INCREMENTAL CHANGE Release Notification Date: 08/03/2022

SPM 70-21-29 CLEANING METHOD NO. 29 - DRY ICE BLAST (CRYOBLAST) CLEANING

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HIGHLIGHTS

HIGHLIGHT REFERENCE	DESCRIPTION OF CHANGE
tk70-21-29-100-801	Technical Change: Added Cleaning Method No. 29 to the Standard Practices Manual.

TASK 70-21-29-100-801

1. General.
   - A. Dry ice blast or cryoblast cleaning is a mechanical technique for removal of surface contaminants and coatings including but not limited to carbon deposits, RTV materials, dry film lubricants, and epoxy/polyurethane paint systems from metallic materials. It may also be used to supplement chemical cleaning.
   - B. Dry ice blasting is considered as an environmentally friendly process. After a part is dry ice blasted to remove contaminants, the dry ice sublimates, i.e., changes from solid carbon dioxide to gas, leaving no hazardous materials to dispose of, except whatever contaminants were dislodged from the parts being cleaned.
   - C. Dry ice blasting is a line-of-sight process. For complex-shaped parts with recessed areas, additional cleaning procedures may be necessary to clean these areas.
   - D. The process can only be used on metallic base materials.
   - E. It can be used for parts at module level or piece part level.
2. Equipment

Subtask 70-21-29-110-001

WARNING: PERSONAL PROTECTIVE EQUIPMENT REQUIRED, ESPECIALLY INSULATED GLOVES AND EYE PROTECTION WHEN HANDLING MATERIAL. USE IN A WELL-VENTILATED AREA.

A. The following equipment is recommended for dry ice blasting and may be obtained as shown.

Equipment	Supplier
Cold Jet i³ Microclean	Cold Jet, LLC. Refer to Subtask 70-80-00-800-012 (paragraph 4., List of Suppliers).
Cold Jet Aero 2 PCS 60	Cold Jet, LLC. Refer to Subtask 70-80-00-800-012 (paragraph 4., List of Suppliers).

(1) To provide good process control, there must be a pressure regulator to control and adjust

blast air pressure. The capability to measure the concentrations of ice pellets in the blast stream must also be provided.

NOTE: It is recommended that compressed air supply for the blasting machine should have a refrigerant air dryer to remove moisture from the compressed air otherwise the pellets may coagulate in the dispenser when they meet the wet air.

(2) Proper personal protection equipment must be used and must include, but not be limited to, protective gloves and eye wear.

3. Materials

Subtask 70-21-29-110-002

WARNING: STORE DRY ICE IN AN INSULATED CONTAINER. DO NOT STORE ICE IN A CONTAINER THAT IS COMPLETELY AIRTIGHT. AS THE DRY ICE CHANGES TO CARBON DIOXIDE GAS, IT WILL CAUSE AN AIRTIGHT CONTAINER TO EXPAND OR POSSIBLY EXPLODE.

Consumable Product	No.
Dry Ice Pellets	C04-311

NOTE: Dry ice blasting equipment manufacturers may also supply dry ice pellets.

NOTE: A pelletizer system that converts liquid carbon dioxide to solid pellets may be used.

NOTE: The size of the dry ice pellet should not be greater than 3.94 inches (100.1 mm) in length and with a maximum diameter of 0.12 inch (3.1 mm).

NOTE: The dry ice blasting (cryoblasting) media (dry ice pellets C04-311) have a specific shelf life and the manufacturer instructions must be followed for storage conditions. Ambient air deteriorates the dry ice blasting media which significantly decreases the efficiency of the cleaning. Pay particular attention to the storage. Replace the dry ice pellets C04-311 as soon as cleaning efficiency is no longer guaranteed.

NOTE: Check frequency of dry ice pellets for cleaning efficiency depends on shop's processing and experience.

