

Outlines of Carbon Intensity Indicator(CII)

Ship Management Systems Department, ClassNK
June 2021

1. EEXI

Technical Approach

2. SEEMP Update

Operational Approach

3. CII Rating

CII: Carbon Intensity Indicator

Proposals for Operational Approach by the stakeholders in MEPC75



SEEMP Update (periodical Audit)
(Shipowners country, Finland,
Japan)



Fuel consumption rating
(China)



Mandatory Speed/FOC limitation
(EU, Environmental Organization,
Island countries)



Gentle

strict



1. Adopted CII related guidelines

1. Guidelines on operational carbon intensity indicators and the calculation methods (CII guidelines, G1)
2. Guidelines on the reference lines for use with operational carbon intensity indicators (CII Reference line guidelines, G2)
3. Guidelines on the operational carbon intensity reduction factors relative to reference lines (CII Reduction factor guidelines, G3)
4. Guidelines on the operational carbon intensity rating of ships (CII Rating Guidelines, G4)

CII Rating (5000GT and above / EEDI applied ship types)

- Rating each vessels by CII from 2023 consumption data (CII Guideline, G1)
- CII and “A” – “E” rating will be added on SOC of IMODCS in accordance with Reference Line (G2), Reduction Factor (G3) and Rating guideline (G4)
- Low rated vessels (“E” or “D” on 3 consecutive years) should develop a plan of corrective actions and the plan should be approved by the Administration or RO

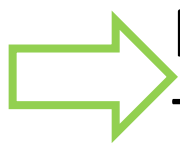
2. Consideration of following guidelines are postponed;

1. Some correction factors and voyage exclusions when calculating CII of each ship

2. Update of SEEMP guidelines

(SEEMP to be updated before 1.Jan.2023)

- Periodical Audit (at ISM audit)
- CII related update



Further information will be updated on ClassNK Technical Information when any development happens

Ship types	Calculation method	Note
Bulk carriers, Tankers, Container ships, Gas carriers, LNG carriers, Ro-ro cargo ships, General cargo ships, Refrigerated cargo carrier Combination carriers	$\frac{CO_2 \text{ Emission}}{Deadweight \times Distance sailed}$	Deadweight: Corresponding to Maximum Summer load draft = the value on IEE Cert supplement
cruise passenger ships Ro-ro cargo ships (vehicle carriers) Ro-ro passenger ships	$\frac{CO_2 \text{ Emission}}{Gross Tonnage \times Distance sailed}$	

$$CII_{ref} = a \text{ Capacity}^c$$

Ship Type		Capacity	a	c
Bulk Carrier	DWT ≥ 279,000	279,000	4745	0.622
	DWT < 279,000	DWT	4745	0.622
Gas Carrier	DWT ≥ 65,000	DWT	14405E+7	2.071
	DWT < 65,000	DWT	8104	0.639
Tanker		DWT	5247	0.610
Container ship		DWT	1984	0.489
General cargo ship	DWT ≥ 20,000	DWT	31948	0.792
	DWT < 20,000	DWT	588	0.389
Refrigerated cargo carrier		DWT	4600	0.557
Combination carrier		DWT	40853	0.812
LNG Carrier	DWT ≥ 100,000	DWT	9.827	0
	100,000 > DWT ≥ 65,000	DWT	14479E+10	2.673
	DWT < 65,000	65,000	14479E+10	2.673
Ro-ro cargo ship (VC)		GT	5739	0.631
Ro-ro cargo ship		DWT	10952	0.637
Ro-ro passenger ship		GT	7540	0.587
Cruise passenger ship		GT	930	0.383

$$\text{Required CII} = \frac{1 - Z}{100} \text{CII}_{Ref}$$

Table 1: Reduction factor (Z%) for the CII relative to the 2019 reference line

Year Reduction factor relative to 2019

Year	Reduction Factor (Z)
2023	5%
2024	7%
2025	9%
2026	11%
2027	**
2028	**
2029	**
2030	**

Reduction factor Z will be starting from 5% in 2023 and 2% will be added yearly

**Z factors for the years of 2027 to 2030 to be further strengthened and developed taking into account the review of the short-term measure.

