

Operations and Maintenance Manual



THIS CHECKLIST

This is a minimum list of components which constitute an effective Operations and Maintenance Manual for any particular irrigation system. A number of points should be remembered when putting the manual together, these include:

- **The manual must be user friendly**
 - The operations and maintenance manual must be kept in a place which is accessible to the people who are involved with the irrigation system, places to consider include the farm office, pump shed or smoko room.
 - There must be clearly marked sections which should include but is not limited to: Safety, The Irrigation System and Equipment.
 - Thought must be given to the format of the manual.
- **The manual is a living document**
 - It is everyone who is involved with the irrigation system to contribute to the operations and maintenance manual. All aspects from hazard identification to completing maintenance schedules is the responsibility of all staff.
 - The manual not only has value in the present season but trends are usually illustrated by looking at historical information and can give the operator an idea of maintenance needs and potential problems to be addressed ahead of time. This ensures the system is operational at critical times.
 - A regular review of the document must be scheduled to check the information for relevancy, update any procedures and review ant trends which become obvious.
- **Each manual is unique**
 - The contents of the operations and maintenance manual is not only unique to each farm and system but also to the people who put it together, use it and review it. This is to ensure that the manual is used by the people who need it.

The checklist overleaf has some items which may be included in an operations and maintenance manual. This is a guideline and can be used to populate each unique document.

OTHER RESOURCES

Manufactures' Information

Every component within the system should be supplied with a manual or other supporting information. Read it and follow instructions. This information will be specific to the equipment installed in your scheme and will include additional information such as troubleshooting guidelines.

Irrigation New Zealand Checklists

Irrigation New Zealand has checklists for the water supply system (intakes, pumps and mainlines) and for different irrigation types. See www.irrigationnz.co.nz. These checklists are for irrigators to use pre-season to check the state of their irrigation systems

Calibration Guidelines

IRRIG8Lite software and IRRIG8Quick System Calibration Guidelines and Worksheets for Drip Micro irrigation systems can be downloaded from www.pagebloomer.co.nz/resources.

RECOMMENDATIONS AND CHECKLIST

Checks completed by: _____

Signature: _____

Date: _____



CONTENT

Section

Documents

Safety

- Hazard Identification
- Procedure
- Hazard Identification Record
- Incident Report Procedure
- Incident Report Records
- Emergency Shut Down Procedures for pumps and machinery
- Other

Irrigation System

- Design Specification Sheet (What the system is designed to do)
- Commissioning Report (What the system actually does)
- Annual Evaluation Reports (What the system continues to do)
- Annual Pump Evaluation Reports.
- IrrigationNZ Checklists Water Supply to Irrigator
- Other

Equipment

- Manufacturers' Information for all Components
- Pumps: Operation Manual, Performance Curve, troubleshooting guide
- Electric motor information
- Irrigator manual including operating procedures, shutdown and troubleshooting guide
- Control unit, all relevant information
- Other

Centre Pivot and Linear Move Irrigators



THIS CHECKLIST

This is a minimum list of checks of pivot and linear systems that should be made before the irrigation season starts.

BE SAFETY CONSCIOUS – ELECTRICAL, HEIGHT AND MECHANICAL HAZARDS PRESENT.

Checks include structural and mechanical checks of the structure, and performance checks of water flow, nozzle delivery and pressure. It can be helpful if two people work together to perform checks.

- **Begin the checks with the machine turned off**
 - Ensure the electrical isolator switch is tagged/locked to prevent accidental starting.
 - Observe the state of the machine, looking for damage or wear and tear.
 - Tighten, adjust, maintain or replace components as required.
- **Make checks with the system running**
 - Consider which aspects required qualified expert (e.g. electrical).
 - Ensure the irrigator travel path is clear before starting the machine.
 - Check the operation of the machine, drive system and nozzles.
- **Check system calibration**
 - Ensure the depth and uniformity of application are as expected.

Many items can be fixed on-farm. Others require specialist skills or equipment. Tick the check boxes as each item is found OK. Make notes on the checklist overleaf against items requiring follow-up attention.

