Delany Products

A look at Water Conservation in the Real World

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Water is a Finite Resource

- 70%: Amount of the Earth's surface is covered by water
- 3%: Total Amount of Freshwater in the world
- 1%: Total Amount that is sufficient for human consumption
- 4%: Average Annual Increase per Year of the Cost of water as well as the sewage treatment cost
- $1.22 vs $0.95: Average Cost of Bottled Water compared to Oil at $40/Barrel

U.S. Water Consumption Since 1950

- 1950 Population: approximately 150 million
- 1950 Water Usage: approximately 14 billion gallons

50 Year's Later….

- 2000 Population: approximately 282 million
- 2000 Water Usage: approximately 43 billion gallons

Population grew by 88%, but water usage grew by 207% over the same period.

Draughts in areas of the US such as California have only highlighted the importance of water conservation in the US and world moving into the future.

Low Consumption to High Efficiency Toilets

- 40-45%: Typical Percentage of Water Usage within a Commercial Building

- In the 1990's plumbing codes in the US required manufacturers to go from water closets using 3.5 gallons per flush ("gpf") to 1.6 gpf. This was accomplished in 1992 with the Water Conservation Act. This saved 54% for a water closet. Urinals went from 1.5 gpf to 1.0 gpf, or a savings of 33%. Today, the state of California is leading the charge to 1.28 gpf for water closets and 0.125 gpf for urinals. This is an additional savings of 32% for the water closet and 87% for urinals.

- A new problem arises. As the industry went from 3.5 to 1.6 what occurred in the real world was water closets and urinals that were not efficient enough to clear the trap properly of the waste. As a result, construction and maintenance teams were force to improvise in the field, meaning find a way to have the flush valve provide more water to clear the trap of the waste. The two most common solutions that result were either substitute a diaphragm with a higher discharge (i.e. 3.5 gpf) or if they did not have another diaphragm then change the existing diaphragm assembly to allow more water to follow through the valve. This is achieved by removing the part known as the choke ring. This then will add 0.75 gpf to the discharge, making a 1.6 gpf into a 2.35 gpf discharge (1.6 + 0.75 = 2.35).

- Report by Koeller & Company and Veritec Consulting for the California Energy Commission: In March of 2010 John Koeller and Bill Gauley set out to find out which saved more water, a sensor activated flush valve or manual valve. They chose a commercial building site in Tampa, FL, the 8-story building known as The LakePointe Two that was built in 1999. They made an "unexpected finding". Upon initial inspection of the valves in the building, they found that the maintenance staff of the building had substituted a 3.5 gpf diaphragm assembly into every flush valve replacing the designed "Low Consumption" 1.6 gpf diaphragm assembly.

The Resulting Problems Occurring Today

- More Problems arise today. Today the world is moving towards even lower flows, as we continue the effort to save more water. This is the move from Low Consumption (1.6 gpf water closets) to High Efficiency Toilets (1.28 gpf water closets). Two primary problems are now being seen in the real world: 1) Poor or inconsistent performance quality of water closets/fixtures and 2) Increasing Pressure on the efficiency of plumbing system design, especially in existing structures.

- Poor or Inconsistent fixture performance: The move to use only 1.28 gallons of water to discharge waste requires a very efficient and precise fixture design. At the same time, the plumbing industry is under constant price pressure to certain manufacturers and of course consumer demand. But this has the unintended consequence of inefficient product entering into the supply chain and thus real world and then contractors and maintenance staff begin substituting higher discharge diaphragm assemblies or removing parts, which results in no water savings or worse higher than 1.6 gpf solutions (1.28 + 0.75 = 2.03). The worst possible scenario is the multiple flushes (1.28 +1.28 = 2.56)

- Pressure on Plumbing System Design: We are at a point where saving water is now not just a matter of designing a fixture that can use less water. It is now a matter as well of designing proper plumbing systems because everything now becomes critical to ensure that sufficient flow ("gallons per minute or gpm") are occurring throughout the building. And what about all the existing buildings. Again in the real world if the pitch of a pipe is not sufficient, substitutions to 3.5 gpf diaphragm assemblies is seen as well as the removal of parts all in order to make sure that the proverbial "s**t is rolling downhill". But this is again wasting water.

