

FBC Advanced Module: Pool/Spa Energy Efficiency Regulations

- In 2008 the Florida Legislature passed House bill 7135, an all encompassing energy bill.
- The bill included provisions for energy efficiency of pool and spa components and their application.
- House bill 663 was passed in 2010, enacting revisions to the pool and spa language in 7135, suggested by the FSPA.
- House bill 849, passed in 2011, made final edits to these new requirements.

Pool/Spa Energy Efficiency Regulations

- The Law applies to new construction pools and spas for the pump, motor, control, heater, and portable spa requirements (appliances).
- For Pools and Spas under renovation or repair, where the value of the contract is below 30% of the value of the structure, filtration pumps, motors and controls are not subject to these regulations. Heater compliance remains per the code and Federal law.
- It is the Contractors responsibility, when required, to select and install a compliant model whenever replacing a pool filter pump or pump motor.

- Pool & spa energy efficiency requirements:
 - FEEC, Section R403.9 for Residential, along with APSP-14 and APSP-15
 - FEEC, Section C404.7 (*504.7 in 2010 Code*) for Commercial

APSP-15 Residential pool pumps and pump motors

- Shall not be split-phase, shaded-pole or capacitor start-induction run type motors.
 - Exception: pool pump motors powered exclusively from on-site renewable generation, e.g. solar photovoltaic and wind generation. Grid-tied generation systems are not exempt since the pump is powered from the traditional utility grid when the alternate power source is not available.

APSP-15 Residential pool pumps and pump motors

- If the Total Horsepower (rated hp x power factor) of a residential filtration pool pump motor is 1.0 HP or greater, the pump motor must have a minimum of two speeds.
- The low speed shall have a rotation rate of no more than $\frac{1}{2}$ of the motor's maximum rotation rate.

APSP-15 Residential pool pumps and pump motors

- Pool pumps motor controls for use with a two-speed, multi-speed, or variable speed pump shall have the capability of operating the pool pump at a minimum of two speeds.
- The default circulation speed shall be the residential filtration speed, with a higher speed override capability for a temporary period not to exceed one normal cycle or 24 hours, whichever is less.
 - Exception: Solar pool heating systems shall be permitted to run at higher speeds during periods of usable solar heat gain.

Time Switches (R & C)

- A time switch shall be installed to control swimming pool heaters and pumps that can automatically turn the heaters and pumps off and on according to a preset schedule.
 - Exceptions:
 - Where public health standards require 24-hour pump operation.
 - Where pumps are required to operate solar-and waste-heat-recovery pool heating systems.
 - Where pumps are powered exclusively from on-site renewable generation (Residential only).

Pool/Spa Energy Efficiency Regulations

The Law contains requirements for pool and spa heating systems

- Federal and State requirements have already been in effect that meet or exceed Florida's new Energy Law
- Heater manufacturers currently should be providing product that meets these requirements

Covers requirements in FEEEC for both C & R:

- Heated swimming pools and in-ground permanently installed spas shall be equipped with a vapor-retardant cover on or at the water surface or a liquid cover or other means proven to reduce heat loss.
 - **Exception:** Outdoor pools deriving over 70 percent of the energy for heating from site-recovered energy (such as a heat pump) or solar energy source computed over an operating season.

Pool and spa heaters (R & C)

- All pool heaters shall be equipped with a readily accessible on-off switch that is mounted outside the heater to allow shutting off the heater without adjusting the thermostat setting.
- Gas and oil-fired pool and spa heaters. All gas- and oil-fired pool and spa heaters shall have a minimum thermal efficiency of **82%** when tested in accordance with ANSI Z 21.56.
 - Pool heaters fired by natural or LP gas shall not have continuously burning pilot lights.

Heat pump pool heaters (R&C)

- Shall have a minimum COP of 4.0 when tested in accordance with ARI 1160, Table 2, Standard Rating Conditions- Low Air Temperature. A test report from an independent laboratory is required to verify procedure compliance.

