APSP-13 Standard for Water Conservation Efficiency in Pools, Spas, Portable Spas and Swim Spas

Scope:
This standard covers methods and technologies to increase the efficient use and conservation of water for residential and public recreational pools, spas, portable spas and swim spas equipped with a filtration circulation system. This standard applies to both new and existing facilities.

Purpose
The purpose of this standard is to address water use by pools, spas, portable spas and swim spas, and provide a means of achieving a higher degree of water use efficiency, including but not limited to: 1) evaporation, 2) filtration, 3) leaks, 4) people use. 5) maintenance, and 6) total dissolved solids control. See Appendices: *A Recommended Water Saving Measures*, *B Procedure for an Evaporation Bucket Test*, *C Water Conservation Measures While Renovating a Pool or Inground Spa and D Addressing Drought Concerns with Local Government Officials and Water Boards*.

Variations in design
This standard permits variations in design and equipment, including special features such as, but not limited to pools and spas with operating water levels at or above deck level; vanishing edge and/or perimeter flow pools and/or spas, gutter pools etc. Such designs shall not be required to comply with certain sections of this standard, since, by virtue of design, they cannot achieve compliance.

1. New Construction, Equipment and Design:

Exception: Portable Spas and Portable Exercise Spas provided with a vapor-retardant cover

1.1 Fill water: Fill water for all newly installed pools and spas shall be metered, monitored or otherwise controlled to prevent over-filling.

1.1.2 Methods of preventing over filling shall include, but are not limited to: deck mounted float devices with automatic hose shut-off control or similar devices. Cross-connections shall be prohibited, except where approved backflow prevention assemblies, backflow prevention devices or other means or methods are installed to protect the potable water supply.

1.2 Splash-out. Newly installed pools and spas shall be designed, when possible based on materials and manufacturing, to divert splashed water back into the pool or spa to reduce the potential for splash out.

1.2.1 Coping or cantilevered decking extending over the edge of the pool 1 in. *(25.4 mm)* or more is permitted to reduce splash out.

1.2.2 Water level shall be maintained at normal operating level (typically center of skimmer opening) or lower.

1.3 Evaporation. Outdoor pools and outdoor permanent spas shall, when required by the authority having jurisdiction, be provided with a vapor-retardant cover or other vapor-retardant means approved by the authority having jurisdiction (AHJ). See *Appendix A*.

NOTE: The addition of make-up water, or any chemical to pool water, in most cases results in an increase in Total Dissolved Solids (TDS) over time. Unusually large increases in TDS can occur, especially in desert climates, simply by the addition of make-up water. If chemical vapor retardant products are used, TDS should be monitored monthly.

1.4 Leaks. Upon filling new pools and starting the circulation system, water level shall be monitored to verify that there are no leaks. With the pool circulating, water level in the pool/spa shall be marked and/or measured and the level shall be verified in approximately 24 hours. During the level check period, auto-fill devices shall be shut off and auto-overflows shall be plugged. It is recommended that the test not be performed in periods of high or gusting winds to limit evaporative loss.

1.4.1 If the initial test results are not conclusive, a bucket test shall be performed. See *Appendix B*.

1.5 Filtration system water efficiency. When cleaning or backwashing the filter, the manufacturer's instructions shall be followed. Cleaning of filters shall be required upon the following conditions:

1.5.1 *Sand Filters* – When the pressure gauge reading is 8-12 PSI (0.55-0.83 BAR) higher than the starting pressure, or when the flow decreases below the required or desired rate, it is time to backwash (clean) the filter.

1.5.2 *Cartridge Filters* – When the pressure rises 8-12 PSI (0.55-.083 BAR) above the starting pressure, or when the flow decreases below the required or desired rate, clean or replace the filter cartridge element(s) per the manufactures' recommendation.

1.5.3 *DE Filters* – When the pressure rises 8-12 PSI (0.55-0.83 BAR) above the pressure reading upon re-coating after cleaning, or when the flow decreases below the required or desired rate, it is time to backwash (clean) and re-coat the filter.

1.5.4 *Vacuum DE Filters* – When the working vacuum reading is 10 inHg above the starting vacuum or when flow decreases below the required or desired rate, it is time to backwash (clean) and re-coat the filter.

1.5.5. Vacuum Sand Filters – When the working vacuum reading is 10 inHg above the starting vacuum or when the flow decreases below the required or desired rate, it is time to backwash (clean) the filter.

NOTE: With the filter clean, the filtration system running, and no air in the system (no air bubbles visible in the pump basket), make note of the initial pressure gauge reading. This number will vary from pool to pool depending on the pump, system components and piping configuration. This pressure gauge reading is the starting point from which pressure increase is measured, indicating when to clean/backwash the filter. Cleaning/backwashing the filter before the pressure or the flow is below the required or desired rate indicates the need to clean or backwash will waste water. Flow below the required or desired rate can cause system components to malfunction or cease to operate; chlorine feeders, heaters, etc. In Commercial facilities, filter cleaning/backwashing may be required more or less frequently by the Authority Having Jurisdiction (AHJ). Commercial/Public facilities may have different or more stringent requirements.

