Instruction Manual for IMTEC Baths with AquaSeal™

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1. Introduction

Description

This chapter describes the AquaSeal in general terms. The information is presented in these sections:

- What is the AquaSeal?
- Standard Features (Static or Recirculating)
- Options (Static)
- Options (Recirculating)
- What This Manual Contains

What is AquaSeal?

The AquaSeal was developed in response to the wafer fabrication industry's need for longer bath lifetimes. A major cause of failure for wet-chemistry baths is acid penetration of the RTV seal. The patented AquaSeal system has a dual-seal feature that uses DI or house water to block acid and wash it away from the RTV seal. At the same time, the circulating water keeps the seal cool, lengthening the life of the seal even while the bath is in operation. It is available in both static and recirculating bath configurations.

Standard Features (Static or Recirculating)

- AquaSeal Dual Seal System
- Inconel heaters bonded to quartz vessel for better heat transfer and longer bath life
- Quartz-to-polypropylene seals for better resistance to acid
- Quartz drain stems to reduce leakage
- Ultra-pure molded or plate quartz
- Engineered structure to reduce case thermal stress
- Packed alumina-silicate fiber insulation to eliminate flame space
- Operation to 190°C

Optional Features (Static)

- Liquid-level sensors for alarm or auto-level control applications
- Resistance Temperature Detectors (RTDs)
- Special quartz grades
- Extended warranties

Optional Features (Recirculating)

- 45° Scallop-edged 360° weir for high velocity "plumed" surface skimming
- Resistance Temperature Detectors (RTDs)
- Proprietary overflow inlet tube
- Manual or automatic lids, hinged or removal, "see-through"
- Liquid-level sensors for alarm or auto-level control applications
- Extended warranties
- Solvent (including NMP) seals
- Quartz-to-polypropylene seals to extend bath life

Icon Key	
	Warning
+	Important
	Procedure

What This Manual Contains

This manual contains instructions for installing, using and troubleshooting the IMTEC AquaSeal. If you have never used an IMTEC bath or an IMTEC AquaSeal, you should read completely through the material before attempting installation or operation. The Icons shown in the Key at left will help guide you through the information.

This concludes Chapter 1, Introduction.

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2. Unpacking Instructions

Description

This section describes the procedures required for unpacking the IMTEC AquaSeal. The information is presented in these parts:

- Inspecting the packaging
- Unpacking the bath

Inspecting the Packaging

Before opening the shipping container, please look for evidence of transportation damage. It is your responsibility to notify the shipper promptly of any claims of freight damage. Notify IMTEC also, so that we may help you both with your damage claim and with an expeditious repair or replacement of the damaged parts.

IMPORTANT:

Keep the pre-formed IMTEC packing and the box in which the AquaSeal bath was shipped. If the bath should ever need to be returned to IMTEC, it **must** be returned in the appropriate container to minimize risk of shipping damage. If the original container is not available, a packaging kit may be purchased from IMTEC for a nominal fee.

Checking the Contents

The AccuBath shipping carton should contain the following:

(1) AquaSeal AccuBath
(1) Warranty registration card (in an envelope)
(1) Instruction Manual
(1) set of drawings
(1) AquaSeal installation kit:

- (1) flowmeter (2-10 GPH; 125 cc/min to 630 cc/min)
- 8 feet of ¼" Teflon tubing
- 12 feet of 1/8" (O.D.) tubing
- (2) ¼" tube fittings
- (4) 1/16" barb/mpt elbow fittings

Any optionally ordered items.

NOTE: If any of the above items are missing, contact IMTEC *immediately.*

If the bath is consolidated in shipment with other components, check your receiving documents and/or additional manuals for a checklist of the pertinent items.

Unpacking Procedure

CAUTION: Quartz, like glass, is fragile and breaks on impact.

2.1.1 When quartz stems are present on the bottom of the tank, make sure to place the bath on a level surface.

This concludes Chapter 2., Unpacking Procedures.

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3. Safety Recommendations & Requirements

Description

The following recommendations are included for your safety and the protection of the bath unit. Please read these recommendations completely before installing and operating your AquaSeal. The information is presented in these sections:

- Regulations Check
- Electrical Safeguard Recommendations
- Handling Recommendations
- In-Use Safety Requirements

NOTE: The recommendations included in this section are advisory in scope. *IMTEC assumes no responsibility for the correct installation or use of this equipment in any user's facility.* IMTEC recommends that installation of this equipment be confined to licensed contractors, OEM-provided personnel and/or trained Facility Maintenance personnel.

Regulations Check

Before beginning, check your company's Wet Station Safety Regulations and Specifications, the local fire marshal codes and applicable electrical code requirements to be sure of compliance.

Electrical Safeguard Recommendations

3.1.1 If your AquaSeal uses an IMTEC controller, refer to the IMTEC controller manual shipped with that unit for electrical safety information and recommendations. If you are using a non-IMTEC controller, refer to the controller manufacturer's documentation for electrical safety information and recommendations.

3.1.2 Avoid exposing the power cable or connectors to immersion in water or other liquids.

3.1.3 When performing a re-install, unplug or unwire the power cable before moving the bath.

Handling Recommendations

3.1.4 *All Installations*

3.1.4.1 Guard against mechanical impact when handling the bath. Even a small chip can start a crack running.

3.1.5 *Re-installations*

3.1.5.1 Careful! Do not touch hot surfaces of quartz tank. These surfaces may be as hot as 200°C.

3.1.5.2 **DO NOT** move a bath that is still hot.

3.1.5.3 **DO NOT** move a bath containing any solution.

3.1.5.4 **DO NOT** flex or crimp the electrical cabling any more than absolutely necessary.

In-Use Requirements

Note that, removal or disconnection of any safety devices included with the AquaSeal and/or unsafe use of the AquaSeal automatically voids the warranty.

3.1.6 Ensure that all protective sensors and automatic shutdowns are attached and functional.

3.1.7 Take extra care when using volatile flammables: fumes are more dangerous than liquids.

3.1.8 **DO NOT** use the AquaSeal with any process chemistry or solvents unless the bath is properly installed in an operating fume hood.

3.1.9 **DO NOT** turn on the bath unless it contains liquid filled to the freeboard line (the horizontal interface line formed by the gray and white backgrounds) or one and one-half inches (1-1/2") from the top of the quartz flange.

3.1.10 **DO NOT** use the AquaSeal unless you are wearing protective outer garments including, but not limited to, industry-approved safety glasses or goggles, splashguard sleeves and aprons, and chemical resistant gloves.

3.1.11 **DO NOT** aspirate (manually drain) hot solution from any process vessel. Allow the liquid to cool first to a maximum temperature of 90°C.

3.1.12 **DO NOT** use Hydrofluoric Acid, B.O.E., or other HF-bearing solutions in this AquaSeal. Such solutions will etch the quartz liner tank and void the warranty.

3.1.13 **DO NOT** leave an operating bath unattended. If qualified personnel are not available, turn the bath power off.

3.1.14 **DO NOT** operate the AquaSeal at temperatures exceeding 190°C.[1] Doing so will void the warranty.

3.1.15 **DO NOT** allow bath liquid levels to fall below the heater mesh and safety over-temperature sensors. The use of a liquid level sensor is highly recommended.

This concludes Chapter 3., Safety Recommendations and Requirements.

[1] Maximum use temperature of the bath is limited to 200°C.

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4. Specifications

Description

This chapter contains information about the general physical characteristics of QRT/S AccuBaths. The information is presented in these sections:

- Explanation of AccuBath Model Numbers
- Description of the AquaSeal AccuBath
- Materials
- Physical Characteristics (Static and Recirculating)

Explanation of AccuBath Model Numbers

The AccuBath model number is symbolic of the following information:

- Model type
- Configuration
- Wafer size accommodated
- Cassette capacity
- Liquid capacity

The information is encoded as shown in the following example:

Example: AQZ-A1501-10

Information Fields:	AQZ	-	A	150	1	-	10
See Note (below):	1		2	3	4		5

Notes:

1. Model Type:,
   AQZ = AquaSeal static bath with or without drain, etc; AQRT/S = AquaSeal Quartz Recirculating with Trough and Sump.
2. A, B, C, etc. Indicates different configurations of the basic design (usually small dimensional variations). A = the first configuration of the bath, B = the second, etc.
3. Wafer size: 150 = 150mm (6 inch).
4. AccuBath wafer cassette capacity: 1 = 1 inch wafer cassette, 2 = 2 inch wafer cassette, etc.
5. Capacity in liters to the top of the working tank: 10 = 10 liters. This number is not the actual fill amount, which is calculated only to the freeboard line.

