

CSU Service Training Seminar

Presented By: Mike Holtsnider / Waterway Plastics
March 21, 2014

Exclusively for:



Waterway

2014 AGENDA

- Introduction
- Development Process
- New 2013 Products
- Product Improvements
- Technical Information
- Servicing
- Fluid Dynamics & Plumbing





Quality, Confidence, Innovation & Service...

Designed, Engineered & Manufactured
in the USA.



- Plastic Molding Manufacturing
- Manufacture of products for: Pool • Spa • Bath
- Since 1973 (40 Years!)
- Located in Oxnard, CA
- 460,000 Sq. Ft. of manufacturing space

Waterway[™]

Specializing in:

- Injection Molding
- Roto Molding
- Extrusion Molding
- Mold Design
- Tooling
- Customization
- Assembly



Waterway™

The background is a dark, abstract composition featuring numerous bright blue and white light streaks and rays that radiate from various points, creating a sense of dynamic movement and energy. The central text is white and stands out against the dark background.

Waterway Company Tour Video



Waterway™



Waterway™



Waterway™

We pride ourselves
on being a
One-Stop Shop!



Waterway

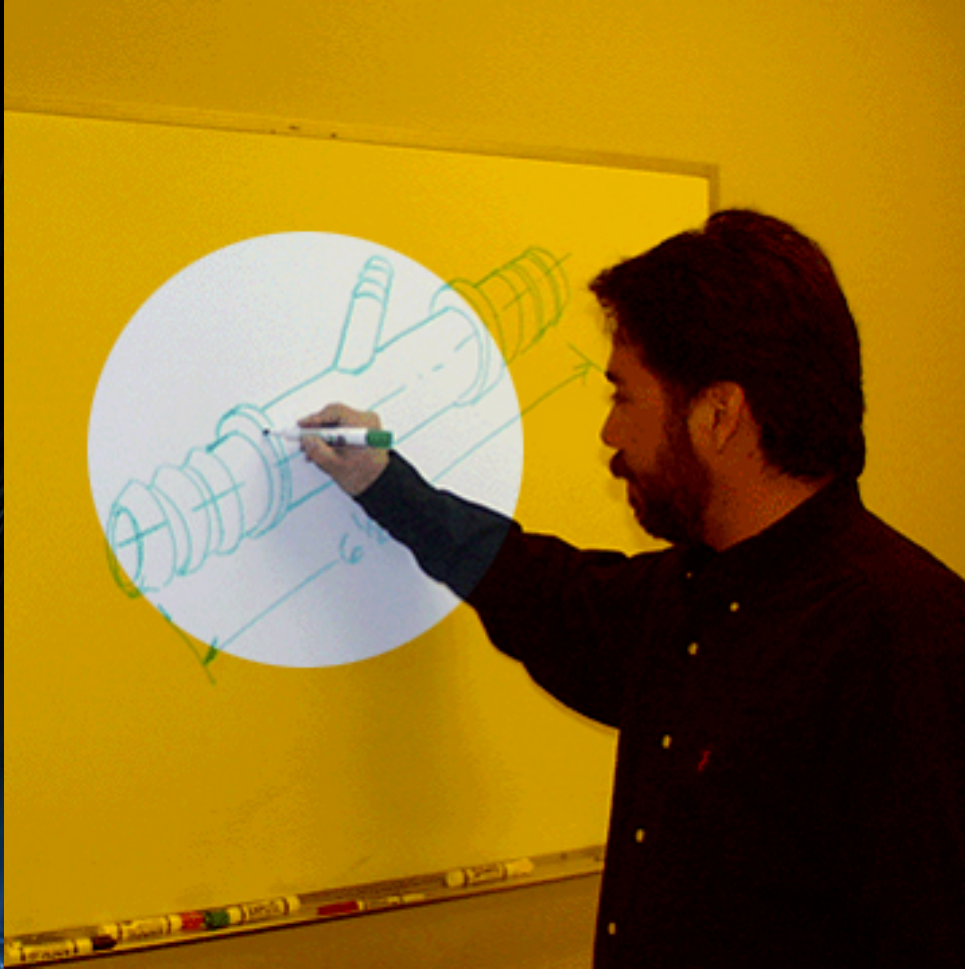
Virtual Tour

Concept • CAD Drawings • Prototyping
Tooling • Manufacturing • Quality Control

Waterway molding process

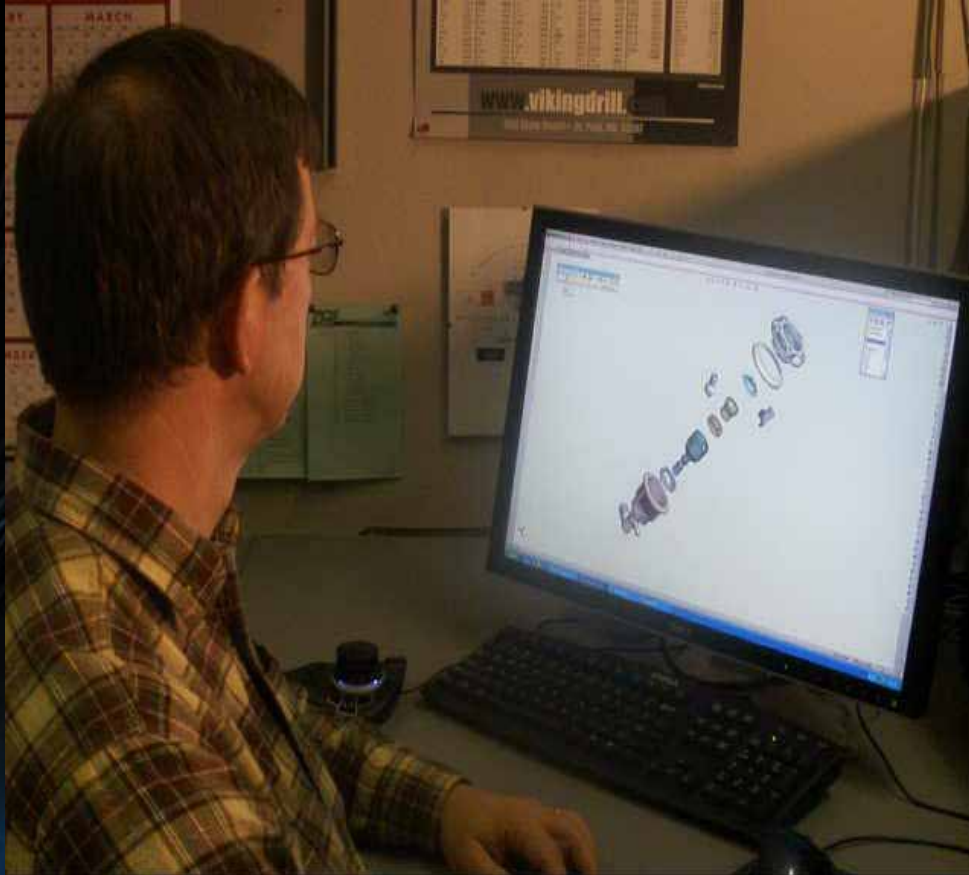


Concept design



Waterway[™]

CAD drawings for parts and molds



Prototyping



Fused Deposition Modeling (FDM)

- Models can be downloaded right from the computer
- Prototypes can be made in hours
- Parts modeled different materials; PVC, ABS, etc.
- Parts can be made in different colors



Prototyping



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Mold Design & Drawing



Waterway

In-house Mold Production



In-house Mold Production



Waterway

Mold Cavity & Base





Molding Equip

Molding Machines



Molding Process

Quality Control



Quality Control



Custom Products

Coast Spas New Products

- Stainless Steel Diamond Grill
