Japan Engine Corporation

# UE SERVICE INFORMATION

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Subject :

Abolition of cylinder oil feed rate at P1 point

| | |
|---|---|
| Application | UEC Diesel Engine |
| Type | All UEC |
| No. | USI-10006E Rev.1 |

**General**

Up to this day, on the instruction book of UEC engine, cylinder oil feed rate is shown as the value of P1 rating engine (P1 converted cylinder oil feed rate ($q_{P1}$)). Therefore on actual setting of each engine, the cylinder oil feed rate of instruction book (P1 converted cylinder oil feed rate) is calculated to the feed rate at MCR of each engine (MCR feed rate ($q_{A100}$)). Today, the concept of P1 conversion cylinder oil feed rate is abrogated because of its complexity.

According to the above, hereafter the concept that the feed rate of instruction book is dealt with equal to MCR feed rate ($q_{P1} = q_{A100}$).

But, it does not mean that the feed rate value set on your engine currently under in service is changed to different value with this service information.

Please refer to related service information (USI-10002) about the guidance of cylinder oil feed rate additionally.

1. The way to know the cylinder oil feed rate setting value.

1) The previous way

- Form the guidance of cylinder oil feed rate on the instruction book, read the feed rate setting value $q_{P1}$ (P1 converted cylinder oil feed rate).
- The ratio of shaft speed of P1 rating engine: Ne(P1) and shaft speed of the engine now used: Ne(CMCR) is multiplied with $q_{P1}$. The value is the actual feed rate setting value (= MCR feed rate ($q_{A100}$).

$$q_{A100}\ (\text{setting value}) = q_{P1} \times \frac{Ne(P1)}{Ne(CMCR)} = q_A \times \frac{Ne(CMCR) \times L}{Ne \times L(CMCR)}$$

$q_A$ : Actual feed rate[g/kWh]

(Regarding $q_A$, 053-02 in INSTRUCTION BOOK(OPERATING) is to be refered(P.4,5).)

Ne : Engine speed[min-1]

L : Engine output[kW/cyl]



| Plan record | | | | |
|---|---|---|---|---|
| | Newly issued 13th Dec.2017<br>MSI-1554/NO.0310<br><br>Rev.1 Page.3 is added. | Approved | T. Yamamoto | SERVICE ENGINEERING DEPARTMENT |
| | | Checked | T. Nasu | SERVICE ENGINEERING SECTION |
| | | Designed | K.Imanaka | DATE OF REVISED :6th Jun. 2018 |

2) The way from hereafter

・Form the guidance of cylinder oil feed rate on the instruction book, read the feed rate setting value $q_{P1}$ (P1 converted cylinder oil feed rate).

・Deal with the above value equal to MCR feed rate and set the lubricator

( Please collect the vertical axis of the guidance of cylinder oil feed rate graph as $q_{P1}$ to $q_{A100}$ ).

