YC4A、YC4B、YC4BA、YC4D

工程机械与农业机械国 2 系列发动机

使用维护说明书

YC4A、YC4B、YC4BA、YC4D for Off-road Equipment、

Agriculture Machinery Series

Euro2 Diesel Engine Workshop Manual

使用前请仔细阅读使用说明书
Please read this manual carefully before operation

广西玉柴机器股份有限公司

Guangxi Yuchai Machinery Co., Ltd.

二 0 一 0 年九月 September , 2010

前　　言 Foreword

本说明书介绍了 YC4A、YC4B、YC4BA、YC4D 系列发动机配套挖掘机、装载机等工程机械及拖拉机、收割机等农业机械用机型的主要结构、技术参数、主要附件的技术规格与数据以及使用和维护方面的基本知识，并对一些常见故障及其排除方法作了初步的介绍。

This manual describes the basic structure, technical parameters, technical specifications, operation & maintenance, common failures and troubleshooting of YC4A、YC4B、YC4BA、YC4D Series Diesel Engine for construction machinery l such as excavator, loader; agriculture machinery such as tractor, harvester.

为了使机器的优越性能得到更好的发挥，并保证机器的安全运行，请您在使用之前首先详细阅读本使用说明书，正确认识、了解与掌握 YC4A、YC4B、YC4BA、YC4D 工程机械与农业机械系列发动机的使用和维护要求，并特别注意以下的“安全注意事项及警示”。Please read this manual carefully prior to operation and pay your particular attention to the Percautions for Safe Operation described below in order to enable the machine to bring its superior performance into full play and ensure its safe operation.

随着社会不断发展和需要，发动机将不断优化和提高，并不断增加变型设计的产品，除特别重大的设计变型外，本说明书不再作更改，因此过了一定的时间后说明书的介绍可能与实际的发动机有一定的出入，请以实物为准，敬请广大用户加以注意和谅解。With continuous development and demand of the society, the engine will be uninterruptedly optimized and improved and its modified products will also be continuously increased. Except for especially great modifications in the design occurs, this manual will not be altered again. Therefore, after a certain period of time, there will be any discrepancies between the description in the manual and the real engine you have, to which kindly ask our customers to pay due attention.

本说明书只对基本型发动机详加说明，变型产品不做列举，请用户注意和谅解。his manual gives a detailed description for the basic model engine only, and any modifications of it are not laid out, to which we ask our customers to pay due attention and understand it well.

安全注意事项及警示 Precautions for safe driving

1、第一次使用前 Before the first use

- 您选择的产品符合国家所有相关的安全规定。All product you use must abide by all national safety regulations.
- 在第一次启动、使用柴油机前，请仔细阅读《使用保养说明书》，它包括十分重要的柴油机安装、使用以及安全说明。 Before starting and operating for the first time, please read the Manual carefully, which provides important information covering engine installation, operation and safety precautions.
- 您如果不遵守这些说明，柴油机一旦出现问题，厂方将不负任何责任。If you don't follow the instructions, once the engine goes wrong, manufacturer will not be responsible.
- 请严格使用按照说明书的内容和要求进行磨合、使用和保养。Please follow the manual for running in, operation and maintenance.
- 柴油机不允许超负荷作业，怠速运行不要超过 10 分钟。It is forbidden to run engine with overload, and operate at idle speed shall not exceed 10 minutes.
- 冷却系统必须使用合格的防冻液，否则由此引起的故障，不予实行免费保修。

Cooling system must use qualified antifreeze, or may cause fault for engine, and manufacturer will not take responsibility for it.

- 柴油机使用的润滑油自然吸气发动机必须是 CD 级或 CD 级以上机油，增压和增压中冷发动机必须是 CF 级或 CF 级以上机油严禁使用低于此级别的柴油机机油。换机油严禁新油、旧油及不同牌号的润滑油混合使用。另外，不同厂家和不同牌号的机油也严禁混合使用，以免降低机油品质。

Natural aspirated diesel engine must use CD or above lubricant. Turbo-charged engine and turbo-charged engine with inter-cooler must use CF or above lubricant. Do not use lubricant under this class. Do not use mixture of new and old lubricant. And do not use mixture of different brand or maker's lubricant, to avoid lubricant quality decrease.

- 柴油机在磨合结束后应用清洁煤油或柴油清洗油底壳，更换机油滤芯，并更换全部机油。严禁不带空气滤清器运转柴油机，未经滤清的空气进入柴油机将会造成柴油机的早期磨损而不能正常工作。

Use clean kerosene or clean diesel fuel to clean oil pan after engine running in, and replace oil filter element as well as oil fully. It is forbidden to run engine without air filter, unfiltered air will cause engine premature wearing, result in abnormal working.

- 电器线路接线必须正确、牢固；发电机运转时，严禁拆卸各连接线路，以免发生意外。

Circuit wiring must be correct and in firm connection, when the generator is operating, it is forbidden to dismantle the wiring to avoid accidents.

2、使用时 While in use

- 每次起动发动机，须怠速运转 3～5 分钟，待各种仪表正常工作后，方可起步运行。不允许冷车突然加大油门，否则会损坏各种仪表及其相应零件、加速发动机运动件的磨损及损坏增压器，从而缩短发动机的使用寿命。
- 凡在保养过程中更换润滑油滤清器时，应先将新润滑油滤清器灌满润滑油再安装，而且安装完成后，必须起动发动机，并使其怠速运转 2～ 3 分钟，接着中速运行 1～ 3 分钟后后下车仔细观察滤清器有无渗漏现象，若有则须及时排除，否则会导致缺油烧坏曲轴、轴瓦等运动副零部件。

Ensure to top up new oil filter before installing whenever replacing the oil filter during maintenance, after installing, be sure to start engine and run it at idle speed for 2-3 mins, then at medium speed for 1-3 mins, check carefully for leakage to filter afterwards. If leakage occurs, service immediately, otherwise the crankshaft, bearing shell etc. moving parts will be burned due to lack of oil.

- 在柴油机运转时，柴油机工作时，增压器、排气管、消声器、散热器等处温度较高，应特别注意您的身体应与柴油机保持一定距离，以免高温烫伤。
- When engine is running and operating, keep away from turbocharger, exhaust pipes, muffler and radiator etc. to avoid scalding injury.

柴油机工作时散热器内部有 20kPa 的内压，添加冷却液是应按要求停车，待冷却液充分降温后，再添加冷却液，以免高温液体溅出烫伤。

- There is 20 kpa internal pressure in radiator when engine is operating, if you want to fill coolant, you must stop the vehicle first and wait until the coolant cools down in case of scalding injury by the spilled high temperature fluid.

当发现柴油机机油压力过低、无机油压力、冷却水温度过高以及柴油机内部有异常响声时，应及时停车检查并排除故障。

- Stop vehicle and check to eliminate troubles timely when oil pressure is low, no oil pressure, too high cooling water temperature and abnormal sound occurs.
- 柴油机要注意防火，明火不得靠近柴油机。同时柴油机的排气温度也很高，如您的机器在附近有易燃物的场合下工作时。应按要求在排气管或消声器出口处加装火星消灭装置。

Guard against fire, engine shall be away from open flame. Exhaust temperature is very high, if engine is working around flammables, please install spark extinguisher.

- 按规定放燃油预滤器积水、更换预滤器滤芯总成和精滤器滤芯总成。

Drain water off the fuel primary filter as required, and replace filter element assembly and secondary filter element assy.

- 应经常检查进气管路是否漏气、空气滤清器是否堵塞，若有以上现象则必须及时维护，否则会损坏增压器和导致拉缸等故障；同时发动机功率会下降，整车只能以较低的车速行驶，应及时维修。

Check often for the leakage and blockage of intake pipe and air filter. Service immediately if occurs to avoid damage to turbocharger and cylinder scoring etc.

failures, while reducing engine power at the same time , therefore vehicle can be driven at pretty low speed。

- 柴油机一旦发生飞车故障，必须立即切断油路或堵死进气系统。

Cut off fuel or blank off intake system immediately when engine runaway occurs.

3、使用结束时 At the end of operating

严禁高速、大负荷运转状态下突然熄火停机，怠速运转 3～5 分钟后再停机。否则会损坏增压器及其它运动件，从而缩短发动机的使用寿命。

Avoid any sudden stall and stop at high speed & high load status, the appropriate way is to gear down gradually and stop after running at idle speed for 3～5 minutes, otherwise it will damage turbocharger and other moving parts and shorten engine service life consequently.

4、出现故障时

- 不允许用带腐蚀性的清洁剂清洗散热器和进气中冷器，否则会造成柴油机冷却系统严重损坏。

It is forbidden to wash radiator and intercooler with corrosive cleaning agent , otherwise it will cause serious failure to engine.

- 喷油泵上铅封的部位，不允许进行拆卸、调整，出现故障时，请与附近的用户服务部或经销商联系。

It is forbidden to remove and adjust the lead seal parts in fuel injection pump .If fuel pump is faulty; please contact customer service department or dealers nearby.

在三包期内当柴油机发生重大事故时未经厂家特约维修站的允许，严禁用户私自拆检、维修。

During the period under guaranty. without permission from special repair shop, users should not dismantle and repair the engine when there is major fault.

- 当发现柴油机无机油压力、无机油压力过低、冷却水温度过高、进气系统有泄露以及柴油机内部有异响时，应与当地客户服务部门联系。严禁柴油机带病运转。

When the diesel engine works, if the oil pressure is too low, cooling water temperature is too high, Air intake leak, and hearing any abnormal noise from engine inside, you should contact local customer service department. The engine is forbidden to operate with fault.

5、其他 Others

- 根据包装箱外的注意事项进行吊装、运输，贮存发动机的环境应通风、干燥、清洁、无腐蚀性物质，发动机有效封存期为见发动机包装箱上注明。

Hoist and transport the engine in accordance with the precautions described on outside the packaging case. The place for storage of the engine shall be well-ventilated, dry, clean and free of corrosive substances. See the mark on the package for preservation of the engine.

- 发动机的标牌含有发动机的基本信息包括:标定功率、标定转速、系列号、生产日期、执行标准等。YC4A、YC4B、YC4BA、YC4D 标牌位于缸盖罩顶面或进气管上面。

Engine nameplate provides engine basic information such as rated power, series code, production date; executed standard etc。YC4A、YC4B、YC4BA、YC4D′s nameplate is located on the top of cylinder head cover or the upper part of intake pipe

- 发动机出厂编号还打印在气缸体下缘中间的平台上。

The engine ex-work number is printed on the platform in the middle of the cylinder lower margin.

- 安全警告包括：敬告用户、曲轴转向、转动危险及高温危险，分别贴在发动机的缸盖罩、离合器壳、缸盖罩靠排气管侧。

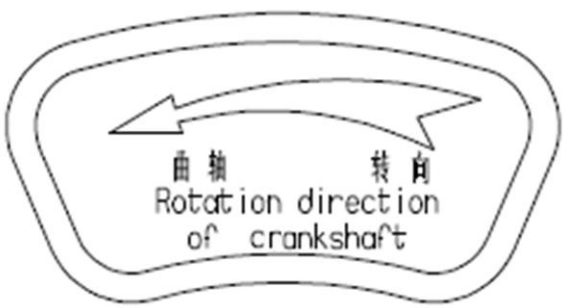
The safety warnings include user’s precaution; Crankshaft rotaing/rotating danger and high temperature danger are sticked on cylinder head cover; flywheel housing and engine head cover near to exhaust pipe respectively.

- 包装箱内随带下列随机文件（使用说明书、随机备件清单、随机工具清单、合格证、装箱清单，用户开箱后应及时清点。

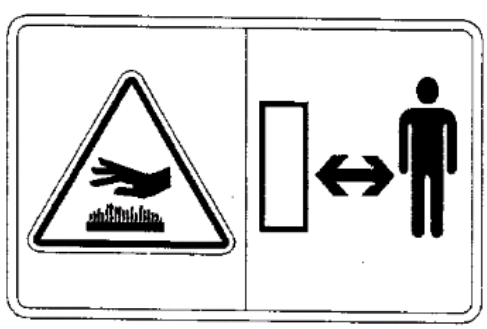
Documents supplied with engine in the packaging case include manual, parts list, tools list,

安全警示标示说明！Safety warning signs and specifications!

不得靠近风扇、飞轮、皮带轮等转动物！Keep away from fan, flywheel, belt roller and so on
不得触摸排气管等高温物，否则将会造造成人身损伤！It is forbidden to touch high-temperature objects such as exhaust pipe, otherwise it will cause physical injury.
位置：缸盖罩左侧显眼处。 Location: Left side of cylinder head cover



发动机高速旋转，旋转请勿靠近！ Engine running in high speed, Please keep off!
位置：发动机飞轮壳上面。 Location: Upside of flywheel housing



远离机器热表面！否则将会烫伤皮肤！机器处于热状态时，请与机器保持安全距离！
Keep away from heat surface of engine, otherwise it will cause scalding injury. Keep a safe distance!
位置：缸盖罩右侧显眼处。 Location: Right side of cylinder head cover

目　　录 Contents

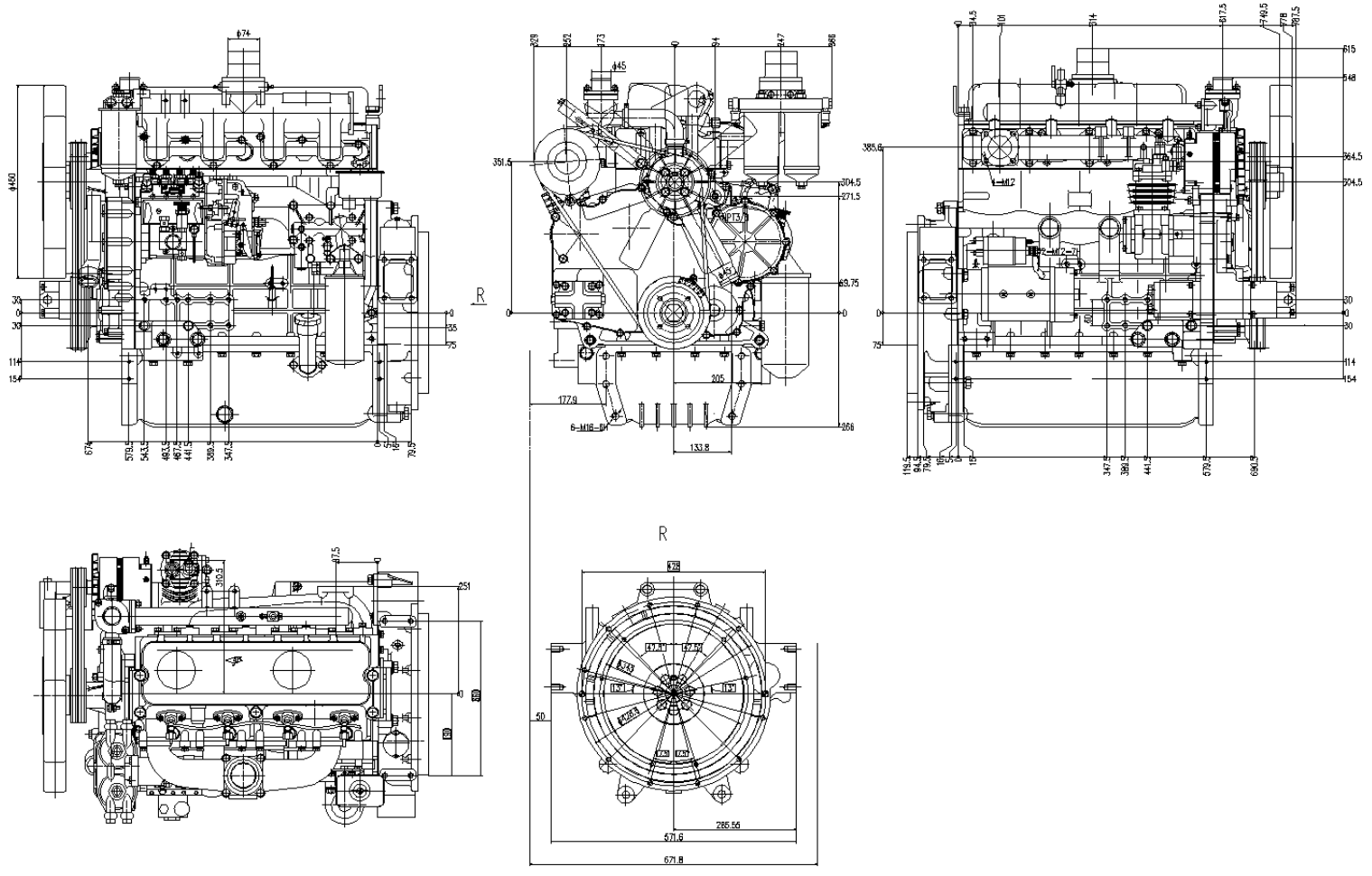


图 1 YC4A90-T22 系列柴油机外形安装图（实际跟配套布置会有小差距）

Figure I YC4A90-T22 series diesel engine lay-out (might have slight difference)

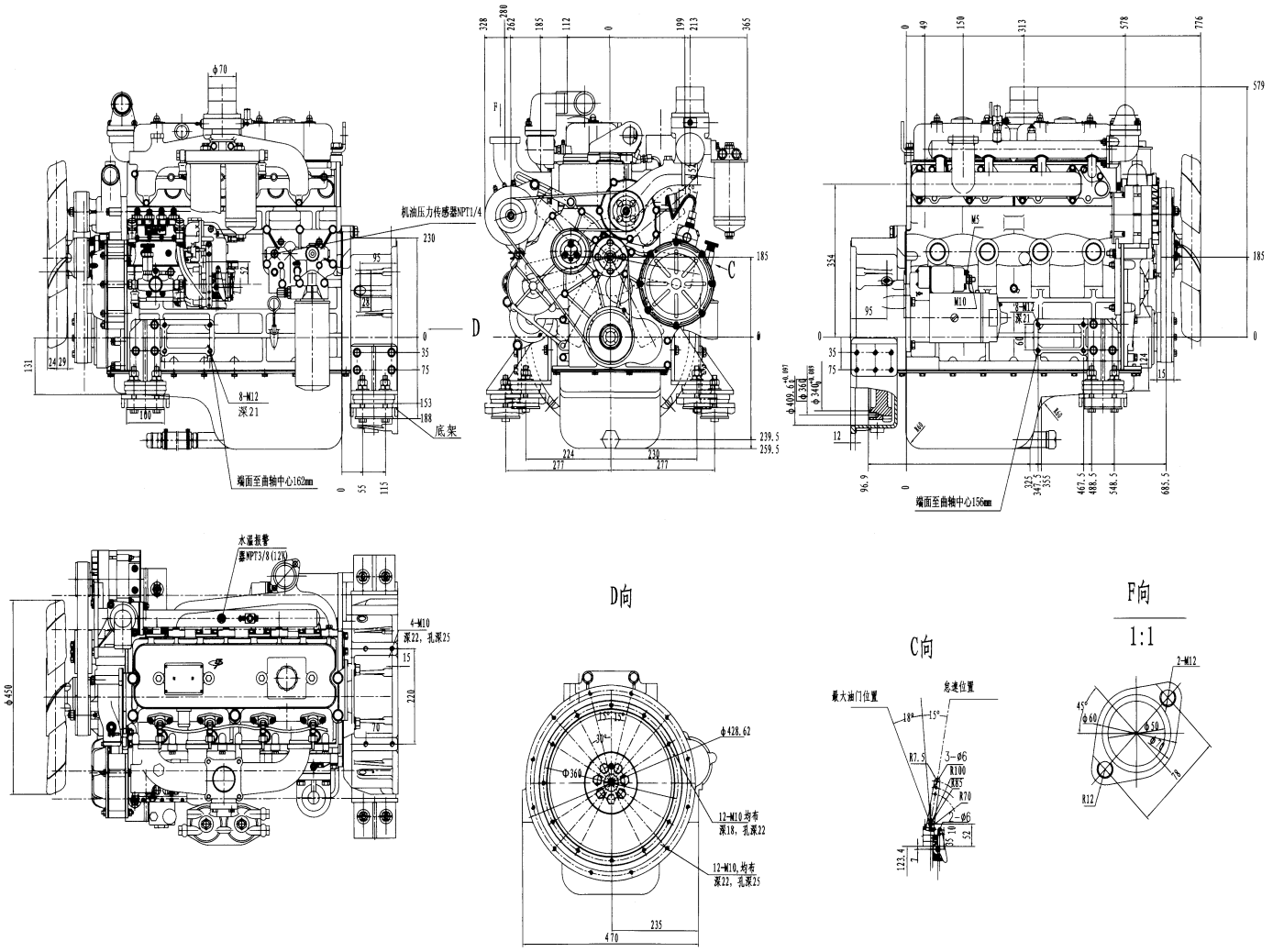


图 2 YC4D80-T20 系列柴油机外形安装图(实际跟配套布置会有小差距)Figure 2 YC4D80-T20 series diesel engine lay-out (might have slight difference)

