Dairy Farmers of America

Residue Removal Procedures

Based on appearance, determine the group the residue best matches. Run the test described for the group to conform the identity of the residue. Some residues can be a mixture and may fit into more than one group.

Group	Type of Residue
Group I	White
Group II	Greasy
Group III	Blue-rainbow, or Yellow
Group IV	Red, Brown-Black
Group V	Small Black Specks
Group VI	Pitted Surface

*In all tests (excluding the detergent residue test), reagents should be rinsed off with DI water after the 15 minute exposure time and dried before observation.

Group I: Milkstone, Silica, Barium, Detergent (Sodium Carbonate)

Appearance: (White to gray powder like residue) Un-dissolved detergent appears in low spots in the system. Milkstone residues tend to be visible throughout most of the system, when the system is wet or dry. Silica residue tends to be more visible in the glass parts of the system, especially when the system is dry.

Test: Put a few drops of DI water on the test area and wipe the area of the pipe with a soft paper to remove any surface moisture (do not rub the residue off).

1. Apply a drop of DI water plus a drop of phenolphthalein to the same spot and observe the color of the spot. If the phenolphthalein turns pink, then the residue is probably un-dissolved detergent (sodium carbonate).

2. Apply a drop of Concentrated Sulfuric Acid and observe if the residue dissolves after 15 minutes.

3. In a separate spot, apply a drop of sulfuric acid<10% and see if the residue dissolves after 15 minutes.

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Residue	Cause	Initial Removal	Prevention
Group I Detergent (medium carbonate)	Low water temperature; excess detergent use; poor drainage; or no rinse agent	Perform a hot acid rinse of system.	Initial water tem.>160°F, adjust product usage rate, adjust pipe configuration, or use an acid rinse.
Group I – Milkstone	Usually caused by failure to acid rinse often enough, or by using an acid rinse that is too weak.	Removal is usually accomplished by alternating hot acid washes (Sheen-EZey @ 1oz/gallon) with chlorinated alkaline washes until the residue is eliminated.	Acid rinsing regularly at proper dilution. Check the acid rinse step and be certain pH is 3 or below. Some waters may require more than label recommended amounts in order to achieve these values.
Group I – Barium	Always caused by barium in the water source. Even very low concentrations of barium in the water can cause a barium residue.	Repeated acid rinse with 1oz/gal. Sheen-Ezey at> 160°F. Re-circulate until foam becomes excessive.	Customer must use an all phosphoric acid rinse product such as Ridstone or Dairy Placid.
Group I – Silica	Causes include silica in the water supply or poor rinsing of detergents containing significant amounts of silicates.	Silica is very difficult to remove chemically. Physical means such as buffing/polishing may be required.	If a source of water low in silica is not available, consult your local water treatment expert concerning effective water treatment options.
Group II – Butterfat	Usually caused by inadequate alkalinity in the wash cycle, or by low wash water temperatures.	Shock clean the system using elevated levels of alkalinity. If using a chlorinated detergent, do not exceed 1000ppm of available chlorine.	Maintain acceptable levels of alkalinity and adequate temperatures in the wash cycle.
Group III – Protein	Usually caused by inadequate chlorine in the wash cycle or by pro-rinse water temperatures above 130°F	Shock cleaning the system using elevated levels of chlorinated alkaline detergent. Do not exceed 1000 ppm of available chlorine.	Maintain sufficient available chlorine levels in the wash cycle. Make sure the pre-rinse water temperature is not above 130°F.
Group IV – Iron/ Manganese	Caused by iron and/or manganese in the water supply. Consult your local water treatment options.	For Iron: Clean system with Iron Out 2oz/gal for 10 min. Drain, rinse with Ridstone or Dairy Placid at 1oz/gal. For Manganese: Clean system using Dyne at 1oz/gal. Repeated applications may be necessary.	For Iron: Use MegaSan+ Della-Final, or Descend acid sanitizer. For Manganese: Continue Dyne at a concentration sufficient to provide a pH of 3 in the rinse.
Group V – rubber	Usually caused by the use of elevated chlorine levels during the wash or sanitizing cycles.	Replace worn lines.	Use proper concentrations of detergents and sanitizers.
Group VI -Pitting	Usually caused by improper use of cleaning chemicals. Mixing acid and chloro-alkali will release sufficient amounts of chlorine as pit stainless steel. Chlorine levels above 1000ppm will cause pitting.	Stainless parts must be replaced or polished to remove surface irregularities.	Use cleaning and sanitizer chemicals at proper concentrations and do not mix chemical.

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Sources of Microbial Contamination as Detected By Selected Bacterial Procedures					
Procedure	Natural Flora	Mastitis	Dirty Cows	Dirty Equipment	Poor Cooling
SPC>10,000	Not Likely	Possible	Possible	Possible*	Possible
SPC>100,000	Not Likely	Possible (rare)	Not Likely	Possible*	Possible*
LPC>250	Not Likely	Not Likely	Possible	Possible*	Not Likely
PIC High vs. SPC	Not Likely	Not Likely	Possible	Possible*	Possible*
SPC High/ No Increase in PIC	Not Likely	Possible*	Not Likely but Possible	Not Likely but Possible	Not Likely but Possible
Coliform Count High	Not Likely	Possible (rare)	Possible	Possible	Not Likely but Possible

‘Culturing for mastitis bacteria would be helpful

*A more likely source