

NEUTRALIZATION SYSTEMS



LIMESTONE CHIPS

FOR ACID NEUTRALIZATION TANKS

GENERAL INFORMATION:

Limestone (marble) chips or lumps are being used in numerous applications to help neutralize and / or dilute chemical bearing wastes (e.g., acid wastes). After years of successful neutralization and dilution, many state and local environmental plumbing codes call for the addition of limestone chips into acid neutralization basins, tanks or sumps. Water is also added to the tanks to initiate the dilution process. The limestone chips being offered by exceeds application requirements. The following two requirements are vital to proper limestone performance: The limestone must be in the one to three inch (1" – 3") diameter size range and must contain a high calcium carbonate content in excess of ninety percent (90%). The limestone contains about 95%.

HOW IT WORKS:

The effective ingredient in limestone is calcium carbonate. This chemical compound actually reacts with acids to form harmless neutral salts, carbon dioxide and water. The neutral salts usually precipitate into a sludge, which falls to the bottom of the tank. Carbon dioxide gas mixes with water to form carbonic acid, which helps to neutralize alkaline (caustic) wastes. The water, of course, helps to dilute the acidic, alkaline and solvent wastes. The above reactions can be illustrated chemically, as follows:

- 1) 2 hydrochloric acid (HCl) + calcium carbonate (CaCO₃) → calcium chloride (CaCl₂) + carbon dioxide (CO₂) + water (H₂O)
- 2) carbon dioxide (CO₂) + water (H₂O) → Carbonic acid (H₂CO₃)
- 3) 2 sodium hydroxide (NaOH) + carbonic acid (H₂CO₃) → sodium carbonate (Na₂CO₃) + 2 water (H₂O)

WHY IT'S IMPORTANT:

Corrosive, toxic and flammable wastes are being discharged daily from numerous industrial, institutional and commercial sources (e.g., hospital labs, school labs, chemical plants, plating facilities, slaughter houses, battery charging stations, photographic labs, etc.). Neutralization and dilution of these potentially hazardous wastes is very necessary, even when the quantities and concentrations are small. Such wastes can cause physical damage to a building's piping or outside sewer system. If the effluent is being discharged to a sewage treatment facility, these harmful wastes can interfere with normal waste treatment. However, if the effluent is being ultimately discharged to a river or lake, the damage to our wildlife and environment is obvious.

Neutralization is the process whereby acids and alkalis (wastes) can be rendered harmless with the use of certain chemicals. Dilution is the process whereby chemical-bearing wastes can also be rendered harmless by the massive solvent (water) mixing or flushing. This mixing dilutes the effluent to a point that the chemicals in the wastes are rendered impotent. The degree of neutralization or dilution can be physically measured in numerical terms, through a system known as pH (positive hydronium ions). Neutral liquids, such as water, register a pH number of 7; acids register from 0 to 6.99; alkalis range from 7.01 to 14. The lower the number, the more acidic the waste. The higher the number, the more alkaline (caustic) the waste.

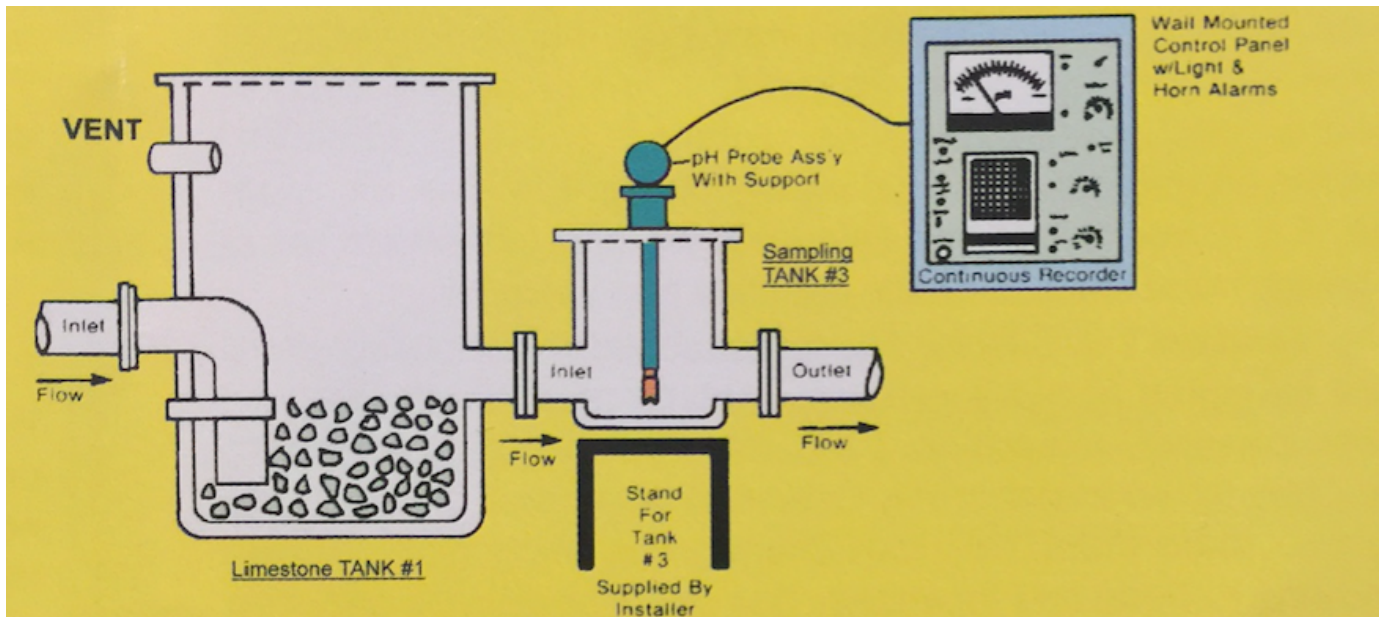
The use of the limestone and tanks are frequently the best and least expensive means to protect pipes and sewers from damage and to meet stringent environmental and plumbing codes. However, if necessary, WES equipment can be used in conjunction with more sophisticated chemical treatment processes in order to achieve neutral and / or clean effluent.