- Tri-Lever Storm Jets
- Premium Grade Speaker
- Adjustable 24" Waterfall
- Electrical Bulkhead Fitting



Custom Products



Stainless Steel Diamond Grill

Features:

- Custom Coast Spas Design
- 304 Stainless Steel Escutcheon
- Snap-in Design

Custom Products



Deluxe Strip Skim Filter

Features:

- Floating guillotine style weir
- Easily accessible basket
- Easily accessible 15 sq. ft. cartridge
- Requires only one round hole to mount

Custom Products



Auto Thermo Vent

Features:

- Automatically adjusts to temperature change
 - Closed at 40° C
 - Open at 70° C
- Easy through-wall installation
- Louvered grill to protect against weather and rodent intrusion

Custom Products



Bluetooth Microphone

Features:

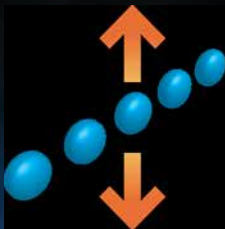
- Allows for hands free communication
- Custom Coast Spas Design

Custom Products



C-10 Storm Jets

- C-10 Cluster Storm Jets
- C-10 Poly Storm Jets
- C-10 Power Storm Jets



Directional

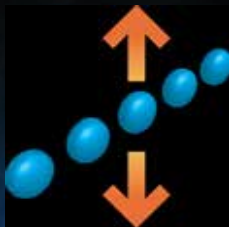


Twin Roto



Massage

Custom Products



Directional

C-10 Cluster Storm Jets

- Coast Spas Custom C-10 Design
- Large 2 1/8" Diameter
- Custom Gunmetal Blue Color
- 304 Stainless Steel
- 1/4" Nozzle = 7 GPM @ 12 PSI

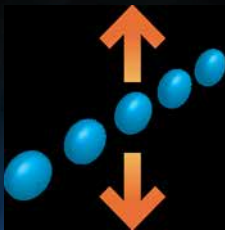
Waterway

Custom Products



C-10 Poly Storm Jets

- Coast Spas Custom C-10 Design
- Large Face 2.5" Diameter
- Custom Gunmetal Blue Color
- 304 Stainless Steel
- LED Capable
- 5/16" Nozzle = 10 GPM @ 12 PSI



Directional



Twin Roto



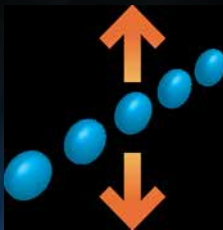
Massage

Custom Products



C-10 Power Storm Jets

- Coast Spas Custom C-10 Design
- Custom Gunmetal Blue Color
- 304 Stainless Steel
- LED Capable
- 3/8" Nozzle = 14 GPM @ 12 PSI



Directional



Twin Roto



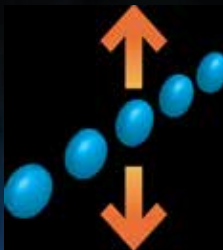
Massage

Custom Products



Tri-Lever Storm Jets

- Tri-Lever Cluster Storm Jets
- Tri-Lever Poly Storm Jets
- Tri-Lever Power Storm Jets



