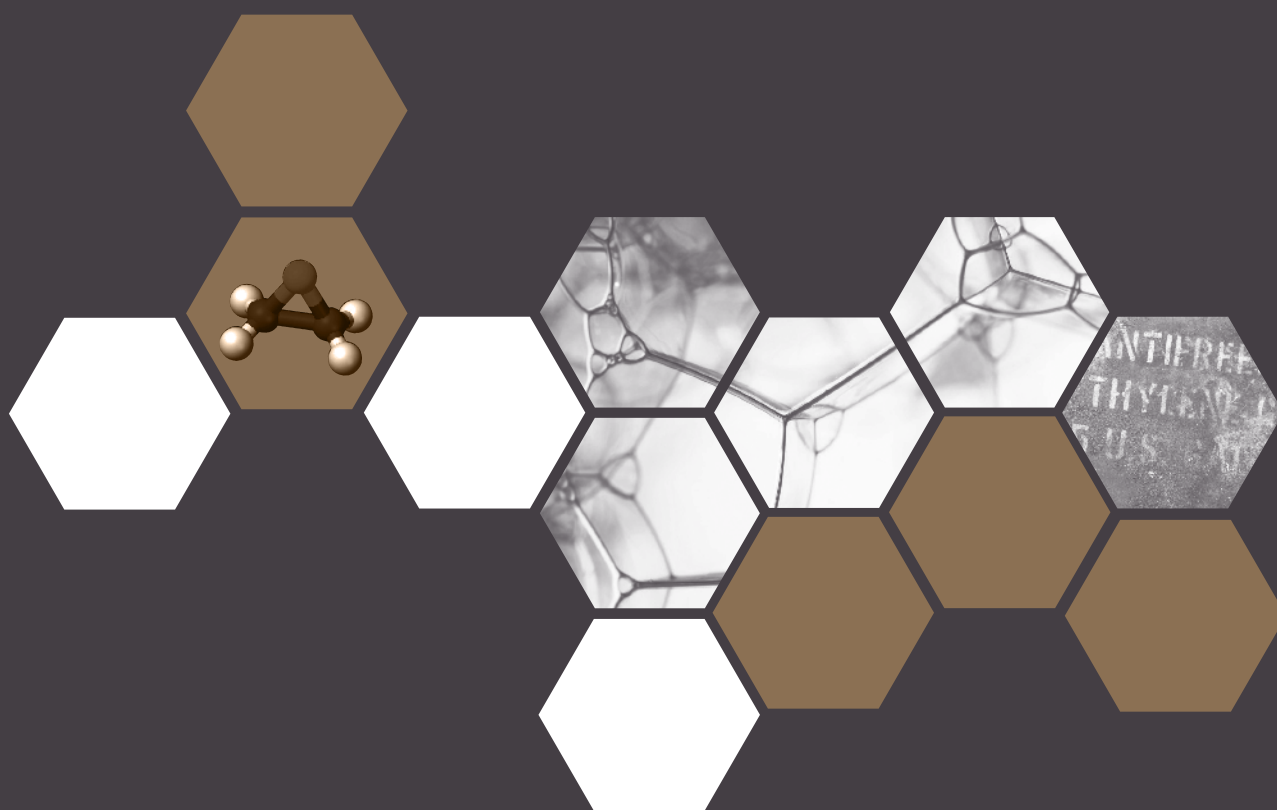


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To the Reader

Manual Preparation

As members and affiliated companies of the American Chemistry Council, we support efforts to improve the industry's responsible management of chemicals. To assist in this effort, the American Chemistry Council's Ethylene Oxide/Ethylene Glycols Panel supported the creation and publication of this manual. The Panel is comprised of the following companies:

Balchem Corporation/ARC Specialty Products

BASF Corporation

Bayer Material Science LLC

Celanese Ltd.

Champion Technologies

Croda, Inc.

