TO: Director, Office of State Cooperative Programs  
Attn: All Staff, Division of Milk Safety

FROM: Milk and Milk Products Branch (HFS-316)

SUBJECT: Pre-Milking Teat Preparation DeLaval VMS™ V300 U.S.A.

**ITEM 13r. MILKING - FLANKS, UDDERS AND TEATS**

The DeLaval VMS™ V300 U.S.A. Teat Preparation Protocol has been submitted and evaluated by CFSAN’s Milk and Milk Products Branch (MMPB) and determined to be in compliance with Item 13r-Milking-Flanks, Udders and Teats of Section 7-Standards for Grade “A” Raw Milk for Pasteurization, Ultra-Pasteurization, Aseptic Processing and Packaging or Retort Processed after Packaging and Item 13r-Milking-Flanks, Udders and Teats of Appendix Q-Operation of Automatic Milking Installations for the Production of Grade “A” Raw Milk for Pasteurization, Ultra-Pasteurization, Aseptic Processing and Packaging or Retort Processed after Packaging of the PMO. Item 13r within Appendix Q of the PMO states:

“AMI manufacturers shall submit data to FDA to show that the teat prepping system employed in their milking system is equivalent to Item 13r., **ADMINISTRATIVE PROCEDURES #4 of this Ordinance**: “Teats shall be treated with a sanitizing solution just prior to the time of milking and shall be dry before milking.” Each AMI installer shall provide the dairy producer and the Regulatory Agency with a copy of this FDA acceptance, including a detailed description of the accepted equivalent procedure. Each dairy producer shall keep a copy of the accepted teat prep protocol along with the appropriate AMI manufacturer’s teat prep protocol verification procedures on file at the dairy farm.”

Compliance with Item 13r of the PMO was based upon the following guidance, provided by DeLaval, (VMS™ V300 U.S.A., Ref. No. 890874, Version 1.0, issued July 10, 2018) for the Teat Cleaning Protocol:

**NOTE:** While this protocol is specified for use with the DeLaval VMS™ V300 U.S.A., its acceptance will remain in effect with future versions (models) of this equipment as long as this accepted Teat Preparation Protocol can be applied as written. If the protocol has not been changed, the manufacturer shall provide this accepted protocol with future versions (models) of their automated milking installations.
Please note that M-I-18-16 is specific to the DeLaval VMS™ V300 U.S.A.. Previously issued M-I-07-5 Supplement 2 is still active and applies to DeLaval VMS™ AMI models built prior to the V300 model.

Please note that upon the issuance of this M-I-18-16 (Supplement 1), M-I-18-16, issued July 19, 2018, will be classified as “INACTIVE”.

With this Supplement, Opti Blue™ 1% dodecyl benzenesulfonic acid is clarified as an additional acceptable teat sanitizing product.

An electronic version of this memorandum is available for distribution to Regional Milk Specialists, Regulatory/Rating Agencies and Milk Sanitation Rating Officers in your region. The electronic version should be widely distributed to representatives of the dairy industry and other interested parties and will also be available on the FDA Web Site at http://www.fda.gov at a later date.

If you would like an electronic version of this document prior to it being available on the FDA Web Site, please e-mail your request to monica.metz@fda.hhs.gov.

Monica Metz
Branch Chief
Milk and Milk Products Branch
## DeLaval VMS V300 Teat Preparation Protocol U.S.A.

<table>
<thead>
<tr>
<th>Name/Subject:</th>
<th>Ref. No.: 890874</th>
</tr>
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<tr>
<td>Pre-Milking Teat Preparation Protocol VMS™ V300 U.S.A</td>
<td>Version: 1.0</td>
</tr>
<tr>
<td>Product Name:</td>
<td>DeLaval VMS™ V300 U.S.A.</td>
</tr>
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<td>Replacing: N/A</td>
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<th>Depart</th>
<th>Date</th>
<th>Page No.</th>
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<tbody>
<tr>
<td>Chris Horton</td>
<td>VMS</td>
<td>10 July 2018</td>
<td>1</td>
</tr>
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<tr>
<td>Epke Bosma</td>
<td>VMS</td>
<td>10 July 2018</td>
<td>17</td>
</tr>
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Versions / Features of this release: New protocol to accompany introduction of new DeLaval VMS V300 model of AMI utilizing Delpro software version 5.4

Standard: CIP system with shared solution preparation trough and control assembly.

