DOWPER

SOLVENT

330 KG

DOW

DOWPER™ Solvent Advertorial: A Steadfast Solution for Dry Cleaning

Dry cleaners have many solvent choices available to them, all having various chemistries (yes, all dry-cleaning solvents are chemicals, whether regulated or not), and yet Perchloroethylene ("PER") is still the most widely used dry cleaning solvent in the world. Olin is the world's largest perchloroethylene producer, after having purchased The Dow Chemical Company's Global Chlorinated Organics business in 2015.

DOWPER™ Solvent, as manufactured by Olin's Chlorinated Organics business for more than 70 years, is a high purity grade of perchloroethylene, specially stabilized for use in dry-cleaning. Since its initial use as a dry-cleaning solvent, perchloroethylene has remained the industry solution to dry cleaners' challenges.

- PER is not flammable, nor combustible, in virtually any vapor or liquid concentration; and has no flammability limits.
- PER has excellent solvency and readily dissolves virtually all organic stains, such as oils, greases, fats and waxes. This proven cleaning performance is still unmatched by any alternative solvents.
- PER penetrates fibers to dissolve solvent-soluble soils rapidly, because of its low viscosity and low surface tension.
- PER evaporates quickly in moderate heat. Combined with its rapid cleaning capability, this enables a shorter machine cycle time.

- PER has low water solubility and can be easily separated for repeated recycling and reuse in a dry-cleaning machine.
- PER is noncorrosive in dry cleaning machines when proper procedures are followed.

Performance

While DOWPER™ Solvent continues to provide these same performance advantages, perchloroethylene dry cleaning machine technology has greatly improved over the past decades. PER has been well-studied and its risks have been assessed under the European legislation on the safe and environmental use of chemicals (REACH). Today worker exposure is much better controlled due to modern cleaning machine technology, which captures and recycles solvent emissions. These efficient machines also greatly reduce the amount of PER needed for cleaning – less than 10g of solvent per kg of garments. Repeated recycling of the solvent means less solvent use and less waste generated.

Best Practices

Modern cleaning machines cannot completely protect workers from exposure to dry cleaning solvents. Workers must follow best practices for safe handling of chemicals. Alternative solvents (silicones, hydrocarbons, glycol ethers, and/or blends of these materials) may not have been as extensively studied as PER and should also be handled responsibly. This includes the use of appropriate Personal Protective Equipment (PPE) when handling the solvent and waste, and when doing machine maintenance. The proper chemical-resistant gloves, safety glasses and/or goggles, and the proper respirator are recommended if users expect to be exposed to the product above its recommended exposure limits. Consult the Safety Data Sheet for your dry-cleaning solvent for additional guidance or contact your solvent supplier.

Tips

Using modern dry-cleaning equipment and following best practices can effectively mitigate many of the risks of PER during standard operations and help to maintain a successful business and safe working environment. Some examples of best practices are given below.

- Comply with all regulations governing the storage, use, and handling of PER for dry cleaning, including waste handling. Obtain and maintain all required licenses/permits and documentation for your cleaning plant.
- Keep a clean/safe work environment. Provide appropriate training and PPE for employees, based on their tasks. Ensure adequate workplace ventilation.
- Follow the manufacturer's recommendations for dry cleaning machine inspections and maintenance. Replace worn parts as recommended.
- Consider sealing the floor drains and concrete floors as added protection against leaks and spills (PER can migrate through concrete if not sealed with an impervious coating).
- Label hazardous waste appropriately. Use secondary containment for solvent and waste. Keep waste containers sealed when not in use. Use a licensed hazardous waste carrier for disposal.

Legal Requirements

Contrary to what its critics state, PER has few restrictions for use in dry cleaning around the world. Efficient machines and appropriate best practices have been developed over the years to mitigate the known risks of PER. Through Olin's worldwide distributor network, DOWPER™ Solvent continues to be used successfully by dry cleaners committed to the safe use of perchloroethylene.

DOWPER ™ is a trademark of The Dow Chemical Company

OLIN CORPORATION
SALES SPECIFICATION

Date Printed: 2016-02-08

Effective Date: 02/06/2013
Supersedes Date: 08/26/2008

Name: DOWPER™ Solvent

Specification Number: 000000025202
Previous Specified Material: 00025202

Additional Product Information:
Perchloroethylene

Shelf Life

Container Type	Conditions of Handling	Conditions of Storage	Shelf Life	Deterioration Characteristics
Bulk			2 Years	
Drum			2 Years	

Government and Industry Standards

ASTM D4081

DIN 53978

Final Testing Requirements

Test and Test Condition	Limit	Unit	Method	Note
Water	30 Max	ppm	ASTM D3401	
Color, Pt-Co	15 Max		ASTM D2108	
Non Volatile Residue	10 Max	ppm	ASTM D2109	
Alkalinity (as NaOH)	15 — 30	ppm	ASTM D2106	
Perchloroethylene	99.900 Min	WT%	ASTM D6806	

OLIN CORPORATION
SALES SPECIFICATION

Name: DOWPER™ Solvent
Specification Number: 000000025202
Effective Date: 02/06/2013

External Notes

1 Latin America Water Content: <60 ppm, based on market demand

2 Shelf life is 2 years from date of packaging.

3 Typical Properties:
Specific Gravity, 25/25: 1.618 - 1.622
Distillation Range @ 760mmHg, IBP-DP: 120.5 - 122.0 degC
Stability with Copper: Pass

READ PRECAUTIONARY INFORMATION AND MATERIAL SAFETY SHEETS. THIS PRODUCT IS SHIPPED IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS REGARDING CLASSIFICATION, PACKAGING, SHIPPING AND LABELING.

