

HAYWARD® Pool Products

One source. Every pool.

Many sealants cannot be used with ABS plastic

Proper sealant selection is a critical factor with plastic pipe fittings – for many of the most common types of pipe sealants do NOT work with plastic.

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Cooler temps can impact heater fuel



As temperatures dip below 60°F, liquid propane's ability to sufficiently vaporize (and fuel a heater) is adversely impacted.

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Acid washing, prewashing

Off-season filter cleansing and acid baths to remove scale and other minerals from the fabric of pool filters is a popular and profitable winter service activity.

But a more common problem that clogs filter elements is body oil build up.

Preceding acid baths with a detergent prewash can extend the life to your customers' filter elements.



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Splash

A technical publication

for Hayward dealers and service providers

THE NEW STANDARD: Cupro nickel heat exchanger in all 2006 gas heaters

Hayward's new cupro nickel heat exchanger is the new standard on all 2006 model year gas heaters.

Fortifying copper's outstanding thermal conductivity with nickel's excellent corrosion resistance, our new heat exchanger features a cupro nickel alloy that delivers superior durability and longevity in many environments, including high-flow conditions, salt chlorination systems and other popular pool and spa applications.

Technicians should note that our new cupro nickel heat exchanger is visually and functionally identical to our most recent copper heat exchangers – and will be a staple component in all 2006 model year gas heaters.

Our cupro nickel heat exchangers are compatible with (and will retrofit) any previous H-Series heater (be sure to order the correct part number, though, because they are size-specific).

Cupro nickel has history of performance, durability

Cupro nickel (CuNi) alloy technology actually dates back to the 3rd century B.C., when it was referred to as "white copper" by the Chinese.

A popular alloy in chemical processing, electronics and the pollution control industries, cupro nickel is commonly handled by people every day – for most silver-colored coins circulated worldwide today are actually cupro nickel.

Most cupro nickel alloys today also include trace amounts of iron and manganese – providing even greater strength and durability.

Key benefits include higher flow rating, durability, longevity

This enhanced durability is one reason the Hayward cupro nickel heat exchanger will withstand higher velocities than copper. In today's pool and spa environments, the endless variety of wonderful water features can add up to higher flow rates – making the higher flow capabilities of a Hayward cupro nickel heat exchanger an important benefit.

Plus, cupro nickel's corrosion resistance offers added protection against premature failure from occasionally aggressive pool and spa water chemistry (though such conditions should be avoided on a prolonged basis for a number of reasons).

Though it is virtually identical in appearance, the Hayward Cupro Nickel Heat Exchanger provides many important advantages to copper heat exchangers.

The lone distinguishing difference in appearance is that the number 2829 is stamped onto the rear tube sheet of the Hayward Cupro Nickel Heat Exchanger.



AREAS OF PERFORMANCE

- High water flow systems
- Salt chlorination systems
- Corrosion resistance

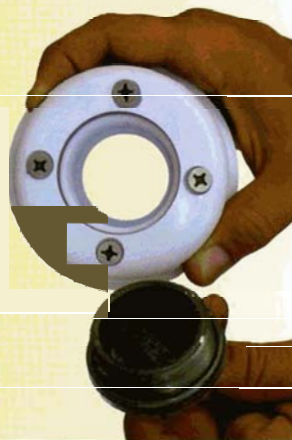


Preparation for the sun

For many of our southern friends, wintertime is anything but a slow season. In fact, spa and pool activity peaks at this time of year in some areas.

But for most of us, wintertime in the frost belt is at least a little bit less hectic. It's also the perfect time to prepare for springtime – and all the opportunities just around the corner.

Inside this issue of Splash, we've put together a lineup of "pool season" startup procedures and opportunities technicians can prepare for – because it won't be long before winter gives way to the warmth and sunny weather that's just ahead.



Are You Ready for Spring's Opportunities?

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Lubricants share similar concerns to sealants

Lubricants should be chosen carefully for the same reasons as sealants.

Many lubricants can cause o-rings and gaskets to swell and stretch out of shape, thus causing leaks and failure. Some lubricants can also attack ABS plastic, causing it to crack.

Knowing the variety of lubricants on the market we choose to tell you what works rather than what doesn't.

Hayward over the years has had its own lubricant called Jack's 327.

This lubricant is the same as Dow Corning's #111 Silicone lubricant. We have tested this lubricant and fully approve of its use on our o-rings and gaskets.

Other than the Dow #111 and Jack's 327, Aladdin makes a similar lubricant. In the past it has been packaged in a red & white tube.