Additional Identifying Information: Serial Numbers: 2017-005 and up

ID Location: media supply cabinet wall, behind cover, upper cabinet, above eye level, adjacent to power supply box
1  Teat Preparation Summary

The DeLaval V300 VMS™ Milk Stations use a single separate “Teat Cleaner” cup to wash the teats individually prior to milking. The functionality of this system is the same as that which is covered under M-I-07-5 for the 2006 VMS from DeLaval.

Per PMO procedure, teats shall be treated with a germicidal teat dip product onto the teat in sequence prior to the time of milking.

A pressurized spray nozzle can **optionally** pre-spray a teat sanitizer product on the teats in sequence, prior to positioning the Teat Cleaner cup over the teat for washing sequentially each teat stored in memory as lactating.

In the United States, the VMS™ Milk Station shall have a mixing system to incorporate a teat wash product with germicidal properties into the potable water delivered to this Teat Cleaner cup for teat preparation.

2  Teat Preparation Procedure

DeLaval V300 VMS™ Milk Stations use a multi-purpose robotic arm with an integrated spraying nozzle to apply optional Pre-Spray, as well as a robotic gripper to apply a specifically designed Teat Cleaner cup connected to a separate control system, delivering the following teat preparation steps:

1. **OPTIONAL** Pre-Spray: A teat sanitizer product can be sprayed on all the teats in sequence after cow identification and cow pre-positioning functions deliver motion guidance to the robotic arm.

2. **STANDARD** Cleaning Procedure: Begins with the robotic arm gripping the Teat Cleaner cup from its storage location outside the cow positioning stall, where it hangs upside-down, moving the Teat Cleaner cup to placement over the first teat.

3. The teat cleaning process operates with pulses of a warm solution of potable water and teat wash product with germicidal properties (**IodoZyme™ 3% iodine, or UdderDyne™ 1.75% iodine, or Clean™ 1.75% iodine, or Tri-Fender™ 1% iodine, or Teat Cleaner NI01™ lactic acid / formic acid, or Hex-O-Prep™ 0.5% chlorhexidine gluconate, or Opti Blue™ 1% dodecyl benzenesulfonic acid**), followed by air pulses, and with this method the air pressure helps to distribute the cleaning solution and increases its impingement for washing teat skin. Pulses inside the teat cleaner cup are directed by nozzle orifices, spiraling from the top.
periphery downward and off the teat. After the wash phase, the rinse phase with potable water occurs to remove teat wash solution from the teat. The cleaning solution and rinse water, together with any residuals, is swept by airflow to be collected in a separate vacuum recovery waste-water tank.

4. Air pulses with increasing vacuum are applied in the Teat Cleaner cup to fore-strip.

5. After the application of potable water ends the application of air and vacuum continues while the arm is lowered slowly to remove the cleaning cup and dry the teat by airflow from the top attachment periphery downwards towards the vacuum outlet, removing remaining droplets to the waste-water tank and drying the teat surfaces.

6. When completed, the teat cleaning process removes pre-sprayed teat dip, if applied, together with soils, and leaves the teats washed with a germicidal solution, rinsed, fore-stripped, dried, and ready to be milked.

7. The teat cleaner cup is applied to the other teats in sequence and the washing, rinsing, fore-stripping, and drying process is repeated for each teat stored in the system memory as lactating.

8. Cleaning solution residue from the teats, any pre-spray sanitizer if exists, rinse water, and fore-stripped milk are collected in a waste-water tank mounted in the milk station. This tank is separate from the milking system, and is emptied to a drain at the end of the completed teat preparation procedure.

9. The Teat Cleaner cup is retracted and stored upside down to drain outside the cow positioning stall, forward of the milking teat cup storage unit, farthest from the rear of the stall.

10. The Teat Cleaner cup is rinsed after the cow is released and covered for protection when the milk station flushes the milking teat cups and spray cleans the cow platform. The CIP cover protects the rinsed Teat Cleaner cup from potential sources of contamination.