If, after examining the model number on the AccuBath, you cannot determine which bath you have, please contact IMTEC and have the serial number of the bath ready. Using the serial number (stamped on both the bath faceplate and inside the bath), we will be able to give you complete information about the bath.

Description of the AquaSeal AccuBath

Bath Function	For use in semiconductor and other similar wet process and solvent-based applications. For example: H_2SO_4 pre-diffusion cleaning and oxide resist stripping; H_3PO_4 nitride-etch solvent-based resist stripping, metal etching, hot DI water rinsing and other similar applications. The QRT/S baths come equipped with either one or two fill ports and one or two drain lines, depending on the bath size and configuration. The baths can also include an overflow standpipe in the sump area. The standpipe is used as a way to prevent overfilling and/or as a method of supplying chemistry to a re-processing system.
Temperature Range	28° to 190°C.
Over-Temperature Sensor #1	Thermocouple (T/C), J-type. Two (2) thermocouples are included, one active, one spare, and are mounted on the outside of the quartz tank wall, just above the heaters, unless otherwise specified.
Over-Temperature Sensor #2	One thermostatic snap switch, normally closed, set to open at 210°C $\pm$ 7°C, mounted on outside of quartz tank wall.
Controller	Refer to IMTEC controller manual or - if controller is not IMTEC-supplied - manufacturer's manual.

Materials

IMTEC's AquaSeal process tank is fabricated of annealed virgin quartz; all wetted surfaces are fire-polished, unless specifically ordered otherwise. The tank enclosure is manufactured of flame-retardant polypropylene (FRP) welded to a single-piece white or natural poly flange (for optimal chemical resistance of this highly exposed part). The poly flange, in turn, is attached to the mating quartz flange. The seal material may vary, depending upon intended bath use. If no chemical usage is stipulated at time of order, our standard fluoroelastomer RTV seal will be supplied. The patented Inconel heating element is bonded directly to the quartz tank. Insulation is refractory alumina-silica. Drains (optional) are typically quartz and terminate with Teflon fittings outside of the FRP housing. AquaSeal water-carrying tubes are also of Teflon.

Physical Characteristics

The capacities and dimensions of the typical Static and Recirculating AquaSeal baths are given in Tables 4-1, 4-2, 4-3 and 4-4. The Dimensional Guides (Figures 4-1and 4-2) provide a reference for the data. Cutout dimensions will be found in Chapter 5, Facility Requirements.

Table 4-1: QZ AquaSeal Capacities and Process Vessel Dimensions

QZ Model	Liquid Capacity (liters)	Capacity (wafer boats)	Process Vessel Internal Dimensions (inches)		
			Length (A)	Width (B)	Depth (C)
A1002-11	9	2-100mm	11.50	7.50	7.81
A1252-14	12	2-125mm	13.50	7.50	8.81
A1254-27	22	4-125mm	13.50	13.50	8.87
A1501-10	8	1-150mm	7.75	7.75	9.81
A1502-18	18	2-150mm	16.00	8.00	9.81
A2001-25	22	1-200mm	12.00	11.00	11.69
B2001-34	30	1-200mm	16.00	10.50	12.25
A2002-51	45	2-200mm	21.50	11.50	12.56

All dimensions ±.10"

Table 4-2: QZ AquaSeal Dimensions

Model QZAS	Below Mounting Flange			Above Mounting Flange		
	Length (D)	Width (E)	*Depth (F)	Length (G)	Width (H)	Depth (I)
A1002-11	13.54	9.54	11.12	15.00	11.00	1.12
A1252-14	15.54	9.54	12.12	17.00	11.00	1.12
A1254-27	15.54	15.54	12.12	17.00	17.00	1.18
A1501-10	9.91	9.91	13.12	11.38	11.38	1.12
A1502-18	18.03	10.03	13.12	19.50	11.50	1.12
A2001-25	14.03	13.03	15.00	15.50	14.50	1.12
B2001-34	18.07	12.57	15.37	19.79	14.29	1.31
A2002-51	23.56	13.56	15.68	25.29	15.29	1.31

*Add 1.6” (4.1 cm) if optional quartz drain is installed.
All dimensions ±.10"

Figure 4-1: AquaSeal Static AccuBath Dimensional Guide

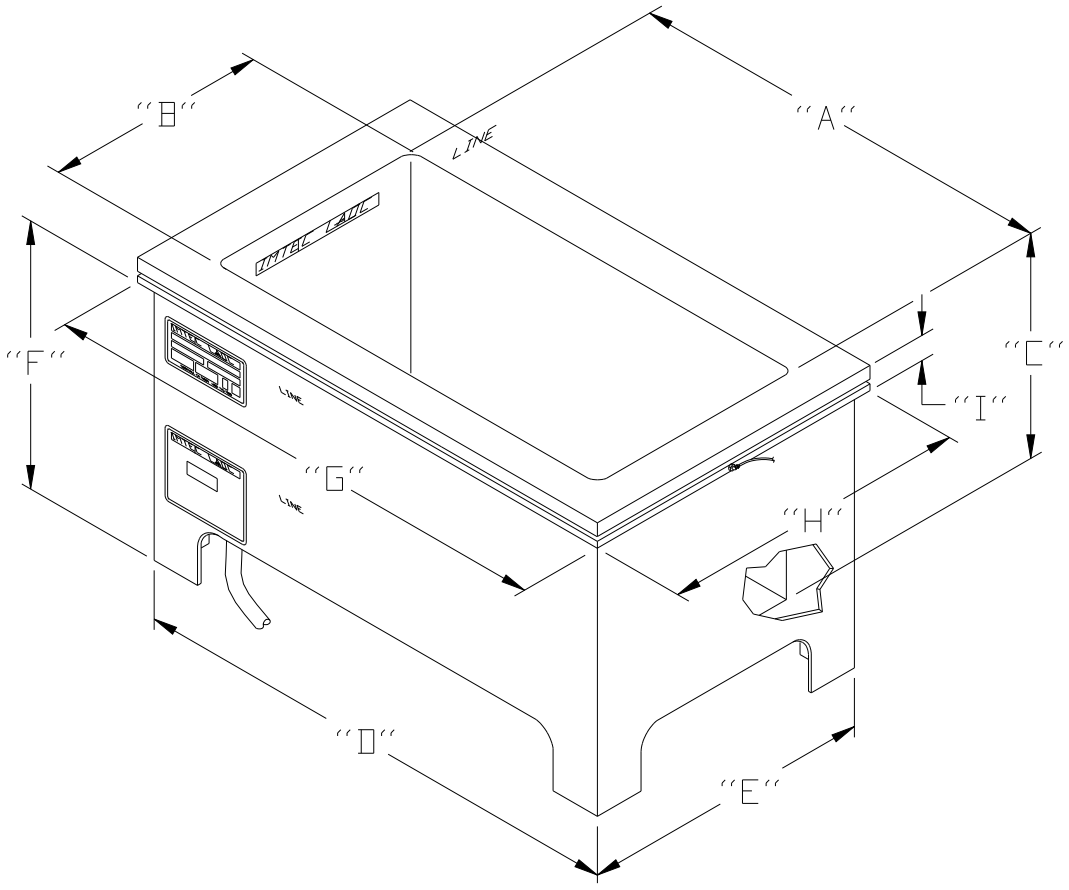


Table 4-3: QRT/S AquaSeal Capacities and Process Vessel Dimensions

QRT/S Model	Liquid Capacity (liters)	Capacity (wafer boats)	Process Vessel Internal Dimensions (inches)		
			Length (A)	Width (B)	Depth (C)
A1002-11	11	1-100mm	11.50	7.50	7.62
A1252-14	14	2-125mm	13.50	7.50	8.62
B1501-15	15	1-150mm	9.87	8.62	11.00
D1501-15	13	1-150mm	9.87	8.62	9.50
A1502-18	20	2-150mm	16.00	8.00	9.62
A2001-25/12	25	1-200mm	11.00	12.00	11.50
B2001-34	33	1-200mm or 2-150mm	16.00	10.50	12.00
A2002-51	51	2-200mm	21.50	11.50	12.50

