Standard Practice for
Handling an Acid Degreaser or Still[1]

1. Scope

1.1 This practice covers the procedures required for recognizing and handling an acid vapor degreaser or still.

1.2 If the degreaser(s) is equipped with a still, follow the procedure in this practice for all of the equipment.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D2110 Test Method for pH of Water Extractions of Halogenated Organic Solvents and Their Admixtures
D2942 Test Method for Total Acid Acceptance of Halogenated Organic Solvents (Nonreflux Methods)
D3698 Practice for Solvent Vapor Degreasing Operations
D4276 Practice for Confined Area Entry

2.2 *Federal Regulations:*

29 CFR 1910.146, Permit-Required Confined Spaces[3]

3. Terminology

3.1 *Definitions:*

3.1.1 *acid degreaser, n*—an acid degreaser is the result of the decomposition of the degreasing solvent to acid products.

4. Significance and Use

4.1 This practice describes the symptoms and causes of an acid degreaser as well as methods for correcting the problem.

4.2 This practice is intended as a reference for use by persons responsible for the operation or maintenance of vapor degreasers or stills.[4]

4.3 This practice is not intended to cover every possible situation.

5. Symptoms of an Acid Degreaser/Still

5.1 An acid condition in a vapor degreaser may be recognized by one or more of the following symptoms:

5.1.1 A strong acid odor.

5.1.2 A dense white smoke in the vapor zone.

5.1.3 An unusually dark brown to black-colored solvent in the degreaser sumps.

5.1.4 Dark spots and pitting of aluminum parts after degreasing.

5.1.5 Rusting of mild steel parts immediately after removal from the degreaser.

5.1.6 New formation of green deposits on copper condensing coils or chiller coils.

5.1.7 Newly formed blush rusting of stainless steel degreaser components, especially welded seams.

5.1.8 Low pH of solvent as determined by Test Method D2110 by water extraction or a low acid acceptance of the solvent as determined by Test Method D2942, or both.

5.1.9 Severe pitting and corrosion inside water separator.

6. Possible Causes of an Acid Degreaser

6.1 It is rare for a solvent vapor degreaser to go acid when properly operated and maintained. An acid degreaser can result from any one or a combination of the following causes:

6.2 *Lack of Proper Maintenance*—If a degreaser is not cleaned out on a regular basis, the accumulations of soluble and insoluble contaminants, especially reactive white metal chips (for example, aluminum), can cause both thermal and chemical breakdown of the solvent resulting in the generation of hydrochloric acid.

6.3 *Deterioration of Heating Surfaces:*

6.3.1 *Damaged Heating Elements*—Deterioration of either gas or electrical heating elements can cause arcing or hot spots resulting in an acid condition of the solvent. The deterioration

---

[1] This practice is under the jurisdiction of ASTM Committee D26 on Halogenated Organic Solvents and Fire Extinguishing Agents and is the direct responsibility of Subcommittee D26.02 on Vapor Degreasing.

Current edition approved March 1, 2012. Published June 2012. Originally approved in 1986. Last previous edition approved in 2006 as D4579 – 00 (2006). DOI: 10.1520/D4579-00R12.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

[4] See also Practice D3698.

may be due to damage, corrosion or accumulation of contaminants on the heating surface.

6.3.2 *Exposed Heating Surfaces*—Exposure of gas and electric heating surfaces to the air can cause solvent decomposition. Heating elements exposure is caused by a low solvent level that is not detected by low liquid level controls.

6.4 *Excessive Amounts of Water*—Hydrolysis of certain solvents and impurities can be a factor in the formation of an acid condition. Free water can also remove stabilizer.

6.5 *Chlorinated and Sulfonated Oils*—Some chlorinated and sulfonated oils used in deep drawing processes begin to break down at 150°F (65°C), liberating acidic components. When in contact with boiling solvents such as trichloroethylene, and perchloroethylene that have boiling points above 150°F, an acid condition can develop.

6.6 *Addition of Acid to a Degreaser*—The addition of certain soils on parts being cleaned, such as solder fluxes, pickling compounds, phosphoric acid for deoxidizer baths, or organic acids such as stearic acid to a degreaser can lead to the development of an acid condition.

6.7 *Mixing of Solvents*—Different solvents, such as 1,1,1-trichloroethane with trichloroethylene, shall not be mixed in a degreaser. Dilution of the solvent stabilizers can lead to the development of an acid condition.

