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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 3821-2015

**Small and medium power internal combustion engines -
Cleanliness limits and measurement methods**

中小功率内燃机 清洁度限值 and 测定方法

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16 Serial number part

17 Serial number part

Appendix A

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009. This standard replaces GB/T 3821-2005 "Measurement method for cleanliness of medium and small power internal combustion engines", compared with GB/T 3821-2005 The technical changes are as follows:

--- Increased demagnetization requirements for parts prior to cleanliness inspection (see 7.1.7);

--- Increased cleanliness quality and particle limit requirements (see Chapters 3, 4). This standard was proposed by the China Machinery Industry Federation. This standard is under the jurisdiction of the National Internal Combustion Engine Standardization Technical Committee (SAC/TC177). This standard was drafted. Weichai Power Co., Ltd., Shanghai Internal Combustion Engine Research Institute, Guangxi Yuchai Machinery Co., Ltd., Changchai Co., Ltd., Kunming Yunnei Power Co., Ltd., Weichai Kaidong Power Machinery Co., Ltd., Ningbo Xuelong Group Fan Co., Ltd. The main drafters of this standard. Wang Jianping, Ji Weibin, Luo Zhijian, Dai Weilin, Yan Dehui, Yang Chunliang, Tao Shouping, Chen Nianhong, Guo Hua, Li Jianghu, Chen Lanlan, Yang Junjie, Meng Hongxia. The previous versions of the standards replaced by this standard are.

---GB/T 3821-1983, GB/T 3821-2005. Small and medium power internal combustion engine cleanliness limit and determination method

0.6

Note. For the oil pump installed inside the internal combustion engine, the limit of the external surface cleanliness of the assembly is determined by the OEM and the accessory factory.

3.2.3 Turbocharger The cleanliness limits for turbochargers are specified in JB/T 6002.

3.2.4 oil pump nozzle The cleanliness limit of the diesel oil pump nozzle is specified in JB/T 7661.

1 Scope

China's national standard for the cleanliness limits of small and medium power internal combustion engines and how they are measured. Cleanliness here means the mass of foreign particles left inside the engine when it leaves the factory - swarf from machining, casting sand, grinding dust, fibres from wipes, and the debris of assembly. It matters because an engine's bearings and its fuel injection equipment run on oil films measured in microns, and a particle larger than that film is dragged through the clearance and scores the surface. The damage is done in the first minutes of running, and it shortens the engine's life by an amount nobody can attribute afterwards, because the engine simply wears out early. Since the contamination cannot be removed once the engine is assembled, the limit has to be enforced during manufacture, which is why it is specified as a product requirement with a defined method of measurement rather than left to housekeeping.

This standard specifies the limits of cleanliness of small and medium-sized internal combustion engines (hereinafter referred to as internal combustion engines), measurement items and locations, measurement conditions, and determination. method. This standard applies to the whole machine and parts of internal combustion engines.

1.0 Cast aluminum 0.9

3.2.5.2 Centrifugal oil filter assembly cleanliness, expressed in WR2 (mg) per mass, see Table 9 for limits. Table

9 Rotor inner diameter d/mm WR2/mg Cast iron filter seat cast aluminum filter seat ≤100 120 108 >100 150 135

3.2.6 Air compressor assembly The cleanliness of the air compressor assembly is expressed in WK (mg) per mass, and the limit is calculated according to formula (6).

$WK = a(K_1 K_2 K_3)$

b) (6) In the formula. a

--- empirical constant, 50mg; K_1

--- total displacement correction coefficient, the value is shown in Table 10; K_2

---Material correction coefficient, the values are shown in Table 11; K_3

---Crankshaft end transmission mode correction factor, the value is shown in Table 12; b

--- The number of drive pairs on the drive shaft. Table

1.1 Calibration speed $n_{eb}/(r/min)$ $K_2 >2000 \sim 3000$ 1.0 >3000

0.9 table

3 Calibration power P_{eb}/kW G/mg ≤3.68 50 (two strokes) 80 (four strokes) >3.68~7.35 150 >7.35~

14.7.200 Calibration power P_{eb}/kW $G/mg > 14.7 \sim 29.4$ $400 \sim aP_{eb} > 29.4 \sim 73.5$ $0 > 73.5$
 $500 \sim 0.5aP_{eb}$

3.1.2 The cleanliness of the whole engine of the internal combustion engine is calculated according to formula (2). $W = 4.66iSD$ (2) In the formula. W

- Cleanliness limits for internal combustion engines in milligrams (mg); i
- number of cylinders; S
- piston travel of the internal combustion engine in centimeters (cm); D
- Cylinder diameter of the internal combustion engine in centimeters (cm).

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only dated versions apply to this article. Pieces. For undated references, the latest edition (including all amendments) applies to this document.

GB 1922-2006 Solvent oil for paints and cleaning

GB/T 5330 industrial wire braided square hole screen

GB/T 23338 internal combustion engine charge air cooler technical conditions

JB/T 6002 turbocharger cleanliness limit and method of determination

JB/T 7661 diesel engine oil pump nozzle product cleanliness limit and determination method

3 Belt drive

1.0 gear drive 1.1 (excluding gears) 1.2 (including gears)

3.2.7 oil cooler assembly The cleanliness of the oil cooler assembly is expressed in WL (mg) per impurity, and the limit is calculated according to equation (7). $WL = a b F_0$ (7) In the formula. a

- empirical constant, the unit is milligram (mg), the value is shown in Table 13; b
- empirical constant, the unit is milligrams per square meter (mg/m^2), the values are shown in Table 13; F_0
- oil side heat transfer area in square meters (m^2). Table

3.1 Machine cleanliness

3.1.1 The cleanliness of the internal combustion engine is expressed in terms of each impurity mass W , and the limit is calculated according to formula (1). $W = aK_1K_2P_{eb} G$ (1)