EEXI Technical File(EPL)

Ship's name: DONG FANG QIANG(东方强)

IMO No.: 9122538

Company: Fujian Orient Shipping Co., Ltd.

Concents

1 Data

1.1 General information

Shipowner	Fujian Orient Shipping Co., Ltd.
Shipbuilder	Flensburger Schifbau GmbH & Co.,KG Germany
Hull no.	692
IMO no.	9122538
Ship type	Container ship

1.2 Principal particulars

Length overall	174.36 m
Length between perpendiculars	163.52 m
Breadth, moulded	30.6 m
Depth, moulded	16 m
Summer load line draught, moulded	11.87 m
Deadweight at summer load line draught	32483 tons

1.3 Main engine

Manufacturer	MANISES DIESEL ENGINE
Type	MAN B&W 6S70MC
Maximum continuous rating (MCR_{Me})	16846 kW
Limited maximum continuous rating with the Engine Power Limitation installed ($MCR_{ME,lim}$)	13495 kW
SFC at 75% of MCR_{me}	190 g/kWh
Number of sets	1
Fuel type	HFO

1.4 Auxiliary engine

Manufacturer	YANMAR DIESEL ENGINE
Type	6N260L-SN

Maximum continuous rating (MCR_{AE})	1214 kW
SFC at 50% MCR_{AE}	215 g/kWh
Number of sets	3
Fuel type	HFO

1.5 Ship speed

Ship speed (Vref) (with the Engine Power Limitation installed)	18.04 knots

2 Power curve

The speed-power curve is not available, the ship speed V_{ref} is approximated by $V_{ref,app}$ which is obtained from statistical mean of distribution of ship speed and engine power as below:

$$V_{ref,avg} = A \times B^{c} = 3.2395 \times 32483.0^{0.18294} = 21.669074$$

$$MCR_{avg} or MPP_{avg} = D \times E^{F} = 0.5042 \times 32483.0^{1.03046} = 22474.188505$$

$m_v$is a performance margin of a ship, which should be 5% of $V_{ref,avg}$ or one knot, whichever is lower;

$$m_v = 1$$

$$V_{ref,app} = \left(V_{ref,avg} - m_v\right) \times \left[\frac{\sum P_{ME}}{0.75 \times MCR_{avg}}\right]^{\frac{1}{3}}$$

$$= (21.669074 - 1) \times \left[\frac{11,201}{0.75 \times 22474.188505}\right]^{\frac{1}{3}}$$

$$= 18.04[knot]$$

3 Overview of propulsion system and electric power supply system

3.1 Propulsion system

3.1.1 Main engine

Refer to paragraph 1.3 of this file.

3.1.2 Propeller

Type	
Diameter	
Number of blades	
Number of set	

3.2 Electric power supply system

3.2.1 Auxiliary engines

Refer to paragraph 1.4 of this file.

3.2.2 Main generators

Manufacturer	NISHISHIBA ELECTRIC CO.,LTD
Rated output	1100
Voltage	450
Number of set	3

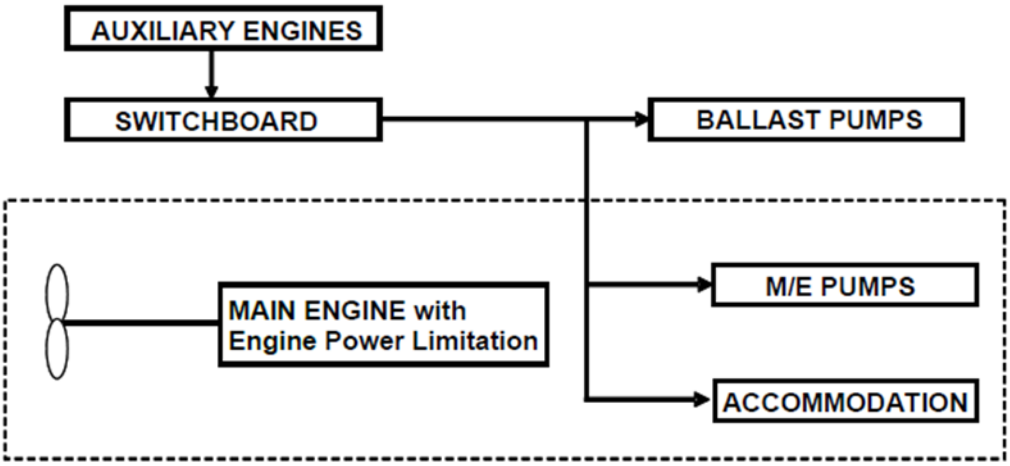

Figure 3.1: Schematic figure of propulsion and electric power supply system

4 Estimation process of speed-power curve

N/A

5 Description of energy saving equipment

5.1 Energy saving equipment the effects of which are expressed as $P_{AEeff(i)}$ or $P_{eff(i)}$ in the EEXI calculation formula

N/A

5.2 Other energy saving equipment

N/A

6 Calculated value of attained EEXI

6.1 Basic data

Type of ship	Capacity DWT	Speed V_{ref} (knots)
Container ship	22,738	18.04

6.2 Main engine

MCR_{ME} (kW)	$MCR_{ME,lim}$ (kW)	P_{ME} (kW)	Type of fuel	C_{FME}	SFC_{ME} (g/kWh)
16846	13495	11201	HFO	3.114	190

Where:

P_{ME}=83%$MCR_{ME,lim}$=11,201 (kW)

The following defaults are used in the calculation:

Type of fuel： HFO

CF_{ME}： 3.114

SFC_{ME}： 190 (g/kWh)

