



SUBJECT TUBE WASHING AND COATING
 Process Specification

SUPERSEDED DATE 11/23/49

This specification covers the continuous machine process of washing and coating the exterior surfaces of completed tubes just prior to packing. This specification applies to such types as 10B, 12L, 16A, and 16G at Lancaster only. (See S.N. 34-17-62, Sched. 4, for hand process performed at Marion.)

1. EQUIPMENT

- a. Tube Washing and Coating Machine - Model No. L799AU.
- b. Eclipse Pressure Tank - 5 gallon - (6)
 - (1) Built in agitator and air motor.
 - (2) Fluid pressure regulator.
- c. Eclipse Pressure Tank - 2 gallon - (2)
- d. 5 gallon safety dispensing cans - (4-6)
- e. DeVilbiss Model CV Spray Gun - (8 plus spares)
 - Air Cap: CV-39-90.
 - Fluid Tip: CV-15-F.
 - Needle: CV-420-F.
- f. DeVilbiss Model AGA Spray Gun - (2 plus spares)
 - Air Cap: AV-1239-765.
 - Fluid Tip: AV-601-FX.
 - Needle: AGA-404-FX.

2. MATERIALS

- Detergent MXP Alkaline Cleaner (A634).
- Conductive Coating)
- Decorative Coating) - as specified in tube const. data.
- Insulating Coating)
- Acetone (A55)

DETERGENT MXP SAFETY PRECAUTIONS: See 33-2-8A.



3. GENERAL DESCRIPTION

The washing and coating machine occupies a floor space of approximately 40 feet by 7 feet. The machine consists of a continuous chain from which tube holders are hung, spaced two feet apart. The tubes are carried through the following stages successively:

- a. Recirculating wash.
- b. Fresh water rinse.
- c. Recirculating rinse.
- d. Fresh water rinse.
- e. Dryer.
- f. Paint booth No. 1.
- g. Paint booth No. 2.

Loading and unloading are done at the same end of the machine. As the tubes pass through the wash and rinse positions they are sprayed from opposite directions with the solution from the tank of the particular washing position, the solutions being recirculated. Following each recirculating position there is a fresh warm tap water rinse, the water being heated by the introduction of steam into the water line. After passing through the final rinse, the tubes are intended to be clean. Special care must be given the glass cone section of metal cone tubes in order that it be clean.

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3. GENERAL DESCRIPTION (Cont'd)

In the dryer oven, warm air is blown over the surface of the tube to dry any remaining moisture, the air being drawn in through a roof opening, passed over steam heated fins, blown across the tubes, and drawn out to the outside air.

As the tube holder approaches the paint booths it is rotated by an air motor and double V belt assembly. The tube is therefore rotating about its own axis and moving forward simultaneously. As the tube progresses, the spray gun carriage is moved in synchronism with the tube. At the end of the spray cycle the carriage returns to its original position and waits for the next tube. In the first paint booth, the metal cone of metal cone tubes is sprayed with a decorative coating. In the second booth the all-glass tubes are sprayed with a conductive coating and the glass cone section of metal cone tubes is sprayed with an insulating coating.

There are five spray guns in the first booth, three of which are used on the 16G metal cone, and all five for the 16A. The guns are adjusted for a vertical fan, and aligned so that the fans overlap and give an even coating. It is important that no paint gets on the glass portion of the cone.

In the second booth, three guns are used for all-glass tubes. A separate gun is used for each of the glass cone section of the metal cone tubes.

4. SPECIAL PRECAUTIONS

- a. Steam must be allowed to pass through the heating fins of the dryer oven at all times. This is to prevent freezing during cold weather.
- b. The exhaust fan on the dryer oven must be left on at all times to prevent a temperature rise which would release the fire safety system.
- c. The air motors and agitators on the paint tanks must be left on at all times to prevent the paint from settling.
- d. Do not clean guns with caustic. Guns are aluminum and will be attacked by caustic.

5. TEMPERATURE AND PRESSURE VALVE READINGS

Wash Tank:

Temp: 71°C. (160°F.)
 Water: 650 Gallons - 13" depth.
 Charge: Initial - 40 lbs. MXP.
 Oper. Maint. - 10 lbs. twice each shift.
 Soln. Strength: Approx. 1 ounce per gallon.

Rinse Tank:

Temp: 71°C. (160°F.)
 Water: Fill to overflow.

Fresh Water Rinse:

Adjust steam and water for 71-82°C. (160-180°F.) with water spraying glass cone of metal tubes.

Paint Booth No. 1:

Decorative Fluid Pressure - 5 lbs.
 Atomizing Pressure - 26 lbs.

