

Irrigation System Walk-through Inspection Analysis

H. Hansen and W. Trimmer

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

		Needs		0.77	Needs
	OK	attention		OK	attention
From deep wells			16. No unnecessary or undersized fittings in discharge line that increase		
1. Well casings properly located and			friction losses:		
without cascading or introducing air			Size, location of tees		
into impellers.			Size, location of elbows, bends		
2. Bowls set below water drawdown			Size, location of valves		
level.			Size, location of couplings, unions		
3. Bowl settings properly adjusted.			Size, location, taper of enlargers		
			17. Flow meter with low flow restriction.		
Pump and fittings			18. Air relief valve at high point in		
Inspect pump assembly with its associ-			system to release trapped air.		
ated inlet and discharge fittings. Consider motor separately			19. Isolation valve on primer pump.		
			Deep well turbines		
Above-ground			1. Sturdy motor base; motor firmly		
centrifugal pumps			supported.		
1. Sturdy pump base with pump firmly			2. Discharge pipe firmly supported.		
attached.			3. Pump operates with no excess		
2. Intake pipe firmly supported within 3 feet of pump			vibration.		
3 Discharge nine firmly supported			4. Pump lubricated with turbine-type		
within 3 feet of pump.			5 Oilers working properly		
4. Impeller rotates freely in casing.			6 Working airline in well to measure		
5. Pump operates with no excess			drawdown.		
vibration.			7. Water velocity in pipeline at 5 fps or		
6. Bearings in good condition.			less.		
7. Shaft properly aligned with motor.			8. Pressure gauge or port in discharge		
8. Impeller firmly attached to shaft.			line.		
9. Stuffing, seals, shaft packing			9. Concentric discharge fitting, if		
adjusted for proper water drip			appropriate.		
lubrication.			10. Straight pipe run out of pump		
10. Wear ring in good condition with no			discharge to minimize turbulence		
configuration			(10) How measurement).		
11 Water velocity in pipeline at 5 fps or			nlumbing fittings in discharge line		
less.			that increase friction losses:		
12. Pressure gauge or port at pump			Size, location of tees		
discharge.			Size, location of elbows, bends		
13. Discharge increaser has 12° taper			Size, location of valves		
(maximum 28°).			Size, location of couplings, unions		
14. Increaser near as possible to pump.			Size, location, taper of enlargers		
15. Straight pipe run out of pump			12. Flow meter with low-flow restric-		
discharge to minimize turbulence			tion.		
(for flow measurement).			13. Air relief valve at high point in		
			system to release trapped air.		

			Needs
		OK	attention
Ele	ectric motor		
Insp	pect motor for mechanical and		
elec	ctrical soundness.		
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, vegeta-		
	tion, straw, caked-on dirt and oil,		
_	rodent or insect nests.		
6.	Motor ventilation vents open,		
	$\frac{1}{4}$ to $\frac{1}{2}$ -inch mesh screen		
7	Cover over motor for shade and rain		
7.	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		
11	condition.		
11.	safety shields attached and function-		
12	Access plates and cover dome in		
12.	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.		
Ele	ectric service		
Insp	pect electric service for safety and		
serv	viceability.		
1.	Overhead lines free of tree branches,		
	other physical obstructions.		
2.	Conductors properly secured to		
2	prevent flexing, shorting hazards.		
3.	Conductors tree of trayed, cracked,		
4	or worn insulation.		
4.	independently of pumping plant		
5	Service head grommets in place in		
5.	good condition.		
6.	All conduit or shielded cable in good		
	condition.		

		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 slugs 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.

less.

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 mini-	
	mum hydraulic turbulence or	
	friction.	
5.	Pipe size adequate to handle water	
	discharge at flow rate of 5 fps or	

		ОК	Needs attention		ОК	Needs attention
6.	No unnecessary or undersized plumbing fittings in line to increase friction losses:			 6. Chains, bearings, drive gears of all wheelmove systems in good operating condition. 		
	Elbows, bends Tees Valves Reducers, enlargers			 7. Electric motors covered and pro- tected. 8. Pipe condition: Bent or flattened piping 		
7. 8.	Couplings, unions Flow meter with low flow restriction. Air release valves and vacuum relief installed as needed on high points of line.			Split seams Bullet holes or other punctures Leaky joints, connections, valves Gaskets worn, sand or dirt behind		
9. 10.	Provision made to drain and flush line if subject to freezing. Line equipped with check valve, if needed			Risers and sprinklers Walk the entire sprinkler line to inspect the following:		
11.	Pressure relief valve set at 10 psi above normal operating pressure.			 Mainline valves and gaskets in good condition. Risers all in place, no broken units. Self-leveler risers operating freely 		
Sta	ationary and			properly aligned.		
m	oving laterals			4. Sprinkler heads operating properly,		
1. 2. 3.	System layout compatible with topography; if not, appropriate pressure control devices used. Lateral spacing on mainline satisfac- tory. Adequate water flow rate and			 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. 		
4. 5.	pressure. System free of leaks from breaks, couplers, drain valves, risers, end plugs. System free of excessive corrosion or wear.			 Sprinkler head base gaskets in good condition. Visual inspection of each sprinkler indicates uniform application pattern. Pressure at sprinkler appropriate. Sprinklers match operating pressure. 		

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Published and distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914, by the Oregon State University Extension Service, Washington State University Cooperative Extension, the University of Idaho Cooperative Extension System, and the U.S. Department of Agriculture cooperating

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