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SPEC SHEET

Date 09/06/2016

CR-100

CHARACTERISTICS

Screen size (U.S. Standard Dry): 8-50 Mesh
 Water Retention: 50%
 pH Range: 6-11
 Approximate Shipping Weight: 50 lb./Cu. Ft.
 Standard Packaging: 1 Cu. Ft. Bag
 Physical Appearance: Grey/White Crystal
 Backwash Flow Rate: 8-10 GPM Per Sq. Ft.

INFLUENT LEVELS

Combination of Manganese & Iron: Up to 15 PPM
 Hydrogen Sulfide (H₂S): Less than .5 PPM
 Hardness as CaCO₃: 3 GPG Minimum
 Minimum TDS: 80 PPM

CAPACITY PER CUBIC FOOT

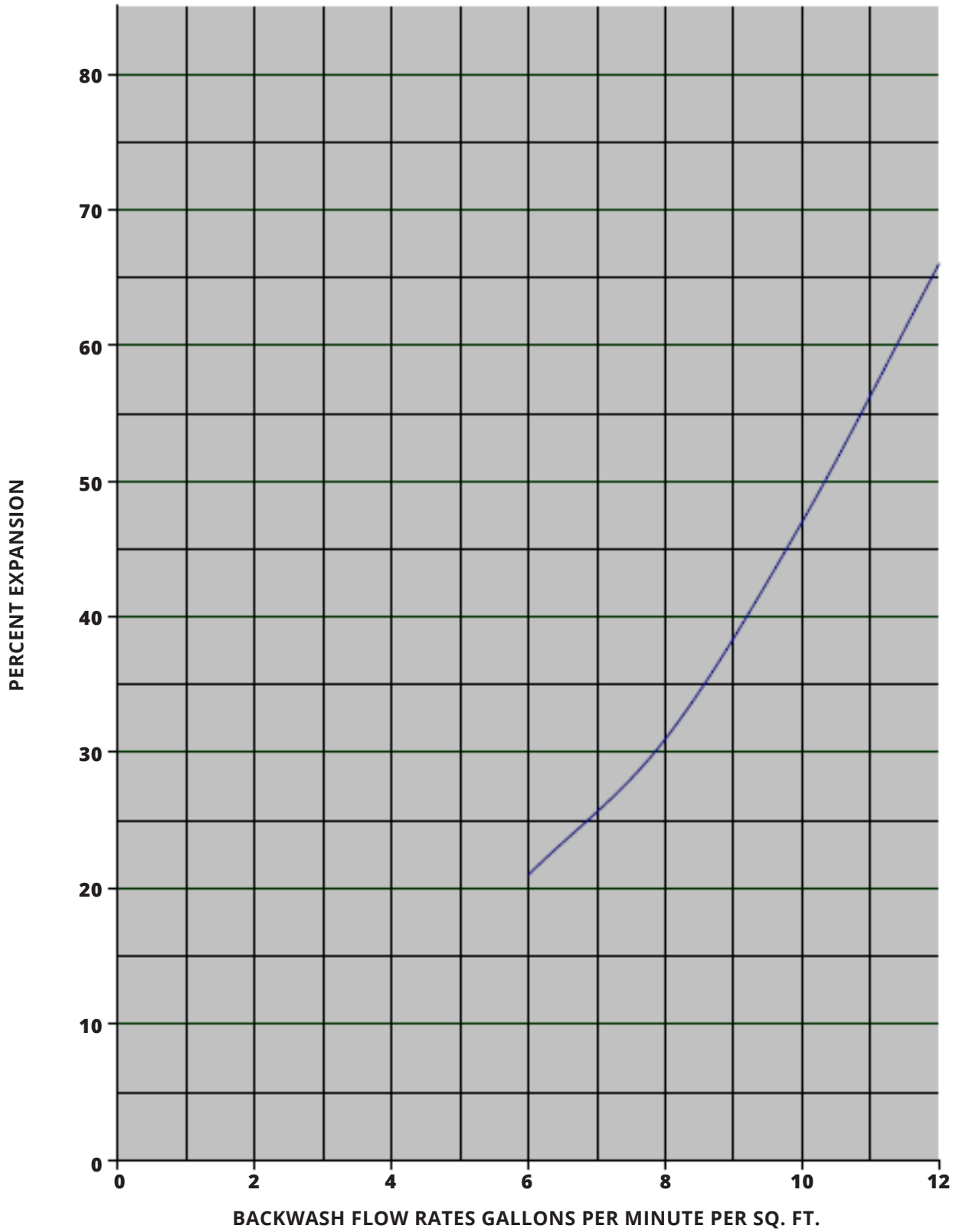
Hardness as CaCO₃: Up To 17,000 Grains (Depending on Unit Efficiency)
 10 PPM of Iron or Manganese = 1 GPG Hardness
 8 PPM of Sodium—1 GPG Hardness

ZEOLITE SIZE SPECIFICATION

U.S. Standard (Mesh Dry)	Sample Weight	% Retained	% Retained (Spec.)
8	000.59	.59	1% Maximum
12	29.92		
16	40.15		
20	16.74		
30	9.13		
40	2.05	97.99	92% Maximum
50	.91	.91	5% Maximum
Pan	.51	.51	3% Maximum
Total	100.00	100%	