1.6 Equipment operations – Filtration turnover rates for residential pools shall comply with the ANSI/APSP/ICC-15 *Standard for Residential Swimming Pool and Spa Energy Efficiency*.

2. Existing Pools, Equipment and Maintenance:

Exception: Portable Spas and Portable Exercise Spas provided with a vapor-retardant cover

2.1 Test for leaks. Residential pool filtration systems shall be shut off and closed to bathers for a period of approximately 24 hours each quarter year, during the operating season, to test for leaks. The test method shall be a bucket test as described in *Appendix B*. Public pools shall be checked monthly. If the public pool cannot be closed for a 24-hour period, the test shall be performed during the maximum time between closing the pool and opening it the next day.

2.2 Water quality control - Total Dissolved Solids (TDS).

2.2.1 *Testing* - Testing for TDS levels shall be performed quarterly.

2.2.2 *Reducing TDS* - Action to lower the level of TDS shall be taken if it reaches 1500 ppm greater than TDS at pool or spa start-up (Start-up TDS includes source water TDS and any other inorganic salt added at start- up or later) using one or more of the following means:

2.2.2.1 Reverse Osmosis

2.2.2.2 Nanofiltration

2.2.2.3 Partially draining and refilling the pool

2.2.2.4 Other means which are equally effective and approved by the AHJ

NOTE: An increase in TDS may indicate an accumulation of impurities during the course of operation. Excessively high TDS (excluding the amount of sodium chloride added) may lead to hazy water and scale formation, corrosion of fixtures, and may inhibit sanitation. TDS needs to be monitored. The buildup of TDS may be a result of the type of sanitizer used, other chemical additives, or may come from other sources). In cases where the increase in TDS is related to the type of sanitizer used, the addition of ozone or UV may slow the rate of increase of TDS.

2.3 Filtration system water efficiency. When cleaning or backwashing the filter, the manufacturer's instructions shall be followed. Cleaning of filters shall be required upon the following conditions:

2.3.1 *Sand Filters* – When the pressure gauge reading is 8-12 PSI (0.55-0.83 BAR) higher than the starting pressure, or when the flow decreases below the required or desired rate, it is time to backwash (clean) the filter.

2.3.2 *Cartridge Filters* – When the pressure rises 8-12 PSI (0.55-0.83 BAR) above the starting pressure, or when the flow decreases below the required or desired rate, clean or replace the filter cartridge element(s) per the manufactures' recommendation.

2.3.3 *DE Filters* – When the pressure rises 8-12 PSI (0.55-0.83 BAR) above the pressure reading upon re-coating after cleaning, or when the flow decreases below the required or desired rate, it is time to backwash (clean) and re-coat the filter.

2.3.4 *Vacuum DE Filters* – When the working vacuum reading is 10 inHg above the starting vacuum or when flow decreases below the required or desired rate, it is time to backwash (clean) and re-coat the filter.

2.3.5. Vacuum Sand Filters – When the working vacuum reading is 10 inHg above the starting vacuum or when the flow decreases below the required or desired rate, it is time to backwash (clean) the filter.

NOTE: With the filter clean, the filtration system running, and no air in the system (no air bubbles visible in the pump basket), make note of the initial pressure gauge reading. This number will vary from pool to pool depending on the pump, system components and piping configuration. This pressure gauge reading is the starting point from which pressure increase is measured, indicating when to clean/backwash the filter. Cleaning/backwashing the filter before the pressure or the flow is below the required or desired rate indicates the need to clean or backwash will waste water. Flow below the required or desired rate can cause system components to malfunction or cease to operate; chlorine feeders, heaters, etc. In Commercial facilities, filter cleaning/backwashing may be required more or less frequently by the Authority Having Jurisdiction (AHJ). Commercial/Public facilities may have different or more stringent requirements.

Appendix A
Supplementary Information – Recommended Water Saving Measures

This Appendix is not part of the American National Standard ANSI/APSP/ICC-13 2016. It is included for informational purposes only and is non-mandatory. This Appendix provides supplementary information and important guidance explanation relating to water saving measures.

