THE TRUTH ABOUT DILUTION CONTROL SYSTEMS

What do they do?
Dilution control systems come in a variety of styles and configurations. All dilution control systems are pieces of equipment designed to perform a function. They take concentrated cleaning or maintenance chemicals and dilute them with water to create “ready-to-use” (RTU) cleaning solutions. Their advantage is that they eliminate the need for maintenance personnel to manually dilute concentrated chemicals to create ready-to-use cleaning solutions. This frequently reduces waste because maintenance personnel often attempt to visually measure chemicals and not recognizing how little an ounce really is, over concentrate cleaning solutions.

How do dilution control systems work?
There are three significant manufacturers of dilution control equipment; Hydro Systems, Dema Engineering and Knight Marketing. Most chemical manufacturers and distributors purchase dilution control equipment from one of these companies. Some larger manufacturers have a company like Hydro Systems custom-design the exteriors of the equipment. However, if you take them apart the operating mechanisms are generally similar.

Most chemical proportioning systems dilute concentrated cleaning chemicals by venturi action. Venturi action occurs when liquid flowing by an opening creates suction that in the case of a dilution control system pulls the concentrated cleaning chemical into the water stream, diluting it. The amount of concentrated chemical drawn though the venturi is usually controlled by a plastic insert with a specific diameter hole in it. The larger the opening the more chemical is pulled in. Other factors that influence the amount of concentrate drawn through a particular size tip are the viscosity/thickness of the concentrate and to some extent the water pressure being fed to the dilution control system. The inserts are usually installed either in the dilution control unit itself or in the bottles of concentrated chemical through the use of an insert with a suction tube that fits into the mouth of the bottle. Advantages to venturi systems are that with a minimum amount of maintenance, they reliably and fairly accurately dispense RTU chemicals, are cost effective and require no electricity to operate.

Another less commonly encountered type of dilution control system are those that use peristaltic pumps. Peristaltic pumps use a rotating cam to compress a specific diameter and length of plastic hose that squeezes a predetermined amount of concentrate into water to produce RTU chemical. The advantages of this type system are that they are very accurate and reliable, require virtually no maintenance and aren’t affected by the viscosity of the chemical or water pressure. They do however require electricity to operate and are generally more expensive than venture systems. They are also somewhat more limited in their configuration options.

There is no such thing as a “FREE” proportioning system!
A commonly used sales approach for dilution control systems is to present a program in which a customer agrees to purchase the concentrated maintenance chemicals and gets the dilution control equipment for “free”. The terms of these agreements generally involve an initial purchase of a specific quantity of product, a purchase contract for a specified length of time or sometimes just an agreement that as long as chemical is being purchased, the customer gets to use the proportioning equipment. When a customer stops purchasing chemical, the equipment is generally removed. The truth is no dilution control equipment is really “free”. The question is how is the cost of the equipment really being covered? In most of the free equipment programs, the cost of the equipment is simply included in the price of the chemical. The issue with these programs is that eventually, often within the first year, the actual cost of the proportioning equipment has been offset but the cost of the chemical concentrate isn’t reduced to reflect it. Although sometimes the difference is used to replace worn or damaged equipment, more often than not it simply turns into additional profit. In these programs customers repurchase the same equipment over and over and over again. This obviously works out well for the supplier, at least until the customer figures it out and then the supplier has a disgruntled customer to deal with.
**Chemical dilution ratios**

There is an expansive range of products available that are marketed for use in dilution control systems. A number of these products are offered with dilution ratios, that in our opinion, are either too high to be effective or too low to be applicable to dilution control systems. For example Johnson/Diversey’s Stride Neutral Cleaner is sold with a dilution ratio fixed at 1:750. We find it questionable, and it has been the experience of a number of maintenance personnel we have worked with, that any product is really going to clean effectively, diluted at \( \frac{1}{6} \) ounce per gallon of water. At the other extreme are products like 3M’s Twist n Fill 52L, Tile, Grout & Bowl Cleaner. This “dilution control” product has a dilution ratio fixed at 1:5 or 25.6 ounces per gallon of water. Twist n Fill is packaged in 2 liter bottles and only produces 2.6 gallons of RTU Restroom Cleaner before the concentrate must be replaced. This may be acceptable if the cleaning solution is only being dispensed into quarts, you get 10 quarts per container of concentrate, but if a 5-gallon mop bucket is used, you would have to replace the concentrate each time you fill up.

