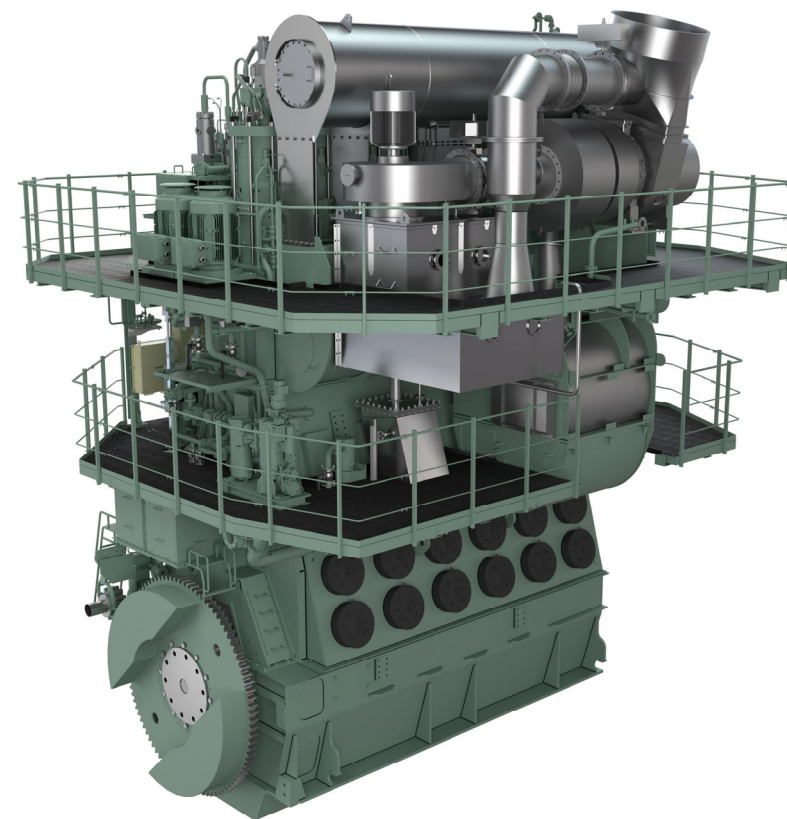


Tier3 Regulations Technology of UE Engine **LP-EGR system**

November 2020

Japan Engine Corporation



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Design Concepts

➤ Simple System

- ✓ **Simple configuration and components**, due to low press. and low temp.
- ✓ **J-ENG Zero-Bleed-off system** will contribute to reduction of the environmental load.

➤ Simple Operation and Control

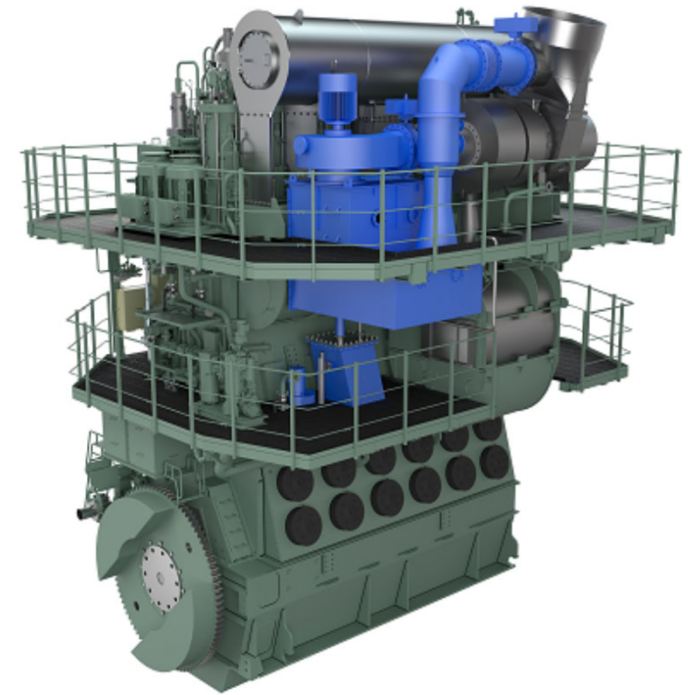
- ✓ Operation is executed by an on/off control of the EGR valves. (within 5 minutes)
- ✓ **Good response and stability** in the maneuvering and for load fluctuation in heavy weather