CR-100

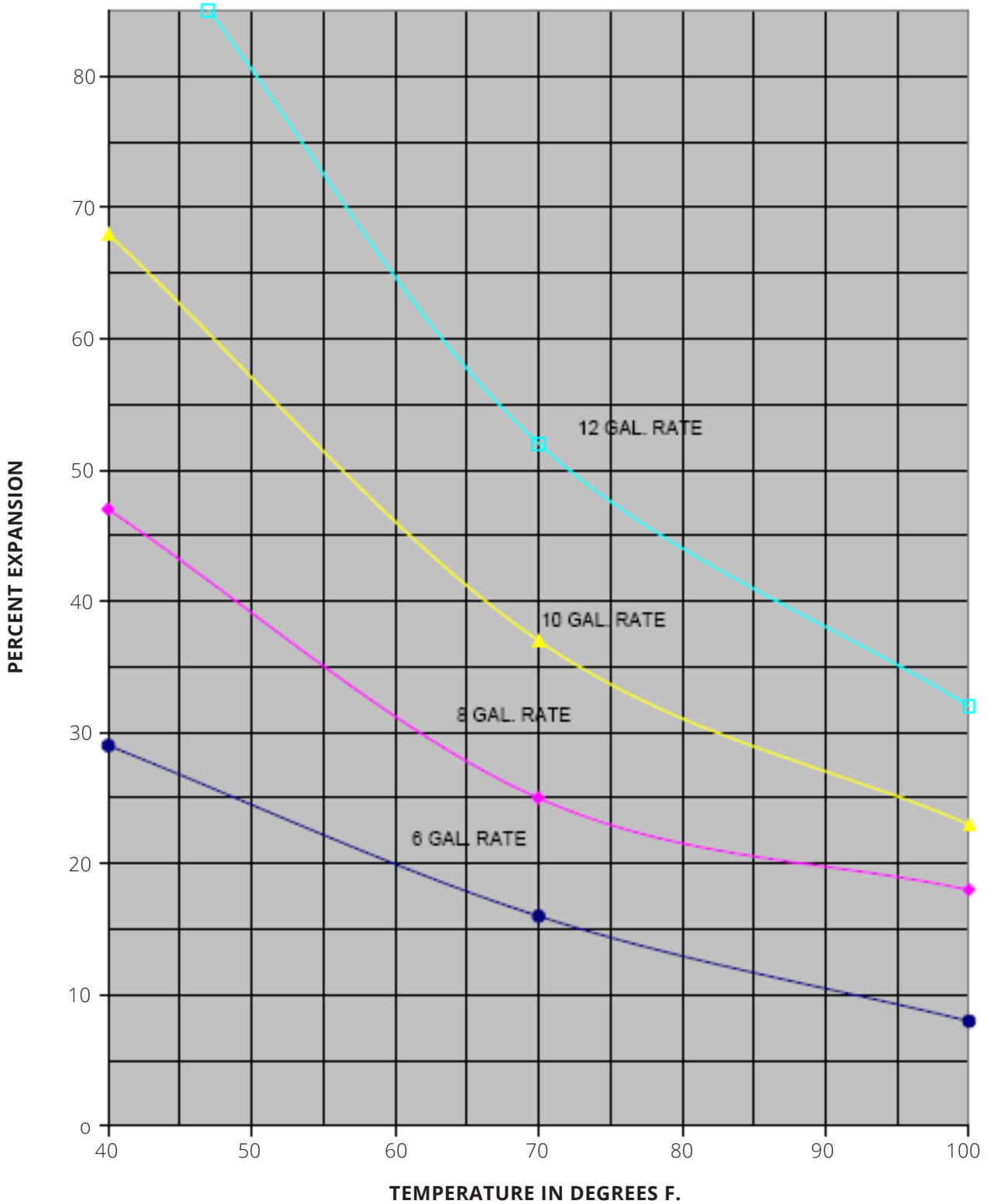
BACKWASH EXPANSION CHARACTERISTICS @ 58°F



CR-100

BACKWASH EXPANSIONS CHARACTERISTICS AT VARIOUS TEMPERATURES

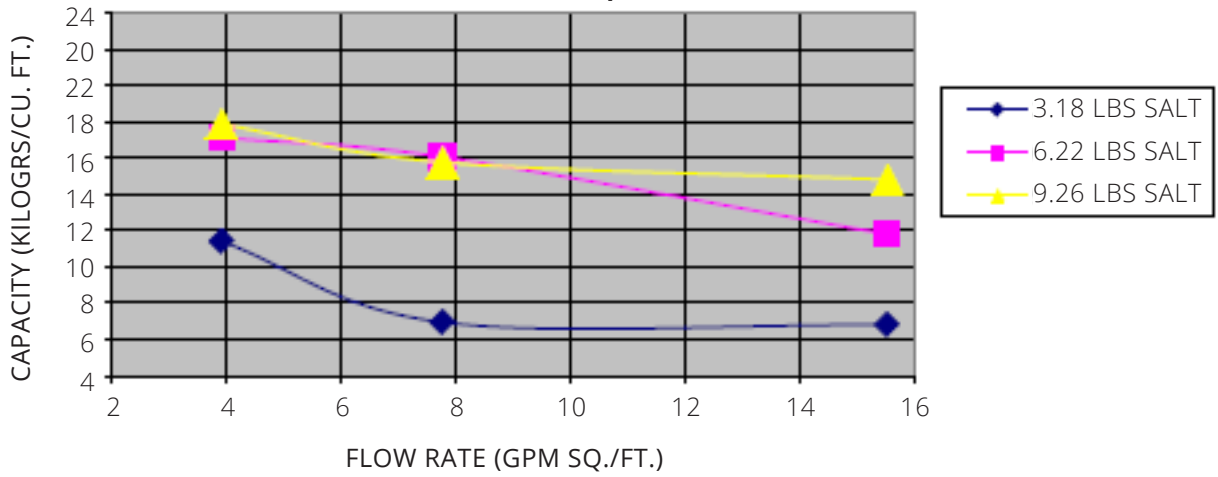
Flow Rates in Gallons Per Minute Per Sq. Ft.