Custom Products



Tri-Lever Cluster Storm Jets

- Coast Spas Custom Tri-Lever Design
- Large 2 1/8" Diameter
- Custom Gunmetal Blue Color
- 304 Stainless Steel
- 1/4" Nozzle = 7 GPM @ 12 PSI

Custom Products



Tri-Lever Poly Storm Jets

- Coast Spas Custom Tri-Lever Design
- Large Face 2.5" Diameter
- Custom Gunmetal Blue Color
- 304 Stainless Steel
- LED Capable
- 5/16" Nozzle = 10 GPM @ 12 PSI

New Products



Tri-Lever Power Storm Jets

- Coast Spas Custom Tri-Lever Design
- Custom Gunmetal Blue Color
- 304 Stainless Steel
- LED Capable
- 3/8" Nozzle = 14 GPM @ 12 PSI

Waterway™

GLO Components



GloJets



GloClips



GloClips



GloTubes

Features:

- Illuminates jets and top side controls with an array of brilliant colors
- Easy to Install GloTubes
- LED GloTubes clip on at 45 degree angle for optimum illumination
- Allows for single or multiple LED's
- Illuminates top side controls without bezels or drilling LED port holes
- Several LED GloTubes available for use with the leading LED suppliers
- Seals LED from foam insulation (No need to tape)
- Single source for LED/Non LED (Allows for upgrading)

Custom Products



6" LED Premium Pop-up Silo Speaker

Features:

- Improved Premium Grade Speaker
- LED Lighted
Dampening Lift Mechanism

Specifications:

- 15 Watts RMS/30 Watts Peak
- Impedance $4\Omega \pm 15\%\Omega$
- Resonant Frequency: $110 \text{ Hz} \pm 20\% \text{ Hz}$
- SPL: $70 \text{ dB} \pm 3\text{dB}$ ref 1 W/1M
- Frequency Response: $\sim 20 \text{ KHz}$,
max $\pm 10 \text{ dB}$

Custom Products



Adj. 24" Waterfall

Features:

- Extra Large 24" Wide Blade
- Built-in Adjustable Valve
- 304 Stainless Steel Escutcheon

Waterway[™]

Custom Products



Waterway Slice Valves

Features:

- Available in 1 ½", 2" and 2 ½"
- Includes Clip

Waterway

Custom Products



XL 7 ½" Spa Light

Features:

- XL 7.5" Diameter
- Accepts 7, 10, 14 & 21 Cluster LED Light
- Frosted light lens
- Stainless Steel Escutcheon

SPECIFICATIONS:

Diameter – 7.5"

Dia. X 2 .75 Thk.

Hole saw size - 5 ¾" Dia.

Metal - 304 Stainless Steel

Other Custom 2014 Products



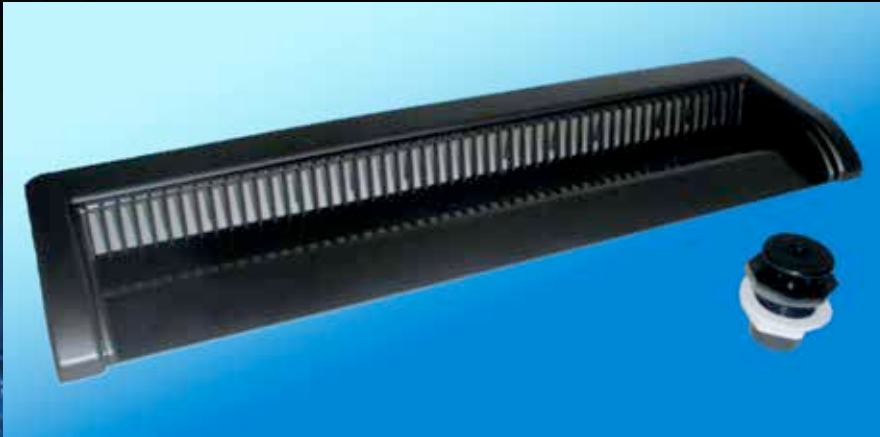
- Tri-Lever Air Controls
- Tri-Lever Valves
- Cyclonic Filter System
- 2 1/2" Gate Valve



Other Custom 2014 Products



- 18" Spillover Waterfall
- 3.5" Adjustable Cascade



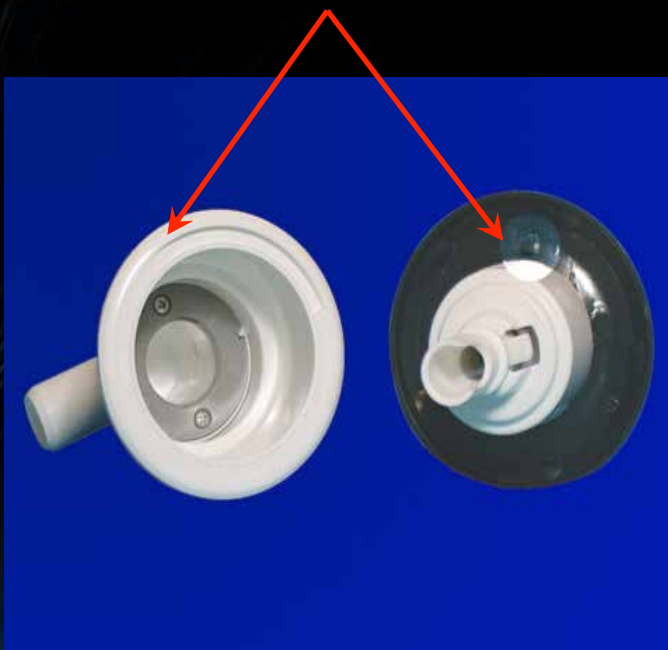
Servicing

- Jet Internal Replacement
- 2" Diverter Valve
- On/Off Valve
- Air Controls



Servicing

ALIGN



Replacing Jet Internals:

(Cluster, Mini, and Poly Jets)

- Turn jet internal counter clock wise until internal comes to a stop. Then abruptly twist jet internal beyond the stop while pulling outward at the same time.
- To replace the internal, align tab on escutcheon with the groove on the jet body and snap into place.

