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玉柴发动机使用与维护

---bosch发动机控制系统

Yuchai Engine Operation & Maintenance

—Bosch electronic control system

玉柴客户服务中心

2023年2月3日

By Customer Service Center

July 25th, 2014

养成良好的“**以养代修**”习惯

对车辆的使用寿命和行车安全至关重要!

REPAIR REPLACED WITH
MAINTENANCE” IS VITAL TO SERVICE
LIFE OF VEHICLES AND DRIVING SAFETY!

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一、仪表盘介绍

I. Dashboard

- 仪表盘介绍
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发动机故障灯的介绍：Malfunction Indicator Lamp (MIL)

发动机运行中，若故障指示灯点亮，表示发动机有当前故障。

The MIL will come on when ECU detects a problem while engine is operating.

- ✚ 一般故障.....故障指示灯常亮；MIL stays on for minor problems.
- ✚ 严重故障.....故障指示灯常亮并闪烁；
- ✚ If the light is flashing it means that something serious has been detected.



✚ 发动机故障灯的使用（2）：

✚ How to operate malfunction indicator lamp (2)



故障闪码读取方法： How to read ECU fault codes

- ◆1，点火开关处于ON状态
- ◆Ignition switch rests at ON position;
- ◆2，待机及运行工况下均可进行
- ◆Fault codes can be read under standby and working mode ;
- ◆3，按下—松开诊断请求开关即可 以激活闪码，每次操作只闪一个故障码依次进行，即可读完所有故障码。
- ◆Press down—release diagnostic request switch to activate flash codes, you get only one fault code flashed every time you proceed in turn, you will finish reading all the codes .

故障码清除方法: How to clear fault codes

- ◆1, 发动机熄火
- ◆1. Engine shutdown
- ◆2, 将点火钥匙关闭, 至少20秒以上 (等ECU内部主继电器断开)
- ◆2. Turn off ignition key for more than 20s (wait ECU main relay to be disconnected)
- ◆3, 打开故障请求开关
- ◆3. Turn on malfunction request switch
- ◆4, 打开点火钥匙
- ◆Turn on ignition key
- ◆5打开点火钥匙后4-8秒迅速关闭故障请求开关
- ◆5. Turn off malfunction request switch ASAP after you switch on ignition key for 4-8s
- ◆6, 再打开故障请求开关, 故障码清除。
- ◆6. Turn on malfunction request switch again, fault codes are cleared

II. Check Engine Light and Malfunction Indicator Lamp (MIL)

水温高警示灯、水温表 High water temperature alarm, water temperature gauge

当发动机水温高警示灯点亮时，怠速运转一段时间再停机检查

When high water temperature alarm comes on, run engine at idle speed for a period of time, and then stop it to check.