1. When a pool or spa is installed with an auto-fill device, it should be shut off for 24 hours each quarter year and the water level measured to check for leaks.
2. Filtration timing, when practical based on wind patterns, should be set to operate during periods of low wind velocity.
3. Water features should be set to run only when serving the purpose for which they are designed (visual effect, sound effect, bather load, etc.) For water features that have a vertical component or a vertical drop of over 12 in. *(304.8 mm)*, a “wind control” system to prevent operation in windy conditions helps reduce water loss.
4. Where available, reverse osmosis or nanofiltration should be considered for lowering total dissolved solids (TDS) instead of pumping out water and re-filling the pool or spa.
5. Use of ozone and/or ultraviolet (UV) can allow for lower chlorine demand, helping to reduce the build up of TDS.
6. Keeping the water level at the lower operational level of the skimmer opening – can help reduce splash out.
7. Pool covers or other vapor-retardant means approved by the authority having jurisdiction (AHJ) are effective on indoor pools and spas for water retention and humidity control.
8. Setting indoor pool air temperature 2 °F *(-16.6 °C)* warmer than water temperature can help reduce evaporation.
9. Consider landscaping around the pool area to block some wind.
10. Oversizing cartridge filters can reduce the number of cleanings required annually, thereby reducing water use.
11. If the pool has an overflow, capping or plugging it when active children or adults are in the pool can save water.
12. For more information, see *Drought Concerns: What to Do When Water Conservation Measures Cause Water Parameters to Exceed Recommended Limits,* a paper written by the APSP Recreational Water Quality (RWQ) Committee[1].

[1] The Association of Pool and Spa Professionals (APSP), 2111 Eisenhower Avenue, Alexandria, VA 22314-4679 USA, 1-703-838-0083, www.APSP.org

Appendix B
Supplementary Information – Procedure for an Evaporation Bucket Test

This Appendix is not part of the American National Standard ANSI/APSP/ICC-13 2016. It is included for informational purposes only and is non-mandatory. This Appendix provides supplementary information on how to conduct an evaporation bucket test. Normal water loss will occur from evaporation due to wind and heat. If the pool loses more than ¼ in. *(6.35 mm)* of water a day, there may be a leak. Consider the geographic location.

1. Before starting this test, turn the pool off – the test will take approximately 24 hours and the pool must remain off and closed to bathers for the entire time of the test.
   Before starting this test, turn off the pool and auto-fill, if so equipped the test will take approximately 24 hours and the pool must remain off and closed to bathers for the entire time of the test.
2. Use a 2½–5 gal. *(9.46353-18.9271 L)* plastic bucket or equivalent.
3. Fill the bucket to about 1 in. *(25.4 mm)* below the top with pool water so wind effect will be similar in the bucket compared to the pool.
4. Set the bucket on the first or second step, or bench so that at least 2/3 of bucket is submerged in the pool water. Put bricks under the bucket if necessary to raise the top above pool level. The water in the bucket should be a little higher than the level of the pool; If the bucket floats put in some bricks or stones to weight it down. Positioning the bucket like this keeps the bucket water and pool water temperature the same.
5. The test should not be done on a day with high or gusting winds, or heavy rains.
6. Mark the water level in the bucket with tape or a scratch mark or measure down from the top of the bucket and write that measurement down. Be consistent in your measuring method and always use a ruler or tape measure. Also measure the distance from the deck or another appropriate spot down to the pool water level or mark the static pool water level on the inside of the skimmer with a scratch mark or piece of tape.
7. If there is a pool cleaner, make sure it remains off for the time of the test.
8. Place deck furniture next to the steps so no one will move the bucket. Also to prevent an animal from drinking the water out of the bucket.
9. If a step is not available, put the bucket on the deck near the pool. This will affect the evaporation rate because the temperature of the water in the bucket will become the same as air temperature. Also, the effect of wind becomes more pronounced, so waiting for a calm wind day is advisable. If you place the bucket on a deck, allow a difference in evaporative loss of plus or minus 1/16 of an in. *(1.5875 mm)…*1/8 in. *(3.175 mm)* total.
10. Allow the pool to sit overnight; the next day (approximately 24 hours after the start of the test), re-measure the two water level distances as compared to the first measurements to see if there is a difference in the water loss levels between the pool and the bucket. Any measureable difference (if pool loss is greater than bucket loss) would indicate a leak.

NOTE:

Generally, rain will fall in the pool and the bucket equally. However, a pool with flat coping may get additional rainwater pouring off the deck in a heavy rain which would invalidate the test.

If a pool has a solid automatic cover over the pool for the duration of the test, there will be negligible evaporation. If you do a bucket test anyway, it will show how much water is being saved by using the automatic cover.

Automatic covers must have an automatic pool cover pump on top of the cover and plugged in, ready to function. Otherwise, a heavy rainfall could put enough weight on top of the cover to displace pool water over the lowered beam and into the cover box or vault.

Appendix C
Supplementary Information – Water Conservation Measures While Renovating a Pool or Inground Spa

This Appendix is not part of the American National Standard ANSI/APSP/ICC-13 2016. It is included for informational purposes only and is non-mandatory. This Appendix provides supplementary information and important guidance explanation relating to water saving measures while renovating a pool or inground spa.

