

# 安徽鸿申能源装备有限公司试车规程

## Test Run Regulations and Procedures of Anhui Hongshen Energy Equipment Co., LTD.

### 1. 润滑系统的试车包括两个方面

#### 1.1 循环油系统的试车

通过试车主要是看油压、油温、各润滑点的供油情况以及油泵机组等运转是否正常。

一般油压为 0.18~0.25MPa (对大型机而言不得低于 0.1MPa, 油温且不超过 35°C)。如果油温过高, 要向油冷器通水进行冷却。

#### 1.2 气缸与填料函、注油器系统的试车

除无油润滑压缩机外, 其它带有注油器系统的压缩机都进行试运转 (也称内部润滑)。

在试车中, 应检查噪声、振动、温度是否符合规定, 检查注油器机组的工作是否灵敏, 各输油管道连接接头是否严密, 输油是否正常、清洁、能否调节油量。

### 1. The test run of the lubrication system includes two parts

#### 1.1 The test run of the circulating oil system

Through the test, we can know the conditions of the oil pressure, oil temperature, the oil supply of each lubrication point and the oil pump unit operation is normal or not.

General speaking, its oil pressure should be 0.18~0.25MPa (not less than 0.1MPa for large machines, and oil temperature is not more than 35°C). If the oil temperature is too high, it should be cooled by the oil cooler through water.

#### 1.2 The test run of cylinder and stuffing box and oil injector system

Except for oil-free lubrication compressor, other compressors with oil injector system must be tested (also known as internal lubrication).

In the test run, check whether the noise, vibration and temperature meet the regulations, check whether the work of the oil injector unit is sensitive, whether the connection joint of each oil pipeline is tight, whether the oil transmission is normal and clean, and whether the oil quantity can be adjusted.

### 2. 冷却水系统通水试验

压缩机冷却水系统由中间冷却器、气缸、填料的水套、润滑油冷却器、后冷器、冷却水管及其水阀门等组成。

通水试验主要是检查有无漏水之处, 若有应及时处理。水压一般不低于 0.2MPa, 实验完后值得指出的是, 当室温低于 5°C 时, 应将通水系统内的水全部放净, 避免冻裂。

### 2. Water supply test of the cooling water system

The compressor cooling water system is composed of intercooler, cylinder, packing water sleeve, lubricating oil cooler, aftercooler, cooling water pipes and its water valves.

Water supply test is mainly to check whether there is any water leakage. If any, there should be dealt with in time. The water pressure is generally not less than 0.2MPa. However, It should be noted that after the experiment when the room temperature is lower than 5°C, all the water in the water system should be drained to avoid freezing and cracking.

### 3. 压缩机的驱动机单独试车和无负荷试车

#### 3.1 驱动机的单独试车

驱动机的单独试车重点检查内容

##### 3.1.1 电动机转动方向是否与压缩机一致;

##### 3.1.2 运转中是否有异常声音;

##### 3.1.3 电动机电压是否正常;

##### 3.1.4 主轴承轴瓦有无振动和漏油现象;

##### 3.1.5 电动机的电流是否符合规定;

##### 3.1.6 循环润滑系统在运转中是否正常;

3.1.7 主轴瓦温度不得超过规定温度（如无规定，应不超过 60° C），电动机温升不超过 70° C。  
在电动机试车中发生的一切故障及毛病要及时排除，检验合格后，才能进行下一阶段的试车——带动压缩机进行无负荷试车。

### 3.2 压缩机的无负荷试车

无负荷试车是在拆除气阀，即不吸气不排气的情况下进行的，其目的是：

- 3.2.1 使填料与活塞杆通过运转达到严密贴合；
- 3.2.2 使曲轴、连杆等运动机构通过运转达到严密转合；
- 3.2.3 检验两个润滑系统的工作情况是否良好；
- 3.2.4 消除无负荷试车中发现的问题，为转入符合试车创造条件。

### 3. The driver of the compressor has a separate test and no load test

#### 3.1 Separate test run of the driver machine

The main test content of separate test run of the driver machine :

- 3.1.1 Whether the rotation direction of the motor is consistent with the compressor;
- 3.1.2 Whether there is any abnormal sound in the operation;
- 3.1.3 Whether the motor voltage is normal;
- 3.1.4 Main shaft bearing bush has vibration and oil leakage;
- 3.1.5 Whether the current of the motor meets the regulations;
- 3.1.6 Whether the circulating lubrication system is normal in operation;
- 3.1.7 The temperature of the main shaft bearing bush shall not exceed the specified temperature (if not specified, it shall not exceed 60°C), and the temperature rise of the motor shall not exceed 70°C.