➤ High performance

- ✓ Minimum SFOC penalty, complying with NOx Tier3 regulation.
- ✓ Verified high reliability of engine parts and EGR components through the bench test and on-board test

➤ Low CAPEX and OPEX

- ✓ **Low installation works** with a simple configuration
- ✓ **Low maintenance costs**
- ✓ Enjoy low fuel costs, acc. to the advantage of low SFOC



【6UEC50LSH-Eco-C3-EGR】

Completely in-house developed technology

- ☆ All knowledge and experience gained during the development process have been utilized
- ☆ No black box, quick response in case of emergency

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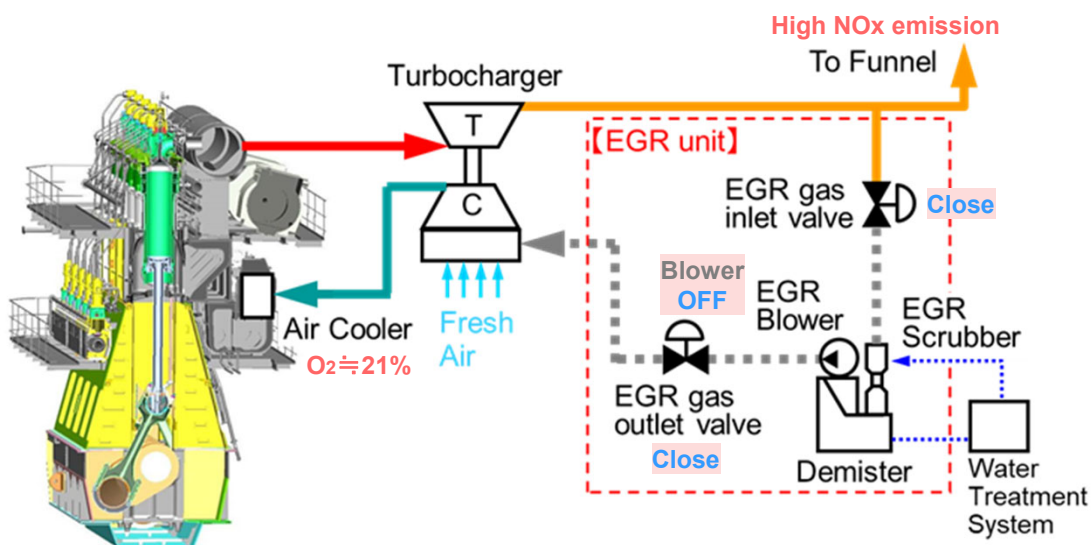
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LP-EGR System

Non-EGR operation (Global Area)

- Non-EGR operation is same as conventional engine (Tier2).
- Scavenging air (O_2 concentration $\approx 21\%$)
- Because of higher combustion temperatures, NO_x emission is high.