水温高
警示灯
High
water
temperat
ure alarm



水温表water
temperature
gauge

II. Check Engine Light and Malfunction Indicator Lamp (MIL)

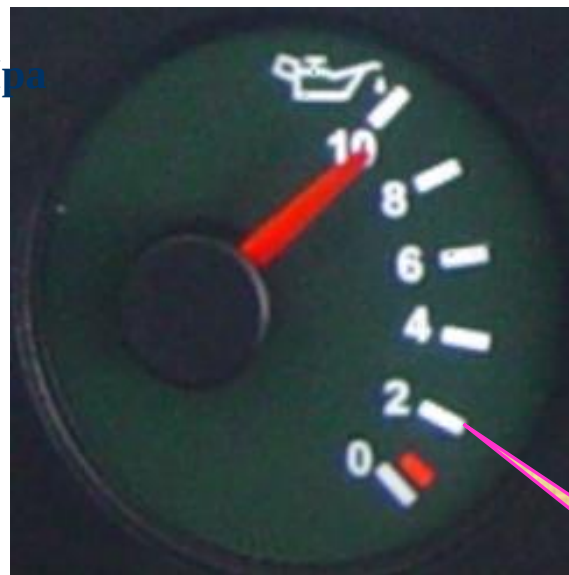
机油压力低警示灯、机油压力表

Low-oil alarm, oil pressure gauge

机油压力正常范围: Oil pressure range

✚ 中高速 at med-/high speed → 0.3~0.6Mpa

✚ 怠速 at idle speed → ≥ 0.1 Mpa



机油
压力表oil
pressure
gauge



机油压力
低警示灯
Low-oil
alarm

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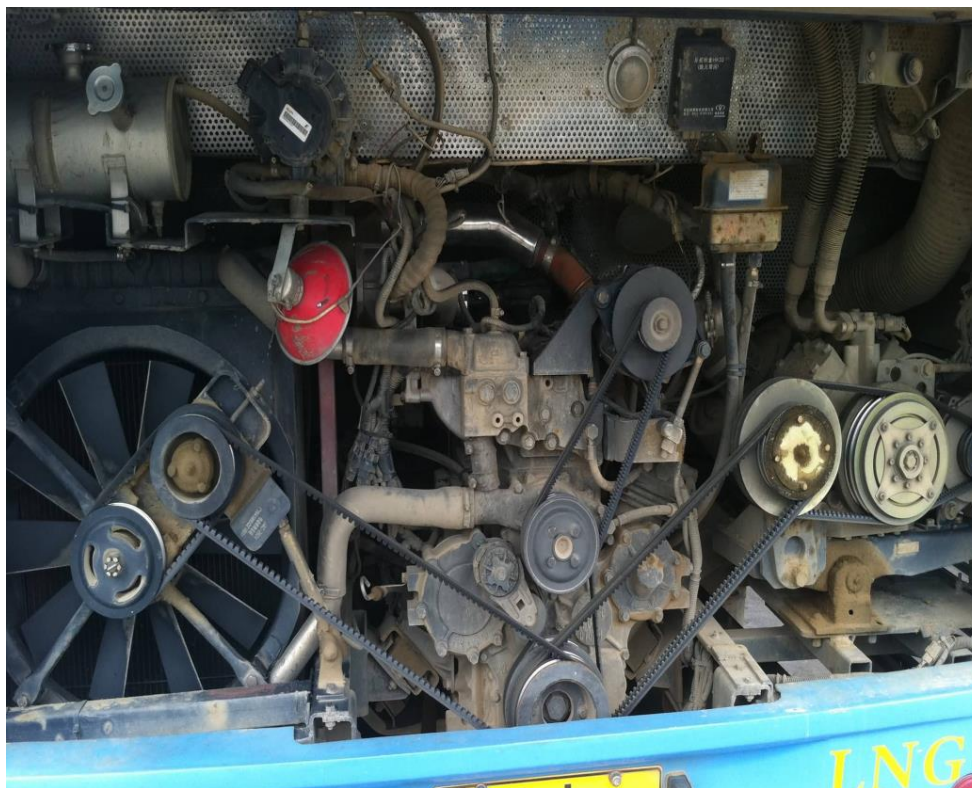
III. 1. Develop good driving behavior

✚ 发动机起动前检查 Checking before start-up

✚ 三漏的检查 Oil/water/air leaks

每天出车前检查发动机外围是否存在三漏（漏油、漏水、漏气）现象。

Check if there are oil/water/air leaks at engine peripherals before driving.



检查发动机燃料情况: **Checking engine fuel**

三、1. 养成良好的驾驶操作习惯 III. 1. Develop good driving behavior

- ✚ 机油量的检查:
- ✚ 禁止两种以上不同牌号的机油混用。
- ✚ Checking oil capacity
- ✚ Never mix different kinds of oil.



✦ 机油的使用（1）：How to choose the right oil

必须选用CF-4级以上级别的机油。

Be sure to select CF-4 grade beyond ;

✦ 每**10000~12000**公里（或行驶累计时间250小时）更换一次新机油，同时更换机油滤芯；

✦ When you do have oil replaced for every 1,000~12,000km (driving for 250hr), be sure to also replace the filter element;

✦ 不同牌号的机油禁止混用。

✦ Never mix different kinds, grades of oil.