Servicing

ALIGN



Replacing Jet Internals:

(Power and Jumbo Jets)

- Turn jet internal counter clock wise until internal comes to a stop. Then abruptly twist jet internal beyond the stop while pulling outward at the same time.
- To replace the internal, align tab on escutcheon with the groove on the retainer ring in the jet body and snap into place.

Servicing



Tri-Lever 2" Valves

1. Pull Tri-knob off
2. Unthread cover
3. Remove diverter barrel

Servicing



Try-Lever ON/OFF Turn Valves

1. Pull Tri-knob off
2. Unthread cover
3. Remove diverter barrel

Servicing



Air Controls:

- Pull Tri-lever knob
- Unthread cover
- Check plunger for flashing
- Remove and check seal for debris
- Check for glue on the float ball
- Re-install check seal
- Clean o-ring before reassembly

Servicing



Replacing Pump Seals - Executive Pumps

- Required Tools:
- Screw gun with 7/16" socket driver
- Channel lock pliers
- Insert screwdriver
- Crescent wrench
- 1/2", 3/4", 1 1/4" (Thin) ridged pipe
- Rubber mallet

Servicing



Replacing Pump Seals

- Unthread and remove each of the eight screws on the cover.
- Remove the front cover using a screw driver or butter knife to pry the cover from the volute body.

Servicing



Replacing Pump Seals

- Using a large screw driver on the motor shaft, remove the impeller by unthreading it counter clockwise.

Servicing



Pool Tool Impeller Removal Tools:

- P/N 128 Armature Holding Tool
- P/N 111 Impeller Wedge
- P/N ? Impeller Holder

Servicing



Removing the Impeller

- P/N 128 Armature Holding Tool
- P/N 111 Impeller Wedge



Servicing



Pool Tool Impeller Removal Tools:

- P/N 128 Armature Holding Tool
- P/N ? Impeller Holder

Servicing



Replacing Pump Seals

- Remove volute housing from the motor by unthreading the four screws from the rear of the motor.

Servicing



Replacing Pump Seals

- Remove the seal from the volute by using a 1/2" piece of pipe as a punch and punch seal out from the rear.
- Add RTV silicone around pan of new seal.
- Reinstall the seal using a 1 1/4" piece of pipe as a punch to set the seal into place.

Note: Do not touch the carbon surface of the seal. Keep this surface clean.

Waterway

Servicing



Replacing Pump Seals

- Remove the ceramic seal from the impeller.
- Install the new ceramic seal by adding liquid soap to the rubber boot of the new seal and pressing it into place.
- Reassemble the volute by reversing the unassembled procedure.

Servicing



Replacing Pump Seals – Extreme Pumps

Required Tools:

- Screw gun with 7/16" socket driver
- Channel lock pliers
- Insert screwdriver
- Crescent wrench
- 1/2", 3/4", 1 1/4" (Thin) ridged pipe
- Rubber mallet

Servicing



Replacing Pump Seals – Extreme Pumps

- Unthread and remove each of the 14 screws on the cover using a screw gun and 7/16" socket driver

Servicing



Replacing Pump Seals – Extreme Pumps

- Remove the four screws on the back fan shroud cover.
- Remove shroud cover

Servicing



Replacing Pump Seals – Extreme Pumps

- Using a crescent wrench on the back shaft, grab the impeller and unthread the impeller counter clockwise

Servicing



Replacing Pump Seals – Extreme Pumps

- Remove the volute using the ¼” socket driver built into the insert screwdriver (screwdriver without insert)

Servicing



Replacing Pump Seals – Extreme Pumps

- Punch out old carbon seal with piece of 1/2" ridged pipe and a rubber mallet.

Servicing



Replacing Pump Seals – Extreme Pumps

- Add RTV Silicon around pan of new seal and punch back into place using a piece of 1 ¼” ridged (thin) PVC pipe.
- Be extremely careful not to touch front of seal with your fingers.
- Clean front of seal with clean towel

Servicing



Replacing Pump Seals – Extreme Pumps

- Remove the old ceramic seal from the impeller using a pair of channel lock pliers.
- Add soapy water to the rubber boot and punch back into place using a piece of $\frac{3}{4}$ " ridged pipe.
- Clean front surface of seal with clean towel

