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# User manual (EEXI)

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March 2021



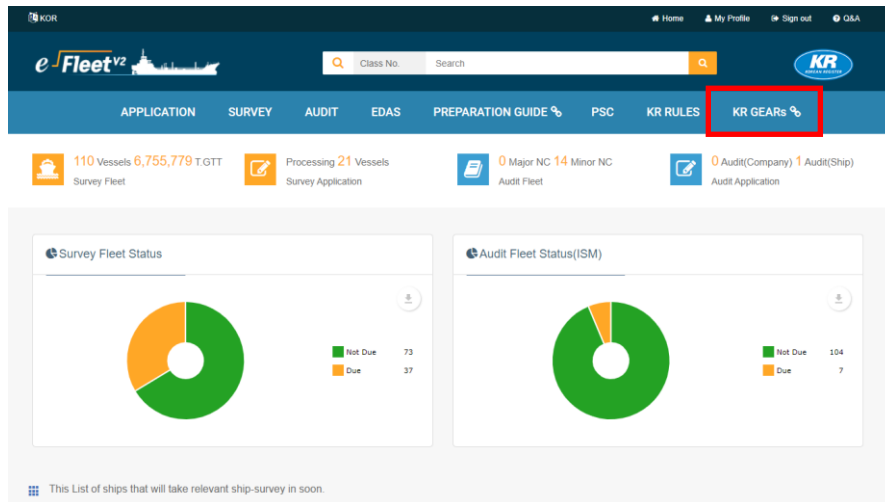
## 1. Function composition

The contents of KR GEARS EEXI program are implemented in three main functions as shown in the table below.

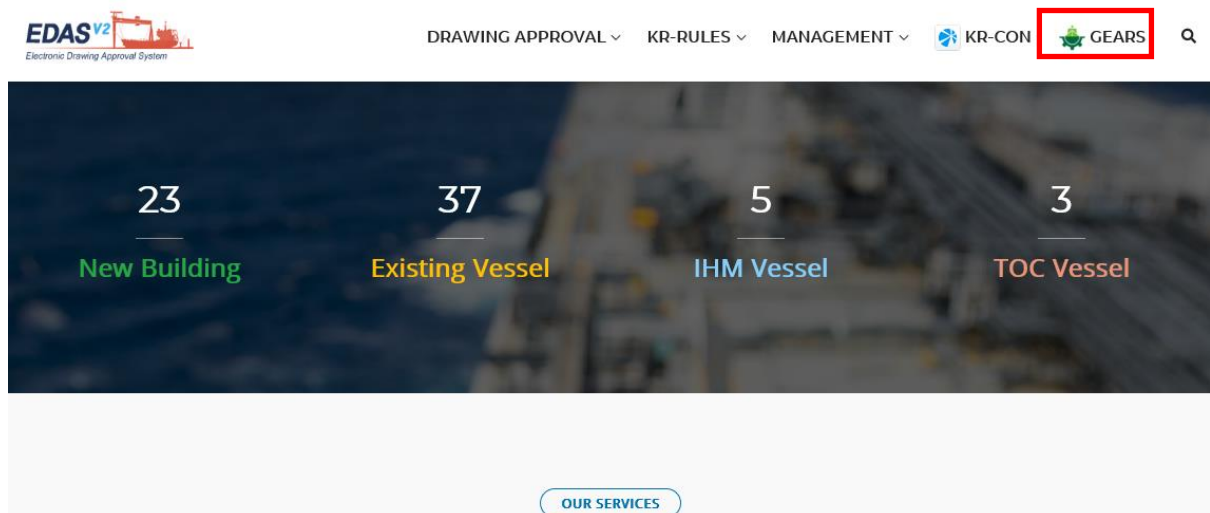
Function	Details
Ship Particular	<ul style="list-style-type: none"><li>• Create basic information of the ship and link necessary data when calculation EEXI</li></ul>
Ship Speed	<ul style="list-style-type: none"><li>• Calculate ship speed at 75% of MCR according to the ship's speed-power table, and configure it to be graphed.</li><li>• If there is no speed-power table, the speed calculation is derived according to the alternative method according to the MEPC 75<sup>th</sup> result</li></ul>
Calculation	<ul style="list-style-type: none"><li>• Calculated attained and required EEXI value</li><li>• Check the result value used for calculation</li><li>• Input the necessary data for application of dual fuel or correction factors</li></ul>

## 2. Login (<https://gears.krs.co.kr>)

1) If you have an KR E-fleet (for Ship Owner) & KR EDAS (for Ship Builder or Designer) registration account, you can log in through the corresponding ID/PW. If you don't remember your E-fleet & EDAS registration account, please contact [decarbonization@krs.co.kr](mailto:decarbonization@krs.co.kr).