The theory behind dilution control systems are that not only does the equipment take the guess work out of creating RTU chemical, but that using concentrated chemicals provides other benefits such as reducing the amount of storage space required, reducing transportation costs and reducing the cost-per-usable-gallon for chemical. To obtain these benefits, a balance must be struck between chemical concentration and effectiveness. Perma’s 55+ years of manufacturing experience has demonstrated that 2 ounces of chemical per gallon of water (1:64), generally allows enough active ingredient to be included in RTU chemical solutions to truly be effective at performing the task for which they were formulated. All of the products in Perma’s Easy Mix System are packaged in gallon bottles with each bottle producing 64 gallons or 256 quarts of RTU cleaning solution.

**Fixed versus Adjustable Dilution Settings**

Many of the dilution control systems on the market are proprietary. They will only accept the containers provided by a specific manufacturer and usually come with the dilution-regulating tip installed in the container. This creates a fixed dilution ratio for that product. The rational offered for this type of system is that it makes using chemicals safer by reducing maintenance personnel’s access and exposure to the concentrated chemical and reduces waste by taking away their discretion to alter the dilution ratio. What often isn’t discussed is that fixing the dilution ratio assumes that the manufacturer understands all of the potential uses for a product and has set the dilution ratio at just the right level. Too often this isn’t the case and when the dilution ratio hasn’t been established correctly maintenance personnel often gain access to sealed containers to make their own product using screw-drivers, knives or whatever tools are at hand. This puts maintenance personnel at a much higher risk of accidental contact with concentrated chemical and negates the reason for having dilution control equipment. Conversations with maintenance personnel about exactly this scenario caused Perma to take a slightly different approach. At 2 ounces per gallon, the eight products in Perma’s Easy-Mix system generally provide excellent. However, not all applications are the same. For example, increasingly customers are looking to reduce the number of chemicals needed to maintain their facilities. This means that a general purpose cleaner could be used for a wide range of cleaning tasks from washing windows, to routine cleaning of table tops, to heavy duty degreasing of commercial kitchen floors. Having the dilution control inserts installed in the equipment allows one product to be dispensed at multiple dilution ratios for different applications.

**Product Packaging**

**Container sizes**-There is a remarkable array of various container sizes used by manufacturers for dilution control systems. Betco’s Green Earth system uses 4 liter containers, Butcher’s Command Center uses 1.5 gallon containers, Ecolab’s QC system uses 44 ounce containers, Enviro Solution’s system uses 1.25 gallon containers, etc. Here again, a balance should be achieved based on the philosophy behind using a dilution control system. The right size package is often determined by how concentrated a chemical is and what it’s being used for. For example, Perma’s Easy-Mix 1000 Glass and Hard Surface Cleaner is generally
dispensed into quarts bottles for cleaning windows, molding, table tops, etc. At 2 ounces per gallon of water, a ½ gallon (2 liter) bottle of concentrate makes 128 quart bottles of RTU cleaning solution. For this product ½ gallon bottles would work fine. As a comparison the Easy-Mix 1035 Cleaner/Gloss Restorer is generally dispensed into automatic scrubbers. A ½ gallon of concentrate makes 32 gallons. Many automatic scrubbers have solutions tanks that hold 15-30 gallons, so this size container would be marginal for this application. Perma chose to package Easy-Mix products in natural gallon containers that produce 64 gallons of RTU cleaning solution. This usually works well for most applications, but sometimes-additional flexibility can be helpful. For example, Perma works with a high school that uses Easy-Mix 1035 Cleaner/Gloss Restorer in 2 30-gallon capacity automatic scrubbers every night to clean. They were required to change containers at least once a night. This was cumbersome, so we packaged their EM1035 in 5-gallon pails and with minor modifications to the proportioning equipment, reduced the required container changes to once a week.