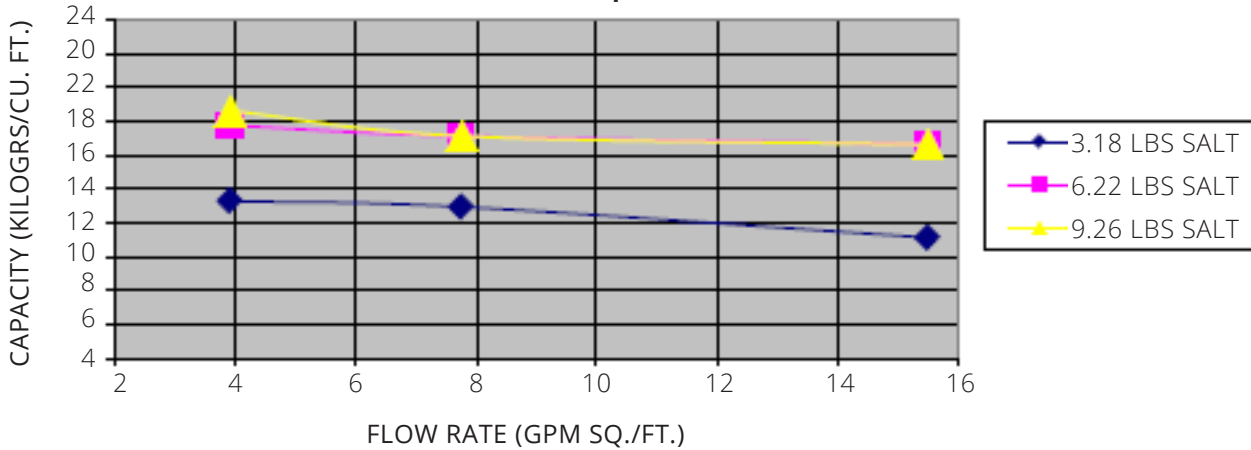
CR-100

CAPACITY vs. FLOW RATE FOR SEVERAL LOADING

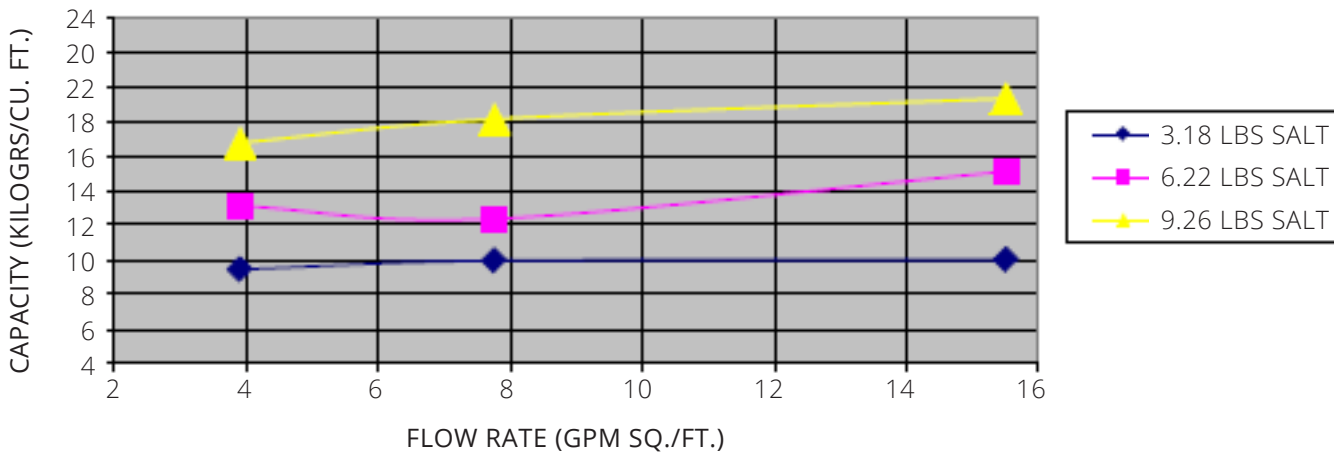
HARDNESS 18 GRS / pH = 7.3



HARDNESS 9 GRS / pH = 6.0



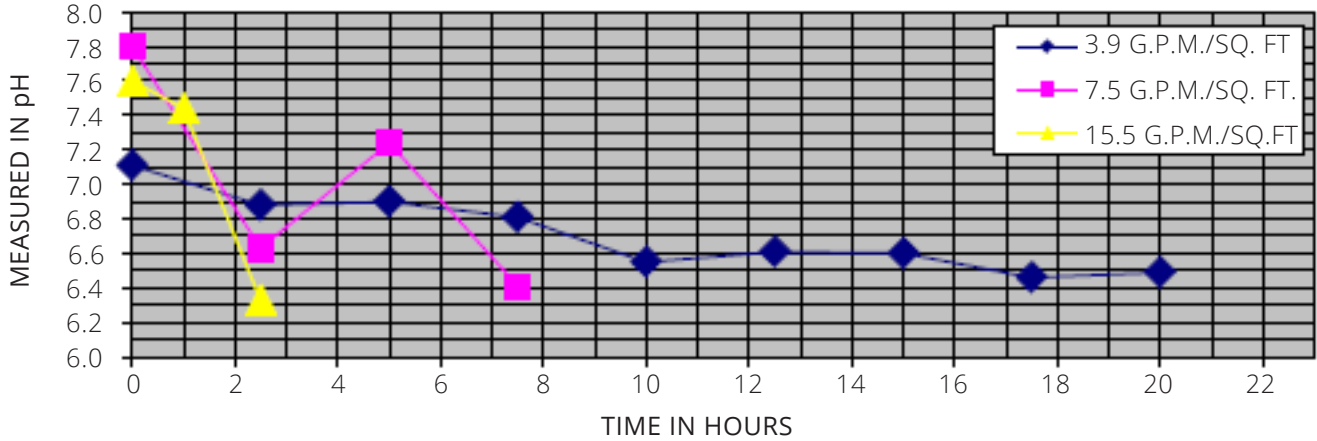
HARDNESS 4.5 GRS / pH = 5.0



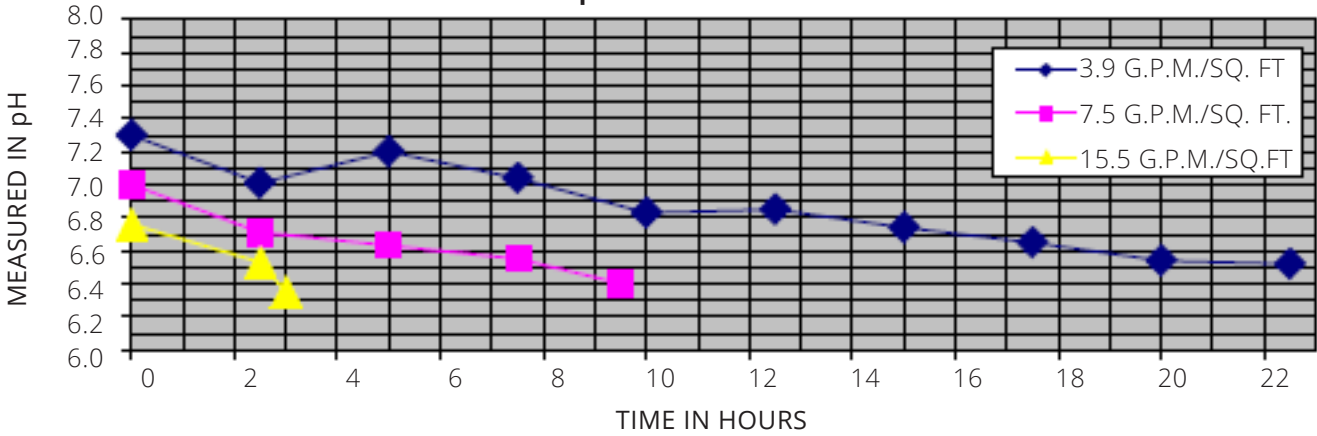
CR-100

ACID NEUTRALIZATION

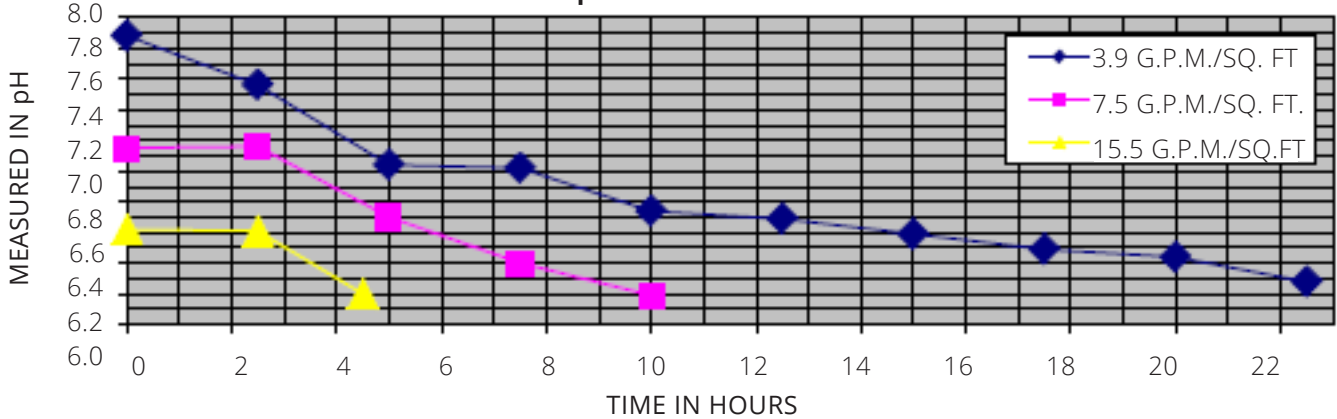
INFLUENT pH = 6 / 9 GPG 3.16 Lb. NaCL



INFLUENT pH = 6 / 9 GPG 6.22 Lb. NaCL



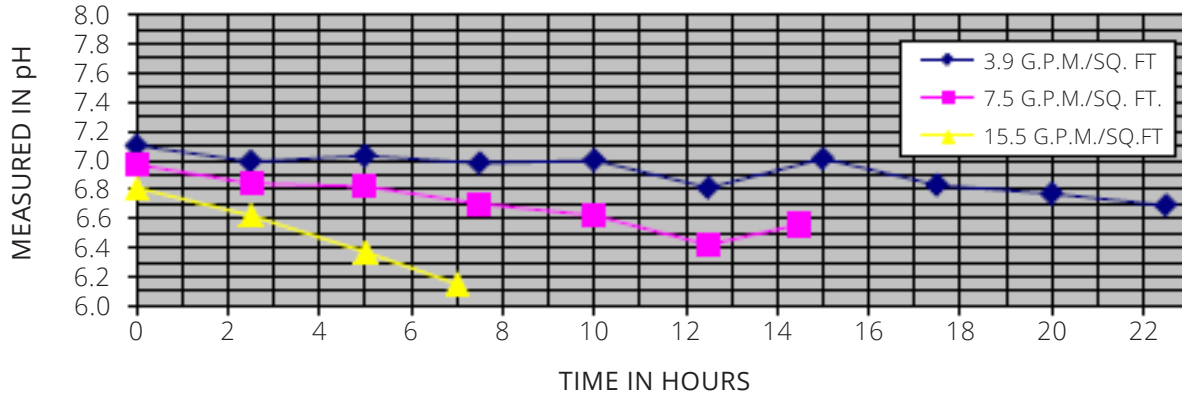
INFLUENT pH = 6 / 9 GPG 9.26 Lb. NaCL



