SECTION 463159 - CLEANING REQUIREMENTS FOR OXYGEN EQUIPMENT

Note that this section has only been edited for NYSOGS standardization and has not been technically edited. The designer shall make all technical edits specific to the project for this section.

This Section provides guideline specifications for cleaning of liquid oxygen tanks and high-pressure gaseous oxygen containers.

Refer to Section 463156 for material and installation requirements for liquid oxygen storage tanks and components, and high-pressure gaseous oxygen containers.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes:

Mechanical cleaning methods.

Chemical cleaning methods.

* + - * 1. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 463156 - Liquid Oxygen Storage and Feed Equipment: Requirements for liquid oxygen storage tanks and components, and high-pressure gaseous oxygen containers.

* + - 1. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
        2. Manufacturer’s installation instructions shall be provided along with product data.
        3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
        4. Product Data: Submit manufacturer information including recommended application, cleaning ability, material compatibility, toxicity, and regulatory requirements.
        5. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate Paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions: Submit special handling procedures and Material Safety Data Sheet (MSDS) for cleaning chemicals.
        2. Inspection Records:

Description: Inspections and acceptances for cleaned equipment.

Records:

Identification of item cleaned.

Cleanliness specification.

Cleaning method.

Inspection method.

Inspection results.

Inspector's signature and date.

<**\_\_\_\_\_\_\_\_**>.

* + - * 1. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
        2. Qualifications Statements:

Coordinate following Subparagraphs with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer and applicator.

Submit manufacturer's approval of applicator.

* + - 1. QUALITY ASSURANCE

Include this Article to specify compliance with overall reference standards affecting products and installation included in this Section.

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Perform Work according to <**\_\_\_\_\_\_\_\_**> standards.
      1. QUALIFICATIONS

Coordinate following Paragraphs with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
        2. Applicator: Company specializing in performing Work of this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience [**and approved by manufacturer**].
      1. DELIVERY, STORAGE, AND HANDLING
         1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
         2. Store materials according to manufacturer instructions.
         3. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

1. PRODUCTS
   * + 1. MECHANICAL CLEANING
          1. Blast Cleaning:

Media:

Material: [**Copper slag particles**] [**Aluminum oxide**] [**Glass beads**] [**Sand**].

Material and Carrier: Free from oil and grease.

Fine powders or grains may ignite when mixed with oxygen.

Use of fine powders or grains is unacceptable.

* + - * 1. Wire Brushes:

Wire Material: [**Stainless steel**] [**, copper**] [**, brass**] [**, or**] [**bronze**].

* + - * 1. High-Pressure Washers:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=12711&mf=04&src=wd):

Designer to provide two manufacturers and approved equivalent for all listed products.

* + - * 1. Ultrasonic Cleaning Equipment:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=12712&mf=04&src=wd):

Designer to provide two manufacturers and approved equivalent for all listed products.

* + - * 1. Cleaning Cloths:

Description: Clean, lint-free, and no oil or grease.

Material: [**Cotton**] [**, linen**] [**, or**] [**paper**].

Desiccation materials may be used to prevent corrosion or other undesired reactions due to humidity.

* + - * 1. Desiccation Materials: [**Alumina**] [**, silica gel**] [**, or**] [**regenerative clays**].
        2. Drying and Purging Gas:

Description: Free of oil, grease, and particulates.

Material:

Dry air.

Dew Point: Minus 40 degrees F at 101.3 kPa

Continuous Purging: Atmospheric air from non-oil-lubricated compressor.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Material: Nitrogen.

Following list of chemical cleaning materials are guidelines only. Strictly follow material manufacturer instructions based on required application.

* + - 1. CHEMICAL CLEANING
         1. Alkaline Chemicals and Detergents:

Carbon, Low-Alloy, and Stainless Steel; Copper and Copper Alloys: Wetting agents and mixtures of sodium hydroxide (caustic soda), sodium [**bi**]carbonate, sodium phosphate, and sodium silicate.

Aluminum and Aluminum Alloys: Wetting agents and mixture of [**sodium hydroxide and sodium phosphate**] [**sodium carbonate, sodium silicate, sodium pyrophosphate, and sodium metasilicate**].

Detergents by Function:

Dirt Dissolvers and pH Raising Agents: Sodium hydroxide, potassium hydroxide, sodium carbonate, and sodium silicate.

Dispersers: Surfactants, sodium silicate, and polyphosphates.

Softeners: Polyphosphates, borates, and glyconates.

Corrosion Inhibitors: Sodium silicate, borates, and amines.

Wetting Agents: Polyphosphates, glyconates, and surfactants.

* + - * 1. Acid Chemicals:

Carbon and Low-Alloy Steel: Wetting agents and mixtures of [**hydrochloric**] [**sulfuric**] acid with corrosion inhibitor.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Carbon and Low-Alloy Steel: [**Citric**] [**, sulfuric**] [**, and**] [**phosphoric**] acid.

