

Irrigation System Walk-through Inspection Analysis

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This “walk-through” worksheet provides a method for making an organized inspection of an entire irrigation system, both hydraulics and hardware. This inspection will help identify components that need maintenance, repair, replacement, or other attention—so that the system will provide the most satisfactory, safe, and efficient performance.

	OK	Needs attention		OK	Needs attention
Suction system					
Inspect system from water supply to pump intake. Generally, suction line should provide smooth water flow with a minimum of fittings that cause obstructions, water turbulence, or head losses.					
From surface supplies and shallow wells					
Note: On shallow wells with above-ground pump mounting, consider pulling suction line to make standard (%) checks.					
1. Trash screening device (if used) clean and properly placed.	_____	_____	*7. Suction pipe inlet submerged adequately to prevent entrance of air and eddying of water.	_____	_____
*2. Intake screen clean, good condition, properly placed.	_____	_____	*8. Suction line free of air leaks.	_____	_____
*3. Foot of check valve operating smoothly.	_____	_____	*9. No unnecessary or undersized plumbing fittings in suction line to increase friction losses.	_____	_____
*4. Suction line does not collapse when pumping.	_____	_____	10. Elbows, bends of flanged type.	_____	_____
*5. Suction pipe size/pump capacity properly matched to maintain flow velocity at 5 feet per second (fps) or less (preferably 2–3 fps).	_____	_____	*11. Couplings flanged or smooth interior bore.	_____	_____
*6. Maximum elevation rise from water surface to pump impeller eye does not exceed 10 feet. Required net positive suction head (NPSH) must not exceed NPSH available; see pump performance curve.	_____	_____	12. Eccentric adapter to pump with 12° taper (not over 28°).	_____	_____
			13. Eccentric adapter installed with slope on bottom side.	_____	_____
			14. Straight pipe at least 4 diameters in length before pump inlet to reduce water turbulence, cavitation.	_____	_____
			15. Horizontal suction line to pump sloped upward at least ¼ inch per foot.	_____	_____
			16. High point of suction line at pump entrance to eliminate air entrapment.	_____	_____
			17. Vacuum gauge or port installed on suction line.	_____	_____
			18. No part of suction piping smaller in diameter than pump suction inlet.	_____	_____
			Hugh J. Hansen, Extension agricultural engineer emeritus; and Walter L. Trimmer, former Extension irrigation specialist; Oregon State University.		

	OK	Needs attention
From deep wells		
1. Well casings properly located and perforated to allow water intake without cascading or introducing air into impellers.	_____	_____
2. Bowls set below water drawdown level.	_____	_____
3. Bowl settings properly adjusted.	_____	_____

Pump and fittings

Inspect pump assembly with its associated inlet and discharge fittings. Consider motor separately.

Above-ground centrifugal pumps

1. Sturdy pump base with pump firmly attached.	_____	_____
2. Intake pipe firmly supported within 3 feet of pump.	_____	_____
3. Discharge pipe firmly supported within 3 feet of pump.	_____	_____
4. Impeller rotates freely in casing.	_____	_____
5. Pump operates with no excess vibration.	_____	_____
6. Bearings in good condition.	_____	_____
7. Shaft properly aligned with motor.	_____	_____
8. Impeller firmly attached to shaft.	_____	_____
9. Stuffing, seals, shaft packing adjusted for proper water drip lubrication.	_____	_____
10. Wear ring in good condition with no deposition, cavitation, or abnormal configuration.	_____	_____
11. Water velocity in pipeline at 5 fps or less.	_____	_____
12. Pressure gauge or port at pump discharge.	_____	_____
13. Discharge increaser has 1/2" taper (maximum 28°).	_____	_____
14. Increaser near as possible to pump.	_____	_____
15. Straight pipe run out of pump discharge to minimize turbulence (for flow measurement).	_____	_____

	OK	Needs attention
16. No unnecessary or undersized fittings in discharge line that increase friction losses: Size, location of tees Size, location of elbows, bends Size, location of valves Size, location of couplings, unions Size, location, taper of enlargers	_____	_____
17. Flow meter with low flow restriction.	_____	_____
18. Air relief valve at high point in system to release trapped air.	_____	_____
19. Isolation valve on primer pump.	_____	_____

Deep well turbines

1. Sturdy motor base; motor firmly supported.	_____	_____
2. Discharge pipe firmly supported.	_____	_____
3. Pump operates with no excess vibration.	_____	_____
4. Pump lubricated with turbine-type oil.	_____	_____
5. Oilers working properly.	_____	_____
6. Working air line in well to measure drawdown.	_____	_____
7. Water velocity in pipeline at 5 fps or less.	_____	_____
8. Pressure gauge or port in discharge line.	_____	_____
9. Concentric discharge fitting, if appropriate.	_____	_____
10. Straight pipe run out of pump discharge to minimize turbulence (for flow measurement).	_____	_____
11. No unnecessary or undersized plumbing fittings in discharge line that increase friction losses: Size, location of tees Size, location of elbows, bends Size, location of valves Size, location of couplings, unions Size, location, taper of enlargers	_____	_____
12. Flow meter with low-flow restriction.	_____	_____
13. Air relief valve at high point in system to release trapped air.	_____	_____

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Electric motor

Inspect motor for mechanical and electrical soundness.