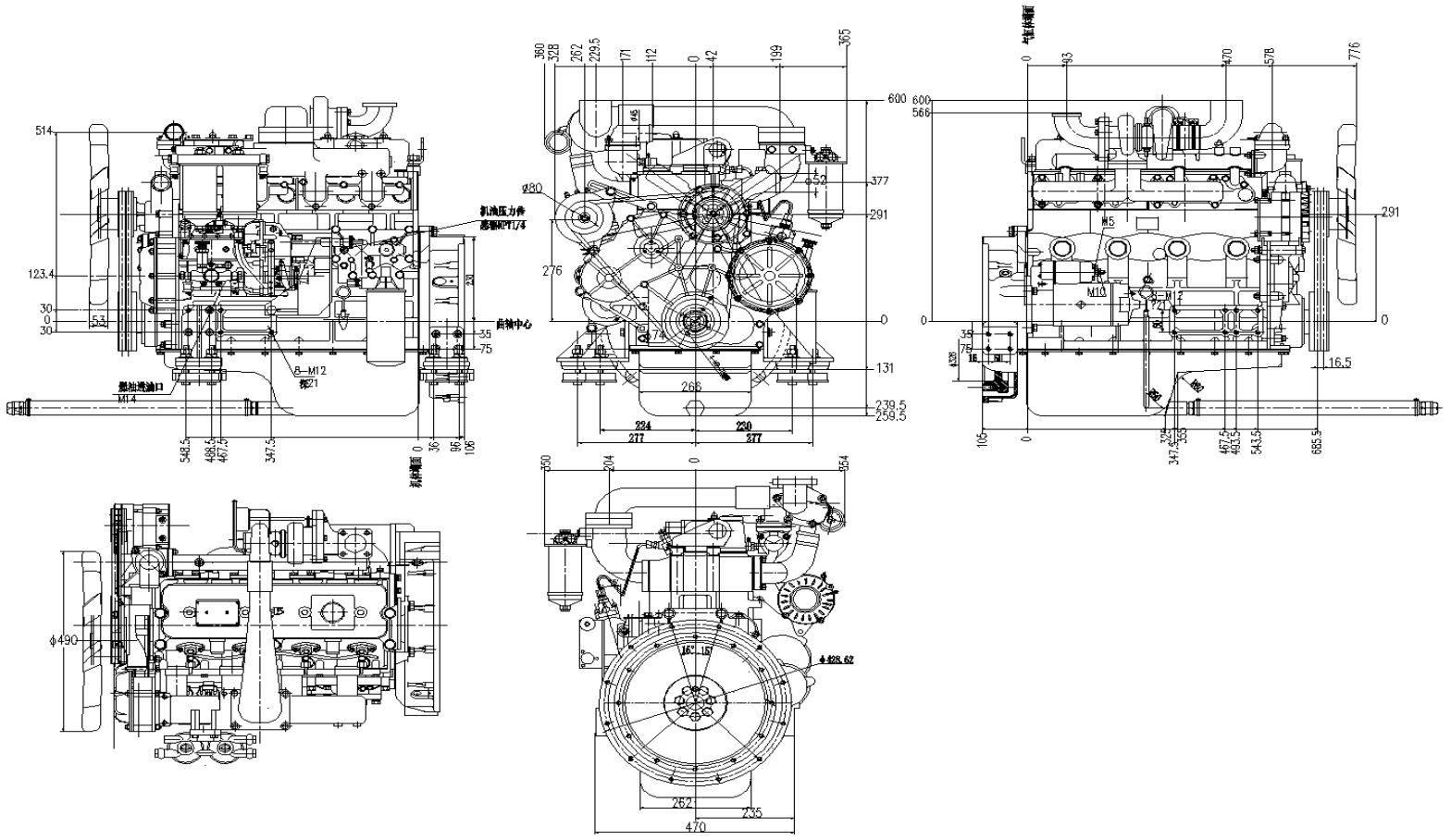


图 3 YC4D100Z-T20 系列柴油机（增压）外形安装图（实际跟配套布置会有小差距）

Figure 3 YC4D100Z-T20 series turbo-charging diesel engine lay-out (might have slight difference)

1 概述 Overview

1.1 产品特点 Characteristics

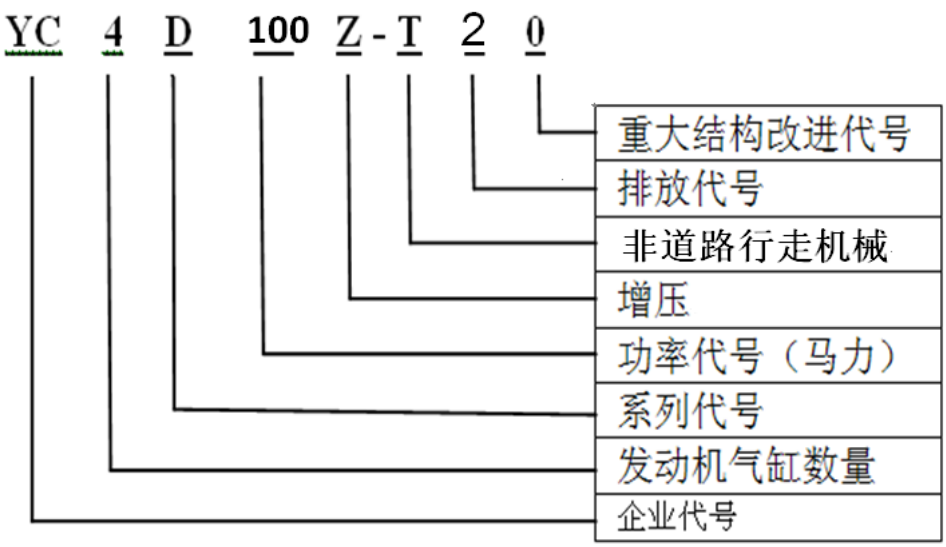
YC4A、YC4B、YC4BA、YC4D 工程机械与农业机械系列发动机是在 D 系列发动机的基础上自主开发而成,秉承了原 D 系列发动机的可靠、省油、动力性好等优点,是一种理想的配套动力。该系列发动机具有以下特点：YC4A, YC4B, YC4BA, YC4D off-road equipment and agriculture machinery series engines are developed on the base of D series engine, which took the advantages of reliability, good fuel economy and excellent dynamics etc. They have characteristics as following:

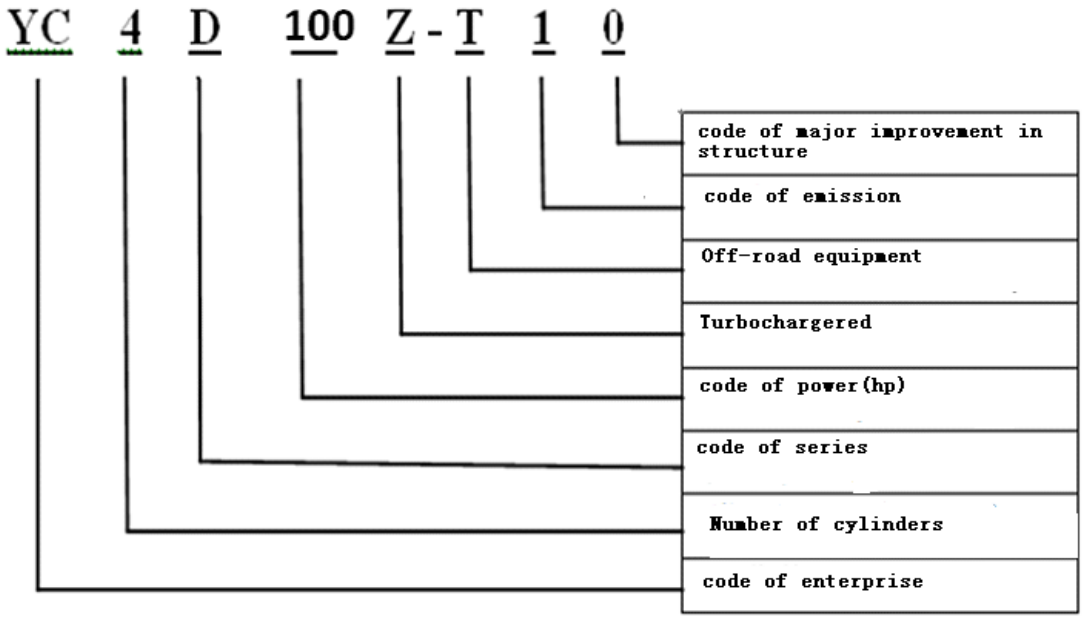
- 良好的经济性：柴油消耗低、机油消耗低。
  Excellent economy: low oil and fuel consumption.
- 良好的舒适性：振动小，噪音低。
  Excellent comfortability: low vibration and noise
- 适应性强：配套使用在农用运输机械、拖拉机、收割机、装载机、挖掘机等
  Excellent adaptability: apply for agricultural transport machine, tractor, harvester, loader, excavator and so on.
- 可靠性好，使用寿命长。
  High reliability and long working life.
- 良好的动力性，动力性强。
  Excellent and strong power performance
- 配件充足，依靠配套车机的配套市场，配件供应及时。
  Sufficient and in time parts supply.

1.2 型号的组成及其代表意义 Model numbering and meaning

产品型号由阿拉伯数字和大写英文字母表示，其组成结构如下：

Product model name made of number and capital as following:





1.3 主要用途及适用范围 Application scope

发动机适用于环境温度为-15℃～40℃、海拔高度 2000 米以下的环境条件下能正常工作，禁止在水浸、火灾环境下工作。在环境温度低于-15℃或高于 40℃或海拔高度超过 2500 米时，用户应向玉柴技术、服务部门咨询，采取有效措施或使用相应专用发动机以保证发动机能正常工作。

Engine works normally under the condition of atmosphere temperature from -15℃ to 40℃, altitude below 2000 miles, running the engine when the atmosphere is water

logging or firing is forbidden. When ambient temperature is below -15℃or above 40℃ or altitude exceeds 2,500m, you should consult technical and service departments of Yuchai and then take effective measures to ensure normal working of the engine.

不按要求范围使用发动机，将造成发动机工作不正常、功率不足、发动机早期磨损、甚至出现捣缸、拉缸等严重故障。

Using engine beyond the scope above, will cause engine abnormal working, under power, early wearing, even piston damage and other major failure.

2 技术特性 Specifications

2.1 主要性能（基本型） Performance of basic model

表2－1 YC4A、YC4B、YC4BA、YC4D工程机械与农业机械**系列发动机主要技术参数**

Table 2-1 Technical parameters

序号 item	名 称 name	技 术 规 格Specifications						
	型 号 Model	YC4A100-T20	YC4A90-T20	YC4A90-T22	YC4A85-T20	YC4A80-T20	YC4A110Z-T21	YC4A110Z-T20
1	型 号Model	立式、直列、水冷、四冲程 Vertical, in-line. Water-cooled, four stroke						
2	型 式Type	自然吸气Naturally aspirated					增压Turbocharged	
3	进气方式Air intake way	直喷式缩口ω燃烧室 Direct injection shrink ora ω						
4	燃烧室形式 Combustion chamber type	4						
5	气缸数Number of cylinders	108						
6	气缸直径 Bore mm	132						
7	活塞行程 Stroke mm	4.837						
8	压缩比 Compression ratio	17.5:1						
9	气缸套型式	湿式 wet						

序号 item	名 称 name	技 术 规 格Specifications						
	型 号 Model	YC4A100-T20	YC4A90-T20	YC4A90-T22	YC4A85-T20	YC4A80-T20	YC4A110Z-T21	YC4A110Z-T20
	Cylinder liner type							
10	标定功率 Rated power kW	69	66	66	62	57	81	81
11	标定转速 Rated rotation speed r/min	2300	2200	2300	2200		2100	2300
12	最大扭矩 Max.torque N·m	330	330	320	320	300	420	420
13	最大扭矩转速 Max.torque rotation speed r/min	1550±100						
14	标定工况燃油消耗率 Fuel consumption rate at rated working conditions g/kW·h	≤240					≤235	≤240
15	最大扭矩工况燃油消耗率 Fuel consumption rate at max. torque g/kW·h	≤230						
16	柴油牌号Fuel brand	夏季：GB 252-2000优级品或一级品0号、10号轻柴油机,summer: GB252-2000 superior class or first-class 0#, 10# light fuel 冬季：GB 252-2000优级品或一级品0号、-10号、-20号、-35号轻柴油。winter: GB252-2000 superior class or first-class 0#, -10#,-20#,-35# light fuel (depends on environmental temperature)						

序号 item	名 称 name	技 术 规 格Specifications						
	型 号 Model	YC4A100-T20	YC4A90-T20	YC4A90-T22	YC4A85-T20	YC4A80-T20	YC4A110Z-T21	YC4A110Z-T20
17	最高空载转速 Max.no-load speed r/min	≤2484	≤2376	≤2484	≤2376		≤2268	≤2484
18	最低空载转速 Min.no-load speed r/min	700～750						
19	工作次序Firing sequence	1-3-4-2						
20	机油消耗率 oil consumption rate g/kW·h	≤0.95					≤0.86	
21	机油牌号 Lubrication oil brand	夏季：CD40、CD15W—40， 冬季： CD30、CD10W—30或与环境相适应的不低于GB 11122-2006中CD级的其他柴油机油 Summer: CD40、CD15W—40, Winter: CD30、CD10W—30 or other CD grade lubrication oil that not lower than GB11122-2006 and compatible with environment					夏季：CD40、CD15W—40， 冬季： CF30、CF10W—30或与环境相适应的不低于GB 11122-2006中CF级的其他柴油机油 Summer: CD40、CD15W—40, Winter: CF30、CF10W—30 or other CF grade lubrication oil that not lower than GB11122-2006 and compatible with environment	
22	曲轴旋转方向(面向功率输出端)Crankshaft rotation	逆时针 counterclockwise						

序号 item	名 称 name	技 术 规 格Specifications						
	型 号 Model	YC4A100-T20	YC4A90-T20	YC4A90-T22	YC4A85-T20	YC4A80-T20	YC4A110Z-T21	YC4A110Z-T20
	direction (facing power output end)							
23	供油提前角(上止点前曲轴转角) °CA Fuel supply advance angle(crankshaft rotation angle before TDC)	15±1						
24	噪声限值 Noise limit LwdB(A)	≤114			≤113		≤115	
25	压缩压力 Compression (n≥200r/min) MPa	≤2.5						
26	润滑方式 Lubrication way	压力润滑与飞溅润滑复合式Press lubricating and splash lubricating in combination						
27	起动方式 Starting way	电起动 Electrical starting						
28	机油容量 L Lubrication oil capacity	12±1						
29	柴油机净质量 kg Net weight	520					540	
30	外形尺寸 长×宽×高 mm Dimension:	851×636×906					851×636×944	

序号 item	名 称 name	技 术 规 格Specifications						
	型 号 Model	YC4A100-T20	YC4A90-T20	YC4A90-T22	YC4A85-T20	YC4A80-T20	YC4A110Z-T21	YC4A110Z-T20
	lengthXwidthxhight							

表2－2 YC4A、YC4B、YC4BA、YC4D工程机械与农业机械**系列发动机主要技术参数（续）**

Table 2-2 Technical parameters

序号 item	名 称 name	技 术 规 格 Specifications						
	型 号 model	YC4A125Z-T21	YC4A125Z-T20	YC4A115Z-T20	YC4B115Z-T20	YC4B90-T20	YC4B85-T21	YC4B85-T22
1	型 式Type	立式、直列、水冷、四冲程 Vertical, in-line. Water-cooled, four stroke						
2	进气方式Air intake way	增压Turbocharged				自然吸气Naturally aspirated		
3	燃烧室形式 Combustion chamber type	直喷式缩口ω 燃烧室 Direct injection shrink ora ω						
4	气缸数 Number of cylinders	4						
5	气缸直径 Bore mm	108						
6	活塞行程 Stroke mm	132			125			
7	活塞总排量 Piston total displacement L	4.837			4.578			
8	压缩比 Compression ratio	17.5:1						
9	气缸套型式 Cylinder liner type	湿式 wet						
10	标定功率 Rated power kW	92	92	85	84	65	62	62

序号 item	名 称 name	技 术 规 格 Specifications						
	型 号 model	YC4A125Z -T21	YC4A125Z -T20	YC4A115Z -T20	YC4B115Z -T20	YC4B90-T 20	YC4B85-T 21	YC4B85-T 22
11	标定转速 Rated rotation speed r/min	2200	2300	2200	2400		2300	2200
12	最大扭矩 Max.torque N·m	460	450	425	390	290	300	300
13	最大扭矩转速 Max.torque rotation speed r/min	1550±100						
14	标定工况燃油消耗率 Fuel consumption rate at rated working conditions g/kW·h	≤240						
15	最大扭矩工况燃油消耗率 Fuel consumption rate at max. torque g/kW·h	≤230						
16	柴油牌号 Fuel brand	夏季：GB 252-2000优级品或一级品0号、10号轻柴油机, summer: GB252-2000 superior class or first-class 0#, 10# light fuel 冬季：GB 252-2000优级品或一级品0号、-10号、-20号、-35号轻柴油。						

序号 item	名 称 name	技 术 规 格 Specifications						
	型 号 model	YC4A125Z -T21	YC4A125Z -T20	YC4A115Z -T20	YC4B115Z -T20	YC4B90-T 20	YC4B85-T 21	YC4B85-T 22
		winter: GB252-2000 superior class or first-class 0#, -10#,-20#,-35# light fuel (depends on environmental temperature)						
17	最高空载转速 Max.no-load speed r/min	≤2376	≤2484	≤2376	≤2592	≤2592	≤2484	≤2376
18	最低空载转速 Min.no-load speed r/min	700～750						
19	工作次序 Firing sequence	1-3-4-2						
20	机油消耗率 oil consumption rate g/kW·h	≤0.86				≤0.95		
21	机油牌号 Lubrication oil brand	夏季：CF40、CF15W—40， 冬季： CF30、CF10W—30或与环境相适应的不低于GB 11122-2006中CF级的其他柴油机油 Summer: CF40、CF15W—40, Winter: CF30、CF10W—30 or other CF grade lubrication oil that not lower than GB11122-2006 and compatible with environment				夏季：CD40、CD15W—40， 冬季： CD30、CD10W—30或与环境相适应的不低于GB 11122-2006中CD级的其他柴油机油 Summer: CD40、CD15W—40, Winter: CD30、CD10W—30 or other CD grade lubrication oil that not lower than GB11122-2006 and compatible with environment		
22	曲轴旋转方向(面向功率输出端)Cranksha	逆时针 anticlockwise						

序号 item	名 称 name	技 术 规 格 Specifications						
	型 号 model	YC4A125Z -T21	YC4A125Z -T20	YC4A115Z -T20	YC4B115Z -T20	YC4B90-T 20	YC4B85-T 21	YC4B85-T 22
	ft rotation direction (facing power output end)							
23	供油提前角(上止点前曲轴转角) °CA Fuel supply advance angle(crank shaft rotation angle before TDC)	15±1						
24	噪声限值 LwdB(A)Noise limit	≤115				≤114	≤113	
25	压缩压力(n≥200r/min) MPa Compression pressure	≥2.5						
26	润滑方式 Lubrication way	压力润滑与飞溅润滑复合式Press lubricating and splash lubricating in combination						
27	起动方式 Starting way	电起动Electrical starting						
28	机油容量 L Lubrication oil capacity	12±1						
29	柴油机净质	540(拖拉机用for tractor)/480（其他用途 for				520		

序号 item	名 称 name	技 术 规 格 Specifications						
	型 号 model	YC4A125Z-T21	YC4A125Z-T20	YC4A115Z-T20	YC4B115Z-T20	YC4B90-T20	YC4B85-T21	YC4B85-T22
	量 kg Net weight	other vehicle）						
30	外形尺寸 长×宽×高 mm Dimension: lengthXwidthxhight	985×750×870（带风扇with fans）		851×636×944	851×686×944	878×636×834	865×636×906	878×636×834

表 2—3 YC4A、YC4B、YC4BA、YC4D 工程机械与农业机械**系列发动机主要技术参数（续）**

Table 2-3 Technical parameters

序号 No.	名称Name	技 术 规 格格Specifications					
		YC4B105Z-T22	YC4B105Z-T20	YC4B95Z-T20	YC4B90Z-T20	YC4B90Z-T21	YC4B105Z-T21
1	型 号Model	立式、直列、水冷、四冲程Vertical, in-line. Water-cooled, four stroke					
2	进气方式Air intake way	增压Turbocharged					
3	燃烧室形式 Combustion chamber type	直喷式缩口ω燃烧室Direct injection shrink ora ω					
4	气缸数 Number of cylinders	4					
5	气缸直径 Bore mm	108					
6	活塞行程 Stroke mm	125					
7	活塞总排量	4.580					

序号 No.	名称Name	技 术 规 格格Specifications					
		YC4B105Z-T22	YC4B105Z-T20	YC4B95Z-T20	YC4B90Z-T20	YC4B90Z-T21	YC4B105Z-T21
	Piston total displacement L						
8	压缩比 Compression ratio	17.5:1					
9	气缸套型式 Cylinder liner type	湿式 Wet					
10	标定功率 Rated power kW	77	74	70	66	66	75
11	标定转速 Rated rotation speed r/min	2300				2400	2200
12	最大扭矩 Max.torque N·m	385	365	350	340	340	390
13	最大扭矩转速 Max.torque rotation speed r/min	1550±100					
14	标定工况燃油消耗率 Fuel consumption rate at rated	≤240					

序号 No.	名称Name	技 术 规 格格Specifications					
		YC4B105Z-T22	YC4B105Z-T20	YC4B95Z-T20	YC4B90Z-T20	YC4B90Z-T21	YC4B105Z-T21
	working conditions g/kW·h						
15	最大扭矩工况燃油消耗率 Fuel consumption rate at max. torque g/kW·h	≤230					
16	柴油牌号 Fuel brand	夏季：GB 252-2000优级品或一级品0号、10号轻柴油机, summer: GB252-2000 superior class or first-class 0#, 10# light fuel 冬季：GB 252-2000优级品或一级品0号、-10号、-20号、-35号轻柴油。 winter: GB252-2000 superior class or first-class 0#, -10#,-20#,-35# light fuel (depends on environmental temperature)					
17	最高空载转速 Max.no-load speed r/min	≤2484				≤2592	≤2376
18	最低空载转速 Min.no-load speed r/min	700～750					
19	工作次序 Firing sequence	1-3-4-2					
20	机油消耗率 oil consumption rate g/kW·h	≤0.86	≤0.95				≤0.86
21	机油牌号	夏季：CF40、CF15W—40，					

序号 No.	名称Name	技 术 规 格格Specifications					
		YC4B105Z-T22	YC4B105Z-T20	YC4B95Z-T20	YC4B90Z-T20	YC4B90Z-T21	YC4B105Z-T21
	Lubrication oil brand	冬季： CF30、CF10W—30或与环境相适应的不低于GB 11122-2006中CF级的其他柴油机油 Summer: CF40、CF15W—40, Winter: CF30、CF10W—30 or other CF grade lubrication oil that not lower than GB11122-2006 and compatible with environment					
22	曲轴旋转方向(面向功率输出端)Crankshaft rotation direction (facing power output end)	逆时针 Anticlockwise					
23	供油提前角(上止点前曲轴转角) °CA Fuel supply advance angle(crank shaft rotation angle before TDC)	15±1					
24	噪声限值 LwdB(A)Noise limit	≤114					
25	压缩压力(n≥200r/min) MPa Compression pressure	≥2.5					

序号 No.	名称Name	技 术 规 格格Specifications					
		YC4B105Z-T22	YC4B105Z-T20	YC4B95Z-T20	YC4B90Z-T20	YC4B90Z-T21	YC4B105Z-T21
26	润滑方式 Lubrication way	压力润滑与飞溅润滑复合式Press lubricating and splash lubricating in combination					
27	起动方式 Starting way	电起动Electrical starting					
28	机油容量 L Lubrication oil capacity	12±1					
29	柴油机净质量 kg Net weight	540					
30	外形尺寸 长×宽×高 mm Dimension: lengthXwidthxhight	851×686×944					

