ZHEJIANG REDBUD PUMP INDUSTRY CO., LTD.
No. 122, Houzhao Second District, Sulou Village, Yuanqiao Town, Huangyan District, Taizhou, Zhejiang, China

Sand Resistance Test Protocol for Submersible Borehole Pumps

Document No.: ZJH25581-TR-01 **Contract No.:** ZJH25581 dated 2025/10/28

English	中文
The tests described below were carried out at the factory of **ZHEJIANG REDBUD PUMP INDUSTRY CO., LTD.**, No. 122, Houzhao Second District, Sulou Village, Yuanqiao Town, Huangyan District, Taizhou, Zhejiang, China.	以下所述试验在**浙江红叶泵业有限公司**工厂内进行，地址：中国浙江省台州市黄岩区院桥镇苏楼村后赵二区122号。
The tests were performed in China and covered the operation of submersible borehole pumps with sand. The tests were completed successfully.	试验在中国进行，内容为潜水泵（井用潜水泵）含砂工况运行试验。试验已顺利完成。
This protocol has been drawn up by the Customer and is signed by the Manufacturer.	本记录由客户编制，并由制造商签署确认。

1. General Information — 基本信息

English	中文
Customer: LIMITED LIABILITY COMPANY GRAV GROUP, INN 5038107295, KPP 503801001, Russia, Moscow Region, Pushkino, Mamontovka Microdistrict, Elochki Street, 4a	**客户：** LIMITED LIABILITY COMPANY GRAV GROUP，INN 5038107295，KPP 503801001，俄罗斯，莫斯科州，普希金诺市，马蒙托夫卡小区，Elochki街4a号
Basis: Contract No. ZJH25581 dated 2025/10/28	**依据：** 2025年10月28日第ZJH25581号合同
Manufacturer: ZHEJIANG REDBUD PUMP INDUSTRY CO., LTD.	**制造商：** 浙江红叶泵业有限公司
Test object: Pump POWER WATER PW TF3-80, manufactured in batch No. ZJH25581	**试验对象：** POWER WATER PW TF3-80 泵，生产批次号 ZJH25581
Test start: 6 December 2025, 12:00	**试验开始：** 2025年12月6日12:00
Type of test: Long-term (endurance) test in sand-laden water	**试验类型：** 含砂水长期（耐久）试验

2. Test Rig and Test Conditions — 试验装置与试验条件

English	中文
The pump was placed in a cylindrical tank with a volume of **1.5 m³**.	泵置于容积为 **1.5 m³** 的圆柱形水箱内。
Exactly **1,000 litres of water** were poured into the tank, and **7 kg of sand** were added (in accordance with the requirements of GRAV GROUP).	箱内注入**正好1000升水**，并加入**7公斤砂**（按 GRAV GROUP 的要求）。
A **HDPE pipe, 32 mm**, was installed at the top and routed back down to the bottom of the tank through elbows, in order to prevent the sand from settling.	上部安装 **32 mm 的 HDPE（PE）管**，经弯头回落至水箱底部，以防止砂粒沉积。
Sand concentration in the test water: 7 kg per 1 m³.	试验水的含砂量：每1 m³ 水7 kg 砂。

3. Test 1 — 试验一

English	中文
The pump was started for **48 hours**.	泵连续运行 **48小时**。
Test end: 8 December 2025, 12:00.	**试验结束：** 2025年12月8日12:00。
The pump was opened and the hydraulic section was removed for inspection.	拆开泵体，取下液压部分（水力部件）进行检查。
Observations: light scuffing (polishing marks) was observed on the polycarbonate impeller chamber.	**观察结果：** 聚碳酸酯叶轮腔内可见轻微擦痕（磨痕）。
No changes on the impellers.	**叶轮无变化。**
The other components showed no changes.	其余部件未见变化。
The pump was reassembled and placed back into the tank.	泵已重新装配并放回水箱。

4. Test 2 — 试验二

English	中文
The pump was started under the same conditions for **30 days**.	泵在相同条件下继续运行 **30天**。
Test end: 7 January 2026, 12:00.	**试验结束：** 2026年1月7日12:00。

