

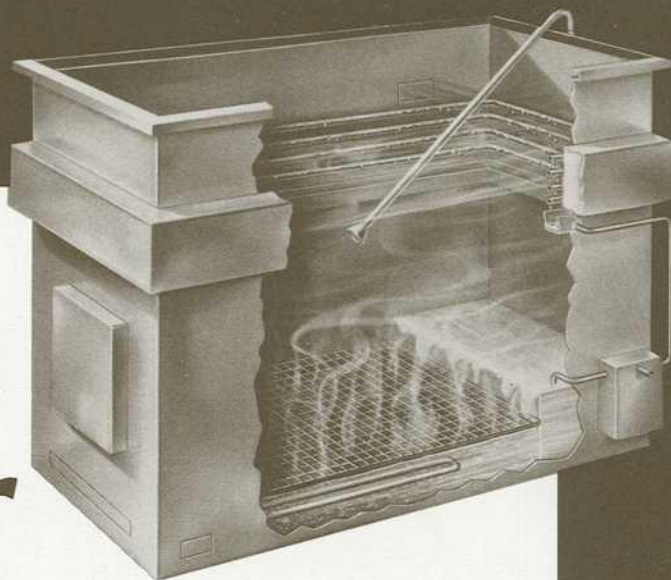


Manual on

Vapor

Degreasing

Third Edition



Manual on Vapor Degreasing 3rd Edition

Compiled by
ASTM SUBCOMMITTEE D26.02
ON VAPOR DEGREASING

ASTM Manual Series: MNL 2
Revision of Special Technical Publication (STP) 310A



ASTM ■ 1916 Race Street ■ Philadelphia, PA 19103

Library of Congress Cataloging-in-Publication Data

Manual on vapor degreasing.

(ASTM manual series; MNL 2)

1. Vapor degreasing—Handbooks, manuals, etc.

I. Beck, Charles A. II. ASTM Subcommittee D26.02 on Vapor Degreasing. III. Series.

TS213.M337 1989 671.3 88-35141

ISBN 0-8031-1217-3

© 1989 by American Society for Testing and Materials

Library of Congress Catalog Card Number: 88-35141

NOTE: The Society is not responsible, as a body, for the statements and opinions advanced in this publication.

Printed in Baltimore, MD

June 1989

Foreword

This manual is a users' guide on the vapor degreasing process. Its contents have been developed by Subcommittee D26.02 on Vapor Degreasing and represents the Subcommittee's best technical knowledge. A complete list of the ASTM Committee D-26 full consensus standards appears in Table 1.

The procedures described herein may involve hazardous materials, operations, and equipment. This manual does not pur-

port to address all of the safety problems associated with its use. It is the responsibility of the user of this manual to establish appropriate safety and health practices and determine the applicability of regulatory limitations before use.

This manual is the 3rd edition and was previously published as STP 310A. It is now designated as MNL 2. It has been updated to reflect advances in environmental and regulatory requirements.

TABLE 1. ASTM Standards on halogenated organic solvents.

<i>Number</i>	<i>Title</i>
TEST METHODS FOR	
D 2106	Acid Acceptance, Amine, of Halogenated Organic Solvents
D 2942	Acid Acceptance, Total, of Halogenated Organic Solvents (Nonreflux Methods)
D 3444	Acid Number, Total of Trichlorotrifluoroethane
D 2989	Acidity-Alkalinity of Halogenated Organic Solvents and Their Admixtures
D 2943	Aluminum Scratch Test for 1,1,1-Trichloroethane
D 3741	Appearance of Admixtures Containing Halogenated Organic Solvents
D 3443	Chloride in Trichlorotrifluoroethane
D 2108	Color of Halogenated Organic Solvents and Their Admixtures (Platinum-Cobalt Scale)
D 2251	Metal Corrosion by Halogenated Organic Solvents and Their Admixtures
D 2109	Nonvolatile Matter in Halogenated Organic Solvents and Their Admixtures
D 3445	Nonvolatile Matter in Trichlorotrifluoroethane
D 3742	1,1,-Trichloroethane Content
D 3979	Particulate Matter in Trichlorotrifluoroethane
D 2110	pH of Water Extractions of Halogenated Solvents and Their Admixtures
D 3447	Purity of Trichlorotrifluoroethane
D 1901	Relative Evaporation Time of Halogenated Organic Solvents and Their Admixtures
D 4494	Residual Odor in Drycleaning Grade Perchloroethylene Detecting

TABLE 1. ASTM Standards on halogenated organic solvents.

<i>Number</i>	<i>Title</i>
D 3448	Specific Aqueous Conductance of Trichlorotrifluoroethane
D 2111	Specific Gravity of Halogenated Organic Solvents and Their Admixtures
D 3316	Stability of Perchloroethylene with Copper
D 3446	Water Content of Trichlorotrifluoroethane with Karl Fischer Reagent
D 3401	Water in Halogenated Organic Solvents and Their Admixtures
D 2988	Water-Soluble Halide Ion in Halogenated Organic Solvents and Their Admixtures
GUIDE FOR	
D 3640	Emission Control in Solvent Metal-Cleaning Systems
PRACTICES FOR	
D 4276	Confined Area Entry
D 4579	Handling an Acid Degreaser or Still
D 3844	Labeling Halogenated Hydrocarbon Solvent Containers
D 3698	Solvent Vapor Degreasing Operations
SPECIFICATIONS FOR	
D 4081	Drycleaning Grade Perchloroethylene
D 4126	Vapor-Degreasing Grade and General Solvent Grade 1,1,1-Trichloroethane
D 4079	Vapor-Degreasing Grade Methylene Chloride
D 4376	Vapor-Degreasing Grade Perchloroethylene
D 4080	Vapor-Degreasing Grade Trichloroethylene

List of Contributors

Task Group Chairman:

Charles A. Beck, Occidental Chemical Corporation

Task Group Members or Contributors:

Richard W. Clement, Detrex Corp.
Richard D'Apolito, Crest Ultrasonics
Ferd J. Chmielnicki, Detrex Corp.