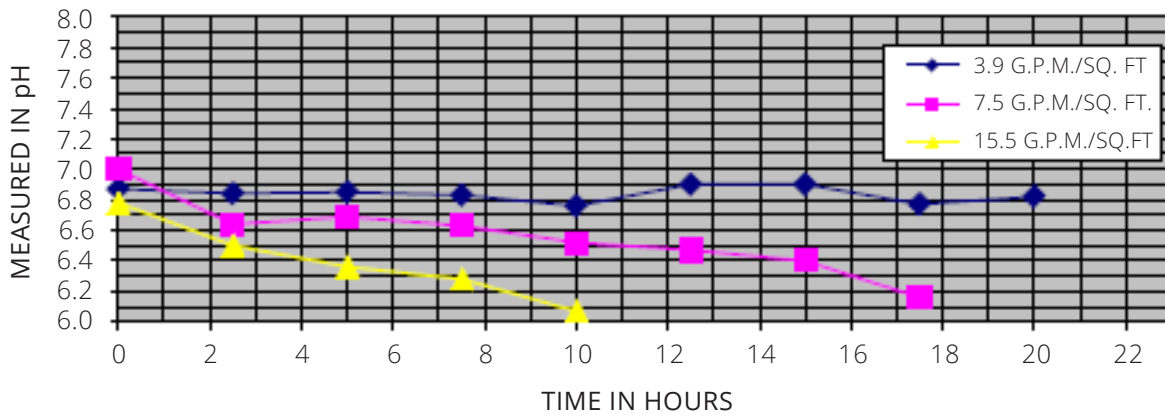
CR-100

ACID NEUTRALIZATION

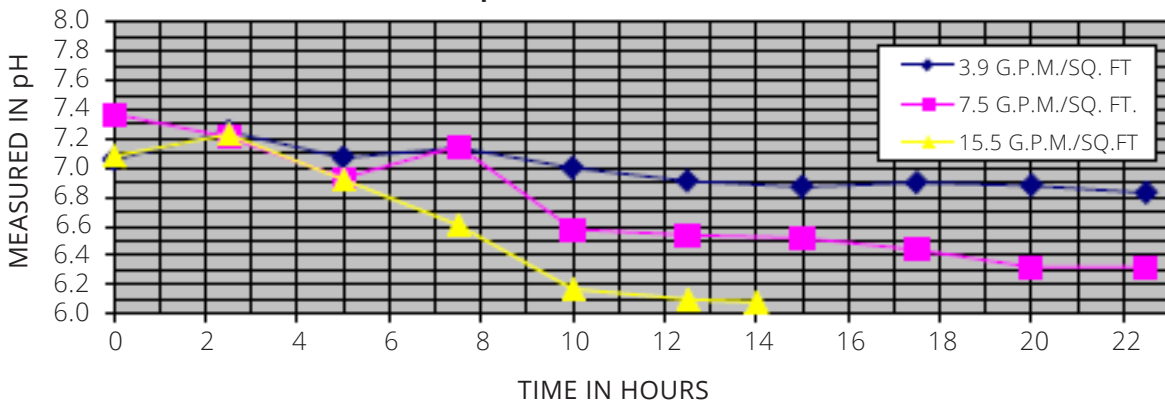
INFLUENT pH = 5 / 4.5 GPG 3.16 Lb. NaCl



INFLUENT pH = 5 / 4.5 GPG 6.22 Lb. NaCl



INFLUENT pH = 5 / 4.5 GPG 9.26 Lb. NaCl



Flow Rate Calculations Based Upon the Following Information:



CR-100 Media
Quantity of Media
 1.0 cubic foot

Depth of Bed
 23.3 inches

Surface Area
 0.5454 sq. ft.

CR-100	
GPM/sq. ft	PSI
3.67	0.18
7.33	0.35
11	0.56
14.67	0.8
18.33	1.06
22	1.36
25.67	1.69
29.34	2.05
33	2.45
36.67	2.87
40.34	3.32
44	3.81
47.67	4.32
51.34	4.87
55	5.45