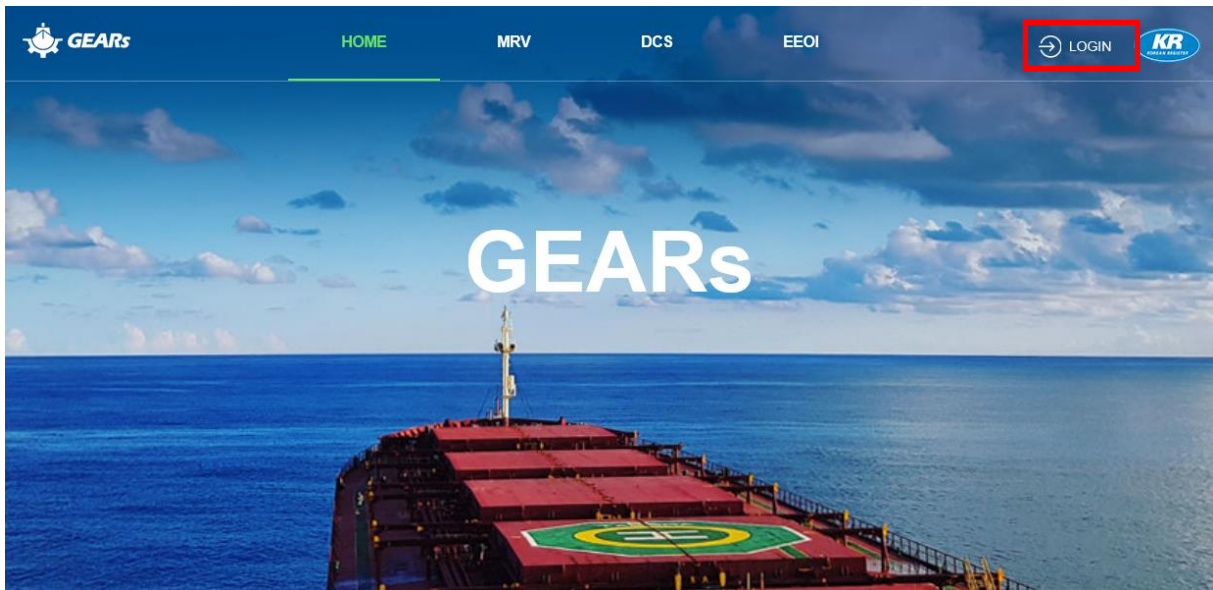


KR e-Fleet Main



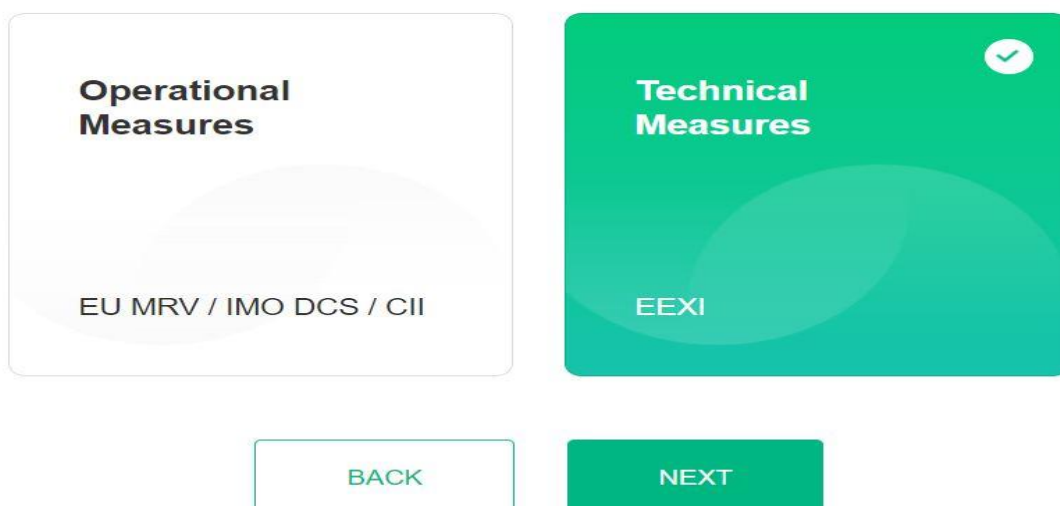
KR EDAS Main

2) If you don't have an KR E-fleet & KR EDAS registration account, you can create an ID/PW by sending the request E-mail to decarbonization@krs.co.kr. And then you can use KR GEARS after login.



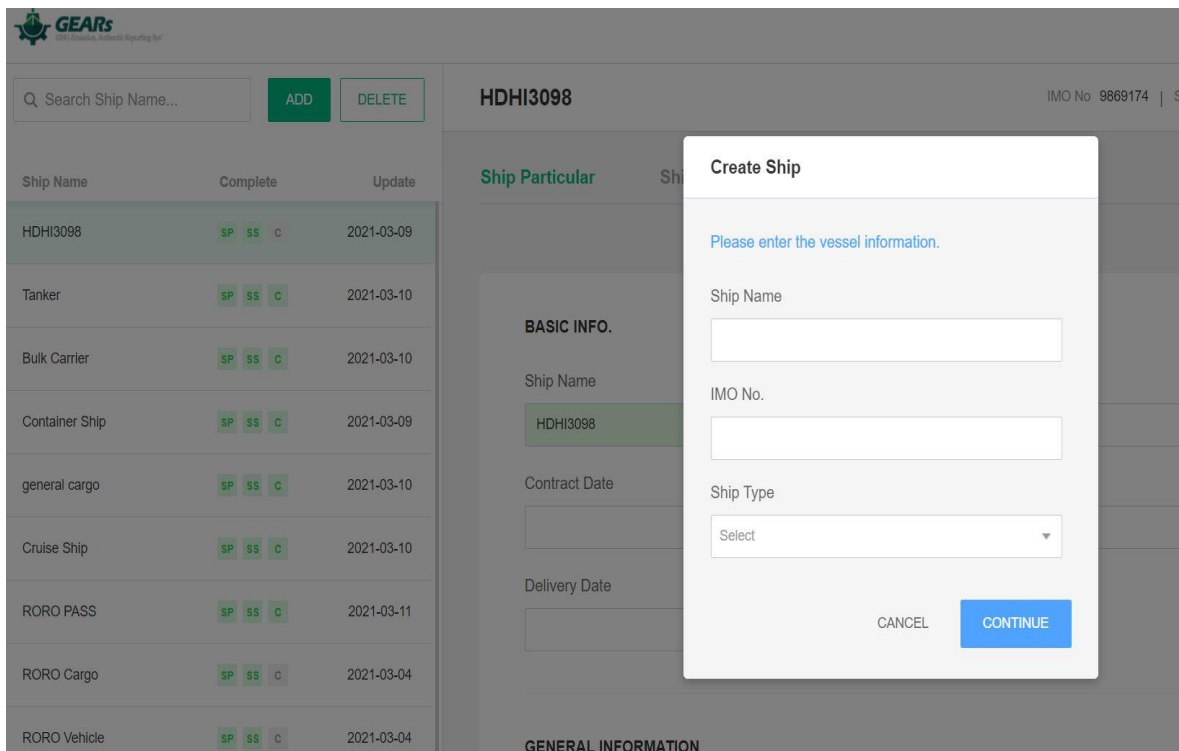
3) After log in KR GEARS, select the EEXI function and click the NEXT button

**Please select the function want to use.**



### 3. Create a new ship / Ship Particulars

3-1) Click the ADD button to create a new ship



3-2) Enter the ship's basic information. The green field is an automatic linkage value, and in the Ship particular page, the value entered when creating a ship is linked, and the blue field is a required data value, which is a required value for EEXI calculation