Roger Etherington, Vulcan Chemical
Dr. Robert A. Gorski, E.I. DuPont
Francis J. Figiel, Allied Signal
Joseph Pokorny, Baron-Blakeslee, Allied Signal
Clete M. Smith, PPG Industries
Peter F. Maltby, Crest Ultrasonics
Ken S. Surprenant, Dow Chemical

Contents

Introduction	1
Process Description	1
Applications	2
Material to Be Cleaned	2
Shape, Form, and Size of Work to Be Cleaned	2
Types and Amounts of Soils to Be Removed	2
Process Limitations	3
Degree of Cleanliness Required	3
Cleaning Limitations	3
Space Requirements	4
Adaptability to Conventional Conveying Work-Handling Methods	4
Total Cost to Attain Desired Cleaning Results	4
Typical Uses for Vapor Degreasing	4
Before Applying Protective Coatings	4
Before Inspection	4
Before Assembly	5
Before Further Metal Work or Treatment	5
Before and After Machining	5
Before Packaging	5
Selection of Vapor Degreasing Solvent	5
Vapor Degreasing Equipment	6
Straight Vapor Degreasing	6
Vapor-Distillate Spray-Vapor Degreasing	6
Vapor-Immersion-Vapor Degreasing	7
Vapor-Spray-Vapor Degreasing	7
Ultrasonics	7
Other Cleaning Cycles	8
Specialized Equipment and Methods of Handling	8
Method of Heating	8
Equipment Design Requirements	9
Size of Equipment	9
Freeboard for Open Top Degreasers	9
Minimum Evaporative Area	9
Heat Input	9
Work Heat	9

Radiation Losses	9
Heat for Distillate	9
Types of Heat Input	10
Steam Heat	10
Gas Heat	10
Electric Heat	10
Hot Water Heat	10
Heat Pump	10
Vapor Control	10
Water Jacket	11
Cooling Coils	11
Moisture Removal	11
Conveyor Systems	12
Monorail Degreaser	12
Crossrod Degreaser	12
Ferris Wheel Degreaser	12
Vibra Degreaser	12
Elevator Degreaser	13
Operating and Safety Controls	13
Steam Heat Degreasers	13
Gas-Heated Degreasers	14
Electrically Heated Degreasers	14
Vapor Thermostat Setting	14
Water Flow Switch	14
Safety Precautions	14
Location of Solvent Degreasing Equipment	14
Ventilation	14
Clearance	14
Drafts	15
Ovens	15
Open Flames or Hot Surfaces	15
Gas-Heated Degreasers	15
Installation	16
Degreaser Operation	16
Operating the Degreaser	16
Proper Positioning of Work	16
Rate of Entry and Removal	17
Duration of Contact Time with Solvent Vapor	17
Solvent Contamination Levels	17
Spraying of Parts	17
Water Contamination	17
Solvent Handling	17
Solvent Distillating and Operation of Stills	17
Shutting Down the Degreaser	19
Cleaning and Maintenance of the Degreasing Equipment	19
Procedure for General Cleaning of Degreaser and Still	19
Routine Maintenance	21

Acid Degreasers	21
Economics of Degreaser Operation	22
Solvent Cost	22
Maintenance and Direct Labor Costs	22
Utilities Costs	22
Safe Handling of Vapor Degreasing Solvents	23
Employee Education	23
Employee Selection	23
Preemployment	23
Reporting Leaks	23
Hazards	23
Health Hazards	23
Inhalation	23
Skin Contact	25
Ingestion (Swallowing)	25
Eye Contact	25
First Aid	26
Inhalation	26
Note to Physician	26
Skin Contact	26
Ingestion (Swallowing)	26
Eye Contact	26
Fire Hazard	26
Degreaser Sludge	26
Decomposition Products	26
Stabilized Grades	27
Effect of Alkalies	27
Chemical Reactivity	27
Reactive Metals	27
Prevention of Exposure to Solvents	28
Safe Working Practices	28
Maintenance Steady Vapor Level	28
Equipment Maintenance	28
Solvent Transfer	28
Spills	29
Contaminated Clothing	29
Personal Protective Equipment	29
Respiratory Protection	29
Methods of Evaluating Exposures in the Workplace	30
Detector Tubes	30
Universal Carbon Tubes	30
Halide Meter	30
Flame Ionization, Organic Vapor Detection	30
Infrared, Organic Vapor Analyses	30
Labeling	30
Handling and Storage	30

Storage	31
Drums	31
Tank Trucks	31
Tank Cars	31
Storage Tanks	32
Containing Spills or Leaks	32
Vents	33
Level Gage	33
Pumps	33
Piping and Hosing	33
Unions	33
Valves	33
Entering and Cleaning Tanks	34
Waste Disposal	34
Solvent Conservation and Procedures	34
Conservation Devices	34
Covers	34
Freeboard Design	34
Refrigerated Freeboard Devices	34
Carbon Adsorber	35
Conservation Procedures	35
Glossary	36
Solvent Nomenclature	37
Abbreviations	37
Appendix	38