表 2—4 YC4A、YC4B、YC4BA、YC4D 工程机械与农业机械**系列发动机主要技术参数（续）**

序号 No.	名 称 Name	技 术 规 格						
	型 号 Model	YC4BA105-T20	YC4BA95-T20	YC4D80-T20	YC4D80-T21	YC4D95Z-T20	YC4D95Z-T21	YC4D75Z-T20
1	型 式Type	立式、直列、水冷、四冲程 Vertical, in-line. Water-cooled, four stroke						
2	进气方式Air intake way	自然吸气Naturally aspirated				增压Turbocharged		
3	燃烧室形式 Combustion chamber type	直喷式缩口ω燃烧室Direct injection shrink ora ω						
4	气缸数 Number of cylinders	4						
5	气缸直径 Bore mm	110		108				
6	活塞行程 Stroke mm	132		115				
7	活塞总排量 Piston total displacement L	5.018		4.214				
8	压缩比 Compression ratio	17.5:1						
9	气缸套型式 Cylinder liner type	湿式 Wet						
10	标定功率 Rated power kW	73	69	58	56	70	70	56
11	标定转速 Rated rotation	2300		2400	2200	2400	2200	

序号 No.	名 称 Name	技 术 规 格						
	型 号 Model	YC4BA105-T20	YC4BA95-T20	YC4D80-T20	YC4D80-T21	YC4D95Z-T20	YC4D95Z-T21	YC4D75Z-T20
	speed r/min							
12	最大扭矩 Max.torque N·m	340	330	260	260	320	320	250
13	最大扭矩转速 Max.torque rotation speed r/min	1500±100		1550±100				
14	标定工况燃油消耗率 Fuel consumption rate at rated working conditions g/kW·h	≤240						
15	最大扭矩工况燃油消耗率 Fuel consumption rate at max. torque g/kW·h	≤230						
16	柴油牌号 Fuel brand	夏季：GB 252-2000优级品或一级品0号、10号轻柴油机, summer: GB252-2000 superior class or first-class 0#, 10# light fuel 冬季：GB 252-2000优级品或一级品0号、-10号、-20号、-35号轻柴油。(按使用环境温度选择) winter: GB252-2000 superior class or first-class 0#, -10#,-20#,-35# light fuel (depends on environmental temperature)						

序号 No.	名 称 Name	技 术 规 格						
	型 号 Model	YC4BA105-T20	YC4BA95-T20	YC4D80-T20	YC4D80-T21	YC4D95Z-T20	YC4D95Z-T21	YC4D75Z-T20
17	最高空载转速 Max.no-load speed r/min	≤2484		≤2592	≤2376	≤2592	≤2376	
18	最低空载转速 Min.no-load speed r/min	700～750						
19	工作次序 Firing sequence	1-3-4-2						
20	机油消耗率 Oil consumption rate g/kW·h	≤0.95						
21	机油牌号 Lubrication oil brand	夏季：CD40、CD15W—40， 冬季： CD30、CD10W—30或与环境相适应的不低于GB 11122-2006中CD级的其他柴油机油 Summer: CD40、CD15W—40, Winter: CD30, CD10W—30 or other CD grade lubrication oil that not lower than GB11122-2006 and compatible with environment				夏季：CF40、CF15W—40， 冬季： CF30、CF10W—30或与环境相适应的不低于GB 11122-2006中CF级的其他柴油机油 Summer: CF40、CF15W—40, Winter: CF30, CF10W—30 or other CF grade lubrication oil that not lower than GB11122-2006 and compatible with environment		
22	曲轴旋转方向(面向功率输出端)Crankshaft rotation direction (facing	逆时针 counterclockwise						

序号 No.	名 称 Name	技 术 规 格						
	型 号 Model	YC4BA105-T20	YC4BA95-T20	YC4D80-T20	YC4D80-T21	YC4D95Z-T20	YC4D95Z-T21	YC4D75Z-T20
	power output end)							
23	供油提前角(上止点前曲轴转角) °CA Fuel supply advance angle(crank shaft rotation angle before TDC)	15±1						
24	噪声限值 LwdB(A)	≤114		≤113		≤114		≤113
25	噪声限值 LwdB(A)Noise limit	≥2.5						
26	压缩压力(n≥200r/min) MPa Compression pressure	压力润滑与飞溅润滑复合式Press lubricating and splash lubricating in combination						
27	润滑方式 Lubrication way	电起动Electrical starting						
28	机油容量 L Lubrication oil capacity	12±1						
29	柴油机净质量 kg Net weight	520		450		470		
30	外形尺寸	887×636×906		885×730×845		885×730×870		

序号 No.	名 称 Name	技 术 规 格						
	型 号 Model	YC4BA105-T20	YC4BA95-T20	YC4D80-T20	YC4D80-T21	YC4D95Z-T20	YC4D95Z-T21	YC4D75Z-T20
	长×宽×高 mm Dimension: lengthXwidthxhight							

表 2—5 YC4A、YC4B、YC4BA、YC4D 工程机械与农业机械**系列发动机主要技术参数（续）**

Table 2-5 Technical parameters

序号 No	名 称 Name	技 术 规 格 Technical parameters			
	型 号Model	YC4D100Z-T20	YC4D100Z-T21	YC4D125L-T20	YC4D110L-T20
1	型 式Type	立式、直列、水冷、四冲程Vertical, in-line. Water-cooled, four stroke			
2	进气方式Air intake way	增压Turbocharged		增压中冷 Turbocharged and inter-cooled	
3	燃烧室形式 Combustion chamber type	直喷式缩口ω燃烧室Direct injection shrink ora ω			
4	气缸数 Number of cylinders	4			
5	气缸直径 Bore mm	108			
6	活塞行程 Stroke mm	115			
7	活塞总排量 Piston total displacement L	4.214			
8	压缩比 Compression ratio	17.5:1			
9	气缸套型式 Cylinder liner type	湿式 wet			
10	标定功率 Rated power kW	73.5		85	81
11	标定转速 Rated	2400	2200		

序号 No	名 称 Name	技 术 规 格 Technical parameters			
	型 号Model	YC4D100Z-T20	YC4D100Z-T21	YC4D125L-T20	YC4D110L-T20
	rotation speed r/min				
12	最大扭矩 Max.torque N·m	350	360	460	420
13	最大扭矩转速 Max.torque rotation speed r/min	1550±100			
14	标定工况燃油消耗率 Fuel consumption rate at rated working conditions g/kW·h	≤240			
15	最大扭矩工况燃油消耗率 Fuel consumption rate at max. torque g/kW·h	≤230			
16	柴油牌号 Fuel brand	夏季：GB 252-2000优级品或一级品0号、10号轻柴油机, summer: GB252-2000 superior class or first-class 0#, 10# light fuel 冬季：GB 252-2000优级品或一级品0号、-10号、-20号、-35号轻柴油。(按使用环境温度选择) winter: GB252-2000 superior class or first-class 0#, -10#,-20#,-35# light fuel (depends			

序号 No	名 称 Name	技 术 规 格 Technical parameters			
	型 号Model	YC4D100Z-T20	YC4D100Z-T21	YC4D125L-T20	YC4D110L-T20
		on environmental temperature)			
17	最高空载转速 Max.no-load speed r/min	≤2592	≤2376		
18	最低空载转速 Min.no-load speed r/min	700～750			
19	工作次序 Firing sequence	1-3-4-2			
20	机油消耗率 Oil consumption rate g/kW·h	≤0.95		≤0.86	
21	机油牌号 Lubrication oil brand	夏季：CF40、CF15W—40， 冬季：CF30， CF10W—30或与环境相适应的不低于GB 11122-2006中CF级的其他柴油机油 Summer: CF40、CF15W—40, Winter: CF30, CF10W—30 or other CF grade lubrication oil that not lower than GB11122-2006 and compatible with environment			
22	曲轴旋转方向(面向功率输出端)Crankshaft rotation direction (facing power	逆时针 counterclockwise			

序号 No	名 称 Name	技 术 规 格 Technical parameters			
	型 号Model	YC4D100Z-T20	YC4D100Z-T21	YC4D125L-T20	YC4D110L-T20
	output end)				
23	供油提前角(上止点前曲轴转角) °CA Fuel supply advance angle(crank shaft rotation angle before TDC)	15±1			
24	噪声限值 LwdB(A)	≤114		≤115	
25	压缩压力(n≥200r/min) MPa Compression pressure	≥2.5			
26	润滑方式 Lubrication way	压力润滑与飞溅润滑复合式Press lubricating and splash lubricating in combination			
27	起动方式 Starting way	电起动Electrical starting			
28	机油容量 L Lubrication oil capacity	12±1			
29	柴油机净质量 kg Net weight	470			
30	外形尺寸 长×宽×高 mm	885×730×870			

序号 No	名 称 Name	技 术 规 格 Technical parameters			
	型 号Model	YC4D100Z-T20	YC4D100Z-T21	YC4D125L-T20	YC4D110L-T20
	Dimension: lengthXwidthxhight				

表2－6 YC4A、YC4B、YC4BA、YC4D工程机械与农业机械**系列发动机主要技术参数（续）**

Table 2-6 Technical parameters

序号 No	名 称 name	技 术 规 格 Specifications				
	型 号 Model	YC4A80-T21	YC4A85-T21	YC4A100Z-T20	YC4A105Z-T20	YC4A105Z-T21
1	型 式Type	立式、直列、水冷、四冲程Vertical, in-line. Water-cooled, four stroke				
2	进气方式Air intake way	自然吸气Naturally aspirated		增压Turbocharged		
3	燃烧室形式 Combustion chamber type	直喷式缩口ω 燃烧室Direct injection shrink ora ω				
4	气缸数 Number of cylinders	4				
5	气缸直径 Bore mm	108				
6	活塞行程 Stroke mm	132				
7	活塞总排量 Piston total displaceme	4.837				

序号 No	名 称 name	技 术 规 格 Specifications				
	型 号 Model	YC4A80-T21	YC4A85-T21	YC4A100Z-T20	YC4A105Z-T20	YC4A105Z-T21
	nt L					
8	压缩比 Compression ratio	17.5:1				
9	气缸套型式 Cylinder liner type	湿式 wet				
10	标定功率 Rated power kW	58	62	73.5	75	78
11	标定转速 Rated rotation speed r/min	2300			2200	2300
12	最大扭矩 Max.torque N·m	280	305	400	390	420
13	最大扭矩转速 Max.torque rotation speed r/min	1550±100				
14	标定工况燃油消耗率 Fuel consumption rate at rated working conditions	≤240				

序号 No	名 称 name	技 术 规 格 Specifications				
	型 号 Model	YC4A80-T21	YC4A85-T21	YC4A100Z-T20	YC4A105Z-T20	YC4A105Z-T21
	g/kW·h					
15	最大扭矩工况燃油消耗率 Fuel consumption rate at max. torque g/kW·h	≤230				
16	柴油牌号 Fuel brand	夏季：GB 252-2000优级品或一级品0号、10号轻柴油机, summer: GB252-2000 superior class or first-class 0#, 10# light fuel 冬季：GB 252-2000优级品或一级品0号、-10号、-20号、-35号轻柴油。(按使用环境温度选择) winter: GB252-2000 superior class or first-class 0#, -10#,-20#,-35# light fuel (depends on environmental temperature)				
17	最高空载转速 Max.no-load speed r/min	≤2484			≤2376	≤2484
18	最低空载转速 Min.no-load speed r/min	700～750				
19	工作次序 Firing sequence	1-3-4-2				
20	机油消耗率 Oil consumption rate g/kW·h	≤0.95			≤0.86	
21	机油牌号	夏季：CD40、CD15W-40		夏季：CF40、CF15W—40，冬季： CF30、CF10W—30或与		

序号 No	名 称 name	技 术 规 格 Specifications				
	型 号 Model	YC4A80-T21	YC4A85-T21	YC4A100Z-T20	YC4A105Z-T20	YC4A105Z-T21
	Lubrication oil brand	冬季：CD30、CD10W-30或与环境相适应的不低GB11122-2006中CD级的其他柴油机油 冬季：CD30, CD10W—30或与环境相适应的不低于GB 11122-2006中CD级的其他柴油机油 winter: CD10W—30 or other CD grade lubrication oil that not lower than GB11122-2006 and compatible with environment		环境相适应的不低于GB 11122-2006中CF级的其他柴油机油 Summer: CF40、CF15W—40, Winter: CF30, CF10W—30 or other CF grade lubrication oil that not lower than GB11122-2006 and compatible with environment		
22	曲轴旋转方向(面向功率输出端)Crankshaft rotation direction (facing power output end)	逆时针 counterclockwise				
23	供油提前角(上止点前曲轴转角) °CA Fuel supply advance angle(crank shaft rotation	15±1				

序号 No	名 称 name	技 术 规 格 Specifications				
	型 号 Model	YC4A80-T21	YC4A85-T21	YC4A100Z-T20	YC4A105Z-T20	YC4A105Z-T21
	angle before TDC)					
24	噪声限值 LwdB(A)Noise limit	≤113		≤114		
25	压缩压力 (n≥200r/min) MPa Compression pressure	≤2.5				
26	润滑方式 Lubrication way	压力润滑与飞溅润滑复合式Press lubricating and splash lubricating in combination				
27	起动方式 Starting way	电起动Electrical starting				
28	机油容量 L Lubrication oil capacity	12±1				
29	柴油机净质量 kg Net weight	520		540		
30	外形尺寸 长×宽×高 mm Dimension: lengthXwidthxhight	851×636×906		851×636×944		

表2－7 YC4A、YC4B、YC4BA、YC4D工程机械与农业机械**系列发动机主要技术参数(续)**

Table 2-7 Technical parameters

序号 No	名 称 Name	技 术 规 格Specifications			
	型 号 Model	YC4A110Z-T22	YC4A115Z-T21	YC4A120Z-T20	YC4B110Z-T21
1	型 式Type	立式、直列、水冷、四冲程Vertical, in-line. Water-cooled, four stroke			
2	进气方式 Air intake way	增压Turbocharged			
3	燃烧室形式 Combustion chamber type	直喷式缩口ω 燃烧室Direct injection shrink ora ω			
4	气缸数 Number of cylinders	4			
5	气缸直径 Bore mm	108			
6	活塞行程 Stroke mm	132			125
7	活塞总排量 Piston total displacement L	4.837			4.578
8	压缩比 Compression ratio	17.5:1			
9	气缸套型式 Cylinder liner type	湿式 wet			
10	标定功率 Rated power kW	81	84	88	81
11	标定转速	2200	2400	2300	2200

序号 No	名 称 Name	技 术 规 格Specifications			
	型 号 Model	YC4A110Z-T22	YC4A115Z-T21	YC4A120Z-T20	YC4B110Z-T21
	Rated rotation speed r/min				
12	最大扭矩 Max.torque N·m	405	420	440	410
13	最大扭矩转速 Max.torque rotation speed r/min	1550±100			
14	标定工况燃油消耗率 Fuel consumption rate at rated working conditions g/kW·h	≤240			
15	最大扭矩工况燃油消耗率 Fuel consumption rate at max. torque g/kW·h	≤230			
16	柴油牌号 Fuel brand	夏季：GB 252-2000优级品或一级品0号、10号轻柴油机, summer: GB252-2000 superior class or first-class 0#, 10# light fuel 冬季：GB 252-2000优级品或一级品0号、-10号、-20号、-35号轻柴油。(按使用环境温			

序号 No	名 称 Name	技 术 规 格Specifications			
	型 号 Model	YC4A110Z-T22	YC4A115Z-T21	YC4A120Z-T20	YC4B110Z-T21
		度选择) winter: GB252-2000 superior class or first-class 0#, -10#,-20#,-35# light fuel (depends on environmental temperature)			
17	最高空载转速 Max.no-load speed r/min	≤2376	≤2592	≤2484	≤2332
18	最低空载转速 Min.no-load speed r/min	700～750			
19	工作次序 Firing sequence	1-3-4-2			
20	机油消耗率 Oil consumption rate g/kW·h	≤0.86			
21	机油牌号 Lubrication oil brand	夏季：CF40、CF15W—40 冬季： CF30、CF10W—30或与环境相适应的不低于GB 11122-2006中CF级的其他柴油机油 夏季：CF40、CF15W—40，冬季： CF30、CF10W—30或与环境相适应的不低于GB 11122-2006中CF级的其他柴油机油 Summer: CF40、CF15W—40, Winter: CF30, CF10W—30 or other CF grade lubrication oil that not lower than GB11122-2006 and compatible with environment			
22	曲轴旋转方向(面向功率输出	逆时针 counterclockwise			

序号 No	名 称 Name	技 术 规 格Specifications			
	型 号 Model	YC4A110Z-T22	YC4A115Z-T21	YC4A120Z-T20	YC4B110Z-T21
	端)Crankshaft rotation direction (facing power output end)				
23	供油提前角(上止点前曲轴转角) °CA Fuel supply advance angle(crankshaft rotation angle before TDC)	15±1			
24	噪声限值 LwdB(A)Noise limit	≤115			
25	压缩压力(n≥200r/min) MPa Compression pressure	≤2.5			
26	润滑方式 Lubrication way	压力润滑与飞溅润滑复合式Press lubricating and splash lubricating in combination			
27	起动方式 Starting way	电起动Electrical starting			

序号 No	名 称 Name	技 术 规 格Specifications			
	型 号 Model	YC4A110Z-T22	YC4A115Z-T21	YC4A120Z-T20	YC4B110Z-T21
28	机油容量 L Lubrication oil capacity	12±1			
29	柴油机净质量 kg Net weight	540			
30	外形尺寸 长×宽×高 mm Dimension: lengthXwidthxhight	851×636×944			851×686×944

表2－8 YC4A、YC4B、YC4BA、YC4D工程机械与农业机械**系列发动机主要技术参数(续)**

Table 2-8 Technical parameters

序号 No	名 称 Name	技 术 规 格Specifications			
	型 号 Model	YC4A140L-T20	YC4A140L-T21	YC4A140L-T22	YC4130L-T20
1	型 式Type	立式、直列、水冷、四冲程Vertical, in-line. Water-cooled, four stroke			
2	进气方式 Air intake way	增压Turbocharged			
3	燃烧室形式 Combustion chamber type	直喷式缩口ω 燃烧室Direct injection shrink ora ω			
4	气缸数 Number of	4			

序号 No	名 称 Name	技 术 规 格Specifications			
	型 号 Model	YC4A140L-T20	YC4A140L-T21	YC4A140L-T22	YC4130L-T20
	cylinders				
5	气缸直径 Bore mm	108			
6	活塞行程 Stroke mm	132			
7	活塞总排量 Piston total displacement L	4.837			
8	压缩比 Compression ratio	17.5:1			
9	气缸套型式 Cylinder liner type	湿式 wet			
10	标定功率 Rated power kW	103			95
11	标定转速 Rated rotation speed r/min	2300	2200	2400	2300
12	最大扭矩 Max.torque N·m	510	495	495	460
13	最大扭矩转速 Max.torque rotation speed r/min	1600-1800			1500-1700

序号 No	名 称 Name	技 术 规 格Specifications			
	型 号 Model	YC4A140L-T20	YC4A140L-T21	YC4A140L-T22	YC4130L-T20
14	标定工况燃油消耗率 Fuel consumption rate at rated working conditions g/kW·h	≤235			
15	最大扭矩工况燃油消耗率 Fuel consumption rate at max. torque g/kW·h	≤230			
16	柴油牌号 Fuel brand	夏季：GB 252-2000优级品或一级品0号、10号轻柴油机, summer: GB252-2000 superior class or first-class 0#, 10# light fuel 冬季：GB 252-2000优级品或一级品0号、-10号、-20号、-35号轻柴油。（按使用环境温度选择） winter: GB252-2000 superior class or first-class 0#, -10#,-20#,-35# light fuel (depends on environmental temperature)			
17	最高空载转速 Max.no-load speed r/min	≤2484	≤2376	≤2592	≤2484
18	最低空载转速 Min.no-load speed r/min	700～750			

序号 No	名 称 Name	技 术 规 格Specifications			
	型 号 Model	YC4A140L-T20	YC4A140L-T21	YC4A140L-T22	YC4130L-T20
19	工作次序 Firing sequence	1-3-4-2			
20	机油消耗率 Oil consumption rate g/kW·h	≤0.90			
21	机油牌号 Lubrication oil brand	夏季：CF40、CF15W—40 冬季： CF30、CF10W—30或与环境相适应的不低于GB 11122-2006中CF级的其他柴油机油 夏季：CF40、CF15W—40，冬季： CF30、CF10W—30或与环境相适应的不低于GB 11122-2006中CF级的其他柴油机油 Summer: CF40、CF15W—40, Winter: CF30, CF10W—30 or other CF grade lubrication oil that not lower than GB11122-2006 and compatible with environment			
22	曲轴旋转方向(面向功率输出端)Crankshaft rotation direction (facing power output end)	逆时针 counterclockwise			
23	供油提前角(上止点前曲轴转角) °CA Fuel supply advance angle(cran	10±1			12±1

序号 No	名 称 Name	技 术 规 格Specifications			
	型 号 Model	YC4A140L-T20	YC4A140L-T21	YC4A140L-T22	YC4130L-T20
	kshaft rotation angle before TDC)				
24	噪声限值 LwdB(A)Noise limit	≤116		≤115	
25	压缩压力 (n≥200r/min) MPa Compression pressure	≤2.5			
26	润滑方式 Lubrication way	压力润滑与飞溅润滑复合式Press lubricating and splash lubricating in combination			
27	起动方式 Starting way	电起动Electrical starting			
28	机油容量 L Lubrication oil capacity	14±1		12±1	
29	柴油机净质量 kg Net weight	550(拖拉机用)/490(其他用途)			
30	外形尺寸 长×宽×高 mm Dimension: lengthXwidthxhight	995×720×905(带风扇)			889×676×925（带风扇）

2.2 主要螺栓、螺柱、螺母拧紧力矩

Tightening torque of main bolts, studs and nuts

表 2-9 YC4A、YC4B、YC4BA、YC4D 工程机械与农业机械系列发动机主要螺栓、螺柱、螺母拧紧力矩

Table 2-9 Tightening torque of main bolts, studs and nuts

名称Name	拧紧力矩（N•m）Tightening torque	名称Name	拧紧力矩（N•m）Tightening torque
主轴承盖螺母Main bearing cover nut	220～260	皮带轮减振器螺栓(起动抓)Belt pulley vibration damper bolt(starting jaw)	≥300
主轴承螺柱Main bearing stud	150～170	飞轮壳螺栓Flywheel shell bolt	100～108
连杆螺栓Connecting rod bolt	170～210	飞轮螺栓Flywheel bolt	170～210
气缸盖螺栓或螺母Cylinder head bolt/nut	210～250	喷油器总成螺母Injector assembly nut	20～30
凸轮轴正时齿轮螺母Camshaft timing gear nut	160～200	铸铁油底壳螺栓Cast iron oil pan bolt 钢板冲制油底壳螺栓 steel-blanking bolt of oil pan	27～34 20～30