Purpose: In some municipalities under certain drought conditions, the filling of new pools or maintaining existing pools may be banned. In these instances, and as a measure of good faith to conserve water, the following steps should be considered to proceed with a pool renovation project.

1. When allowed by the authority having jurisdiction, utilize a bladder to store the water at the jobsite while the pool is being renovated. Take note of the weight limitations of these temporary vessels, as well as the volume and quantity needed. If the project is going to last more than a few days, provisions may be needed to circulate and/or sanitize the water. Due to the excessive weight created by the water, these bladders may create the unintended side effect of damaging landscaping. Examples of temporary bladders include:

    a. Above ground pools (typically 5,000-10,000 gal. or 18927.06- 37854.12 L)
    b. Inflatable pools (3,000 to 7,000 gal. 11356.24 to 26497.88 L)
    c. Pillow tanks (up to 50,000 gal. or 189270.59 L)

2. Water trucks, depending on size, have a capacity range from 2,500 to 3,700 gal. *(9463.529 to 14006.02 L)* for tandem axle trucks, and a capacity of 5,500 to 11,000 gal. *(20819.76 to 41639.53 L)* for semi-truck. Source of water for hauling via truck includes hydrant (municipal), irrigation meter, wells, and natural bodies of water.

    a. When filling from hydrant, a meter is usually required by local water management authorities. Connecting hoses to a hydrant without a permit or meter can result in significant fines and/or imprisonment.
    b. Irrigation meters are utilized in some parts of the country as a means to use municipal water without paying for sewage as part of the withdrawal.
    c. Well water can be used if the water can be treated (filtered and chemical introduction) within a reasonable period of time after its introduction to the pool, usually within 72 hours. In many areas, permits for wells on private property are still allowed in extreme drought conditions, and the withdrawal of water is largely untracked due to most states' inability to require well meters on private property.
    d. Natural bodies of water include lakes, rivers, streams and ponds. Due to the United States Environmental Protection Agency's (EPA) recent changes to the Clean Water Act (CWA), withdrawal of water from certain sources may be prohibited. However, if a clean, reliable source is available and not subject to the CWA, this could be a last resort consideration.

3. If water trucks are available in any of the above sizes, water can be transported from one project to another to recycle the existing water. This "leap frog" method can be transformed into a positive sales tool for owners wanting to minimize their ecological footprint.

    NOTE: When leap frogging pool water from one job to the next freshly plastered job, the water should be run through a reverse osmosis (RO) or nanofiltration process to reduce high total dissolved solids (TDS) and cyanuric acid (CYA) before introduction to the new vessel.

Appendix D

Supplementary Information – Addressing Drought Concerns with Local Government Officials and Water Boards

This Appendix is not part of the American National Standard ANSI/APSP/ICC-13 2016. It is included for informational purposes only and is non-mandatory. This Appendix provides supplementary information on how to better educate elected and appointed officials on the usage of pools and the conservation of the water within those pools. The following talking points have been utilized in markets across the country to assist with those efforts.

1. Identify the jobs affected in the drought area. This would include the total number of full-time equivalents (FTEs) in construction, renovation, service, retail and manufacturing. Identify the revenue generated, the tax base, and the total number of people. Legislators are always more concerned when they know the number of potential voters in their district who are impacted by a law or ruling.

2. Qualify the number of permits built per year, in contrast to the number of existing pools. This figure will highlight the relatively small impact this will have on new water withdrawn from state or regional resources.

3. In most states, EPA statistics show that filling existing and new pools consume less 1-2% of municipal water supplies. In winter months, this drops to ¼ to ½%.

4. Pools are water reservoirs, not water "wasters." It is a common misconception that pools are refilled annually, when in fact in areas of moderate rainfall compared to the national average, only 2-6 in. (50.8-152.4 mm) of water are needed to maintain.

5. If a pool is not permitted to maintain its proper water level at the skimmer, 100% of the water is spoiled and can lead to greater public health issues such as mosquito breeding (West Nile), bacteria, and drowning. See Centers for Disease Control and Prevention (CDC), www.CDC.gov, statistics for specific waterborne illnesses in your specific area.

6. Include local swim teams, ranging from summer swim leagues to National Collegiate Athletic Association (NCAA) programs, in your efforts. Parents of young swimmers make a very strong argument for keeping pools operational.

7. Meet with as many elected officials of all political affiliations to discuss your concerns, as well as local media. Identify any who own a swimming pool or live in a neighborhood with a pool. These individuals may offer some of the strongest influence for or against water restrictions with pools, and it is important to know their motivation.

8. When hearings/meetings about swimming pools are posted at the city, county or state level, promote and encourage every pool professional to attend. Masses carry great influence with all levels of government officials. Private business owners often carry more credibility than paid lobbyists.