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Date edition: 12/2006

Failure Analysis System Procedure

6" Z6-ZN6 Submersible Electric Pump

1) Pump applications

• Water distribution;
• industrial washing;
• pressurization;
• irrigation;
• industrial system;
• fire fighting;
• reverse osmosis.

2) Critical items of application

2.1) Liquid
• Max liquid temperature: from 20°C to 30°C depending from installation conditions and motor power.
  - if liquid temperature is greater than limits, motor overheats.
• Max amount of sand in water: 50 g/m^3.
  - excessive presence of sand generates wear of impellers and wear rings, so a decrease of performances.
• Liquid must not be brackishwater, seawater or corrosive.
  - corrosions are caused by incorrect applications (inadequate ground system, leakage current, stray current, unsuitable pumped liquid...) and they cannot be inputed to product or constructive materials.

2.2) Installation:
• Max depht of immersion: 150 m (OS6 motors), 250 m (L6C motors), 350 m (F6 motors):
  - an excessive depht of immersion causes over heating of motor.
• Installation of non return valve at 10 m from delivery and another nonreturn valve for anyone of 30 ÷ 50 m of pipeline:
  - lack or insufficient presence of nonreturn valve, generates a great water hammer, so damaging of pump.
• It must be guarantee a minimum distance of 1 m between pump and bottom of well:
  - if pump is too near the bottom, it can suck deposited solid parts, witch obstruct the filter and damages the pump.

2.3) Motor cupling
• Pump can be cupled with 6" encapsulated motors or oil filled motors with power from 3 kW to 37 kW.

3) Inspection of defected product

3.1) Preliminary information
To receveing of defected product, require of Customer:
• purchase date (if possible, confirmed by bill or sale slip);
• installation date;
• conditions of installation.

3.2) External visual inspection
• External aspect of product
Corrosion on metal surface or on welds (with little holing) are an indication of incorrect or unsuitable use (see 2.1, 2.2, and 2.3) and exclude an acknowledgment of technical warrant.
Product analyse stop and repair (if required) is made for a fee.
If there are not elements of objection, go on with inspections in 4.3.

3.3) Preliminary inspections
• Data in plate:
  - type of product and code;
  - series number;
  - manufacturing date;
• Welds and dents in the jacket.
• Integrity of lower suction casing

4) Disassembly and analysis

• Remove the filter:
  - check presence of sand or earth deposits.

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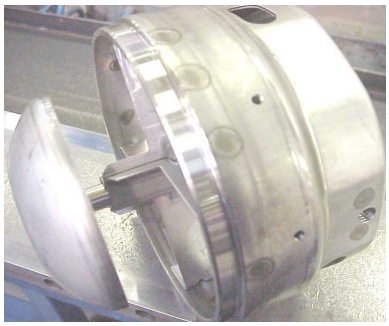
• Unscrew sleeve lock screws, remove external sleeve and check:
  - upper head;
  - non return valve.



• Unscrew impellers lock screw, so check conditions of:
  - upper support with bush bearing;
  - diffuser cover (if present) with wear ring;
  - diffusers and impellers.
• Check the possible presence of foreign matters.

• Remove initial spacer and lower support

• Remove the thrust washer and check his conditions.

• Examine condition of shaft and coupling

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5) Check list

Type of problem

- ☐ Does not delivery water
- ☐ Low performance
- ☐ Noisy
- ☐ Further:

Pump data

Type:
Code:
Series number:
Installation date:
Manufacturing date:
Liquid pumped:
Temperature:
Note:

6" submersible pump failure causes required for claim opening

Where	What	Why	
300 Total hydraulic	300 Low performance	106 Uncorrect assembly/testing of components	
		112 Not complying components tooling	
		300 Wrong rating plate/packing	
		100 Further (supply detailed description of failure)	
		103 Not complying/unsuitable applications	
		119 Normal wear	
		120 Excessive wear	
		101 Further:	
300 Total hydraulic	104 Noisy / locked / vibrate	106 Uncorrect assembly/testing of components	
		112 Not complying components tooling	
		114 Hydraulic rotating part locked	
		100 Further (supply detailed description of failure)	
		103 Not complying/unsuitable applications	
		119 Normal wear	
		120 Excessive wear	
		101 Further:	
403 Pump sleeve	400 Leak	106 Uncorrect assembly/testing of components	
		112 Not complying components tooling	
		100 Further (supply detailed description of failure)	
		103 Not complying/unsuitable applications	
		119 Normal wear	
		120 Excessive wear	
		101 Further:	
404 OR/Mechanical seal	400 Leak	106 Uncorrect assembly/testing of components	
		112 Not complying components tooling	
		100 Further (supply detailed description of failure)	
		103 Not complying/unsuitable applications	
		119 Normal wear	
		120 Excessive wear	
		101 Further:	
408 Pump shaft/joint	401 Broken/cracked	106 Uncorrect assembly/testing of components	
		112 Not complying components tooling	
		100 Further (supply detailed description of failure)	
		103 Not complying/unsuitable applications	
		119 Normal wear	
		120 Excessive wear	
		101 Further:	
600 Product	600 Wrong rating plate packing	106 Uncorrect assembly/testing of components	
	601 Wrong product document	200 Lack of technical / commercial information	
	602 Not acknowledgment of warranty	600 Out of legal warranty period	
		601 Product tampering	

7) Faq

Problem founded	Possible causes of the problem
Pump does not start	Power supply problems: • no power; • unconnected cable or damaged; • supply voltage too low; • starting drop voltage too high; Fuses burnt. Circuit breaker not calibrated. 2 phases powered. Mechanical seal stuck. Stator slot interrupted. Pump shaft broken. Activation of level probes. Excessive operating depht. Hydraulic locked. Faulty stator
Pump does not delivery water	Water level has dropped Depht of installation too low Delivery outlet clogged Pump shaft broken Clogged filter
Low performance	Water level has dropped Delivery outlet clogged Clogged non return valve Pump shaft broken Wrong connections in the motor System leaks Dirty filter Wear of hydraulic part Wear of wear ring Pump run in the opposite way Wrong pump, undersized
Does not stops	Level probe defected Leaks in system
Noisy	Motor bearings damaged Unbalanced hydraulic Impellers slides on diffusers
Starts and stops too frequently	Pump oversized Pressure switch not calibrated Liquid temperature too high Excessive power input Leaks in system
Runs slowly	Wrong windings connections inside the motor

Execessive power input	Uncorrect voltage Windings defected Motor supplied with 2 phases instead of 3 Presence of sand or other foreign matters inside of pump Wrong pump Pump defected Motor bearings and/or thrust washer defected
Hydraulic locked	Liquid unsuitable Presence of foreign matters in pump

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6) Failure tree (6" submersible pump)