注：高强度螺栓在此基础上加 5 N • m

Note: high rigidity bolt should be applied an extra 5 N.m

表 2-10 其它螺栓拧紧力矩推荐值

Table 2-10 Recommended Values of Tightening Torque for other bolts

螺纹直径（mm）Thr diameter	公制 Metric system	M6	M8	M10	M12	M14
扭紧力矩(N·m)Tightening torque	8～12	16～20	27～34	61～68	115～129	

3 柴油机主要装配要求以及柴油机的调整 Assembly requirements and adjustment

3.1 柴油机主要装配要求 Assembly requirements

3.1.1 曲轴的安装

Crankshaft assembly

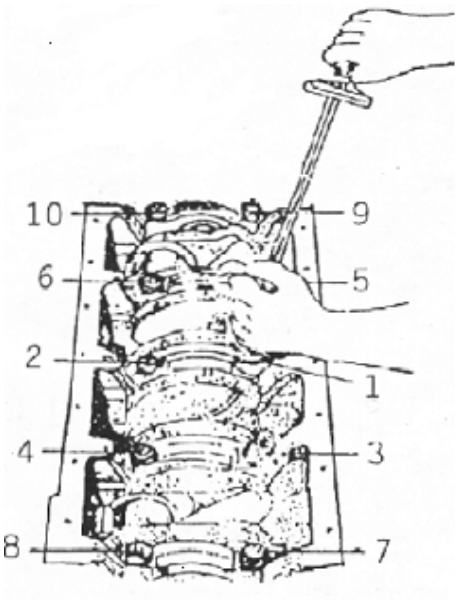


图 4

曲轴装配时，应从止推档（即第三档）开始拧紧主轴承螺栓，然后向两端依次拧紧，主轴承螺栓不允许一次拧紧，应分三次依次轮流均匀拧紧，三次拧紧力矩为：

第一次拧紧力矩：60～80N·m

第二次拧紧力矩：160～180N·m

第三次拧紧力矩： 260N·m,

检验 230～300N·m

每拧紧一次，应转动曲轴，以检查灵活性。按规定力矩拧紧后，曲轴应转动灵活自如，曲轴轴向窜动量（轴向间隙）应在 0.1～0.27mm 范围内。

Start tightening main bearing bolt from thrust (the third one) to each side. Main bearing bolts should be evenly tightened for both ends by turns in three times:

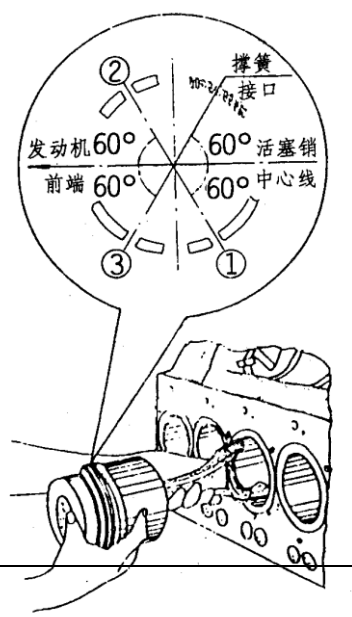
Tightening torque for the first time 60 N•m ~80 N•m

Tightening torque for the second time 160 N•m ~180 N•m

Tightening torque for the third time 260 N•m

Check in 230-300 N.m

After each tightening, rotate the crankshaft to check for its flexibility. Axial play of the crankshaft should be 0.1~0.27mm.



3.1.2 活塞连杆的安装 **Piston connecting rod assembly**

活塞环装配时，活塞环上有向上标记的一面

朝上（第二道内扭曲环内倒角朝上），严禁反装。活塞连杆组装入缸孔时，活塞环的开口位置应依次错开（如图），并使活塞顶面上的箭头指向发动机前端。连杆螺栓装配时应涂抹少许干净机油，然后拧紧，检验力矩为 190～260N•m，应按下列要求分三次均匀拧紧，严禁一次拧紧：

The side of piston ring that marked “TOP” should be faced upwards when fitted. Note that groove of piston ring should be staggered in turn and arrow in piston crown should head out towards engine front end when piston connecting rod fitted. Apply a few clean engine oil to connecting rod bolt and tighten afterwards. The tightening torque is 190～260N.m when inspection. Please do not tighten bolt at one time, but follow the procedure as bellow:

第一次拧紧力矩：50～70N.m

The first tightening torque: 50～70N.m

第二次拧紧力矩：110～130N.m

The second tightening torque: 110～130N.m

第三次拧紧力矩：220N.m

The third tightening torque: 220N.m

【注意】：活塞顶部的方向标记。Pay attention to the direction mark in piston crown

图 5

安装活塞连杆组件时，必须注意连杆体和连杆盖上的配对号。

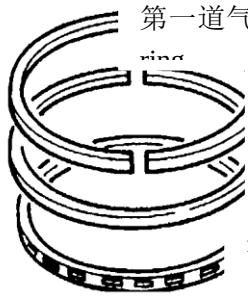
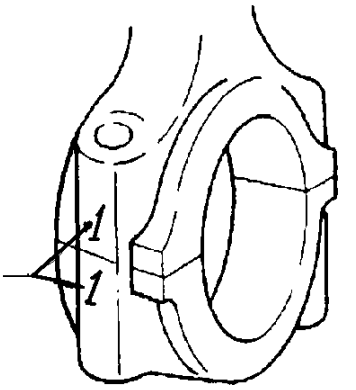


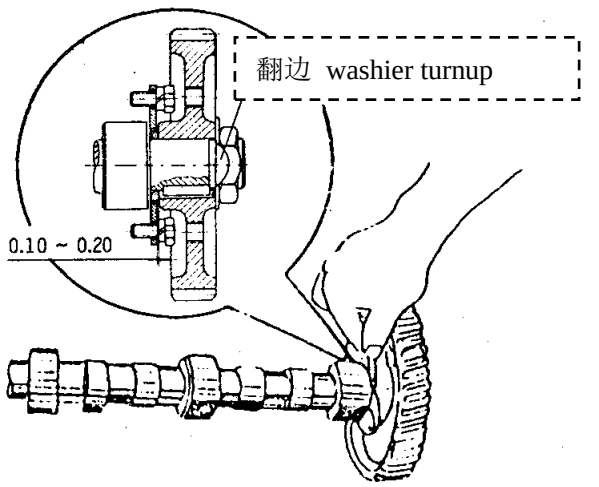
图 6

图 7



3.1.3 凸轮轴的安装 Camshaft assembly

小心地将凸轮轴装入机体中，注意轴颈、凸轮与衬套表面不得碰伤，装上隔圈、凸轮轴止推板、凸轮轴齿轮，上紧锁螺母，其拧紧力矩应大于 300 N•m，把垫片翻边防松。凸轮轴应转动自如，其轴向间隙为 0.10～0.2mm。



Enclose camshaft into cylinder block carefully to prevent journal, cam and bushing surface from damage, and then mount spacer, camshaft thrust plate and camshaft gear, fit lock nut with tightening torque that is larger than 300 N.m. Slacken gasket flang, the camshaft can rotate freely, and its axial clearance should be 0.10～0.2mm.

3.1.4 气门及导管的安装 Valve and valve guide assembly

气门导管应在常态下压入，导管上端面至气缸盖弹簧座面的距离在 20±0.3mm 范围内。进气门密封锥角为 120°、排气门的密封锥角为 90°，气门与气门座圈均需配对研磨，气门下沉量控制在进气门：1±0.2mm 范围内，排气门：1.7±0.2mm 范围。

Press in the valve guide at normal condition and ensure the distance from valve guide top to spring seat surface of cylinder head should be within 20±0.3mm, seal cone angle of intake valve is 120° and seal cone angle of exhaust valve is 90°. Valve and valve seat ring should be grinded in all correspondence, valve sinking is required at 1±0.2mm 1.7±0.2mm.

图 diagram 8

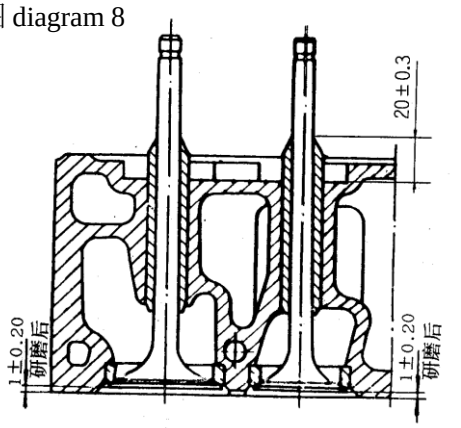


图 9

3.1.5 喷油器的安装 Injector assembly

在安装气缸盖前，先把喷油器装到气缸盖上，检查喷嘴凸出缸盖底面高度，此高度控制在要求的范围内，各系列机型喷油器具体凸出高度可参照表 2-1、2-2、2-3、2-4。超差时通过垫片来调整，然后把喷油器拆下待后装配。调整好后的喷油器及垫

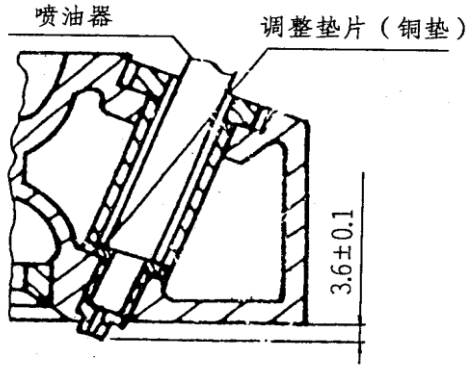


图 10

片在装配时应对号入座，不能调换装配。

Mount the injectors in the cylinder head first, and check the height that injectors project over the cylinder head from the bottom. Ensure the projection height to be met the requirements, details please refer to table 2-1, 2-2, 2-3, 2-4. If the projection is not within the tolerance, adjust gasket. Remove injectors afterwards.

Injectors and gaskets should be assembled in all correspondance after adjustment.

3.1.6 气缸盖的安装 ylinder head assembly

安装气缸盖时，缸盖螺栓应按图示顺序均匀拧紧，最后检查保证每个螺栓拧紧力矩为 210～260N•m，不允许一次拧紧，应分三次依次拧紧：

第一次拧紧力矩：60～80N•m

第二次拧紧力矩：120～140N•m

第三次拧紧力矩：230N•m

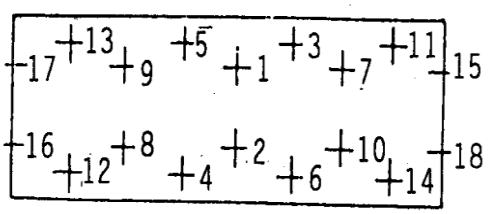


图 Figure 11

Cylinder head bolts should be tightened evenly in sequence shown in the figure 11, and ensure the tightening torque of bolt should be 210～260N.m, which is done in three stages as follows:

The first stage: 60～80N.m

The second stage: 120～140N.m

The final stage: 230N.m

3.1.7 电气系统

YC 系列柴油机的电器系统按照不同用途分为 12V 和 24V 两种。出厂的柴油机带有交流发电机和起动机，同时根据用户需要还可以配备电机调节器、预热器及仪表的传感元件等。交流发电机的作用是向蓄电池充电和对外负载供电，整体式交流发电机自带电压调节器。电路图见图 19-15。

YC series diesel engine would adopt 12V or 24V electrical system according to different application. Engine is delivered from factory with AC alternator and starter, while the sensor components of starter regulator, pre-heater and instrument are optional according to customer requirements. The AC alternator is used to charge for storage battery and provide electricity for other components, the integrated AC alternator is equipped with voltage regulator. See Figure. 12 for the circuit diagram.

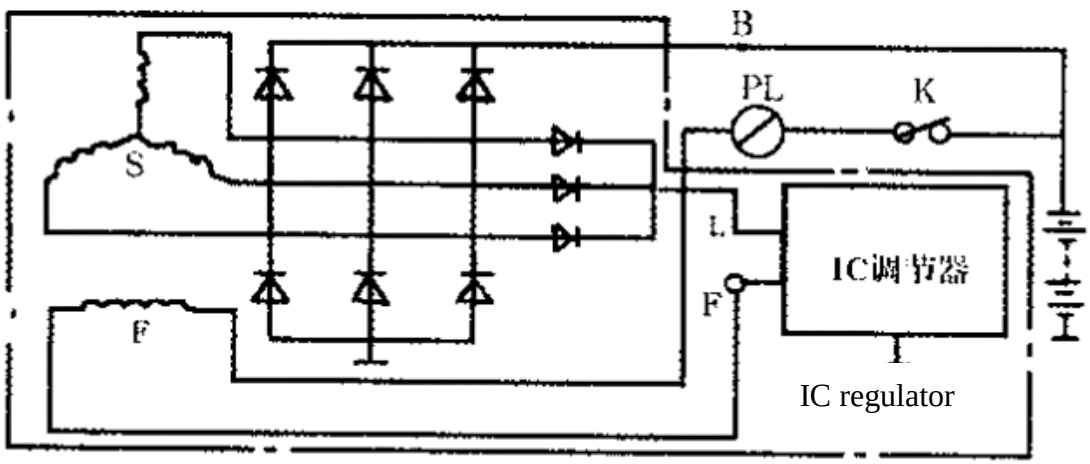


图 12 整体式交流发电机接线图 Fig. 12 Circuit diagram of integrated AC alternator

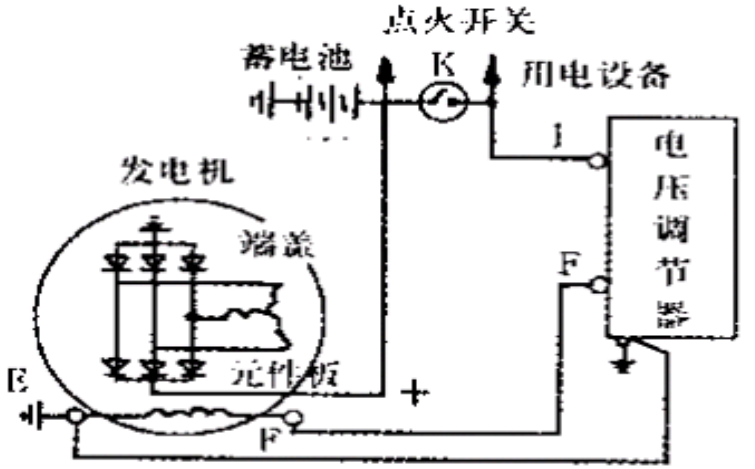


图 13 内搭铁 Fig. 13 Inner ground
蓄电池 Battery. 点火开关：switch。用电设备： electric equipment。
发动机：Alternator。端盖： End closure 元件板：Element plate.
电压调节器： Voltage regulator

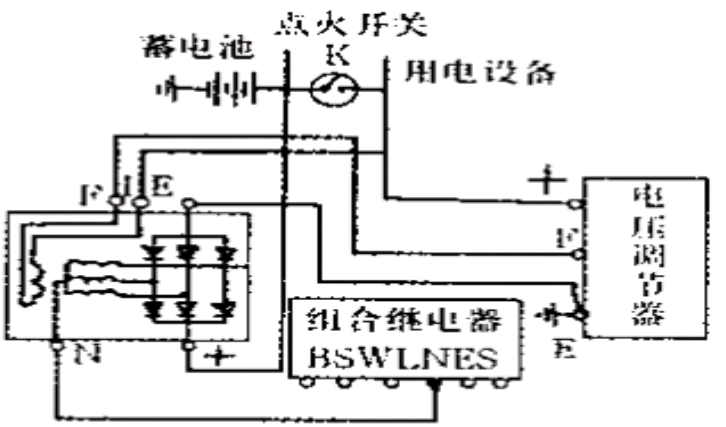
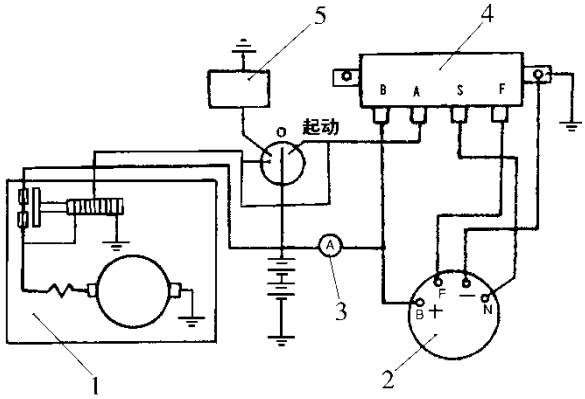


图 14 外搭铁 Fig.14 Outer ground
蓄电池 Battery. 点火开关：switch。 electric equipment。
发动机：Alternator。端盖： End closure 元件板：Element plate
电压调节器： Voltage regulator 组合继电器 banked relay

柴油机所用启动电机为四极四刷直流串激电动机，上述起动电机工作电压均

为直流 24V，最大输出功率 6.6KW，单线制负极接地（搭铁）。电机小齿轮与飞轮齿圈的啮合用电磁铁控制机械驱动并带有滚柱式单向离合器，以防止电机转子超速，当按下启动开关一次不能起动时，必须等利用复位的小齿轮完全退回原来位置后，才可以进行第二次启动，连续二次启动间隔时间应不少于 1 分钟以上，每次启动时间不应超过 10 秒，以防止电机过热损坏。决不允许在柴油机及启动电机尚未停止转动时再次按下启动按钮，否则将会引起齿轮和齿圈的剧烈撞击而损坏。当发动机起动成功后，应立即松开按钮，使小齿轮复位。电气系统原理图如图 15 所示。

The engines use fourpole 4 brush Series DC starter. The above starter's working voltage is 24V, Max. Power is 6.6KW, single-line and negative pole grounding. The engagement between motor pinion and flywheel gear ring adopts the electromagnet to control the mechanical drive, with a roller-type one-way clutch, to avoid rotor overspeed. When fail to start the engine, please wait for the small replaceing gear return to its position, then start the engine again. The time between first time and second time engine starting should over 1 minute, and each time for starting engine should not be over 10 seconds, to avoid starter overheat. Do not press the start bottom before engine shut down or the starter stop rotary, otherwise, it may cause damage by gear and teeth ring serious impact.



1. 起动电机 starter 2.发电机 alternator 3.电流器 current regulator 4.电压调节器 voltage regulator 5.进气加热器 intake air pre-heater

图 15 电气系统图 electrical system

发电机为 JF 型硅整流无刷发电机，工作电压为 28V，根据不同的机型，其功率有 0.5KW、0.75KW 两种，不允许超负荷使用。发电机为负极接

地（搭铁），不能接错，否则将会烧坏电机。并严禁将发电机“+”与“F”或“-”极接线端头相碰，否则将会损坏电压调节器。电压调节器的作用是当发电机转速发生变化时，自动地将发电机输出的电压稳定在一定的范围内，供用电器使用并向蓄电池充电。电压调节器安装时应垂直安装，接线柱向下，调节器是较精密的电器，切勿随意调整，当确认有故障时，应将盖子拆下，先检查触点有否污染不通，触点弹簧仅起调节电压数值的大小作用，拉长弹簧电压上升，反之下降。每经工作 350 小时后，应检查电压数值并整修触点，调节器衔铁与铁芯间隙应为 1.4～1.5mm。

Alternator is JF type silicon rectifier brushless alternator. Its working voltage is 28V, and power is 0.5KW, or 0.75KW according to different engine model. Do not overload use the alternator. Its negative pole should grounding, and should not mis-connect, or the alternator will be burn. Do not let positive pole connect to “F” pole, or negative pole end socket, otherwise, the voltage regulator might be broken. Function of voltage regulator is when rotary speed changing,keep voltage at certain rang automatically, and supply power to electronical device and charge the battery. It should be installed vertically, and the wiring terminal should face downward. The regulator is precise device, do not adjust it without authorization. When there is failure, check contactor’s cleanness and wiring at first. Contactor spring is for voltage regulating, pull the spring to raise voltage, otherwise, drop the voltage. Every 350 working hour, check the voltage value and adjust the contactor, clearance between regulator armature and iron core should be 1.4 to 1.5mm.

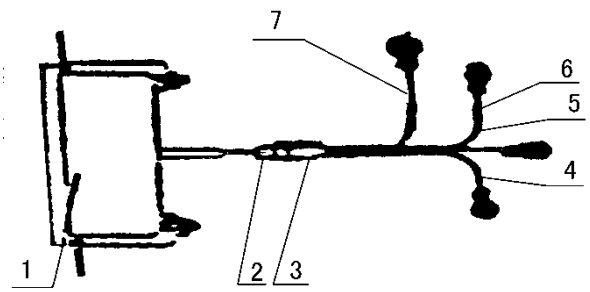
进气加热器安装于进气管与进气弯管接合处，是当环境温度较低时，使柴油机更易于起动而设置的辅助启动装置。其工作原理是当空气从空气滤清器进入进气管流经加热器时，已通电发热的电热板将流过的空气进行加热，温度升高后的空气被吸入气缸使柴油机易于起动。与配置有进气加

热器的柴油机配套的工程机械应设有带预热启动的启动开关，接线时注意与加热器两个接线柱相联接的接线端子不要与柴油机外壳相碰，以免造成短路故障。在启动时如需进行预热启动，则应先把启动开关板至预热位置，每次预热时间应控制在 40 秒内，然后再将开关板至启动位置，对发动机进行启动.

Intake air heater install between intake pipe and intake elbow pipe. It is assiting engine start device to make engine start easier, when the environmental temperature is low. The working principle is that when the air from the air filter enters the intake manifold and then flows through the heater, the powered and heated electric heating plate will heat the flowing air, and the air with temperature increase will be sucked into the cylinder so that the diesel engine can be easily started. The construction machinery, matched with the diesel engine with air intake heater, shall be equipped with a preheating start switch. During wiring, the terminals connected to two wiring terminals of the heater shall not contact with the diesel engine casing so as to avoid short-circuit fault. If the preheating start is needed during startup, first the start switch plate is pulled to the preheating position. Each preheating time shall be controlled within 40 seconds, and then the switch plate is pulled to the start position to start the engine.