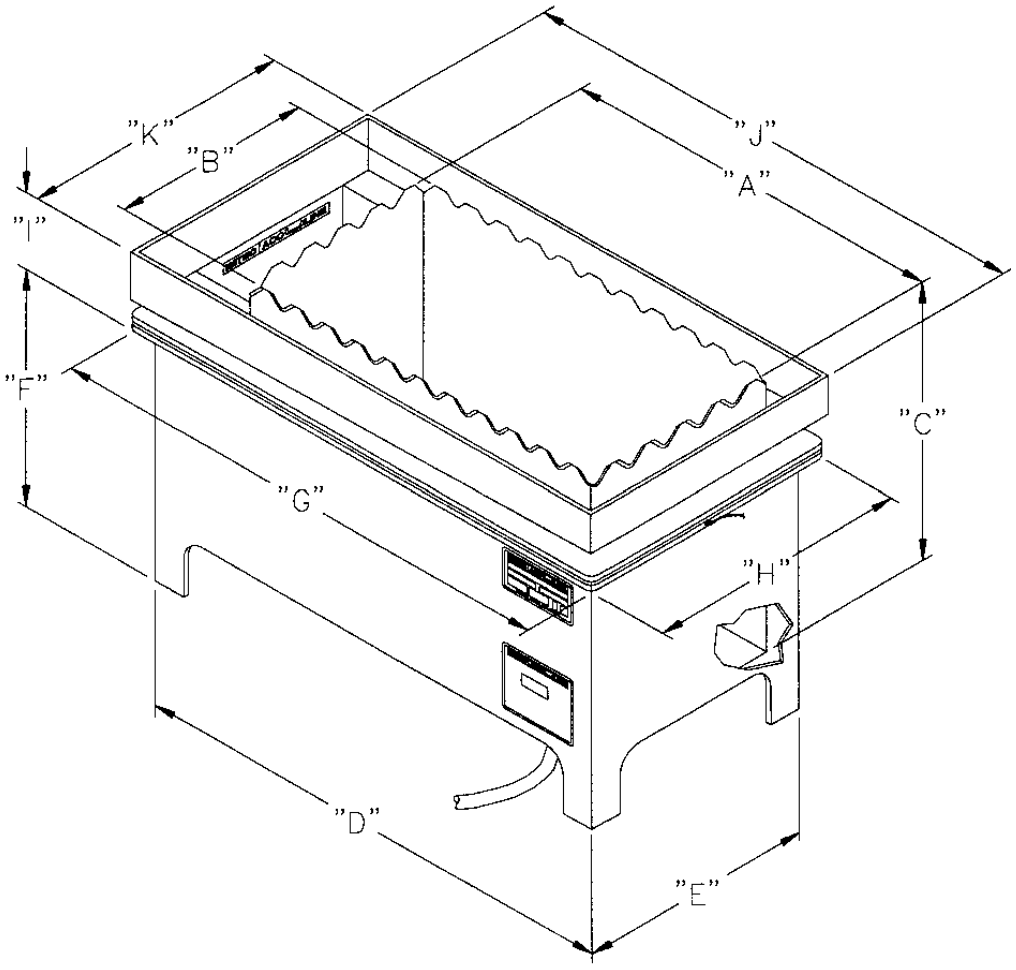
All dimensions ±.10"

Table 4-4: QRT/S AquaSeal Dimensions

Model QRT/S	Below Mounting Flange			Above Mounting Flange				
	Length (D)	Width (E)	*Depth (F)	Length (G)	Width (H)	Depth (I)	Length (J)	Width (K)
A1002-11	18.59	10.41	10.27	20.07	11.89	3.84	17.57	10.88
A1252-14	20.59	10.41	11.24	22.06	11.88	3.87	19.57	10.88
B1501-15	16.96	11.53	13.50	18.43	13.00	3.81	15.94	12.00
D1501-15	16.96	11.53	12.18	18.43	13.00	3.81	15.94	12.00
A1502-18	23.22	11.03	12.06	24.69	12.50	4.05	22.07	11.38
A2001-25/12	19.09	14.91	14.01	20.82	16.64	3.97	18.07	15.38
B2001-34	23.09	13.41	14.44	24.83	15.14	4.04	22.07	13.88
A2002-51	29.41	14.41	14.83	31.14	16.14	4.16	28.38	14.88

*Add 1.6” (4.1 cm) if optional quartz drain is installed.
All dimensions ±.10”

Figure 4-2: AquaSeal Recirculating AccuBath Dimensional Guide



This concludes Chapter 4., Specifications.

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5. Facility Requirements

Description

This chapter describes the facility requirements needed to install and operate an IMTEC AquaSeal. The information is provided in these sections:

- Requirements
- Cutout Dimensions

Requirements

Bath Power	Dedicated circuit, 208 VAC, nominal, single phase, 50/60 Hz*. As a general rule, IMTEC recommends that a circuit breaker with a capacity of 125% of the bath draw be used (check the bath faceplate or drawings shipped with the bath to determine draw). If 125% of the nominal current load falls into an area between nominals, use the next larger nominal. This recommendation is based on 208 VAC power. If your input voltage differs from this, *amperage will vary and watt-density limits may be exceeded*. Be sure the voltage range specified on the AccuBath faceplate includes your local supply voltage. If in doubt, contact IMTEC. For IMTEC recirculating baths drawing above 20 amps, special circuitry information is available. 24 VAC operator interface controllers with 24 VAC control output are an available option. Line noise filter as required.
Heater Leads	IMTEC recommends that each pair of heater leads be serviced by a dedicated two-pole circuit breaker.
Level-Sensor Power	Factory set: see LAM label. Shared circuit, 120 VAC, single phase, 20 Amp, 50/60 Hz. Also available: 200-245 VAC, single phase, 50/60 Hz.
Wetstation provisioning	Provide adequate support for bath flange (see Tables 4-2 and 4-4). Fume hood. Appropriate location for flowmeter in the maintenance chase.
Controller	Provide for Controller mounting in headcase (see Controller manual for details).
Electrical	All baths are to be installed with a UL-recognized GFCI (Ground Fault Circuit Interrupter) at the line voltage heater input (not provided by IMTEC).
GFI	All IMTEC baths come equipped with a three-wire scheme for connecting leak sensors. If a leak-sensing device *will not* be connected, a butt connector should be crimped on the user end of the cable assemblies to prevent accidental electrical shock (see Chapter 6, Installation).
AquaSeal	DI or house water continuous flow source for use as AquaSeal water supply.

Cutout Dimensions (Tables 5-1 and 5-2)

Note: Most modern wetbenches are designed to handle different sizes of baths and a cutout is not necessary. This information is provided in the interest of being thorough. Please note that the cutout is measured from *below* the tank flange. The minimum required deck space is measured from *above* the tank flange.

Table 5-1: AquaSeal Static Bath Recommended CutOut (Inches)

Model QZ	Rec. Cut-Out		Min. Deck Space Req.		
	Length	Width	Length	Width	Depth
A1002-11	14.29	10.29	15.50	11.50	1.62
A1252-14	16.29	10.29	17.50	11.50	1.62
A1254-27	16.29	16.29	17.50	17.50	1.68
A1501-10	10.66	10.66	11.88	11.88	1.62
A1502-18	18.78	10.78	20.00	12.00	1.62
A2001-25	14.78	13.78	16.00	15.00	1.62
B2001-34	18.82	13.32	20.29	14.79	1.81
A2002-51	24.31	14.31	25.79	15.79	1.81

All dimensions ±.10"

Table 5-2: AquaSeal Recirculating Bath Recommended CutOut (Inches)

Model QRT/S	Rec. Cut-Out		Min. Deck Space Req.		
	Length	Width	Length	Width	Depth
A1002-11	19.34	11.16	20.57	12.39	4.34
A1252-14	21.34	11.16	22.56	12.38	4.37
B1501-15	17.71	12.28	18.93	13.50	4.31
D1501-15	17.71	12.28	18.93	13.50	4.31
A1502-18	23.97	11.78	25.19	13.00	4.55
A2001-25/12	19.84	15.66	21.32	17.14	4.47
B2001-34	23.84	14.16	25.33	15.64	4.54
A2002-51	30.16	15.16	31.64	16.64	4.66

All dimensions ±.10"

This concludes the Chapter 5., Facility Requirements.

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6. Installation

Description

This chapter describes the procedures required for installing the AquaSeal and ensuring it is ready for processing. The information is presented in these sections:

- Types of Installation
- Required Items
- Pre-Installation
- Dimensional Verification
- Installation

Types of Installation

Wet Sump Configuration	The IMTEC AquaSeal bath was designed to be used in a drained wet sump style wetbench or with other suitable drip pans.
Dry Sump Configuration	Call IMTEC Customer Service for information about baths equipped with a dry sump option.

