FRF Series Neutralizing Media Filters (Reionizing Filters) Application Table

Model[1]	50	70	100	120	150	240	300	600
Part Number	919305	919307	919310	919312	919315	919324	919330	919360
Mineral Tank	12x52	13x54	14x65	16x65	21x62	24x72	30x72	36x72
Media Volume (ft^3)	1 ½	2 ¼	3 ¼	4	5	8	10	15
Gravel (lbs)	15	30	40	55	140	200	250	300
Bed Area (ft^2)	0.79	0.92	1.07	1.40	2.40	3.14	4.90	7.10
Backwash Rate (gpm)	8	10	15	15	30	35	60	70
Head Loss								
Flow at 5 gpm/ft^2	3.9	4.6	5.4	7.0	12.1	15.7	24.5	35.4
Head Loss in psi at 5 gpm/ft^2	0.5	0.7	0.9	1.2	2.3	2.7	0.8	1.8
Flow Range								
Flow at 3 gpm/ft^2 (gpm)	2.4	2.8	3.2	4.2	7	9	15	21
Flow at 6 gpm/ft^2 (gpm)	4.7	5.5	6.4	8.4	14	19	29	42

CALCITE

Calcite is a crushed and screened white marble media, which can inexpensively be used to neutralize acidic or low pH waters to a neutral, less corrosive condition. Calcite is a **naturally occurring** calcium carbonate media. One of the advantages of Calcite is its **self-limiting** property. When properly applied, it corrects pH only enough to reach a non-corrosive equilibrium. It does not overcorrect under normal conditions. Upon contact with Calcite, acidic waters slowly dissolve the calcium carbonate to raise the pH, which reduces the potential leaching of copper, lead and other metals found in typical plumbing systems. Periodic backwashing will prevent packing, reclassify the bed and maintain high service rates. Depending on pH, water chemistry and service flow, the Calcite bed will have to be periodically replenished as the Calcite is depleted. Calcite is a carbonate mineral and the most stable polymorph of calcium carbonate ($CaCO_3$).

GMO

Granular Magnesium Oxide (GMO) is a specially processed hard, bead-like magnesia (MgO), adapted for use in filters to neutralize acidity by increasing the pH value. By neutralizing the free carbon dioxide in water, GMO can correct acidic water conditions and render it less corrosive. GMO, being a highly reactive magnesium oxide, is used most effectively where pH correction is substantial or high flow conditions are in use. pH correction and media consumption are affected by a number of water chemical variables. Being soluble to acidity, GMO will slowly dissolve and will need to be replenished periodically. On a per weight basis, magnesium oxide can neutralize much more acidity than can calcium carbonate, (five times as much). This results in greatly reduced chemical usage for the same pH correction. (GMO often goes by the trade name Corsex.)

Water King neutralizing filters use a 60/40 Calcite/GMO mix.

CALCITE

ADVANTAGES
•Naturally occurring material
•Low uniformity coefficient for maximum contact for controlled pH correction
•Slower reacting for controlled pH correction
•Inexpensive

CONDITIONS FOR OPERATION
•A gravel support bed is recommended
•Water pH range: 5.0-7.0
•Bed depth: 24-30 in.
•Freeboard: 50% of bed depth (min.)
•Backwash rate: 8-12 gpm/sq. ft.
•Backwash Bed Expansion: 35% of bed depth
•Service flow rate: 3-6 gpm/sq. ft. but may be modified to adapt to local conditions

DESCRIPTION OF OPERATION
As the Calcite's calcium carbonate neutralizes the water, it will increase hardness and a softener may become necessary after the neutralizing filter. Calcite can be effectively combined with Granular Magnesium Oxide (GMO) to combine the high flow neutralization properties of GMO, along with the slower reacting low flow properties of Calcite, increasing the ability to correct low pH.

CALCITE PHYSICAL PROPERTIES
•Color: Near white
•Bulk Density: 90 lbs./cu. ft.
•Mesh Size: 16 x 40
•Specific Gravity: 2.7
•Effective Size: 0.4 mm
•Uniformity Coefficient: 1.5
•Hardness: 3.0 (Mohs scale)
•Composition: $CaCO_3$, 95% min. $MgCO_3$, 3.0% max.

GMO

ADVANTAGES
•High degree of activity and speed of correction allowing high flow
•High capacity...less chemical usage

CONDITIONS FOR OPERATION
•Downflow service is generally satisfactory on waters with a hardness of less than five grains/gal. or where it's combined with Calcite at least 50-50. Upflow service is generally recommended with hardness exceeding five grains/gal. to prevent "cementing of the Corosex bed"
•Use distributors designed for upflow applications
•A gravel support bed is recommended
•Water pH range: 4.5-6.0
•Bed depth: 24-30 in.
•Freeboard: 50% of bed depth (min.)
•Backwash frequently to prevent possible cementing
•Backwash rate: 10-12 gpm/sq. ft.
•Service flow rate: 5-6 gpm/sq. ft. but may be modified to adapt to local conditions

PHYSICAL PROPERTIES
•Color: Brownish white
•Bulk Density: 75 lbs./cu. ft.
•Mesh Size: 6 x 16
•Specific Gravity: 3.6 gm/cc
•Effective Size: 1.4 mm
•Uniform Coefficient: 1.7
•Composition: MgO 97% min

Why mix Calcite and GMO? Under certain low flow conditions, when using a pure GMO media, the GMO may overcorrect and create a highly basic (high pH) condition. Under certain hardness conditions, pH correction can cause hardness minerals to precipitate out of solution, resulting in cementing or solidification of the GMO, mineral bed. To avoid this problem, Water King neutralizing filters use a 60/40 Calcite/GMO mix that takes advantage of the high flow neutralization properties of GMO along with the slower reacting low flow properties of Calcite, reducing the potential for over correction.