INCREMENTAL CHANGE Release Notification Date: 07/28/2022

SPM 70-21-03 CLEANING METHOD NO. 3 - STEAM CLEANING

DISCLAIMER

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HIGHLIGHTS

HIGHLIGHT REFERENCE	DESCRIPTION OF CHANGE
tk70-21-03-160-001	Technical Change: Added TASK 70-21-29-100-801 to the Steam Cleaning procedure.

TASK 70-21-03-160-001

1. General.

A. Steam cleaning combines the mechanical force of the spray jet with the chemical and physical action of the cleaning solution to remove oils, greases, and light soil from parts. This method is used when the part is too big for a soak tank or for component parts of different materials that cannot be put into acid or alkaline tanks.

NOTE: Unless specified differently, the procedures that follow are considered equivalent alternatives to this process for appropriate sized metallic parts:

TASK 70-21-14-110-012, Cleaning Method No. 14 Manually-Assisted Detergent Cleaning.

TASK 70-21-22-110-042, Cleaning Method No. 22 Light Duty Aqueous Cleaning (Method No. 1).

TASK 70-21-22-110-050, Cleaning Method No. 22 Light Duty Aqueous Cleaning (Method No. 2).

TASK 70-21-29-100-801, Cleaning Method No. 29 - Dry Ice Blast (Cryoblast) Cleaning.

NOTE: Unless specified differently, TASK 70-21-24-110-052, Cleaning Method No. 24 - Exterior Engine Cleaning can be used as alternative to TASK 70-21-03-160-001, Cleaning Method No. 3 - Steam Cleaning when it is used for exterior engine cleaning.

B. An alternative to this process is to use steam cleaning at temperatures greater than 212°F (100°C) without the detergent additive. At these elevated temperatures, most detergents break down and become ineffective. However, steam at these high temperatures will effectively remove oils, greases, and light soils without any detergent.

CAUTION: DO NOT APPLY THIS PROCESS ON THERMOSET MATERIALS AT TEMPERATURE ABOVE 212°F (100°C). CRACKS CAN BE OBSERVED AT THE SURFACE OF THERMOSET MATERIALS WHEN EXPOSED TO STEAM AT TEMPERATURE ABOVE 212°F (100°C).

C. This process can be used on all materials except thermo-plastic materials.

2. Equipment.

Subtask 70-21-03-160-011

A. The following equipment is required for the application of this process.

(1) Safety equipment and devices which are standard equipment in surface treatment shops such as: eye bath, emergency showers, protective clothing against electroplating products and means for neutralizing acid or alkaline splashing.
(2) Processing plant for neutralizing waste and used solutions.
(3) Efficient ventilation system for extracting and neutralizing vapors.
(4) Two types of steam cleaning equipment are generally available:
(a) Portable Equipment.
1 Contains tanks for water.
2 Contains tanks for detergent solutions.
3 Contains heat source to generate steam.
4 Contains controls for temperature, flow mixing, to supply steam at 40-150 psi (276-1034 kPa).
5 Principle of operation of portable equipment requires only an external source of electric power to generate the steam from the water contained within the equipment. Separate tanks of detergent solution are mixed with the steam by metering valve controls. The detergent solution is premixed in the tank to the desired concentration. The equipment produces either pure steam or a steam/solution mixture.
(b) Fixed Equipment.
1 Requires external supply of water at 20 psi (140 kPa) minimum.
2 Requires external supply of steam at 40-150 psi (276-1034 kPa).
3 Requires external supply of concentrated liquid detergent.
4 Contains controls to mix the water, steam, and detergent in desired concentrations to regulate water temperature and cleaning action.
5 Principle of operation of fixed equipment is to mix steam, cold water and detergent and deliver hot detergent solution combined with vapor under pressure through a spray gun to the surface to be cleaned. Impingement is directly related to steam pressure. The concentrated detergent is mixed with incoming water by means of an eductor and the concentration is controlled by orifice tips. Detergent supply line can be dosed for hot water rinse without stopping flow of water and steam.

