NAVFAC Naval Facilities Engineering Command
ENGINEERING AND EXPEDITIONARY WARFARE CENTER

TechData Sheet

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Cleaning Solvents for the 21st Century

OVERVIEW

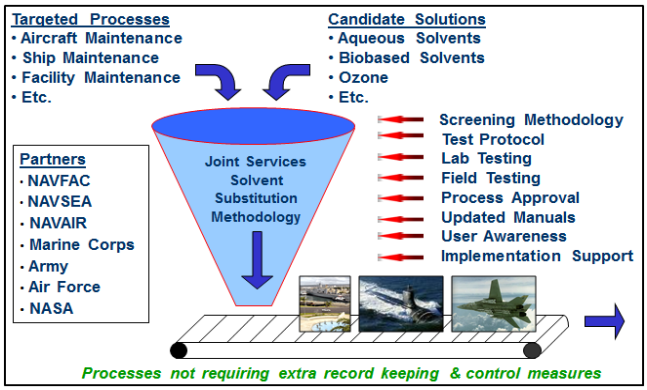
A methodology was developed to facilitate information transfer/exchange and furnish guidance on executing solvent substitution efforts. In 2002 the DoD formed a Joint Service Solvent Substitution Working Group (JS^3WG) comprised from Army, Navy, Air Force, Marine Corps, and the National Aeronautics and Space Administration personnel. The JS^3 WG identified cleaning processes impacted by regulations targeting volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) containing solvents and cleaners. This was a collaborative effort led by the NAVFAC Engineering and Expeditionary Warfare Center (NAVFAC EXWC) and the Army Research Laboratory.

Traditionally vehicle, equipment, aircraft, and ship maintenance activities have used solvents containing HAPs and/ VOCs in their cleaning processes. P-D-680, TCE, and PCE, are used to remove dirt, grease, soot, and burned-on carbon from various platforms, equipment, and parts. As the National Emissions Standards for HAPs and the National Ambient Air Quality Standards continue to tighten restricting the use of HAPs and VOCs containing cleaners, the DoD has relied more on aqueous-alkaline cleaners to comply. Aqueous-alkaline cleaners provide substantial environmental benefits, however they are not adequate for certain applications as they can be ineffective and corrosive to some metal surfaces. As a result, the DoD continues to use solvent cleaners containing HAPs and/or VOCs.

DESCRIPTION

The JS^3methodology focuses on systematically resolving the impact that environmental regulations have on DoD cleaning operations through multi service cooperative and collaborative efforts addressing HAP and/or VOC containing solvents. The methodology fosters multi-service engagement with the goal of identifying alternative materials to use as substitutes in various DoD weapons cleaning operations.

The collaborative efforts conducted by the JS^3 WG were made possible by the Navy Environmental Sustainability Development to Integration (NESDI) program with resources provided by the Chief of Naval Operations Energy and Environmental Readiness Division (CNO N45) and the Sustainable Painting Operations for the Total Army (SPOTA).



Collaborative efforts executed under the guidance of the JS^3 WG included:

- Validate alternative bio-based solvents for high VOC containing solvents used in Aeronautical Antifriction Bearing Cleaning
- Evaluate alternative cleaners for T10 Thinner used for paint gun cleaning.
- Evaluate alternative solvents for MIL-PRF-680 specification.
- Development of HAP free/VOC compliant General Cleaning and Aviation General Cleaning Specifications

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- Identify HAP free/VOC compliant solvents for MIL-PRF-380

There are significant barriers for implementing alternative cleaners and processes given the current DoD policies and procedures. To overcome these barriers and facilitate implementation, engaging the decision-making stakeholders early so that buy in and endorsement easily follows the conclusion of each effort is critical. Implementation mechanisms mostly consist of inserting new specifications in cleaning governing documents which are mainly cleaning manuals and standard operation procedure documents. The following are successes that have been documented and implemented:

- MIL-PRF-32405 (A new HAP free hand wipe cleaner for aviation specification) was developed with 3 classes and 5 types. Cleaner selection will be based on the application and region.
- TBAC, EP-921, and HTF 85B were down selected and evaluated as alternatives to T10 thinner for paint gun cleaning operations. TBAC and EP-921 were both identified as the better alternatives. Further testing is recommended before selection of either cleaner can be made due to changes in paint manufacturers at the end of the test period.

- MIL-PRF-32295 (A new low VOC/HAP free MIL-PRF-680 alternative specification) has three types of cleaners which consist of Exempt/0 mg/liter VOC content, less than 25g/liter VOC content, and a third which is for heavy degreasing applications with less than 25g/liter VOC content.

- MIL-PRF-32359 (A HAP-free general cleaning ground support equipment specification) was developed with 2 classes and 5 types. Cleaner selection will be based on the application, platform, and region.

These specifications have been incorporated into the appropriate governing documents for cleaning of vehicles, equipment, aircraft, and ship platforms at DoD maintenance activities.

BENEFITS

Allow DoD to comply with ever increasing air pollutant regulations while continuing to support its mission. Enhance worker safety by reducing exposure to HAPs and VOC containing solvents.

RECOMMENDATIONS

Recommend future efforts utilize this JS3 Methodology for executing new solvent substitution efforts. Emerging solvent technologies will create new opportunities for solvent changes that will improve process and environmental performance.

REFERENCES

Technical Memorandum-2361-ENV-Joint Service Solvent Substitution Methodology- May 2003
MIL-PRF-32295 Specification - Cleaner, Non-Aqueous, Low-VOC, HAP-free - November 2008

MIL-PRF-32405 (MR) Specification – Cleaner, Hand wipe, for aviation and Missile Systems, Metallic Substrates, Low or exempt VOC, HAP Free - January 2013
MIL-PRF-32359 Specification – Cleaner, General, for Ground Vehicles and Ground support Equipment, HAP-free – August 2012

POINTS OF CONTACT

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