Jack's 327 Sealant

Hayward part number SP032712

Metal-to-Plastic Fittings

When attaching plastic to metal, plastic sealants (see adjacent story) are recommended. If using Teflon tape, be sure to deburr and clean any rough threads to prevent ripping or tearing the tape.

When metal-to-plastic fittings are necessary, use a male metal fitting into a female plastic fitting. Never use a male plastic threaded end into a female metal thread. The different expansion rates will cause leaks.

Improper sealants, overtightening can crack ABS plastic pipe ports

A cracked ABS plastic port can almost always be traced to one of two culprits:

- overtightening, or
- improper sealants.

In itself, a cracked port may seem like a minor issue, but the time it takes for a cracked port to be discovered can lead to hydraulic system stresses on multiple components. Examples include insufficient water flow for the pump, poor water flow to a Phantom or Viper booster pump, ineffective cleaning by the filter – not to mention lost water and added costs to refill and rebalance water chemistry.

Cracked ports are essentially attributable to human error, so it is important that technicians be aware of these factors and ensure that these mistakes are not unknowingly repeated time and again.

How to avoid overtightening

Most ABS plastic ports are tapered pipe thread – and will therefore be forced to crack if overtightened.

Meanwhile, plastic tolerances allow for some degree of looseness without being out of specification. These tolerances can even vary within the same manufacturer because unlike metal, plastic ports come with their own "built in" lubrication.

To prevent overtightening, therefore, the very first thing a technician must do (before applying sealant) is perform a **dry-fit** to see if the fitting is tight or loose. To dry-fit, thread in the male port until feeling resistance, or thread engagement. A common term used to describe this point of resistance is "hand tight" – though we prefer the term "finger tight" as a term that clearly discourages overtightening.

From this point of finger-tight resistance, back the port out while counting the turns. Three or four full turns is normal. Anything more than four full (360°) turns is called a loose fit. (HINT: A typical finger-tight connection results in the dry male port being threaded about 2/3 of the way into the female connection.)

Carefully select sealant — many will damage plastic

In most cases, a loose fit is caused by the ABS port, not by the molded part (pump, valve, etc.). Regardless of the cause, a loose fitting is easily resolved with the correct sealant or Teflon tape.

Proper sealant selection is a critical factor with plastic ports – for many of the most common types of pipe sealants do **NOT** work with plastic.

Common oil-based plumber pipe sealants, for example, should never be used with ABS valves or ports. The oil in these plumber pipe dope compounds cause ABS valves and ports to crack and break, sometimes in a short period of time.

Any good plastic pipe sealant should have three basic qualities:

- A. It must adhere to the threads when applied. (It also tends to get and stay on you, your tools, clothes etc.)
- B. It should have a muddy consistency allowing it to fill the gaps on loose fitting threads, and to ooze out of the pipe when threads are tight.
- C. It must be plastic-tolerant (with tests having proved the sealant does not chemically attack any type of plastic).

With hundreds of sealants on the market, Hayward cannot test all of them. However, we have tested a lot of them, applying them to the ABS plastic of our multi-port valves. As a result of



Teflon tape is a clean, easy and versatile sealant.

those tests, following is a list of currently **approved** sealants for use on Hayward ABS ports and fittings:

1. Teflon tape
2. Permatex #2 (black)
3. Permatex No More Leaks (white)
4. Oatey Great White with Teflon # 31230
5. 100% Pure Silicone Sealant (G.E.)

Using any of the above sealants (all but the Teflon tape), apply a liberal coat to the male threads only (normal fit).

If the fitting has a loose fit, apply one coat to the male threads, then apply 2 wraps of Teflon tape, followed by a second coat over the Teflon tape.

If using Teflon tape with a normal fit, wrap 2 to 2½ full turns in a clockwise direction. For a loose fit, add another 1 to 2 full wraps. Kind in mind, excessive wraps of tape will increase the male thread dimension and could force the male port to crack when threaded into the female port.

Making the Final Connection

When making the final connection, tighten the fitting one full turn past finger-tight.

Exercise caution when using a wrench or pliers, remembering that the tool attached to your 2-foot arm allows you to exert a great amount of torque.

60% of propane tank is usable fuel

When having a liquid propane heater installed, one of a homeowner's first questions to arise is, "What size tank will I need to have in my yard?"

Instead of pawning off the question to the propane company, pool technicians should take advantage of this opportunity to answer the question (see "Tank Size" inset at right) and provide a simple explanation of how LP works (see "Vaporization" story below).

The short answer and explanation to the first question is, liquid propane is extremely compact and portable, but must vaporize to be released as a gas providing fuel for the homeowner's heater (or other appliance).