请根据下表选用与环境温度对应的机油粘度级别的机油

Select the right oil viscosity grade to adapt to environment temperature in accordance with below chart

环境温度℃ Ambient Temperature °C	粘度级别 Viscosity Grade		环境温度℃ Ambient Temperature °C	粘度级别 Viscosity Grade		环境温度℃ Ambient Temperature °C	粘度级别 Viscosity Grade
-35~30	0W-30		-25~30	10W-30		-20~50	15W-50
-35~40	0W-40		-25~40	10W-40		-15~30	20W-30
-30~30	5W-30		-25~50	10W-50		-15~40	20W-40
-30~40	5W-40		-20~30	15W-30		-15~50	20W-50
-30~50	5W-50		-20~40	15W-40		-	-

油品粘度级别：

W前数字越小，表明油品低温性能越好，W后数字越大，表明油品粘度越大。

Viscosity grade of oils

The smaller the number in front of W, the better the low temperature performance of oils; the larger the number at back of W, the better viscosity grade of oils.



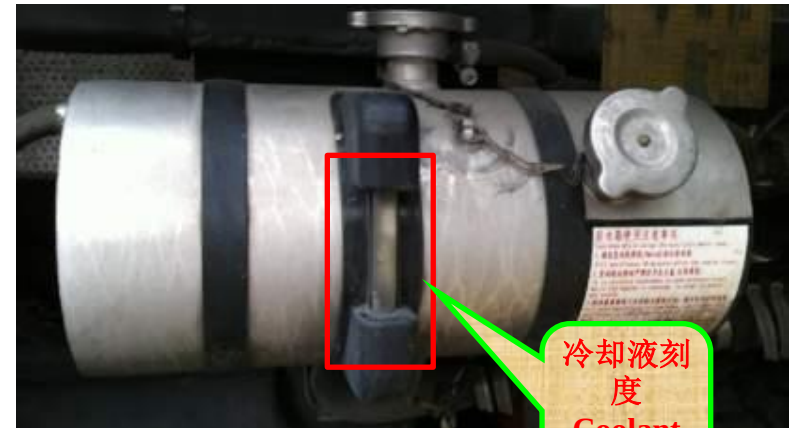
III. 1. Develop good driving behavior

- ✚ 冷却液位的检查:
- ✚ 冷却液面不能高于膨胀水箱的上刻线,
- ✚ 每次加注冷却液后, 必须拧好水箱盖或膨胀水箱盖。

Checking coolant level:

Coolant level cannot exceed the high limit of expansion water tank;

Tighten water tank cap or expansion water tank cap every time you fill up.



冷却液刻度
Coolant
scale
marks

发动机的冷却液必须使用防冻液

Be sure to use anti-freeze on engine

三、1. 养成良好的驾驶操作习惯

III. 1. Develop good driving behavior

✚ 风扇皮带

- ✚ 每**15000**公里检查风扇皮带的松紧度，过紧过松请按技术要求调整；
- ✚ 检查皮带是否有裂纹（含横纹或纵纹）断裂现象，有则需更换新件。

Fan belt pulley:

Check fan belt tension for every 15,000km, and make adjustment to specification if the belt is loose or tight.

Check if belt is cracked (transversal or longitudinal cracks) , replace with new one when it is cracked.

皮带松紧度要求：
在40~50N压力作用下，皮带
挠度为10~15mm为合适。



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在40~50N压力作用下，皮带挠度为10~15mm为合适。

Belt tension specifications:

Belt deflection is 10~15mm under a force of 40~50N.

皮带龟裂 Belt is cracked.



皮带龟裂

三、1. 养成良好的驾驶操作习惯 III. 1. Develop good driving behavior

- 冷却风扇的检查:
- 检查冷却风扇叶、导风罩是否存在变形、裂纹等现象,
- Checking cooling fan:
- Check to see if fan blades and shroud are deformed, or cracked.