柴油机根据用户的需要，可选配不同的仪表及传感器，主要有微细管膨胀式水温表、油温表;油管直通式机油压力表;直流电流表;电信号机油压力过低报警器;电信号机油温度、冷却水温度传感器;电子式转速表;带计时器电子式转速表;冷却水温度过高报警器。电子转速表的接线示意图如 16 所示。

According to client’s demand, the engine can install different meter and sensor, including micro-capillaryexpandsion type water thermometer, oil themometer, oil pressure meter, AC ampere meter, oil low pressure alarm, oil temperature, cooling water temperature sensor,electronic rotary speed meter, rotary speed meter with timer, cooling water overtemperature alarm. electronic rotary speed meter wiring diagram as bellow:



1.转速表 meter,2.六芯插头 6 pins plug, 3.六芯插座 6 pins socket, 4.地线（黑）ground wire(black) 5.电源线（红）power wire(red), 6.灯线（白）lamp wire(white) 7.讯号线接充电发电机中性点“N”)（蓝） sign wire, connect to alternator neutral point "N"(blue)

图 16 电子转速表接线示意图 rotary speed meter wiring diagram

3.1.8 正时齿轮及皮带

曲轴正时齿轮、喷油泵齿轮、凸轮轴齿轮等均有定时要求，因此，在上述三部齿轮及正时惰齿轮上均有定时装配标记，装配齿轮时须对准装配标记，装配后在齿面上加润滑油，齿轮啮合侧隙在 0.07～0.25mm 范围内。

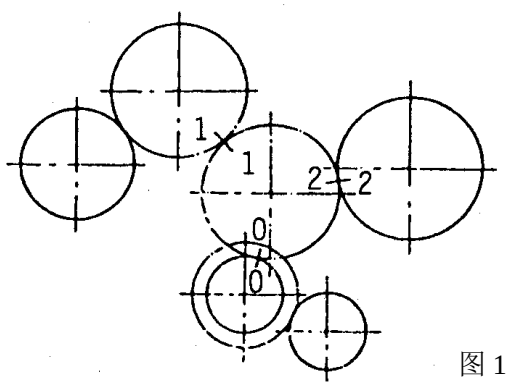


图 17

Crankshaft timing gear, injection pump gear, camshaft gear and timing idle gear all bear timing assembly marks, with which should be aligned when assembly. Lubricate the gears afterwards. Ensure gear mesh backlash should be within 0.07～0.25mm.

附件传动机构为皮带传动。曲轴上减振器皮带轮通过三角皮带传动充电机和水泵，发电机通过张紧轮由皮带传动。使用过程中应经常检查水泵皮带的张力是否适当。如张力过小（过松），皮带与皮带轮间会打滑，使循环水量不足，水温会过高，同时会加速皮带磨损。如张力过大（过紧），会加速水泵轴承和皮带的磨损，而且多消耗功率，一般在(40～50)N 力作用

下，皮带挠度在(10～15)mm 范围内，如图 18。\

Accessories are belt drive. Belt wheel on crankshaft shock absorber drive alternator and water pump through triangle belt. Belt drive alternator through tension pulley. Check water pump belt tension regularly. Small tension makes belt slip from belt wheel, and water supply not enough, water over temperature, and makes belt wear fast. Tight tension makes water pump bearing and belt wear fast, and make power lost. Tension force should be 40 to50N, belt bend should be 10-15mm. See picture bellow

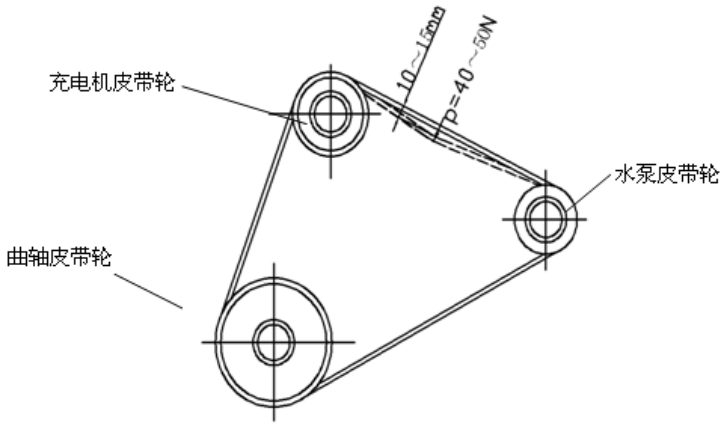


图 18

3.1.9 油标尺 Oil scale

应定期检查油底壳内油面的高度，油面高度应保证置于油标尺上下限刻度之间，约 2/3 处为好（见图 19）。加机油时不允许加过量,不足时应及时加足。油底壳下部设有放油螺塞，供更换机油时放油用。放完油后应注意检查放油螺塞的磁铁内是否吸附有磨合铁屑,如有则清除铁屑后装复再加新机油。如果磁铁吸附有异常铁块，则应请玉柴服务站分析是否为发动机运动件异常磨损或脱落，分析清楚原因并采取相应对策后再加注新机油正常使用。

Regularly check the oil level of the oil pan and ensure the oil level should be in

the range of the indicator and should be kept at the height of two-third in the oil scale. The oil could not be too much and fill the oil when inadequate. Replace the oil when every dr4ing 10000km (or 250 hours). Shorten the replacement cycle if the engine has frequent start and usually runs at high speed with heavy load. The oil pan capacity of YC4F is about 10L and 7L for YC4FB.There is oil plug screw at the bottom of the pan for drain the oil when replacing.

Check if there is scrap iron in the magnet of the oil drain plug. If so, fill new oil after eliminating the scrap iron. If the magnet absorbs abnormal iron, sent it to Yuchai service station to check if there is worn out or fall-off of the engine parts. Fill new oil after solve the problem

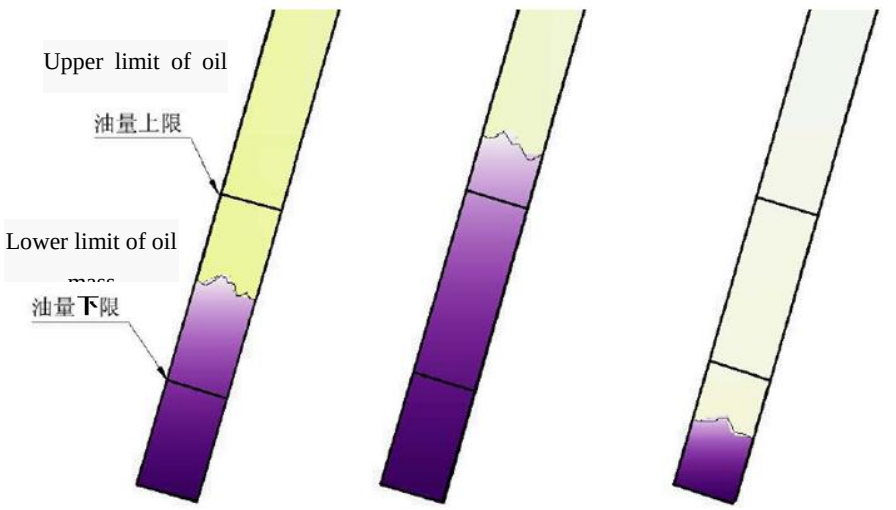


图 19

3.1.10 冷却系统 Cooling system

冷却系统采用强制闭式循环水冷却系统。冷却液应按要求采用合格的防冻液。

Cooling system uses a forced closed cycle cooling system. Coolant should

be qualified anti-freeze.

发动机冷却系统的功能是在发动机运转时，对高温条件下工作的零部件加以适度且可靠的冷却，从而保证各种环境条件和工况下发动机均能在最适宜的温度状态下工作。冷却液循环路线见图 20。

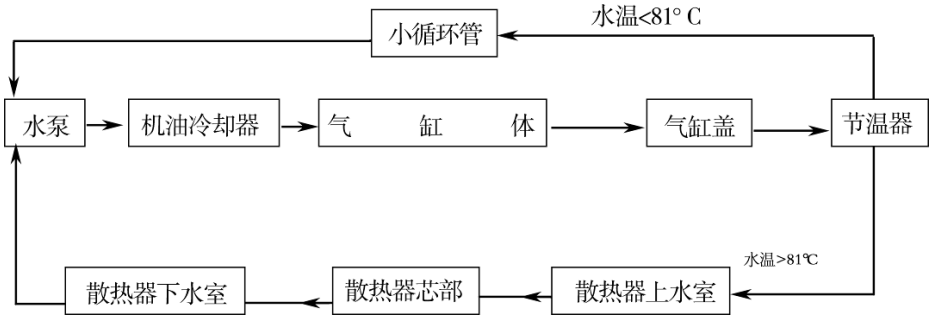
The engine cooling system is used to moderately and reliably cool the parts and components working at high temperature conditions so as to ensure that the engine will work in the optimal temperature status under various environmental conditions and operating modes. Its sketch and circulating path of the coolant are shown respectively in Fig. 20

水泵及风扇是冷却系统的主要部件。水泵进水口与散热器之间的管路应选用刚性较好的胶管或钢管，以免被吸扁。发动机使用过程中，不要轻易把节温器拆掉，以免影响发动机的正常工作状态。

The water pump and fan are the main parts in the cooling system. The pipes between water inlet and radiator should be rigid tube or steel pipe to avoid distortion. Don’t remove the thermostat when the diesel engine’s operating, otherwise the diesel engine will be unable to work properly.

车辆应配备有膨胀水箱（副水箱），防止和排除冷却系统中进入空气，减少冷却液的膨胀溢出，同时可提高水泵进水口处静压，避免产生气蚀。膨胀水箱底面至少应该高出发动机水道或散热器上水室的顶部。

The vehicle should be equipped with expansion water tank（auxiliary water tank）, to prevent air from entering the cooling system, which reduces the expansion and overflow of the coolant. Meanwhile, it’s also advisable to increase the static pressure of the pump water inlet port to avoid cavitation erosion. The bottom of expansion water tank should be at least above the engine water gallery or the top of the radiator upper tank.



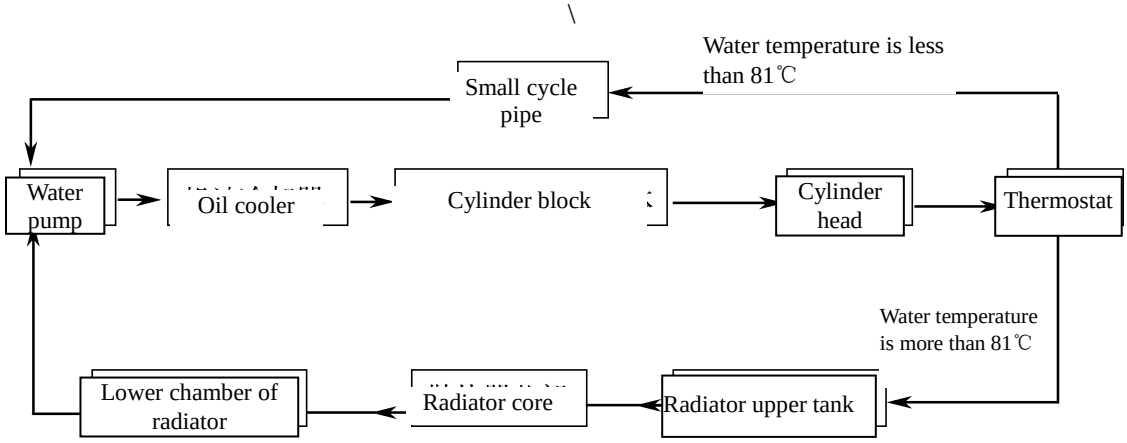


图 Figure 20 冷却液循环路线图 Coolant circulation route chart

3.1.10.1 水泵使用时应注意如下事项：

- 使用过程中应经常检查水泵皮带的张力是否适当。如张力过小(过松)，皮带与皮带轮间会打滑，使循环水量不足，水温会过高，同时会加速皮带磨损。如张力大（过紧），会加速水泵轴承和皮带的磨损，而且多消耗功率。一般在两带轮之间向里加 40～50N 作用力时，皮带能弯进 5～8mm 为宜。

  During operation, frequently check if tension of the water pump belt is proper.

If the tension is too small (too loose), skid may occur between the belt and its pulley, which will result in insufficient volume of circulating water, water temperature rising and quickening wear of the belt. If the tension is too large (too tight), wear of the water pump bearing and belt will result in and more power will be consumed as well. It's better that the belt can be bend for 5-8mm when apply 40-50N force inside the two belts.

- 水泵轴承及张紧轮轴承应定期加注润滑脂，一般运行 200 小时要加一次，每次不要加得过多，防止甩出污染皮带和发动机。轴联轴承水泵无需加注润滑脂。

  Grease the water pump bearing and tensioner pulley bearing periodically. Usually, grease once every 200 working hours. Every time do not grease too much so as to prevent the grease from being thrown out and contaminating the belt and engine. Coupler bearing need no grease.

- 水泵结构可靠性主要取决于水封，在使用时要经常检查水泵下部泄水孔是否漏水，若漏水（往往在运转时并不漏水而停车后才漏），说明水封已损坏，应予以更换。

  Reliability of structure of the water pump mainly depends on the water seal. During operation, frequently check the draining orifice at bottom of the water pump for water leak; if water leaks (sometimes, it does not leak during running but leaks after stopping), it indicates that the water seal is broken, repair or replace it with a new one.

- 水泵进水口与散热器之间的管路应选用刚性较好的胶管或钢管，以免被吸扁。

  Select the rubber hoses or steel pipes of superior rigidity to lay the pipeline between water inlet of the water pump and radiator to avoid flattening of the pipeline due to the suction force

3.1.10.2 风扇 Fan

风扇通常安装在水散热器后面。当风扇旋转时，对空气产生吸力，使之沿轴向流动。空气流由前向后高速通过散热器芯，使流经散热器芯的冷却水加速冷却，从而加强了冷却系对发动机的冷却作用。

Fan usually is installed behind radiator. When it rotates, its induced draft make air flow along axle. Air flow rapidly through radiator core from the front to the rear, cooling the water inside the radiator, then the whole engine.

风扇安装要求有导风罩，见图 21，要求风扇伸进导风罩约 2/3，径向间隙约(15～30)mm。

Fan must have wind ring, see picture 21, 2/3 of fan must inside wind ring, radial clearance between them must be 15 to 30mm

风扇与风扇护风罩的安装要求，如图示：
The installation requirements for fan and fan hood are shown in the figure:

H≥50mm;

L1=2/3L;

f=2.5%Φ,或14~20mm

式中：H-风扇前端至散热器芯子距离；L1-风扇叶片的投影宽度伸入护风罩的距离；f-护风罩与风扇叶尖的径向间隔；Φ-风扇直径
Where: H-distance from fan front-end to the radiator core; L1-distance of projection width of fan blade stretching into the hood; f-radial clearance between hood and fan tip; φ-fan diameter

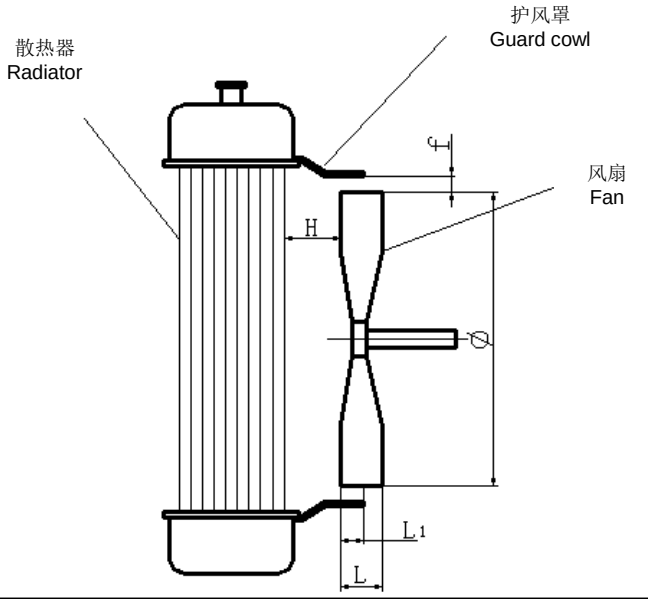


图 picture 21

3.1.10.3 冷却系统的保养 Maintenance of Cooling System

装在行进车辆或机械上的发动机，在冬季气温降到 0℃以下，而又无保温措施且停止工作时，冷却系中的水便会凝结成冰，水结成冰后体积发生

膨胀，会发生机体、水箱、缸盖和水泵等冷却系部件被撑裂的情况，因此必须要给冷却系加注防冻液。常用的防冻液为乙二醇+水型。

When winter temperature drops below 0℃, there is no thermal insulation measurement and when the engines stop working which installed in travelling vehicles or machines, water in cooling system will condense into ice, and the volume will expand after water condenses into ice, and components of cooling system such as the body, water tank and water pump etc. will breach. Therefore, antifreeze should be added in cooling system. Common antifreeze is ethylene glycol with water.

■ 冷却系统要求使用发动机冷却液。Engine coolant should be used in cooling system

俗称防冻液。冷却液的5大功能：冷却、防腐蚀、防穴蚀、防水垢、防冻裂、高沸点防开锅。

It is familiarly known as antifreeze. There are five functions of coolant such as cooling, anti corrosion, anti cavitation, anti water scale, anti cracking and anti boil at high boiling point.

■ 防冻液的分类 Antifreeze classification

发动机冷却液分类如下 Engine coolant classification is as follows（表 Table 3-1）：

	分类方法 Classify Model	分类 Classify	推荐使用范围 Recommended application range
冷却液	按发动机负荷分类 Classify by engine load	轻负荷冷却液 Light load coolant	推荐用于长期工作负荷不超过30%的发动机 It is recommended in use of engine with long-term workload less than 30%.

coolant		重负何冷却液 Heavy load coolant	推荐用于长期工作负荷超过 70%的发动机。一般采用有机酸型添加剂、不含无机盐型添加剂。重负何防冻液，也可归为有机酸型防冻液。 It is recommended in use of engine with long-term workload more than 70%. Use organic acid additive without inorganic salt additive. Heavy load antifreeze can be classified into organic acid antifreeze.
	按防冻剂分类 Classify by antifreeze	乙二醇型冷却液 Ethylene glycol coolant	
		丙二醇型冷却液 Propylene glycol coolant	
	按添加剂分类 Classify by additive	无机盐型冷却液 Inorganic salt coolant	通常含有硅酸盐、硼酸盐、磷酸盐、亚硝酸盐等无机盐型添加剂。 Commonly contain inorganic salt additive such as silicate, borate, phosphate, and nitrite and so on.
		有机酸型冷却液 Organic acid coolant	用有机酸型添加剂（OAT 技术）,不含有硅酸盐、硼砂、胺、咪唑、磷酸盐、亚硝酸盐等添加剂。重负荷防冻液，属有机酸型防冻液。 Use organic acid additive (OAT technology) without additives such as silicate, borax, amine, imidazole, phosphate, and nitrite and so on. Heavy load antifreeze

			can be classified into organic acid antifreeze.

冷却液应满足的质量标准。Quality standard of coolant

■ 玉柴发动机规定使用的冷却液，可分为 2 类，不同类的冷却液，其更换周期不同，具体规定如下 Coolants which Yuchai engines require can be classified into two classes. Different types of coolants have different replacement cycles and specifications are as follows:（表 Table 3-2）：

名称 Name	别名 Alias	技术要求 Technical requirements	更换周期 Replacement cycle
轻负荷冷却液 Light load coolant	无机盐型冷却液 Inorganic salt coolant	符合表 1 规定 Meet requirement of table 3-1	24 个月/16 万公里/3000 小时,以先到达者为准。 24 months/160000km/3000hours. Who reaches first prevails.
重负荷冷却液 Heavy load coolant	有机酸型冷却液 Organic acid coolant	符合表 2 规定 Meet requirement of table 3-1	36 个月/30 万公里/5000 小时,以先到达者为准。 36 months/300000km/5000hours. Who reaches first prevails.
注：当发动机工作负荷处于轻负荷与重负荷之间时，建议选用重负荷冷却液。 Note: When engine workload is between light load and heavy load, heavy load coolant is recommended to use.			

■ 冷却液牌号的选用 Select of coolant grades

一般选择冰点比车辆运行地区的最低温度再低 10℃左右的防冻液。例如：北京的最低温度假设是-15℃，则选择牌号是-25 号的防冻液。

Usually choose antifreeze whose freezing point is about 10℃ lower than lowest temperature of the area where vehicles travel. For example, if the lowest temperature in Beijing is -15℃, then the antifreeze of which the designation is -25 must be used.

■ 防冻液的使用意事项 Use notice of antifreeze

在加入冷却液前先使用清水清洗发动机冷却系统，有条件的最好使用软化水或去离子水进行清洗；

Before adding coolant, first use water to clean cooling system of the engine. If so, best use softened water or deionizer water to clean.

注意检查冷却液的液面高度和冷却系统的密封性。无溢流箱的车辆加入时不要加满，应加入约 95%容积；有溢流箱的车辆先加入到指定刻线，启动发动机几分钟后继续加冷却液至规定高度；

Carefully check liquid level of coolant and seal of cooling system. Do not fill up for vehicles without spill box and add about 95% of the volume. When adding vehicles with spill box, first add till specified groove, and continue to add coolant till required height after the engine has started for several minutes.

不同厂家、不同类型的发动机冷却液，不可以混用，否则，冷却液的性能会降低，甚至导致发动机损坏；

Different types of engine coolants from different manufactures can not be mixed. Otherwise, the performance of cooling liquid will reduce, even leading to engine damage.

如果液面低于规定的刻度，则需补加至规定的液面。补加的防冻液必须是同厂家、同牌号的防冻液；

If liquid level is lower than set position, antifreeze should be added till specified liquid level. Additional antifreeze should be from the same manufacturer with same brand.

乙二醇有毒，若沾染皮肤应迅速用水洗净；乙二醇遇火会燃烧，故切勿在防冻液渗漏的机体附近进行电焊或使用明火；乙二醇沸点为 197.4℃，所以防冻液中的水易蒸发，在使用一定时间后要添水。

Ethylene glycol is poisonous. If skin is contaminated, quickly wash with water. If ethylene glycol catches fire, it will burn. Therefore, be sure not to do electrical welding or use flame near the body where antifreeze spills. Boiling point of ethylene glycol is 197.4℃, so that water in antifreeze is easy to evaporate. After it is used for a while, add water.

■ 防冻液定期检查 Regularly check of antifreeze

冷却液在使用过程中，要注意观察是否出现异常、变质现象，一旦出现异常、变质，则需要更换。并注意防冻液温度是否正常及容量是否足够。

Before using coolant, note if there is abnormal and degenerative phenomenon. Once it is abnormal and degenerative, need to be replaced. And note if the temperature of antifreeze is normal and if the capacity is adequate.

如果有检测条件的，每隔 6 个月/5 万公里/1000 小时(先到者为准)，做一次检测。检测方法采用试纸法，现场快速检测。检测结果超标的，需要及时更换。

If there are test conditions, do a test every 6 months/50000 km/1000 hours (Who reaches first prevails). Test methods use dipstick to test on site quickly. If test results exceed standard, need to be replaced in time.