11. The entire Teat Cleaner and waste-water tank is “Cleaned-In-Place” in the same fashion as the milking equipment of the milk station, with a separated circulation.

12. Shielding for urine and fecal discharge is integrated into the mechanical positioning unit behind the cow which incorporates a diversion pan that is pressed against the cow, above rear udder attachment, and directs urine and/or feces rearward, outside the cow positioning stall and shielded from beneath the udder.

3 Technical Specifications

3.1 General Overview

The teat preparation is performed with a single separate Teat Cleaner cup that is connected to a Waste-Water Tank. The Teat Cleaner and its chemical injection system are separated during milking from the milking equipment of the milk station. The waste from the teat preparation process, together
with the fore-milk, is collected in the Waste-Water Tank, and this fluid is released to drain after the teat preparation procedure a cow is completed.

3.2 Optional Pre-Spray Sanitizer Application

This optional application of teat germicidal teat dip spray is activated by trained DeLaval Dealer representatives, or dairy farm operators. The milk station multi-purpose arm can pre-spray the teats, before the teat cleaning process, using one of three Spray Methods (pattern data table below) coupled with one of three Spray Settings. Programming configures the arm motion during the pre-spray. The acceptance region for quantities delivered are valid for DeLaval teat dip spray products specified for milk station. The quantity stated is the total for one spraying application of the udder.

DeLaval uses a globally recognized method (EN 1656) to measure the germicidal effect of a teat dip against mastitis causing pathogens in-vitro. A formulation is considered an efficacious teat dip under the EN1656 standard when it is able to achieve a 5 log reduction (99.999% kill) of *E. coli*, *S. uberis*, and *S. aureus* within 5 minutes of exposure at a temperature of 30°C in the presence of milk at a concentration of 1% v/v. In order to further mimic application conditions, and better predict mastitis prevention with DeLaval teat dips, DeLaval’s internal standard is stricter by reducing contact time in EN1656 teat dip testing to 60 sec for post-milking teat disinfectants and 30 sec for pre-milking teat disinfectants.

<table>
<thead>
<tr>
<th>Pattern Name</th>
<th>Shape</th>
<th>Quantity Delivered (1 ‘spray’ to 4 teats)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Central</td>
<td>5.8 grams (0.20 Oz)</td>
</tr>
<tr>
<td>Medium</td>
<td>Central</td>
<td>8.1 grams (0.29 Oz)</td>
</tr>
<tr>
<td>Heavy</td>
<td>Fast Loop</td>
<td>14.5 grams (0.51 Oz)</td>
</tr>
</tbody>
</table>

3.2.1 Setting Up Teat Spraying:

3.2.1.1 Turning Pre-Spray ON

For each milk station the Pre-Spray is turned on in the Delpro Herd Management software in the ‘Milking Station’ tab as follows:

1. Open the ‘Devices’ tab by clicking on the tab at the top left of the page.
2. On the next screen under AMS Controller, double-click on the VMS milk station desired. If the drop-down menus are not shown click on the ‘+’ sign to the left of the titles.

3. Check the box next to “Disinfect Before Milking” in the ‘Disinfection’ section.

Note: On the ‘Milking Station’ tab in Delpro the spray settings of Thorough, Normal, or Economic in the upper right of the ‘Disinfection’ section only apply to older legacy VMS machines and not to the V300 model VMS as the software can be used when there is a mix of legacy and V300 VMS machines on the farm. These correspond to Heavy, Medium, and Light.

NOTE: Legacy VMS machines will note a ‘TYPE’ as ‘VMS™ Milking Station’ on the Serial Number tag as shown at left. VMS V300 machines will show a ‘PRODUCT NAME’ of ‘DeLaval voluntary milking system VMS’ note on the Serial Number tag as shown at right.

