# 5 1MW Maintenance instructions1MW维修说明

In order to maintain the normal operation of diesel engines, in addition to doing routine testing, they also need regular maintenance and replacement of some of the useless parts, so that the engine is in good technical condition. Regular technical maintenance can reduce the possibility of engine damage and prolong engine life.

New machine the first time or had engine overhaul put into operation in the first 50 hours, you must clean all the filters, check and adjust valve clearance and overhead valve and two ends of the same-name valve's top; check all the site of connections which use bolts or threaded connections (including the outside pipe); check disc cam, roller cam surface lubrication, remove the cam box oil properties.

为了维护柴油机的正常运行，除了进行常规的检测外，还需要定期的维护和更换一些零部件，使发动机处于良好的技术状态。定期的技术维护可以降低发动机损坏的可能性，延长发动机的使用寿命。

新机器第一次或有发动机大修投入运行前50小时内，必须对所有过滤器进行清洗，检查和调整阀门间隙和顶置阀以及同型号阀门顶部两端;检查所有使用螺栓或螺纹连接的连接处(包括外管);检查盘形凸轮、滚子凸轮表面的润滑情况，凸轮箱的油管。

### Daily maintenance日常维护

Tabulation of diesel engine's daily maintenance:柴油机日常维护一览表:

|  |  |
| --- | --- |
| No. | Maintenance tasks维护内容 |
| 1 | Check the fuel oil level of daily fuel box, and give out the water which may exist in fuel tank and fuel strainer.检查日常油箱的油位，并将油箱和滤网中可能存在的水排放出来。 |
| 2 | Check the lubricating oil level of diesel engine's oil pan, and the lubricating oil level should in  the range of surveyor's staff.检查柴油机油底壳的润滑油位，润滑油位应在油底壳内  测量的工作范围。 |
| 3 | Check the water level of water tank which expansion tank.检查哪个膨胀水箱的水位。 |
| 4 | Back-check the press of air in air bottle and blow off the seeper, if the air pressure is not enough,add to specified value.检查空气瓶内的空气压力，将积水吹出，如果空气压力不够，则加到规定值 |
| 5 | Check and exclude the oil spills, leakage and air leak of diesel engine检查并排除柴油机的溢油、漏气和漏气 |
| 6 | Check the connections of diesel engine and it's accessories, watching whether it have abnormal noise and vibration during running检查柴油机及其附件的连接情况，观察柴油机在运行过程中是否有异常的噪声和振动 |
| 7 | Check the appearance of diesel engine,keep neat and wipe away water stains, grease and grime.检查柴油机外观，保持清洁，清除水渍、油污和污垢。 |
| 8 | Check whether the instrument is normal and replace them if it's necessary.检查仪器是否正常，必要时更换。 |

### Technical maintenance of Diesel engine after every 100 hours

**operation.**

**5.2 每100小时后对柴油机进行技术维护操作。**

In addition to routine maintenance items, the following work should be increased :

|  |  |
| --- | --- |
| No. | Maintenance tasks维护内容 |
| 1 | Clean the dust and dirt of turbocharger s air filter.清洗增压器空气滤清器的灰尘。 |
| 2 | Clean the filter of respirator.清洁过滤器。 |
| 3 | Check whether the two ends of overhead valve are contact with the other two valve push rod, and adjust the gap if necessary.检查顶置阀两端是否与另两个阀推杆接触，必要时调整间隙。 |
| 4 | By gently tapping screw and method of checking the main bearing connecting rod bolt preload case, the insurance gasket is intact.通过轻敲螺钉和检查主轴承连杆螺栓预紧情况，保险垫片完好无损。 |
| 5 | Clean the lubricating oil colander of turbocharger .(for diesel engine which have turbocharger )  清洗涡轮增压器的润滑油滤器。(有涡轮增压器的柴油机) |