**Inserts**—The argument that putting inserts into the bottles makes them safer by restricting access to the concentrated chemical has validity. Installing inserts does make it less likely that concentrated chemical will be spilled or splash during container changes. Obviously, using reasonable care when handling chemicals mitigates this concern. Also, inserts do make it harder to engage in unauthorized custom dilutions. As previously mentioned, however, maintenance personnel can be quite creative in breaking into containers and we have yet to meet anyone who indicated they would bother to tamper with a product that is working the way they need it to. Another issue is that the inserts often make it difficult to completely empty the container. Particularly in the case of disinfectants, this requires that the insert be removed so any residual concentrate can be removed and the container rinsed to comply with State and Federal disposal regulations. Still, for customers who desire inserts, they are readily available from various sources and simple to install. Ultimately, the primary consideration becomes whether the perceived benefits are worth the additional cost? Depending on the number of inserts purchased, they cost approximately $.70-$.75 per gallon, plus $3.00-$3.50 per product for a proportioning unit adapter that mates with the inserts.

**Perma’s perspective**
Considering the almost mind-boggling array of dilution control equipment available on the market already, it was a challenge to determine what direction to take in putting together a program. Our decision was that simple, reliable and versatile was the approach we would take. Based in part on the experiences of our distributors, we decided to use Hydro’s Taskmizer Dual Select Unit. The Taskmizer Dual Select can be configured to dispense up to eight products, from various size containers, at multiple dilution ratios, that can be easily set to provide optimum performance in various maintenance situations. Containers can supplied with or without safety inserts. The bucket and automatic scrubber filling hose is eight feet long with a remotely operated dispensing valve. The quart fill assembly allows one-handed operation and is equipped with a built in overflow tray. When purchased from Perma we assemble and custom configure the units for the specific needs of a customer so that installation simply requires two screws and connecting a hose to a water source. Our experiences to date indicate that they are a good, reliable piece of equipment that very effectively dispenses diluted cleaning solutions. However, as versatile as the Taskmizer is, it may still not be the best choice for all situations. In that event, Hydro alone manufacturers 11 other configurations of proportioning units. There are an equal number of choices from the other dilution control equipment manufacturers.

**Conclusions About Dilution Control Units**
Like buffing machines, automatic scrubbers, mops & buckets, vacuum cleaners, etc., they are pieces of equipment, designed to perform a function. They are available in a range of styles, from multiple suppliers and at competitive prices depending on what you want. Some companies try and get customers to pay premium prices for cleaning chemicals by claiming to provide a “free” proprietary dilution control unit that will only accept their chemicals. *Again, there is no such thing as a free dilution control unit, it’s just a question of how the cost is covered.* Anyone, who tries to convince you otherwise, may also have a bridge in New York City they would like you to buy.
Get Answers before you buy or sign!

1. Before you commit to a dilution control system, demand to know what the dilution ratios of the products are. If you can’t get the information, you could be getting set up for an unpleasant surprise relative to price, performance or both.

2. Take a calculator and divide the number of gallons or liters a container of concentrate makes, into the cost of the container to obtain a cost-per-use gallon or liter for all the products you are considering.

3. Compare the cost-per-use gallon with the product’s performance. Cleaning products with very high dilution ratios may look cost effective but clean poorly. Cleaners with low dilution ratios may clean very well but be over priced.

4. Find out if there is any way to change the dilution ratios to allow for using one chemical for multiple applications? Using a “general purpose cleaner” for multiple applications can be a good way to save money and reduce inventory costs.

5. Find out if you get to keep the dilution control equipment when any contract you may have sign, is over? Whether you see a cost for the equipment on your bill or not, you are paying for it.

6. Find out if the dilution control equipment is proprietary and will only take a specific manufacturer’s products, or any concentrated chemical. Even if you get to keep the equipment, if it’s proprietary you will only be able to use specific chemicals and if you can’t negotiate a better price, may still have to pay for the unit over and over again.