3.2.1.2 Setting Spray Pattern
Setting the spray pattern is performed under Device Configuration in the System Controller screen in the Stall tab. Note that the settings for Pre-Spray and Post-Spray are the same.
Spray Method:

There are three selections available for the Pre-Spray Pattern:

A. "Center" sprays the center of each teat (default).

B. "Local Path" sprays each teat in a path (for better coverage).

C. "Fast Loop" sprays all teats in a loop movement.

Spray Settings:

"Spray Setting", selects the spray intensity:

i. The “Light” setting sprays for 0.15 seconds with "Center" selected. With "Fast Loop" selected, the speed of the spray loop is fast, 500 mm/s.

ii. The “Heavy” setting sprays for 0.35 seconds with "Center" selected. With "Fast Loop" selected, the speed of the spray loop is slow, 200 mm/s.

iii. Medium" setting sprays for 0.20 seconds with “Center” selected. With "Fast Loop" selected, the speed of the spray loop is between Light and Heavy, 350 mm/s.
Spray Fast Loop as Fallback:
When "Spray Fast Loop as Fallback" is enabled a "Fast Loop" spray if the teat location fails. The teat locations are approximated.

Spray Fast Loop Max Duration:
"Spray Fast Loop Max Duration", sets the duration (in seconds) of the whole spray loop operation. The recommended time is 12 seconds for "Light" and "Medium" spray settings. Use a longer time if "Heavy" is selected.

Disinfect – Additional Disinfect:
Check this box to turn on Pre-Spray

Spray Nozzle Specifications

<table>
<thead>
<tr>
<th>Spray pressure</th>
<th>6 bars (120 psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nozzle Part Number</td>
<td>920706 12</td>
</tr>
</tbody>
</table>

3.3 Teat Cleaner Cup Attachment to Teat

During attachment, vacuum is applied to the teat cleaner cup which is controlled in position by the arm. The airflow is limited at 28 – 35 SCFM (800-1000 l/min). Airflow rate is limited either by the vacuum pump capacity or the use of a limiting valve.

Teat Cleaner with Germicidal Properties

The Teat Cleaner solution shall have germicidal properties. DeLaval uses a globally recognized method (EN 1656) to measure the germicidal properties of the Teat Cleaner solution. A Teat Cleaner formulation is considered to have germicidal properties when it is able to achieve a 5 log reduction (99.999% kill) of E. coli, K. pneumoniae, S. uberis, and S. aureus within 30 seconds of exposure at a temperature of 30°C in the presence of 3g/L of Bovine Serum Albumin. This is a DeLaval internal standard based on EN1656 methodology.

Teat Cleaner Cup Method

The Teat Cleaner cup device and method has a teat receiving top opening mouthpiece with a resilient rubber or plastic collar which gives a substantially air-tight sealing contact with the udder when the teat is fully inserted into the Cleaner cup. The cup is connected to a vacuum supply at its bottom draining outlet. The circular inner wall of the Cleaner cup is rigid, and is a larger diameter than almost all cow's teats. Vacuum application causes the teat to expand in this chamber, which cracks and loosens any dried-on matter on the teat. Cleaning solution is supplied as a pulsating flow, and with sequenced injecting of air into this flow for accelerating the cleaning fluid ejected from the inner wall nozzle orifices to high speed for cleaning impingement force. The rows of directional orifices in the chamber wall direct this flow to impact tangentially on the teat. The resulting impact of this fluid flow on the circular
inner wall of the Cleaner cup produces vortices which clean the teat due to turbulent motion. This Teat Cleaner cup device and method makes it effective to wash expanded teat skin for removing dried-on matter, and easy for sweeping residuals out from the space between the chamber inner wall and the teat, and downward to the draining outlet during the cleaning process. After cleaning the teat, dried air is blown into the Cleaner cup to forcefully purge out fluid and residues within. In this step the vacuum 'under-pressure' within the Cleaner cup increases, sufficient to overcome the muscle pressure holding closed the milk canal which leads from the teat milk cavity to the teat end orifice. This causes the milk canal to open and the pre-milk contained in the teat milk cavity to flow out.

Final drying is achieved by the robotic arm lowering the Teat Cleaner cup. Air flowing down and off the teat is greatly increased by the opening of the cup collar sealing contact with the udder. The robotic arm movement controls the shutoff of the vacuum supply. When the cup has moved down to the coordinates of the teat end, the vacuum is stopped and the Teat Cleaner cup releases the teat.