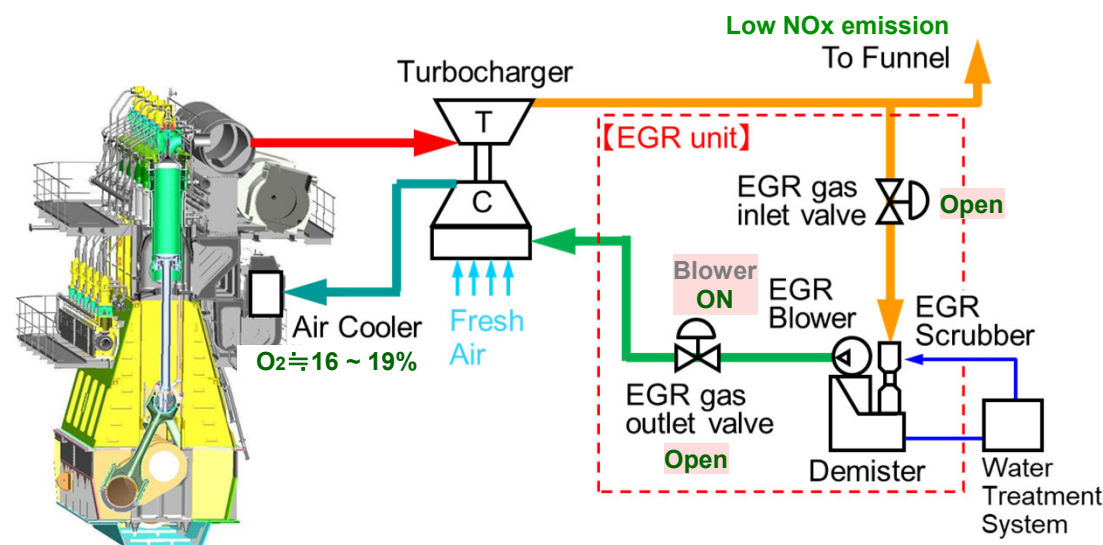
※ For switching the operation mode, all you need to do is one-touch the button in touch panel.



EGR operation (NECA)

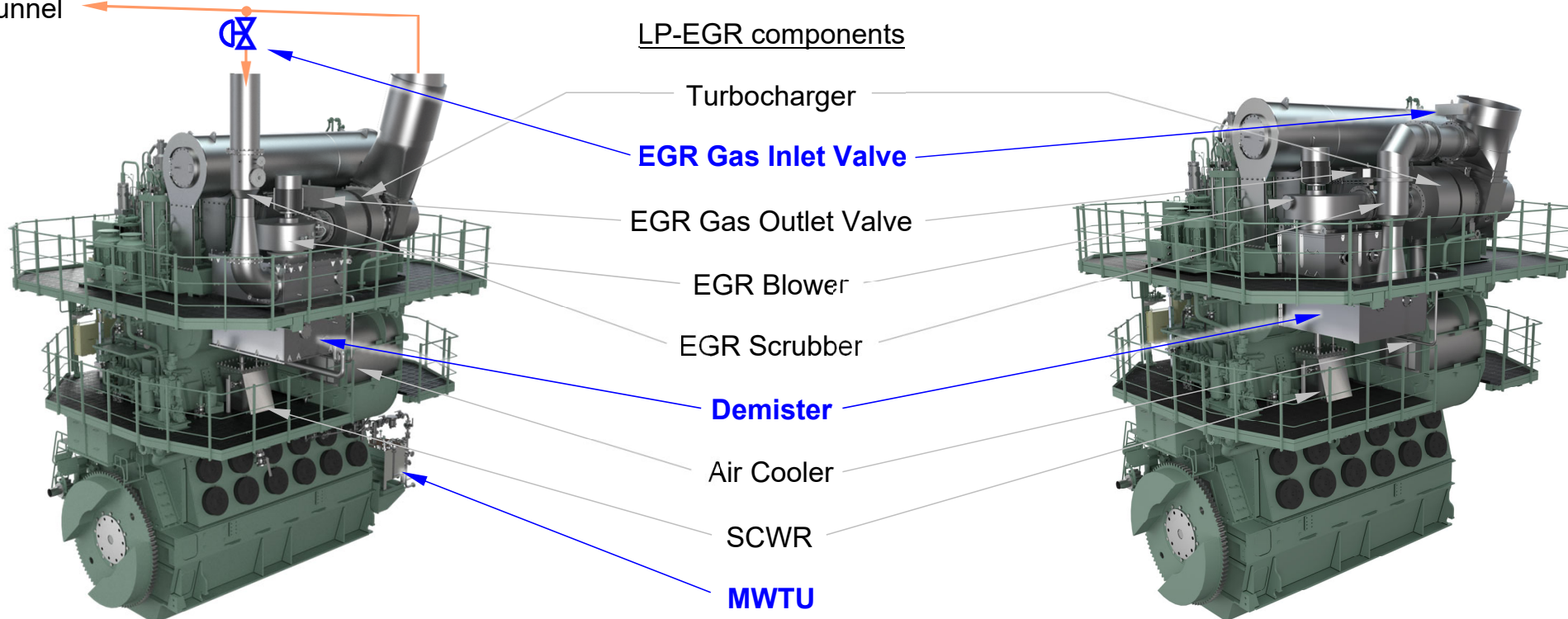
- A part of exhaust gases is recirculated to engine.
- Scavenging : mixture of air and recirculated exhaust gas (O_2 concentration ≈ 16 to 19%)
- Slow speed combustion results in low thermal- NO_x production.