Servicing

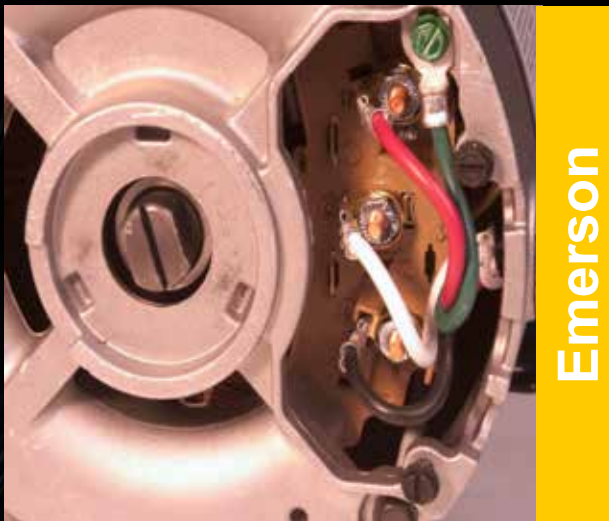


Replacing Pump Seals – Extreme Pumps

- Reassemble by reversing the disassembly procedure

Waterway

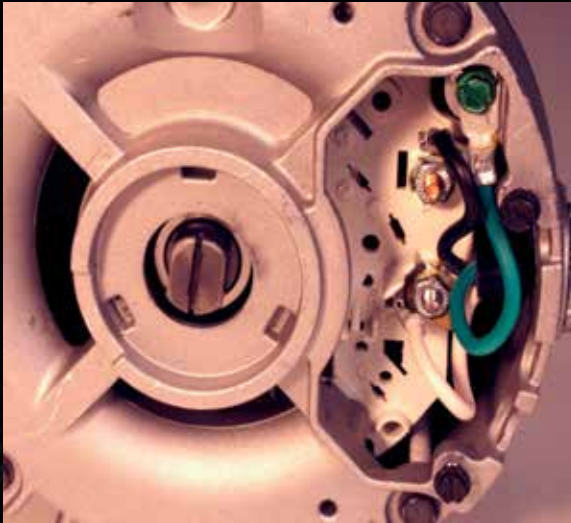
Servicing



Two Speed Wiring

- Emerson and Century Line wires are backwards.
- Emerson Low (Red) on top
- Century Low (Red) on bottom

Servicing



Emerson

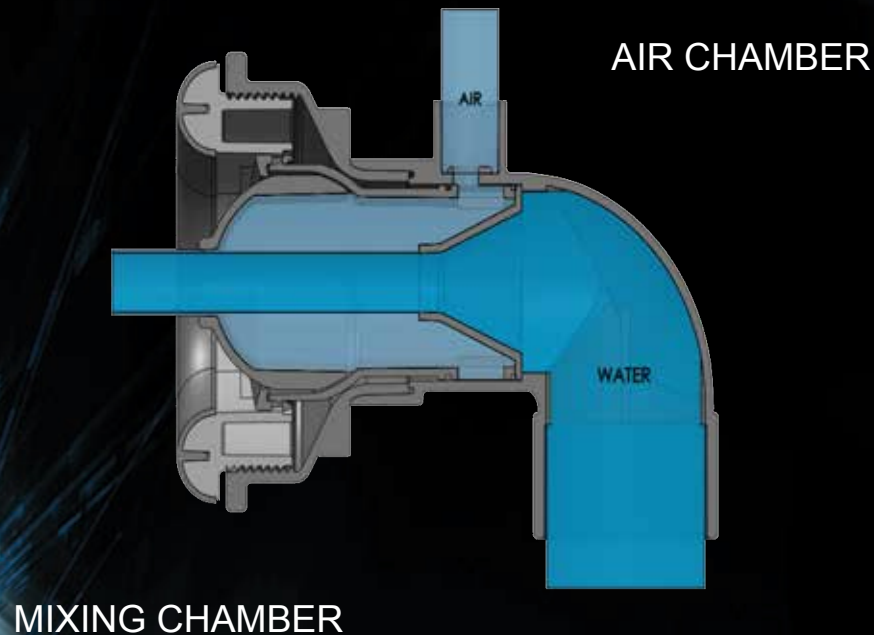


Century

Single Speed Wiring

- Both Century & Emerson are wired the same.
- Line wire on top, common down below.

Fluid Dynamic



Venturi Principles

Jet Air Venturi:

- Increases performance
- Increases impact
- Increases function ability

Flow Formula:

V_d = Velocity

Q_d = Flow (Feet / Second)

A_d = Area (Sq. Ft.)

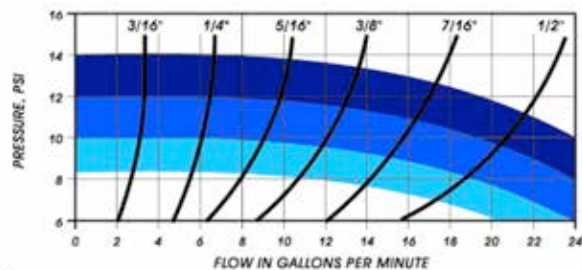
$$Q_d = \frac{(\text{Flow in GPM}) (0.133)}{60}$$

$$V_d = \frac{Q_d (\text{Feet / Second})}{A_d (\text{Sq. Ft.})}$$

Fluid Dynamics

JET FLOW CURVES

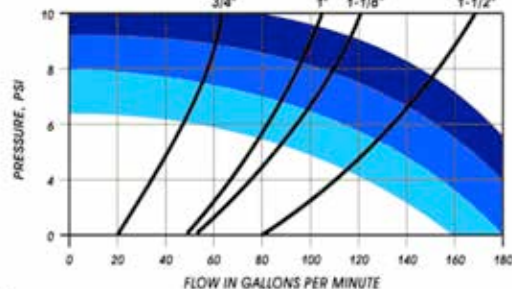
JET PERFORMANCE CURVES 3/16" - 1/2" ORIFICES



LEGEND:

- WEAK
- MODERATE
- STRONG

JET PERFORMANCE CURVES 3/4" - 1-1/2" ORIFICES



LEGEND:

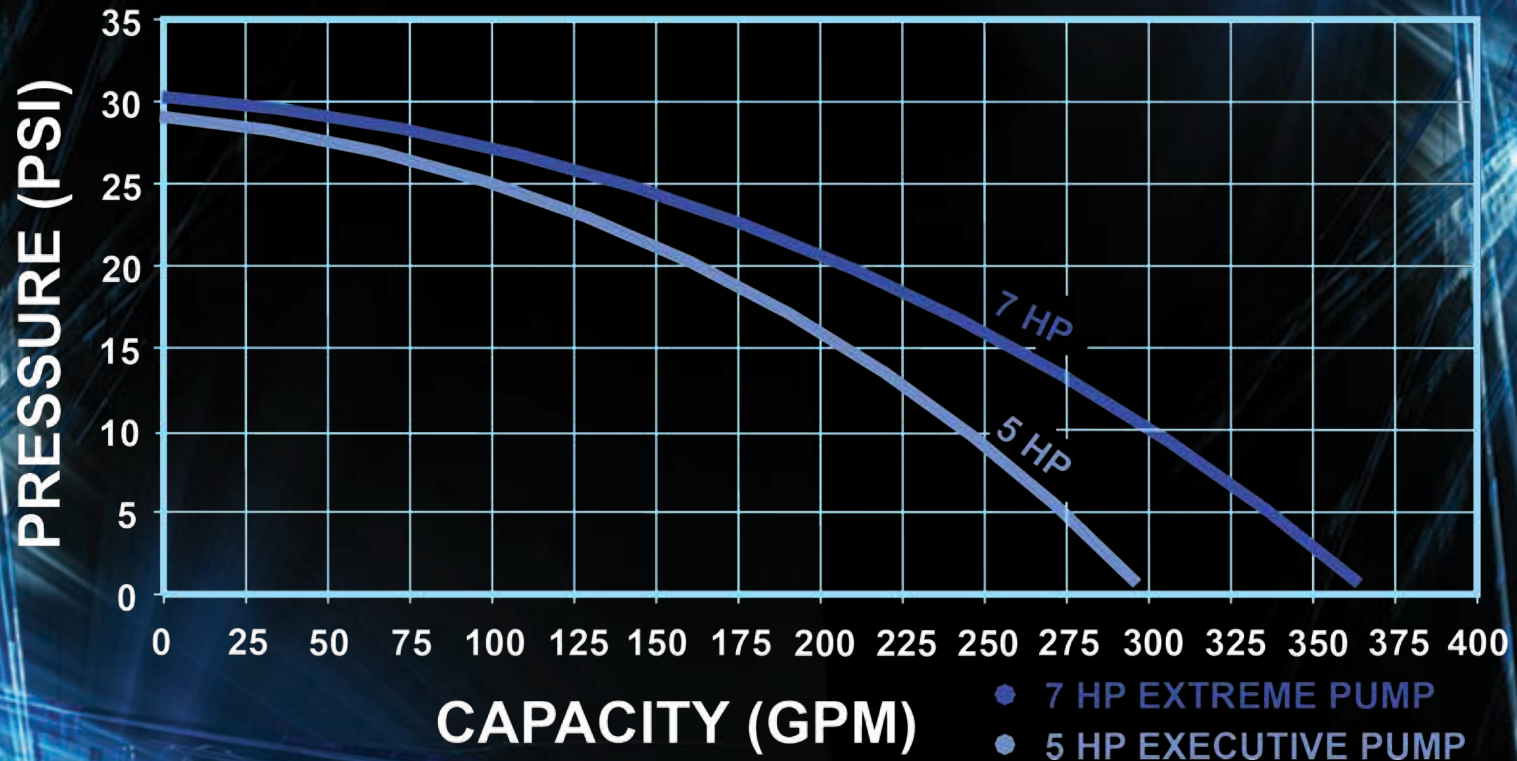
- WEAK
- MODERATE
- STRONG

JET FLOW CHART

JET FLOW CHART				
JETS				
NOZZLE ORIFICE SIZE	WEAK	MODERATE	STRONG	
3/16"	2	3	3	GPM
1/4"	5	6	7	GPM
5/16"	8	10	11	GPM
3/8"	11	13	15	GPM
7/16"	14	16	17	GPM
1/2"	18	22	26	GPM
3/4"	50	60	70	GPM
1"	80	90	100	GPM
1-1/8"	90	110	120	GPM
1-1/2"	120	150	175	GPM