### 3.3.1 Teat Cleaner Cycle Options

There are 4 different programs plus: *Extra Light; Light; Medium; Heavy; and Double*. A *Double* teat cleaning procedure means that the selected program for a cow runs twice (the cup will attach to all teats in sequence, then repeat the sequence again). Per VMS™ Milk Station, the program can be set to *Light; Medium; or Heavy*. Then on a per cow basis, the program can be set to choose any of the options, including Extra Light, or Double (for cows that tend to be dirty).

**NOTE:** *None* must not be utilized when milking cows with normal milk. The None setting is only utilized in special situations, such as when the milk station is being used solely as a feed station, or when training new cows to move in and out of the milk station without being milked.

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Teat Cleaning</th>
<th>Fore-Stripping</th>
<th>Drying</th>
<th>Total Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Extra-Light per cow parameter</td>
<td>2.7s</td>
<td>1s</td>
<td>3.3s</td>
<td>7s</td>
</tr>
<tr>
<td>Light per station parameter</td>
<td>5.8s</td>
<td>1s</td>
<td>3.3s</td>
<td>10.1s</td>
</tr>
<tr>
<td>Medium per station parameter</td>
<td>7.8s</td>
<td>1s</td>
<td>3.3s</td>
<td>12.1s</td>
</tr>
<tr>
<td>Heavy per station parameter</td>
<td>9.8s</td>
<td>1s</td>
<td>3.3s</td>
<td>14.1s</td>
</tr>
<tr>
<td>Double per cow parameter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set on a per cow basis, the Teat Cleaner will complete the Teat Cleaning program that is set twice. Both passes operate a full program cycle, including fore-stripping and drying.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Limits and thresholds for the cleaning media action have been established for the VMS™ Milk Station, and studies have been documented which validate the effectiveness. Vacuum level is evaluated for the Teat Cleaner cup during the teat cleaning process by measuring the vacuum level in the VMS™ Milk Station supply piping, which is higher but proportionate. An alarm is generated when the vacuum level is too low. Airflow rates are limited, either by the vacuum pump capacity or by the use of a limiting valve.

<table>
<thead>
<tr>
<th>Supply</th>
<th>Pressure/Vacuum</th>
<th>Flow Rate</th>
<th>Quantity</th>
<th>Chemical &amp; Recommended Concentration in Solution</th>
</tr>
</thead>
</table>
3.3.2 Teat Cleaner Adjustment and Verification

a. Teat Cleaner Solution Pressure & Adjustment

Cleaning Solution pressure is dependent on the air pressure supplied to the Flowjet™ pump that supplies water to the Dosatron™ chemical injection system. The air pressure regulator and gauge is located in the ‘main cabinet’ in the location shown by the red star in Figure 1 below. The regulator and pressure gauge, identified as Z235 in DeLaval technical documents, is shown in Figure 2. Normal starting pressure is 4 bar (60 psi). The pressure can be varied to increase or decrease the amount of Teat Cleaning Solution utilized at the Teat Cleaning Cup. The amount of Teat Cleaning Solution utilized for cleaning 4 teats and collected in the Teat Cleaner Waste Tank at the Medium setting is 1 liter.

b. Teat Cleaner Cup Air Pulse Pressure & Adjustment

Air pulses to the Teat Cleaning Cup is supplied from the same regulator noted above. Normal starting pressure is 4 bar (60 psi). Air pulse injections accelerate water in the solution delivery tubes for addition cleaning effect, but can be set too high for cow comfort. The pressure can be lowered if cows show signs of discomfort.

c. Fore-Stripping

Vacuum with air pressure pulses with increasing vacuum are applied to the Teat Cleaner cup for one second to purge and dry the supply tubes and nozzles, and fore-strip the teat. The vacuum can vary...
somewhat (as measured inside the Teat Cleaner cup) depending on shape of the teat. The fore-milk will be collected in the waste-water tank together with the washing residuals. This cycle does not require measurement of vacuum level.

<table>
<thead>
<tr>
<th>Supply</th>
<th>Vacuum Level</th>
<th>Flow Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum During Fore-Stripping</td>
<td>6 – 9 inches of Hg (20-30 kPa)</td>
<td>21 – 25 SCFM (600-700 l/min)</td>
</tr>
</tbody>
</table>

**d. Drying/Cleaner Cup Removal**

Vacuum is applied in the Teat Cleaner cup for drying the teats. During this cycle, the robotic arm moves very slowly downwards, to remove the Teat Cleaner cup. Incremental airflow from the Teat Cleaning cup mouthpiece withdrawal is added to that from the Teat Cleaner cup atmosphere vents. The typical vacuum decay in the Teat Cleaner cup is the result of exponentially increasing airflow which is drying the teat.