CII Rating (G4)

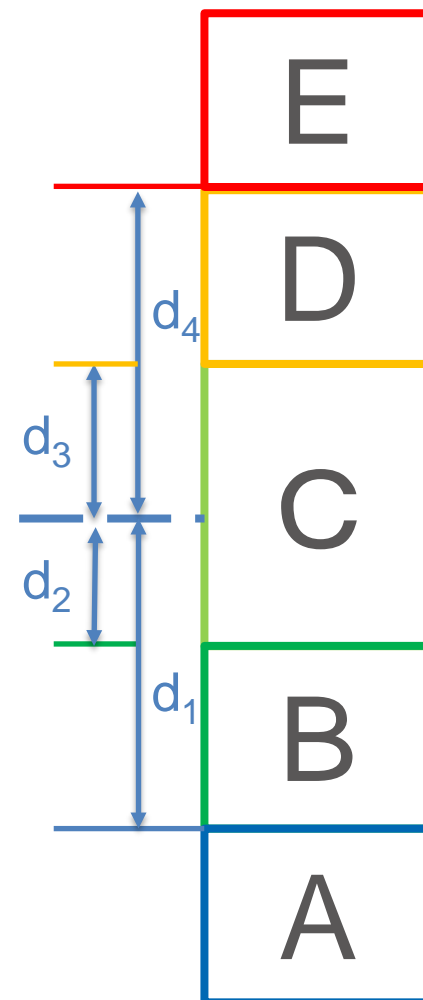
CII Reference Line (G2)

Reduction factor, % (G3)

Required CII (G3)

Table 1: dd vectors for determining the rating boundaries of ship types

Ship type		d1	d2	d3	d4
Bulk Carrier		0.86	0.94	1.06	1.18
Gas Carrier	>=65,000DWT	0.81	0.91	1.12	1.44
	<65,000DWT	0.85	0.95	1.06	1.25
Tanker		0.82	0.93	1.08	1.28
Container ship		0.83	0.94	1.07	1.19
General cargo ship		0.83	0.94	1.06	1.19
Refrigerated cargo carrier		0.78	0.91	1.07	1.20
Combination carrier		0.87	0.96	1.06	1.14
LNG Carrier	>= 100,000DWT	0.89	0.98	1.06	1.13
	<100000DWT	0.78	0.92	1.10	1.37
Ro-ro cargo ship (VC)		0.86	0.94	1.06	1.16
Ro-ro cargo ship		0.66	0.9	1.11	1.37
Ro-ro passenger ship		0.72	0.90	1.12	1.41
Cruise passenger ship		0.87	0.95	1.06	1.16



Items	
Ship type	Bulk Carrier
Deadweight	62000
Gross tonnage	33255
Distance Travelled (NM)	60045
CO2 emissions (ton)	17477
Attained CII (G1)	4.69
a (G2)	4745
c (G2)	0.622
CII ref (G2)	4.96
Required CII (G3, 2023)	4.71
Attained CII / Required CII	1.00
Rating (2023)	C

Data source from IMODCS fuel reporting (started from emission of 2023)

$$\begin{aligned} \text{Attained CII (g/ton mile)} \\ = \frac{17447 \text{ (ton)}}{62000 \times 60045 \text{ (ton mile)}} \times 10^6 = 4.69 \end{aligned}$$

$$\text{CII ref} = 4977 \times 62000^{-0.626} = 4.96$$

Rating (on 2023 reduction factor)

$$\text{Required CII} = 4.96 \times \frac{100-5}{100} = 4.71 \text{ (2023)}$$

$$\frac{\text{Attained CII}}{\text{Required CII}} = 1.00 < d2 \text{ (1.06)}$$

Items	
Ship type	Bulk Carrier
Deadweight	62000
Gross tonnage	33255
Distance Travelled (NM)	60045
CO2 emissions (ton)	17447
Attained CII (G1)	4.69
a (G2)	4745
c (G2)	0.622
CII ref (G2)	4.96

If the vessel keep their emission score same, the rating will be slightly worse year by year



Reporting Year	Reduction factor (%)	Required CII	Rating
2023	5	4.71	C
2024	7	4.61	C
2025	9	4.51	C
2026	11	4.41	D

- CII rating will be added to IMODCS annual report

IMODCS annual report

Reporting period	
Start date	2020/02/13
End date	2020/12/31

Ship Particulars	
Name of ship *	
IMO No. *	
Company *	
FLAG / PORT *	Singapore / Singapore
Distinctive number or letters * (Call sign / Official Number)	5VJ666 / 401431
Ship type *	Gas Carrier
Gross tonnage *	48122
Net tonnage *	14437
Deadweight *	54823
EEDI (gCO2/t.nm) *	5.85
Ice class (if applicable)	
Power output (rated power)(kW)	<div> Main Power Propulsion * 13000 </div> <div> Auxiliary Engine(s) * 4110 </div>

(Please input the total output of all the Auxiliary Engines. e.g.