Choose Between FOUR Methods of Neutralizing and/or Diluting Chemical Bearing Wastes and Effluents:

Method #1 – Passive Systems, offered, offered TWO ways:

Method #1 (A) / Passive System – Single Treatment Tank (No Sampling or Monitoring)

Method #1 (B) / Passive System – Single Treatment Tank plus Sampling Tank with or without Optional Monitoring System. (Model #K-100A or Model #K-100AM)



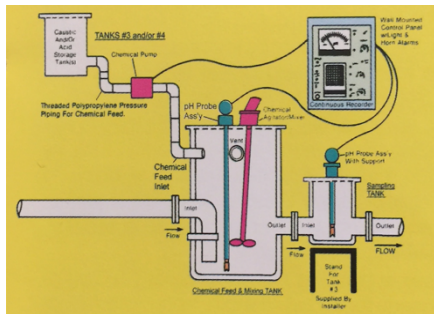
Most Common

Standard WES round, (vertical/cylindrical) flat bottom tanks for use in collecting or intercepting, chemical bearing wastewaters, above or below ground. This can be done with diluting liquids or water and/or neutralizing agent (limestone chips, chemicals or gases). Our quality tanks and fittings are designed specifically to handle the worst chemicals for this application. This method is the most commonly used, practical choice for treating polluted wastes, for most installations. (Round, cone bottom, rectangular, square and horizontal/cylindrical tanks are also available). Extensions can be had for tanks in certain below ground situations. These tanks can be used for the storage, sampling and/or pumping of chemicals. Also, available as small, under sink units.

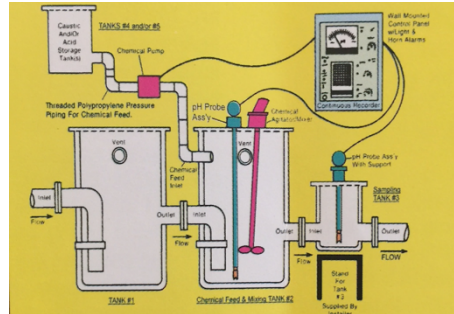


Method #2 – Active Treatment Systems – Chemical Feed / Mixing Systems, Offered THREE Ways:

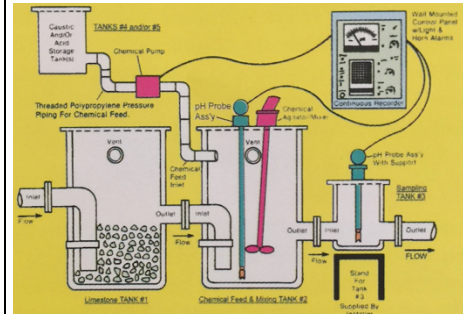
Method #2 (A) Active System Straight Chemical Treatment Only



Method #2 (B) Active & Passive System Straight Chemical Treatment plus Pretreatment Tank



Method #2 (C) Active & Passive System Straight Chemical Treatment with Pretreatment Limestone Tank



More Precise Control

This method offers the same standard round, flat bottom tanks, modified slightly for more sophisticated chemical feed treatment, mixing and pH monitoring and controlling of chemical bearing wastewaters. These systems usually include chemical feed and connecting polypropylene pumps, piping, fittings, valves, alarms, recorders, etc. This method is more sophisticated and can provide more precise control of the effluents being discharged. The tanks are also available in different shapes for above and below ground use. These systems usually include a sampling tank and chemical feed tank(s). NOTE: Variations of this set up are available.



Method #3 – Shunt Tank System

Avoid Shutdowns for Servicing

This method consists of at least two separate standard WES round, flat bottom tanks for each drainage piping system. We call this system the “shunt (multiple) tank method”. You can use the same tanks as mentioned in either one of the above two methods. However, this “shunt method” should be chosen where approved maintenance servicing is necessary; particularly when system shutdowns must be avoided, such as in hospitals, research facilities, production/manufacturing plants, etc. This system usually includes two or more polypropylene valves and some polypropylene fittings and pipes. This system allows one tank to be shut off for servicing or cleaning, while wastewater flows to and through other tank(s). Thus, your facility remains on-line at all times.