The screenshot displays the 'TEST SHIP' form. At the top right, it shows 'IMO No 1236547 | Ship type tanker'. The form is divided into two main sections: 'BASIC INFO.' and 'GENERAL INFORMATION'. In the 'BASIC INFO.' section, 'Ship Name' is 'TEST SHIP' (green field), 'Call Sign' is 'TEST1', 'Contract Date' is '2021-02-01', 'Keel laid Date' is '2021-02-01', and 'Delivery Date' is '2021-02-01'. In the 'GENERAL INFORMATION' section, 'Shipbuilder' is 'JAPAN Shipbuilding Company', 'Hull No.' is '12345', 'IMO No.' is '1236547' (green field), and 'Ship Type' is 'tanker' (green field). A 'SAVE' button is located at the top right of the form.

**MAIN ENGINE**

Fuel Type Diesel/Gas Oil ▾

No.	Power at MCR(kW)	SFC at 75% MCR(kWh)	RPM at MCR(RPM)	Type	Manufacturer
1	15000	80			
2					
3					
4					

**SP Ship Particular : Complete**

**Ship Particular**

The Configuration of the field is as follows.

- Automatically linked field
- Required field
- Output value field

*\* If you modify the value of the linked field, it can be changed together.*

3-3) If you click the SAVE button without input the required data, it shows the error

**Ship Particular**   Ship Speed   Calculation

**SAVE**

Breadth, moulded(m)      Depth, moulded(m)

Summer load line draught, moulded(m)      Deadweight at Summer load line draught(ton)

Gross ton(ton)

81000

**Error data 1**

Deadweight at Summer load line draught(ton)  
Deadweight is required data.

*This is a required field.*

3-4) If you input all the required data and press SAVE, you can move to the next tab with a message "The data saved successfully"

The screenshot shows a web application interface for a ship management system. At the top, a blue notification banner displays the message "The data saved successfully." with a close button. Below this, the main header area includes the title "TEST SHIP" on the left and the text "IMO No 1236547 | Ship type tanker" on the right. The interface features three tabs: "Ship Particular" (highlighted in green), "Ship Speed", and "Calculation". A green "SAVE" button is located in the top right corner of the form area. The form contains several input fields: "Breadth, moulded(m)", "Depth, moulded(m)", "Summer load line draught, moulded(m)", "Deadweight at Summer load line draught(ton)", and "Gross ton(ton)". The "Deadweight at Summer load line draught(ton)" field contains the value "150000", and the "Gross ton(ton)" field contains the value "81000".

## 4. Ship Speed

- 4-1) If you input the speed-power table with Use Speed Power Curve at EEDI draught enabled and click the calculation button, the ship speed is automatically calculated and displayed in the red field with speed-power curve

