# Wave™, IntegraClean™ Installation (Pre-Start up) Checklist

A complete review of installation and startup requirements may be found in the applicable IOM.

## SITE/ SO:

<table>
<thead>
<tr>
<th>Panel Mounting</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Wave panel, Conductivity Controller, and InstAlert: within 15’ for low-voltage wiring terminations</td>
<td></td>
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<tr>
<td>C. InstAlert: Line-of-sight to sky to permit cellular connection (call factory re: antenna extensions)</td>
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</tbody>
</table>

## Electrical & Controls requirements

<table>
<thead>
<tr>
<th>Wave panel (NEMA 4X standalone panel) - Power supply:</th>
<th>Y</th>
<th>N</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 a. Factory power cord used or field installed to factory supplied cord-tight fitting</td>
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<tr>
<td>D1 b. No GFIC present. (GWS recommends dedicated power supply that avoids the use of GFIC circuits.)</td>
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<tr>
<td>E2 a. Field installed UL approved Type 4(x) seal tight &amp; Factory-penetration sealed – See &quot;General&quot; p. 3-4</td>
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<tr>
<td>E2 b. Metal punched (vs. drilled) and all metallic fragments removed.</td>
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<td></td>
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<tr>
<td>E3 Dedicated power supply, unit is not electrically interlocked with operating equipment pump ect.</td>
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</tbody>
</table>

## IntegraClean filter skid (NEMA 4X unitary and standalone pump starter panels) – Power supply:

| F1. Unitary panel only: Power installed at factory supplied NEMA plug location on the upper panel. |   |   |     |
| F2 All panels: Power penetration is UL approved Type 4(x) seal tight – See “General” next page |   |   |     |

## Mechanical requirements

| M. Makeup Plumbing: to tower sump or if direct-injection, downstream of heat exchangers in CWR | Y | N | N/A |
| N. Wave Reaction Chamber (RC): Gasket is present, bolts and washers are present |   |   |     |
| O. Wave RC: No metal within 5” of blue-colored shell, no metallic insulation or heat-trace present |   |   |     |
| P. Wave RC: Pipe hangers or other support present to avoid axial stress |   |   |     |
| Q. Wave RC: No high energy sources, pumps or motors within 3 feet |   |   |     |
| R. Wave RC No magnetic flow meter(s) within 4-feet (Installation tip: Wave may affect meter reading) |   |   |     |
| S. Wave RC: Multiple units staggered to avoid signal interference |   |   |     |
| T. Wave RC, Panel, Cable: Serial numbers match (when multiple units are present) |   |   |     |
| U. Signal Cable: Supported to avoid direct tension on connector(s) |   |   |     |
| V. Signal Cable Extension (if applicable): Heat shrink applied to connector after operation verified |   |   |     |
| W. Blowdown Controller: Piped across adequate pressure drop to induce flow > 5 gpm |   |   |     |
| X. Blowdown Controller: Piping includes local service valves (line strainer recommended) |   |   |     |
| Y. Blowdown Vertical: Pipe or if installed in a header, at 9 to 3-o’clock location over top |   |   |     |
| Z. Blowdown Valve: Isolation valve present for servicing and throttling flow |   |   |     |
| AA. Blowdown Valve (Belimo): Weather shield installed if outdoor installations |   |   |     |
| BB. Blowdown Valve & IntegraClean (IC) Purge Valve discharge pipe: Hard piped to drain and secured |   |   |     |
| CC. IC: Skid secured, bolted to ground; pipe supports present |   |   |     |
| DD. IC: Supply and Return pipe matches filter inlet/ outlet size |   |   |     |
| EE. IC: Tower internals installed per factory diagram |   |   |     |
| FF. IC: Pressure across separator vessel (psi, as applicable) | Differential: | #1: | #2: | #3: | #4: |
| GG. IC: Pressure each CT cell (3 – 7; 6 psi optimum) |   |   |     |
### Water Treatment

**Name of Certified Service Provider:**

**Service Partner notified of impending startup**

**Completed:**

**CAUTION, AVOID WARRANTY LOSS:** Never startup system without complete installation of the WAVE, Automatic Blowdown Equipment, InstAlert, and Filtration Systems (if applicable).

### A. Water for Hydrostatic Testing (Red-Water Avoidance).

N/A:

Some makeup water types will cause a rapid oxidation of iron pipe. It is the responsibility of the Contractor to delay filling the system; periodically circulate; or add corrosion inhibitors to avoid flash-corrosion and “red-water”. Coordinate preventative actions with the Griswold designated Certified Service Provider to avoid an unsightly situation and a subsequent cleanup.

**Contractor refuses:**

**Plan in place:**

**Water has been added:**

**Water has not been added:**

**If added, water has been chemically treated:**

### B. Initial Flush and Chemical Cleaning.

All systems should be flushed with clean water to remove dirt and debris. A chemical cleaning of the entire system will be required to further remove sediment, oxides, and oils. When a written procedure is not included in the project specification, the Griswold Certified Service Provider will supply a procedure.