※ Calibration of O_2 sensor is required before EGR operation, (Push the calibration button in touch panel)



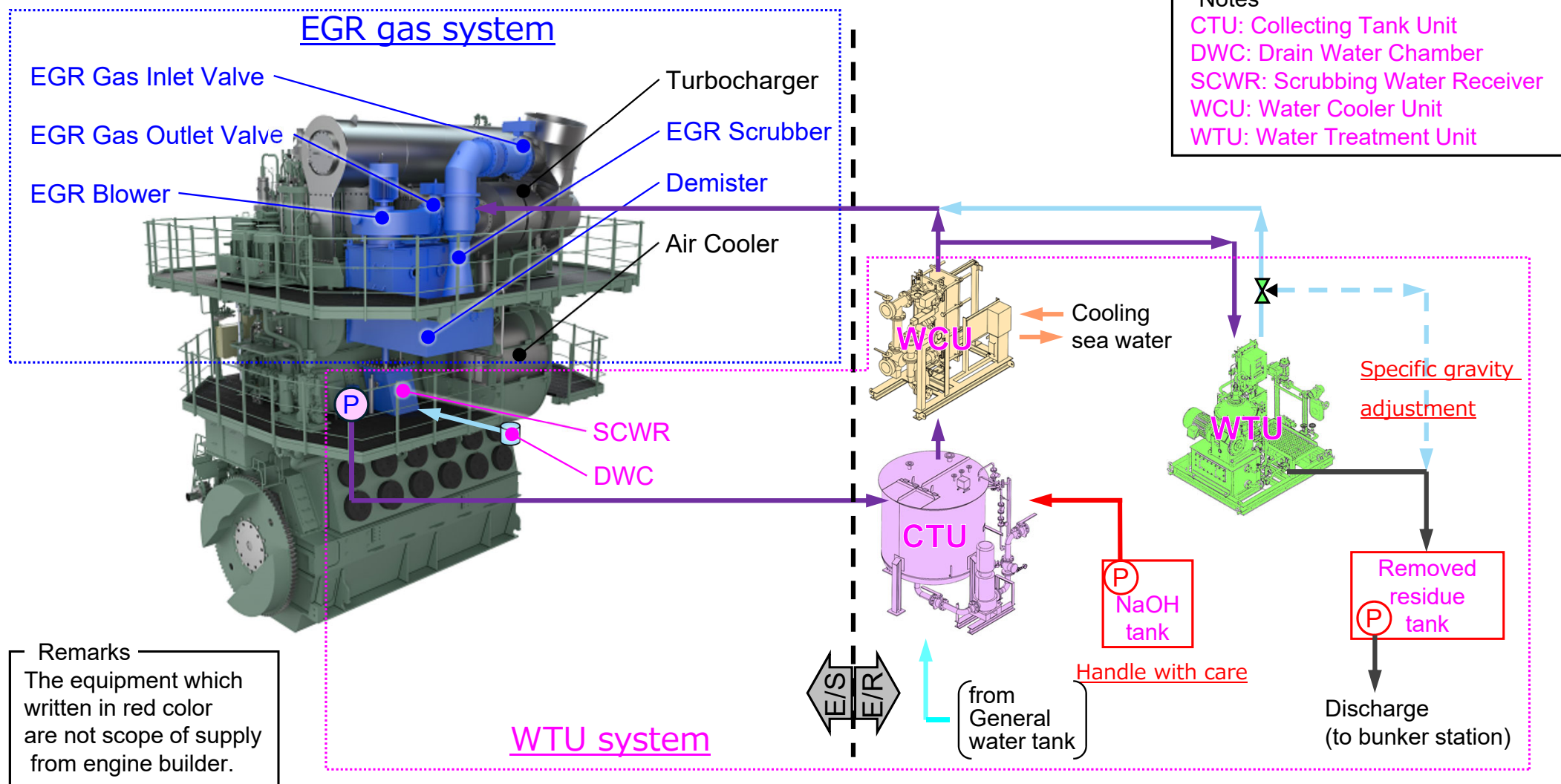
Latest Layout of LP-EGR unit

To Funnel

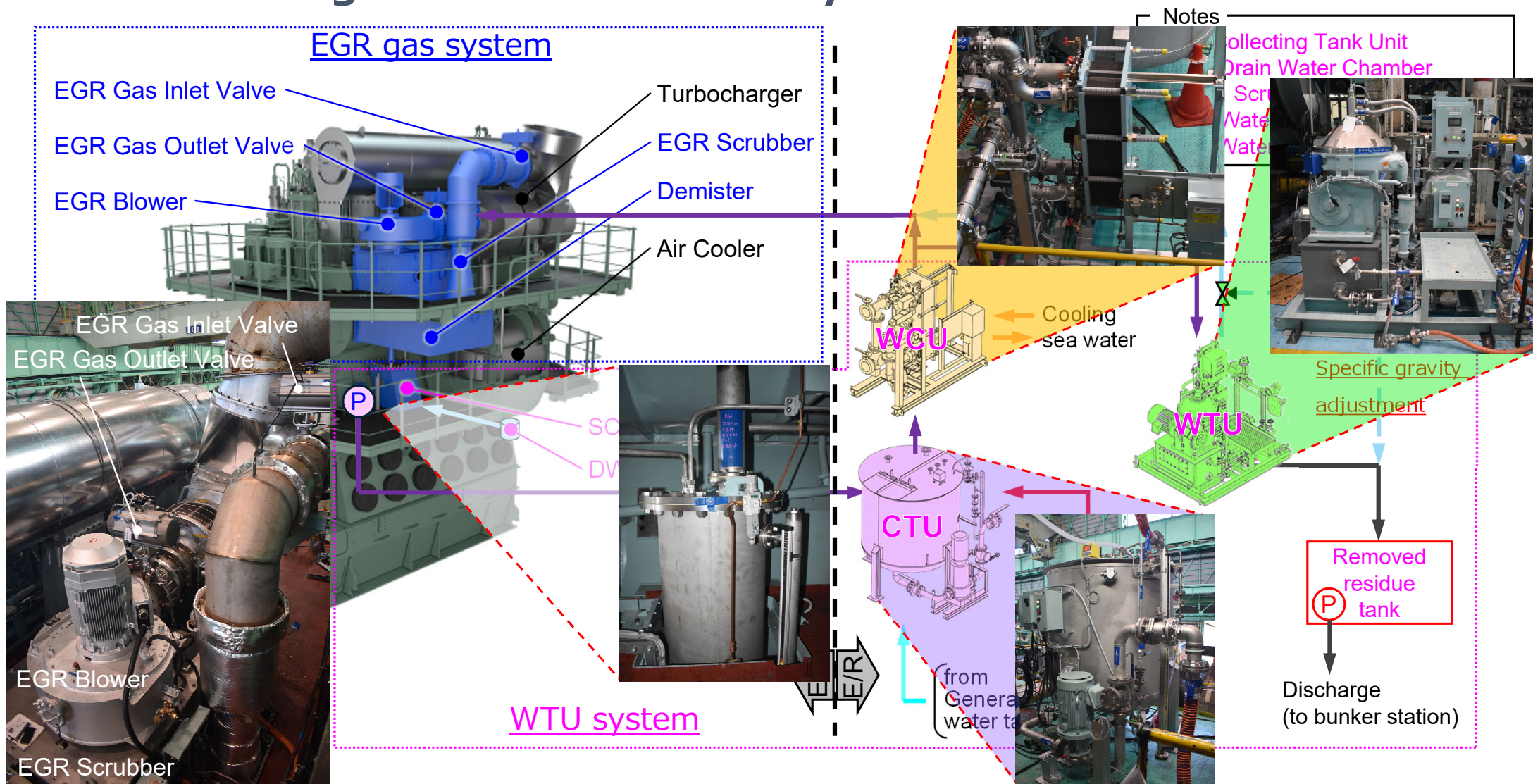


Conventional		Latest spec.
Branched from exh gas piping on ship side (installation in ship side)	Exh. Gas branch piping (Exh. Gas Inlet Valve)	Built-in (Exh. gas is bypassed from reducer on T/C turbine outlet.)