Pool/Spa Energy Efficiency Regulations

- The Florida Building Code, FBC, within Chapter 4 of the Florida Energy & Conservation Code, will mandate all of the requirements of the Florida Energy Law. Chapter 4 will also have additional mandates not found in the law.**
- These additional requirements are based on ANSI approved reference standards (APSP-14 and 15).**

ANSI/APSP-15 (residential only)

- Maximum filtration flow rate: Depending on the volume of the pool, the pool filtration flow rate shall not be greater than the rate needed to turn over the pool water volume in six hours or 36 gpm, whichever is greater.*

*Applications using a single speed pump of less than 1 H.P. are exempt from this requirement per APSP-15 Addenda A

ANSI/APSP-15

- This means that for pools of less than 13,000 gallons the pump shall be sized to have a flow rate of 36 gpm or less and for pools greater than 13,000 gallons, the pump shall be sized using the following equation:
 - Maximum filtration flow rate (gmp) = pool volume (gallons) / 360
- These are maximum flow rates. Lower filtration flow rates and longer filtration times are encouraged and will result in added energy savings

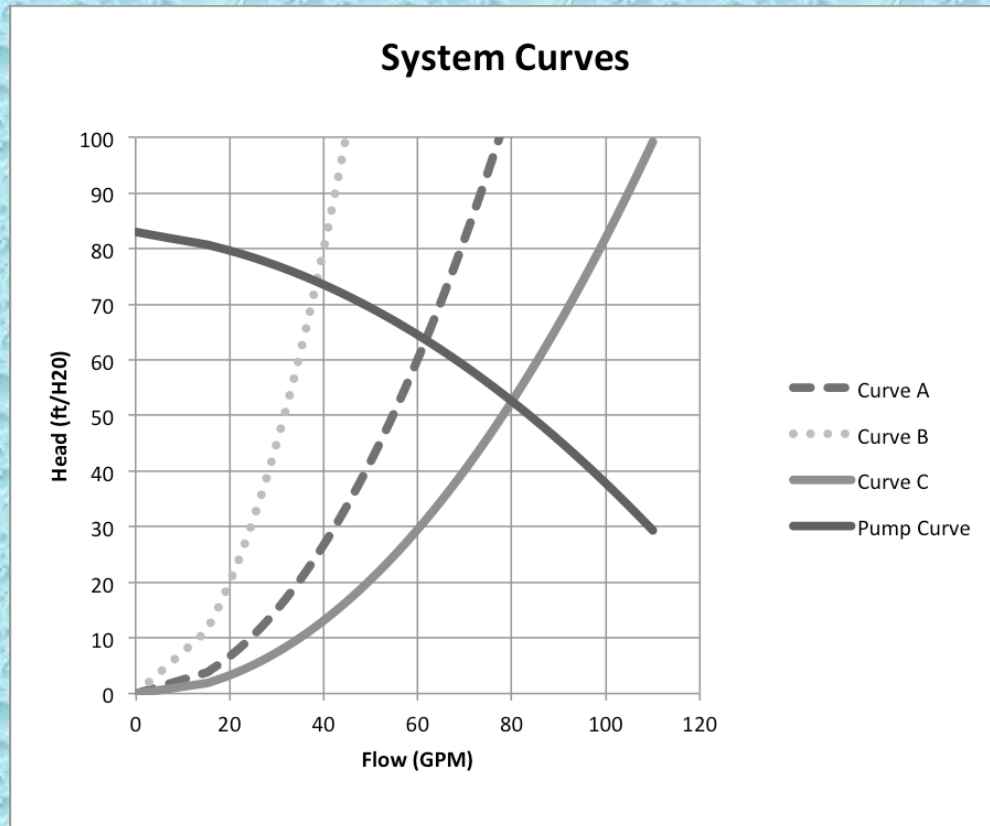
ANSI/APSP-15

- Pools with auxiliary pool loads must use either a multi-speed pump or a separate pump for the auxiliary pool load(s).

Example: If a spa shares the pool filtration system, either a multi-speed pump must be used or a separate pump must be provided to operate the spa.