Required Items

You should have received the following items with your AquaSeal bath:

- (1) flowmeter (2-10 GPH; 125 cc/min to 630 cc/min)
- 8 feet of ¼" Teflon tubing
- 12 feet of 1/8" (O.D.) tubing
- (2) ¼" tube fittings
- (4) barbed/mpt elbow fittings

If any of the above items is missing, notify IMTEC immediately.

Pre-installation

6.1.1 Make sure you have the supplied the following:

- DI or house water continuous flow source for use as the AquaSeal water supply (minimum 15 psi pressure)
- Appropriate location for the flowmeter in the maintenance chase
- Appropriate location for ¼" water supply line to pass through bench bulkhead into plenum.

6.1.2 Remove all chemicals from adjacent work areas. Clean up any chemical spills on the wetbench and in the bath plenum.

CAUTION: Observe all normal safety precautions followed when working with electricity!

Dimensional Verification

6.1.3 *Wetbench Cutout Exists*

If installing the AquaSeal in a bench modified for a standard bath, verify and correct for dimensional differences between the standard bath and the AquaSeal quartz flange. Critical dimensions are from the top of the quartz liner to the base of the flange (see “I” in Tables 4-2 and 4-4).

Verify that there are no interference issues, including the elbow fittings.

6.1.4 *Wetbench Cutout Does Not Exist*

Verify the dimensions needed for the mounting cutout, referring to Tables 5-1 and 5-2 for the necessary data.

Installation

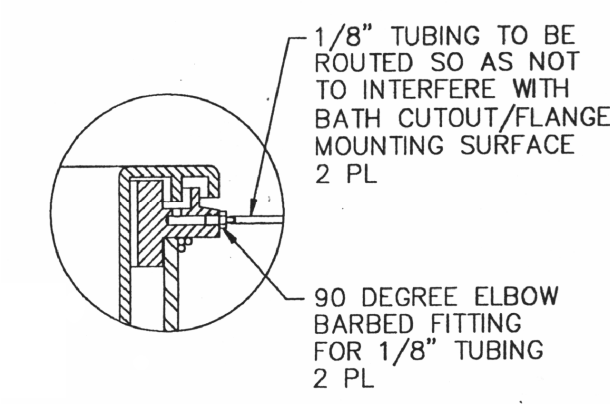
NOTE: Drawings specific to your AquaSeal AccuBath were shipped with the system. You may wish to refer to these drawings during the installation process.

Please read all instructions through before beginning installation.

6.1.5 In most cases, the bath is mounted on a frame system and the top deck serves as a spill cover. However, if a cutout is needed, make it, ensuring that you have verified the dimensions required.

6.1.6 Install the barbed/mpt elbow fittings on the bath flange as shown in Figure 6-1. Hand-tighten until firmly mounted, but take care not to overtighten.

Figure 6-1: Barbed Elbow Fitting



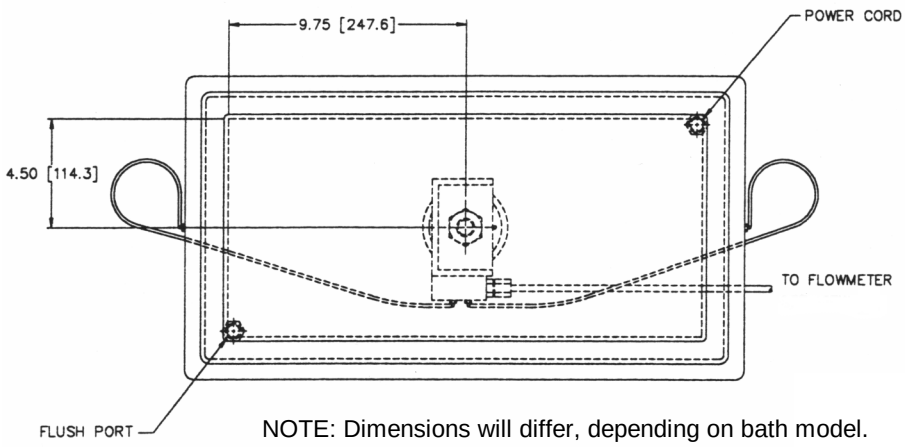
6.1.7 Determine the best routing for the 1/8” Teflon tubing which will be connected to the elbow fittings and run to the bath manifold (at the base of the bath) once it is installed. Turn the elbow fittings to accommodate that routing.

6.1.8 Install the flowmeter in the maintenance chase and connect the ¼” line to it (see Figure 6-4).

6.1.9 Measure the lengths of 1/8” tubing needed to connect each flange elbow fitting to the base of the bath and cut them.

6.1.10 Install the 1/8” tubing to manifold at bath base. Be careful not to crimp the lines (see Figure 6-2).

Figure 6-2: Bottom Bath View

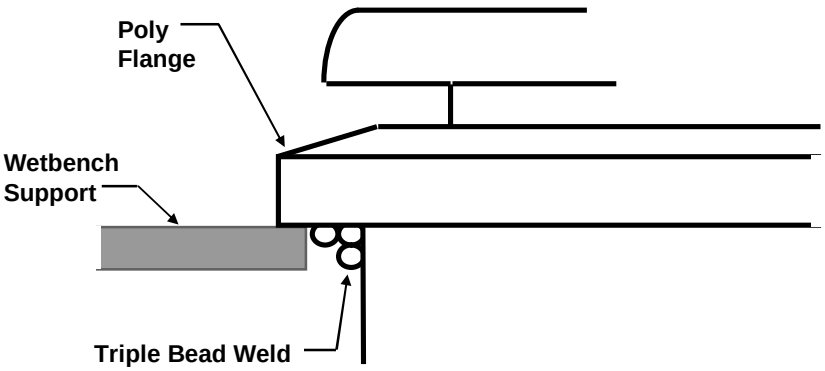


NOTE: Dimensions will differ, depending on bath model.

6.1.11 Gently lower the bath into the sink cutout, supporting the bath evenly on all sides while lowering it into the plenum. Make sure that the heater power cable harness is led through the cutout into the plenum and that it is clear of the enclosure hanging brackets and any other obstructions. Take care in aligning the bath so that it is evenly supported by its flange and clear of the triple bead weld (see Figure 6-3).

CAUTION: Damage to the bath can result from accidentally supporting the tank weight on the triple bead weld!

Figure 6-3: Proper Deck Mounting Alignment



6.1.12 Check that the bath is level.

6.1.13 Connect 1/8” lines to elbow flange fittings by routing them around to the outside of the bath supports..

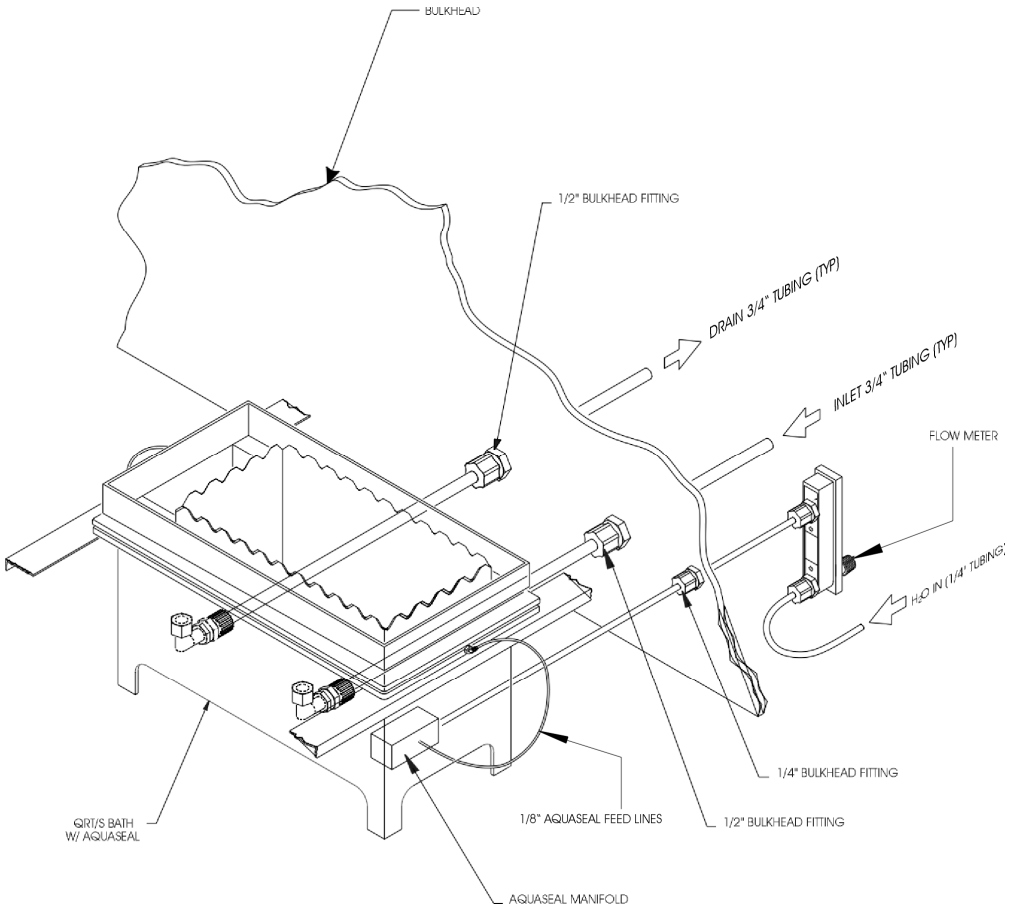
6.1.14 Connect ¼” line from AquaSeal Manifold to flowmeter (see Figure 6-4).