The Dow Chemical Company

Eastman Chemical Company

Honeywell

Shell Chemical LP

The development of this manual was led by the Panel's Ethylene Oxide Safety Task Group (EOSTG), a group comprised of producers and users of ethylene oxide. The EOSTG functions to generate, collect, evaluate and share information to support product stewardship with regard to ethylene oxide. The EOSTG formed a manual work group, chaired by Keith Vogel of Lyondell Chemical Company, to lead the development of this document. The following work group members provided significant contributions:

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Appendix E Glossary of Selected Terms, Abbreviations and Organizations

A

AAEE	American Academy for Environmental Engineers. www.aaee.net
AAR	Association of American Railroads. www.aar.org
ABIH®	American Board of Industrial Hygiene®. www.abih.org
ACC	American Chemistry Council (Formerly the Chemical Manufacturers Association). www.americanchemistry.com
ACH	Air Changes per Hour (unit for quantifying air flow).
ACHMM	Academy of Certified Hazardous Materials Managers. www.achmm.org
ACGIH®	American Conference of Governmental Industrial Hygienists. www.acgih.org
ACS	American Chemical Society. www.chemistry.org
ADI	Acceptable Daily Intake
AEGL	Acute Exposure Guideline Levels. www.epa.gov/oppt/aegl
AIChE®	American Institute of Chemical Engineers. www.aische.org
AIHA	American Industrial Hygiene Association (issues EPRGs). www.aiha.org
ALARA	As Low As Reasonably Achievable
ALARP	As Low As Reasonably Practicable
ANSI	American National Standards Institute. www.ansi.org
APHA	American Public Health Association. www.apha.org
API	American Petroleum Institute. www.api.org
APIH	Association of Professional Industrial Hygienists. www.apih.us
AQS	Air Quality Standard

ASHI	American Safety and Health Institute. www.ashinstitute.org
ASME	American Society of Mechanical Engineers. www.asme.org
ASSE	The American Society of Safety Engineers. www.asse.org
ASTM	American Society for Testing & Materials International (a Standards Development Organization that issues, among other things, standards for test methods). www.astm.org
ATSDR	Agency for Toxic Substances and Disease Registry, part of the U.S. Department of Health and Human Services, is a public health agency. www.atsdr.cdc.gov

B

BACT	Best Available Control Technology
BADCT	Best Available Demonstrated Control Technology
BAT	Best Available Technology
BCSP	Board of Certified Safety Professionals. www.bcsp.org
BCT	Best Conventional Technology
BDAT	Best Demonstrated Available Technology
BEIs®	Biological Exposure Indices (ACGIH). www.acgih.org/TLV
BEJ	Best Engineering Judgment
BI	Business Interruption
BLEVE	Boiling Liquid Expanding Vapor Explosion
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand. A measure of the oxygen required to oxidize any organic matter present in a water during a set period of time (usually 5 days).
Bonding	The connection of two or more conductive objects by means of a conductor (most commonly a wire or metal plate)
B.P.	Boiling Point
BPCS	Basic Process Control System
BTU	British Thermal Unit

C

C	Consequence factor, related to magnitude of severity
C#	The number of carbon atoms present in a molecular composition.