导风罩
shroud



风扇
fan



维修窗口
Service
area

中冷器
迎风面
intercooler
windward side

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三、1. 养成良好的驾驶操作习惯

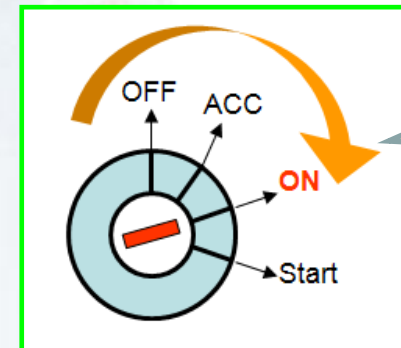
III. 1. Develop good driving behavior

启动: Start-up

- 检查结束后, 打开电源总开关, 将钥匙依次旋转到ON档位置。
- After you checked, switch on power supply, and set key to ON position
- 将钥匙打到Start档, 发动机启动。
- Set key to STRAT position, engine is getting started.
- 若启动不成功, 请不要让起动机持续工作超过10秒, 且等待1~2分钟后再进行第二次启动。
- Do not work starter successively for more than 10s if it fails to start, and the next start interval shall come after 1~2 min.



电源
总开关
Power
switch



钥匙锁
key



后控制盒
rear
control
box

使用发动机 (1) Operate engine (1)

- ✦ 发动机成功起动后，应先怠速运行3~5分钟，并检查以下各项指标是否正常：
- ✦ **Let engine run at idle speed for 3~5 mins after starting, and check the following items:**
 - ✦ 起动后15秒内，必须有机油压力显示，否则立即停机；
 - ✦ **You should have oil pressure within 15 seconds after starting, otherwise stop engine right away;**
 - ✦ 机油压力不低于0.15MPa（水温60℃以上时，机油压力不低于0.1Mpa）；
 - ✦ **Oil pressure is not less than 0.15Mpa (oil pressure is not less than 0.1 Mpa when water temperature is getting higher than 60℃)**
 - ✦ 发动机运转无异响；
 - ✦ **Engine is running fine without unusual noise;**
 - ✦ 水温表有动作，温度逐渐上升；
 - ✦ **Water temperature gauge is working fine, temperature is in gradual increase.**
- ✦ 发动机在怠速运转时间不允许超过10分钟；
- ✦ **Do not let engine run at idle speed for more than 10 mins.**



III. 1. Develop good driving behavior

使用发动机 (2) Operate engine (2)

✚ 车辆起步：按常规操作，要求用一档起步，避免高档位起步。

✚ Drive off vehicle from a standstill as routine operation, use 1st gear to start and avoid driving off vehicle in a higher gear.

不能猛踩油门

Do not step hard on accelerator pedal.



使用发动机 (3) Operate engine

- 换挡 Shift gears
- 涉水行驶注意事项
- Important notices to run under condition of wading



选用合适的档位行驶，有利于提高驾驶舒适性和节省燃油。

Select right gears will be good to improve ride comfort , and save fuel.

III. 1. Develop good driving behavior

发动机表面、线束、电子元件不能用水直接冲洗
The engine surface, wiring harness, electric elements cannot be washed with water directly

使用发动机 (4)