6.1.15 Run the heater power cable harness through the plenum wall or floor, using fittings appropriate for your wetbench. Ensure that plenum integrity is maintained.

6.1.16 Ensure that the power cable harness is connected correctly (see Chapter 9, Electronics and the drawings that came with your AquaSeal), but do not power up the bath!

6.1.17 If the AquaSeal is equipped with other external plumbing, complete any remaining necessary connections, being careful not to crimp the AquaSeal 1/8" tubes.

Figure 6-4: Installation Overview



6.1.18 Turn on the water supply to the flowmeter and adjust the flow to a setting appropriate for your bath (see Tables 6-1 and 6-2)[2]. Confirm that water is dripping from the bath flange at random locations around the bath.

6.1.19 Monitor the flowmeter weekly to ensure the proper flow rate (green "stripe" on flowmeter indicates the operating range).

[2] If in doubt about the correct flow setting, please refer to the Marketing Illustrations that accompanied your IMTEC AquaSeal bath.

Table 6-1: Recommended Flowmeter Settings (QZ)

QZ Models	Meter Setting
A1002-11	45 cc/min.
A1252-14	55 cc/min.
A1254-27	60 cc/min.
A1501-10	35 cc/min.
A1502-18	50 cc/min.
A2001-25	50 cc/min.
B2001-34	50 cc/min.
A2002-51	60 cc/min.

Table 6-2: Flowmeter Settings (QRT/S)

QRT/S Models	Meter Setting
A1002-11	50 cc/min.
A1252-14	50 cc/min.
B1501-15	50 cc/min.
D1501-15	50 cc/min.
A1502-18	60 cc/min.
A2001-25/12	60 cc/min.
B2001-34	60 cc/min.
A2002-51	75 cc/min.

If your specific tank size is not listed here, use the following formula:

$L + W \times 1.6$

Where L = Length of tank housing and W = Width of tank housing. This formula will result in turning over the volume of water in the Aquaseal channel approximately 20 times per hour.

This concludes the section on installation.

7

7. Pre-Process Operation

Description

This chapter describes the procedures necessary for preparing the IMTEC AquaSeal for its first processing. The information is presented in these sections:

- Pre-Start
- Initializing the Controller
- Pre-Process Cleaning
- Ramp-Up
- Adjustments and Calibration

NOTE: You are requested to read completely through the instructions before beginning.

Pre-Start

7.1.1 If you have not already done so, check to ensure the bath is correctly connected (see Chapter 9. Electronics, and the drawings that were shipped with your AquaSeal for details). Also verify that water is flowing properly through the quartz flange channel.

7.1.2 If the bath is equipped with a drain, ensure that the drain valve is closed before filling the bath.

7.1.3 For QZ model AquaSeal baths, fill to the freeboard line (where the gray and white backgrounds meet on the inside of the bath). For QRT/S models, fill the bath to within 1½" from the top of the quartz flange, making sure the amount of solution used is appropriate to the bath (see Tables 4-1 and 4-3 for capacity amounts).

NOTE: IMTEC recommends that, as an absolute minimum, you fill the bath to a level ½" above the top of the heater mesh (visible through the walls of the quartz process tank).

CAUTION: *Do not power up the bath without liquid in the process tank!*

Initializing the Controller

Before powering-up the bath, the Controller must be initialized. Please refer to your Controller manual for specific instructions related to the following instructions:

7.1.4 Turn on the Controller power switch.

7.1.5 Actuate the temperature control and heating systems.

7.1.6 Set the Controller to the correct temperature for an SC-2 process.

Pre-Processing Cleaning Sequence

Your new IMTEC AquaSeal bath was carefully cleaned before being seal-packaged for shipment. However, a general pre-clean sequence is necessary to ensure purity of process. Once the bath has been properly filled and the Controller initialized, you may perform a pre-processing sequence:

7.1.7 Power-up the bath.

7.1.8 Perform a standard SC-2 process.

7.1.9 Follow the SC-2 process with several DI water rinses and drain the bath.

7.1.10 Power-down the bath.

Ramp-Up

At this point, you have verified that your new AquaSeal bath has been correctly connected. The Controller has been initialized and a pre-processing sequence done. You are now ready for the ramp-up procedure in which you will bring the newly installed bath up to process temperature slowly to ensure future correct performance.

During this process, visually inspect the bath for any quartz breakage that may not have been apparent before.

NOTE: Process control temperature sensors are typically supplied with the Controller, not the bath. Refer to your Controller manual for process temperature calibration information and other Controller-related parameter checks that may be performed during ramp-up.

7.1.11 Ensure that the bath power is OFF.

7.1.12 Fill the bath with the correct amount of process fluid (see Tables 4-1 and 4-3).

7.1.13 Turn on the Controller and set the temperature at 90°C.

7.1.14 Turn the bath power ON.

7.1.15 When the process fluid temperature reaches 90°C, heat soak the bath for one hour.

7.1.16 Increase the temperature 30°C and allow the bath to soak for ½ hour.

7.1.17 Repeat step 7.5.6 above until the process temperature is reached. Ramp up is now completed.

NOTE: Once ramp-up has been completed, the bath may be taken directly from ambient to process temperature.

Adjustments and Calibration

Your AquaSeal bath includes, as the primary over-temperature sensors, two J-type thermocouples (one active and connected to the system Controller and one spare). IMTEC recommends that the over-temperature setting on your Controller or over-temperature protection circuit board be set at 10°C or less over the intended process temperature of the bath, but no higher than 190°C. An IMTEC

Controller will shut off power to the bath when the setpoint is reached and go into “HOLD” mode, rather than power-up when the bath temperature falls.

The bath’s secondary over-temperature sensor – a thermostatic snap switch (normally closed) – is mounted inside the bath and is factory preset to open at 210°C (±7°C). It cannot be adjusted. It should be attached to an independent shutdown circuit, such as that provided by the “redundant” overtemperature safety circuit in IMTEC Controllers. Since the thermostatic switch will reset when the temperature falls, the safety circuit should disable the power to the heater until reset.

Standard AquaSeal bath units will require no calibration. However, when combined with the Controller and various sensors, the bath may become part of a general system which requires calibration. In this case, refer to your Controller manual for recalibration information.

This concludes the chapter on Pre-Process Operation.

8

8. Operating Instructions

Description

This chapter describes the procedures for operating an IMTEC AquaSeal bath. The information is presented in these sections:

- Start-Up
- Shut-Down

NOTE: You are requested to read completely through the instructions before beginning processing.

Start-Up

These instructions assume that, if the bath is newly installed, it has been taken through the necessary pre-processing steps including ramp-up, and the bath is filled with the correct amount of process fluid (refer to Tables 4-1 and 4-3). *Do not initiate processing unless these conditions have been fulfilled.*

CAUTION: Do not power-up the bath without liquid in the process tank!

8.1.1 Turn on the Controller, check that the process temperature setpoint is correctly set.

8.1.2 Turn the bath power ON.

8.1.3 When the specified operating temperature has been reached, begin processing.

Shut-Down

8.1.4 Turn the bath power OFF.

8.1.5 Turn the Controller off.

8.1.6 Allow the process chemistry to cool, following your company's normal procedure.

8.1.7 Aspirate or (if drain is installed) drain the solution, taking all safety precautions.

CAUTION: Do not aspirate or drain hot chemicals (above 90°C)!

This concludes the chapter on Operating Instructions.