- Rigid Non-adjustable valves: The reason that contractors, maintenance staff and those in the field are resulting to these drastic moves it result of having to deal with plumbing products that have no adjustability, no ability to fine tune the product to problem being encountered in the real world.

True-in-the-Field Water Conservation

- Delany believes that to save the maximum amount of water in the real world that fine tuning the product to the variables being encountered in the real world is critical. Because the real world is not going to present consistent perfect lab-like variables allowing the flush valve and fixture to be installed and problem never incurred. In fact quite the opposite occurs in the real world where inefficient fixtures are experienced or flow rates that are not optimal or pressures that significantly different in the building.

- External adjustment or the Regulation Screw: Delany provides a flush valve that when needed can be externally adjusted or fined tuned in the field. This is done by adjusted the Regulation Screw or the top of the line product, the Saber's Upper Chamber Regulation Screw. Changes in the Screw position allow from minor for fine tuning of the discharge, giving the water closet only the minimum amount need to make it perform to its potential. This means small changes can be effected resulting in the discharge effectively be changed to for example from 1.28 to 1.4 and that is enough to get the fixture preforming again while still saving water over making changes to a 1.6 discharge or higher.

- Time and Money Saving: This is adjustment is done very easily by removing the cap on the top of the valve and then regulating screw can be adjusted upwards or downwards with a simple flat blade screw driver. The water at the Control Stop does not need to be turned off, or the cover taken off, or a new internal assembly substituted or part broken off and removed. Instead an easy and quick change to the Regulation Screw can be employed saving time, money and water.

True-in-the-Field Water Conservation in Action

- The Table below is used to exemplify this concept. This table is a comparison of the cost savings of going from a base line line of 1.6 gpf fixture to 1.28 gpf fixtures. These savings are projected out over a 5-Year and 10-Year periods. 100 fixtures are assumed in the building, which are flushed 25 times per day every day. At the end of the 10-Year period, **$127,008** would be saved.

- Competitor's Scenario: Ten (10) fixtures (or 10%) needed more water in order for the solids to clear the trap. The building maintenance resorted to opening the valves and broke off a part called the choke. This results in roughly ¾ of a gallon of extra discharge being added or making a total flush of 2 gpf per those fixtures. This raises the average across the entire building to 1.355 gpf. The end result is would be final savings of **$97,240.** This is only 75% of what could have been achieved.

- Adjustable Valve Scenario: The Delany valve example found the ten (10) fixtures (or 10%) needed more water, but instead a minor fine tuning of the discharge to a 1.4 gpf was used. This is an increase across the building to 1.292 gpf and the result of this small change generates a savings of **$125,245,** or 99% of the original amount.

Water Cost/Gallon 0.0441

School	Flushes per Day per W.C.	AVG GPF for 100 W.C.s	Gallons per Day	Days/Mo 30	Gallons Saved/Mo	Cost Savings per Gallon	Annual Cost	# of Fixtures per Building 100	Savings for Building 5 Yrs	Savings for Building 10 Yrs
Base Line	25	1.6	40	1200	0	$0.00	$0.00	$0.00	$0.00	$0.00
Competitors	25	1.355	33.875	1016.25	183.75	$8.10	$97.24	$9,724.05	$48,620.25	$97,240.50
Delany	25	1.292	32.3	969	231	$10.19	$122.25	$12,224.52	$61,122.60	$122,245.20
100% at 1.28	25	1.28	32	960	240	$10.58	$127.01	$12,700.80	$63,504.00	$127,008.00

Assumptions: for Delany 10% @ 1.4 gpf

Assumptions for Competitor 10% @ 2.03 gpf

Water Savings Automatic Sensor Activated flush valve versus Manually Activated

- Due to the powerful information found in the report by Koeller & Company and Veritec Consulting for the California Energy Commission, we will submit that full report at this time. Please find attached that reported titled "Sensor Operated Plumbing Fixtures: Do they Save Water?", dated March 2010.

- Conclusion: Like the report finds, we believe that manually activated valves actually save water when compared with the sensor activated. That is because in the real world there are issues of phantom flushes as well as whether we choose to admit it or not, not every manual valve will be flushed, which saves water. In the Koeller and Veritec report, they found that the sensor activated plumbing products used nearly double the amount of water over the same given amount of time, 654 gallons per day Versus 1,243 after being converted to sensor activated.