Ship Particular      **Ship Speed**      Calculation

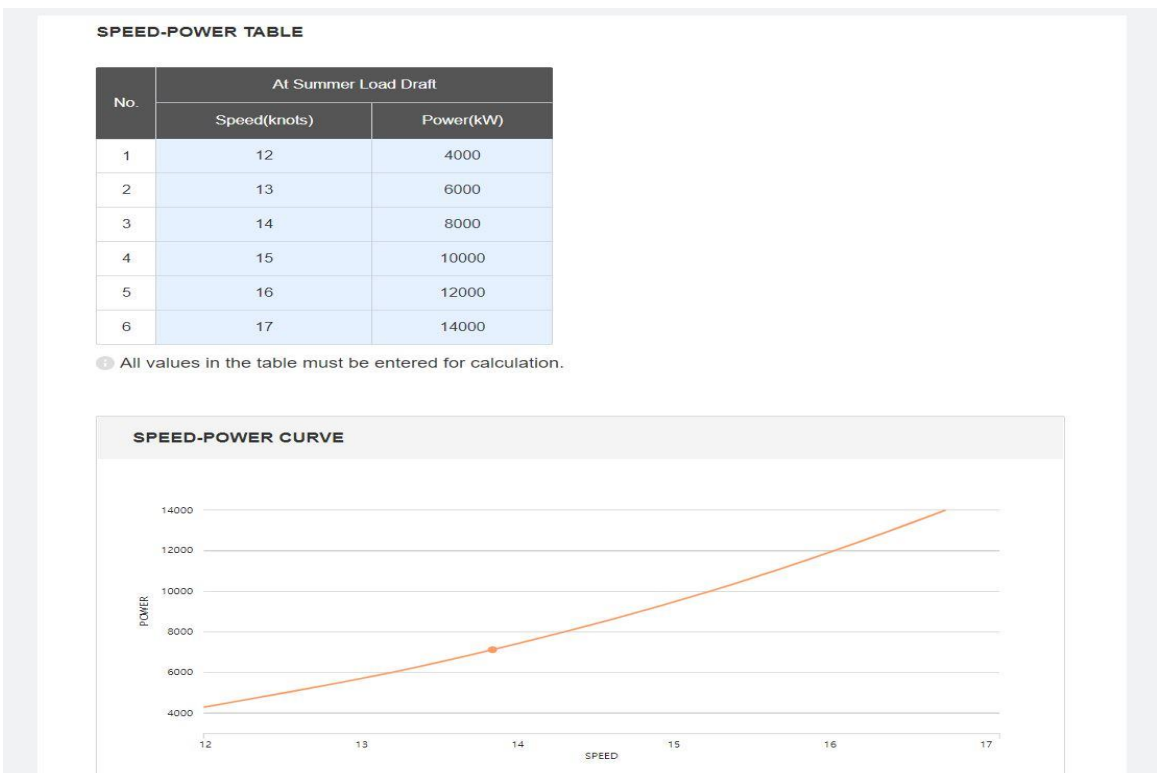
SAVE      CALCULATE

### SHIP SPEED

Use Speed Power Curve at EEDI draught      **ON** ✓

EEDI Engine Power at MCR      Ship Speed at 75% of MCR

9500      13.8





4-2) When the Use Speed Power Curve at EEDI draught is enabled, speed-power values entered, MCR power can be adjusted, and the corresponding speed value can be calculated by pressing the arrow

(Conversely, if you press the arrow after adjusting the speed, the corresponding power value can be calculated)

Ship Particular    **Ship Speed**    Calculation

SAVE    CALCULATE

**SHIP SPEED**

Use Speed Power Curve at EEDI draught    **ON** ✓

EEDI Engine Power at MCR    Ship Speed at 75% of MCR

12000    ⇄    12.013

Ship Particular    **Ship Speed**    Calculation

SAVE    CALCULATE

**SHIP SPEED**

Use Speed Power Curve at EEDI draught    **ON** ✓

EEDI Engine Power at MCR    Ship Speed at 75% of MCR

13291.872    ⇄    13

**SPEED-POWER TABLE**

No.	At Summer Load Draft	
	Speed(knots)	Power(kW)
1	11	8000
2	12	9000
3	13	10000

4-3) When the speed-power table is not used, click the calculated button while the Use Speed Power Curve at EEDI draught is disabled, and the field displays the speed value calculated using the alternative method according to MEPC 75<sup>th</sup> result

The screenshot shows a web interface for 'TEST\_SHIP' with IMO No 1236547 and Ship type Tanker. The 'SHIP SPEED' section has a toggle for 'Use Speed Power Curve at EEDI draught' set to 'OFF'. The 'EEDI Engine Power at MCR' is 15000, and the 'Ship Speed at 75% of MCR' is 13.975. There are 'SAVE' and 'CALCULATE' buttons.

Field	Value
EEDI Engine Power at MCR	15000
Ship Speed at 75% of MCR	13.975

4-4) If the user knows the speed value, you can directly input the speed value manually

The screenshot shows the same web interface as above, but the 'Ship Speed at 75% of MCR' field is manually input with the value 12.0. The 'EEDI Engine Power at MCR' remains 15000. The 'CALCULATE' button is highlighted.