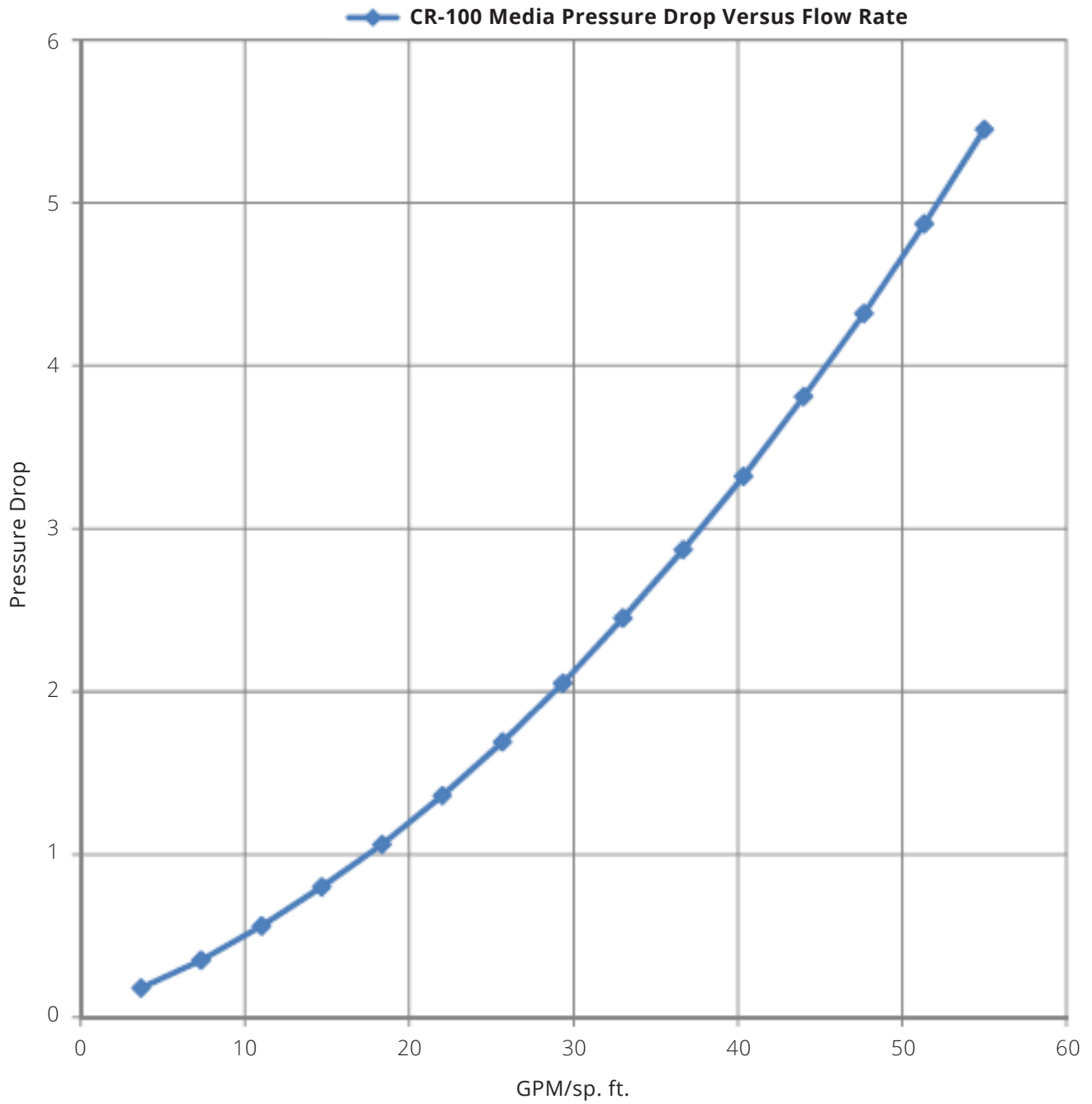
CR-200 Media
Quantity of Media
 1.0 cubic foot

Depth of Bed
 23.3 inches

Surface Area
 0.5454 sq. ft.

CR-200	
GPM/sq. ft	PSI
3.67	0.31
7.33	0.66
11	1.03
14.67	1.42
18.33	1.82
22	2.24
25.67	2.68
29.34	3.13
33	3.59
36.67	4.08
40.34	4.58
44	5.09
47.67	5.62
51.34	6.17
55	6.73

CR-100 Media Pressure Drop vs. Flow Rate





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SPEC SHEET

Date 09/06/2016

CR-200

CHARACTERISTICS

Screen size (U.S. Standard Dry): 8-50 Mesh
 Water Retention: 50%
 pH Range: 7-11
 Approximate Shipping Weight: 50 lb./Cu. Ft.
 Standard Packaging: 1 Cu. Ft. Bag
 Physical Appearance: Grey/White Crystal
 Backwash Flow Rate: 6-8 GPM Per Sq. Ft.

INFLUENT LEVELS

Combination of Manganese & Iron: Up to 15 PPM
 Hydrogen Sulfide (H₂S): Less than .5 PPM
 Hardness as CaCo₃: 3 GPG Minimum
 Minimum TDS: 80 PPM

CAPACITY PER CUBIC FOOT

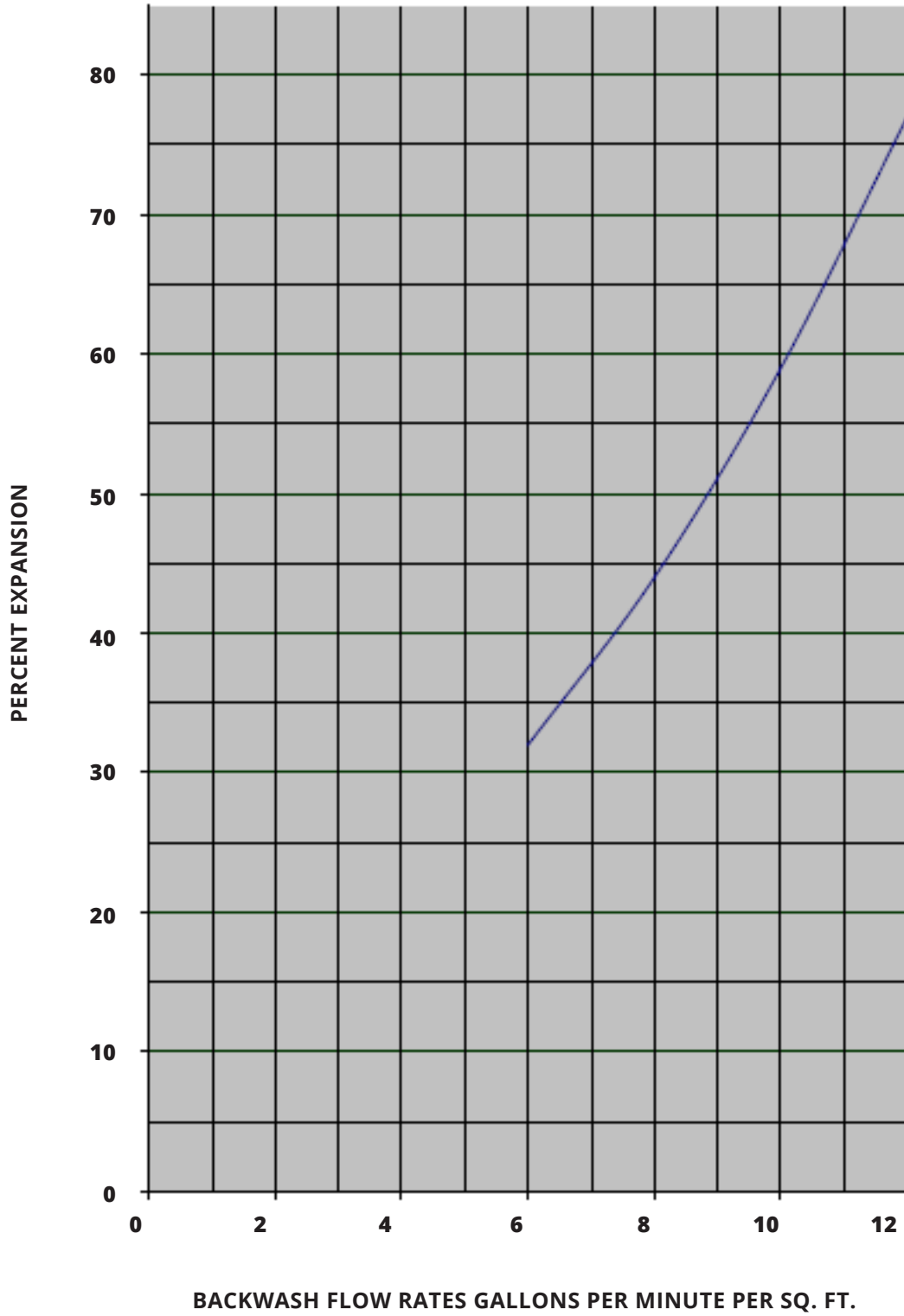
Hardness as CaCo₃: Up To 22,000 Grains, (Depending on Unit Efficiency)
 10 PPM of Iron or Manganese = 1 GPG Hardness
 8 PPM of Sodium—1 GPG Hardness