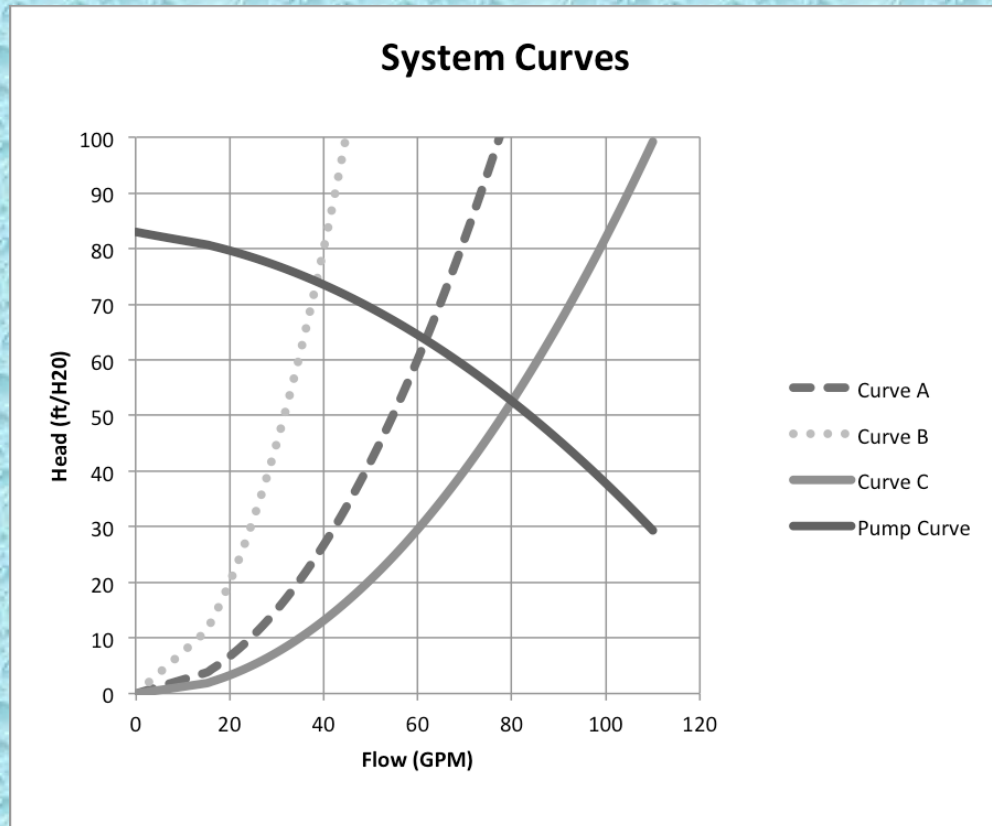
- If the pool system can be served by one pump of less than 1.0 total horsepower in capacity, the pump may be single speed

ANSI/APSP-15



**Filter Pump
manufactures will
create
performance
charts similar to
this example**

ANSI/APSP-15



Curve A, B & C are calculated using a coefficient multiplier where:

Curve A = pools equal to or less than 17,000 gallons with 2" plumbing

Curve B = pools less than 17,000 gallons with 1.5" plumbing

Curve C = pools greater than 17,000 gallons with 2.5" plumbing

ANSI/APSP-15

- For pools equal to or less than 17,000 gallons, a filter pump shall be selected so that the flow rate listed for Curve A is less than the maximum filtration rate calculation (six hour turnover rate)
- For multi speed and variable speed filter pumps, at least one speed shall have the flow listed for Curve A that is less than the maximum filtration rate calculation (six hour turnover rate)

ANSI/APSP-15

- For pools greater than 17,000 gallons, a filter pump shall be selected so that the flow rate listed for Curve C is less than the maximum filtration rate calculation (six hour turnover rate)
- For multi speed and variable speed filter pumps, at least one speed shall have the flow listed for Curve C that is less than the maximum filtration rate calculation (six hour turnover rate)

ANSI/APSP-15

- Pool filtration piping shall be sized so that the velocity of the water at the maximum flow rate does not exceed 8 feet per second in the return line and 6 feet per second in the suction line.