CAA	U.S. Clean Air Act. www.epa.gov/oar/caa/contents.html
CAS®	Chemical Abstracts Service. A division of the American Chemical Society, CAS products an index of scientific literature in the chemical field (Chemical Abstracts) and maintains the CAS Registry SM , a database of chemical substances. www.cas.org/
CASRN	CAS Registry SM Numbers are unique, numerical identifiers for chemical substances (chemical compounds, polymers, mixtures, alloys, and biological sequences). CAS numbers are assigned by the Chemical Abstracts Service of the American Chemical Society. The CAS Registry SM Number for ethylene oxide is 75-21-8. www.cas.org/EO/regsys.html#q2
CANUTEC	Canadian Transport Emergency Centre. www.tc.gc.ca/canutec/
CCF	Common Cause Failure
CCOHS	Canadian Centre for Occupational Health and Safety. www.ccohs.ca
CCPS	Center for Chemical Process Safety, a part of AIChE that addresses process safety issues across the chemical, petroleum, and pharmaceutical industries. www.aiche.org/CCPS/About/index.aspx
CDC	Centers for Disease Control & Prevention, part of the U.S. Department of Health and Human Services. www.cdc.gov
CEI	Chemical Exposure Index
CEPA	Canadian Environmental Protection Act. www.ec.gc.ca/CEPARRegistry/the_act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act. www.epa.gov/superfund/action/law/cercla.htm
CFR	U.S. Code of Federal Regulations. www.access.gpo.gov/nara/cfr/cfr-table-search.html
CGA	Compressed Gas Association. www.cganet.com
CHEMNET®	Chemical Industry Mutual Aid Network. www.chemtrec.org/Chemtrec/ProductsAndServices/CHEMNET
CHEMTREC®	Chemical Transportation Emergency Center (part of the American Chemistry Council). www.chemtrec.org
CMA	Chemical Manufacturers Association (now the American Chemistry Council)
CNS	Central Nervous System
COD	Chemical Oxygen Demand. The amount of oxygen needed to oxidize any organic matter in water using harsh chemical conditions.
Confined Space	An area that by design has limited openings for entry and exit. A confined space has unfavorable natural ventilation and is not intended for continuous worker occupancy.

CPC	Chemical Protective Clothing
CPQRA	Chemical Process Quantitative Risk Assessment
CRBOH	Canadian Registration Board of Occupational Hygienists. www.crboh.ca
CSB	U.S. Chemical Safety and Hazard Investigation Board. www.chemsafety.gov
CSSB	Canadian Society of Safety Engineering. www.csse.org
CW	Cooling Water
D	
D	Number of times a component or system is challenged (hr-1 or year-1)
DCS	Distributed Control System
DHS	U.S. Department of Homeland Security. www.dhs.gov/dhspublic
DIERS	The Design Institute for Emergency Relief Systems, a part of AIChE, develops methods for emergency relief system design focusing on handling runaway reactions. www.aiche.org/TechnicalSocieties/DIERS/index.aspx
DIPPR®	The Design Institute for Physical Properties, a part of AIChE, develops thermophysical and environmental property data. www.aiche.org/TechnicalSocieties/DIPPR/index.aspx
DO	Dissolved Oxygen. The amount of molecular oxygen dissolved in water.
DOE	U.S. Department of Energy. www.doe.gov
DOT	U.S. Department of Transportation. www.dot.gov
DSL	Domestic Substances List (Canada). www.ec.gc.ca/CEPARRegistry/subs_list/Domestic.cfm
E	
EBV	Emergency Block Valve
EC	European Community
EG	Ethylene Glycol
EO	Ethylene Oxide
EO/EGs Panel	Ethylene Oxide/Ethylene Glycols Panel of the American Chemistry Council.
EOSTG	Ethylene Oxide Safety Task Group of the American Chemistry Council
EPA	U.S. Environmental Protection Agency. www.epa.gov
EPCRA	Emergency Planning and Community Right-to-Know Act. http://yosemite.epa.gov/oswer/ceppoweb.nsf/content/epcraOverview.htm