Exh. gas is leaded to lateral of the demister	Demister	Size-downed. Exh. gas is leaded to vertical.
Mounted on engine fore side	MWTU	No installation (Function of MWTU is provided to SCWR and DWC)

Latest configuration of LP-EGR System



Latest configuration of LP-EGR System



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Overhaul Inspection at On-board Test (45LSE-Eco-EGR)

【 Turbocharger 】

[Compressor]



[Silencer]



[Air inlet guide]



[Diffuser]



[Oil labyrinth]



[Thrust bearing]

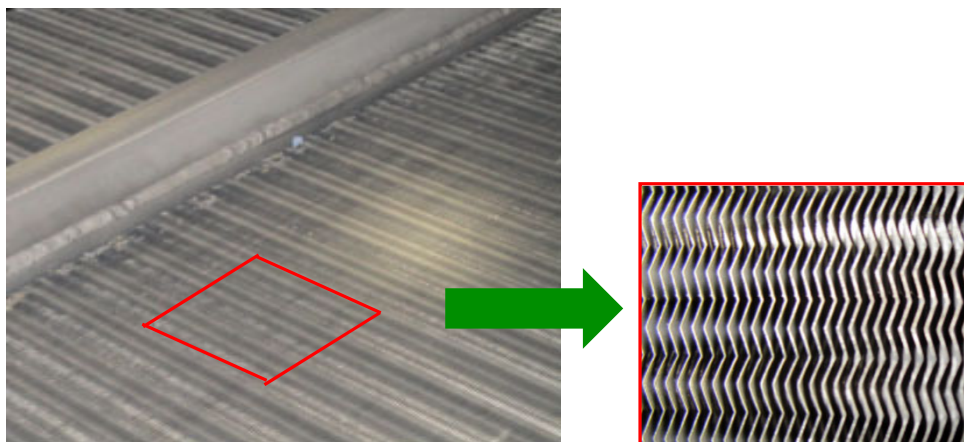


Good Condition!!

[EGR op. time: abt. 540 hrs]

Overhaul Inspection at On-board Test (45LSE-Eco-EGR)

【 Air cooler 】



- No corrosion on fins and tubes
- Keep good condition, acc. to automatic cleaning function

【 Scav. air trunk 】



【 EGR gas piping 】



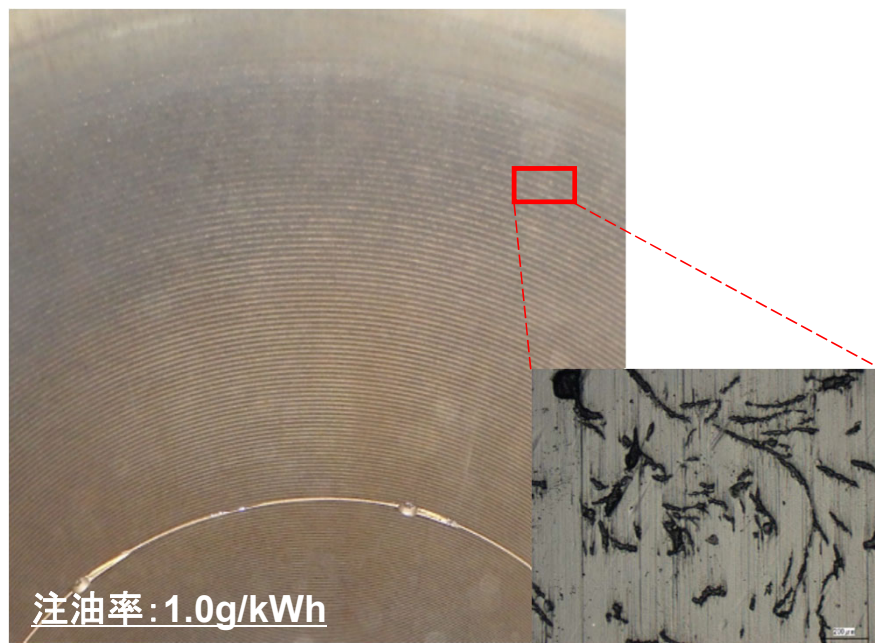
Good Condition!!