English	中文
The pump was opened and the hydraulic section was removed for inspection.	拆开泵体，取下液压部分（水力部件）进行检查。
Observations: matting (loss of surface gloss) was observed on the polycarbonate impeller chamber; in the areas where the impellers rotate, the matting is at its maximum.	**观察结果：** 聚碳酸酯叶轮腔出现雾化（发白、失去光泽）；在叶轮转动部位雾化程度最大。
No changes on the impellers.	**叶轮无变化。**
The other components showed no changes.	其余部件未见变化。
The slow-drain valve operates correctly.	慢排阀工作正常。
The motor shaft seals show no changes.	电机轴封未见变化。
The pump was reassembled and placed back into the tank.	泵已重新装配并放回水箱。

5. Test 3 — 试验三

English	中文
The pump was started for **5 months** (total test time **6 months**).	泵运行 **5个月**（累计试验时间 **6个月**）。
Test end: 7 June 2026, 12:00.	**试验结束：** 2026年6月7日12:00。
The pump was opened and the hydraulic section was removed for inspection.	拆开泵体，取下液压部分（水力部件）进行检查。
Observations: matting was observed on the polycarbonate impeller chamber; in the areas where the impellers rotate, the matting is at its maximum. **Remaining plastic: 78 %.**	**观察结果：** 聚碳酸酯叶轮腔出现雾化；在叶轮转动部位雾化程度最大。**塑料剩余量：78%。**
Changes on the impellers: at the edges of the vanes; **the vanes are worn by 10 %**.	**叶轮变化：** 叶片边缘处，**叶片磨损10%。**
Matting was noted on the entire hydraulic section.	整个水力部分均可见雾化现象。
The slow-drain valve operates correctly and is matted.	慢排阀工作正常，并已雾化。
The motor shaft seals show no changes.	电机轴封未见变化。
The pump was reassembled and placed back into the tank.	泵已重新装配并放回水箱。
Next inspection: after **6 months**, i.e. 7 December 2026.	**下次拆检：** **6个月**后，即2026年12月7日。

6. Summary of Test Results — 试验结果汇总

Parameter / 项目	Test 1 试验一	Test 2 试验二	Test 3 试验三
Duration / 运行时间	48 h / 48小时	30 days / 30天	5 months / 5个月
End of test / 结束时间	2025-12-08 12:00	2026-01-07 12:00	2026-06-07 12:00
Impeller chamber / 叶轮腔	Light scuffing 轻微擦痕	Matting, maximum at rotation areas 雾化，转动部位最重	Matting, remaining plastic 78 % 雾化，塑料剩余78%
Impellers / 叶轮	No changes 无变化	No changes 无变化	Vane edges worn 10 % 叶片边缘磨损10%
Other components / 其余部件	No changes 无变化	No changes 无变化	Hydraulic section matted 水力部分雾化
Slow-drain valve / 慢排阀	—	Correct / 正常	Correct, matted / 正常，已雾化
Motor shaft seals / 电机轴封	—	No changes / 无变化	No changes / 无变化

7. Laboratory Conclusion — 实验室结论

English	中文
The pump is capable of operating for a long period of time.	该泵能够长时间连续运行。
The pump is capable of operating at the rated data of **3 kg/m³** of sand for **5–7 years**, taking into account the correlation with the severe test conditions.	在额定含砂量 **3 kg/m³** 条件下，考虑与严苛试验条件的相关性，该泵可运行 **5–7年**。
The expected service life of the pump under conditions where the sand content is increased from 3 kg/m³ to **7 kg/m³** is estimated at **2–3 years**.	当含砂量由 3 kg/m³ 提高至 **7 kg/m³** 时，该泵的预计使用寿命为 **2–3年**。

8. Signatures — 签署

English	中文
Chief Engineer of the Technical Control Department	**技术检验部总工程师**
Signature: _____	签字：_____
Name: Chén Yǔháo 陈宇浩	姓名：陈宇浩
Date: 2026-06-12	日期：2026/06/12

浙江紫荆花泵业有限公司
ZHEJIANG REDBUD PUMP INDUSTRY CO.,LTD.