ERPG	Emergency Response Planning Guidelines (issued by the AIHA). www.aiha.org/1documents/Committees/ERP-erpglevels.pdf
ERG	Emergency Response Guidebook. This book was developed jointly by the U.S., Canada, and Mexico to assist first responders to hazmat transportation incidents. www.chemtrec.org/Chemtrec/Resources/ERG.htm
ESD	Electrostatic Discharge
ES&H	Environment, Safety & Health
EtO	Ethylene Oxide
EU	European Union. www.eurunion.org
EuReData	European Reliability Data (a series of conferences)
EVC	Equilibrium Vapor Concentration
F	
F	Failure rate (hr-1 or year-1)
<i>f</i>	Frequency (hr-1 or year-1)
FCE	Final Control Element
F&EI	Fire and Explosion Index
Flashpoint	The minimum temperature at which a liquid gives off vapor in sufficient concentrations to form an ignitable mixture with air near the surface of a liquid.
FMEA	Failure Mode and Effects Analysis
F/N	Fatality Frequency versus Cumulative Number
FR	U.S. Federal Register. www.gpoaccess.gov/fr/index.html
FTA	Fault Tree Analysis
G	
GC	Gas Chromatography
GDP	Gross Domestic Product. In the U.S., this is calculated by the Bureau of Economic Analysis by the U.S. Department of Commerce. www.bea.gov
GHS	Globally Harmonized System
GLP	Good Laboratory Practices. GLPs are set out by applicable regulation.
Grounding	The connection of one or more conductive objects to the ground: a specific form of bonding. Grounding is also referred to as “earthing.”
H	
HAP	Hazardous Air Pollutant. www.epa.gov/ttn/atw/pollsour.html
HAZCOM	Hazard Communication (Standard)

HAZMAT	Hazardous Materials
HAZOP	Hazard and Operability Analysis
HAZWOPER	Hazardous Waste Operations and Emergency Response Standard. Hazwoper is a set of OSHA requirements. www.osha.gov/html/faq-hazwoper.html
HCS	Hazard Communication Standard, an OSHA requirement. www.osha.gov/SLTC/hazardcommunications/standards.html
HE	Hazard Evaluation
HHC	Highly Hazardous Chemical
HMIRS	Hazardous Materials Information Resource System, a U.S. DOD automated system functioning as the repository for MSDS for U.S. agencies and the military. www.dlis.dla.mil/hmirs/default.asp
HMIS®	The Hazardous Materials Identification System was developed by the National Paint & Coatings Association to help employers comply with OSHA's Hazard Communication Standard. www.paint.org/hmis/index.cfm
HON	Hazardous Organic NESHAP. www.epa.gov/ttn/atw/hon/honpg.html
HRA	Human Reliability Analysis
HSDB	Hazardous Substances Data Bank, a database of toxicology data managed by the National Library of Medicine. http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB
I	
IARC	International Agency for Research on Cancer, a part of the World Health Organization. www.iarc.fr
ICSC	International Chemical Safety Cards, issued through the International Programme on Chemical Safety. www.cdc.gov/niosh/ipcs/ipcscard.html
IDLH	Immediately Dangerous to Life or Health as defined by NIOSH. www.cdc.gov/niosh/idlh/intridl4.html
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers. www.ieee.org
IMDG	International Maritime Dangerous Goods (IMDG) Code, an international code addressing the transport of dangerous goods by sea. www.imo.org/Safety/mainframe.asp?topic_id=158
IMO	International Maritime Organization. www.imo.org
IOMC	Inter-Organization Programme for the Sound Management of Chemicals, a group that focuses on international coordination on chemical safety matters. www.who.int/iomc/en

IPCS	International Programme on Chemical Safety. Develops International Chemical Safety Cards. www.who.int/ipcs/publications/icsc/en/
IPCT	Industrial Process Cooling Towers.
IPL	Independent Protection Layer
IRIS	Integrated Risk Information System, EPA's database for human health effects from environmental exposures. www.epa.gov/iris
ISA	The Instrumentation, Systems and Automation Society (formerly, Instrument Society of America)
ISHM	Institute for Safety and Health Management. www.ishm.org
ISO	International Organization for Standardization. www.iso.org/iso/en

J

JHA	Job Hazard Analysis
JSA	Job Safety Analysis

K**L**

LAH	Level Alarm – High
LDAR	Leak Detection and Repair
LEL	Lower Explosive Limit
LFL	Lower Flammability Limit
LI	Level Indicator
LIC	Level Indicator – Control
LLDPE	Linear Low Density Polyethylene
LNG	Liquefied Natural Gas
LOPA	Layer of Protection Analysis
LOTO	Lock-Out Tag-Out
LPGs	Liquefied Petroleum Gases
LT	Level Transmitter

