

## DIAGNOSTIC CHART FOR CENTRIFUGAL PUMP TROUBLES

SYMPTOMS	POSSIBLE CAUSES OF TROUBLE
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—11—14—17—20—22—23—29—30—31
Insufficient pressure delivered	5—14—16—17—20—22—29—30—31
Pump loses prime after starting	2—3—5—6—7—8—11—12—13
Pump requires excessive power	15—16—17—18—19—20—23—24—26—27—29—33—34—37
Stuffing box leaks excessively	13—24—26—32—33—34—35—36—38—39—40
Packing has short life	12—13—24—26—28—32—33—34—35—36—37—38—39—40
Pump vibrates or is noisy	2—3—4—9—10—11—21—23—24—25—26—27—28—30—35—36—41—42—43—44—45—46—47
Bearings have short life	24—26—27—28—35—36—41—42—43—44—45—46—47
Pump overheats and seizes	1—4—21—22—24—27—28—35—36—41

### 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
10. Foot valve partially clogged
11. Inlet of suction pipe insufficiently submerged
12. Water seal pipe plugged
13. Seal cage improperly located in stuffing box, preventing sealing fluid entering space to form seal

#### System troubles

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

#### Mechanical troubles

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

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