

YANMAR SERVICE NEWS

Subject	Crankshaft Deflection Measurement	No.: 17-2-G-05-001-O Date: 2017.05
Engine Model	All Models	Use
		Marine Aux. Engines
		Engine Nos. _____

The operation manual of Yanmar engines requests measurement of crankshaft deflection when the engine is cooled down. This is because of the use of the deflection value measured when the engine is cold for assessing the engine performance.

However, in the marine auxiliary engines, it is hard to make the cold state of the engine. Furthermore, it is hard, too, to clearly define the engine cold-state in terms of temperature.

Such being the circumstances, we would like to introduce you to the procedure for realizing more accurate deflection measurement for your reference.

1. Cold State

25°C is one of the temperature standards for dimension measurement. In the deflection measurement, too, it is ideal to conduct measurement at 25°C. In actuality, however, it is very difficult to create such environment for the marine auxiliary engines.

We, accordingly, would like to define the cold-state of the engine as follows:

Cold-state of the engine shall be the state where, within the usage condition of ambient temperature in the range of 0~45°C, the temperatures of elements, that would influence the engine deflection, (crankshaft, cylinder block, bedplate, CMB, cooling water, lube and fuel oils, etc.), are equivalent to or lower than the ambient temperature.

Although it is not very simple to create the cold-state above during the navigation of the ship, it is possible to make the environment closer to the cold-state by implementing the following items. Implement each procedure depending on the situation:

- ① Stop the engine and close the inlet and outlet valves of the cooling water and warming up lines at least 24 hours prior to the deflection measurement.
- ② When it is possible, it is better to have the cooling water inside the engine drained.
- ③ Stop the LO purifier circulation. (In the case of the overflow purification, close the LO inlet and outlet valves. Do not conduct batch purification.)
- ④ In both of the HFO direct starting and the operation on MDO, close the fuel inlet/outlet valves when the fuel temperature is over 45°C. In the case of HFO direct starting, switch the operation to MDO and discharge HFO fully before stopping the engine.

2. Deflection Measurement and Assessment

For the basic deflection measurement and assessment, please refer to the operation manual. Use the TEST RECORD Sheet attached for recording the measurement data.

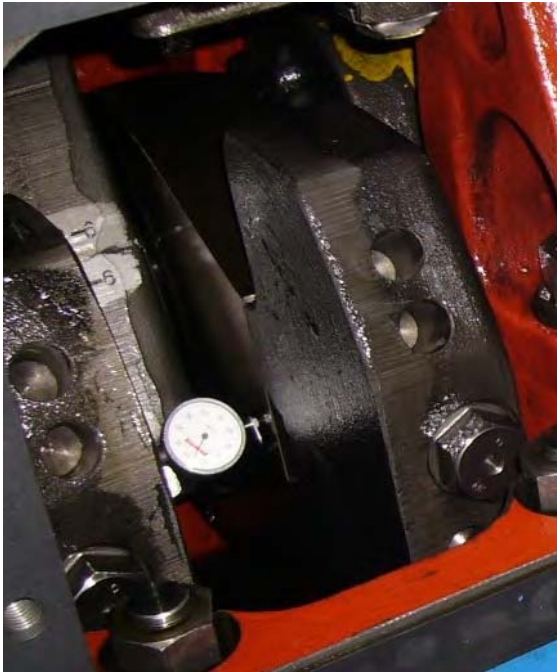
The allowable value varies depending on the engine model and specifications. Check the value of the shop test record and the operation manual.

When the deflection measurement was implemented on the engine still hot, the deflection measurement value being affected by the temperature is hard to be assessed. In our experience, the value will be 2/10000 ~ 3/10000 x Stroke (—, downside narrowed).