All faults in the motor test should be eliminated in time. After passing the inspection, we can go to the next stage of test —— drive the compressor for no load test.

#### 3.2 No-load test run of the compressor

The unload test is carried out under the condition of removing the air valves, that is, without suction and exhaust, its purpose is:

- 3.2.1 Make the packing (stuffing) and the piston rod tightly fit through operation;
- 3.2.2 Make the crankshaft, connecting rod and other moving mechanism close through operation;
- 3.2.3 Check whether the two lubrication systems work well;
- 3.2.4 Eliminate the problems found in the unloaded test, and create conditions for the successful test.

### 3.3 无负荷试车控制技术指标

无负荷试车应该严格控制下列技术指标

- 3.3.1 电动机电流不得超过规定值；
- 3.3.2 填料函温度不得超过 60 ° C；
- 3.3.3 机身十字头滑道温度应不超过 60 ° C；
- 3.3.4 所有压缩机机组运动件与静止件之间应无碰撞现象，运动机构无敲击或碰撞等异常音响；
- 3.3.5 气缸、填料及循环油润滑系统应运转正常；
- 3.3.6) 气缸填料与活塞杆的接触应严密不漏气；
- 3.3.7 压缩机所有电气仪表、调节装置等均应符合有关专业技术规程的技术要求；
- 3.3.8 在压缩机无负荷试车过程中所发现的问题，在停车后应及时地消除，经检查合格后，方可进入下一阶段地试车。

### 3.3 Technical index of no-load test run

The following technical data should be strictly controlled for no load test run:

- 3.3.1 The motor current shall not exceed the specified value;
- 3.3.2 The temperature of the stuffing box shall not exceed 60°C;
- 3.3.3 The temperature of the crosshead slide shall not exceed 60°C;
- 3.3.4 There shall be no collision between the moving parts and the static parts of all compressor units, and no abnormal sound such as percussion or collision;
- 3.3.5 The cylinder, packing and circulating oil lubrication system shall operate normally;
- 3.3.6) The contact between cylinder packing and piston rod should be strict without air leakage;
- 3.3.7 All electrical instruments and regulating devices of the compressor shall meet

the technical requirements of the relevant professional technical regulations;

3.3.8 The problems found in the no-load test of the compressor should be eliminated in time after shutdown, and the next stage can be entered after passing the inspection.

### 3.4 管线吹除及负荷试车

#### 3.4.1 管线吹除

凡是压缩气体通过的管道都要进行吹除。吹除过程中不断用手锤敲击管道和焊接处，从而使一些杂物、脏物被吹掉。

吹除用的气体由本压缩机自己供给，也可由别的压缩机供给。吹除所用气体的压力一般不超过 0.3MPa，从第一级开始逐级吹除，边吹除边安装，吹除完了，也就安装好了。吹除所需时间，视各压缩机的具体情况而定，一般要求吹到最末级排出干净气体为止。

#### 3.4.2 压缩机的负荷试车

压缩机负荷试车是试车过程中最重要的一个阶段，其目的在于检查压缩机各级压力增加，作用力加强之后，还存在哪些故障和问题，若有，应及时的进行排除。

试车时，可先空转 30min，当无异常现象后，可分成 3~5 个阶段分次逐步提高压力。每次加压后均需连续运转 2h。满负荷后，连续运转 72h 以上。

### 3.4 Pipeline blow-down and load test

#### 3.4.1 Pipeline blowdown

All the pipes through which the compressed gas passes have to be blown out. In the process of blowing away, the pipes and the welding places are constantly struck with the hand hammer, so that some sundries and dirt are blown off.

The air/gas for blowing is supplied by the compressor itself or by other compressor. The pressure of the air/gas used for blowing is generally not more than 0.3MPa. From the first stage, starting step by step, it is being installed while blowing. After blowing, its installation is finished. The required time of blowing depends on the specific situation of each compressor, generally required to blow to the last stage, until it could discharge clean air/gas.