9

9. Electrical and Electronics Information

Description

This chapter provides an overview of the electrical and electronic components of the AquaSeal baths. The information is presented in these sections:

- General
- Over-Temperature Sensor #1
- Over-Temperature Sensor #2
- Bath Heater Power

General

Most IMTEC QZ AquaSeal model baths include a cable containing wires for the overtemperature thermocouples and GFI ground reference (or conductivity sensing), the high-temperature safety snap switch and leads for the heaters. Each cable contains two pairs of wires for the thermocouples, one pair for the snap switch and up to four pairs for the heater elements. If there is more than one pair of heater element leads, the load on each pair is identical[3]. IMTEC recommends that each pair of heater leads be serviced by a dedicated two-pole circuit breaker.

Figures 9-1 and 9-2 on pages 9-3 and 9-4 illustrate typical wiring diagrams for AquaSeal baths. Please note that these diagrams are for *general information only.* A wiring diagram for your specific AquaSeal bath was enclosed in the envelope in which you also found this manual and the bath warranty card. Please refer to this diagram for specific wiring information.

Over-Temperature Sensor #1

Thermocouple (T/C), J-type. Two (2) thermocouples are included, one active and one spare, and are mounted on the outside of the quartz tank wall, just above the heaters unless otherwise specified.

Over-Temperature Sensor #1

One thermostatic snap switch, normally closed and set to open at 210°C (±7°C), mounted on the outside of the quartz tank wall.

Bath Heater Power

Please refer to Tables 9-1 and 9-2 on the next page.

This concludes the chapter on electrical and electronics information.

[3] Except for the QZ-A2002, in which one pair has twice the load of the other.

Table 9-1: AquaSeal Bath Power (QZ Models)

Electrical at 208VAC (V)			
Model	**Power (Watts)**	**Nominal* Resistance (Ohms)**	**Current (Amps)**
A1002-11	2372	18.2	11.4
A1252-14	2372	18.2	11.4
A1254-27	2809	15.4	13.5
A1501-10	1588	27.2	7.6
A1502-18	2689	16.1	12.9
A2001-25	2933	14.8	14.1
B2001-34	2982	14.5	14.3
A2002-51	5769	7.5	27.7

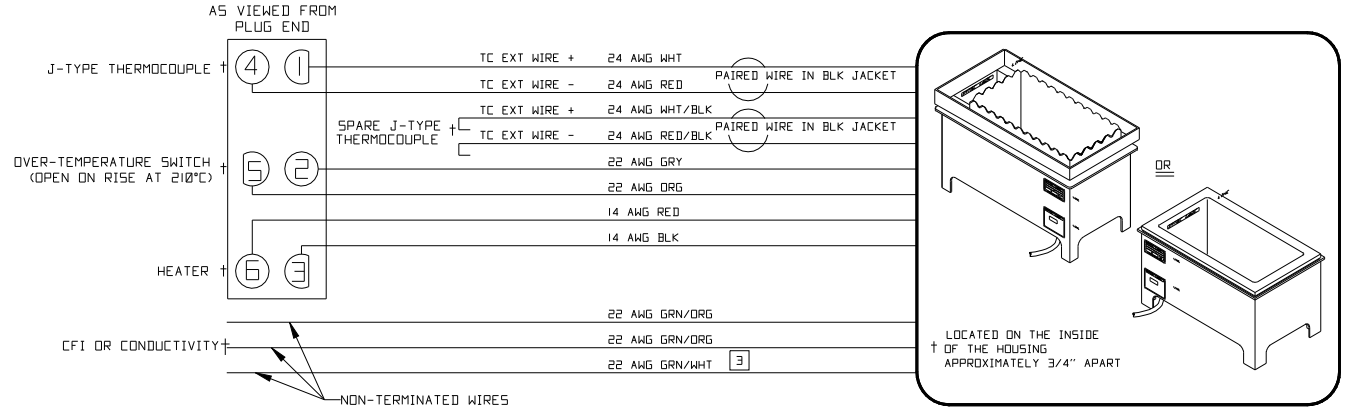
All specifications ±10% tolerance.

Table 9-2: AquaSeal Bath Power (QRT/S Models)

Electrical at 208VAC (V)			
Model	**Power (Watts)**	**Nominal* Resistance (Ohms)**	**Current (Amps)**
A1002-11 (240 VAC)	1812	31.8	7.6
A1252-14	3407	12.7	16.4
B1501-15	2030	10.0	20.8
D1501-15	1767	24.5	8.5
A1502-18	4233	10.2	20.4
A2001-25/12	4279	10.1	20.6
B2001-34	5753	7.5	27.7
A2002-51	6933	6.2	33.3

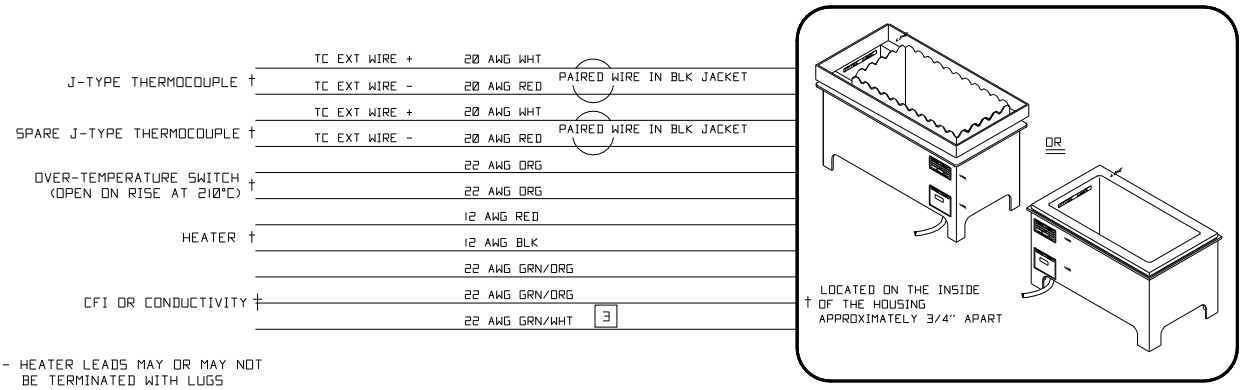
All specifications ±10% tolerance.

