

# Plant Health Assessment Checklist

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## Handover of Desalination Bundles and Purification Plants (Brackish)

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### 1. General Information & Handover Details

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- Plant Name:
  - Plant Location:
  - Handover Date:
  - Handover From (Government of Saudi Arabia):
  - Handover To (WSM):
  - Assessment Date:
  - Assessor(s):
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### 2. Documentation Review

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- ☐ Design & As-Built Drawings:
- ☐ Operation & Maintenance (O&M) Manuals:
- ☐ Process & Instrumentation Diagrams (P&IDs):
- ☐ Equipment Specifications & Data Sheets:
- ☐ Safety Manuals & Procedures:
- ☐ Environmental Permits & Compliance Records:
- ☐ Water Quality Analysis Records:
- ☐ Maintenance Records & Logs:

- **[ ] Spare Parts Inventory:**
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### **3. Mechanical Systems Assessment**

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This section covers the detailed assessment of all mechanical equipment in the plant. The condition of each component should be carefully evaluated and documented. The assessment should be based on visual inspection, operational data review, and maintenance records analysis.

### 3.1 Pumps (Feed, High-Pressure, Dosing, etc.)

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No visible leaks from seals or casing			
No excessive vibration or noise			
Foundation and baseplate are in good condition			
Coupling alignment is within tolerance			
<b>Operational Data Review</b>			
Suction and discharge pressures are within design range			
Flow rate is stable and meets process requirements			
Motor current and temperature are within limits			
<b>Maintenance Records Analysis</b>			
Regular maintenance has been performed as per schedule			
No history of frequent breakdowns or major repairs			
Spare parts availability is adequate			

### 3.2 Motors & Drives

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No signs of overheating or physical damage			
Cooling fans are clean and operational			
No loose connections or damaged cables			
<b>Operational Data Review</b>			
Motor current and voltage are balanced			
No frequent trips or alarms			
Variable Frequency Drive (VFD) parameters are optimized			
<b>Maintenance Records Analysis</b>			
Regular lubrication and inspection have been performed			
No history of winding failures or bearing issues			

### 3.3 Valves & Actuators

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No leaks from body, bonnet, or stem			
No signs of corrosion or physical damage			
Position indicators are functioning correctly			
<b>Operational Data Review</b>			
Valves open and close smoothly without sticking			
Actuators respond correctly to control signals			
No passing or leakage in the closed position			
<b>Maintenance Records Analysis</b>			
Regular inspection and servicing have been performed			
No history of frequent failures or seat/seal replacements			

### 3.4 Piping & Fittings

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No visible leaks, corrosion, or damage			
Pipe supports and hangers are in good condition			
Insulation is intact and in good condition			
<b>Maintenance Records Analysis</b>			
Regular inspections and pressure tests have been conducted			
No history of frequent leaks or repairs			

### 3.5 Tanks & Vessels

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No signs of leaks, corrosion, or structural damage			
Internal and external coatings are in good condition			
Vents, overflows, and drains are clear and functional			
<b>Maintenance Records Analysis</b>			
Regular inspections and cleaning have been performed			
No history of structural failures or major repairs			

### 3.6 Filtration Systems (Pre-treatment)

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
Media (sand, anthracite, etc.) is clean and at the correct level			
No leaks from vessels or piping			
Backwash system is functioning correctly			
<b>Operational Data Review</b>			
Differential pressure is within the acceptable range			
Backwash frequency and duration are optimized			
Turbidity removal efficiency meets requirements			
<b>Maintenance Records Analysis</b>			
Regular media replacement and inspection have been performed			
No history of frequent clogging or performance issues			



### 3.7 Reverse Osmosis (RO) Membranes & Pressure Vessels

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No visible leaks from end caps or connections			
Pressure vessels are in good condition with no signs of damage			
<b>Operational Data Review</b>			
Normalized salt rejection and permeate flow are within design range			
Differential pressure across each stage is stable			
Cleaning in Place (CIP) frequency and effectiveness are optimal			
<b>Maintenance Records Analysis</b>			
Regular membrane cleaning and performance monitoring have been conducted			
No history of frequent fouling, scaling, or membrane damage			
Membrane replacement history is documented			

### 3.8 Energy Recovery Devices

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No visible leaks or physical damage			
No excessive noise or vibration			
<b>Operational Data Review</b>			
Energy recovery efficiency meets design specifications			
Booster pump pressure is stable			
<b>Maintenance Records Analysis</b>			
Regular inspection and maintenance have been performed			
No history of frequent failures or performance degradation			

### 3.9 HVAC Systems

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
Filters are clean and in good condition			
No leaks from ductwork or equipment			
No excessive noise or vibration			
<b>Operational Data Review</b>			
Temperature and humidity levels are maintained within the desired range			
No frequent alarms or trips			
<b>Maintenance Records Analysis</b>			
Regular filter replacement and cleaning have been performed			
No history of major component failures			

## 4. Electrical Systems Assessment

This section covers the detailed assessment of all electrical equipment in the plant. The condition of each component should be carefully evaluated and documented. The assessment should be based on visual inspection, operational data review, and maintenance records analysis.