轻负荷冷却液/无机盐型冷却液，检测项目及可接受范围见表 3。

Light load coolant, inorganic salt coolant, test items and acceptable limits are shown in table 3.

重负荷冷却液/有机酸型冷却液，检测项目及可接受范围见表 4。

Heavy load coolant, organic acid coolant, test items and acceptable limits are shown in table 4.

■ 防冻液定期更换 Regularly replacement of antifreeze

轻负荷冷却液/无机盐型冷却液，更换周期按 24 个月/16 万公里/3000 小时,以先到达者为准。

Replacement cycle of light load coolant and inorganic salt coolant is in accordance to 24 months/160000 km/3000 hours. Who reaches first prevails.

重负荷冷却液/有机酸型冷却液，更换周期按 36 个月/30 万公里/5000 小时,以先到达者为准。

Replacement cycle of heavy load coolant and organic acid coolant is in

accordance to 36 months/300000 km/5000 hours. Who reaches first prevails.

■ 轻负荷冷却液/无机盐型冷却液技术要求、重负荷冷却液/有机酸型冷却液技术要求，必需满足石化行业相关标准或玉柴 Q/YC 908《发动机冷却液技术条件》要求。

Technical requirements of light load coolant, inorganic salt coolant, heavy load coolant and organic acid coolant should meet relevant standards of petrochemical industry or requirements of Yuchai Q/YC 908 “Technical condition of engine coolant”.

■ 定期检测项目及可接受范围 Regularly test items and acceptable items

轻负荷冷却液/无机盐型冷却液定期检测项目及可接受范围（表 3-3）

Regularly test items and acceptable items of light load coolant and inorganic salt coolant

序号 Number	检测项目 Test items	可接受范围 Acceptable limits	备注 Note
1	腐蚀性检查 Corrosivity test	气缸套、水泵、节温器座等铸铁件和铝合金件不得出现异常的腐蚀或穴蚀现象。Abnormal corrosion or cavitation should not happen on cast iron and aluminium such as cylinder liner, water pump and thermostat seat and so on.	
2	乙二醇含量 Ethylene glycol content	40%～60%	
3	PH 值 PH value	7.5～11.0	
4	氯离子 Chloridion	＜200ppm	
5	硫酸根离子 Sulfate ion	＜1500ppm	
6	亚硝酸根离子 Nitrite ion	≥800ppm	适用于含亚硝酸根离子、不含钼酸根离子缓蚀剂的防冻液

			For antifreeze with corrosion inhibitor with nitrite ion and without Mo04-ion
7	亚硝酸根离子＋钼酸根离子的总和 Sum of nitrite ion and Mo04-ion	≥520ppm， 其中，还应同时满足： While satisfying: 亚硝酸根离子≥200ppm Nitrite ion≥200ppm 钼酸根离子≥200ppm Mo04-ion≥200ppm	适用于同时含有亚硝酸根离子、钼酸根离子复合缓蚀剂的防冻液 For antifreeze with compound corrosion inhibitor with nitrite ion and Mo04-ion

重负荷冷却液/有机酸型冷却液定期检测项目及可接受范围 Periodic checking items and acceptable range for heavy load coolant/organic acid coolant（表 Table 3-4）

序号 Number	检测项目 Test items	可接受范围 Acceptable limits
1	腐蚀性检查 Corrosivity test	气缸套、水泵、节温器座等铸铁件和铝合金件无目视可见的腐蚀现象。 There is no visual visible corrosion on cast iron and aluminium such as cylinder liner, water pump and thermostat seat and so on.
2	乙二醇含量 Ethylene glycol content	40%～60%
3	PH 值 PH value	7.5～11.0
4	氯离子 Chloridion	＜200ppm
5	硫酸根离子 Sulfate ion	＜1500ppm

▲注意事项 Cautions

装配前各零部件均应仔细清洗干净，特别是各油孔油道，不允许有任何杂质存在。

Clean all parts before assembly, specially oil hole and vita, do not leave and dirt.

零部件配合表面不允许有锈蚀、毛刺、碰伤等缺陷。

All parts surface should have rust, skin needling, scratch and etc.

零部件的摩擦表面、重要的配合表面应涂以清洁机油再进行装配。

All friction and contact surface should be oiled with clean oil before assembly.

3.2 柴油机的调整 Adjustment

3.2.1 供油提前角的调整 Fuel supply advance angle adjustment

EMBED PBrush

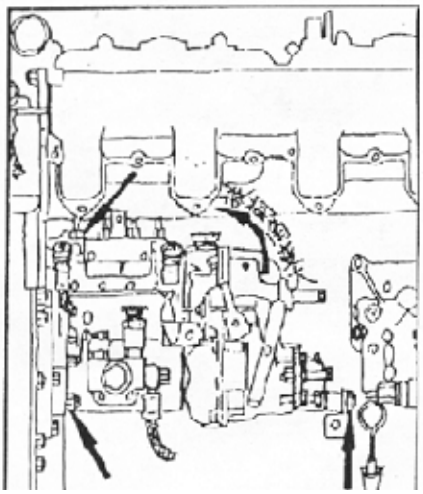


图 22

技术要求 Technical requirements：

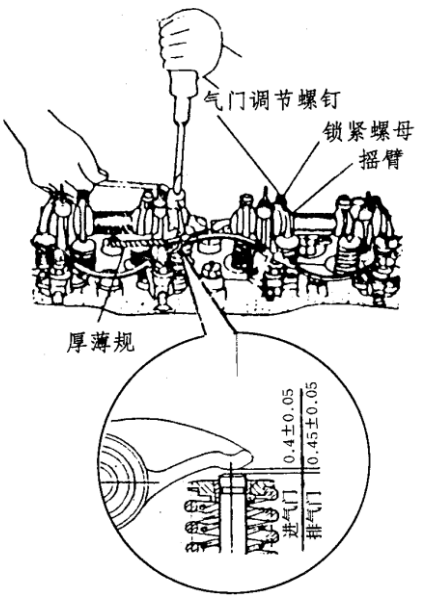
各系列机型的供油提前角不同，在调整供油提前角时可参照表 2-1、2-2、2-3、2-4。**静态供油提前角检查：**松开第一缸高压油管与喷油泵的连接螺母，慢慢转动曲轴，当出油阀紧帽中的油面开始波动时即停止转动曲轴，此时装在齿轮室罩上的定时指针在皮带轮减振器定时刻度上的指示值即为静态供油提前角度。**静态供油提前角的调整：**松开喷油泵前端联接法兰的紧固螺母，以及松开后端支架，然后把喷油泵适当拨转一角度（喷油泵往内拨转则提前角度增大，喷油泵往外拨转则提前角度变小），然后拧紧联接法兰的螺母，检查供油提前角，调整至符合要求后把联接法兰紧固螺母及后端支架螺栓、螺母拧紧。

Different engine model has different advance angle, please refer to table 2-1、2-2、2-3、2-4. Check static fuel supply advance angle: unscrew connecting nut between high pressure fuel line of No.1 cylinder and injection pump, afterwards rotate crankshaft slowly until the fuel level in cap nut of outlet valve is shown to be waved, timing pointer in gear housing cover.

Adjustment: slacken front end connecting flange lock nut of injection pump as well as the rear end bracket. Turn the injection pump in a proper angle (turn the injection pump inwards will increase the advance angle while turn it outwards will decrease advance angle), tighten the connecting flange bolt and adjust the advance angle to meet the requirements. Afterwards tighten

lock nut of front end flange and rear end bracket bolt and nut.

3.2.2 气门间隙的调整 Valve clearance adjustment



技 术 要 求 ：（ 冷 态 ） Technical requirements (cold state)

进气门间隙 0.4±0.05mm，Intake valve clearance is 0.4±0.05mm

排气门间隙 0.45±0.05mm。Exhaust valve clearance is 0.45±0.05mm

第一缸压缩上止点判别:转动曲轴至指针(装在齿轮室罩上)对准曲轴皮带轮减振器上“0”刻度，然后连续正反转小角度范围（10°～20°即可）转动曲轴，若此时第一缸进、排气摇臂无摆动动作，而第四缸进、排气摇臂有摆动动作，这时把曲轴转回到指针对准“0”刻度，此时处于第一缸压缩上止点位置。连续正反小角度转动曲轴时第一缸摇臂有摆动动作而第四缸摇臂无摆动动作，指针对准“0”刻度时为第四缸处于压缩上止点，此时把曲轴再转一圈（360°）即变为第一缸处于压缩上止点。

Rotate crankshaft until the pointer(fitted on gear housing cover) points at scale “0” on vibration damper of crankshaft belt pulley, and then rotate crankshaft with approximately 10°～20° in clockwise and counterclockwise continuously. If intake and exhaust rocker arm of No.1 cylinder don’t swing but intake and exhaust rocker arm of No.4 cylinder swing, then rotate crankshaft back until the pointer points at scale 0, crankshaft now is positioned at compression TDC. When rotate crankshaft with small angle continuously in clockwise and counterclockwise, intake and exhaust rocker arm of No.1 cylinder swing but intake and exhaust rocker arm of No.4 cylinder

don’t swing, No.4 cylinder is now positioned at compression TDC as pointer points at scale 0. Rotate the crankshaft in a further full round（360°）, No.1 cylinder now is positioned at compression TDC.

气门间隙调整：把曲轴转到第一缸压缩上止点位置，此时可调整 1、2、3、6 气门，再把曲轴转过 360°，此时可调整第 4、5、7、8 气门。调整时先把气门调整螺钉的锁紧螺母松开，用起子适当旋出调整螺钉，把厚薄规插入摇臂与气门杆端之间，然后适当旋进调整螺钉，直至摇臂刚好压紧厚薄规，再把锁紧螺母拧紧。正确的气门间隙应能让厚薄规以微小的阻力来回插过。

Rotate crankshaft to TDC position, No. 1 cylinder to adjust 1、2、3、6 valve, rotate crankshaft in 360°to adjust 4、5、7、8 valve. Slacken lock nut of regulating bolt and screw regulating bolt out properly with a screwdriver. Place a feeler gauge between rocker arm and valve stem and screw the regulating bolt in properly until the rocker arm press on the feeler gauge, tighten the lock nut afterwards. The correct valve clearance should be allowed the feeler gauge to move through back and forth with slight resistance.

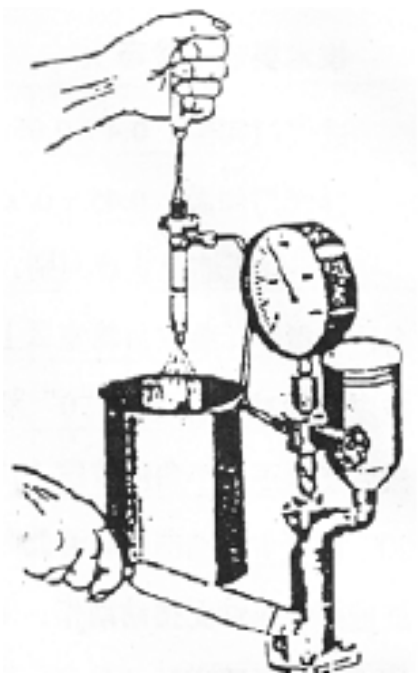
3.2.3 喷油压力的调整 Injection pressure adjustment

技术要求（喷油压力 injection pressure ）Technical requirements：

23±0.5MPa（自然吸气 natural aspirated）

26±0.5MPa(增压机 turbo-charged)

喷油压力调整：拆下调压螺钉护帽，把调压螺钉按需要旋进或旋出。调压螺钉旋进则喷油压力增大，调压螺钉旋出则喷油压力减小。喷油压力的调整应在专用试验台上进行。



The adjustment of injection pressure is carried out in the following manner: remove

regulating bolt cap and screw the regulating bolt in or out where necessary. Screw the regulating bolt will increase injection pressure while screw the regulating bolt out will decrease injection pressure. Note: the adjustment of injection pressure should be performed on the special test bench.

图 24

3.2.4 机油压力的调整 Lubrication oil pressure adjustment

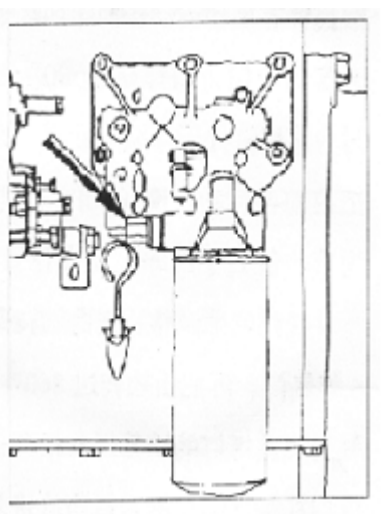
技术要求 Technical requirements：

怠速时机油压力≥0.1MPa Lubrication oil pressure at idle speed is ≥0.1MPa

标定转速时机油压力 0.25～0.6MPa Lubrication oil pressure at rated speed is 0.25～0.6MPa

机油压力调整：

机油滤清器上安装有调压阀，可通过调整调压阀调节螺丝来进行机油压力的调整，调整时先把调压阀的螺帽拆下，旋松锁紧螺母，用起子把调节螺丝旋进，则机油压力升高，调节螺丝退出则机油压力下降，调整完毕后拧紧锁紧螺母及螺帽。如果调整后机油压力还不符合要求，则需认真检查润滑油路中的故障并予以排除。



Lubircation oil pressure is adjusted through regulating bolt of pressure regulating valve that fitted on oil filter. Remove bolt cap of regulating valve and slacken lock nut, screw the regulating bolt in with a screwdriver to increase oil pressure while screw the regulating bolt out to decrease the oil pressure, tighten lock nut and bolt cap afterwards. If oil

pressure fails to meet the requirements after adjustment, check and troubleshooting lubrication system for failures.

图 25

4 发动机的使用和维护保养 Operation and maintenance

4.1 发动机的使用 Operation

4.1.1 起动前 Before starting

- 检查油底壳润滑油油面，确保润滑油足够，保证润滑，若不够，则应添加到润滑油标尺规定的位置;
- Check oil level in oil pan; ensure lubricating oil is enough, if it is not enough, fill to the required scale in oil dipstick.
- 检查水箱中的冷却液，保证正常冷却;
- Check the cooling fluid in radiator to make sure cooling effect.
- 检查排除燃油管路的空气和柴油滤清器的水；
- Check and drain the air off fuel pipeline and water in diesel filter.
- 检查油箱，若不够，添加燃油;
- Check fuel tank and add fuel if it is not enough.
- 检查电器系统（各连接线路、开关接线等是否牢固可靠，电瓶电解液是否充足，若不够，加足电解液）;
- Check electrical system (reliability and fastness of all connections and switch connections; the capacity of battery electrolyte, add it if necessary).
- 检查皮带，松紧度应适宜，皮带过松打滑使水泵、风扇的工作不正常，冷却效果差，发动机水温高，过紧则使皮带轮轴受力过大、皮带寿命缩短;
- Check belt for tension. Too loose and slipping belt will result in water pump and fan working abnormally, poor cooling and too high water temperature, while too tight belt will result in belt shaft being born too large force and also shortening belt service life. .
- 检查汽车底盘和操纵装置，禁止汽车带病行驶。
- Check vehicle chassis and control devices; avoid vehicle driving in troubles.

4.1.2 起动 Starting

完成起动前准备工作并确认符合要求后，才可以起动发动机（冬天天气寒冷时需对柴油机预热后才能起动），起动发动机时，持续起动时间不能超过 **10 秒**钟;二次起动的时间间隔不应少于 1 分钟;若连续三次均无法起动，则应检查原因，排除故障，再行起动。起动后检查:

Start the engine (In cold winter, diesel engine should be started after preheating for a while) after completing preparation and ensuring all requirements meet . When starting engine, continuous starting time should be limited in 10 seconds; the interval for restarting should be at least one minute; if it can not be continuously started for three times, driver should check

and eliminate, and then restart engine. Recheck after starting:

润滑油压力:在怠速时不能低于 0.1Mpa，压力过低，发动机润滑不良会造成各运动副磨损;

Lubricating oil pressure: The pressure should not be lower than 0.1Mpa at idle speed; if it is too low, bad lubrication will cause moving parts worn out.

水泵工作情况良好，确认冷却液已进入发动机水套内循环;无“三漏”、异响现象;

Good working situation of water pump; make sure cooling fluid has entered the internal cycle of engine water jacket; no “three leakages” and abnormal sound.

各汽车仪表的工作情况。发现有不正常现象，必须立即停车检查排除，必要时送修。

Working situation of all vehicle instruments: Driver must stop vehicle and check and solve the problem if abnormal symptoms occur, sent it to service station if necessary.

4.1.3 运行 Running

发动机起动之后，依次使发动机在低速和中速下空车暖机，当发动机冷却液温度高于 60℃，润滑油温度高于 45℃时，才允许带负荷工作。并注意以下各点：

Warm up vehicle with no load by running the engine successively at low and medium speed after it is started; it is allowed for the engine to work with loads only when the engine coolant temperature is higher than 60℃ and the oil temperature higher than 45℃. Pay due attention to the following items:

不允许发动机长期在怠速下运转。

Do not run the engine at the idle speed for a long time.

怠速时润滑油压力不得低于 0.1Mpa。

The oil pressure shall not be lower than 0.1Mpa during running at idle speed.

运转期间的润滑油压力、润滑油温度及出水温度应正常。

The oil pressure & temperature and outlet water temperature should be normal during running period

如发现有异响和振动，应立即停车检查。

Stop and check the vehicle immediately if there is any abnormal noise and vibration.

注意油、气、水的密封情况，如有泄漏，应立即消除。

Pay due attention to the sealing conditions of fuel, air and water; eliminate leakage immediately.

新的发动机或大修后的发动机不允许一开始就以高速、重负荷工作，在最初的 2500 公里或 60 小时之内，应降低功率使用，负荷应不超过 65%，以保证良好的磨合。

It is forbidden for a new or an overhauled engine to work at high speed and with heavy load at the beginning; for the first 2500km or 60h, run the engine at decreased power and with a load of less than 65% to ensure good running-in.**4. 1. 4 停车 Stopping**

发动机应避免急速停车熄火。停车前应低转速运转 3～5 分钟，以使发动机冷却下来，然后加怠速空转 2～3 分钟，使各部分得到充分的润滑油，然后停车熄火。Avoid stopping engine abruptly at high speed. Before stopping engine, run engine at low speed for 3-5 mins to have it cooled down, then run at idle speed for 2-3 mins to ensure all parts got adequate lubricant

oil.

当气温低于-30℃时，应将蓄电池拆下，搬入暖室内保温，否则难以起动。 Remove the battery and keep it warm in room when the ambient temperature is lower -30℃, otherwise it will be difficult to start.

4.1.5 燃油 Fuel

为了使发动机拥有更高的可靠性和更低油耗，燃油应选用符合 GB252－2000《轻柴油》规定的清洁轻柴油，并随着地区环境气温的不同而选用不同牌号的清洁柴油，一般夏季选用 0 号，冬季气温在-5℃以上时选用－10 号，当气温在-14℃以上时应选用－20 号，当气温在-29℃以上时应选用－35 号。In order to achieve higher reliability and lower oil consumption, select the light diesel fuel that is in comply with GB252-2000 Light Diesel Fuel, and use different brand diesel fuel according to various ambient temperatures in different areas. Generally, select 0# diesel fuel in summer; and-10# diesel fuel at temperature over -5℃ in winter ; -20# diesel fuel at the temperature over -14℃; -35# diesel fuel at the temperature over -29℃.

燃油的指标，Index of fuel

黏度：40 ℃时 为 1.3～5.8 厘泡

十六烷值：环境温度高于 0℃时，不低于 40

低于 0℃时，不低于 45

含硫量：不超过 0.5 质量百分比

水和沉积物：不超过 0.05 体积百分比

浊点：低于燃油所要工作的最低环境温度 6℃

Viscosity: 1.3 to 5.8 centistokes at the temperature of 40 °C

Cetane number: higher than 40 at the environmental temperature of over 0°C

When temperature is lower than 0°C, it should not be less than 45

Sulphur content: Lower than 0.5%

Water and sediment: Lower than 0.05%

Turbidity point: Lower than 6°C that is the lowest environmental temperature diesel fuel requires

用户请注意：Notice

为确保您购买的燃油品质满足以上的要求，避免燃油中可能存在的杂质和水分对发动机燃油系统零部件的影响，玉柴要求用户到正规加油站购买燃油。有条件的用户，最好自备一个加装燃油滤清器的储油罐。买来的柴油先在罐中存放两天，待杂质和水分沉淀以后再取出使用。储油罐要定期排除沉淀下来的杂质和水分并更换加装的滤清器。In order to ensure fuel can satisfy the requirements above and avoid the impurity and water held in fuel influencing fuel system's parts and components, Yuchai suggests customers purchase fuel at standard gas station. It is better for customers to provide a fuel tank with fuel filter. Have fuel kept in the

tank for two days and then use it after impruites and water having been deposited. Be sure to remove the deposited impurities and water from fuel tank regularly and replace the filter.

4.2 发动机的维护保养

新机使用 50-60 小时必须通过当地玉柴技术服务站进行首次保养（俗称“走保”),保养需要更换三滤及机油等。First maintenance (running-in)shall be carried out at local Yuchai service station after first driving for 50～60 hours . it is required to replace three filters and oil during maintenance.

项目 Item l	保养周期 Maintenance interval	保　养　项　目 Maintenance items
日常维护 **Routine maintenance**	每日进行 Daily maintenance(carried out everyday)	检查油箱油量 Check the fuel quantity in the tank
		检查冷却水量 Check cooling water quantity
		检查油底壳及喷油泵内的机油量 Check the oil quantity in the oil pan and fuel injection pump.
		检查“三漏”情况 Check leakage of fuel, water and oil
一级保养 Normal service	每 100 小时 Every 100 hours	所有日常维护项目 All items of daily maintenance
		清洗输油泵进油滤网 Clean fuel inlet strainer screen of fuel delivery pump
		检查风扇皮带的松紧度 Check fan belt for tension
		检查缸盖螺母的拧紧情况 Check the tightening of the cylinder head nut

		检查并调整气门间隙 Check and adjust the valve clearance
		检查喷油器的喷油压力及雾化状况 Check the fuel injection pressure and atomazation of the fuel injector
		对新机或刚大修好的机更换机油 Replace the oil for new engine or engine after overhauled.
二 级 保 养 Major service	每 250 小时 Every 250 hours	所有一级保养项目 All items of normal service
		检查供油提前角 Check the fuel supply advanced angle
		更换机油滤清器 Replace the oil filter
		更换柴油滤清器 Replace the fuel filter
		清洁空气滤清器 Clean the air filter
		检查气门密封情况 Check the valve sealing
		给水泵加注润滑脂 Apply lubricating grease to the water pump
		检查电器线路各连接点的接触情况 Check the contact of the circuit connection
		检查所有重要螺栓螺母的拧紧情况 Check the tightening of all key bolts and nuts.
		若冷却系统结垢严重，水温高的应及时除垢 Remove water scald from cooling system timely if water temperature is high .
		清洗呼吸器滤芯 Clean the filter element of breather
		更换机油 Replace the oil
三 级 保 养 Major service	每 1500 小时 Every 1500 hours	解体整机清除油污、积炭、结焦等 Disassemble the engine to remove oil dirt, carbon deposit and coking
		检查各摩擦副、运动件的磨损变形情况 Check the wearing and distortion of friction parts and moving parts.