Field	Value
EEDI Engine Power at MCR	15000
Ship Speed at 75% of MCR	12.0

## 5. Calculation

- 5-1) When you click the calculate button, the attained and required EEXI value is calculated through the information entered on the Ship Particular / Ship Speed tab, and the result used in the calculation is pop-up

**TEST SHIP** IMO No 1236547 | Ship type tanker

Calculation : Complete

Ship Particular Ship Speed **Calculation**

SAVE CALCULATE

**RESULT**

**1.71** g-CO<sub>2</sub>/ton.nm  
Attained EEXI

**2.90** g-CO<sub>2</sub>/ton.nm  
Required EEXI

**-41.27 %**  
Difference

**20 %**  
Applied Reduction Factor

**REFERENCE CURVE**

Reference line Attained EEXI

**Result**

Parameter	Unit	Value
MCR <sub>ME</sub>	KW	15000
Capacity	DWT	150000
V <sub>ref</sub>	kn	13
P <sub>ME</sub>	KW	11250
P <sub>AE</sub>	KW	625
C <sub>FME</sub>	-	3.206
C <sub>F<sub>AE</sub></sub>	-	3.206
SFC <sub>ME</sub>	g/kWh	80
SFC <sub>AE</sub>	g/kWh	220

- 5-2) Check the Dual checkbox in Main Engine / Auxiliary Engine, values that were not required data become required data, indicating data entry, and creating an additional information window

**TEST SHIP** IMO No 1236547 | Ship type tanker

Ship Particular Ship Speed **Calculation**

SAVE CALCULATE

**MAIN ENGINE (S)**

Fuel type Diesel/Gas Oil Fuel type (pilot fuel) Select

Dual	Power at MCR (kW)	SFC at 75% MCR(g/kWh)	SFC (LNG for Dual fuel) [g/kWh]	SFC (Pilot fuel for Dual fuel)[g/kWh]
<input checked="" type="checkbox"/>	15000	80	!	!
<input type="checkbox"/>				
<input type="checkbox"/>				
<input type="checkbox"/>				

**AUXILIARY ENGINE (S)**

Fuel type Diesel/Gas Oil Fuel type (pilot fuel) Select

Dual	Power at MCR (kW)	SFC at 50% MCR(g/kWh)	SFC (LNG for Dual fuel) [g/kWh]	SFC (Pilot fuel for Dual fuel)[g/kWh]
<input type="checkbox"/>	600	220		
<input type="checkbox"/>				

**TEST SHIP** IMO No 1236547 | Ship type tanker

Ship Particular    Ship Speed    **Calculation**

**SAVE**    **CALCULATE**

**ADDITIONAL INFORMATION**

	Tank Volume	Density	Low calorific value	Filling rate
LNG	!	450	48000	0.95
HFO	!	991	40200	0.98
MDO	!	900	42700	0.98

5-3) At the Bottom of the calculation tab is the value of the correction factor for a ship

**CORRECTION FACTOR**

$f_{CSR}$  +                       $f_c$  +

5-4) If you click the +button next to the correction factor, a window where you can calculate the correction factor appears. After input the required data, press the calculate button to automatically calculate the correction factor, and click the SAVE button to save the calculated value

$f_{CSR}$

**tanker**

ficsr : ships under common structural rules(CSR)

Light weight(ton)	Deadweight(ton)	ficsr
450000	150000	1.24

**CALCULATE**

**Light weight**

Ship's light weight

Unit:     Range:

**CANCEL**    **SAVE**

5-5) If you save all the additionally input data and click the CALCULATE, the values are reflected and EEXI is re-calculated

**TEST SHIP**
IMO No 1236547 | Ship type tanker
c Calculation : Complete

Ship Particular
Ship Speed
Calculation

SAVE
CALCULATE

**RESULT**

**2.24** g-CO<sub>2</sub>/ton.nm

Attained EEXI

**2.90** g-CO<sub>2</sub>/ton.nm

Required EEXI

**-22.95** %

Difference

**20** %

Applied Reduction Factor

**REFERENCE CURVE** — Reference line ● Attained EEXI

**Result** ✕

Parameter	Unit	Value
MCR <sub>ME</sub>	KW	15000
Capacity	DWT	150000
V <sub>ref</sub>	kn	13
P <sub>ME</sub>	KW	11250
P <sub>AE</sub>	KW	625
C <sub>F</sub> Pilotfuel	-	3.206
C <sub>FAE</sub> Pilotfuel	-	0
C <sub>FLNG</sub>	-	2.75
C <sub>FMDO</sub>	-	3.206

**Calculation**

This page is for EEXI calculations.

Ship particular and ship speed information entered on the previous page are automatically linked.

<End>