This information may seem trivial – but it is not. For the process of converting liquid propane to propane gas determines the amount of "fuel efficient" or "usable" propane gas that is provided by a full tank of LP.

The ability and rate that LP is converted to vaporized propane gas is influenced by many factors – including humidity, ambient temperature, and the surface area of the liquid in the tank. Since the size and design of propane tanks vary, and climatic factors (temperature, humidity) are constantly changing, it is impossible to precisely state at what point a heater's propane tank can no longer convert LP to propane gas at a sufficient rate to fulfill a heater's need for a constant fuel source.

However, the accepted "rule of thumb" for factoring in these variables is to assume that a heater's LP tank should be refilled when 60% of its full-tank capacity has been consumed.

Liquid-to-gas vaporization key to propane usability

Discovered less than 100 years ago (1912), propane gas has many admirable characteristics.

Propane burns cleanly, leaving no lead or carbon deposits, and is therefore sometimes referred to as a low-maintenance fuel.

Propane gas is pure and efficient, with an octane rating of 110. Propane is also environmentally friendly.

And propane is mostly homegrown, with the U.S. & Canada producing more than 90% of the propane gas we use each year.

Most notably, however, propane's most unique feature is its portability, which is partly attributable to the fact that propane can exist in liquid form as well as gaseous form. More to the point, when in its liquid form, propane is 270 times more compact than as a gas.

Talk about compression!

What's more, whereas water can be converted to solid (ice) or gaseous (steam) form by applying thermal (temperature) influence, propane can be converted from gaseous to liquid form even simpler – by applying pressure. Simply put the propane in a tank, remove some air, and presto – we have pressurized propane, or liquid propane.

NOTE: Though unusual, it is possible to "overfill" the tank. When this occurs, there is not enough liquid propane surface area to allow the liquid to gas off.

Tank Size

As a rule of thumb, propane tank sizes should be 100 gallons for every 100,000 BTU of the heater. For example, a 400,000 BTU heater should have a minimum tank size of 400 gallons. Be sure to add in any other appliances that may be pulling from the propane tank.

LP Tank Size (Gallons)	'Usable' Propane (BTU per hour – With 40% Liquid in Tank)	
	Prevailing Air Temperature	
	20° F	60° F
120	235,008	417,792
150	290,304	516,006
200	341,280	606,720
250	406,080	721,920
325	514,100	937,900
500	634,032	1,127,168
1000	1,088,472	1,978,051

Safety

Propane gas is heavier than air and will therefore pool or puddle in low areas. So always observe strict safety precautions when working on propane units, allowing for plenty of time and ventilation so that any puddles of gas that may have formed while working on the gas system can evaporate.

Usable LP plummets with temperature

Propane's ability to vaporize decreases with the temperature – particularly as temperatures dip below 60°F.

The flip side of that phenomenon is also true, meaning that if the temperature outside is warm, say 85°F, an LP tank that has been 60% consumed will likely continue to provide sufficient gas flow for awhile.

However, as the thermometer dips below 60°F, an LP tank's ability to produce vaporized gas decreases sharply. In fact, as the chart above indicates, a propane tank will yield barely HALF as much capacity at 20°F as it does at 60°F.

Also, keep in mind that cooler overnight temperatures can have a lingering effect during the following day, causing the tank to not supply sufficient gas to the heater.

"Low gas" conditions like these should be avoided, as they result in sporadic, inefficient operation. An insufficient gas supply causes poor combustion, which leads to sooting.

Calculating a heater's operating time

A single gallon of propane will produce 91,000 British Thermal Units (BTUs) in an hour.

This fact, coupled with the "60% usable" rule of thumb (see above left) allows anyone to determine how long a propane tank can normally be counted on to supply enough gas to run a heater.

Calculating a heater's operating time involves a three-step formula illustrated below – though we should emphasize that these shortcut calculations are general in nature. The accompanying shortcut calculations are quite convenient, but are not a foolproof method for estimating when a heater's LP tank will need to be refilled. The safest answer to that question is to follow the "60% usable" rule.

Unpredictable and constantly changing environmental factors prevent any formula from reliably projecting the longevity of a partially full tank.

As a propane tank is used or emptied, the tank's contents steadily shift from a liquid state to a vaporized gas, reaching a point at which the remaining liquid propane no longer vaporizes enough to supply the proper amount of gas to the heater or appliance.