ZEOLITE SIZE SPECIFICATION

U.S. Standard	Sample		
(Mesh Dry)	Weight	% Retained	% Retained (Spec.)
8	.07	.07	1% Maximum
12	.13	.13	1% Maximum
16	24.21		
20	44.09		
30	24.01		
40	6.52	98.83	86% Maximum
50	.61	.61	10% Maximum
Pan	.36	.36	4% Maximum
Total	100.00	100%	

CR-200

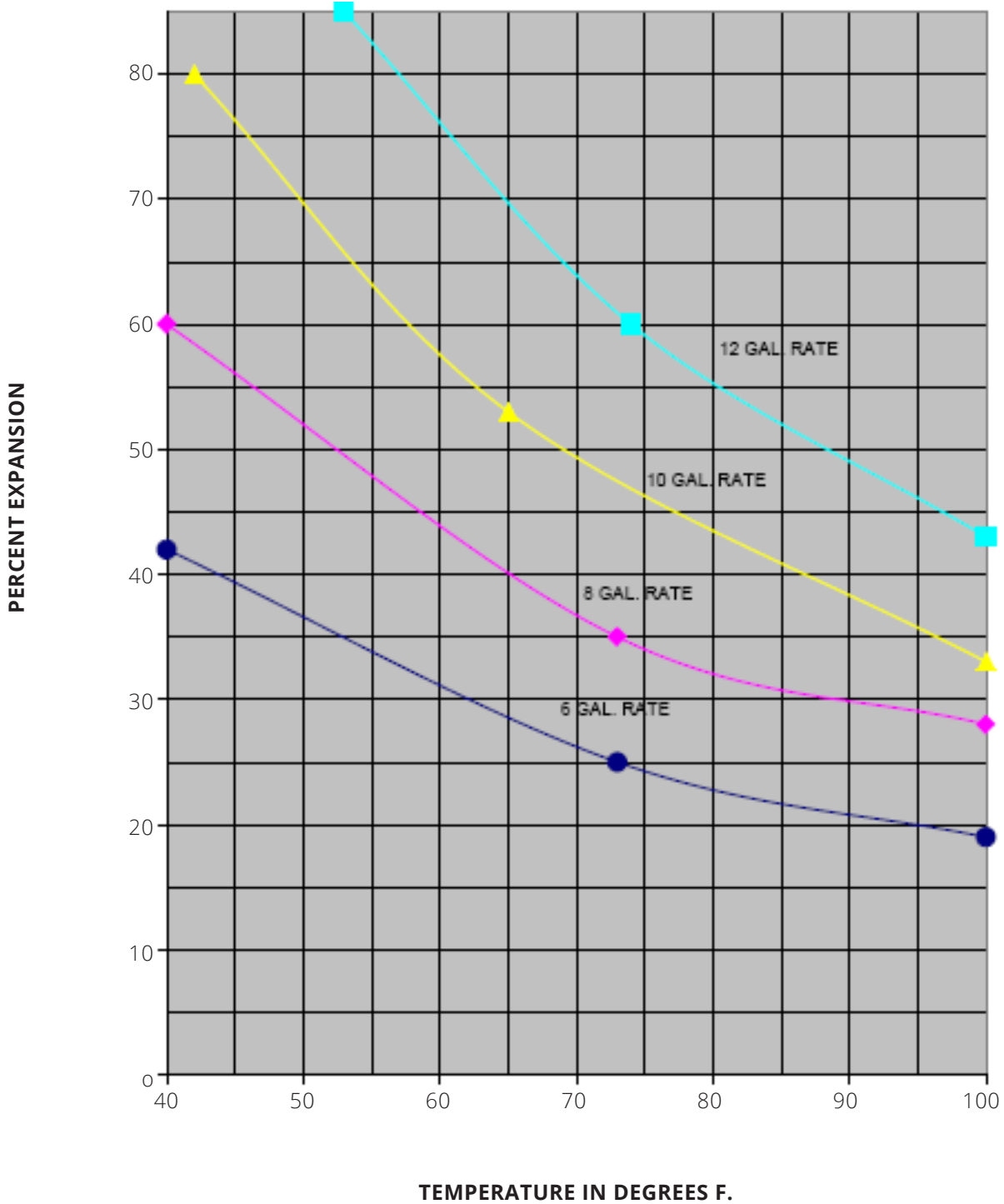
BACKWASH EXPANSION CHARACTERISTICS @ 58°F



CR-200

BACKWASH EXPANSIONS CHARACTERISTICS AT VARIOUS TEMPERATURES

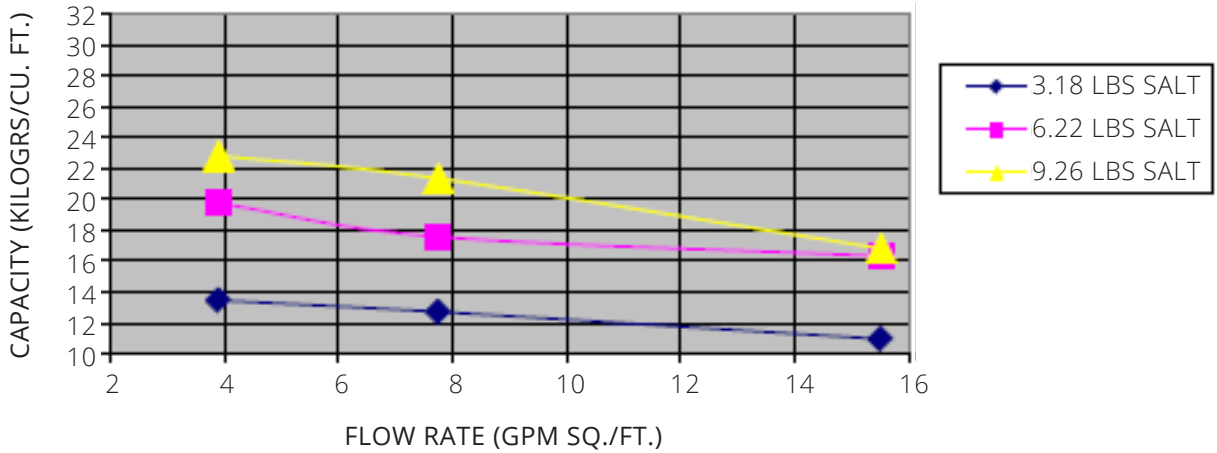
Flow Rates in Gallons Per Minute Per Sq. Ft.



