TSX5 Shaft Power Meter & CII compliance

PREPARE YOUR FLEET FOR CII COMPLIANCE

Carbon Intensity Indicator (CII) explained

On 17 June 2021, the International Maritime Organisation (IMO) adopted amendments to MARPOL Annex VI at MEPC 76, introducing regulations 23 and 25 – The Energy Efficiency Existing Ship Index (EEXI) and Operational Carbon Intensity Indicator (CII), which are the first steps for the shipping industry to move towards its target of zero carbon emissions by 2050, compared with their level in 2008.

The CII provides a grading system for ships of 5,000GT and above, based on their operational efficiency and therefore the potential amount of carbon emissions they produce. CII applies to both cargo and passenger ships, with ships rated from A to E, where A represents the most efficient and E the least efficient.

The ship's rating will be recorded in the Ship Energy Efficiency Management Plan (SEEMP), which documents a plan for each ship to demonstrate how it will achieve a C rating or higher. Any ship rated D or E for three consecutive years must submit a corrective action plan detailing how they will achieve C rating or higher.

To establish the CII rating, each ship must perform three calculations:

1. **Calculate a reference CII value based on the type of ship such as a bulk carrier. This is a one-time calculation.**
2. **Calculate the required CII value based on the CII reduction factor for that year. This is the score the ship must meet or be lower than.**
3. **Calculate the attained CII value. This is the actual CII value for each ship in a given year. The Attained CII calculation is done by dividing the grams of CO_2 emitted per tonne/nautical mile of operation.**

From the attained CII value, the actual rating of the vessel (A-E) can be determined using a reference table. Thereafter, each ship must then commit to achieving a percentage reduction in the attained score, which increases year after year.

YEAR	REDUCTION FACTOR (Z)
2023	5%
2024	7%
2025	9%
2026	11%

To help ships improve their CII attained score and overall rating, each ship can adopt a variety of measures that will enhance its overall operating efficiency. This may include:

- New equipment such as propellors and rudders.
- Using renewable power sources.
- Switching to alternative fuels.
- Improved hull performance.
- Measure of KPI's such as shaft power, fuel consumption and ship's speed.

IMPLICATIONS OF CII

- Logging and recording of performance parameters will be necessary to measure improvements in ship performance as energy efficiency measures are introduced onboard.
- Logging and recording of performance parameters will allow ships to reduce their attained score and improve their overall CII rating year on year.
- Shaft power is the true measure of power being delivered to the propellor and therefore is a key part of any ship performance monitoring.
- When shaft power measurement is combined with fuel consumption, ship speed, and distance travelled a number of efficiencies can be calculated:

1. **Attained CII - CO2 emitted against cargo capacity and distance travelled**
2. **Fuel Efficiency – fuel consumed ÷ power expended (specific fuel oil consumption)**
3. **Hull Efficiency – distance travelled ÷ power expended**
4. **Ship Efficiency – distance travelled ÷ fuel consumed**

- Ships that adopted the engine power limitation (EPL) method for EEXI compliance may not have a shaft power meter fitted onboard, making true power measurement for performance monitoring will not be possible.
- Switching to a shaft power limitation (ShaPoLi) method for EEXI compliance will address this issue while also providing a number of other advantages for ship safety and engine performance.

OVERVIEW

SHIP	
Speed (ground)	14.2 kn
Speed (water)	14.6 kn
Wind speed rel	23 kn
Wind direction	-7°
Wave height	0.5 m
Wave direction	-32°

PROPULSION	
Shaft power	8100 kW
Shaft torque	1430 kN
Shaft speed	120.3 rpm
ME load	67.9 %
ME HFO consumption	1420 kg/h

EFFICIENCY	
Attained CII	4.06 gCO2/nm*dwt
Hull efficiency	3.51 m/kWh
Ship efficiency	10.73 nm/tonne
SFC	175.0 g/kWh
Slip	2.24 %

EFFICIENCIES	VOYAGE	TIME (UTC)	ELAPSED	STATE	CORRECTIONS
○ ○ ○	Voyage 1	4 August 2023 10:20:52	0h, 0m, 19s	Under Way	Wind

TSX5 ShaPoLi SYSTEM

A TSX5 ShaPoLi system consists of two components:

- TSX5 shaft power meter.
- ShaPoLi display, alarm and datalogger.