Pipe Size	1.5"	2"	2.5"	3"	3.5"	4"	5"	6"
Nominal GPM @ 6 fps	38	63	90	138	185	238	374	540
Nominal GPM @ 8 fps	51	84	119	184	247	317	499	720

Note: Flow rates are calculated based on the nominal inside diameter of ASTM D1785 schedule 40 PVC pipe

Note: Do not confuse these requirements with the ANSI-7 water velocity requirements for entrapment prevention purposes. Piping design must comply with both requirements

ANSI/APSP-15

- **Filters (cartridge, sand and DE) must have a minimum area based on the 6 hour turnover flow rate**
The filter sizing factors that must be used are:
Cartridge = .375 (gpm/ft²) Ex: 40 .375 = 107 sq ft. filter
Sand = 15 (gpm/ft²) Ex: 40 15 = 2.6 sq ft. filter
DE = 2 (gpm/ft²) Ex: 40 2 = 20 sq ft. filter
- **When used, filter backwash valves must be a minimum of 2" or the diameter of the return pipe, whichever is greater**
- **Pools shall be equipped with directional inlets fittings**
- **At least 18" of horizontal or vertical pipe shall be installed after the filter to allow for the future addition of solar heating equipment**

Pool/Spa Energy Efficiency Regulations

When do these new requirements go into effect?

- Manufacture and sales: The law states that as of December 31, 2011, everyone must comply with the heater, pump and motor and portable spa requirements. Most already do comply.
- Field compliance is an FBC issue. The Florida Building Code require compliance with all pool and spa energy efficiency requirements under the law beginning March 15, 2012

Savings

Are all these new laws and codes really going to save the consumer money?

The following are good general examples of existing pool savings possible by just changing the pump from single to two speed models.

1 ½ Horse Power Single Speed Filtration Pump

<u>running "speed" is</u>	<u>3450 rpm</u>
<u>Motor Amp Rating</u>	<u>10.5 amps</u>
<u>Motor Voltage</u>	<u>230 volts</u>
<u>Estimated Watts used (amps x volts)</u>	<u>2415 watts</u>
<u>Kilowatts (watts / 1000)</u>	<u>2.42 Kw</u>
<u>Average cost per Kilowatt</u>	<u>.14 cents</u>
<u>Cost per hour (Kw x Avg Cost per Kw)</u>	<u>.34 cents</u>
<u>Average running hours (8)</u>	
<u>Est. Cost per Day (.34 cents x 8 Hours)</u>	<u>\$2.72</u>
<u>Est. Cost per Month (\$2.72 x 30 days)</u>	<u>\$81.60</u>
<u>Est. Cost per Year (\$81.60 x 12 Mths.)</u>	<u>\$979.20</u>

Savings

Applying a Two Speed Motor and running the system twice as long on low speed for filtration:

1 ½ Horse Power Two Speed Filtration Pump	
running “speed” on low speed is	1725 rpm
Motor Amp Rating	2.0 amps
Motor Voltage	230 volts
Estimated Watts used (amps x volts)	460 watts
Kilowatts (watts / 1000)	.460
Kw Average cost per Kilowatt	.14 cents
Cost per hour (Kw x Avg Cost per Kw)	.06 cents
Adjusted running hours (12)	
Est. Cost per Day (.08 cents x 12 Hours)	\$.72
Est. Cost per Month (\$.72 x 30 days)	\$21.60
Est. Cost per Year (\$21.60 x 12 Mths.)	\$259.20

Savings

Operation cost comparison of a 1.5 H.P. single speed pump running 8 hours per day vs. a 1.5 H.P. two speed pump running 12 hours per day**

\$979.00 vs. \$259.20

Savings of \$719.80 per year (estimation)

Variable Speed Pump Motors Save Even More

Greater savings will be realized on new construction pools that adhere to the new requirements that result in lower TDH for the system vs typical current design practices.

**** 12 hours per day would not be necessary in most applications**

**More Information Regarding
These New Requirements
Can Be Found on the
FSPA website at**

<http://floridapoolpro.com/industry/govtreations/regulations.html>.