6.3 Auxiliary engines

P_{AE}(kW)	Type of fuel	C_{FAE}	SFC_{AE}(g/kWh)
671	HFO	3.114	215

Where：

$$\sum_{i=1}^{nPTI} P_{PTI(i)} = 0$$

$$P_{AE} = \left\{0.025 \times \left(\sum_{i=1}^{nME} MCR_{ME(i)} + \frac{\sum_{i=1}^{nPTI} P_{PTI(i)}}{0.75}\right)\right\} + 250$$

$$= \left\{0.025 \times \left(16846 + \frac{0}{0.75}\right)\right\} + 250$$

$$= 671 \quad (kW)$$

SFC_{AE}:

No.	$MCR_{AE(i)}$(kW)	$SFC_{AE(i)}$(g/kWh)
1	1214	215
2	1214	215
3	1214	215

$$SFC_{AE} = \frac{\sum_{i=1}^{nAE}\left(MCR_{AE}(i) \times SFC_{AE}(i)\right)}{\sum_{i=1}^{nAE} MCR_{AE}(i)}$$

$$= \frac{1214 \times 215 + 1214 \times 215 + 1214 \times 215}{1214 + 1214 + 1214}$$

$$= 215 \qquad [g/kWh]$$

6.4 Ice class

Ice class:N/A

6.5 Innovative electrical energy efficient technology

Peff:N/A

6.6 Innovative mechanical energy efficient technology

PAEeff:N/A

6.7 f_j

$f_j = 1$

6.8 f_i

$f_i = 1$

6.9 f_c

fc is the cubic capacity correction factor and should be assumed to be one (1.0) if no necessity of the factor is granted.

$f_c = 1$

6.10 f_l

$f_{cranes} = 1$ If no cranes are present.

$f_{sideloader} = 1$ If no side loaders are present.

$f_{RoRo} = 1$ If no ro-ro ramp is present.

$f_l = f_{cranes} \times f_{sideloader} \times f_{RoRo} = 1$

6.11 f_w

$$f_w = 1$$

6.12 f_m

If ice class ship with notation"IA Super" or "IA",then f_m=1.05,else f_m= 1;

$$f_m = 1$$

6.13 Calculated value of attained EEXI

$$EEXI = \frac{\left(\prod_{j=1}^{M} f_j\right)\left(\sum_{i=1}^{nME} P_{ME(i)} \cdot C_{FME(i)} \cdot SFC_{ME(i)}\right) + \left(P_{AE} \cdot C_{FAE} \cdot SFC_{AE}\right)}{f_i \cdot f_c \cdot f_l \cdot Capacity \cdot f_w \cdot V_{ref} \cdot f_m}$$

$$+ \frac{\left\{\left(\prod_{j=1}^{M} f_j \cdot \sum_{i=1}^{nPTI} P_{PTI(i)} - \sum_{i=1}^{neff} f_{eff(i)} \cdot P_{AEeff(i)}\right) \cdot C_{FAE} \cdot SFC_{AE}\right\}}{f_i \cdot f_c \cdot f_l \cdot Capacity \cdot f_w \cdot V_{ref} \cdot f_m}$$

$$- \frac{\left(\sum_{i=1}^{neff} f_{eff(i)} \cdot P_{eff(i)} \cdot C_{FME} \cdot SFC_{ME}\right)}{f_i \cdot f_c \cdot f_l \cdot Capacity \cdot f_w \cdot V_{ref} \cdot f_m}$$

$$= \frac{1 \times (11201 \times 3.114 \times 190) + (671 \times 3.114 \times 215)}{1 \times 1 \times 1 \times 22738 \times 1 \times 18.04 \times 1}$$

$$+ \frac{\{(1 \times 0 - 0 \times 0 \times 3.114) \times 215\}}{1 \times 1 \times 1 \times 22738 \times 1 \times 18.04 \times 1}$$

$$- \frac{(0 \times 0 \times 3.114 \times 190)}{1 \times 1 \times 1 \times 22738 \times 1 \times 18.04 \times 1}$$

$$= 17.3 (g - CO_2/ton \cdot mile)$$

Attained EEXI: 17.3 g-CO_2/ton mile

6.14 Calculated value of required EEXI

The reference line value RLV is calculated as follows:

RLV = a ×b$^{(-c)}$ = 174.22×32483.0$^{-0.201}$ = 21.5901

The required EEXI is calculated as follows:

Required EEXI =(1-y/100) × RLV

= (1-20/100) ×21.5901

=17.3 (g-CO_2/ton·mile)

Where, y=20, is the reduction factor

Required EEXI: 17.3 g-CO_2/ton mile

Attained EEXI ≤ Required EEXI

7 EPL table

Current					With EPL						
MCR (kW)	Vref (knot)	Req.EEXI (g-CO_2/ton mile)	Att.EEXI (g-CO_2/ton mile)	EEXI Deviation	▽EPL	MCR_{lim} (kW)	De-rated MCR	Vref (knot)	Att.EEXI (g-CO_2/ton mile)	EEXI Deviation	Improved EEXI
16846	18.78	17.3	18.6	7.51%	-1685	15161	-10%	18.75	18.5	6.94%	+1%
16846	18.78	17.3	18.6	7.51%	-3351	13495	-20%	18.04	17.3	0.0%	+7%
16846	18.78	17.3	18.6	7.51%	-4211	12635	-25%	17.65	16.6	-4.05%	+11%
16846	18.78	17.3	18.6	7.51%	-5054	11792	-30%	17.24	15.9	-8.09%	+15%