel oil consumption and distance travelled concerning voyage adjustments when a scenario specified in regulation 3.1 of MARPOL Annex VI applies, which may endanger safe navigation of a ship, or when sailing in ice conditions.

1 Fuel oil consumption for voyage periods should include all the fuel oil consumed on board including but not limited to the fuel oil consumed by the main engines, auxiliary engines, gas turbines, boilers and inert gas generator, for each type of fuel oil consumed, regardless of whether a ship is under way or not. Methods for collecting data on fuel oil consumption in metric tonnes include the method using flow meters or method using bunker fuel oil tank monitoring on board as described in paragraphs 7.1.2 and 7.1.3 of the *2022 Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP Guidelines)* (resolution MEPC.346(78)) correspondingly.

2 The distance travelled over ground in nautical miles for voyage periods should be recorded in the logbook in accordance with SOLAS regulation V/28.1 and submitted to the Administration.

3 At the end of the voyage, if the ship has encountered ice conditions during its voyage, when the ship was under way sailing between the ice edges or between the ice edge and the port, or when a scenario specified in regulation 3.1 of MARPOL Annex VI applies:

- .1 the fuel oil consumed measured in accordance with 7.1.2 or 7.1.3 of the SEEMP Guidelines for the voyage period should not be included in the calculations for the annual average attained CII index value;
- .2 if the voyage period is excluded from calculations of the attained CII index value when a scenario specified in regulation 3.1 of MARPOL Annex VI applies, the distance travelled should be clearly marked in the SEEMP monitoring plan, the ship's logbook should include data entries for the voyage period with date, time and position of the ship, when a scenario specified in regulation 3.1 of MARPOL Annex VI started to apply and ceased to apply, and data should be added to the data reporting format;
- .3 if the voyage period is excluded from calculations of the attained CII index value due to sailing in ice conditions, the distance travelled should be clearly marked in the SEEMP monitoring plan, the ship's logbook should include data entries for the voyage period with date, time and position of the ship when the ship encountered ice conditions and left ice conditions, and data should be added to the data reporting format.

4 The summary of monitoring data containing records of measured fuel oil consumption and distance travelled for voyage periods should be available on board. Ice charts related to the voyage periods should also be available if the ship has sailed in ice conditions.

Figure 1: An example of an ice chart of the Baltic Sea area