OTHER RESOURCES

System Operation Manual

Every system should be supplied with a system operation manual. Read it and follow instructions. The manual may include extra checks not listed here. It will give more detail than this checklist including information specific to your system.

Other Checklists

This checklist is only for the centre pivot or linear move machine itself. Irrigation New Zealand has additional checklists for the water supply system (intakes, pumps and mainlines) and for other irrigation types.

See www.irrigationnz.co.nz.

Calibration Guidelines

IRRIG8Lite software and IRRIG8Quick system calibration guidelines and worksheets for centre pivot and linear move systems can be downloaded from www.pagebloomer.co.nz/resources.

PRE-SEASON CHECKLIST

Checks completed by: _____

Signature: _____

Date: _____



SYSTEM OFF CHECKS

(SYSTEM NOT RUNNING)

Component	Check
Safety	<input type="checkbox"/> Electrical isolator switch is tagged/locked
Pivot point	<input type="checkbox"/> Lubrication, grease
Drag hose (linear)	<input type="checkbox"/> Condition of other connections <input type="checkbox"/> Hose condition and fittings secure
Towers	<input type="checkbox"/> U joints for wear, replace if necessary <input type="checkbox"/> Cable and rod connections <input type="checkbox"/> Wheel lug bolts, tyre condition and pressure <input type="checkbox"/> Gearboxes, drive shafts – lubricate as required
Riser and spans	<input type="checkbox"/> Boots – tighten bands if necessary <input type="checkbox"/> Flanges
End gun, corners	<input type="checkbox"/> Connections <input type="checkbox"/> Wiring and hydraulic lines
Sprinklers	<input type="checkbox"/> Every sprinkler against nozzle chart, for damage and correct size <input type="checkbox"/> Droppers for wear or damage, replace as necessary
Control unit	<input type="checkbox"/> Electronic controls and battery charge
Prepare to start	<input type="checkbox"/> Before starting: Ensure nothing is parked in front of the irrigator

SYSTEM ON CHECKS

(SYSTEM RUNNING)

Component	Check
Pivot point	<input type="checkbox"/> For leaks, movement
Riser and spans	<input type="checkbox"/> For leaks along spans and at towers <input type="checkbox"/> Flanges – call service company if flanges leaking
Towers	<input type="checkbox"/> Motors, gear box and drive shaft operation for noise or vibration
Sand trap	<input type="checkbox"/> Empty and flush
Sprinklers	<input type="checkbox"/> Each sprinkler is turning correctly and cage not damaged
End gun, corners	<input type="checkbox"/> Droppers for leaks, repair or replace as necessary <input type="checkbox"/> Connections <input type="checkbox"/> Operation <input type="checkbox"/> Gun angles are correct, turns on and off at right locations <input type="checkbox"/> Corner arm sprinklers turn on and off correctly
System pressure	<input type="checkbox"/> Inlet pressure gauge with alternative – replace if necessary <input type="checkbox"/> Inlet pressure is correct <input type="checkbox"/> End pressure – above pressure regulator at last dropper
Other	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Drip Micro Irrigation



THIS CHECKLIST

This is a minimum list of checks of drip or micro irrigation systems that should be made before the irrigation season starts.

BE SAFETY CONSCIOUS – ELECTRICAL, HEIGHT AND MECHANICAL HAZARDS PRESENT.

Checks include physical checks of the system, and performance checks of water flow, emitter delivery and pressure. It can be helpful if two people work together to perform checks.

- **Begin the checks with the machine turned off**
 - Ensure the electrical isolator switch is tagged/locked to prevent accidental starting.
 - Observe the state of the machine, looking for damage or wear and tear.
 - Tighten, adjust, maintain or replace components as required.
- **Make checks with the system running**
 - Consider which aspects required qualified expert (e.g. electrical).
 - Ensure the irrigator travel path is clear before starting the machine.
 - Check the operation of the machine, drive system and nozzles.
- **Check system calibration**
 - Ensure the depth and uniformity of application are as expected.