Determining how long a full tank of LP will last

FORMULA	EXAMPLE
<p>Step One: Multiply the LP tank's capacity by 60%. This establishes the "usable" propane available with a full tank.</p>	<p>Heater: H400IDL2 (400,000 BTU) Tank: 500-gallon tank NOTE: 1 gallon LP yields 91,000 BTU</p>
<p>Step Two: Divide the heater's BTU rating by 91,000. This establishes how many gallons of LP will be consumed in an hour.</p>	<p>STEP ONE Calculate: Usable LP 500 gallons X 60% = 300 gallons</p>
<p>Step Three: Divide the usable propane figure (step one) by the heater's per-hour demand (step two). This reveals how many hours of normal operation can be expected with a specific heater and specific propane tank when that LP tank is full.</p>	<p>STEP TWO Calculate: LP Needed Per Hour 400,000 ÷ 91,000 = 4.4 gal. / hr.</p>
	<p>STEP THREE Calculate: Hours LP Will Last 300 ÷ 4.4 = 68.2 hours of operation</p>

Filter must fit lifestyle & pump

Each of the three types of pool filters Hayward manufactures have their own set of flow factors, their own sizing parameters, and their own maintenance processes.

Utilizing the correct sizing and maintenance procedures for each type of filter will help your customers' pool and spa systems remain healthy.

When installing a new filter, service technicians can help select the best option for each individual customer by understanding one essential filtration tradeoff: As a filter's filtration level increases, so does its maintenance regimen.

Hayward sand filters, for example, require the lowest maintenance. Our cartridge filters offer greater filtration levels with a nominal increase in maintenance requirements.

And customers who want the cleanest pool in town should be made aware that while a Hayward DE (diatomaceous earth) filter offers the highest level of filtration money can buy, a DE filter's biggest price may not be the financial cost. More maintenance is required with a DE filter – a modest toll that many customers are happy to pay. But it's important that technicians and their customers honestly and accurately assess this tradeoff before installation – thereby avoiding situations where an under-informed customer becomes uncomfortable with a high-end filter's maintenance requirements.

Regional popularity is a second factor that should be considered prior to selecting a filter. D.E. filters

are very popular in some parts of the country, while cartridge cleaners are popular in others.

Filter Sizing

NEW SYSTEMS

The designed flow rate of the proposed filter must be greater than the GPM of the system's pump. When considering a sand or DE filter the system pump's GPM should be at least 60% of the filter's designed flow rate to achieve an effective backwash cycle. When sizing a cartridge filter, you are able to exceed the pump's GPM by any amount because the elements are manually cleaned. The benefit of using larger cartridge filters is: the larger the cartridge filter, the longer operational time before it needs to be cleaned.

EXISTING SYSTEMS

Choosing a new filter with an existing pump is very simple. Because the plumbing system is already installed and there is no easy way to determine the flow rate of the existing pump, you need to match flow rate for flow rate. When replacing a filter with a DE or sand filter, match the new filter with the old filter's designed flow rate. If you are looking to install a replacement cartridge filter, as stated above, you can go as large as you want in order to maximize the time between cleanings.



Many pool shops offer to clean cartridge elements and DE components, and then store them during the off-season. Likewise for pumps and motors. This ensures that these components can be found in good working condition for the following spring's pool opening. (And guess which "storage service" provider has thereby placed itself in line for the spring service contract as well!)

Acid Washing, Prewashing

Routine backwashing (sand filters and DE filters) and hosing off (cartridge elements) is dictated anytime a filter's attached pressure gauge has climbed 8-10 PSI above the system's clean-filter pressure.

Additionally, DE filter grids, Perfex fingers, and cartridge elements need to be cleaned once a season to remove oils and scale/calcification.

The common and accepted way of cleaning these elements and grids is (after hosing off dirt and debris) to let them soak in a muriatic (hydrochloric) acid solution. The concentration of the acidic mixture varies widely, and highly concentrated solutions can damage decorative cement or nearby objects if technicians are not careful.

The purpose of an acid bath is to remove scale and other minerals from the fabric of the filters.

But Wait! The more common problem that clogs filter elements is body oil build up. These oils and greases need to be removed first.

An acid bath will not remove oils. In fact, it will actually embed the oils into the fabric and make the filter have short filter runs.

As oils are embedded in the fabric, the filter element becomes difficult to thoroughly clean, which can eventually require the filter element to be replaced.

So, before acid washing filter elements, wash

them with dishwasher detergent or a solution of TSP (Tri-Sodium Phosphate).

Remove the elements from the filter and hose them off with a Hayward Jet-Action Cleaning Wand or forceful garden hose. Fill a large plastic container with the warm water, slowly mix in about a 1/2-cup of detergent, then soak the elements for approximately 3-4 hours. After soaking, rinse off the elements again – and do so thoroughly so you don't wind up with detergent bubbles in the pool!

The detergent or TSP bath can then be followed with an acid bath to remove any scale buildup.