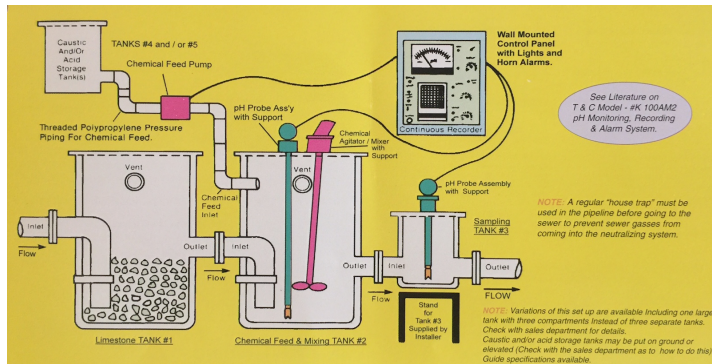
Method #4 - Double Wall Tanks

Added Safety with Secondary Containment

These double walled, round, flat bottom, WES tanks offer improved and greater safety, against possible chemical leakage, in below and above ground installations. Chemical leakage monitors and/or chemical displacement pumps can be installed between the inner and outer walls. The double wall results from two tank construction – a tank within a tank. The inner tank neutralizes/dilutes the effluents, while the outer tank is a containment tank. Many states and local jurisdictions are demanding this type of double walled protection. NOTE: Fitting connections are welded to both tank walls.

NOTE: Ask for literature on WES pH monitoring, recording & alarm systems or leak detection system, which can be ordered and installed with any of the above four methods. Check with Federal, State, and Local authorities regarding any law that may require reporting of all underground chemical tanks, as well as laws that may require secondary containment.

*HDPE=HighDensityPolyEthylene **PP=Polypropylene



**CHEMICAL FEED / MIXING SYSTEMS -
TYPICAL METHOD #2 INSTALLATION (Other
Variations Available)**

OPERATION OF ALL FOUR METHODS:

A common neutralizing medium for all methods can be either lump limestone (or marble chips), one to three inches in diameters with a high calcium carbonate equivalent content in excess of 90%. For wastes containing predominantly (sulfuric) acid, a dolomitic limestone is preferred. (Dolomitic limestone contains a high percentage of magnesium carbonate in addition to the calcium carbonate.) Specify the dolomitic limestone especially in applications where lead acid battery wastes are expected. A smaller size medium should not be used as it tends to solidify and prevent passage of effluent. Water added to the tank helps to dilute the chemical bearing wastes. The water also functions as a seal, similar in nature to the seals of drum traps or P-traps in typical plumbing systems.

In operation, as acids percolate up through the tank, they react and chemically with the limestone to become neutral salts, water and carbon dioxide. For those applications requiring a tightly controlled effluent waste, having a pH of around 7.0, another secondary or sophisticated neutralization system should also be employed. This is our Method #2.

INSTALLATION & LOCATION:

WES tanks should be installed on the floor of a basement room, placed into a concrete pit or installed directly into the ground, provided appropriate burial procedures are utilized. Burial procedures for the tanks are similar to burial procedures for most polyolefin piping systems (contact WES for further details). Under sink installations are also possible.

In as much as these tanks are installed at either the end of a building's piping system or directly at the source of pollution, these tanks actually help to extend the life of a sewer piping system located directly outside the building or the life of the piping within the building.

In installing the pipe to the tank fitting connections, avoid leaving the piping or fittings in strain. Tanks must NOT be supported by inlet, outlet or vent piping. In addition to installing tanks by just placing them on level flooring, tanks may be installed with sturdy sheeting, supporting entire tank bottoms. Also, tanks should be piped and filled completely with water, prior to carefully filling with limestone. Fill water to invert of outlet.

TYPICAL APPLICATIONS:

SCIENCE LABORATORIES –

Middle schools, high schools, colleges, universities, hospitals, medical labs, research institutes, testing facilities, dental facilities, pharmaceutical and food processing plants, chemical and other industrial plant locations.

PHOTO ENGRAVING AND PHOTOGRAPHIC –

Newspapers, publishing houses, printers, photography labs, etc.

BATTERY ACID –

Auto service centers, industrial battery stations, battery manufacturing facilities, etc.

METAL CLEANING AND PAINTING –

Electronics, metal finishers, spraying facilities, etc.

Plating wastes may not be discharged directly to sanitary sewers, because the metallic salts (e.g. chrome, nickel and copper) are generally too toxic to handle and interfere with normal sewage treatment.

A WORD OF CAUTION:

There are many variables affecting neutralization and dilution of various chemicals being discharged through an acid waste system. Water Engineering Services makes no performance claims for the tanks described in this specification/buyer's guide; nevertheless, In every application, the proper WES tanks must be selected and maintained, particular attention must be paid to composition and quantity of effluent being discharged.

For the most reliable performance, WES recommends the employment of professional assistance in analyzing the effluent, recommending appropriate equipment and prescribing the necessary maintenance services.

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