M

MACT	Maximum Achievable Control Technology
MAWP	Maximum Allowable Working Pressure

MedlinePlus®	A service of the U.S. National Library of Medicine and NIH, MedlinePlus contains health information and articles from medical journals. http://medlineplus.gov
MeSH	Medical Subject Headings (browser service of the National Library of Medicine).
M&O	Management & Operating
MOC	Management of Change
MSDS	Material Safety Data Sheet, a requirement of the OSHA Hazard Communication Standard. www.osha.gov/SLTC/hazardcommunications/index.html

N

N ₂	Nitrogen
NCEA	National Center for Environmental Assessment of the U.S. Environmental Protection Agency. http://cfpub.epa.gov/ncea .
NDE	Nondestructive Evaluation
NDT	Nondestructive Testing
NEC®	National Electrical Code®, a publication of the National Fire Protection Association. www.nfpa.org
newton	Unit of force in the meter-kilogram-second system equal to the force required to impart an acceleration of one meter per second to a mass of one kilogram.
NFPA	National Fire Protection Association. www.nfpa.org
NGLs	Natural Gas Liquids
NIH	National Institutes of Health, part of the U.S. Department of Health and Human Services. www.nih.gov
NIOSH	National Institute for Occupational Safety and Health, part of the Centers for Disease Control & Prevention of the U.S. Department of Health and Human Services. www.cdc.gov/niosh/homepage.html
NLM	The U.S. National Library of Medicine of the National Institutes of Health. www.nlm.nih.gov
NMAM	NIOSH Manual of Analytical Methods. www.cdc.gov/niosh/nmam
NOEL	No Observed Effect Level
NOAEL	No Observed Adverse Effect Level
NPRI	National Pollutant Release Inventory
NSMS	National Safety Management Society. www.nsms.us

NSPE	National Society of Professional Engineers. www.nspe.org
NTP	National Toxicology Program
O	
OECD	Organisation for Economic Cooperation and Development. www.who.int/iomc/participants/po/en/index2.html
OEL	Occupational Exposure Limit
OES	Occupational Exposure Standard
OPPT	U.S. EPA's Office of Pollution Prevention and Toxics. www.epa.gov/opptintr
OREDA	The Offshore Reliability Date Project
ORD	Office of Research and Development, U.S. Environmental Protection Agency. www.epa.gov/ord
OSBL	Outside Battery Limits
OSHA	U.S. Occupational Safety and Health Administration. www.osha.gov
P	
P	Probability
Pfatality	Probability of Fatality
Pignition	Probability of Ignition
Pperson present	Probability of Person Present
PEL	Permissible Exposure Limit, set by OSHA. www.osha.gov/SLTC/pel
P&ID	Piping and Instrumentation Diagram
PFA	Perfluoroalkoxy Polymer Resin is a polymer resin with properties similar to PTFE.
PFD	Probability of Failure on Demand
PIH	Poison Inhalation Hazard
PHA	Process Hazard Analysis
PHMSA	The Pipeline and Hazardous Materials Safety Administration, part of the U.S. DOT, is responsible for safe and secure movement of hazardous materials to industry and consumers by all transportation modes, including the nation's pipelines. www.phmsa.dot.gov
PI	Pressure Indicator
PL	Protection Layer
PM	Preventative Maintenance
PPE	Personal Protective Equipment

ppm	Parts Per Million
ppmv	Parts Per Million by Volume
ppmw	Parts Per Million by Weight
PrHA	Process Hazard Analysis
PSI	Process Safety Information
psia	Absolute pressure in Pounds per Square Inch
psig	Pounds per Square Inch Gauge
PSM	Process Safety Management
PSR	Pre-Startup Safety Review
PSV	Pressure Safety Valve (Relief Valve)
PTFE	Polytetrafluoroethylene, a thermoplastic fluropolymer, is a polymer of fluorinated ethylene. PTFE has the lowest coefficient of friction of any known solid material. Very non-reactive, this material is often used in containers and piping for reactive chemicals.
PubMed	PubMed, run by the National Library of Medicine, includes citations from MEDLINE and other life science journals for biomedical articles. www.ncbi.nlm.nih.gov/entrez/query.fcgi?DB=pubmed