Fluid Dynamics

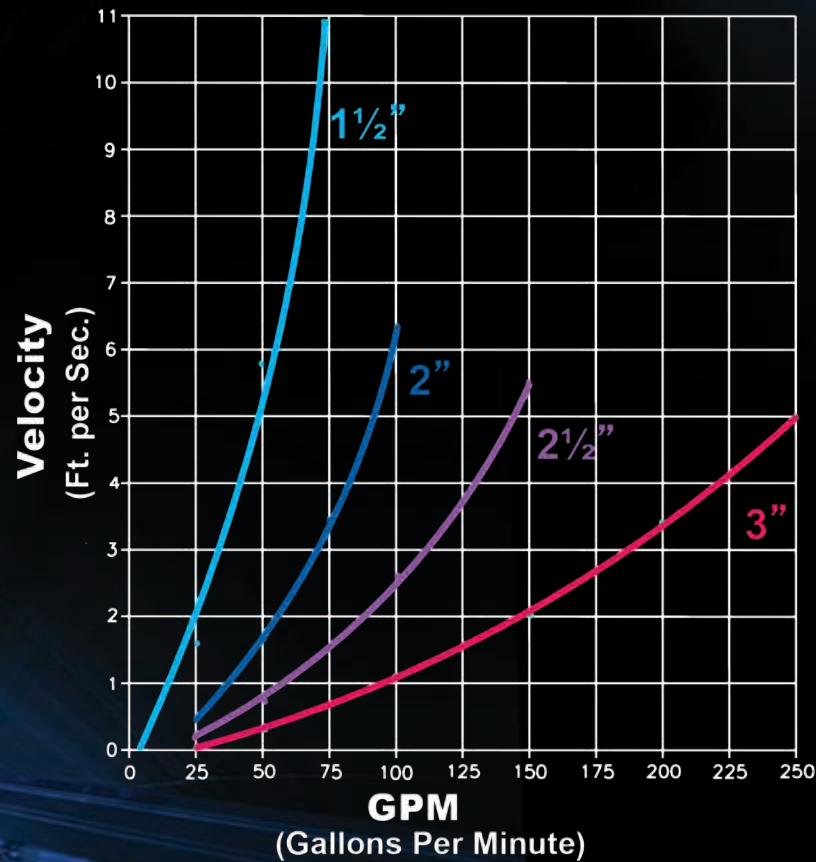
PUMP PERFORMANCE CURVE



Waterway

Fluid Dynamics

Friction Loss



FRICTION FLOW CHART

U.S.	3/4" PIPE		1" PIPE		1 1/4" PIPE		1 1/2" PIPE		2" PIPE		2 1/2" PIPE		3" PIPE	
Gal.	Vel.	Loss	Vel.	Loss	Vel.	Loss	Vel.	Loss	Vel.	Loss	Vel.	Loss	Vel.	Loss
per	Ft. Per	in	Ft. Per	in	Ft. Per	in	Ft. Per	in	Ft. Per	in	Ft. Per	in	Ft. Per	in
Min.	Sec.	PSI	Sec.	PSI	Sec.	PSI	Sec.	PSI	Sec.	PSI	Sec.	PSI	Sec.	PSI
1	0.60	0.11	0.37	0.03	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
2	1.20	0.39	0.74	0.12	0.43	0.03	-----	-----	-----	-----	-----	-----	-----	-----
3	1.80	0.83	1.11	0.26	0.64	0.07	0.47	0.03	-----	-----	-----	-----	-----	-----
4	2.41	1.42	1.48	0.44	0.86	0.11	0.63	0.05	-----	-----	-----	-----	-----	-----
5	3.01	2.51	1.86	0.65	1.07	0.17	0.79	0.08	-----	-----	-----	-----	-----	-----
6	3.61	3.00	2.33	0.93	1.29	0.24	0.95	0.11	0.57	0.03	-----	-----	-----	-----
8	4.81	5.10	2.97	1.56	1.72	0.42	1.25	0.20	0.76	0.06	0.54	0.02	-----	-----
10	6.02	7.75	3.71	2.40	2.15	0.63	1.58	0.30	0.96	0.09	0.67	0.04	-----	-----
15	9.02	16.37	5.57	5.07	3.22	1.33	2.36	0.63	1.43	0.19	1.01	0.08	0.65	0.03
20	-----	-----	7.42	8.62	4.29	1.82	3.15	1.07	1.91	0.32	1.34	0.13	0.87	0.05
25	-----	-----	9.28	13.00	5.36	3.42	3.94	1.60	2.39	0.05	1.67	0.20	1.08	0.07
30	-----	-----	11.14	18.19	6.43	4.80	4.73	2.30	2.87	0.67	2.01	0.28	1.30	0.10
35	-----	-----	-----	-----	7.51	6.37	5.52	3.03	3.35	0.89	2.35	0.38	1.52	0.13
40	-----	-----	-----	-----	8.58	8.20	6.30	3.90	3.82	1.14	2.64	0.48	1.73	0.17
45	-----	-----	-----	-----	9.65	10.18	7.09	4.80	4.30	1.40	3.01	0.60	1.95	0.21
50	-----	-----	-----	-----	10.72	12.30	7.88	5.80	4.78	1.70	3.35	0.73	2.17	0.25
60	-----	-----	-----	-----	-----	-----	9.46	8.18	5.74	2.40	4.02	1.02	2.90	0.35
70	-----	-----	-----	-----	-----	-----	11.03	10.90	6.69	3.20	4.69	1.36	3.04	0.47
80	-----	-----	-----	-----	-----	-----	-----	-----	7.65	4.10	5.35	1.73	3.47	0.60
90	-----	-----	-----	-----	-----	-----	-----	-----	8.60	5.10	6.03	2.20	3.91	0.75
100	-----	-----	-----	-----	-----	-----	-----	-----	9.56	6.30	6.70	2.64	4.34	1.90
120	-----	-----	-----	-----	-----	-----	-----	-----	11.95	9.40	8.38	4.00	5.42	1.38
150	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	10.05	5.50	6.51	1.95
175	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	7.59	2.55
200	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	8.68	3.40
225	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	9.76	4.07
250	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	10.85	4.99

Schedule 40 
 Schedule 80 

PVC

Nominal Pipe In.	Size mm.	Regular Body			Medium Body			Specialty Cements					Heavy Body			Extra Heavy Body
		710	700 2700	702	704 2704	705 2705	721* 2721*	725* 2725*	727*	747* 2747*	795 2795	2800	737*	711 2711	717 2717	719 2719
1/2	15															
3/4	20															
1	25															
1 1/4	32															
1 1/2	40															
2	50															
2 1/2	65															
3	80															
4	100															
6	150															
8	200															
10	250															
12	300															
14	350															
24	600															
30	750															

*Can be used without a primer with fittings having an interference fit (unless required by local code).