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5. TEMPERATURE AND PRESSURE VALVE READINGS (Cont'd)

Paint Booth No. 2:

- Insulating Fluid Pressure - 3-1/2 lbs.
- Insulating Atomizing Pressure - 32 lbs.
- Conductive Fluid Pressure - 6 lbs.
- Conductive Atomizing Pressure - 22 lbs.

6. OPERATING PROCEDURE

a. Starting Instructions:

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| Tanks | (1) Fill wash tank with 650 gal. water, approximately 13 inches deep. Leave auxilliary valve open. A float inside tank will maintain level of 13 inches. |
| | (2) Fill rinse tank with water to overflow. (See note 1) |
| | (3) Open 6x6 main steam valve. |
| | (4) Open steam valves to wash and rinse tanks. Allow about one hour for tanks to heat. |
| Fresh Rinse | (5) Turn on water to fresh water rinse. |
| | (6) Turn on steam to fresh water rinse steam mixer - adjust for correct temperature. |
| Oven | (7) Turn on blower in dryer oven. |
| | (8) Open main steam valve to blower oven heaters (see note 2). |
| | (9) Start air motor and check Veelox belt in dryer oven. |
| Paint Booths | (10) Turn on paint booth exhaust fans. This will also turn on light in each booth. |
| | (11) Fill water curtain tanks with water. |
| | (12) Start water curtain pumps. |
| | (13) Adjust water flow for even curtain. |
| | (14) Flush out all guns with acetone until clean. |
| | (15) Switch guns to paint and flush until paint comes out. Adjust guns for good vertical fan. |
| | (16) Start air motor for chuck rotation. |
| | (17) Add Detergent MXP to wash tank - 40 lbs. |
| | (18) Check machine for temperatures, pressures, pump operation, etc. |
| | (19) Start conveyor. |
| | (20) Adjust guns for proper coverage. See general instructions, Part 6c below. |
| Notes | (1) The wash and rinse tanks can be filled with hot water by passing water and steam through the steam mixer and into the tanks. |
| | (2) The valve controlling the flow of steam to the air heating coils is located overhead and is operated by an endless chain suspended from the valve. Steam should be admitted to the air heating coils just before starting operations, and shut off when machine will be idle for periods longer than half hour. |

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★ CHANGE
 ★★ ADDITION
 ★★★ DELETION



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6. OPERATING PROCEDURE (Cont'd)

(b) Stopping Instructions:

- (1) Stop conveyor.
- (2) Flush guns with acetone.
- (3) Stop belts in paint booth.
- (4) Stop spray booth water pumps.
- (5) Turn off steam into fresh water mixer, then turn off water valve.
- (6) Close steam valve to dryer oven. Use chain hanging down from valve.
- (7) Stop pumps in wash and rinse tanks.
- (8) Turn off 6x6 valves - steam, water and air. Leave steam return valve open.
- (9) Turn off dryer oven blower fan.

Note: Leave dryer oven exhaust fan on, and also be sure steam by-pass into dryer oven is left open.

- (10) Turn off exhaust fans in paint booths.

Note: Leave agitators in pressure tanks going at all times.

(c) Operating Instructions:

- (1) Add 10 lbs. Detergent MXP twice each shift.
- (2) Keep oil cups on air motors filled.
- (3) A running log must be kept, and readings entered every two hours. Use log sheet supplied by foreman or supervisor. The following data to be entered.
 - (1) Main steam pressure.
 - (2) Steam return pressure.
 - (3) Wash, rinse, fresh rinse, and dryer temperatures.
 - (4) Amount detergent added.
 - (5) Conductivity readings.
 - (6) Paint fluid pressures.
 - (7) Brands and labels, check "OK".
- (4) Clean guns with typewriter brush and acetone when necessary.

7. LABORATORY TESTS

- a. Every day three tubes (one from each shift) representing the regular product is to be submitted to the C & P Laboratory for standard leakage test.
- b. Every day a sample of wash solution is to be submitted to the C & P Laboratory for solution strength test.

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8. MAINTIENANCE

a. Daily:

- (1) Clean guns and tips with acetone and typewriter brush.
- (2) Fill oil cups on air motors.

b. Weekly:

- (1) Clean spray booths and water tanks.
- (2) Clean out sludge from wash and rinse tanks.
- (3) Change spray booth filters.

c. Monthly:

- (1) Clean fresh water rinse pipes.
- (2) Clean steam heater coils in wash and rinse tanks.

d. Semi-yearly:

- (1) Clean exhaust fans on roof.

ENGINEERING SECTION
STANDARDIZING