Q

QA	Quality Assurance
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R

R	Risk
RACT	Reasonably Available Control Technology
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit, set by NIOSH. www.cdc.gov/niosh
RMP	Risk Management Plan
RQs	Reportable Quantities
RREL	Risk Reduction Engineering Laboratory
RV	Relief Valve

S

SAR	Safety Analysis Report
SASS	Safety Assurance System Summary
SCBA	Self-Contained Breathing Apparatus
SCC	Standards Council of Canada. www.ssc.ca
SCE	Safety Critical Equipment

SCHC	Society for Chemical Hazard Communication. This organization promotes effective international hazard communication for chemicals. www.schc.org/schcnewsite/home.php
SHI	Substance Hazard Index
SIF	Safety Instrumented Function
SIL	Safety Integrity Level
SIS	Safety Instrumented System
SOCMA	Synthetic Organic Chemicals Manufacturing Association
SOP	Safe Operating Practice / Standard Operating Procedure
SOT	Society of Toxicology. www.toxicology.org
STEL	Short Term Exposure Limit (ACGIH)
T	
T	Test Interval for the Component or System (hours or years)
TDI	Tolerable Daily Intake
TIH	Toxic Inhalation Hazard
TLV®	Threshold Limit Value (ACGIH). www.acgih.org/TLV
TLV-TWA	Threshold Limit Value, Time Weighted Average (ACGIH)
TOC	Total Organic Carbon
ToxFAQs™	ToxFAQs™ are summaries about hazardous substances developed by ATSDR's Division of Toxicology. www.atsdr.cdc.gov/toxfaq.html
TOXNET®	The Toxicology Data Network is a group of databases covering toxicology, hazardous chemicals, environmental health, and related topics. It is managed by the Toxicology and Environmental Health Information Program in the Division of Specialized Information Services of the National Library of Medicine. http://toxnet.nlm.nih.gov
TPQ	Threshold Planning Quantity
TQ	Threshold Quantity
TRI	Toxics Release Inventory. www.epa.gov/tri
TRS	Terminology Reference System. The US EPA's glossary of commonly used terms. www.epa.gov/trs
TSCA	Toxic Substances Control Act. www.access.gpo.gov/uscode/title15/chapter53_.html
TSD	Treatment, Storage, and Disposal
TWA	Time-Weighted Average

U

UEL	Upper Explosive Limit
UF	Uncertainty Factor
UES	Uniform Emission Standard
UL	Underwriters Laboratory
Ullage	Amount by which a packaging falls short of being liquid full
UN	United Nations. www.un.org
USCG	United States Coast Guard. www.uscg.mil

V

Vapor Pressure	The pressure exerted by a volatile liquid while under defined equilibrium conditions. Vapor pressure is usually measured in millimeters of mercury (mm Hg).
VCE	Vapor Cloud Explosion
VLE	Vapor Liquid Equilibrium
VOC	Volatile Organic Chemical

W

WAO	Wet Air Oxidation
WEBWISER	Internet information system for first responders in hazmat incidents. http://webwiser.nlm.nih.gov
WEEL	Workplace Environmental Exposure Levels (AIHA). www.aiha.org/Content/InsideAIHA/Committees/WEELcomm.htm
WHMIS	Workplace Hazardous Materials Information System (Canada). www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/index_e.html
WHO	World Health Organization, the United Nations' specialized agency addressing public health. www.who.int/en/
WISER	Wireless Information System for emergency responders. A service of the U.S. National Library of Medicine, the system assists first responders in hazmat incidents. http://wiser.nlm.nih.gov

XYZ

XV	Remote Activated/Controlled Valve
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