Many items can be fixed on-farm. Others require specialist skills or equipment. Tick the check boxes as each item is found OK. Make notes on the checklist overleaf against items requiring follow-up attention.

OTHER RESOURCES

System Operation Manual

Every system should be supplied with a System Operation Manual. Read it and follow instructions. The manual may include extra checks not listed here. It will give more detail than this checklist including information specific to your system.

Other Checklists

This checklist is only for the centre pivot or linear move machine itself. Irrigation New Zealand has additional checklists for the water supply system (intakes, pumps and mainlines) and for other irrigation types.

See www.irrigationnz.co.nz.

Calibration Guidelines

IRRIG8Lite software and IRRIG8Quick system calibration guidelines and worksheets for drip micro irrigation systems can be downloaded from www.pagebloomer.co.nz/resources.

PRE-SEASON CHECKLIST



Checks completed by: _____

Signature: _____

Date: _____

SYSTEM OFF CHECKS

(SYSTEM NOT RUNNING)

Component	Check
Safety	<input type="checkbox"/> Pump switch is tagged/locked
Water supply	<input type="checkbox"/> Checks completed
Filtration	<input type="checkbox"/> Condition of filter media <input type="checkbox"/> Rings/screens clean with no holes <input type="checkbox"/> Pressure gauges in good condition
Fertigation/ Chemigation	<input type="checkbox"/> No signs of corrosion <input type="checkbox"/> System clean, no blockages <input type="checkbox"/> No leaks <input type="checkbox"/> Wiring and hydraulic lines secure
Control valves	<input type="checkbox"/> Valves, wiring and hydraulic lines secure
Off-takes	<input type="checkbox"/> Manual taps correctly set
Flushing points	<input type="checkbox"/> Flushing points accessible <input type="checkbox"/> Caps in place
Pipe network	<input type="checkbox"/> Sub-mains/headers <input type="checkbox"/> Laterals undamaged
Emitters	<input type="checkbox"/> Every emitter against nozzle chart, for damage and correct size <input type="checkbox"/> Risers for wear or damage
Control unit	<input type="checkbox"/> Electronic controls and battery charge
Prepare to start	<input type="checkbox"/> Before starting: Pump system secure

SYSTEM ON CHECKS

(SYSTEM RUNNING)

Component	Check
Pipe network	<input type="checkbox"/> For leaks along mains <input type="checkbox"/> For leaks along sub-mains <input type="checkbox"/> For leaks along laterals <input type="checkbox"/> Laterals flush clear
Emitters	<input type="checkbox"/> All flowing correctly <input type="checkbox"/> Moving sprinkler parts free
Headworks	<input type="checkbox"/> For leaks <input type="checkbox"/> Flow rate of each block
System pressure	<input type="checkbox"/> Pump pressure for each block <input type="checkbox"/> Pressure before and after filters <input type="checkbox"/> All off-take pressures correct <input type="checkbox"/> End pressure – tested at ends of far laterals
Calibration	<input type="checkbox"/> Calibration checks completed
Other	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Sprayline Irrigation



THIS CHECKLIST

This is a minimum list of checks of sprayline irrigation systems that should be made before the irrigation season starts.

BE SAFETY CONSCIOUS – ELECTRICAL, HEIGHT AND MECHANICAL HAZARDS PRESENT.

Checks include physical checks of the system, and performance checks of water flow, sprinkler delivery and pressure. It can be helpful if two people work together to perform checks.

- **Begin the checks with the machine turned off**
 - Ensure electrical isolator or motor switches are tagged/locked to prevent accidental starting.
 - Observe the state of equipment and components, looking for damage or wear and tear.
 - Tighten, adjust, maintain or replace components as required.
- **Make checks with the system running**
 - Consider which aspects required qualified expert (e.g.electrical).
 - Ensure the pumping system is safe before starting the system.
 - Check the operation of the pump system, pipework, hydrants/off-takes, laterals and nozzles.
- **Check system calibration**
 - Ensure the depth and uniformity of application are as expected.