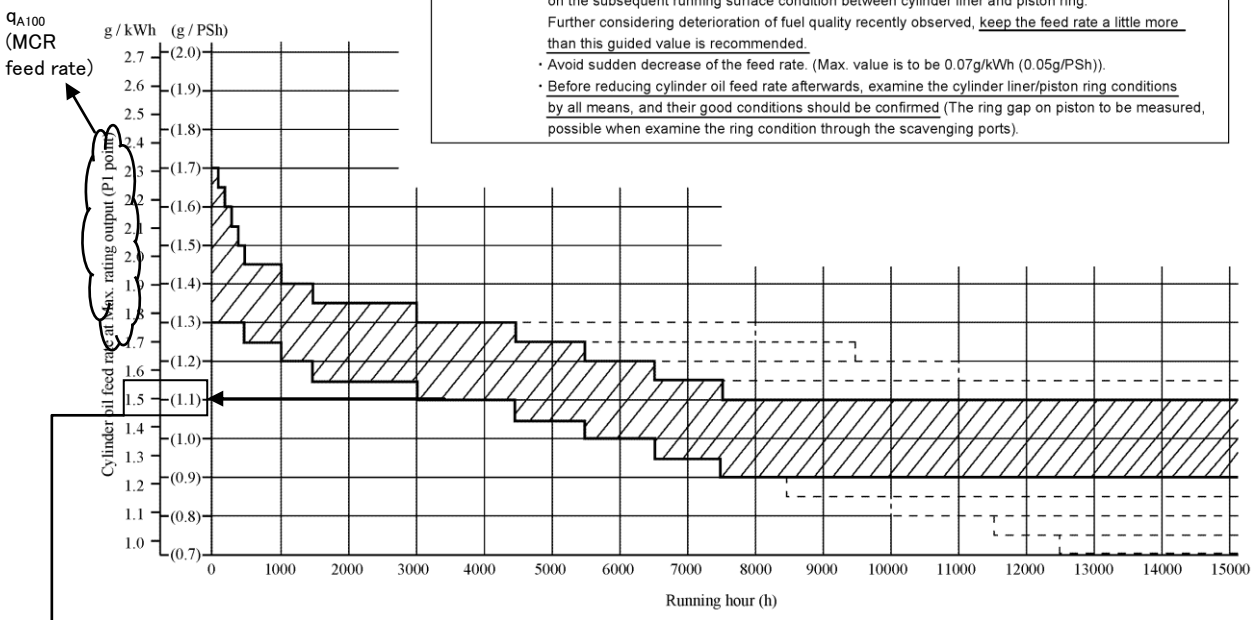
**⚠ CAUTION**

・Thereby, the practical cylinder oil feed rate should be adjusted depending on character of cylinder oil/fuel oil, engine load condition, and actual running condition of cylinder liner and piston ring. Especially pay attention to that engine condition during running–in period has greatly influence on the subsequent running surface condition between cylinder liner and piston ring. Further considering deterioration of fuel quality recently observed, keep the feed rate a little more than this guided value is recommended.

・Avoid sudden decrease of the feed rate. (Max. value is to be 0.07g/kWh (0.05g/PSh)).

・Before reducing cylinder oil feed rate afterwards, examine the cylinder liner/piston ring conditions by all means, and their good conditions should be confirmed (The ring gap on piston to be measured, possible when examine the ring condition through the scavenging ports).

An example of the guidance




*: About A-ECL ECL-T system, please set this value from ECL operation panel.

## ⚠ CAUTION

・As cylinder lubricating feed rate is determined according to the condition of piston ring and cylinder liner, it is not necessary to modify feed rate rapidly by applying this instruction.

・The feed rate shall be reduced gently after confirming that piston ring and cylinder liner are in good condition. Rapid changing of feed rate must be avoided.

[Reducing range of feed rate]

・Conventional / SIP / ECL-T system :

Max. 0.07g/kWh

・A-ECL system:

1.3g/kWh and over: Max.0.10～0.15g/kWh

Less than 1.3g/kWh: Max.0.05～0.10g/kWh

3) -1 Conversion into CMCR feed rate $q_{A100}$ (**A-ECL / ECL-T system**)

Feed rate set value shall be calculated on a basis of feed rate ($q_{A100}$ ($q_{A1001}$, $q_{A1002}$, $q_{A1003}$)) at 100% continuous output.

Mode1 (Proportional to the engine load)

$$q_{A1001} * = q_A$$

Mode2 (Proportional to the mean effective pressure)

$$q_{A1002} * = q_A \times \frac{Ne}{Ne(CMCR)}$$

Mode3 (Proportional to the engine speed)

$$q_{A1003} * = q_A \times \frac{Ne(CMCR) \times L}{Ne \times L(CMCR)}$$

＊Formulas of Mode1&2 will be applied only when the main engine speed is 63% or more of CMCR.

| | | |
|---|---|---|
| $q_{A1001}$: | CMCR conversion feed rate in Mode1 | g/kWh |
| $q_{A1002}$: | CMCR conversion feed rate in Mode2 | g/kWh |
| $q_{A1003}$: | CMCR conversion feed rate in Mode3 | g/kWh |
| $q_A$: | Actual feed rate | g/kWh |
| Ne: | Engine speed | min-1 |
| Ne(CMCR): | Engine speed at maximum continuous rating | min-1 |
| L: | Engine output | kW/cyl. |
| L(CMCR): | Engine output at maximum continuous rating | kW/cyl. |

NOTE

If the deviation of the actual feed rate ($q_{A100}$) from set value (q100) is large (±10%), consult with the service dept. of the engine maker.