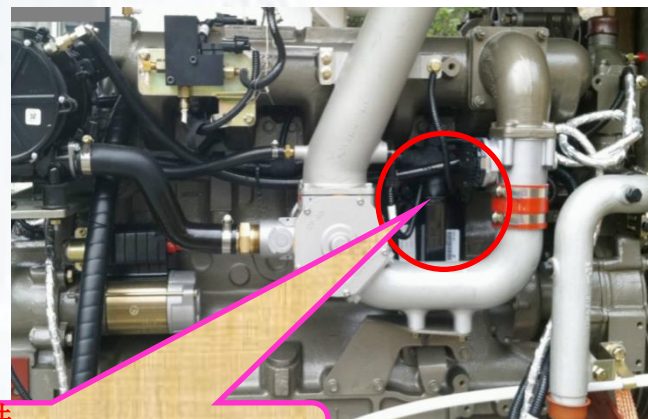
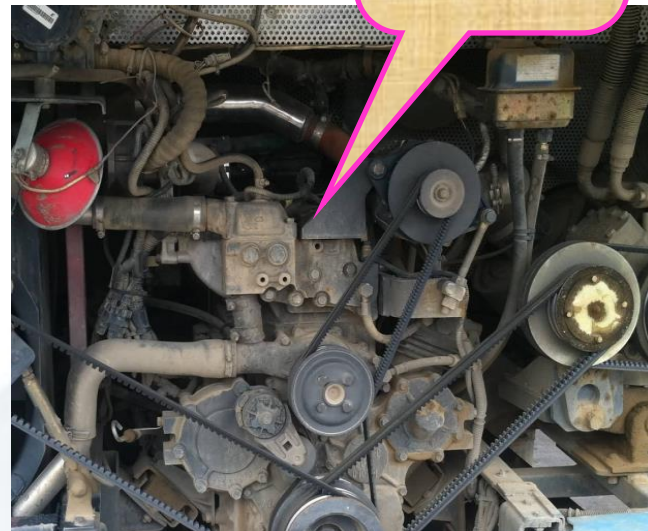
清洁时不能用水冲洗发动机。

在整车上电焊作业时：断开电源总开关，同时断开控制器的插接件，防止控制器损坏！

Operate engine (4)

Do not flush engine with when you're cleaning.

Welding on the whole vehicle: disconnect the main switch of power supply, and disconnect control unit connector to prevent control unit being damaged.

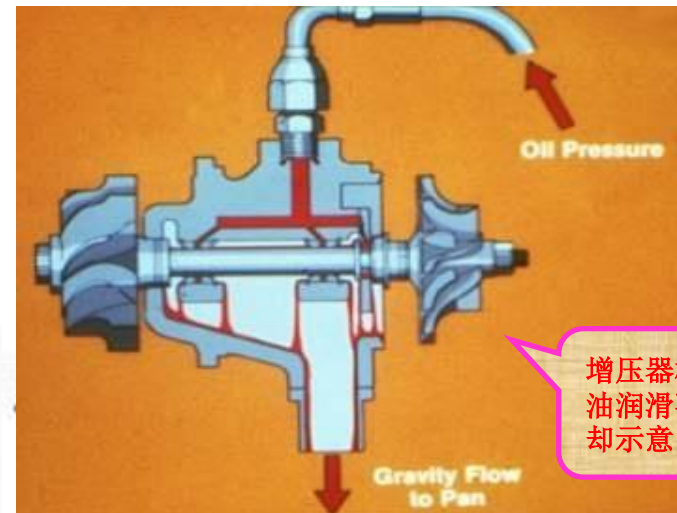


电焊时拨开控制器插接件
Disconnect control unit connector during welding

✚ 停机 Shutdown

- ✚ 当车辆在停稳之后，发动机怠速运转**3-5**分钟后熄火 When you pull over, let engine run at idle speed for 3-5 mins before stopping.