3. Materials.
Subtask 70-21-03-160-012

Alkaline Cleaning Solution - Table 1

Solution Name	No.	Operating Temperature °F (°C)
Detergent solution	S1025	160-220 (70-105)

NOTE: The solution operating temperature corresponds to the temperature of the spray exiting the gun.

4. Procedure.
Subtask 70-21-03-160-013

WARNING: WHEN USING THE SPRAY GUN, WEAR GLOVES, A PROTECTOR MASK, A RUBBER APRON, AND APPROPRIATE PROTECTIVE FOOTWEAR. THE STEAM CAN BURN YOU.

A. Adjust the appropriate water/steam/solution/temperature control to the required setting to obtain a proper cleaning action. This will give a wet spray with sufficient impact to clean the surface.
B. Hold spray gun approximately 10-12 inches (250-300 mm) from surface and inclined at about 45 degrees to the surface.
C. Rinse the part with unheated water (optional).

CAUTION: TITANIUM PARTS MAY BE DAMAGED WHEN EXPOSED TO CHLORIDE CONTENT BEYOND ACCEPTABLE LIMITS.

D. Rinse the parts with hot water at minimum 150°F (66°C) using the spray gun with the cleaning solution supply shut off and as follows:
(1) If this procedure is used on titanium, titanium is subject to the following requirements regarding chloride. Refer to TASK 70-00-05-800-006, Water Types (paragraph 3., Definitions and Test Protocol).
(a) If parts will be exposed to subsequent processing that operates above 500°F (260°C) (for example, welding or heat treating), the final rinse water used on the parts must not exceed 50 ppm chloride (10000 ohm-cm minimum resistivity, 100 Microsiemens/cm maximum conductivity).
(b) For parts that will not be exposed to subsequent processing that operates above 500°F (260°C), the final rinse water used on the parts can be potable water that must not exceed 250 ppm chloride (1800 ohm-cm minimum resistivity, 550 Microsiemens/cm maximum conductivity).

WARNING: WHEN USING COMPRESSED AIR FOR CLEANING, COOLING, OR DRYING, DO NOT EXCEED 30 PSIG (207 KPA). WEAR EYE PROTECTION AND DO NOT DIRECT COMPRESSED AIR AT SELF OR OTHERS.

CAUTION: PARTS MUST BE THOROUGHLY DRY PRIOR TO FPI INSPECTION. WATER ON THE PARTS MAY DEGRADE THE SENSITIVITY OF THE PROCESS, ESPECIALLY FOR THE WATER WASHABLE PENETRANT PROCESS.

E. Dry the part by one of the following two methods.
(1) Flash dry the part as follows.
(a) Let the steam and hot water dwell on the part long enough to reach a temperature sufficient to provide flash drying.

NOTE: The time required will vary with part size, water temperature and tank size. Proper flash drying is indicated by seeing the water on the surface of a part start to "flash" or "whisk" off as the part is being removed from the hot water tank.

(b) Use repositioning, suction, blotting with a clean, absorbent material, or by blowing off with an oil and water filtered shop air gun to remove excess water.

(2) You can substitute drying the part in an air re-circulating oven for the dwell time in the hot water spray.

(a) Remove the part from the water. You can remove excess water by repositioning, suction, blotting with a clean absorbent material, or blowing the water off with an oil and water filtered shop air gun.

(b) Move the part into the oven and set the oven at a temperature compatible with part materials, heat treatments, and coatings. Keep the part in the oven until all traces of surface water are removed. It is recommended to keep the part in the oven for an additional 15 minutes after all traces of surface water have been removed. A temperature of 200°F plus or minus 25°F (93°C plus or minus 14°C) is recommended.

5. Quality Assurance.

Subtask 70-21-03-160-014

A. Visually check the cleanliness of the parts particularly for residues trapped in holes and recesses.