除日常维护项目外，还应增加以下工作

### Technological maintain of diesel engine after every 500 hours

**operation.**

**5.3 每隔500小时对柴油机进行技术维护操作。**

In addition to technological maintain of diesel engine after every 100 hours operation items, the following work should be increased :柴油机每100小时运行项目后，除技术维护外，还应增加以下工作:

|  |  |
| --- | --- |
| No. | Maintenance tasks |
| 1 | Replacing diesel engine and governor's lubricating oil更换柴油机及调速器润滑油 |
| 2 | Check the surface circus of cam and idler wheel, if is lightly damaged, mended it by whetstone.检查凸轮和惰轮表面是否有轻微损坏，用磨石修补。 |
| 3 | Check the main bearing bolt, connecting rod bolt, connecting rod balance weight screws stud fastening and locking nut case. If there are signs of loosening, should be re-tightened according to specifications, re-locking.检查主轴承螺栓、连杆螺栓、连杆平衡锤螺钉、螺柱紧固和锁紧螺母壳。如有松动迹象，应按说明书重新紧固，重新上锁。 |
| 4 | Check the injector fuel injection pressure and fuel injection, if necessary, clean the fuel injectors and re-adjustment.检查喷油器喷油压力和喷油情况，如有必要，清洗喷油器并重新调整。 |
| 5 | Check the cylinder head and rocker arm injector valve installation and start-tighten the bolt, nut case. Check and adjust valve clearance (cold).检查气缸盖和摇臂喷油器阀门的安装情况，并开始拧紧螺栓、螺母壳。检查和调整阀门间隙(冷)。 |
| 6 | Wind turbine cleaning guide turbocharger compressor impeller and diffuser flow.风力清洗引导涡轮增压器压气机叶轮和扩压器流量。 |
| 7 | Check intake or exhaust valve and the valve seat airproof situation. |
| 8 | Check the temperature of engine speed and other testing pressure protection device, if the problem be excluded. |

### Technological maintain of diesel engine after every 1000 hours

**operation.每1000小时后对柴油机进行技术维护操作。**

In addition to technological maintain of diesel engine after every 500 hours operation items, the following work should be increased :柴油发动机每运行500小时，除进行技术维护外，还应增加以下工作:

|  |  |
| --- | --- |
| No. | Maintenance tasks |
| 1 | Check the agility behavior of oil adjust set-up.检查调油装置的敏捷性。 |
| 2 | Check the injector assembly, replace the injector performance has deteriorated.检查喷油器总成，更换喷油器性能已经恶化。 |
| 3 | Check valve of fuel injection pumps seal, if necessary, grinding amendments.检查喷油泵阀的密封，如有必要，磨削修正。 |
| 4 | With the mirror reflectivity, check the piston skirt and cylinder liner wall of the situation.用反射镜反射率，检查活塞裙和缸套壁的情况。 |
| 5 | Change turbine oil in turbocharger(TZ250) 更换增压器涡轮机油(TZ250) |
| 6 | Check the turbocharger impeller and the housing gap, bearings and air seal, seal effectiveness, if necessary, adjustment and replacement.检查增压器叶轮与壳体的间隙，轴承与空气密封，密封效果，如有必要，进行调整和更换。 |

* 1. **Technological maintain of diesel engine after every**

**2000 hours operation. 柴油机每运行2000小时后的技术维护。**

In addition to technological maintain of diesel engine after every 1000 hours operation items, the following work should be increased :柴油机每1000小时运行项目后，除技术维护外，还应增加以下工作:

|  |  |
| --- | --- |
| No. | Maintenance tasks |
| 1 | Clean the air cooler, especially in the oil on the heat sink material.清洗空气冷却器，特别是散热片 |
| 2 | Remove the two cylinder heads, check the piston carbon deposition, if necessary, remove coke; check valve seal, if necessary, grinding.拆卸两个缸盖，检查活塞积碳情况，如有必要，拆卸焦炭;止回阀密封，如果需要，研磨。 |
| 3 | Check and clear the water cooler oil cooler fouling, if necessary, replace the corrosion of zinc  block.  检查并清除水冷却器油冷却器的污垢，如有必要，更换锈蚀的锌块。 |
| 4 | Check the turbocharger bearing clearance, cleaning turbocharger compressor impeller and volute sludge and coke.检查增压器轴承间隙，清洗增压器压气机叶轮及蜗壳内的污泥和焦炭。 |
| 5 | Check valves and pipeline control system. |
| 6 | Check the oil pump water pump work, if necessary, to adjust. |
| 7 | Clean the inner side of oil sump, and Daily oil tank. |