**Contractor refuses:**

**Plan in place:**

**System has been cleaned:**

### C. Full Startup and System Load.

**Plan in place:**

It is important to establish a system load immediately following the Chemical Cleaning to enable the Wave corrosion inhibition and biological control mechanisms. If a load is not available, the filling and system cleaning should be delayed – Or, a temporary chemical-based treatment program must be employed.

**Contractor refuses:**

**Plan in place:**

**System is operating:**

### D. Galvanized Metal Conditioning/ Passivation Plan.

N/A:

All galvanized cooling tower sumps, hot decks, and submersed components are susceptible to a “white rust” condition. A Galvanized Metal Conditioning/ Passivation Plan must be pre-arranged with the Certified Service Provider prior to adding any water to the system. Failure to establish a Conditioning Plan can cause irreversible damage and/or result in an expensive remediation.

**Contractor refuses:**

**Plan in place:**

**System is operating:**

**Raw/ City water & Low conductivity is in Plan:**

**Conditioning Plan requires acid feed**

### E. Low-Load Operation.

N/A:

At no time should wet equipment be allowed to remain idle without flow for longer than three-days. Circulate WAVE treated system water into all standby chillers and heat exchangers at least one-hour per day or at least three-hours every three days.

**Contractor refuses:**

**Plan in place:**

**System is operating:**

**If operating, rotation is manual (by operator):**

**If operating, rotation is automatic (BMS control)**

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**Make notes of any deficiencies and make comments here:**

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**Completed by:**

**Date:**

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**Return Form To:** GWS Project Service Manager, Mike Jakubowski, mike@griswoldwatersystems.com, 386.663.3384

If all items are complete, take photos of the Wave, CleanSweep and all equipment panels for project records.
Wave and IntegraClean unitary panel penetrations

Subject: Maintaining the NEMA 4X integrity of panels when field penetrations are performed for Power and Control wiring.

Wave panels, standalone units:

A.) **Power supply.** Panel is supplied with a 15’, (North American) 120 VAC power cord.
   a. Use the factory installed power cord to maintain the panel integrity and re-use the existing cord-tight if an alternate cord is installed.
   b. If alternate power supply type (conduit etc.) is used:
      i. Remove the factory cord and place a solid plug in the cord-tight vacated during the cord removal.
      ii. Follow the General Standards for Alternate Panel Penetration Methods below.

B.) **Low-voltage** (request GWS-1260 for available BAS terminations).
   a. Route all control wiring through the factory installed, multi-port auxiliary cord-tight connector; 3 spare ports are provided in the bottom, lower right of the lower enclosure to pass cable through; only 5 to 24 volt wire/cables should be ran through the auxiliary port (low voltage).
   b. If a conduit penetration is necessary, only make the penetration in the bottom portion of the enclosure; follow the General Standards for Alternate Panel Penetration Methods below.

*Note:* At no time should the Wave panel be used as a junction box to house aftermarket or field-installed accessories.

IntegraClean (filter skid) Pump Starter panels and Unitary Pump Starter and Wave control panels

*Note on Unitary Pump Starter and Wave control panels:* Installers should refrain from making penetrations in the lower section of the panel which houses the Wave circuit board and the InstAlert remote monitor.

A.) **Power supply.**
   a. Unitary Panels only: A NEMA 4X panel plug is provided in the upper right side of the panel; remove the plug and supply a comparable NEMA 4X connector. See Alternate for approved types.
   b. All other Pump Starter panels: No NEMA plug is provided; see the General Standards for Alternate Panel Penetration Methods below.

B.) **Low-voltage** (request GWS-1260 for available BAS terminations).
   a. Route all control wiring through the factory installed, multi-port auxiliary cord-tight connector; 3 spare ports are provided in the bottom, lower right of the lower enclosure to pass cable through; only 5 to 24 volt wire/cables should be ran through the auxiliary port (low voltage).
   b. If a conduit penetration is necessary, follow the General Standards for Alternate Panel Penetration Methods below.

*Note:* At no time should the Wave panel be used as a junction box to house aftermarket or field-installed accessories.
General Standards for Alternate Panel Penetration Methods:

- Disconnect all power before any modifications.
- Use only UL listed Type 4(X) seal tight connector, cord grips/glands and UL listed rigid or flex duct.
  - Any conduit prone to carry moisture into the panel should be sealed internally with silicone (or alternate).
- Use a punch while making penetrations; vacuum and remove all metal fragments produced.
- UL listed THHN TFFN type 90° C rated stranded copper wire (No stranded copper wire rated less than 90° C).
- Do not connect or install other relays or controls in conjunction to the GWS electrical equipment without written approval from GWS.
- Always properly ground the equipment by using the provided labeled equipment ground terminals.
- Follow all local codes requirements.