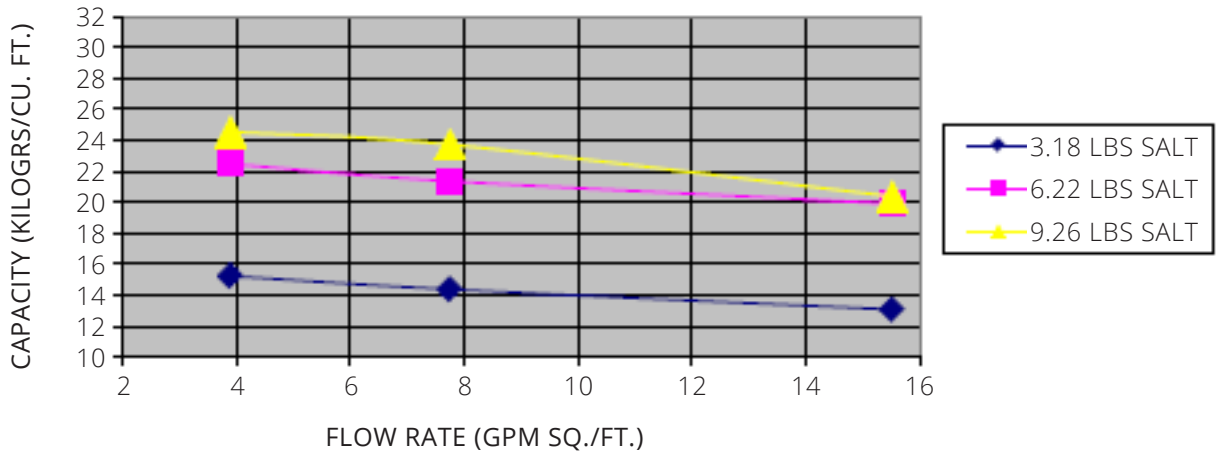
CR-200

CAPACITY vs. FLOW RATE FOR SEVERAL LOADING

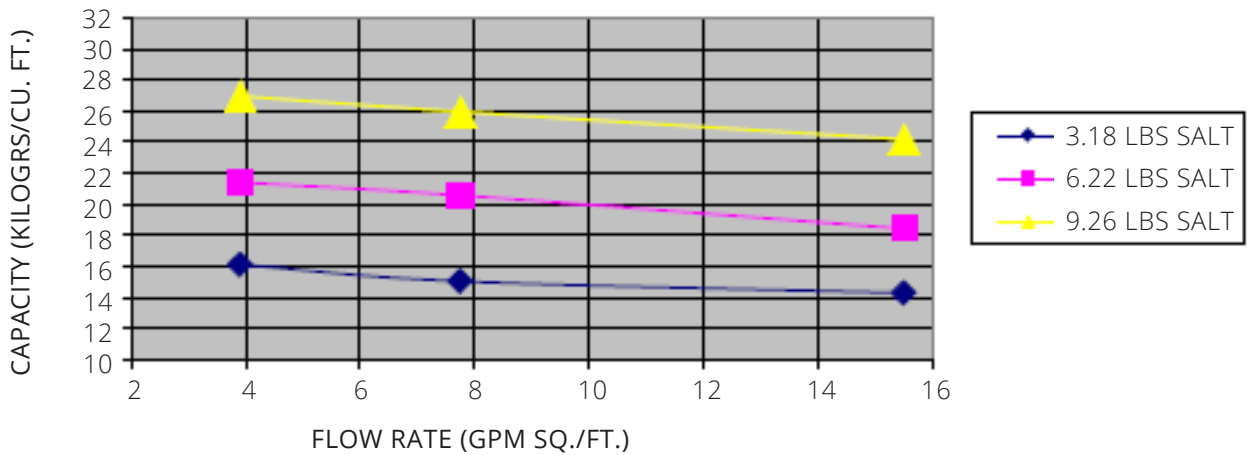
HARDNESS 27 GRS / pH = 7.5



HARDNESS 18 GRS / pH = 7.5



HARDNESS 9 GRS / pH = 7.5



Flow Rate Calculations Based Upon the Following Information:



CR-200 Media
Quantity of Media
 1.0 cubic foot

Depth of Bed
 23.3 inches

Surface Area
 0.5454 sq. ft.

CR-100	
GPM/sq. ft	PSI
3.67	0.18
7.33	0.35
11	0.56
14.67	0.8
18.33	1.06
22	1.36
25.67	1.69
29.34	2.05
33	2.45
36.67	2.87
40.34	3.32
44	3.81
47.67	4.32
51.34	4.87
55	5.45