## 4.1 Main Power Supply & Switchgear

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No signs of overheating, arcing, or physical damage			
All indicators and meters are functional			
Breakers and switches are in good condition			
<b>Operational Data Review</b>			
Voltage and frequency are stable and within limits			
No frequent trips or alarms			
<b>Maintenance Records Analysis</b>			
Regular cleaning, testing, and maintenance have been performed			
No history of major faults or failures			

## 4.2 Transformers

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No oil leaks or signs of overheating			
Bushings and insulators are clean and in good condition			
No excessive noise or vibration			
<b>Operational Data Review</b>			
Oil temperature and pressure are within limits			
Winding temperature is stable			
<b>Maintenance Records Analysis</b>			
Regular oil analysis and testing have been performed			
No history of internal faults or major repairs			

### 4.3 Motor Control Centers (MCCs)

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No signs of overheating, arcing, or physical damage			
All starters, contactors, and relays are in good condition			
No loose connections or damaged wiring			
<b>Operational Data Review</b>			
No frequent trips or alarms			
<b>Maintenance Records Analysis</b>			
Regular cleaning, inspection, and testing have been performed			
No history of frequent component failures			

### 4.4 Cabling & Conduits

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No signs of physical damage, corrosion, or degradation			
Cable trays and supports are in good condition			
Conduits are properly sealed and supported			
<b>Maintenance Records Analysis</b>			
Regular insulation resistance testing has been performed			
No history of cable faults or failures			

### 4.5 Grounding & Lightning Protection

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
All grounding connections are tight and free of corrosion			
Lightning rods and conductors are in good condition			
<b>Maintenance Records Analysis</b>			
Regular resistance testing of the grounding system has been performed			

## 4.6 Emergency Power (Generators, UPS)

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No fuel or oil leaks			
Batteries are clean and in good condition			
No signs of physical damage			
<b>Operational Data Review</b>			
Generator starts automatically on power failure			
UPS provides uninterrupted power to critical loads			
<b>Maintenance Records Analysis</b>			
Regular load testing and maintenance have been performed			
No history of frequent failures or starting issues			



### 4.7 Lighting Systems

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
All lights are functional			
Fixtures are clean and in good condition			
<b>Maintenance Records Analysis</b>			
Regular lamp replacement has been performed			

## 5. Control & Instrumentation Systems Assessment

This section covers the detailed assessment of all control and instrumentation systems in the plant. The condition of each component should be carefully evaluated and documented. The assessment should be based on visual inspection, operational data review, and maintenance records analysis.

## 5.1 Distributed Control System (DCS) / SCADA System

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
Hardware is clean and in good condition			
No loose connections or damaged cables			
<b>Operational Data Review</b>			
System is stable and responsive			
No frequent alarms or communication errors			
Historical data is being logged correctly			
<b>Maintenance Records Analysis</b>			
Regular backups and software updates have been performed			
No history of major system failures			

## 5.2 Programmable Logic Controllers (PLCs)

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
Hardware is clean and in good condition			
No loose connections or damaged cables			
<b>Operational Data Review</b>			
PLC is operating in run mode without errors			
I/O modules are functioning correctly			
<b>Maintenance Records Analysis</b>			
Regular backups of the PLC program have been performed			
No history of frequent faults or hardware failures			

### 5.3 Sensors & Transmitters (Flow, Pressure, Level, etc.)

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No physical damage or corrosion			
Impulse lines are clean and not leaking			
<b>Operational Data Review</b>			
Readings are stable and accurate			
No frequent alarms or out-of-range values			
<b>Maintenance Records Analysis</b>			
Regular calibration and inspection have been performed			
No history of frequent failures or inaccurate readings			

## 5.4 Analyzers (pH, Turbidity, Chlorine, etc.)

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No physical damage or leaks			
Reagent levels are adequate			
<b>Operational Data Review</b>			
Readings are stable and accurate			
No frequent alarms or out-of-range values			
<b>Maintenance Records Analysis</b>			
Regular calibration and servicing have been performed			
No history of frequent failures or inaccurate readings			

## 5.5 Control Valves & Positioners

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No leaks from body, bonnet, or stem			
No signs of corrosion or physical damage			
<b>Operational Data Review</b>			
Valve responds correctly to control signals			
No hunting or sticking			
<b>Maintenance Records Analysis</b>			
Regular inspection and servicing have been performed			
No history of frequent failures or performance issues			

### 5.6 Network Infrastructure & Communication

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
Switches, routers, and firewalls are in good condition			
No loose connections or damaged cables			
<b>Operational Data Review</b>			
Network is stable and reliable			
No frequent communication errors or packet loss			
<b>Maintenance Records Analysis</b>			
Regular monitoring and maintenance have been performed			
No history of major network outages			

## 6. Water Quality & Treatment Process Assessment

This section covers the detailed assessment of the water quality and treatment processes in the plant. The performance of each process should be carefully evaluated and documented. The assessment should be based on water quality analysis, operational data review, and maintenance records analysis.