Many items can be fixed on-farm. Others require specialist skills or equipment. Tick the check boxes as each item is found OK. Make notes on the checklist overleaf against items requiring follow-up attention.

OTHER RESOURCES

System Operation Manual

Every system should be supplied with a System Operation Manual. Read it and follow instructions. The manual may include extra checks not listed here. It will give more detail than this checklist including information specific to your system.

Other Checklists

This checklist is for sprayline irrigation systems. With thought, it may also be used for long-lateral systems. Irrigation New Zealand has additional checklists for the water supply system (intakes, pumps and mainlines) and for other irrigation types. See www.irrigationnz.co.nz.

Calibration Guidelines

IRRIG8Lite software and IRRIG8Quick system calibration guidelines and worksheets for sprayline irrigation systems can be downloaded from www.pagebloomer.co.nz/resources.

PRE-SEASON CHECKLIST



Checks completed by: _____

Signature: _____

Date: _____

SYSTEM OFF CHECKS

(SYSTEM NOT RUNNING)

Component	Check
Safety	<input type="checkbox"/> Pump switch is tagged/locked
Water supply	<input type="checkbox"/> Checks completed
Filtration	<input type="checkbox"/> Rings/screens clean with no holes <input type="checkbox"/> Pressure gauges in good condition
Control valves	<input type="checkbox"/> Wiring and hydraulic lines secure
Off-takes	<input type="checkbox"/> Hydrants secure <input type="checkbox"/> Manual valves correctly set
Flushing points	<input type="checkbox"/> Flushing points accessible <input type="checkbox"/> Caps in place
Laterals	<input type="checkbox"/> Laterals undamaged <input type="checkbox"/> Tapping saddles/connections secure <input type="checkbox"/> Risers for wear or damage
Sprinklers	<input type="checkbox"/> Every sprinkler against nozzle chart <input type="checkbox"/> Every sprinkler for wear and damage <input type="checkbox"/> Alignment correct
Control unit	<input type="checkbox"/> Electronic controls and battery charge
Prepare to start	<input type="checkbox"/> Before starting: Pump system secure

SYSTEM ON CHECKS

(SYSTEM RUNNING)

Component	Check
Headworks	<input type="checkbox"/> For leaks <input type="checkbox"/> Flow rate of each block
System pressure	<input type="checkbox"/> Pump pressure for each block <input type="checkbox"/> Pressure before and after filters <input type="checkbox"/> All off-take pressures correct <input type="checkbox"/> Lateral inlet pressures* <input type="checkbox"/> Lateral end pressures**
Pipe network	<input type="checkbox"/> For leaks along mains <input type="checkbox"/> For leaks along sub-mains <input type="checkbox"/> For leaks along laterals <input type="checkbox"/> Laterals flush clear
Off-takes	<input type="checkbox"/> Hydrants not leaking
Sprinklers	<input type="checkbox"/> Application pattern <input type="checkbox"/> Moving sprinkler parts free
Calibration	<input type="checkbox"/> Calibration checks completed
Other	<input type="checkbox"/> <input type="checkbox"/>

* Can measure at first sprinkler

** Can measure at last sprinkler

Travelling Irrigators



THIS CHECKLIST

This is a minimum list of checks of travelling irrigators that should be made before the irrigation season starts.

BE SAFETY CONSCIOUS – ELECTRICAL, HEIGHT AND MECHANICAL HAZARDS PRESENT.

Checks include structural and mechanical checks of the structure, and performance checks of water flow, nozzle delivery and pressure. It can be helpful if two people work together to perform checks.

- **Begin the checks with the machine turned off**
 - Ensure the electrical isolator switch is tagged/locked to prevent accidental starting.
 - Observe the state of the machine, looking for damage or wear and tear.
 - Tighten, adjust, maintain or replace components as required.
- **Make checks with the system running**
 - Consider which aspects required qualified expert (e.g. electrical).
 - Ensure the irrigator travel path is clear before starting the machine.
 - Check the operation of the machine, drive system and nozzles.
- **Check system calibration**
 - Ensure the depth and uniformity of application are as expected.