Figure 9-1
Typical wiring diagram for AquaSeal Baths



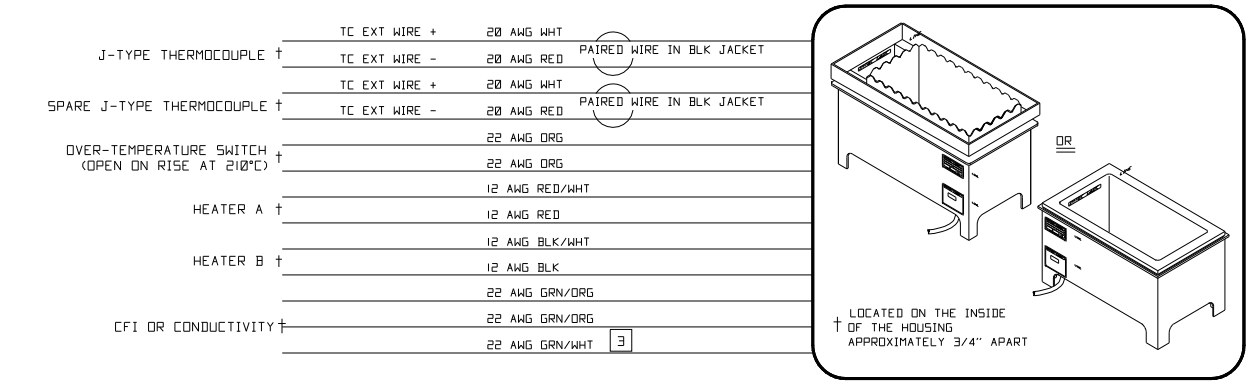
A

REF DWG NO.
10-007-0080



B

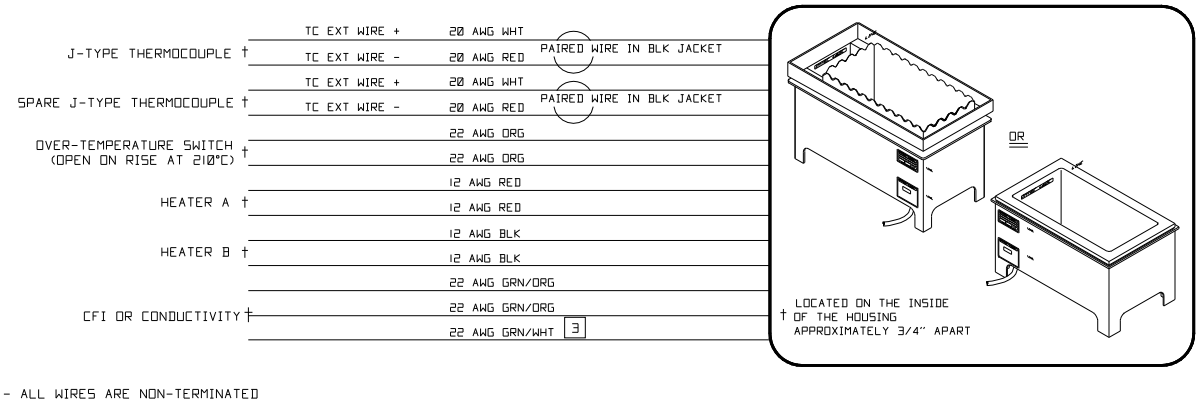
REF DWG NO.
10-007-0081



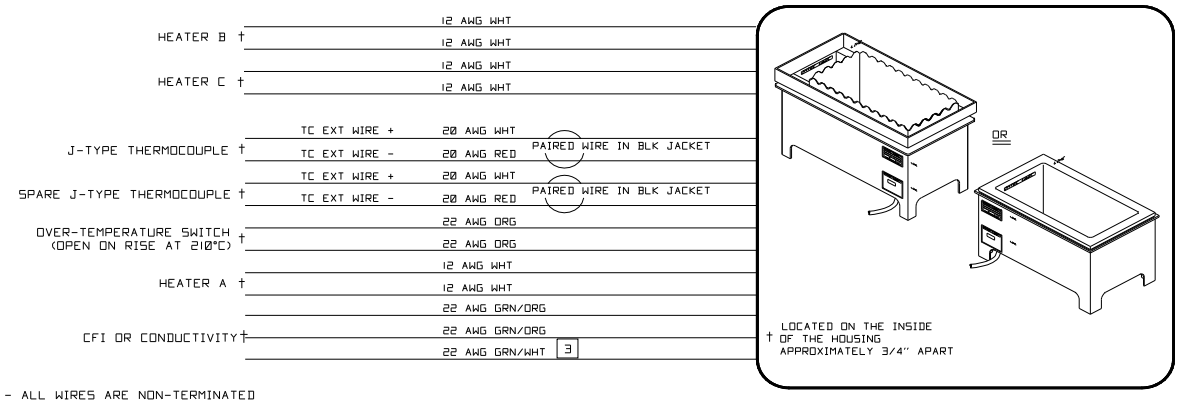
C

REF DWG NO.
10-007-0082

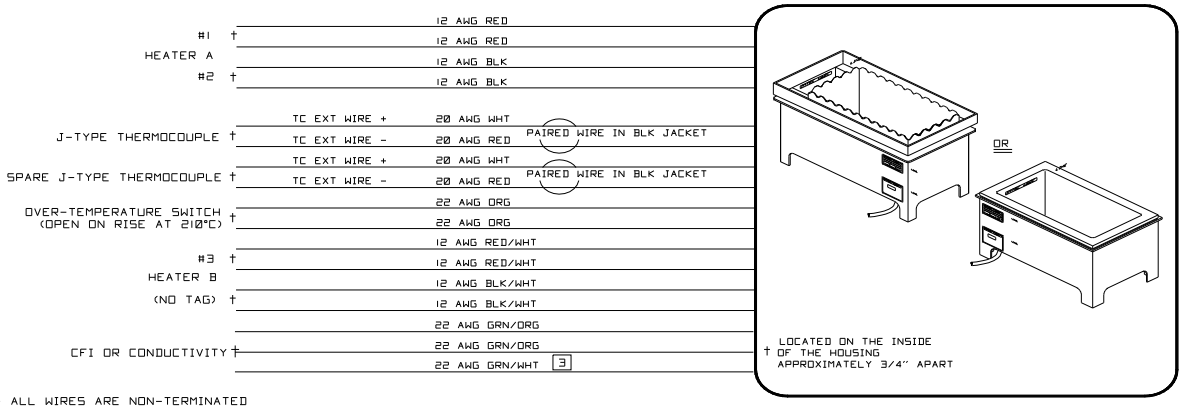
Figure 9-2
Typical wiring diagram for AquaSeal baths



D REF DWG NO. 10-007-0083

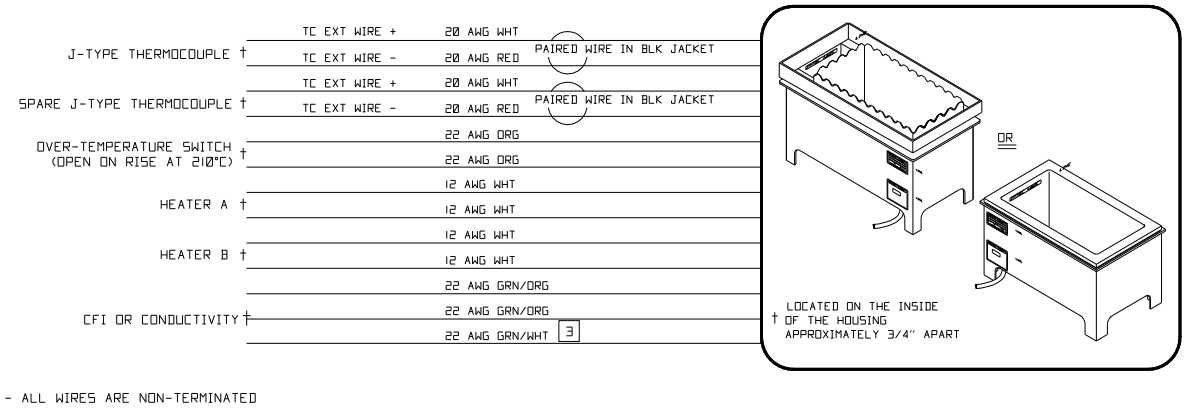


E REF DWG NO. 10-007-0084



F REF DWG NO. 10-007-0085

Figure 9-3
Typical wiring diagram for AquaSeal baths



10

10. Troubleshooting

Description

This chapter describes the procedures required for troubleshooting the AquaSeal bath. The information is presented in these sections:

- Heating Element Does Not Heat
- Failed Over-Temperature Thermocouple
- Other Troubleshooting Procedures

Heating Element Does Not Heat

10.1.1 Check that power is present at the Controller.

10.1.2 If power is present at the Controller, check that the bath wiring harness is properly connected to the Controller.

10.1.3 If still no heat, check for proper voltage and power at the bath power cord attachment terminal.

10.1.4 If still no heat, use an OHM meter to check the heater condition (contact IMTEC for the proper heater resistances).

NOTE: AquaSeal baths drawing up to 15 amperes are typically provided with a pre-wired Amp connector. These components are keyed and will only connect when in the proper orientation. *Do not force them.* Call IMTEC if you experience difficulty testing the bath components.

Baths drawing up to 20 amperes may be hard-wired to the IMTEC Controller or to an external relay package of adequate capacity which, in turn, is hard-wired to the Controller.

Baths drawing over 20 amperes *must* be connected to IMTEC Controllers through intermediary external relays.

Failed Over-Temperature Thermocouple

10.1.5 Over-temperature thermocouples do not have to be highly accurate to perform their safety function. However, if a T/C sensor is open, shorted, or you detect a highly deviant voltage (checking at ambient), disconnect the T/C leads. Find the spare 6-pin connector wire pair (in QZ baths, it will be found in the cable harness jacket) and connect them, making sure that the white and red leads are connected in the correct polarity.

Other Troubleshooting Procedures

10.1.6 All other troubleshooting procedures for the AquaSeal are performed at the Controller. If there are any difficulties with either the AquaSeal (or the IMTEC Controller) you cannot resolve by study of the documentation, please contact IMTEC for assistance.

This concludes the chapter on Troubleshooting.

A

Appendix A. AquaSeal 30 Month Limited Warranty

(Non-Warranty of Merchantability, Fitness and Limitation of Liabilities)

1. Definitions

a. *AquaSeal:*
IMTEC's patented compound quartz/housing seal feature.

b. *Conventional Seal*:
Standard RTV quartz/housing seal.

c. *Remanufactured bath:*
Bath which has been rebuilt to new standards and modified from the conventional seal to the AquaSeal.

d. *Reconditioned bath*:
Bath which is rebuilt to new standards without changing the seal type.

e. *Warranty, and Unconditional Warranty:*
Repair/replacement of faulty components at no cost to owner.

f. *Limited Warranty:*
Warranty in which the owner may share some portion of the cost of repair.

2. Warranty Statement

IMTEC provides a limited warranty on products containing the AquaSeal feature, whether new or remanufactured. IMTEC warrants the bath to be free from manufacturing defects in materials and workmanship for a total period of thirty months. The first 24 months include a 100% warranty (all repair costs are borne by IMTEC); the last six months have a 50% warranty (prevailing repair rates are split evenly between owner and IMTEC).