- ✚ 增压器机油润滑冷却示意图
- ✚ Schematic diagram of turbo lubricated with oil



增压器机油润滑冷却示意图

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三、2、发动机维护与检查项目

III. 2. Service and maintenance items

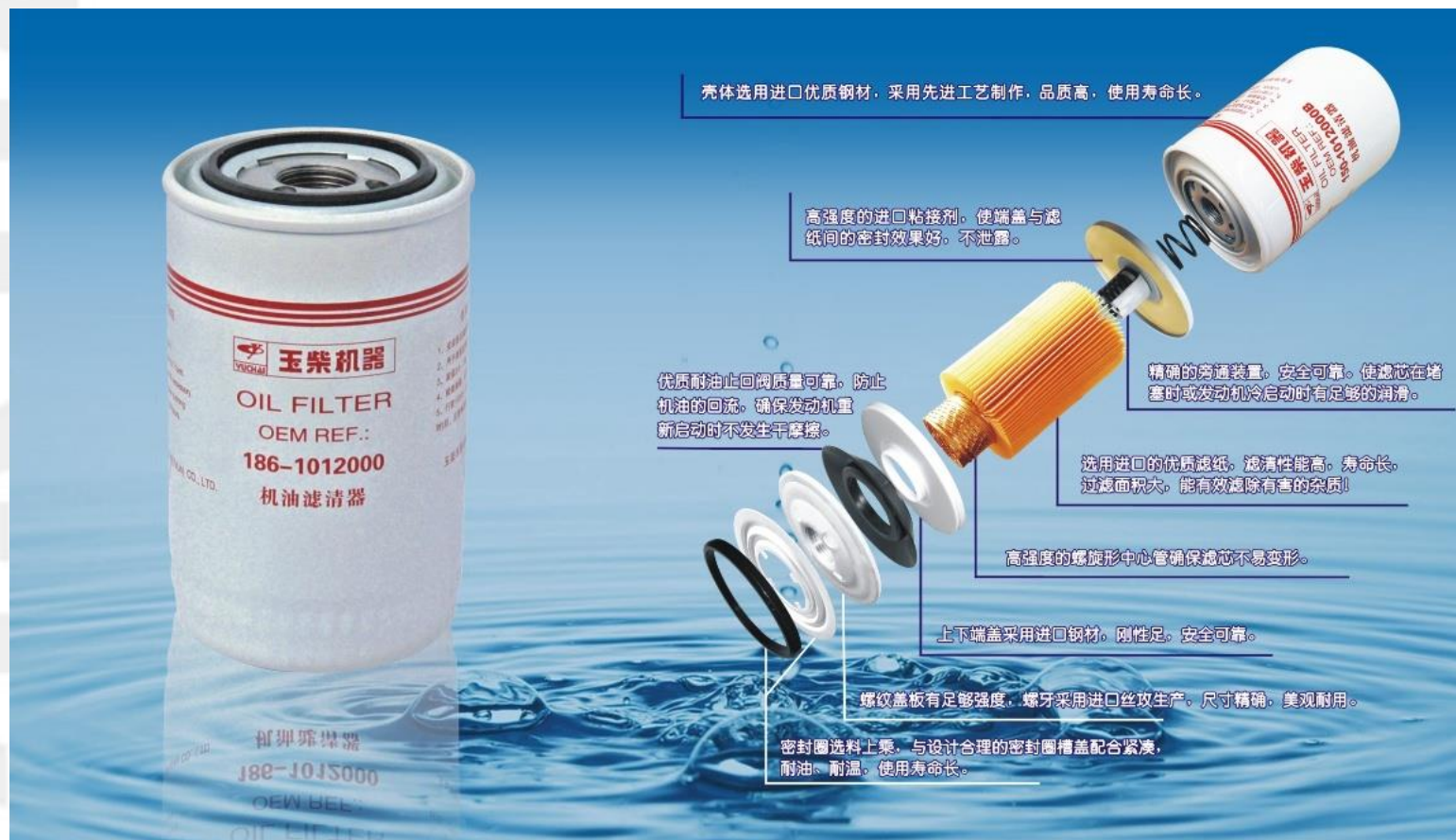
柴油滤清器:

- 请每天放掉柴油滤清器滤除水分
- 每**30000**公里（200-250小时）更换柴油滤清器
- Fuel filter
- Be sure to drain water off fuel filter everyday;
- Change fuel filter for every 30,000km (200~250 hr).



机油滤清器 Oil filter

- 每10000-12000公里或200-250小时更换机油滤清器。
- Change oil filter for every 10,000km~12,000km, or 200~250 hr.



三、2、发动机维护与检查项目

III. 2. Service and maintenance items

空气滤清器 (1)

空滤指示器显示红色信号或每**5000**公里必须保养一次空气滤清器

当空气滤清器保养完毕后，轻按空滤指示器复位按钮复位（**红色**变为**绿色**）。

Air filter (1)

Do maintenance the air filter when its indicator flashing red or for every **5,000** km.

After maintenance is done, press slightly the indicator button to reset (**red** turns into **green**).