NOTE 1—Some paints, tapping compounds, or cooling fluids may contain an incompatible solvent(s).

6.8 *Use of Inadequately Stabilized Solvents*—Make-up solvent for the degreaser from auxiliary equipment, such as carbon adsorbers, should be portioned with virgin solvent to maintain proper stabilization levels or accumulated and restabilized in accordance with the manufacturer's instructions. If reclaimed solvent is used, care shall be taken to ensure that it is fully stabilized for use in a vapor degreaser.

6.9 *Improper Degreaser/Still Design*—Degreaser/still design shall be compatible with the solvent used, including materials of construction, such as tank walls, piping, heating elements, pumps, etc.

7. Immediate Action for Handling an Acid Degreaser/Still

7.1 Turn off heat source to the degreaser. Do not turn off the condenser water or the ventilation fan.

7.2 Send all unnecessary personnel away from the affected area. Personnel sent in to clean the unit shall be properly trained and equipped for such exposure.

7.3 Introduce enough water into the unit to cover all solvent to a depth of 2 to 4 in. Add a water solution of soda ash (sodium carbonate) at a concentration of about ¼ to ½ lb/gal of water. This will help neutralize the acid decomposition products and will facilitate cleaning the machine. Do not use caustic soda (sodium hydroxide) or caustic potash (potassium hydroxide) or other strong alkali, because an explosive product may result.

8. Recommended Procedure for Cleaning an Acid Degreaser

8.1 Make sure enough soda ash solution is present in the degreaser to prevent solid residue from being exposed to air when the solvent is pumped out of the machine. (The water solution floats on top of the solvent.) Pump the acid solvent into steel drums containing about one pound of soda ash. Care should be taken to remove all solvent from water separators, pumps etc. Do not insert the bungs in the drums until neutralization reaction is complete. (Carbon dioxide is formed by the neutralization reaction. If sealed, pressure from the evolution of carbon dioxide could rupture the drums.)

8.2 After the solvent has been removed from the degreaser, inspect the surface of the water solution in the degreaser. If a boiling action is observed, break up any lumps that may exist on the bottom of the degreaser using a metal rod or similar device. Boiling action is most likely to occur in the boiling chamber of the degreaser where chips and oils concentrate but may also occur in the spray sump or other reservoirs. After all action ceases, pump the water solution out of the degreaser into drums.

8.3 Shut off the water to the condenser.

8.4 Remove the clean-out doors and heating elements.

8.5 Thoroughly air out the degreaser. Do not enter without ensuring that no solvent or solvent fumes are present. Make absolutely certain that proper tank entry procedures are followed. For proper tank entry procedures, see Practice D4276 and Federal Standard 29 CFR 1910.146.

8.6 Transfer all solids from the unit into metal drums containing soda ash water solution. Remove the drums to an isolated area and treat as a hazardous waste. Handle the drums with care.

8.7 Scrape or wire brush all internal areas on which solid residues remain, being careful to remove all residue.

8.8 Wash down all interior surfaces of the degreaser with the soda ash solution to neutralize residual acid products. Be particularly diligent in neutralizing corners, condensate troughs, and conveyor systems.

8.9 Remove and dismantle all pipes, fittings, pumps, and valves. Do not neglect the water separator, spray system, storage tank, and the still. Clean and inspect carefully to ensure that all solid residues have been removed and that all surfaces have been neutralized. An undetected deposit of unneutralized residues as small as a match head can cause the degreaser to become acidic again.

8.10 Rinse thoroughly with clean water.

8.11 Dry all interior surfaces of the degreaser body, conveyor, and components.

8.12 Reassemble the degreaser.

8.13 Replace damaged or corroded components and controls.

8.14 Readjust spray piping and nozzles.

8.15 Reposition all clean-out doors using new gaskets with a proper sealing compound.

8.16 Recharge the degreaser with suitably stabilized vapor degreasing grade solvent and follow normal start up procedures.

8.17 Monitor the condition of the degreasing solvent using acid acceptance tests or other procedures as recommended by the solvent supplier, or both. This should be done at least daily until the system has reached a stable operating condition.

8.18 Do not reuse the solvent removed from the degreaser.

8.19 The solvent and soda ash water solutions shall be handled, transported, and disposed of in accordance with federal, state, and local regulations.

9. Keywords

9.1 acid degreaser; chlorinated solvents; degreaser; vapor degreasers

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the ASTM website (www.astm.org/COPYRIGHT/).