Many items can be fixed on-farm. Others require specialist skills or equipment. Tick the check boxes as each item is found OK. Make notes on the checklist overleaf against items requiring follow-up attention.

OTHER RESOURCES

System Operation Manual

Every system should be supplied with a system operation manual. Read it and follow instructions. The manual may include extra checks not listed here. It will give more detail than this checklist including information specific to your system.

Other Checklists

This checklist is only for travelling irrigators themselves. Irrigation New Zealand has additional checklists for the water supply system (intakes, pumps and mainlines) and for other irrigation types.

See www.irrigationnz.co.nz

Calibration Guidelines

IRRIG8Lite software and IRRIG8Quick system calibration guidelines and worksheets for travelling irrigator systems can be downloaded from www.pagebloomer.co.nz/resources.

PRE-SEASON CHECKLIST



Checks completed by: _____

Signature: _____

Date: _____

SYSTEM OFF CHECKS

(SYSTEM NOT RUNNING)

Component	Check
Safety	<input type="checkbox"/> Electrical isolator and motor switches are tagged/locked
Hose reel and cable reel	<input type="checkbox"/> Structure condition, corrosion or damage
	<input type="checkbox"/> Wheel lug bolts, tyre condition and pressure
	<input type="checkbox"/> Gearboxes, drive shafts – lubricate as required
	<input type="checkbox"/> Cable winch action and ratchets
	<input type="checkbox"/> Tighten all bolts, check pins
	<input type="checkbox"/> Lubrication, grease (see manual)
	<input type="checkbox"/> Seals and flanges
Gun cart	<input type="checkbox"/> Structure condition, corrosion or damage
	<input type="checkbox"/> Wheel lug bolts, tyre condition and pressure
	<input type="checkbox"/> Tighten all bolts, check pins
	<input type="checkbox"/> Condition of other connections
	<input type="checkbox"/> Lubrication, grease (see manual)
	<input type="checkbox"/> Seals and flanges
	<input type="checkbox"/> Rotating boom turntable not worn, allows free turning
Drag hose	<input type="checkbox"/> Hose condition for wear, kinks or other damage
	<input type="checkbox"/> Boots – tighten bands if necessary
Sprinklers	<input type="checkbox"/> Nozzle orifice condition – replace if wear detectable
	<input type="checkbox"/> Ensure rotating nozzles are free turning and cages not damaged
	<input type="checkbox"/> Splash plate, angle, alignment
	<input type="checkbox"/> Components for looseness, freedom of movement
	<input type="checkbox"/> Outlet nozzle orifice condition – replace if wear detectable
	<input type="checkbox"/> Electronic controls and battery charge
	Prepare to start <input type="checkbox"/> Before starting: Ensure nothing is parked in front of the irrigator

SYSTEM ON CHECKS

(SYSTEM RUNNING)

Component	Check
Hose reel and cable reel	<input type="checkbox"/> Reel turning smoothly
	<input type="checkbox"/> Hose or cable winding in correctly
	<input type="checkbox"/> Inlet pressure gauge – replace if necessary
	<input type="checkbox"/> Inlet pressure – preferably at furthest hydrant
Drag hose	<input type="checkbox"/> Turbine functioning
Gun cart	<input type="checkbox"/> Cart moving correctly
	<input type="checkbox"/> Inlet pressure – replace gauge if necessary
	<input type="checkbox"/> No leaks
Drag hose	<input type="checkbox"/> No leaks
	<input type="checkbox"/> Not mis-shapen
Sprinklers	<input type="checkbox"/> Each sprinkler is turning correctly and cage not damaged
	<input type="checkbox"/> No leaks, repair or replace as necessary
	<input type="checkbox"/> Pressure above last sprinkler, above pressure regulator if fitted
Gun	<input type="checkbox"/> Operation
	<input type="checkbox"/> Gun angles are correct, switches direction at right locations
Control unit	<input type="checkbox"/> Correct functioning
Other	<input type="checkbox"/>
	<input type="checkbox"/>
	<input type="checkbox"/>