✚ 空气滤清器 Air filter (2)

✚ 保养要求: Maintenance requirements



绝对禁止发动机在不装空气滤清器或空气滤清器失效的情况下工作！

Do not operate engine when air filter is not equipped or when air filter is faulty.

增压器 Turbo

每60000公里检查增压器叶轮转动是否灵活、轴向窜动量是否过大

Check if turbo impeller can rotate freely, and axial movement is excessive for every 60,000km.



三、2、发动机维护与检查项目

1. 本规定适用于玉柴生产出厂的所有系列发动机。
2. 本规定是玉柴服务站进行保养服务的依据。
3. 保养里程或时间要求：

行驶里程（时间）	YC I 类	YC II 类
行驶至3000~5000km（60~80小时）	首次保养	首次保养
每15000km或250小时	二级保养	一级保养
每30000km或500小时	三级保养	二级保养
每60000km或1000小时		三级保养

根据使用条件对整车分类：

（一）、YC I类：

1. 1）使用条件恶劣（最低气温低于-20℃、或最高气温高于35℃、或环境含尘量高的沙漠、矿区、工地、煤场等），运距短的工程、自卸、矿用车；
2. 2）或年行驶里程≤25000km（或年工作时间≤600小时）的商用车；

（二）、YC II类：年行驶里程≥25000km的各种用途的商用车。

III. 2. Service and maintenance, maintenance items

1. This regulation is applicable to all engine series manufactured by Yuchai.
2. This regulation is the reference when Yuchai service station do engine maintenance or repair;
3. Maintenance mileage or intervals:

Driving mileage(time)	YC I	YC II
After a 3,000~5,000km drive (60~80 hours)	Initial Service	Initial Service
For every 15,000km or 250 hours	2 nd Major Service	Normal Service
For every 30,000km or 500 hours	3 rd Major Service	2 nd Major Service
For every 60,000km or 1,000 hours		3 rd Major Service

Note: Vehicles can be classified on the basis of operation conditions

1. YC I:

- 1) Short-distance-drive construction vehicles, dump trucks and mining vehicles that working under extremely hard conditions (lowest temperature can fall below -20°C and highest temperature can get higher than 35°C, and heavy sandy desert, mining, construction site and coal-field, etc.)
- 2) Commercial vehicles with annual mileage $\leq 25,000\text{km}$ (or working hour ≤ 600 a year)

2. YC II: Commercial vehicles fit for various applications with annual mileage $\geq 25,000\text{km}$

项目	保养周期	保 养 项 目
日常维护★	每日进行	检查油箱油量
		检查冷却水量
		检查油底壳及喷油泵内的机油量
		检查“三漏”情况
		油水分离器放水
		起动发动机检查机油仪表压力
		起动发动机检查仪表水温情况
首次保养	每3000~5000公里 (或60~80小时)	检查并调整皮带松紧度
		检查加速和减速性能及排气状况
		检查发动机“三漏”情况
		检查燃油箱油量
		检查机油状况和液面
		更换发动机机油
		更换机油滤清器滤芯
		油水分离器放水
		检查冷却液面

Item	Maintenance interval	Maintenance items
Routine ★	Daily	Check fuel tank volume
		Check cooling water capacity
		Check oil sump volume and injection pump oil volume
		Check air/water/oil leak
		Drain off fuel-water separator
		Start engine to check oil gauge pressure indication
		Start engine to check gauges for water temperature pressure
Initial Service	Every 3,000~5,000km (or 60~80 hr)	Check and adjust belt pulley tension
		Check acceleration/ de-acceleration performance and exhaust
		Check air/water/oil leak
		Check fuel tank volume
		Check oil condition and oil level
		Replace engine oil
		Replace oil filter element
		Drain off fuel-water separator
		Check coolant level

一级 保 养	每15000公里 (或250小时)	清洁发动机总成外表
		检查并调整皮带松紧度
		检查加速和减速性能及排气状况
		检查发动机“三漏”情况
		检查燃油箱油量
		检查机油状况和液面
		更换发动机机油
		更换机油滤清器滤芯
		油水分离器放水
		检查冷却液面
		检查电气线路各连接点的接触、干涉、磨损情况