Waterway

Fluid Dynamic



Plumbing Options

Pipe Types:

- Ridged PVC
- Spa Flex
- Vinyl Tubing
- Reinforced Vinyl
- Shur-Grip

Glue Types:

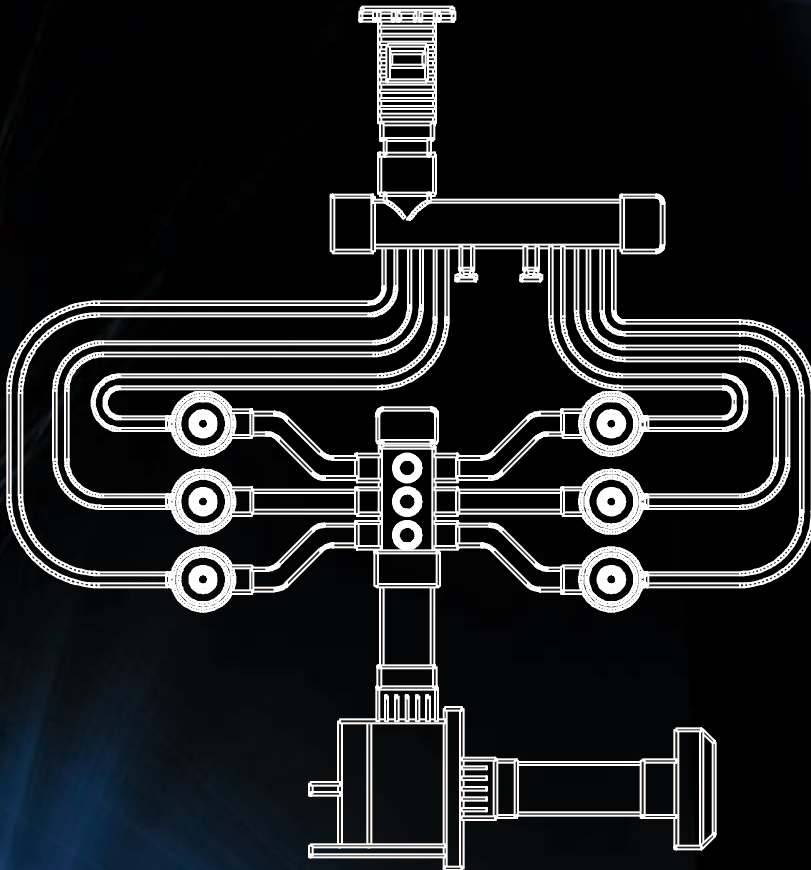
IPS Weldon 747 –
For ridged, Spa Flex
and Vinyl Tubing

Silicone Sealants:

- Use Neutral Cure type silicones (Stay away from acetoxy silicones)

Troubleshooting

Plumbing Overview



Waterway

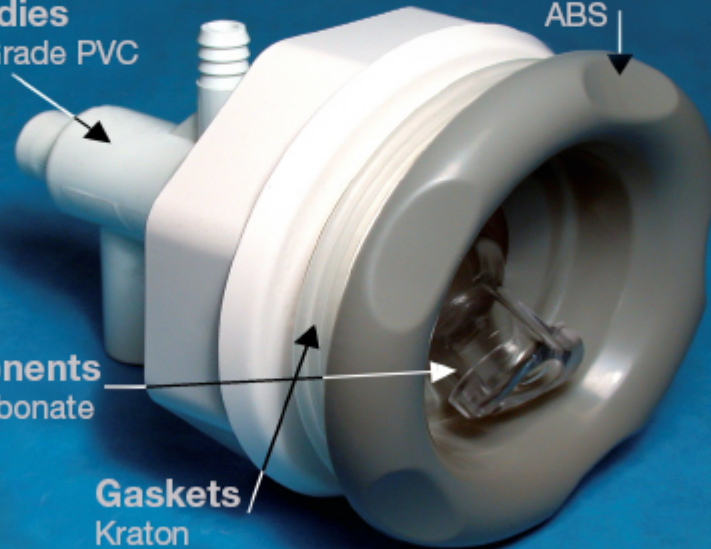
MATERIALS

Jet Bodies
Fitting Grade PVC

**Colored
Escutcheon**
ABS

**Clear
Components**
Poly Carbonate
(Lexan)

Gaskets
Kraton



Waterway

Pump Noise

- Cavitation
 - Bleed air bleed valve
 - Check plumbing for air pockets
 - Check all unions and fittings for a good seal
 - Check for dirty filter
- Check to see if pump is rubbing on something

Why Coast Spas is the right choice

- Innovative Product Design
- Aggressive Product Development
- Reliability
- Safety Orientated
- Committed to Quality



*Coast Spas & Waterway...
Partners in the Past, Present
and Future!*

Waterway™

Waterway Product Support

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Web: www.waterwayplastics.com

URL: www.waterwayplastics.com/coast_2014.pdf