3. Inclusions

IMTEC guarantees its AquaSeal-equipped baths only if used with approved chemistries, within proper temperature ranges for these chemistries, in proper environments with uninterrupted water supply to the AquaSeal and proper voltage ranges. With these conditions met, IMTEC guarantees that the:

a. Sealing material used to bond the quartz chamber to the poly housing shall not fail before the poly housing;

b. Case welds and seams shall not fail before the base material of the housing;

c. Heaters shall not fail before the base material of the housing;

d. Built-in sensors shall not fail before the base material of the housing;

e. General workmanship meets or exceeds industry standards.

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Part No. 10-018-0013

4. Exceptions

a. Exceptions to the above-stated warranty are as follows:IMTEC quartzware is guaranteed to remain sound and whole in normal usage for a period of 45 days from the date of the initial shipment.

5. Limitations

a. Such warranty of IMTEC is limited as follows: In the event of such defect as described in paragraphs 3.1 through 3.5 and 4.1 above, IMTEC agrees at its option to either replace or repair the defective unit or refund the purchase price and IMTEC's liability is limited thereto. Units repaired or replaced under warranty will bear the remainder of the original equipment warranty in Terms and Conditions.

b. During the first 24 months of ownership, the owner has the option of either of the following:

i. Return the bath for repair under the 100% warranty as described in Paragraph 2, above, OR

ii. Pay the prevailing repair rate and have the balance of the existing Limited Warranty converted to an Unconditional Warranty and receive an additional 24 month Unconditional Warranty added to the remaining balance of the original warranty.

c. All repairs will be made at IMTEC's place of business. Buyer shall pay the cost of returning the product to IMTEC's factory. Any such return must be pre-authorized by IMTEC, through issuance of an IMTEC RGA number. That number must be shown on the returned merchandise.

d. It shall remain the buyer's responsibility to carefully inspect each quartz AquaSeal equipped bath unit upon its receipt for breakage, including hairline cracks. The buyer is also responsible for retaining the original packing materials for use in the event a return is necessary, or for obtaining the approved packaging materials from IMTEC.

e. It shall remain the buyer's responsibility to file claims for quartz damage during shipment with the proper carrier.

f. The AquaSeal water supply must remain uninterrupted and set at flow rates specified in the operating manual during any period in which the bath contains chemicals. Failure to do so voids the Warranty.

6. Exclusions

While other exclusions may apply, IMTEC specifically does not guarantee and accepts no responsibility for:

a. Penetration of the base material of the outer case wall or flange by any user chemistries;

b. Chemical attack on quartz components;

c. Breakage of quartz or other product by impact, improper facility/wet-station installation, handling or other abusive treatment, or damage related to such impact-related or physically induced damage, such as internal corrosion;

d. Damage to any portion of the bath resulting from operating the unit with a liquid level so low as to expose the heater strips, or operating the bath at a temperature above 190°C;

e. Unauthorized customer modifications to any portion of the system (that may disqualify all warranties);

f. External temperature sensors where the protective outer coating has been torn, cut or abraded;

g. Operation of the bath without sufficient water supply to the AquaSeal, resulting in process chemical degradation of the RTV seal.

h. Submersion of the bath or other non-standard practices.

IMTEC does not warrant Merchantability or fitness for any purpose and there are no warranties, expressed or implied other than those expressly stated herein. IMTEC is not responsible for any consequential, incidental or other damages whatsoever. IMTEC's liability is limited to the repair or replacement of such defective product or refund of purchase price at IMTEC's sole option, as stated above. All claims must be made in a timely manner and within the warranty period.

IMTEC Acculine
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B

Appendix B. Policy and Instructions for Returning AccuBaths

1. General

The following describes IMTEC's policies regarding returning bath products and the procedures to be followed when returning baths. The information is presented in these parts:

- Return Policy
- Obtaining a Return Authorization
- Packing the bath for return

NOTE: Read *completely* through the instructions before beginning to package a bath for return.

2. Return Policies

a. All ACCUBATH's must be returned in IMTEC shipping containers and packaging material. If you no longer have the original container, a shipping kit is available for a nominal fee from IMTEC Customer Service.

b. All ACCUBATH returns must be authorized by an IMTEC representative (see 1.3, below). If a bath is shipped to IMTEC without a Returned Goods Authorization (RGA) number, the bath will be refused by the IMTEC Receiving Department and returned to the sender.

c. Unless the shipment was an IMTEC error, all freight charges are the responsibility of the customer. IMTEC recommends you insure for full or repaired value.

3. Return Preauthorization

a. Have the following information ready:

- Reason for the repair
- Type of chemistry used in the bath
- Process temperature used
- Purchase Order Number (used for tracking only; there will be no charge amount until the bath has been evaluated by IMTEC).

b. Call IMTEC Customer Service at 510-770-1800 and request an RGA number.

c. Be sure to tell them if you require a shipping container kit.

d. If bath is contaminated (quartz is cracked or the seal breached), ask for a contamination shipping kit (DOT-approved for transporting acid-present baths).

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4. Return Procedures

a. You will need the following:

Tape (OSHA White, 5-mil, 1-inch wide, pressure-sensitive vinyl plastic) meeting Federal Spec. PPP-T-66E, Type 1 and CID A-A-1689A, Type 1.

b. Have the ACCUBATH shipping container ready (see paragraph 1.2.1, above).

c. Clean bath of as much chemistry as possible, draining the bath and rinsing with DI water. Test with pH paper.

d. Create a detailed description and rough sketch of the condition of the quartz before packing bath for return. This will ensure IMTEC can readily identify baths damaged in shipment. IMTEC recommends that all baths, with or without quartz damage, be photographed using a Polaroid camera. Photos should show any quartz damage and include the serial number label visible through the quartz. Two pictures of each view should be taken; ship one set with the bath, keep the other set with your shipping documentation.

e. Create a description of the chemistry used and process temperature used with the bath.

f. If the quartz is cracked or broken, carefully tape damaged pieces in position on the quartz bath or assembly, using the approved tape specified above.

g. Disconnect electrical connections and plumbing and tape the power cable to the **outside** of the bath, away from the quartz. It is preferable to tape the cable to the bottom of the bath.

IMPORTANT: For **contaminated** baths (quartz cracked or seal breached), use the contamination shipping kit from IMTEC. Making sure that the bath is as clean of chemistry as possible, dry the bath, then install the drain plug. Instead of taping the power cable(s) to the bottom of the bath, cut the cable(s) flush with the bottom (1/2” OD) end of fitting and install the power cord plug(s) before continuing.

h. *NOTE: Baths larger than 19.5”Lx11.5”Wx15”D" (QZA1502) must be shipped upright.* For these baths, tape the “scored” fiberboard pieces shipped with the bath into place over the bath feet. If these pieces are not available, tape corrugated cardboard to the bath feet; this will prevent the feet from “punching” through the box bottom*.

i. Insert the bath into an approved plastic bag (you will need three (3) for each bath to be returned). If the originals are no longer available, bags may be obtained from IMTEC Customer Service.

j. Carefully and **completely** squeeze out all of the trapped air. Seal the bag with a tie-wrap.

k. Repeat steps 1.4.9 and 1.4.10 twice more, using the remaining two bags.

l. Carefully place the bagged bath into the lower molded foam section in the shipping container, laying the bath on its side (except for those larger baths which are shipped upright – see Section 1.4.8).

m. Place upper molded foam section in place over the bath.

n. Pull up the bag liner, twist its top once and squeeze out **all** trapped air. **It is important that ALL trapped air be removed.** Twist the liner excess to seal out the air and use a tie-wrap to secure the liner top.

o. Insert photos, diagrams and documentation of chemicals and process temperature into a re-sealable plastic bag and place into container with bath.

p. Seal the bath's shipping container.

q. Remove backing and secure a shock watch and companion label to the side of the container.

r. If they do not already appear on the container, write (or apply labels) on all sides of container except bottom: "GLASS", "FRAGILE."

s. For large baths, position four edge protectors in place and firmly strap the shipping container to a pallet, using strapping and buckles.

t. Mark the RGA number legibly on the sides of the container.

u. Place packing list to outside of container and tape securely in place.

v. If the bath is palletized, make sure the freight bill is marked, "Do Not Break Down Pallet".

w. Ship the container to IMTEC.

If you have any questions about IMTEC's return policies or procedures, please call IMTEC at 510-770-1800.

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