<table>
<thead>
<tr>
<th>Supply</th>
<th>Pressure</th>
<th>Flow Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum During Drying</td>
<td>Decline from fore- stripping, 6 – 9 inches Hg, to atmosphere (0 PSIG) due to increasing airflow</td>
<td>From fore- stripping level, increasing to 28 – 35 SCFM (800-1000 in)</td>
</tr>
</tbody>
</table>

**e. Result**

The teat preparation procedure leaves the teat washed with a germicidal, fore-stripped, dried, stimulated, and ready to be milked.

**f. Sequence**

Washes each teat stored in memory as lactating.

**g. Waste Water and Fore-Milk Discard**

Cleaning solution, residue from the teats, any pre-spray sanitizer product if exists, and fore-stripped milk are collected in the waste water vessel mounted in the milk station. This vessel is emptied to a drain at the end of the teat cleaning process. The capacity of the vessel is 2.64 gallons (10 L), which is much larger than necessary for the fluid volume, and is to provide a reserve volume during drying, together with centrifugal airflow design for the separation of water from the air to protect against dirty water from entering the vacuum line.

**h. Teat Cleaner Cup Flushing**

The teat cleaner cup is rinsed between each cow when retracted, and hangs upside down, away from the cow, and is protected from splash by its CIP cover. This location and orientation allows for the drainage of the rinse water, as well as protecting the rinsed Teat Cleaner cup from potential sources of contamination.
i. Cleaning-In-Place

During the “Cleaning-In-Place” (CIP) of the VMS™ Milk Station, the entire teat cleaner apparatus is cleaned and sanitized in the same fashion as the milking equipment of the milk station but with a separated circulation. To protect the cow’s teats from aggressive chemicals, which may be used in CIP, the teat cleaner cup purges with a short potable water rinse when the milk station cleaning is completed.

3.3.3 Teat Cleaning Verification

The sequential pulse injections creating the washing spiral action, and the suction removal, can be easily observed by looking at the Teat Cleaner Cup during test operation. The Teat Cleaner Cup is made of a translucent material that provides the ability to observe the operation. The individual valve function can also be verified for evaluating each valve’s performance, as well as validating the inclusion of chemical into washing water for compliance with Item 13r. Administrative Procedure #4, that teats shall be treated with a sanitizing solution just prior to the time of milking. The following describes various means of verification for Teat Cleaner operation.

3.3.3.1 Visual Verification of Cleaning Sequence during Normal Milking:

During normal operation of the milk station when cows are being milked Teat Cleaning can be verified as follows: Using a stopwatch, start timing from the moment the Teat Cleaning Cup is raised to engulf a teat, which begins the vacuum and pulsing of cleaning solution and air pressure. Be alerted for the impending stop of timing when the cup begins to be lowered. Stop timing at the moment the cup is pulled free from the teat. The per teat time measured will be either the ‘default’ setting of the Milk Station, or the ‘override’ setting of the individual cow, as shown in table 3.3. The dairyman can assist viewing and determining which setting is operating for Milk Station(s) or for individual cow(s). A duration of 7 to 14 seconds indicates a valid cleaning sequence.

3.3.3.2 Visual Verification of Cleaning Sequence when Cows Not Available:

Step 1: Set the VMS to Manual operation

Turn the Auto/Manual switch on the button controls panel to the Manual position (pointing to “hand”). The blue lamp by ‘P’ will illuminate.

Step 2: Release Teat Cleaner Cup
a. Press the Teat Cleaner button on the control panel once.

b. Pull out Teat Cleaner and hold opening upright with open end pointing away from your face and body and any others.

**Step 3: Activate Teat Cleaning**

Press the Teat Cleaner button again

The Teat Cleaning system begin a teat cleaning cycle starting with injections of teat cleaning solution and air from alternating galleries within the teat cleaning cup for the cleaning phase.