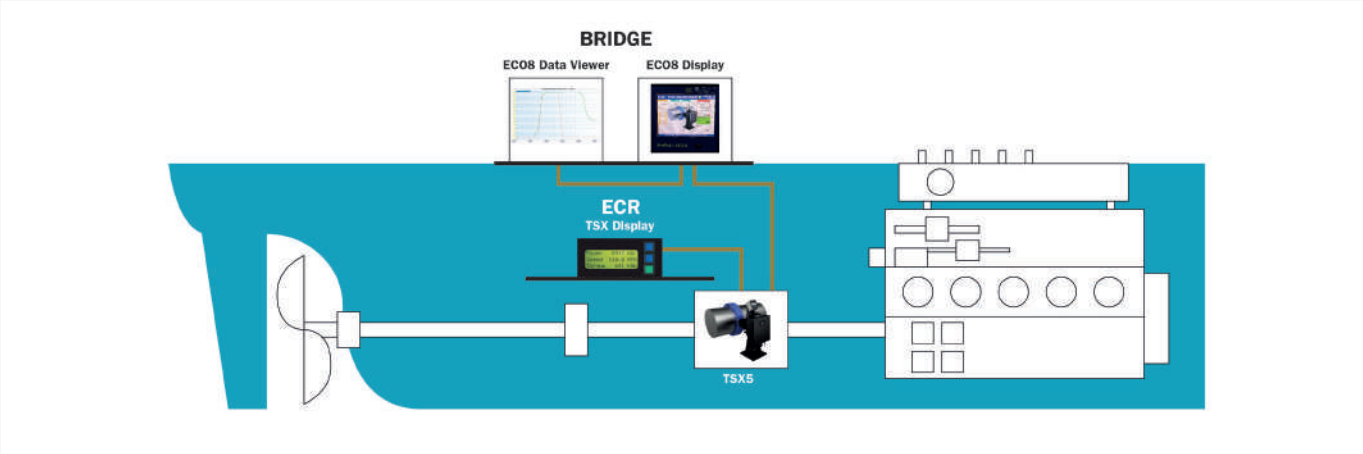
The TSX5 is installed on the intermediate shaft measuring shaft power, torque and RPM and these readings are viewed on the ShaPoLi display fitted on the bridge. The ShaPoLi display has the added flexibility that it can be connected to existing installed shaft power meters.

The ShaPoLi computer is programmed with the EEXI engine power limit and will generate visual and audible alarms if the EEXI limit is exceeded.

All readings, along with alarm events and override use, are recorded in the datalogger. Data from the datalogger can be viewed with software installed on a ship's computer, aiding surveyors for verification.

In emergencies, the override function can be activated by pressing the override icon on the touch screen display and the Captain entering a password. This cancels the EEXI alarm and enables the override function to be activated within seconds, with the reason for the override selectable via the touch screen.

The system provides full compliance with EEXI requirements and has numerous Type Approvals with major Class Societies.



ADDITIONAL BENEFITS OF ShaPoLi

Adopting the ShaPoLi method for CII compliance will not only allow ships to reduce their attained score and improve their overall CII rating year on year, but will also bring other positive benefits such as:

- Immediate access to full power in an emergency.
- Avoid the challenges of complying with USCG Policy Letter 01-24.
- Increased flexibility in engine operation.
- A TSX5 ShaPoLi system is a positive investment as it provides the ship with a shaft power meter that can be used as a key tool for CII improvements, reducing fuel consumption and carbon emissions as part of a ship's energy efficiency programme.

GET IN TOUCH

Website | trelleborg.com/marineandinfrastructure
Sales | sales.TMSUK@trelleborg.com

LEARN MORE ABOUT TSX5 SHAFT POWER METER

FL_OGT_TSX5CII_v1_EN_2024

TRELLEBORG

Trelleborg is a world leader in engineered polymer solutions that seal, damp and protect critical applications in demanding environments. Its innovative solutions accelerate performance for customers in a sustainable way.

Trelleborg Marine and Infrastructure is a leading provider of premium solutions for critical marine, port, and built infrastructure applications. Its innovative polymer and smart technology solutions enhance operational efficiency, safety, and sustainability.

WWW.TRELLEBORG.COM/MARINEANDINFRASTRUCTURE

LinkedIn: Linkedin.com/company/trelleborg-marine-and-infrastructure
YouTube: Youtube.com/c/TrelleborgMarineInfrastructure
Facebook: TrelleborgMarineandInfrastructure
Twitter: @TrelleborgMI

Trelleborg Marine and Infrastructure
Email: sales.TMSUK@trelleborg.com