### Technological maintain of diesel engine after every 5000 hours

**operation.每5000小时后对柴油机进行技术维护**

**操作。**

In addition to technological maintain of diesel engine after every 2000 hours operation items, the following work should be increased :柴油发动机每运行2000小时后除进行技术维护外，还应增加以下工作:

|  |  |
| --- | --- |
| No. | Maintenance tasks |
| 1 | Remove the cylinder head assembly, grinding or repair the valve and the valve seat surface. Check the rocker arm assembly valve guides wear, decide whether to replace the actual situation  拆卸气缸盖总成，研磨或修理阀门和阀座表面。检查摇臂总成阀门导轨磨损情况，决定是否更换实际情况 |
| 2 | Check the crank arm length difference (with the piston rod assembly), and make a record.  Demolition of the piston rod assembly, remove carbon deposit, check the piston ring groove.检查曲轴臂差(与活塞杆总成)，并记录。拆卸活塞杆总成，清除积炭，检查活塞环沟槽。 |
| 3 | Check the piston pin diameter size, and testing, inspection rings, according to the circumstances change.检查活塞销的直径大小，并检测、检查密封圈，根据变化,更换。 |
| 4 | Check the connecting rod bearing and measure the size of head wear size, such as the bulk of  bearing alloy wear more, or less than the amount of expansion that should be replaced.检查连杆轴承的尺寸和测量头的磨损尺寸，如体积等  轴承合金磨损多，或膨胀量少，应更换。 |
| 5 | Check the wear of cylinder liner and measure the size, if minor injuries are available Whetstone polished, serious need of replacement.检查气缸套的磨损情况并测量尺寸，如有轻微损伤可用磨石打磨，严重需要更换。 |
| 6 | Random sampling two main bearings and check the wear of the alloy layer, and thus determine  whether the need to check the other bearing the decision whether to replace the actual situation.  随机抽取两个主轴承并检查其合金层的磨损情况，从而确定  是否需要检查轴承的决定是否符合实际情况。 |
| 7 | Check valve gear, such as the valve rocker shaft adjusting bearing screws, lumps and other wear and tear, according to the circumstances change. Check the intake and exhaust, oil pump wheel and wheel sales, according to the circumstances change.检查,阀的齿轮，如阀摇臂轴调节轴承螺丝、块等磨损，可根据情况改变。检查进气和排气情况，油泵轮毂和车轮的销售情况，根据情况变化。 |
| 8 | Check all the drive gears and idler gear, measuring backlash, change it according to the actual  circumstances.检查所有传动齿轮和惰轮，测量齿隙，根据实际情况更换. |
| 9 | Check the fuel pump assembly, such as the plunger deputy oil or injury replacement Couples.  检查油泵总成，如柱塞损伤更换 |
| 10 | Check the turbocharger, governor, according to the requirements of Annex manual maintenance.检查增压器、调速器，按附件要求手动维护。 |
| 11 | Re-examination or replace the engine instrumentation, alarm systems and cable channels.重新检查或更换发动机仪表、报警系统和电缆通道。 |

### Technological maintain of diesel engine after every 10000

**hours operation. 柴油机技术维护每10000小时后的操作。**

|  |  |
| --- | --- |
| No. | Maintenance tasks |
| 1 | Pull out the cylinder liner, (measure bore wear before the pull out ) Check the corrosion damage of appearance of and repair it depend on the circumstances or replacement, then replace the O-ring sealing water.将气缸套拉出，(拉出前测量内径磨损情况)检查腐蚀损坏的外观，视情况进行修复或更换，然后更换o型圈密封水。 |
| 2 | Check all the main bearings and thrust washer, and change it according to the circumstances crank shaft connecting rod measured and recorded. Measured by the bridge rules crankshaft main journal wear (four-point measurement, the mean value) and recorded.检查所有主轴承和止推垫圈，并根据曲轴连杆测量记录的情况进行更换。由桥规测量曲轴主轴颈磨损(四点测量，平均值)并记录。 |
| 3 | Check the camshaft bearings and cam wear and replace if necessary.检查凸轮轴轴承和凸轮的磨损情况，必要时更换。 |
| 4 | Check the safe valve on cylinder head, crankcase explosion-proof doors, and check the reliability of air tightness.检查气缸盖、曲轴箱防爆门上的安全阀，检查气密性的可靠性。 |
| 5 | Check the intake and exhaust tappets, tappet blocks and roller, fuel injection pump roller. And proof whether the re-plunger oil pump pre-school trip is meet the requirements or not.  检查进排气挺杆、挺杆座和滚轮、喷油泵滚轮,柱塞是否符合要求。 |
| 6 | Removed the rubber flexible coupling, check whether the rubber part of the crack damage, examine the output flange bolts' fastening circs.拆下橡胶挠性联轴器，检查橡胶部分裂纹是否损坏，检查输出法兰螺栓紧固情况。 |
| 7 | Check the air starter motors, replace the parts if necessary.检查空气起动电机，必要时更换部件。 |
| 8 | Check the installed base of diesel engines and all the outside pipes, containers, etc., and  make the necessary adjustments and cleaning.  检查柴油机安装底座及所有外部管道、容器等  进行必要的调整和清洗。 |

In addition to technological maintain of diesel engine after every 5000 hours operation items, the following work should be increased :除进行柴油发动机每运行5000小时技术维护外，还应增加以下工作

### Technological maintain of diesel engine after every 30000

**hours operation.**

The diesel engine parts all open, including the crankshaft, to fine the inspection and measurement, then determine the scope of repairs according to test results.