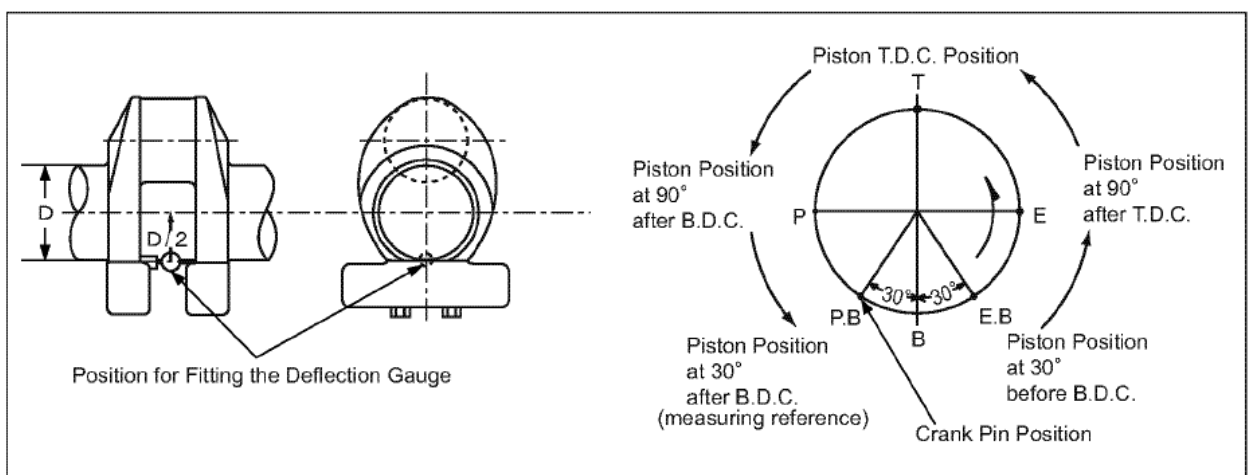
<p>YANMAR CO.,LTD. Power Solution Business Large Power Products Management Division Quality Assurance Division</p>	Approved	Checked	Prepared
			

3. Procedure to Raise Measurement Accuracy

- ① Prior to the measurement, install the deflection gauge (w/ magnet base) to the crankshaft or the cylinder block and leave the installation for more than 15 minutes for eliminating temperature gap between the gauge and crankshaft.



- ② After installing the deflection gauge to the specified location, move the probe to check that the needle returns to the original position. Turn the flywheel slowly to its turning direction. After completing measurement at PB→P→T→E→EB, turn the flywheel reverse for returning it to PB again and check that the needle points to "0". If the needle did not point to "0", implement the measurement again.



試験成績表 ・ TEST RECORD

クランク軸デフレクション ・ Crank Shaft Deflection

機関型式 Engine Model		機関番号 Engine No.	冷態 ・ Cold State					
			計測日 Date		周囲温度 Amb. Temp.	°C		
Cyl. No.	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
T								
P								
E								
P・B								
E・B								
備考 Remarks	上段：冷態時 ・ Upper Field : Cold State 下段：温態時(参考値) ・ Lower Field : Hot State (For Reference) 【計測日・Date : _____ , 周囲温度・Amb. Temp. : _____ °C, 潤滑油温度・L.O. Temp. : _____ °C】							

デフレクション計算結果(冷態時) ・ Result of calculation for deflection (Cold State)

Cyl. No.	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
T-PB								
T-EB								
P-E								

<デフレクションの計算式 ・ Calculation for deflection>


- 上下方向のデフレクション = T-PB および T-EB ・ Vertical deflection = T-PB and T-EB as well
- 左右方向のデフレクション = P-E ・ Horizontal deflection=P-E

冷態時デフレクション許容値 ・ Allowable deflection values at cold state

ストローク(行程) ・ Stroke ; mm

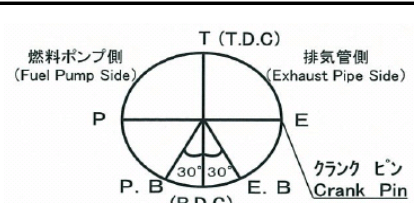
T-PB/EB		P-E		T-PB/EB		P-E	

直結方式 Coupling System	被駆動機 Driven Machine	据付方式 Installation System



(下膨み)
(expansion below)

(下つぼみ)
(contraction below)



T (T.D.C) 燃料ポンプ側 (Fuel Pump Side) 排気管側 (Exhaust Pipe Side)

P (B.D.C) E (B.D.C) クランク ピン (Crank Pin)

単位：1/100mm (Sは行程) ・ Unit: 1/100mm ("S" stands for stroke)