CR-200 Media
Quantity of Media
 1.0 cubic foot

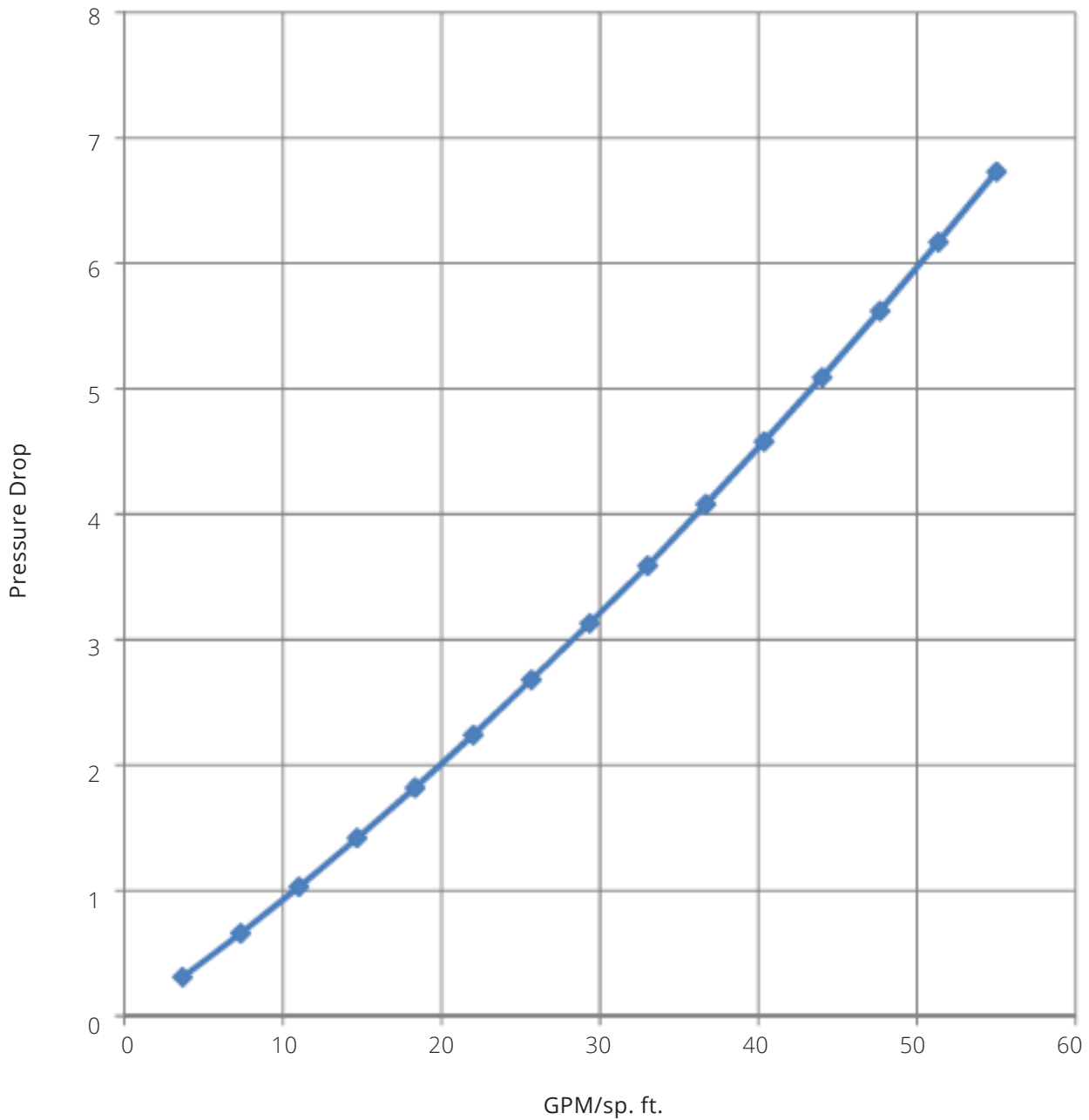
Depth of Bed
 23.3 inches

Surface Area
 0.5454 sq. ft.

CR-200	
GPM/sq. ft	PSI
3.67	0.31
7.33	0.66
11	1.03
14.67	1.42
18.33	1.82
22	2.24
25.67	2.68
29.34	3.13
33	3.59
36.67	4.08
40.34	4.58
44	5.09
47.67	5.62
51.34	6.17
55	6.73

CR-200 Media Pressure Drop vs. Flow Rate

CR-200 Media Pressure Drop Versus Flow Rate



CR-100 AND CR-200 SYNTHETIC ZEOLITES

Listing Under NSF/ANSI Standard No. 61



Tested and Certified by WQA
against NSF/ANSI 61 for
material safety only.

NSF/ANSI-61 International Standard for Drinking Water Additives
NSF/ANSI-61 Drinking Water System Components - Health Effects

This Standard establishes minimum health effects requirements for the chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems. This Standard does not establish performance, taste and odor, or microbial growth support requirements for drinking water systems products, components, or materials.

Drinking Water Treatment Products certified to NSF/ANSI 61 have not been tested or evaluated for contaminant reduction performance. Contaminant reduction testing and certification claims shall be evaluated via the industry's residential drinking water treatment standards.

INTRODUCTION

American founder of a water treatment company. In 1936, Emmett J. Culligan launched the Culligan Zeolite Company (Water Softening) in Northbrook, Illinois. During WW II, Culligan built a facility to manufacture silica gel, a dehydrating material that protected metals from atmospheric corrosion that was greatly in demand during the war, and Culligan soon became one of the largest suppliers. He developed a novel process for manufacturing zeolite, the man-made mineral used in water softeners, and built a nationwide service industry in water conditioning and filtering, which then expanded internationally.

This synthetic zeolite has been used in water softening applications for nearly seven decades and is currently being manufactured by Mineral Right, Inc. at Phillipsburg, KS. Many models in the current softener line Water Right, Inc., Appleton, WI also incorporate the zeolite.

Toxicology of sodium aluminosilicate has been GRAS (generally regarded as safe) designated by Food and Drug Administration (FDA, 21 CFR 182.2727)¹. The CR-100 and CR-200 zeolites have numerous applications in treating water and as FT-511P has recently received orphan-drug designation by the FDA as an ingested medical treatment for chronic hepatic encephalopathy secondary to end stage liver disease.

Two versions of the Mineral Right synthetic zeolite are being presented for NSF/ANSI Standard No. 61 approval. The CR-100 and CR-200 are essentially identical except for the minor variation in $\text{Na}_2\text{O}:\text{Al}_2\text{O}_3:\text{SiO}_2$ ratios. The change in ratios increases pH stability with a slight decrease capacity.

¹ See FDA letter in Appendix A

DESCRIPTION OF THE ZEOLITE MEDIA

Names

Chemical Name: Sodium Aluminosilicate

Structural Formula and Molecular Weight:

CR-100 and CR-200 sodium aluminosilicates are chemically inert, cage-like, tectosilicates in which silicon and aluminum atoms are covalently bonded in tetrahedral arrangements forming pores and channels that permit the non-covalent binding of water and metallic cations. This property is commonly used for ion exchange of hardness and iron in the field of water conditioning.

Molecular Weight: CR-100: 1,523 (hydrated), 1,109 (anhydrous)
CR-200: 632 (hydrated); 524 (anhydrous)

PHYSICAL AND CHEMICAL CHARACTERISTICS

Appearance:

White-light gray crystals

Specific Gravity:

The specific gravity of the synthetic zeolite at 22°C is 0.686.

Pore Size:

Approximately 100 Å

MATERIAL SAFETY DATA SHEET FOR ZEOLITE

MANUFACTURED BY MINERAL-RIGHT, INC.

Revised 3/22/95

Chemical Name: Sodium Alumina Silicate (Zeolite) CAS #12141-46-7

Trade Name: Crystal-Right Silica Crystals (CR-100, CR-200, MR1, MR2, MR3, MR6, MR7, Odor-Z-Way)

Formula: $[(\text{AlO}_2(\text{SiO}_2)_y\text{H}_2\text{O}]$

1. Ingredients: Hydrated Alumina—CAS# 1344-28-1
Sodium Silicate—CAS# 134409-8

Percent	TWA ₃	RCRA
21%	15. mg/m	N/A
68%	N/A	N/A

2. Physical Data:

Physical State: Solid
Physical Form: Granular Crystals
Evaporation Rate (H₀=1): N/A
Specific Gravity (H₂O=1): .80/Cu. Ft.
Vapor Pressure (mm Hg.): N/A
Vapor Density (Air =1): N/A
Solubility: Insoluble
Boiling Point: N/A
Appearance: White/Opaque Granular Crystals
Odor: Neutral
pH: 7—10

3. Fire and Explosion Hazard Data:

Flash Point: N/A
Flammable Limits: N/A
Extinguishing Media: N/A
Special Fire Fighting Procedure: N/A

4. Reactivity Data:

Stability: Stable
Conditions to Avoid: N/A
Material to Avoid: N/A

5. Health Hazards:

Eye: Solid or dust may cause irritation or corneal injury due to mechanical action.
Skin: N/A
Ingestion: Non-toxic
Inhalation: N/A
Systemic and Carcinogenicity: N/A

6. First Aid:

Flush eyes and skin with running water if signs of irritation appear.

7. Environmental Protection Procedures:

Conventional housekeeping methods, handle similar to earth.
No special protection needs to used when handling this product.

This information herein is given in good faith, but no warranty, express or implied, is made.
Consult Mineral-Right, Inc. for further information.