Cast Iron: Chromic and sulfuric acid.

Austenitic Stainless Steel: [**Chromic, sulfuric, and hydrofluoric**] [**Nitric, hydrofluoric, and phosphoric**] acid.

Copper and Copper Alloys: [**Hydrofluoric**] [**Sulfuric**] acid.

Aluminum and Aluminum Alloys: [**Chromic and sulfuric**] [**Nitric and hydrofluoric**] [**Phosphoric and chromic**] acids.

Cleaning ability, material compatibility, toxicity, flammability, and regulatory requirements should be considered when selecting a solvent for a particular application.

* + - * 1. Solvents: <**\_\_\_\_\_\_\_\_**>.

Proprietary emulsion cleaners are available to clean different polymers, metals, and alloys.

* + - * 1. Emulsions: <**\_\_\_\_\_\_\_\_**>.

1. EXECUTION
   * + 1. APPLICATION
          1. Accessories and Small Parts:

Individually package valves, gaskets, and similar small parts to be cleaned, in a clean and sealed polyethylene bag.

Close openings on parts with degreased plastic or metal plugs.

[**Evacuate air from interior of sealed bag**] [**Fill bag with oil-free nitrogen**].

* + - * 1. Equipment Openings:

Seal with degreased caps, plugs, or blind flanges.

[**Purge of atmospheric air; fill with oil-free dry clean air or inert gas at slightly positive pressure.**]

* + - * 1. Mechanical Cleaning:

Blast Cleaning:

Application: Rough castings, forgings, plates, vessels, piping, and cylinders.

Air Supply: Dry, oil-free compressed air; nitrogen; or high-pressure water.

Do not use on aluminum alloy surfaces.

Wire Brushes:

Do not use carbon steel brushes on stainless-steel or aluminum surfaces.

* + - * 1. Chemical Cleaning:

Alkaline Cleaning:

Solution Strength: As recommended by cleaning agent manufacturer.

Solution Temperature Range: 100 to 180 degrees F

Completely rinse solutions from items being cleaned, using oil-free [**hot**] water.

Drying: Purge with dry air or nitrogen.

Detergent Cleaning:

Solution Strength: As recommended by cleaning agent manufacturer.

Injection Method: [**Pumping**] [**Recirculation**] [**Jetting**].

Completely rinse solutions from items being cleaned, using oil-free [**hot**] water.

Drying: Purge with dry air or nitrogen.

Acid Cleaning:

Solution Strength: As recommended by cleaning agent manufacturer.

Hydrochloric Acid Solutions: Use on carbon and alloy steels only.

Solvent cleaning has typically been replaced by other cleaning methods for safety and environmental reasons. However, solvent cleaning may be considered if other cleaning methods cannot be applied effectively. If emulsion cleaning methods are to be used, consider performing a risk assessment to identify hazard potential, specific application procedures, waste disposal requirements, and personnel experience levels.

* + - * 1. Solvent Cleaning: <**\_\_\_\_\_\_\_\_**>.

Penetration into narrow hollows is typically improved when using emulsions than using aqueous systems.

* + - * 1. Emulsion Cleaning:

Solution Strength: As recommended by cleaning agent manufacturer.

Ensure that chemicals being used are compatible with metallic and organic components likely to be affected.

Solution Temperature Range: Ambient.

Completely rinse solutions from items being cleaned, using oil-free [**hot**] water.

Drying: Purge with dry air or nitrogen.

* + - 1. FIELD QUALITY CONTROL
         1. Inspection:

Coordinate inspection methods with methods recommended by cleaning agent manufacturer.

Direct Visual Inspection with White Light:

No residual evidence of following:

Oil, grease, paint, or other organic material.

Cleaning agents.

Rust, loose scale, weld spatters or flux, dust, or fibers.

Direct Visual Inspection with UV Light:

Light:

Wavelength: 370 nm.

Intensity: 1,000 microwatts/sq. cm.

Distance from Surface Being Inspected: 4 to 10 inches

No residual evidence of hydrocarbons or organic oils.

Wipe Test:

Wipe surface with white filter paper or clean, lint-free cotton or linen cloth.

Examine paper or cloth under white light or UV light.

No residual evidence of oils or grease.

Solvent extraction may be used to determine the amount of soluble contaminants remaining after cleaning operations. This method may be especially applicable for inspecting inaccessible surfaces, or for verification of other inspection methods.

Solvent Extraction:

Determine amount of contaminants in laboratory using one of following methods:

Weight of residue removed per unit of cleaned surface area.

Volume of residue removed per unit of cleaned surface area.

Relative light transmission with reference sample of unused solvent.

Water Break Test:

Spray [**potable**] [**distilled**] water on surface.

Determine presence of oils by observing if water remains intact or forms small beads.

Total organic carbon (TOC) analyzer.

END OF SECTION 463159