

## DIAGNOSTIC CHART FOR CENTRIFUGAL PUMP TROUBLES

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(source of information unknown)

PROBLEM	POSSIBLE CAUSES
Pump does not deliver water	1—2—3—4—6—11—14—16—17—22—23
Insufficient capacity delivered	2—3—4—5—6—7—8—9—10—13—16—19—21—22—28—29—30
Insufficient pressure delivered	5—13—15—16—19—21—28—29—30
Pump loses prime after starting	2—3—5—6—7—8—10—11—12
Pump requires excessive power	14—15—16—17—18—19—22—23—25—26—28—32—33—36
Stuffing box leaks excessively	12—23—25—31—32—33—34—35—37—38—39
Packing has short life	11—12—23—25—27—31—32—33—34—35—36—37—38—39
Pump vibrates or is noisy	2—3—4—9—10—20—22—23—24—25—26—27—29—34—35—40— 41—42—43—44—45—46
Bearings have short life	23—25—26—27—34—35—40—41—42—43—44—45—46
Pump overheats and seizes	1—4—20—21—23—26—27—34—35—40

### LIST OF POSSIBLE CAUSES

#### Suction troubles

1. Pump not primed
2. Pump or suction pipe not completely filled with liquid
3. Suction pipe lift too high
4. Insufficient margin between suction pressure and vapor pressure
5. Excessive amount of air or gas in liquid
6. Air pocket in suction line
7. Air leaks in suction line
8. Air leaks into pump through stuffing box
9. Foot valve too small or partially clogged
10. Inlet of suction pipe insufficiently submerged
11. Water seal pipe plugged
12. Seal cage improperly located in stuffing box, preventing sealing fluid entering space to form seal

#### System troubles

13. Speed too low
14. Speed too high
15. Wrong direction of rotation
16. Total head of system higher than design head of pump
17. Total head of system lower than design head of pump
18. Specific gravity of liquid different from design
19. Viscosity of liquid different from design criteria
20. Operation at very low capacity
21. Parallel operation of pumps unsuitable for such operation

#### Mechanical troubles

22. Foreign matter in impeller
23. Misalignment
24. Foundations not rigid

25. Shaft bent
26. Rotating part rubbing on stationary part
27. Bearings worn
28. Wearing rings worn
29. Impeller damaged
30. Casing gasket defective permitting internal leakage
31. Shaft or shaft sleeves worn or scored at the packing
32. Packing improperly installed
33. Incorrect type of packing for operating conditions
34. Shaft running off center because of worn bearings or misalignment
35. Rotor out of balance resulting in vibration
36. Gland too tight resulting in no flow of liquid to lubricate packing
37. Failure to provide cooling liquid to water cooled stuffing box
38. Excessive clearance at bottom of stuffing box between the shaft and casing, causing packing to be forced into pump interior
39. Dirt or grit in sealing liquid, leading to scoring of shaft or shaft sleeves
40. Excessive thrust caused by a mechanical failure inside the pump or by the failure of the hydraulic balancing device, if any
41. Excessive grease or oil in bearing housing or lack of cooling, causing excessive bearing temperature
42. Lack of lubrication
43. Improper installation of antifriction bearings (damage during assembly, incorrect assembly of stacked bearings, use of unmatched bearings as a pair, etc.)
44. Dirt getting into bearings
45. Rusting of bearings due to water getting into housing
46. Excessive cooling of water cooled bearing resulting in condensation in the bearing housing from moisture in the atmosphere