		检查喷油泵的工作情况 Check the working condition of the fuel injection pump
		检查喷油器的工作情况 Check the working condition of the fuel injector
		检查机油泵的工作情况 Check the working condition of the oil pump
		检查发电机及起动马达的使用情况，清洗轴承及其它机件，加注润滑脂 Check the operation of the generator and the starting motor; clean the bearing and other parts; fill lubricating grease
		检查气缸垫及其它垫片的使用情况 Check the operation condition of the cylinder gasket and other gaskets
		排除各种隐患 Eliminate other malfunctions
		更换机油 Replace the oil

注意：三级保养完成的柴油机应有 50 小时的磨合期，不能马上高速高负荷运转，以免损伤机件，影响使用寿命。Note: a running-in period of 50 hours is required for engine after the major service(for every 1500 hours), and it can' work at high speed with heavy load to avoid damaging the parts and shortening the lifetime.

4.2.1 柴油机的使用： Operation of engine

(1)检查准备 Checking：

- 检查油底壳机油面应在油标尺上下两刻线之间。
- Check whether the oil level of oil pan is between the upper and lower scales.
- 检查冷却液是否充足。
- Check whether the coolant is sufficient
- 检查柴油是否充足，并排干净管路中的空气：Check whether furl is sufficient and discharge air from pipeline completely.

松开喷油泵上回油管的放气螺塞，逆时针拧转输油泵上的手柄，手柄升起后反复向下压，待放气螺塞冒出的柴油不带气泡后，将放气螺塞和输油泵手柄拧紧。

Slacken air-bleeding plug in fuel return pipe of injection pump, and rotate the injection pump lever counterclockwise; press the lever several times after raised, and then tighten the

air-bleeding plug and injection pump lever until there is no air bubble in the fuel split out.

- 检查进排气管路连接是否密封和牢固。
- Check whether the air intake/exhaust pipe connection is sealed and firm.
- 检查水泵皮带松紧程度是否合适：

在水泵与充电机两皮带轮中部向下施加 4-5 公斤的作用力，皮带下沉 10-15mm 为宜。

Check the tightness of the water pump belt:

A force of 4-5 kg is applied downwards to the middle of the belt pulleys of the water pump and charger; it is proper when the belt sinkage is 10-15mm.

- 检查电气线路是否连接牢固，是否有碰线和破损。
- Check whether the electric circuit is connected firmly, whether there is swing cross and damage.
- 检查是否有的三漏现象（漏油、漏水、漏气）。
- Check whether there is leakage of oil, water and air.
- 检查各种仪表、感应元件是否有缺损。
- Check whether there is damage of the instruments and inductive elements.
- 检查各外围零件连接是否紧固。
- Check whether the external parts are connected firmly.

⑵起动：Starting

1. 完成起动前准备工作并确认符合要求后，才可以起动柴油机（冬天天气寒冷时需对柴油机预热后才能起动）
2. Start the engine after the preparation and confirmation of the requirement. (The diesel engine can be started after preheating in winter.)
3. 起动柴油机时，持续起动时间不能超过 10 秒钟；二次起动的时间间隔不应少于 1 分钟；若连续三次均无法起动，则应检查原因，排除故障，再行起动。
4. The continuous starting time shall not exceed 10 seconds, and the interval between the two startings shall be at least 1 min; if the engine can’t be started after three attempts, check the reason, and start again after eliminating the fault.
5. 严禁起动后猛轰油门。
6. It is forbidden to operate the accelerator fiercely after starting.
7. 机油压力:在怠速时不能低于 0.1Mpa，压力过低，发动机润滑不良会造成各运动副磨损；
8. Oil pressure shall not be lower than 0.1Mpa at idle speed; if the pressure is too low, poor lubrication of the engine will cause the moving parts worn out.
9. 检查水泵工作情况良好，检查有无“三漏”、异响现象；
10. Check whether the working condition of the water pump is good, whether there is leakage of oil, water and air, whether there is abnormal sound.
11. 检查整车仪表的工作情况。发现有不正常现象，必须立即停车检查排除，必要时送修。
12. Check the working condition of the instruments. Stop driving and eliminate the fault if there is abnormal phenomenon. Send it to repair if necessary.

13. 严禁长时间怠速：起动后怠速 3-5 分钟，一般要求不超过 10 分钟，否则易引起烧油嘴、缸套活塞环磨损等故障。
14. It is forbidden to operate at idle speed for a long time: the engine works at idle speed for 3-5 min after start,ing generally not exceeding 10 mins, otherwise, the nozzle may be burnt out and the cylinder liner piston ring may be worn out.

(3)运行：Operation

- 柴油机冷机起动后，禁止大油门高速高负荷运转柴油机，应逐渐提高柴油机转速，水温上升到 60℃以上，发动机充分润滑、受热均匀后才能正常运转。
- It is forbidden for engine to work at high speed with heavy load after starting from the cold state; increasing engine speed gradually, engine can be operated normally with full lubrication and water temperature is over 60℃
- 正常运行时机油压力应在 0.25-0.6MPa 之间。
- The oil pressure shall be between 0.25-0.6MPa when normal operation.
- 汽车在行驶阶段，机手应经常注意观察车上各种仪表，随时掌握发动机的运行情况，发现不正常情况必须立即停车检查排除，必要时送修。
- The driver shall observe the instruments of the vehicle when driving to know the operation of the engine; if abnormal status appears, stop driving to eliminate the fault. Send it to repair if necessary.

(4)停机：Stop

- 停车前怠速运行 3～5 分钟后才熄火，避免急速停车，特别是高转速高负荷运转时更应如此。
- Run engine at idle speed for 3~5 mins before stopping. Sudden stop shall be avoided, especially when the engine operates at high speed with heavy load.
- 每次停车后，必须及时排除在运行期间所发现的故障，并经常进行必要的检查，保证柴油机正常的技术状态。
- The malfunctions in operation shall be eliminated timely after stopping; necessary checking is required regularly to ensure the engine normal technical status.

4.2.2 柴油机的维护保养：Engine service and maintenance

(1)磨合：Running-in

- 新柴油机（或刚大修好的柴油机）必须进行先期磨合，以此改善各摩擦副的配合及提高工作能力，这对保证柴油机工作可靠性及使用寿命至关重要。The early stage of running-in shall be carried out for new engine (or engine only after overhauled) to improve the matching of friction parts and the working ability. It is quite important to ensure engine reliability and long service life.
- 磨合时间为 40-50 小时，磨合期的功率和转速应由低到高，但最大不应超过标定功率的 80%。The running-in period lasts 40～50 hours. The power and speed of running-in shall be increased gradually, but the max. power shall not exceed 80% of the rated power.

- 磨合期结束后更换机油、机油滤清器。Replace the oil and oil filter after the running-in period
- 严禁长时间怠速和低速磨合，否则容易造成早期磨损、烧油嘴等故障。(有些用户将正常的磨合等同于怠速磨合，机器买回来后长时间怠速磨合，其实这种做法是错误的，磨合期是可以进行工作的,只要不超负荷就可以了)It is forbidden to operate at idle speed and low speed for a long time in running-in period, otherwise, premature wearing may be caused and fuel nozzle burnt out . (some users take normal running-in the same as idle speed running-in, and operate the engine at idle speed for a long time. The above operation is incorrect. The engine could work in running-in period with proper load.)

(2)机油的使用：

CF40、(使用外界温度为 10℃～40℃)CD40 (environmental temperature is 10℃～40℃)

CF30（使用外界温度为 0℃～30℃）CD30 (environmental temperature is 0℃～30℃)

20W/50（使用外界温度为-5℃～50℃）20W/50 (environmental temperature is -5℃～50℃)

15W/40（使用外界温度为-10℃～40℃）15W/40 (environmental temperature is -10℃～40℃)

10W/30（使用外界温度为-20℃～30℃）(environmental temperature is -20℃～30℃)

5W/30、5W/40、0W/30(使用外界温度为-20℃以下)(environmental temperature is below -20℃)

- 自然吸气柴油机建议选用 CD 级或以上级的机油，增压柴油机建议选用 CF 级或以上级的机油。As for natural aspirated diesel engine, select the oil of CD grade or above; as for turbocharged diesel engine, select the oil of CF grade or above.

柴油机在使用过程中，会消耗一定比例的机油。During operation, certain proportion oil will be consumed.

- 不同品牌的机油由于配方不同，混合使用可能会对柴油机产生不良影响。Do not mix different oil brands due to the different formula to avoid bad influence to engine.
- 严禁使用劣质机油，否则将会对柴油机造成严重损害，由此产生的故障玉柴不予保修。It is forbidden to use poor quality oil, or it will lead serious damage to engine, which will not be covered in warranty.
- 当机油变稀、变稠、变黑、失去粘性时，必须及时更换机油，建议更换周期 150-250 小时。 When oil becomes thin, thick, black and missing viscosity, it must be replaced in time. Recommended replacement cycle is 150-250 hours.
- 更换机油时必须同时更换机油滤清器，请引导用户使用品质信誉好的柴油滤清器 When replacing oil, oil filter shall be replaced at the same time; Please select fuel filter with high reputation and excellent quality.

(3)柴油的使用：Application of fuel

- 0 号柴油（使用外界最低温度≥4℃）

0# diesel fuel (lowest enviornmental temperature ≥4℃)
-10 号柴油（使用外界最低温度为≥-5℃）
-10# diesel fuel (lowest enviornmental temperature ≥-5℃)
-20 号柴油（使用外界最低温度为≥-14℃）
-20# diesel fuel (lowest enviornmental temperature ≥-14℃)
-35 号柴油（使用外界最低温度为≥-29℃）
-35# diesel fuel (lowest environmental temperature ≥-29℃)
-50 号柴油（使用外界最低温度为≥-44℃）
-50# diesel fuel (lowest enviornmental temperature ≥-44℃)

伸入油箱的油管吸油口应距离油箱底面 25mm 以上，同时避免从油箱底部出油，以防水分及杂质进入柴油机的燃油系统。The fuel suction port in the fuel tank shall be away from the tank bottom for over 25mm to avoid the fuel out of the bottom and to prevent water and impurities entering in the fuel system of the diesel engine.

- 在输油泵进油接头处有一滤网，用于滤除柴油中的杂质，请定期清洗此滤网。There is a strainer screen at the end of fuel inlet connector of the fuel feeding pump functioning to filter the impurities held in fuel. Clean the strainer screen regularly.
- 用户应到正规的加油站加注符合要求的柴油，避免使用油贩子经营的散装油，否则极易卡死油嘴，由于所用柴油不合格造成的故障玉柴不予保修。Filling the required diesel fuel at official gas station. Avoid using poor quality brands, otherwise, the nozzle will be blocked. Yuchai will not provide warranty for the malfunction due to using unqualified fuel.
- 请引导用户使用品质信誉好的柴油滤清器，建议使用 200-300 小时进行更换。It is recommended to replace the fuel filter after using for 200-300 hours. Please select fuel filter with high reputation and excellent quality.

(4)冷却液的使用 Application of coolant：

- 使用防冻液做为冷却液，特别是使用环境温度较低、海拔高度较高时。防冻液具有防冻、防腐蚀 、防穴蚀、防垢、高沸点等功能。Use antifreeze as coolant, especially in the environment of low temperature and high altitude. Antifreeze has the advantages of freeze resistance, corrosion prevention, cavitation corrosion prevention, anti-scale prevention and high boiling point.
- 优质的防冻液是国家指定的检测站检测合格的品牌，从外观上看:清澈透明、无杂质、不浑浊、无刺激性气味，产品外包装上应有详细的生产单位名称，产品说明书以及明确的指标说明。The good antifreeze should be the qualified brands that designated by state specific inspection station, which is clearely and free from dirty, impurity, pungent odor in appearance. Detailed manufacter information, instrutions and definite spcifictions should be stated on package.
- 使用劣质的防冻液不但不能防冻防沸，反而会加速冷却系统的腐蚀。 Poor quality

antifreeze will damage the cooling system rapidly.

(5)空气滤清器的保养 Maintenance of air cleaner：

- 空滤过滤原理：Air cleaner function

一级过滤：导风罩（使空气形成涡流，在重力和离心力作用下使灰尘沉淀到底部由排尘袋排出）First-stage filteration: Wind cowl (function to swirl the air, directing dust to be accumulated at bottom by the action of gravity and centrfugal force and discharged from dust bag)

二级过滤：主滤芯（起主要过滤作用，过滤效果达 95%以上）The second -stage filteration:Outer filter element (mainly function to filter with a filteration effect of above 95%)

三级过滤：安全滤芯（起辅助过滤作用，同时防止异物进入）Third-stage filteration:Inner filter element（function to filter in assistance and prevent foreign matters enter into）

- 保养 Maintenance：

空滤器壳体：清理滤清器内腔、导风罩、排尘袋中的灰尘，注意不能认为导风罩没有用途而扔掉。Air filter housing: clean filter inner space, shroud and the dust in dust bag. Please note that the shroud shall not be considered to be useless, therefore to remove and not use it .

主滤芯：用毛刷刷除滤芯表面尘土，接着用压缩空气（压力 0.4-0.6MPa)从滤芯里面往外吹。Major filter element: use brush to clean the dust on the surface of filter element, and then use compressed air (pressure 0.4-0.6MPa) to blow from inside to outside. Replace the filter element immediately if it is damaged.

安全滤芯：用手拍打清洁，避免用空气吹。Minor filter element : use hand to flap to clean it and avoid blowing with air,

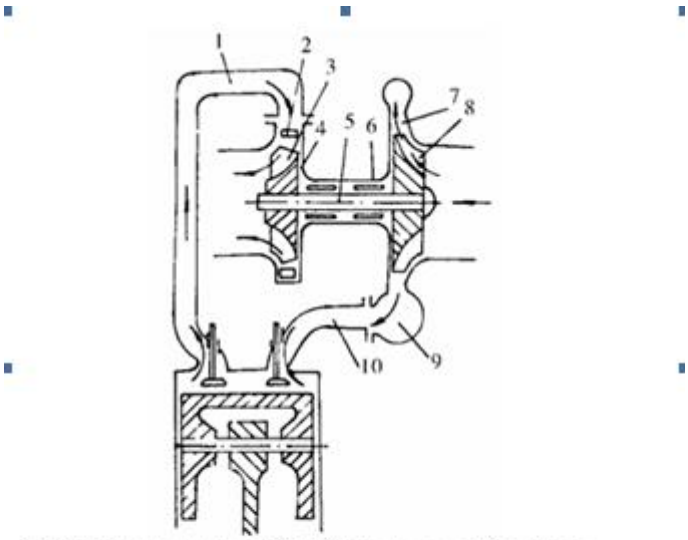
- 安装：检查密封圈是否破损缺失，拧紧时先旋转一下滤芯使其到位，一定要注意安装必须密封，不能造成空气短路。
- Installation: check whether seal ring is damaged. when tightening it, rotate the filter element in place. Pay attention that it must be sealed when installation and can not cause air short circuit.
- 注意检查排尘袋口必须向下。
- Pay attention to check whether the mouth of dust bag is downward.

(6)增压器的保养 Maintenance of turbocharger

YC4A、YC4B、YC4BA、YC4D 系列柴油机如为增压柴油机，均采用废气涡轮增压系统。其工作原理如下图所示。柴油机排气管 1 接到增压器的涡轮壳 4 上，柴油机排出的高温和有一定压力的废气经涡轮壳 4 进入喷嘴环 2，由于喷嘴环的通道面积由大到小，因而废气的压力和温度下降，而速度却迅速提高。这个高速的废气气流，按着一定的方向冲击涡轮 3，使涡轮高速旋转。废气的压力、温度和速度越高，涡轮转动越快。通过涡轮的废气最后排入大气。因为涡轮 3 与压气机叶轮 8 固装在同一根转轴上，所以叶轮与涡轮以相同的速度旋转，将经过空气滤清器滤清过的空气吸入压气机壳。旋转的压气机叶轮将空气压力提高后进入气缸，由于空气密度增加，进入气缸的空气量也增加，因而可以增加喷入气缸的油量，从而提高发动机功率，降低

燃油消耗率。YC4A、YC4B、YC4BA、YC4D series diesel engine adopts exhaust gas turbocharged system. The working principle is shown as following. The diesel engine exhaust pipe 1 is connected to the turbo housing 4 of the Turbocharger; high temperature of the diesel engine and the exhaust gas with certain pressure will enter the injection ring 2 through turbo housing. Since the path area of the injection ring changes from large to small, the pressure and temperature of the gas will decrease, but the speed increases rapidly. The high speed gas flow will rush the turbo 3 as per certain direction to make turbo rotating at high speed. The higher the pressure, temperature and speed are, the quicker the turbo rotates. The exhaust gas will exhaust to outside through turbo. The turbo 3 and air compressor impeller 8 are installed on the same shaft, so the impeller and turbo rotate at the same speed to suck the air passing the filter to air compressor housing. The rotating air compressor impeller will increase the air pressure to enter the cylinder. Since the air intensity increases, more air enters into the cylinder, so the fuel quantity injected into the cylinder increases, thus the engine power can be improved and the fuel consumption can be reduced.

涡轮增压器和增压柴油机在性能上有着密切的关系，如果增压器的性能改变，将直接影响到柴油机的性能。为了使增压柴油机保持良好的综合性能，同柴油机一样，增压器在使用过程中必须用正确的方法和进行良好的保养。由于整个进排气系统各接头处漏气时会影响增压器的工作，因此必须经常检查外部接头的紧固情况。The performance of the turbo Turbocharger attaches much importance to the turbocharged diesel engine. If the performance of the Turbocharger changes, it will affect the engine performance directly. In order to keep good performance of the Turbocharged engine, correct operation and good maintenance of the Turbocharger shall be followed when using. Since the leaking of joints of the whole exhaust system will affect the working of the Turbocharger, so the tightening condition of the outer connectors shall be checked.



1.排气管 Exhaust pipe 2.喷嘴环 Injector ring 3.涡轮 Turbo
4.涡轮壳 Turbo housing 5.转子轴 Rotor shaft 6.轴承 Bearing
7.扩压器 Diffuser 8.压气机叶轮 Air compressor impeller
9.压气机壳 Air compressor housing 10.进气管 Air intake pipe

图 22 废气涡轮增压柴油机工作原理图 Fig22 Exhaust gas turbocharger diesel engine working principle

增压器系统常见故障及排除方法 Turbocharging system common troubles and solutions

故障原因 Causes	排除方法 Solutions
①进气系统堵塞 Air intake system blocked	检查空气滤清器与压气机之间的管路、压气机出口与进气管管路及进气管、清理通畅。Check and clean the pipe between air filter and compressor, compressor outlet and air intake pipe
②进气泄漏 Air intake leaking	检查空气滤清器与压气机之间的管路、压气机出口与进气管之间的管路，进气管与发动机连接处等是否有泄漏、可拧紧紧固螺栓、更换垫片等零件。Check whether there is leak between air filter and compressor, air intake pipe and connection; tighten the bolt and replace the gasket
③排气系统阻塞 Air exhaust blocked	维修或更换有关部件 Repair and replace related parts
④排气泄漏 Air exhaust leak	检查排气管与发动机、涡轮进口与排气管，涡轮壳与中间壳，涡轮出口至排气管连接处，如有泄漏可更换密封垫片拧紧紧固螺栓 Check whether there is leak between air exhaust pipe and engine, turbo inlet and exhaust pipe, turbo housing and intermediate housing, turbo outlet to exhaust pipe connector; replace the gasket and tighten the bolt.

⑤压气机转子与压气机壳体、涡轮与涡轮壳相碰 Rotor of compressor touches compressor housing and turbo housing	更换总成 Replace assembly
⑥进、回油管漏油 Fuel leak of fuel intake/ return pipe	更换 Replace

由于增压器属于精密的部件，对装配技术要求很高，为了保证增压器有较长的寿命，属于增压器本身的故障，请与全国各地玉柴的委托技术服务站联系解决。用户切莫自行解体增压器，否则，不予质量保修。另外，凡更换润滑油，清洗机油滤清器或发动机长时间停放后（约一周以上），必须松开增压器的进油接头，注入干净润滑油，使增压器润滑系统中充满润滑油。

Since turbocharger is with high precision, it is required strictly for the assembly. In order to ensure long service life of turbocharger, if there is malfunction , please contact the Yuchai technical service station to solve the problem. The user is forbidden to disassemble the turbocharger, otherwise,it is will not be covered in warranty. Whenever replacing the lubricating oil, clean the oil filter or engine has not been used for a long time (more than one week), you shall loosen the fuel inlet connector of the turbocharger and fill clean lubricating oil to turbocharger's lubrication system.

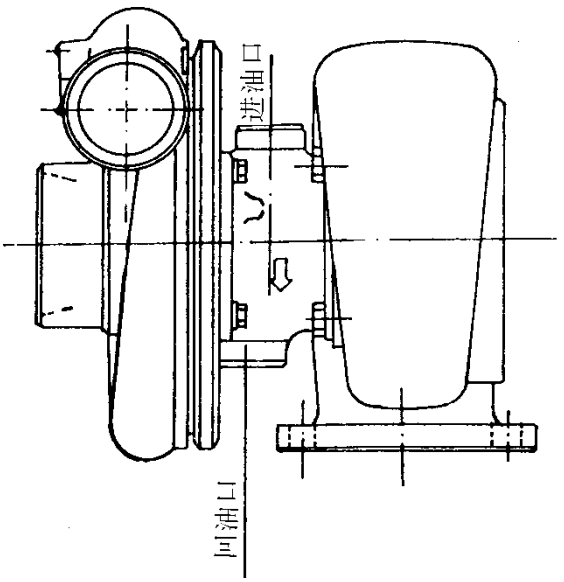


图 23 废气涡轮增压器 Fig 23 Exhaust gas turbocharger

4.2.3 长期存放注意事项 Attentions for Long Term Storage：

- 长期存放前，须对发动机进行保养、修复损坏的零部件，并进行彻底的清理，保持技术状态良好;Before Long Term Storage, maintenance should be done and repair the worn parts ,clean the engine.
- 必须将机械停放在干燥的室内，不得已停在室外者，建议拆下蓄电池并放室内保管，须用罩布盖好机械；Keep the engine in a dry room, if you have to keep it outside, please remove the battery and put it indoor, cover the engine with cloth.
- 应使发动机的燃油控制手柄置于怠速位置;The fuel control handle should be in the idle speed position.
- 放掉发动机内的冷却液；Drain off the coolant in the engine.
- 更换发动机机油。新机油通常呈中性，不会腐蚀发动机的金属机件;Replace engine oil, new oil is neutral and it won't corrode the metal parts.
- 在停机期间每月启动一次发动机，使机械作短距离行驶，使各零件润滑处建立新的油膜，防止生锈。应注意：在启动前应注满冷却液，结束时应放尽冷却液。

Start the engine once a month, running for a short distance. protecting parts from corrosion, attention：Fill the coolant before starting, and drain off it when it is done.