5.8 每30000小时的操作,对柴油机进行技术维护

柴油机各部件全部打开，包括曲轴，要进行精检查和测量，然后根据试验结果确定修理范围。

1. **1MW maintenance parts list 1MW 维护零件表(100-30000hr）**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 序 号  Item |  | 名 称  Name | 数量  Qty | Price  RMB |
| 1 | Daily maintenance日常维护 | 不换零件Don't change parts |  |  |
| 2 | 100hr | 换零件Don't change parts,: filter.。 |  | 200 |
| 3 | 500hr | 换零件Don't change parts: filter. |  | 200 |
| 4 | 1000hr | 换零件Don't change parts:filter. |  | 200 |
| 5 | 2000-3000hr | 可能换零件Possible parts replacement |  | 100000 |
| 5.1 |  | 气缸盖调整垫片  Cylinder head adjust gasket | 12 |  |
| 5.2 |  | 排 气 阀  Exhaust valve | 12 |  |
| 5.3 |  | 封 水 圈  Water-seal ring | 12 |  |
| 5.4 |  | 小 封 水 圈  Small water-seal ring | 12 |  |
| 5.5 |  | 气 缸 盖 出 口 垫 片 组 件  Gasket sub\_assy for exhaust port of cylinder head | 4 |  |
| 5.6 |  | 排 气 管 垫 片 组 件  Exhaust pipe gasket sub-assy | 4 |  |
| 5.7 |  | 增 压 器 进 口 垫 片 组 件  Turbocharger inlet gasketsub-assy | 4 |  |
| 5.8 |  | 喷 油 嘴 偶 件  Injection nozzle sub-assy(with needle valve) | 12副 Sets |  |
| 7 | 8000-10000hr | 可能换零件Possible parts replacement |  | 300000 |
| 7.1 |  | 喷油器套垫圈  Injector jacket washer | 4 |  |
| 7.2 |  | 喷油器垫圈  Injector washer | 4 |  |
| 7.3 |  | 气 门 导 管  valve guide | 12 |  |
| 7.4 |  | 气 门 弹 簧  valve spring | 12 |  |
| 7.5 |  | 进 气 阀  Intake valve | 12 |  |
| 7.6 |  | 阀 锥 块  Valve collet | 48 Sets |  |
| 7.7 |  | 排 气 阀  Exhaust valve | 12 |  |
| 7.8 |  | 顶 架 调 节 螺 钉  Adjusting screw for valve | 12 |  |
| 7.9 |  | 硬 块  block | 12 |  |
| 7.10 |  | 调 节 螺 钉  Adjusting screw | 12 |  |
| 7.11 |  | 螺 母 M16×1.5  Nut | 12 |  |
| 7.12 |  | 螺 母 M20×1.5  Nut | 48 |  |
| 7.13 |  | 示功阀组件  Indicator valve sub-assy | 2 |  |
| 7.14 |  | 气缸盖调整垫片  Cylinder head adjust gasket | 6 |  |
| 7.15 |  | 气 缸 盖 垫 片  Cylinder head gasket | 6 |  |
| 7.16 |  | 止 推 环  Thrust ring | 2 |  |
| 7.17 |  | 凸轮轴中间轴承  Camshaft middle bearing | 4 |  |
| 7.18 |  | 主 轴 瓦(上下)  Bearing metal | 8 |  |
| 7.19 |  | 凸轮轴两端轴承  Camshaft both sides bearing | 4 |  |
| 7.20 |  | 封 水 圈  Water-seal ring | 12 |  |
| 7.21 |  | 小 封 水 圈  Small water-seal ring | 12 |  |
| 7.22 |  | 气 缸 套 封 水 圈  Water-seal ring for cylinder liner | 18 |  |
| 7.23 |  | 第一道气环  No.1 compression ring | 6 |  |
| 7.24 |  | 第二道气环  No.2 compression ring | 6 |  |
| 7.25 |  | 第三道气环  No.3 compression ring | 6 |  |
| 7.26 |  | 油环组件  Oil scraper ring sub-assy | 6 |  |
| 7.27 |  | 上 轴 瓦  Upside bush | 12 |  |
| 7.28 |  | 下 轴 瓦  Underside bush | 12 |  |
| 7.29 |  | 气 缸 盖 出 口 垫 片 组 件  Gasket sub\_assy for exhaust port of cylinder head | 6 |  |
| 7.30 |  | 排 气 管 垫 片 组 件  Exhaust pipe gasket sub-assy | 6 |  |
| 7.31 |  | 增 压 器 进 口 垫 片 组 件  Turbocharger inlet gasketsub-assy | 4 |  |
| 7.32 |  | 喷油器接杆  Injector link rod | 2 |  |
| 7.33 |  | 垫圈  Washer | 12 |  |
| 7.34 |  | 高 压 油 管 组 件  Injection pipe sub-assy | 6 |  |
| 7.35 |  | 密 封 垫 片  Seal washer | 6 |  |
| 7.36 |  | 柱 塞 弹 簧  Plunger spring | 6 |  |
| 7.37 |  | 出 油 阀 偶 件  Delivery valve sub-assy | 6 |  |
| 7.38 |  | 柱 塞 偶 件  Plunger with barrel | 6 |  |
| 7.39 |  | 喷 油 嘴 偶 件  Injection nozzle sub-assy(with needle valve) | 6 |  |
| 7.40 |  | O形圈 d90X5.3  O-rubber seal ring | 24 |  |
| 7.41 |  | O形圈 d45X5.3  O-rubber seal ring | 24 |  |
| 7.42 |  | 增压器备件  Spare part case for turbucharger | 1 |  |