4. Procedure

Subtask 70-21-29-110-003

WARNING: DRY ICE MUST NOT BE TOUCHED WITH BARE HANDS. IT MAY CAUSE LOW-TEMPERATURE SKIN DAMAGE AND SERIOUS BURNS. AVOID CONTACT WITH SKIN. OPERATOR SHOULD WEAR GOGGLES, GLOVES AND PROTECTIVE SHOES.

WARNING: DRY ICE CAN DECREASE AVAILABLE AIR. ASPHYXIANT.

WARNING: SERIOUS INJURY COULD RESULT IF CONTACT IS MADE WITH BLAST STREAM. SKIN, EYE, AND RESPIRATORY TRACT PROTECTION IS REQUIRED. AVOID ALL BLAST STREAM CONTACT.

WARNING: WHEN USING COMPRESSED AIR FOR CLEANING, COOLING, OR DRYING, DO NOT EXCEED 30 PSIG (207 KPA). EYES CAN BE PERMANENTLY DAMAGED BY CONTACT WITH LIQUID OR LARGE PARTICLES PROPELLED BY COMPRESSED AIR. INHALATION OF AIR-BLOWN PARTICLES CAN DAMAGE LUNGS.

CAUTION: PARTS WITH WALL THICKNESSES UNDER 0.035 INCH (0.89 MM) MAY BE DISTORTED OR OTHER DAMAGE TO SIGNIFICANT SURFACES MAY OCCUR.

CAUTION: IN CASE OF ICE FORMATION ON PART SURFACE DUE TO CONDENSATION, DRY USING COMPRESSED CLEAN AND DRY AIR.

A. In case of excessive dirt, pre-clean the part. Refer to TASK 70-21-01-110-001 (70-21-01, Cleaning Method No. 1 - Solvent Degreasing) or TASK 70-21-22-110-042 (70-21-22, Cleaning Method No. 22 Light Duty Aqueous Cleaning (Method 1)).

CAUTION: DO NOT DRY ICE BLAST NON-METALLIC PARTS.

CAUTION: SOFT COATINGS SUCH AS DRY FILM LUBRICANTS, PRIMERS, PAINTS, INORGANIC ALUMINUM PROTECTIVE COATINGS, ADHESIVES, SEALANTS, RTVs, ETC. AND NON-METALLICS SUCH AS RUBBER AND COMPOSITES MAY BE REMOVED OR DAMAGED BY BLASTING.

B. Mask the part to protect surface coatings which are not to be stripped and non-metallic materials.

C. If necessary, restrain parts in holding fixture for proper position cleaning.

NOTE: Parts must be secured or firmly supported to prevent them from moving during the dry ice blasting process.

D. Set the machine air pressure to maximum 110 psi (758.4 kPa).

E. Nozzle tip/model should be defined by shop to maintain air pressure at maximum 110 psi (758.4 kPa) to part surface. Customized nozzles may be required to improve accessibility.

CAUTION: DO NOT PERMIT BLASTING TO DWELL ON THE SAME SPOT. DAMAGE TO PART MAY OCCUR.

F. Blast with dry ice pellets C04-311 to clean the part as follows:

NOTE: The recommended dry-ice consumption rate is 0.55 kg/min.

(1) The distance from the nozzle to the part should be minimum 1-2 inches (26-51 mm).

(2) The recommended angle to the surface being blasted is 45-90 degrees.

(3) Blast with a continuous movement of the nozzle and/or the part.

G. If parts are still not clean, repeat Subtask 70-21-29-110-003 (paragraph 4.D.) thru Subtask 70-21-29-110-003 (paragraph 4.F.).

H. Blow clean, dry air at 30 psi (206.8 kPa) maximum to remove all remaining material from the part.

I. Remove parts from holding fixture if applied.

J. Remove the masking if applied.

K. Hand clean the repair area. Refer to TASK 70-21-23-110-053 (70-21-23, Cleaning Method No. 23 - Hand-Wipe Degreasing) or by alternative available cleaning method at the part cleaning section.

5. Quality Assurance

Subtask 70-21-29-110-004

A. Visually make sure that the part has been evenly cleaned and there is no masking residue on the

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part.

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