Normal Service	Every 15,000 km (or 250 hr)	Clean outer appearance of engine assembly
		Check and adjust belt pulley tension
		Check acceleration/ de-acceleration performance and exhaust
		Check air/water/oil leak
		Check fuel tank volume
		Check oil condition and oil level
		Replace engine oil
		Replace oil filter element
		Drain off fuel-water separator
		Check coolant level
		Check electrical power wire connections for contact condition, interference and wear

二级 保 养	每30000公里 (或500小时)	清洁发动机总成外表
		检查并调整皮带松紧度
		整体更换空气滤清器滤芯
		检查加速和减速性能及排气状况
		检查发动机“三漏”情况
		检查燃油箱油量
		检查机油状况和液面
		更换发动机机油
		更换机油滤清器滤芯
		油水分离器放水
		更换燃油滤清器滤芯（含油水分离器和精滤器）
		检查冷却液面
		检查电气线路各连接点的接触、干涉、磨损情况
		检查供油提前角（机械直列泵发动机）
		给水泵加注润滑脂（适用于润滑油嘴结构的水泵）

2 nd Service	Major	Every 30, 000km (or 500 hr)	Clean outer appearance of engine assembly
			Check and adjust belt pulley tension
			Replace entire air filter element
			Check acceleration/ de-acceleration performance and exhaust
			Check air/water/oil leak
			Check fuel tank volume
			Check oil condition and oil level
			Replace engine oil
			Replace oil filter element
			Drain off fuel-water separator
			Replace fuel filter element (including fuel-water separator and secondary fuel filter)
			Check coolant level
			Check electrical power wire connections for contact condition, interference and wear
			Check fuel supply advanced angle (engine equipped with mechanical, in-line pump)
			Apply lubrication grease to water pump (applicable to water pump that provided with lubrication grease nipple)

三级 保 养	每60000公里 (或1000小时)	清洁发动机总成外表
		检查并调整皮带松紧度
		整体更换空气滤清器滤芯
		检查加速和减速性能及排气状况
		检查发动机“三漏”情况
		检查燃油箱油量
		检查机油状况和液面
		更换发动机机油
		更换机油滤清器滤芯
		油水分离器放水
		更换燃油滤清器滤芯（含油水分离器和精滤器）
		检查冷却液面
		检查电气线路各连接点的接触、干涉、磨损情况
		检查供油提前角（机械直列泵发动机）
		给水泵加注润滑脂（适用于润滑油嘴结构的水泵）
		清洁发动机冷却系
		检查增压器工作情况（叶轮转动是否灵活、轴向窜动量小于1mm）

注：每5000公里保养空气滤清器滤芯，发现主滤芯破损、严重变形或保养超4次，应更换主滤芯，或参考 40 空气滤清器说明书有关规定执行。

3 rd Major Service	Every 60, 000km (or 1000 hr)	Clean outer appearance of engine assembly
		Check and adjust belt pulley tension
		Replace entire air filter element
		Check acceleration/ de-acceleration performance and exhaust
		Check air/water/oil leak
		Check fuel tank volume
		Check oil condition and oil level
		Replace engine oil
		Replace oil filter element
		Drain off fuel-water separator
		Replace fuel filter element (including fuel-water separator and secondary fuel filter)
		Check coolant level
		Check electrical power wire connections for contact condition, interference and wear
		Check fuel supply advanced angle (engine equipped with mechanical, in-line pump)
		Apply lubrication grease to water pump(applicable to water pump that provided with lubrication grease nipple)
		Clean cooling system
		Check turbocharger performance (if the impeller can rotate freely, and axial movement is less than 1mm)

Note: do maintenance the air filter element for every 5,000km, if the main filter element is damaged, badly distorted or has already been serviced for more than four times , then replace it with a new one, or follow the instructions in Air Filter Manual to perform.

以卓越与领先，满足公众的动力需求
Taking the Lead & Meeting the Power Need
of the General Public

谢谢
Thank you!