Overhaul Inspection at On-board Test (45LSE-Eco-EGR)

【 Cylinder liner 】

Liner wear rate:

0.015mm/1000h @ TRH: abt. 5,500 hrs
(EGR op. time: abt. 480 hrs)

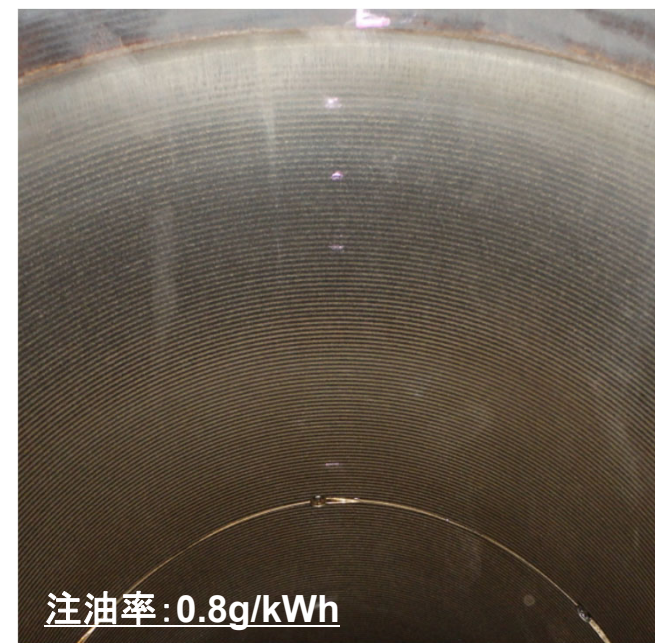


【 No.1 cyl. 】

No corrosion

Liner wear rate:

0.010mm/1000h @ TRH: abt. 12,500 hrs
(EGR op. time: abt. 860 hrs)



【 No.3 cyl. 】

Good Condition!!

Overhaul Inspection at On-board Test (45LSE-Eco-EGR)

【 EGR Gas Inlet Valve 】



Inspection at dock

TRH: abt. 12,500 hrs

EGR op. time: abt .800 hrs

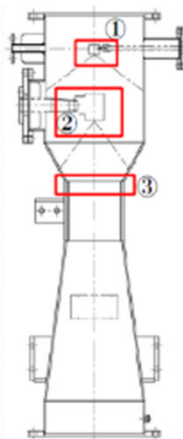
【 EGR Gas Outlet Valve 】



Good Condition!!

Overhaul Inspection at On-board Test (45LSE-Eco-EGR)

【 EGR Scrubber 】



① Scrubber nozzle
(cleaning)



② Scrubber nozzle
(circ.)



③ Venturi



Inspection at dock

TRH: abt. 12,500 hrs

EGR op. time: abt .800 hrs

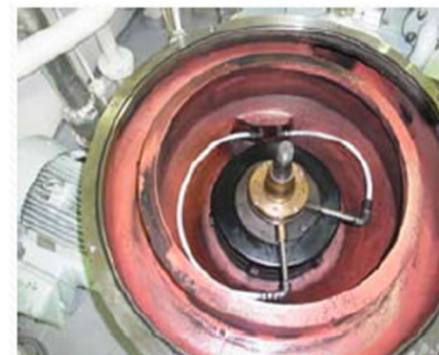
【 Demister 】



【 EGR Blower (impeller) 】



【 WTU (centrifuge) 】



Good Condition!!

Thank you for your attention!!

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