The flow of solution ends while air injections and vacuum continue for the stripping and drying phases.

The Teat Cleaner Waste Tank within the milk station cabinet can be observed to see the teat cleaning solution enter.
**Step 4: Retract Teat Cleaner Cup**

Press the hold the Teat Cleaner button on the control panel for three (3) seconds. The Teat Cleaner Cup will retract.

**Step 5: Turn VMS back to Automatic operation.**

Turn the Auto/Manual switch to Auto as shown.

Press the blue ‘P’ button to return milk station to Automatic operation.

**3.3.3.3 Test Simulation of Teat Cleaning Cup Functions**

Testing of the individual valve circuits that provide water and air to the Teat Cleaner Cup can be performed from the VMS touchscreen as outlined below.

Note: It is not possible to turn on the Teat Cleaner Cup vacuum from the touchscreen. The application of vacuum is verified in Step 3 of Section 3.3.3.2 above.

**Step 1: Set the VMS to Manual operation**

Turn the Auto/Manual switch on the button controls panel to the Manual position (pointing to “hand”). The blue lamp by ‘P’ will illuminate.
Step 2: Release Teat Cleaner Cup

Press the Teat Cleaner button on the control panel once.

Pull out Teat Cleaner and hold opening upright with open end pointing away from your face and body and any others, or hang from Spray Nozzle mount.

Step 3: Access ‘Service’ tab:

From the main viewing screen as shown at right.

Press the “Service” tab at the top right to access the Service menus.

Step 4: Activate ‘Teat Cleaning Verification’ menu:

Press the icon for ‘Teat Cleaning Verification’.
**Step 5: Activate Individual Water & Air Valves:**

Take note of the valve functions on the screen.

a. Activate the Teat Cleaner Air 1 Valve by pressing the ‘I’ under the heading. The ‘I’ icon will turn blue and air should exit from half the columns in the cup. Deactivate by pressing the ‘O’ under the heading.

b. Activate the Teat Cleaner Air 2 Valve by pressing the ‘I’ under the heading. The ‘I’ icon will turn blue and air should exit from the other half of columns in the cup. Deactivate by pressing the ‘O’ under the heading.

c. Activate the Teat Cleaner Water 1 Valve by pressing the ‘I’ under the heading. The ‘I’ icon will turn blue (as shown in the lower image at left) the water valve will open, the Flojet™ pump will come on, and water will enter the Teat Cleaning Cup through half the rows of orifices in the cup. Turn the Teat Cleaner Water 1 Valve off by pressing ‘O’ under the heading.

d. Activate the Teat Cleaner Water 2 Valve by pressing the ‘I’ under the heading. The ‘I’ icon will turn blue (as shown in the lower image at left) the water valve will open, the Flojet™ pump will come on, and water will enter the Teat Cleaning Cup through half the rows of orifices in the cup. Turn the Teat Cleaner Water 1 Valve off by pressing ‘O’ under the heading.
Step 6: Activating the Teat Cleaning Solution

a. Activate the ‘Teat Cleaner Detergent Main Valve’
b. Activate the ‘Teat Cleaner Detergent 1 Valve’

c. Activate the ‘Teat Cleaner Water 1 Valve’. Teat Cleaning Solution will now begin flowing into the Teat Cleaning Cup as shown in the image below.
d. Deactivate the ‘Teat Cleaner Water 1 Valve’.

e. Activate the ‘Teat Cleaner Water 2 Valve’. Teat Cleaning Solution will now begin flowing into the Teat Cleaning Cup as shown the image below.
Step 7: Turn VMS back to Automatic operation.

Turn the Auto/Manual switch to Auto as shown. Press the blue ‘P’ button to return milk station to Automatic operation.

Cleaning of Teat Cleaning System
The Teat Cleaning System is CIP cleaned concurrently, but separately, during all regular milk station wash cycles. Rinse, Wash, and Sanitizing solutions are drawn from the same solution preparation trough but once these solutions enter the Teat Cleaning System these solutions do not return to, or recirculate within, any part of the milking system. Cleaning solutions are recirculated within the Teat Cleaning System by a dedicated recirculation pump and are then dumped down a separate drain.