- | | OK | Needs attention |
|---|-------|-----------------|
| 1. Sturdy base mounting. | _____ | _____ |
| 2. Proper shaft alignment with pump. | _____ | _____ |
| 3. Proper belt alignment and tension between motor and pump. | _____ | _____ |
| 4. Motor bearings in good condition, properly lubricated. | _____ | _____ |
| 5. Motor frame free of debris, vegetation, straw, caked-on dirt and oil, rodent or insect nests. | _____ | _____ |
| 6. Motor ventilation vents open, unobstructed, and protected with ¼- to ½-inch mesh screen. | _____ | _____ |
| 7. Cover over motor for shade and rain protection. | _____ | _____ |
| 8. Unobstructed ventilation around motor—if in motor house, ample-sized openings on opposite walls for ventilation. | _____ | _____ |
| 9. Good drainage away from motor base. | _____ | _____ |
| 10. Wiring to motor in good, safe condition. | _____ | _____ |
| 11. Safety shields attached and functioning. | _____ | _____ |
| 12. Access plates and cover dome in place and secure. | _____ | _____ |
| 13. Motor free of evidence of excess heat due to electrical overloading. | _____ | _____ |
| 14. Motor runs quietly, free of excess vibration or noise. | _____ | _____ |

Electric service

Inspect electric service for safety and serviceability.

- | | | |
|---|-------|-------|
| 1. Overhead lines free of tree branches, other physical obstructions. | _____ | _____ |
| 2. Conductors properly secured to prevent flexing, sparking hazards. | _____ | _____ |
| 3. Conductors free of frayed, cracked, or worn insulation. | _____ | _____ |
| 4. Service panel properly grounded independently of pumping plant. | _____ | _____ |
| 5. Service head grommets in place, in good condition. | _____ | _____ |
| 6. All conduit or shielded cable in good condition. | _____ | _____ |

Mainline system

Inspect entire mainline from pump to terminal end.

- | | OK | Needs attention |
|---|-------|-----------------|
| 7. Service panel properly, securely installed. | _____ | _____ |
| 8. Service panel has functioning interlocking door latches, padlock. | _____ | _____ |
| 9. Service panel door has adequate seals and/or drip traps. | _____ | _____ |
| 10. Service panel free of open holes, missing knockout plugs. | _____ | _____ |
| 11. Electrical connections within service panel secure, free of signs of arcing. | _____ | _____ |
| 12. Service panel interior free of moisture, corrosion, insects, rodents, snakes. | _____ | _____ |
| 13. Lightning arrestors properly installed on meter and motor side of buss and breaker. | _____ | _____ |
| 14. Overload protection properly sized. | _____ | _____ |
| 15. Circuit breakers operable, no plugs or copper bars used in place of fuses. | _____ | _____ |
| 16. Shade over service panel to cool thermal breakers. | _____ | _____ |

Mainline system

Inspect entire mainline from pump to terminal end.

- | | | |
|--|-------|-------|
| 1. Pipe condition: | | |
| Bent or flattened piping | _____ | _____ |
| Split seams | _____ | _____ |
| Bullet holes or other punctures | _____ | _____ |
| Leaky joints, connections, valves | _____ | _____ |
| Gaskets worn, sand or dirt behind | _____ | _____ |
| Leaky end plugs | _____ | _____ |
| 2. If buried, mainline protected and covered. | _____ | _____ |
| 3. Evidence of sink holes indicating unsupported piping. | _____ | _____ |
| 4. Line designed and sized for minimum hydraulic turbulence or friction. | _____ | _____ |
| 5. Pipe size adequate to handle water discharge at flow rate of 5 fps or less. | _____ | _____ |

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	OK	Needs attention
6. No unnecessary or undersized plumbing fittings in line to increase friction losses:		
Elbows, bends	_____	_____
Tees	_____	_____
Valves	_____	_____
Reducers, enlargers	_____	_____
Couplings, unions	_____	_____
7. Flow meter with low flow restriction.	_____	_____
8. Air release valves and vacuum relief installed as needed on high points of line.	_____	_____
9. Provision made to drain and flush line if subject to freezing.	_____	_____
10. Line equipped with check valve, if needed.	_____	_____
11. Pressure relief valve set at 10 psi above normal operating pressure.	_____	_____

Stationary and moving laterals

1. System layout compatible with topography; if not, appropriate pressure control devices used.	_____	_____
2. Lateral spacing on mainline satisfactory.	_____	_____
3. Adequate water flow rate and pressure.	_____	_____
4. System free of leaks from breaks, couplers, drain valves, risers, end plugs.	_____	_____
5. System free of excessive corrosion or wear.	_____	_____

	OK	Needs attention
6. Chains, bearings, drive gears of all wheelmove systems in good operating condition.	_____	_____
7. Electric motors covered and protected.	_____	_____
8. Pipe condition:		
Bent or flattened piping	_____	_____
Split seams	_____	_____
Bullet holes or other punctures	_____	_____
Leaky joints, connections, valves	_____	_____
Gaskets worn, sand or dirt behind	_____	_____

Risers and sprinklers

Walk the entire sprinkler line to inspect the following:

1. Mainline valves and gaskets in good condition.	_____	_____
2. Risers all in place, no broken units.	_____	_____
3. Self-leveler risers operating freely, properly aligned.	_____	_____
4. Sprinkler heads operating properly, no plugged nozzles.	_____	_____
5. Sprinkler nozzles properly sized, not worn (check orifice by using shank of high-speed drill bit as a gauge).	_____	_____
6. Sprinkler heads rotate smoothly and freely at 1 to 2 revolutions per minute.	_____	_____
7. Sprinkler head base gaskets in good condition.	_____	_____
8. Visual inspection of each sprinkler indicates uniform application pattern.	_____	_____
9. Pressure at sprinkler appropriate.	_____	_____
10. Sprinklers match operating pressure.	_____	_____

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