3) -2 Conversion into CMCR feed rate qA100 (**Conventional / SIP system**)

Feed rate set value shall be calculated on a basis of feed rate ($q_{A100}$)) at 100% continuous output.

$$q_{A100} = q_A \times \frac{Ne(CMCR) \times L}{Ne \times L(CMCR)}$$

| | | |
|---|---|---|
| $q_{A100}$: | CMCR conversion feed rate | g/kWh |
| $q_A$: | Actual feed rate | g/kWh |

053-02 in INSTRUCTION BOOK(OPERATING)



Calculation of feed rate :

1. Actual feed rate $q_A$ in partial load

$$q_A = \frac{Q \times 1000 \times \gamma}{24 \times L} \quad \text{——— (1)}$$

| | | |
|---|---|---|
| $q_A$ | : Actual feed rate | g/kWh |
| Q | : Actual measured feed oil quantity | ℓ/day･cyl. |
| $\gamma$ | : Density of cylinder lubricating oil | $\gamma$ = 0.91kg/ℓ |
| L | : Engine output | kW/cyl. |

2. Calculation of predicted feed rate $q_A'$ at each load

This method is intended to predict the feed rate on the basis of the planned feed oil amount of the A-ECL system. Therefore, to correct the oil feed rate, measure the actual consumption of cylinder lubricating oil and calculate the feed rate using formula (1).

(1) The feed rate $q_{100}$ at 100% load setting

$q_{100}$ is a value entered through the ten-key pad on the A-ECL operation panel.

**⚠ CAUTION**

The unit of the feed rate entered through the operation panel is "g/kWh".

(2) Prospect feed rate $q_A'$ ($q_{A1}'$, $q_{A2}'$, $q_{A3}'$) in partial load

Mode 1

When mode 1 is selected, the same value as obtained in calculation in item 1 as actual rate of lubrication $q_A$, and as obtained in setup in item 2-(1) as setup of actual feed rate $q_A$ shall be given. However, this shall be applied only when the main engine speed is 63% or more of CMCR.

$$q_{A1}' = q_{100} \quad \text{——— (2)-1}$$

Mode 2

When mode 2 is selected, actual rate of lubrication $q_A$ calculated in item 1 shall be the same value as $q_{A2}$ worked out in the following equation. However, this shall be applied only when the main engine speed is 63% or more of CMCR.

$$q_{A2}' = q_{100} \times \frac{Ne\ (CMCR)}{Ne} \quad \text{——— (2)-2}$$

Mode 3

When mode 3 is selected, actual rate of lubrication $q_A$ calculated in item 1 shall be the same value as $q_{A3}$ worked out in the following equation.

$$q_{A3}' = q_{100} \times \frac{Ne \times L\ (CMCR)}{(Ne\ (CMCR) \times L)} \quad \text{——— (2)-3}$$

Where,

| | | |
|---|---|---|
| $q_{A1}'$ | : Partial load rate of lubrication in Mode 1 | g/kWh |
| $q_{A2}'$ | : Partial load rate of lubrication in Mode 2 | g/kWh |
| $q_{A3}'$ | : Partial load rate of lubrication in Mode 3 | g/kWh |
| Ne | : Engine speed | $min^{-1}$ |
| L (CMCR) | : Engine output at maximum continuous rating | |
| Ne (CMCR) | : Engine speed at maximum continuous rating | |

NOTE Since the specific gravity of cylinder lubricating oil of 0.91 is used, if the specific gravity of cylinder lubricating oil actually used is not 0.91, correct the values derived from formula (1) and (2).

$$q_A,\ q_{100},\ q_{A100},\ q_A' \times \frac{\text{the density of cylinder lubricating oil actually used}}{0.91}$$

A-ECL

L

3. Conversion into CMCR feed rate $q_{A100}$

The necessary feed oil quantity shall be calculated on a basis of feed rate ($q_{A100}$ ($q_{A1001}$, $q_{A1002}$, $q_{A1003}$)) at 100% continuous output.

The Fig.1−5 Guidance of the cylinder oil feed rate (2/9, 3/9) is shown at CMCR.

Mode 1

$$q_{A1001}{}^{*} = q_A \quad \text{———} \quad (3)\text{-}1$$

Mode 2

$$q_{A1002}{}^{*} = q_A \times \frac{Ne}{Ne\ (CMCR)} \quad \text{———} \quad (3)\text{-}2$$

Mode 3

$$q_{A1003}{}^{*} = q_A \times \frac{Ne\ (CMCR) \times L}{Ne \times L\ (CMCR)} \quad \text{———} \quad (3)\text{-}3$$

＊(3) -1,2 formulas will be applied only when the main engine speed is 63% or more of CMCR.

| | | |
|---|---|---|
| $q_{A1001}$ | : CMCR conversion feed rate in Mode 1 | g/kWh |
| $q_{A1002}$ | : CMCR conversion feed rate in Mode 2 | g/kWh |
| $q_{A1003}$ | : CMCR conversion feed rate in Mode 3 | g/kWh |
| $q_A$ | : Actual feed rate | g/kWh |

NOTE If the deviation of the actual feed rate ($q_{A100}$) from set value ($q_{100}$) is large (±10%), consult with the service dept. of the engine maker.