5 发动机常见故障及排除方法 Engine common troubles and solutions

5.1 发动机不能起动 Engine can not start

故 障 原 因	排 除 方 法 Solutions
①起动机转速过低 Too low starter rotating speed.	检查起动系统，起动转速不得低于 110r/min。Check starting system, and the starting speed can not be lower than 110r/min.
②供油系统内有空气 Air in fuel feeding system.	1．检查供油管路接头是否松动。拧松燃油滤清器总成上的放气螺钉，用手动泵压送燃油，直到溢出的燃油不带气泡为止。Check whether the connector of fuel supply pipe is loose. Loosen the air-bleeding bolt of the fuel filter and pump the hand pump to deliver fuel until there is no air bubble in the fuel split out. 2．拧松喷油器端的高压油管接头，用手动泵压送燃油，直到溢出的燃油不带气泡为止。Unscrew the high pressure fuel pipe joint at injector end; feeding the fuel by the hand pump until there is no air bubble in the fuel spilt out.
③燃油管路阻塞 Fuel pipeline is clogged.	检查供油管路是否通畅。Check whether the fuel feeding pipeline is unobstructed or not.
④燃油滤清器阻塞 Fuel filter is clogged	更换燃油滤清器总成的旋装式滤芯。Replace the rotary element of the fuel filter assembly
⑤输油泵不供油或断续供油 Fuel delivery pump does not supply the fuel or supplies the fuel interruptedly.	检查进油管是否漏气；Check whether or not the fuel intake pipe is air leaking; 输油泵是否有故障。whether or not there are troubles whith the fuel supply pump
⑥喷油少，不喷油或喷油压	1. 检查喷油器雾化情况;

力低 Injecting less fuel; injecting no fuel or low injecting fuel pressure.	Check the fuel injector for atomization. 2. 喷油泵柱塞及出油阀是否磨损或卡死、柱塞弹簧及出油阀弹簧是否折断； Check whether t whether the injection pump plunger and fuel outlet valve seized or worn out excessively, and whether the plunger spring and fuel outlet valve spring broken down. Check and adjust the injection pressure to the prescripted range.
⑦起动系统故障：Starting system troubles	
电路接线错误或接触不良：Wrong wiring connection or poor contact:	检查接线是否正确、可靠。Check wiring for its correction of connection and reliability.
蓄电池电力不足：Underpower of the battery	向蓄电池充电。Charge the battery
起动机碳刷与整流子接触不良：Poor contact of the starter carbon brush with commutator	修理或调换电刷，用木砂纸清理整流子表面，并吹净。 Repair or replace the electric brush; clean the commutator surface by abrasive paper and blow it clean.
⑧压缩压力不足：Insufficient compression pressure	更换活塞环，视情况加缸套。Replace piston ring; add cylinder liner as per actual situation.
活塞环过度磨损： 气门漏气。Piston ring is excessively worn: the valve has any air leak.	检查气门间隙，气门弹簧、气门导管及气门座的密封性，密封不好应研磨气门座。Check the valve clearance and hermetization of the valve spring, valve guide pipe and valve seat, lap the valve seat in case of poor hermetization.
⑨燃油切断电磁阀的接头松动或脏污、腐蚀 Fuel shut off solenoid joint is loosed, contaminated or corroded	拧紧、清洗或更换。Re-tighten, clean or replace.
⑩装配正时不正确。Incorrect assembly timing.	检查并调整。Check and adjust.

5.2 发动机功率不足 **Underpower**

故 障 原 因 Causes	排 除 方 法 Solutions
①进气堵塞 Air intake is clogged.	检查空气滤清器、进气管，清理或更换空气滤清器滤芯。Check air filter and intake pipe. Clean or replace air filter element
②排气背压过高 Too high exhaust back pressure.	检查气门定时，必要时调整；清理排气管。Check valve timing and adjust it as necessary; clean the exhaust pipe.
③增压系统压力不足 insufficient pressure of turbocharged system.	检查并排除管路和连接处的泄漏。 Check and eliminate the leaking from pipeline and connection
④增压器工作失常：压气机、涡轮气流通道污染堵塞或损坏；Turbocharger faulty; air compressor and turbine air flow passage contaminated, blocked or damaged	清洗或更换压气机壳、涡轮壳。Clean or replace air compressor & turbine housing.
轴承失效；Bearing faulty	更换。Replace.
涡轮、压气机背面间隙处有积碳、油泥 Carbon deposit or oily dirt built up in the turbine and air compressor backside gap	清洗。Clean.
⑤中冷器损坏、漏气 Intercooler is damaged or has any air leaks.	修补或更换。Repair or replace.
⑥燃油管路漏油或堵塞 Fuel pipeline is leaking or clogged.	检查油管及接头处的密封情况、燃油滤清器的堵塞情况，更换旋装式滤芯。检查喷油控密封。Check the fuel pipe and joints for seal, the fuel filter for clogging; replace the rotary filter element. Check injection seal
⑦喷油泵柱塞磨损过大 Injection plunger worn out severely	检查、更换。 Check and replace
⑧传感器坏 Sensor fault	检查、更换

	Check and replace
⑨ 增压补偿管损坏漏气 Turbocharged compensating pipe broken and air leak	更换。Replace
⑩ 喷油器雾化不良 Poor atomization of fuel injector	检查喷油压力、清理积碳、调整及修理。Check injection fuel pressure, clean carbon deposit, adjust and repair.
⑾配气相位不对 Incorrect valve timing phase	检查并调整配气定时及气门间隙。Check and adjust valve timing and valve clearance
⑿供油提前角提前或迟后 Fuel supply advanced angle is ahead or lag	检查并调整。Check and adjust
⒀调速器高速调整过低 Regulator high-speed is adjusted too low	检查并调整。Check and adjust
⒁气缸垫漏气 Air leak of cylinder gasket	按规定力矩、顺序拧紧气缸盖螺栓或更换气缸垫。Tighten the cylinder head bolt to specified torque or replace cylinder gasket
⒂气门密封不良 Poor sealing of the valve	研磨或更换重新研磨。Rub or replace
⒃发动机过热冷却液温度过高 Engine overheating too high coolant temperature	检查并修理散热器、调温器，调整风扇皮带张紧力。Check and repair radiator and thermostat; adjust the fan belt tension.
⒄活塞环磨损过大，断裂 Piston ring is worn too much; broken	更换 Replace it with a new one

5.3 发动机运转时有不正常的杂声 Abnormal sound during running

故障原因 Causes	**排除方法 Solutions**
① 气缸内有异响 There is abnormal sound in the cylinder	检查装配正时是否正确 Check whether the timing is correct or not. 检查并调整配气定时。 Check and adjust the valve timing.

②连杆轴瓦、主轴瓦磨损过大，在曲轴箱处可听到撞击声 Connecting rod bearing bushing and main bearing bushing worn out servely and clash can be heard in the crankcase.	拆检轴瓦，必要时更换，并保持规定的合理间隙。Dismantle and check the bearing bushing, if necessary, replace it and maintain the reasonable clearance as required.
减振器损坏，不起减振作用 The Damper is damaged and faulty	检查连接螺栓及损坏情况，必要时更换。Check the connecting bolts and if necessary, replace them.
④传动齿轮磨损，间隙过大。在正时齿轮室盖处可听到撞击声 Drive gears worn out and has too large clearance. Clash can be heard in timing gear housing cover	检查齿侧间隙，视磨损情况更换齿轮。Check the gear backlashes and replace If necessary..
⑤活塞与气缸间隙过大，运转时气缸壁处的撞击声 Too large clearance between piston and cylinder, clash can be heard in cylinder wall when operating	更换活塞，视磨损情况加修理用缸套，注意保持配缸间隙。Replace the piston; add cylinder liner that used for repair if necessary. Keep a clearance between the piston and the cylinder.
⑥增压器轴承损坏，转动件与壳体相碰 Turbocharger bearing is damaged, so the rotating part bumps with the housing.	更换增压器总成。 Replace the turbocharger assembly.

⑦气门间隙过大，在气缸盖处有较大响声 The valve clearance is too big; there is bigger sound at the cylinder head.	调整气门间隙。 Adjust the valve clearance.
⑧ 增 压 器 喘 振 Turbocharger surging	清除压气机通道、废气通道的积碳及污物，运行海拔过高。Remove the carbon deposit and dirt in the passage air compressor and exhaust gas path; operate at too high elevation.

5.4 排气冒黑烟 Exhaust with balck smoke

故 障 原 因 Causes	排 除 方 法 Solutions
①进气堵塞 Intake blocked	检查空气滤清器、进气管路并清理。Check and
②燃油质量差 Poor quality of fuel.	换用规定的燃油。Replace the fuel as specified.
③ 喷 油 器 雾 化 不 良 Poor atomization of fuel injector	检查，修复或更换。Check, repair or replace.
④增压系统压力不足 Inadequate pressure of Turbocharged system	检查并排除管路和连接处的泄漏。 Check and eliminate the leak of pipes and connectors
⑤增压器工作失常 Abnormal working of Turbocharger	检查更换总成。Check and replace the assembly
⑥ 中 冷 器 损 坏 、 漏 气 Intercooler damaged and air leaking	修补或更换。Repair or replace

5.5 排气冒白烟、蓝烟 Exhaust with white and blue smoke

故 障 原 因 Causes	排 除 方 法 Troubleshooting
①燃油质量差、含水份过多 Poor quality of fuel and too much content of water	更换燃油。Replace the fuel.

② 冷却水温度过低 Too low temperature of coolant	检查调温器工作温度，必要时更换。Check the working temperature of thermostat, and replace it
③配气或供油定时不正确 Incorrect valve timing or fuel supply timing	按专门人员检查和调整。Check and adjust by technicians .
④压缩压力低、燃烧不完全 Low compression pressure; incomplete combustion.	检查活塞环及气缸垫，更换。Check piston ring and cylinder head gasket; replace.
⑤活塞环安装方向不对，开口未错开 Incorrect piston ring assembly direction; piston gap is not staggered	检查并重新装配。Check and reassemble.
⑥长期低负荷运转 Long-time running with low load	注意使用适当的工作转速和负荷。 Use proper working speed and load.
⑦增压器密封环磨损 Turbocharger seal ring is worn out	检查并更换。 Check and replace.
⑧增压器止推轴承磨损 Thrust bearing of turbocharger is worn out	检查并更换。 Check and replace.
⑨增压器回油管路阻塞 Turbocharger oil return pipe is blocked	清洗、修理。 Rinse and repair.

5.6 润滑油压力异常 Lubrication oil pressure is abnormal

5.6.1 润滑油压力过低 Lubrication oil pressure is too low

故障原因	排除方法
①机油变稀或所用机油不当 Thinned oil or improper use of oil	按规定选用作品适的机油。Use proper engine oil as required

②机油泵转子磨损或装配间隙过大 Worn inside/outside rotors of the oil pump , or too big assembly clearance	更换机油泵。Replace engine oil pump
③机油滤清器堵塞 Oil filter is clogged	更换旋装式滤芯 Replace rotary element
④机油滤清器调压阀失灵 Failure of pressure adjustment of oil filter	修复。Repair
⑤机油泵齿轮损坏或磨损 Damaged or worn oil pump gear	更换。Replace
⑥机油泵进油管有裂缝 Cracks on the oil inlet pipe of oil pump	修复、更换。Repair and replace
⑦机油泵进油管固定螺栓松动 Loosened bolt fixing the oil inlet pipe of oil pump	拧紧到规定力矩。Tighten to the specified torque
⑧轴瓦间隙过大 Too big clearance of shaft bush	检查并更换 Check and replace

5.6.2 润滑油压力过高 Lubrication oil pressure is too high

故 障 原 因 **Causes**	排 除 方 法 **Troubleshooting**
①气温过低，机油粘度变大 Increased oil viscosity due to too low ambient temperature	选用规定牌号的机油，起动后应先低速运转，待油温正常后再检查。Select the oil of selected brand,run the engine at a low speed after it is started,check it again when the oil temperature is normal
②溢流阀堵塞 Clogged overflow valve	检查、清洗。Check and clean

5.7 润滑油消耗高、消耗量大 High consumption of lubrication oil is high

故 障 原 因	排 除 方 法

①外部机油管路有泄漏 Leakage in the exterior oil line	检查并修复。Check and repair it.
②柴油机负荷过重 Too high diesel engine load	降低负荷。Decrease the load.
③使用机油牌号不当 Improper use of engine oil brand	按规定选用。Use the oil as required
④活塞环卡死或磨损过大 Clogged piston ring or its severe wear	检查、修复、必要时更换。Check and repair, if necessary, replace it.
⑤缸孔磨损过大 Too severe wear of the cylinder bore	镗缸后换加工尺寸的活塞环，或加修理用缸套。After cylinder boring replace the piston ring with
⑥气门导管磨损过大，气门杆密封失效 Excessive wear of the valve guide pipe,	检查、更换。Check and replace

5.8 出水温度过高 Too high water outlet temperature

故障原因 Causes	排除方法 Solutions
⑴冷却水量不足，水流量过小 Inadequate cooling water, water flow is too small	检查冷却水量是否足够，不足就添加; Check whether there is enough cooling water;replenish if inadequate
⑵皮带是否过松 Check if belt is too loose	调整 Adjust
⑶水泵有漏水 Water leak from the water pump	及时进行修理 Repair in time
⑷节温器失灵、损坏 Thermostat is faulty or damaged	检查更换 Check and replace
⑸水温表损坏，水温感应塞失灵 Water temperature gauge is damaged, water temperature sensor plug is damaged	检查实际温度与表指示温度是否相符;如不符则更换感应塞或水温表 Check whether the actual temperature is the same as the indicating temperature; if not, replace he sensor plug or water temperature gauge
⑹冲缸垫 Damage cylinder gasket	检查更换 Check and replace
⑺改装情况下水箱、风扇匹配问题 Radiator and fan matching problem in the condition of repowering	重新按要求匹配 Match again as required

5.9 增压器常见故障及排除方法 Turbocharger common troubles and solution

故障原因 Causes	排除方法 Solutions
① 进气系统堵塞 Air intake system is blocked	检查空气滤清器与压气机之间的管路、压气机出口与进气管路及进气管、清理通畅。 Check and clean the pipe between air filter and compressor, compressor outlet portand air intake pipe
②进气泄漏 Air intake leaks	检查空气滤清器与压气机之间的管路、压气机出口与进气管之间的管路，进气管与发动机连接处等是否有泄漏，可拧紧紧固螺栓、更换垫片等零件 Check whether there is leak between air filter and compressor, air intake pipe and connecting part.; tighten the bolt and replace the gasket
③排气系统阻塞 Exhaust system is blocked	维修或更换有关零件。Repair and replace related parts
④排气泄漏 Exhaust leaks	检查排气管与发动机、涡轮进口与排气管，涡轮壳与中间壳，涡轮出口至排气管连接处，如有泄漏可更换密封垫片拧紧紧固螺栓。Check whether there is leak between exhaust pipe and engine, turbo inlet port and exhaust pipe, turbo housing and intermidate housing, turbo outlet port to exhaust pipe connection; replace the gasket and tighten the bolt.
⑤压气机转子与压气机壳体、涡轮壳相碰 Rotor of compressor bumps into compressor housing and turbo housing	更换总成 Replace assembly
⑥进、回油管漏油 Fuel leak of fuel intake/ return pipe	更换 Replace

5.10 柴油机飞车 Engine runaway

注意：如遇柴油机“飞车”，应首先设法使柴油机熄火，然后再进行检修。一般应综合采取停供柴油、“断气”等措施，使柴油机停止运转，以免造成人身安全和机具损害等重大事故。若拖拉机、汽车、工程机械行驶时出现“飞车”，还应踩下制动装置使柴油机憋灭火，严禁踩下离合器。Attention: In case of engine "run away ", firstly try to stop engine, and then check and service. Generally , we always take measures such as stopping fuel supply, "cutting off air" or other measures to stop engine, so as to avoid serious accidents endanger personal safety and cause damage to equipments. If the tractor, vehicle, construction machinery have runaway malfunction, also step on the brake to stop engine, it is strictly prohibited to engage clutch.

故障原因 Causes	排除方法 solutions
1.喷油泵调速器失灵 Fuel pump governor is faulty	→ 更换调速器或排除故障 Replace governor or eliminate faults
2.喷油泵供油拉杆卡在最大供油位置不能回位 The fuel pump lever stuck at the max. fuel feeding position and fails to reset	→检查并排除故障 Check and eliminate faults
■ 启动预热塞失灵，柴油大量进入进气管 Starting pre-heating plug is faulty ,a large amount of fuel enters into the air pipe	→更换预热塞，清除进气管内柴油 Replace the pre-heating hlug ,clean away all the fuel in the air pipe
4.使用油浴式空气滤清器时，因油盆内错用轻质柴油或油面过高，使进气管进油 Due to incorrect adoption of light diesel fuel as oil or too high oil lever in the oil basin when using the oil-bath air filter ,causing fuel enter the air pipe.	→按要求更换用油或将油面降低致规定，并清洗进气管、进气道 Replace the required oil or lower the oil lever to the required height, and clean the air intake pipe and air inlet passage
5.油底壳油面过高，通过曲轴箱通风装置将机油吸入进气管 Too high oil lever in oil sump, intaking oil into the air intake pipe through the crankcase ventilation device	→放出多余机油，清洗进气管 Drain off surplus oil ,clean the air intake pipe

5. 11 离合器常见故障及排除方法 Clutch common troubles and solutions

故障原因 Causes	排除方法 solutions
1.离合器抖动 Clutch vibrates	校正离合器压盘和从动盘的变形，消除不规则接触 Adjust the distortion of clutch pressure plate and driven plate; eliminate abnormal contact
2.油路堵塞或有大量空气进入 Fuel pipe is blocked or a large amount of air enters fuel pipe	清理油污，调整分离轴承位置，更换从动盘总成，减少负荷 Clean out the oil dirt and adjust releasing bearing position; replace driven plate assembly
3.离合器分离不彻底:压盘或从动盘变形，传动片变形 The clutch disengages incompletely ; pressure plate or driven plate is distorted; drive plate is distorted.	消除变形，调整自由行程或更换离合器 Eliminate distortion and adjust free stroke or replace the clutch
4.离合器异常响动:离合器的零件松动，减震弹簧断裂或离合器中有异物 Abnormal sound: clutch parts loosed, vibration absorber spring broken or	将松动零件铆紧，消除异物或更换从动盘总成 Tighten the loosed parts; remove foreign matters or replace driven plate assembly

foreign matters in the clutch	

5.12 发动机自行熄火 Engine stops of itself

故障原因 **Causes**	排除方法 **Troubleshooting**
1.燃油用完 Fuel is running out	检查、添加，注意排除除油路中的空气 Check and replenish, pay attention to remove air from fuel pipeline
2.油路堵塞或有大量空气进入 Fuel pipeline is clogged or has a great deal of air enter into	检查、清理油路，排除油路中的空气，找出进气的原因并排除 Check and clean fuel pipeline, remove air from fuel pipeline and find out reasons and eliminate
3.发动机润滑油路不通畅，引起烧轴瓦 Bearing shell is brunt out due to engine lubrication pipe is obstructed	如水温正常突然停机多属于此种情况，应拆开油底壳检查、维修，更换相应的损坏零件 Engine stop suddenly in normal temperature which belongs to this condition, disassemble oil sump and check, service and replace relative those damaged parts
4.柴油机过热拉缸，一般是由于缺水或水温过高引起的 Too hot engine causes cylinder scoring which results from deficient water or too high water temperature	先让机子自行冷却（绝不允许加入冷水或用冷水冲），然后试着转动曲轴，如无卡滞现象可加入冷却水后起动。如转不动则应拆机检查，修复，更换损坏的零部件 Have engine cooled of itself(it's not allowed to fill cooling water or rinse with cooling water), then rotate crankshaft, start after cooling water is filled if there is no sluggish.disassemble to check, repair and replace those damaged parts if it can't be rotated

附录： Appendix **发动机易损件清单** Lists of easy wear parts

序号 No.	品名Parts	数量 Qty.	单位Unit	等级Class
1	气缸套封水圈（套） Cylinder liner water seal ring	1	件piece	B
2	齿轮室垫片 Gear housing gasket	1	件piece	C
3	喷油泵齿轮盖垫片 Injection pump gear cover gasket	2	件piece	C
4	齿轮室盖垫片 Gear housing cover gasket	1	套 set	C
5	油封65X90oil seal 65X90	2	件piece	C
6	气缸盖垫片 Cylinder head gasket	1	件piece	B
7	气缸盖罩垫片 Cylinder head cover gasket	1	件piece	C
8	活塞环Piston ring	1	套 set	B
9	喷油器Injector	1	件piece	C
10	排气管垫片 Exhaust manifold gaskets	4	件piece	C
11	油底壳垫片 Oil pan gasket	2	件piece	C
12	机油冷却器盖垫片 Oil cooler cover gasket	1	件piece	C
13	柴滤滤芯Fuel filter element	1	件piece	B
14	蜡式调温器 Wax thermostat	1	件piece	C

15	节温器盖垫片 Thermostat cover gasket	1	件piece	C
16	油封100X125 oil seal 100X125	1	件piece	C
17	皮带Belt	2	件piece	B
18	机油滤清器Oil filter	1	件piece	B

YC 系列柴油机随机技术文件清单

Documents list supplied with YC series diesel engines

序号 No.	名称 Name	单位 Unit	数量 Qty.	备注 Remarks
1	柴油机使用维护说明书 Engine workshop manual	本	1	
2	保修手册 Service and maintenance manual	本	1	
3	随机工具备件清单 Lists of spare parts and tools supplied with engine	份	1	
4	合格证 Certificates	张	1	挂在柴油机上 Attached to the engine