## 6.1 Raw Water Quality Analysis

Parameter	Unit	Historical Min	Historical Max	Current Value	Remarks
pH	-				
Turbidity	NTU				
Total Dissolved Solids (TDS)	mg/L				
Salinity	PSU				
Temperature	°C				
Hardness (as CaCO3)	mg/L				
Chlorides (Cl-)	mg/L				
Sulfates (SO4--)	mg/L				
Iron (Fe)	mg/L				
Manganese (Mn)	mg/L				

## 6.2 Pre-treatment Performance

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Operational Data Review</b>			
Silt Density Index (SDI) is consistently below the required limit			
Turbidity removal efficiency meets design specifications			
Chemical dosing is optimized			
<b>Maintenance Records Analysis</b>			
Regular monitoring and maintenance of pre-treatment filters			



## 6.3 RO System Performance

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Operational Data Review</b>			
Normalized salt rejection meets design specifications			
Normalized permeate flow meets design specifications			
Recovery rate is optimized			
Differential pressure is stable and within limits			
<b>Maintenance Records Analysis</b>			
Regular CIP and performance monitoring have been conducted			

## 6.4 Post-treatment & Disinfection

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Operational Data Review</b>			
Remineralization process is stable and effective			
Disinfection process (e.g., chlorination) is effective			
Residual disinfectant level is within the required range			
<b>Maintenance Records Analysis</b>			
Regular maintenance of post-treatment equipment has been performed			

## 6.5 Final Product Water Quality

Parameter	Unit	Specification	Current Value	Remarks
pH	-			
Turbidity	NTU			
Total Dissolved Solids (TDS)	mg/L			
Hardness (as CaCO3)	mg/L			
Chlorides (Cl-)	mg/L			
Residual Chlorine	mg/L			

## 6.6 Chemical Dosing Systems

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
Dosing pumps are in good condition with no leaks			
Chemical tanks are clean and in good condition			
Calibration columns are clean and readable			
<b>Operational Data Review</b>			
Dosing rates are accurate and stable			
<b>Maintenance Records Analysis</b>			
Regular calibration and maintenance have been performed			

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# 7. Safety & Environmental Compliance Assessment

This section covers the detailed assessment of safety and environmental compliance in the plant. The assessment should be based on visual inspection, documentation review, and interviews with plant personnel.

## 7.1 Hazardous Area Classification

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Documentation Review</b>			
Hazardous area classification drawings are available and up-to-date			
All equipment installed in hazardous areas is certified for the correct zone			

## 7.2 Fire Protection & Detection Systems

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
Fire extinguishers are in place, charged, and inspected			
Fire hydrants are accessible and in good condition			
Fire and gas detectors are clean and unobstructed			
<b>Maintenance Records Analysis</b>			
Regular inspection, testing, and maintenance of fire protection systems have been performed			

### 7.3 Emergency Shutdown (ESD) Systems

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
ESD pushbuttons are accessible and clearly marked			
<b>Maintenance Records Analysis</b>			
Regular testing of the ESD system has been performed			

### 7.4 Personal Protective Equipment (PPE) Availability

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
Adequate supply of PPE (e.g., safety glasses, gloves, hard hats) is available			
PPE is in good condition and stored correctly			

### 7.5 Chemical Storage & Handling

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
Chemicals are stored in designated areas with proper segregation			
Chemical storage tanks and containers are in good condition with no leaks			
Safety showers and eyewash stations are accessible and functional			

## 7.6 Waste Management & Disposal

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Documentation Review</b>			
Waste management plan is available and up-to-date			
All waste is being disposed of in accordance with regulations			

## 7.7 Spill Containment & Response

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
Spill containment bunds are in good condition with no cracks or leaks			
Spill response kits are available and fully stocked			

## 8. Civil & Structural Assessment

This section covers the detailed assessment of all civil and structural assets in the plant. The condition of each component should be carefully evaluated and documented. The assessment should be based on visual inspection and maintenance records analysis.

## 8.1 Buildings & Foundations

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No cracks or signs of settlement in foundations			
Walls, roofs, and floors are in good condition			
Doors and windows are functional			

## 8.2 Roads & Access Ways

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
Road surface is in good condition with no potholes			
Access ways are clear and unobstructed			

## 8.3 Pipe Racks & Supports

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
<b>Visual Inspection</b>			
No signs of corrosion or structural damage			
All supports are in place and secure			

### 8.4 Concrete Structures (Tanks, Basins)

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
Visual Inspection			
No cracks, spalling, or signs of leakage			
Concrete surfaces are in good condition			

### 8.5 Corrosion & Coating Inspection

Check Item	Condition (Good/Fair/Poor)	Remarks	Action Required
Visual Inspection			
No signs of corrosion on steel structures			
Protective coatings are intact and in good condition			

## 9. Handover Verification & Punch List

- Verification of all checklist items.
- List of outstanding issues or deficiencies (Punch List).
- Agreed-upon corrective actions and timeline.
- Sign-off by all parties.