1. **After-sales service售后服务**

**7.1 Provide the following after-sales service items**

**1) Provide after-sales maintenance and repair services to help users troubleshoot problems;**

**A Warranty Service: During the warranty period, if there is any quality problem, we shall be responsible for the warranty service and replace the unqualified parts at our own expense.Warranty scope: within the scope of warranty, if the unit failure is caused by the manufacturer's manufacturing and design reasons within one year after the product leaves the factory and the total operation time is 1000 hours.The fault of the generator set caused by the user's human operation error and negligent maintenance is not covered by the warranty.**

**B. Maintenance service outside the warranty period: after the expiration of the warranty period, if the unit has problems, we shall provide maintenance and spare parts service.Can accept user application and entrustment:**

**1) Provide regular maintenance and maintenance for the user's equipment.**

**2) Provide users with equipment installation and testing services;**

**Cooperate with installation work, assign experienced installation supervisor and test engineer to provide technical guidance for installation, commissioning and field test of contract equipment.Our company instructor is responsible for the correctness of all installation work.**

**7.1 提供下列售后服务项目**

1）提供产品售后维护、维修服务，帮助用户排除故障；

A 保修服务：在保修期内,产品质量问题，我方负责保修服务,替换不合格的部件并承担费用。保修范围：产品自出厂一年且累计运行1000小时内,因厂方制造、设计原因导致的机组故障，均属保修范围之内。因用户人为操作错误、疏忽保养等原因导致发电机组故障不属于保修范围。

B 保修期外维修服务：保修期满后,机组出现问题，提供维修,零配件服务。可接受用户申请和委托:

1)为用户设备提供定期维护和保养。

2）提供用户设备安装和调测服务；

配合安装的工作，指派有经验的安装指导人员和试验工程师，对合同设备的安装、调试和现场试验等进行技术指导。我公司指导人员对所有安装工作的正确性负责。

7.2 Technical training and management

On-site training and management: our company provides on-site training and management, including equipment installation and precautions, system testing, routine fault handling and maintenance, etc.

**7.2** **技术培训和管理**

现场培训和管理：我公司提供现场培训和管理，培训内容包括设备安装及其注意事项、系统测试、常规故障处理及维护等。

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 序号no | training content培训内容 | Time  时间 | personnel人员 | |
| Title  职称 | number  人数 |
| 1 | Operating principle of equipment设备工作原理 | 5day | engineer工程师 | 2 |
| Basic knowledge of the equipment设备的基本知识 |
| 2 | Installation of equipment设备的安装 | 5day | engineer工程师 | 2 |
| Equipment operation设备操作 |
| 3 | Equipment maintenance设备维护保养 | 5day | engineer工程师 | 2 |
| Common faults and treatment常见故障与处理 |