#### 3.4.2 Load test of the compressor

Compressor load test is the most important stage in the test process. Its purpose is to check the pressure at all stages of the compressor, after the force is strengthened, what faults and problems exist, if any, it should be eliminated in time.

During the test run, it can be no-load running for 30min. When there is no abnormal phenomenon, it can be divided into 3~5 stages to gradually increase the pressure. It should be run continuously for 2h after each pressure period. After full load, continuous operation should be more than 72h.

### 3.5、负荷试车中检查项目

3.5.1 检查压力和各级温度分配情况，压力和温度均应符合技术要求。

3.5.2 检查各级冷却器和气缸的冷却水温度，水温应符合规定。水流应正常，没有断断续续的流动和产生气泡、堵塞等现象。

3.5.3 检查各处仪表及自动控制装置的灵敏度。 4、检查各供油点漏油的情况。

3.5.4 检查摩擦部分（指机身、滑道、填料函、轴承）发热情况。

3.5.6 检查各部分有无撞击声、杂音或振动现象。各连接部分不得有松动。

3.5.7 检查各级油水分离器和缓冲器的排油水情况。

3.5.8 检查全部管路有无振动和摩擦现象。

3.5.9 检查压缩机组各电动机的电流变化和温升情况。

3.5.10 所有连接处有没有松动的现象。

3.5.11 电动机温升及电流值应在规定范围之内。

3.5.12 各连接法兰部分、油封、进气阀、气缸盖和水套等不得漏气、漏油或漏水

3.5.13 进、排气阀的工作应正常，安全阀应灵敏。

在运转中每隔 30min 作记录一次，将运转中发现的问题及时报告并作记录，以便检修。

### 3.5. Inspection items in the load test run

3.5.1 Check the pressure and temperature distribution of all stages, and the pressure and temperature shall meet the technical requirements.

3.5.2 Check the cooling water temperature of the coolers and cylinders, and the water temperature shall meet the regulations. The water flow should be normal, without

intermittent flow and bubbles, blockage and other phenomena.

3.5.3 Check the sensitivity of various instruments and automatic control devices. 4. Check the oil leakage situation at each oil supply point.

3.5.4 Check the heating condition of friction part (referring to fuselage, slide, packing function and bearing).

3.5.6 Check each parts for impact, noise or vibration. Each connection part shall not be loose.

3.5.7 Check the oil and water discharge of oil and water separator and buffers at all stages.

3.5.8 Check whether all pipes have vibration and friction phenomenon.

3.5.9 Check the current change and temperature rise of each motor of the compressor unit.

3.5.10 Whether all the connections are loosened.

3.5.11 The temperature rise and current value of the motor shall be within the specified range.

3.5.12 Each connecting flange, oil seal, inlet valve, cylinder head and water sleeve shall not leak gas/air, oil or water.

3.5.13 The inlet and exhaust valves shall work normally, and the safety valves shall be sensitive.

Record them every 30min in the operation, and report the problems found in the operation in time and record them for maintenance.

### 3.6 负荷试车后的检查项目

3.6.1 检查主轴承与轴的配合情况，温度不得超过 60° C。

3.6.2 拆开连杆、检查大、小头轴瓦及十字头销处的配合情况；拆下各级气缸，检查各级气缸镜面及活塞杆表面磨损情况，不应有磨痕及拉毛现象。

3.6.3 拆下各级气缸的进口气阀进行清洗。检查阀片及阀体的贴合情况，阀片如有裂纹时，以备件更换之。

3.6.4 检查各部分螺栓的紧固情况，尤其要注意检查连杆螺栓的紧固情况。

3.6.5 全面检查电动机各部分情况。

3.6.6 复测各级气缸和主轴的水平情况。

3.6.7 连杆轴承、填料函和活塞杆、十字头销及衬套，十字头滑板与机身导轨的温度不得超过 60° C。

3.6.8 机身油温不高于 60 ° C，而无十字头的压缩机应不高于 70 ° C。

3.6.9 运动机件所有得摩擦表面情况良好、无烧、擦伤痕。

### 3.6 Inspection items after the load test run

3.6.1 Check the cooperation between the main bearing and the shaft, and the temperature shall not exceed 60°C.

3.6.2 Disassembly the connecting rod, check the coordination of large and small head bearings and cross pin; remove the cylinders at all stages, check the surface wear of the cylinder mirror and piston rod, it must be without wear and tear.