Consumption Data	
Distance Travelled (nm)	Actual reported value 79536
Hours underway (h)	5281
Diesel/Gas Oil (Cf: 3.206)	631
LFO (Cf: 3.151)	0
HFO (Cf: 3.114)	7987
LPG(Propane) (Cf: 3.000)	
LPG(Butane) (Cf: 3.030)	
LNG (Cf: 2.750)	
Methanol (Cf: 1.375)	
Ethanol (Cf: 1.913)	
Method used to measure fuel oil consumption	method using Bunker Fuel Oil Tank Monitoring <input type="checkbox"/>



CII result

CII	
Attained CII	6.17
Required CII	7.23
CII Rating (2023)	B

Corrective action plan
(if rating is “E” or “D” for three years in a row)



- Tick corrective actions to be made
- Document will be Automatically generated on the system

- CII rating estimation function will be implemented

Ship
NK Bulker

Year
2018

☐ Exclude Submitted voyage

Search

Each ship's voyage data

Showing records per page : 50

☒

Error Mark

V/No.

Departure

Arrival

☒

80

2018/08/09 13:42

El dekheila

2018/08/11 20:12

2018/08/17 03:52

GREEK

☒

81

2018/08/17 03:52

GREEK

2018/08/27 13:54

2018/08/30 23:18

Schiedam

☒

81

2018/08/30 23:18

Schiedam

2018/08/31 12:42

2018/09/25 14:24

Calais

☒

82

2018/09/25 14:24

Calais

2018/10/20 18:12



CII rating estimation

Users can easily understand the ship's estimated rating on-demand

- CII rating fleet / historical analysis

Vessel	Attained CII (Required CII) 2019	Attained CII (Required CII) 2020	Attained CII (Required CII) 2021	Attained CII (Required CII) 2022
NK Bulker	3.47 (3.22)	3.52 (3.15)	3.43 (3.09)	3.22 (3.05)
NK Maru	...			
...	...			
...	...			
...	...			
...	...			
...	...			

Users can understand the CII result for all vessels

User also can download the detailed data set and use it for further analysis

- CII calculation excel sheet will be available on ClassNK Homepage as a tentative manner until ClassNK MRV Portal update
- Support for SEEMP Revision will be announced when further updates are made by IMO

CII calculation sheet

CII Calculation		
*Please input blue cells		
Version 0.1 June 2021		
Ship Particular	IMO Number	1111111
	Ship Name	NK LNG
	Ship Type	Gas carrier
	Deadweight	54823
Fuel Consumption (ton)	Gross Tonnage	48122
	Diesel/Gas Oil	631
	LFO	0
	HFO	7987
	LPG(Propane)	
	LPG(Butane)	
	LNG	
	Methanol	
	Ethanol	
Distance Travelled (nm)		79536
CO2 Emission		26895
Attained CII		6.17
CII ref		7.61
Rating Year		2023
Required CII		7.23
Attained CII / Required CII		0.853
CII Rating		B

IMODCS / SEEMP information

The screenshot shows the ClassNK website with the following structure:

- Header:** ClassNK logo, Site Map, Links, and language options (English, 日本語, 简体中文, 繁體中文, 한국어, Deutsch).
- Navigation:** HOME, AboutNK, Products & Services, Certification Services, Information Services, Research.
- Breadcrumb:** HOME > Products & Services > Statutory Services > IMO DCS and SEEMP.
- Left Sidebar (Products & Services):**
 - Classification Services
 - Web Service Portal
 - International Activities
 - Common Structural Rules for Bulk Carriers and Oil Tankers (CSR BC & OT)
 - Common Structural Rules for Bulk Carriers (CSR-BC)
 - Common Structural Rules for Double Hull Oil Tankers (CSR-OT)
 - ClassNK Archive Center
 - Statutory Services
- Main Content Area:**

IMO DCS and SEEMP

Introduction

Amendments to MARPOL Annex VI that makes the data collection system for fuel oil consumption of ships mandatory were adopted at 70th session of the Marine Environment Protection Committee (MEPC 70) held in October 2016, and has already entered into force from 1 March 2018 (IMO Resolution MEPC.278(70)). According to this regulation, for ships of 5,000 gross tonnage and above engaged in international voyage, the data collecting and reporting will be required from the 2019 calendar year. ClassNK will conduct the relevant document review and issuance of the statement of compliance subject to the authorization from Administration.

This page provides information for the preparation and submission of the SEEMP (Data Collection Plan) for verification as well as Data Collection, aggregation and reporting for fuel oil consumption and also the general explanations of the requirements on data collection system (hereafter IMO DCS) and the relevant procedures for its implementation.

1. Application

IMO DCS applies to ships of 5,000 gross tonnage and above, for which the Ship Energy Efficiency Management Plan (SEEMP) is required to be retained on board. (It is not applied to ships not propelled by mechanical means, and platforms including FPSOs, FSUs and drilling rigs, regardless of their propulsion.)

2. Requirements of IMO DCS and implementation schedule

The following requirements are applied.

 - 1) Review of the revised SEEMP by the Administration or Recognized Organization (RO), issuance of Confirmation of

<https://www.classnk.or.jp/hp/en/activities/statutory/seemp/index.html>

Contact

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