If unsure whether there is scale on the filter elements, carefully apply 1-2 drops of acid onto the elements. If you notice any foaming, the elements need an acid bath.

If the filter elements are relatively new and not too scaled, a mild mixture of one (1) part acid to four (4) parts water may be used to achieve a good cleaning.

If the elements are badly scaled or look old and poorly maintained, increase the strength of the acid bath to a 1:1 mixture.

Soak the grids in the acid bath until the foaming stops. Then carefully remove the elements and hose off thoroughly.

HEALTHY HYDRAULICS



This is the fourth article in our Healthy Hydraulics series examining the principles, challenges and techniques for installing and maintaining healthy hydraulic systems.



Service with a Splash

Cartridge filter customers should always be encouraged to purchase a spare set of filter elements.

That way, there is always a clean (set of) filter element(s) waiting whenever the filter must be removed and cleaned. With the second filter element (or set of elements), the pool owner never has to wait while a dirty filter is cleaned, and technicians never feel pressured to rush back with a freshly cleaned filter element. In non-freezing areas, this service can be offered twice a year.

DANGER

When handling acidic cleaning agents and solutions, strictly follow manufacturer instructions. Failure to follow manufacturer instructions (located on the container label) can result in severe or fatal injuries.

Improper handling of acidic cleaning agents and solutions can be harmful to the eyes, skin, and internal body parts as well as nearby objects, plant life and other people.

Acidic cleaning agents and solutions can be harmful if swallowed, can result in severe burns and may cause blindness if splashed into eyes. Always keep out of reach of children and use in well-ventilated locations.

Protective eyewear and rubber gloves must always be worn while preparing an acid bath, during the acid bath, and throughout the cleanup process afterward.

Startup and Cleanup

When preparing an acid bath, NEVER add water to acid. Instead, do the opposite, slowly adding acid to water until your acidic solution reaches the desired strength.

Careful handling and proper disposal of acidic solutions are critical concerns when completing an acid bath. Filter elements should be rinsed with cold water, and acidic solutions must be neutralized prior to disposal.

Technicians must be familiar with and refer to the cleaning product's Material Safety Data Sheet (MSDS) to ensure proper disposal of any acidic solution or residue. Pay particular attention to runoff water, as it will be acidic – meaning it can kill grass, harm concrete, and result in injury if not properly disposed.



Tool tip

Jet-Action Cleaning Wand for Perflex Filters

Part Number EC2024

Having the right tools is one of the easiest ways to save time and improve profits. The Hayward jet-action cleaning wand for Perflex filters, for example, attaches to any garden hose, allowing service technicians to easily provide year-round, on-site cleaning and filter maintenance.



Pump Sizing Correction

The example in our "Pump Sizing at a glance" package last issue inadvertently listed the pressure-side as 8 psi instead of 18 psi.

We apologize for any confusion this may have caused.

NOTE: The correct pressure-side reading of 18 psi is more realistic and makes the balance of the example compute correctly.



Preparing for the sun

In addition to ensuring a smooth spring start-up with maintenance measures outlined in the article below, technicians can distinguish their service with a proactive examination of the entire pool site.

While opening a pool/spa for the new season, technicians should examine the pool cover and winter plugs. If the pool cover is damaged, mentioning it to the pool owner now will be perceived as a positive, proactive suggestion allowing the customer to order a replacement cover in plenty of time. Likewise, let the owner know that severely worn plugs should be replaced, and doing so now is both inexpensive and proactive (order Hayward part number **SP1022C**).

Similarly, a visual examination of major pool system components can reveal worn equipment that will soon need servicing or replacement. While this may be unpleasant news, pool owners will appreciate an advance warning “before it breaks” – allowing repair or replacement to be performed before worn equipment quits working at a less convenient time.

While reassembling pool system components for the new season, technicians should lubricate all o-rings and gaskets with Jack’s 327 (Hayward part number **SP032712**, see page 2) to keep them pliable. Any gaskets displaying excessive wear or cracking should be replaced.

Finally, make sure gas supply lines are “on” and properly functioning, and that power to all components is “on” before starting up the hydraulic system.



*Replace worn
plugs now
instead of waiting until next winter.*

\$ervice *with a Splash*

Spring startup service is the perfect opportunity to inform pool owners of new items you have learned about at the latest trade shows. Everyone loves to have the latest and greatest – but they can’t order products they don’t know about (or forgot to order last year).

AquaRite™ chlorine generators, **AquaLogic™** controllers, and **ColorLogic™** lighting – all available from Hayward – are some of today’s most popular upgrade opportunities, and can often be presented with “proactive maintenance” solutions.