3.6.3 Remove the inlet and outlet air valves of the cylinders at all stages for cleaning. Check the fit of the valve piece and the valve body. If the valve piece cracks, replace it with spare parts.

3.6.4 Check the fastening of the bolts of each part, especially pay attention to check the fastening of the connecting rod bolts.

3.6.5 Comprehensive inspection of all parts of the motor.

3.6.6 Test the level of cylinders and main shaft at all stages.

3.6.7 The temperature of connecting rod bearing, stuffing box, piston rod, cross head pin and bush, cross head skateboard and body guide rail shall not exceed 60°C.

3.6.8 The oil temperature of the body should be not higher than 60°C, and the compressor without crosshead should not be higher than 70°C.

3.6.9 The friction surfaces of all the moving parts are in good condition, without burning and rubbing scars.

### 4. 试车注意事项

4.1 压缩机试车注意事项及停车步骤：

4.1.1 所有操作阀门应指定专人进行操作，无关人员不准乱动

- 4.1.2 压缩机运转中严禁任何修理工作。
- 4.1.3 冬季试车应采取防冻措施。
- 4.1.4 在升压过程中应注意观察压缩机各部件运转情况，升压告一阶段，稳定 20min 之后，进行全面检查。
- 4.2 一般性停车  
压缩机一般性停车由试车小组负责人通知操作人员按如下步骤进行：
  - 4.2.1 从压缩机末级开始，依次用卸载阀和放油水阀逐渐降压，不得过快。
  - 4.2.2 由电机操作人员关闭电动机。
  - 4.2.3 电动机停转后，立即停止注油器供油，5min 后，关闭循环油泵。
- 4.3 事故停车  
在紧急情况下，带负荷的压缩机应紧急停车，停车后立即卸载，其方法同上 4.2。
- 4.4 再次试车  
为了检查再装配的可靠性，在负荷试车中所发现的故障是否已排除，因此，必须再次试车。其方法是使压缩机在全负荷下连续运转 8h，将各级安全阀调整好后再完成试车。试车阶段，应给予充分的润滑油量。试车合格后，随即更换润滑油。

此外，必须指出一点，当压缩介质不是空气的压缩机，采用空气进行负荷试车时，必须控制各级排气温度，最高排气温度不得超过 180 °C。冷却水的排出温度不得高于 40 °C。

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#### 4. Cautions for the test run

##### 4.1 Notice and shutdown steps for compressor commissioning:

- 4.1.1 All operating valves shall be operated by special personnel, and irrelevant personnel shall not be allowed to move them randomly.
- 4.1.2 Any repair work is prohibited during compressor operation.
- 4.1.3 Anti-freezing measures should be taken in winter commissioning.
- 4.1.4 In the process of pressure-up, observe the operation of the compressor components for 20min, then take full inspections.

##### 4.2 Daily shutdown

The routine shutdown of the compressor shall be notified by the head of the commissioning team to proceed as follows:

- 4.2.1 Starting from the last stage of the compressor, use the unloading valves and the oil discharge valves to lower pressure gradually, not too fast.
- 4.2.2 The motor should be closed by the motor operator.
- 4.2.3 After the motor stops, stop the oil supply immediately. After 5min, close the circulating oil pump.

##### 4.3 Accident shutdown

In case of emergency, the compressor with load should stop in an emergency and unload immediately after stopping, with the same method as 4.2.

##### 4.4 Re-test run

In order to check the reliability of the reassembly, whether the faults found in the load test run has been eliminated, so the test run must be taken again. The method is to make the compressor run continuously at full load for 8h, and complete the test run after adjusting the safety valves at all stages.

During the test run stage, a sufficient amount of lubricating oil should be given. After the test run is qualified, the lubricating oil should be replaced immediately.

In addition, it must be pointed out that when the working compression medium is not air but air is used for load test, the exhaust temperature of all stages must be controlled, and the maximum exhaust temperature shall not exceed 180°C. The discharge temperature of the cooling water shall not be higher than 40°C.

Anhui Hongshen Energy Equipment Co., LTD