SAFETY DATA SHEET
BLUE CUBE OPERATIONS LLC

Product name: DOWPER™ Solvent

Issue Date: 05/10/2016
Print Date: 11/29/2016

BLUE CUBE OPERATIONS LLC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. IDENTIFICATION

Product name: DOWPER™ Solvent

Recommended use of the chemical and restrictions on use
Identified uses: Industrial solvent. As your supplier, we do NOT approve this product for direct sales to the general public. As your supplier, we do NOT recommend the use of this product in applications where: - soil or ground water contamination is likely (direct applications to the ground, sink drains, sewers, or septic tanks). - where over exposure is likely (small rooms or confined space, or where there would be inadequate ventilation). - where skin contact is likely (adhesive tape removal from skin or as hand cleaner to remove oils and greases). - where there is direct food contact. - where vapor concentrations would be in the flammable range. - where disposal of waste would pose an environmental or health risk. - where chemical reactivity poses a danger (contact with strong alkali, or in areas where welding is done).

COMPANY IDENTIFICATION
BLUE CUBE OPERATIONS LLC
2030 DOW CENTER
MIDLAND MI 48674-0000
UNITED STATES

Customer Information Number: +1 844-238-3445
INFO@OLINBC.com

EMERGENCY TELEPHONE NUMBER
24-Hour Emergency Contact: 1 800 424 9300
Local Emergency Contact: 1 800-424-9300

2. HAZARDS IDENTIFICATION

Hazard classification
This material is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.
Skin irritation - Category 2
Skin sensitisation - Sub-category 1B
Carcinogenicity - Category 2
Specific target organ toxicity - single exposure - Category 3

Label elements
Hazard pictograms

Signal word: **WARNING!**

Hazards
Causes skin irritation.
May cause an allergic skin reaction.
May cause drowsiness or dizziness.
Suspected of causing cancer.

Precautionary statements

Prevention
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
Wash skin thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Contaminated work clothing should not be allowed out of the workplace.
Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response
IF ON SKIN: Wash with plenty of soap and water.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
IF exposed or concerned: Get medical advice/ attention.
If skin irritation or rash occurs: Get medical advice/ attention.
Take off contaminated clothing and wash before reuse.

Storage
Store in a well-ventilated place. Keep container tightly closed.
Store locked up.

Disposal
Dispose of contents/ container to an approved waste disposal plant.

Other hazards
No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms: Tetrachloroethylene
This product is a substance.

Component	CASRN	Concentration

Ethene, tetrachloro-	127-18-4	> 99.9 %

4. FIRST AID MEASURES

Description of first aid measures
General advice: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Skin contact: Remove material from skin immediately by washing with soap and plenty of water. Remove contaminated clothing and shoes while washing. Seek medical attention if irritation persists. Wash clothing before reuse. Discard items which cannot be decontaminated, including leather articles such as shoes, belts and watchbands. Suitable emergency safety shower facility should be available in work area.

Eye contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Ingestion: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed: Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed
Notes to physician: Maintain adequate ventilation and oxygenation of the patient. If burn is present, treat as any thermal burn, after decontamination. Exposure may increase "myocardial irritability". Do not administer sympathomimetic drugs such as epinephrine unless absolutely necessary. Alcohol consumed before or after exposure may increase adverse effects. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Skin contact may aggravate preexisting dermatitis.

5. FIREFIGHTING MEASURES

Suitable extinguishing media: This material does not burn. If exposed to fire from another source, use suitable extinguishing agent for that fire.

Unsuitable extinguishing media: None known.

Special hazards arising from the substance or mixture
Hazardous combustion products: Fire conditions may cause this product to decompose. Refer to section 10 - Thermal Decomposition.

Unusual Fire and Explosion Hazards: Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

Advice for firefighters
Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Do not use direct water stream. May spread fire. This material does not burn. Fight fire for other material that is burning. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this (M)SDS.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Evacuate area. Only trained and properly protected personnel must be involved in clean-up operations. Keep personnel out of low areas. Keep upwind of spill. Ventilate area of leak or spill. Refer to section 7, Handling, for additional precautionary measures. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Material will sink in water. Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

Methods and materials for containment and cleaning up: Small spills: Absorb with materials such as: Bentonite. Sawdust. Clay. Large spills: Contain spilled material if possible. Recover spilled material if possible. Collect in suitable and properly labeled containers. Suitable containers include: Metal drums. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling: Do not swallow. Avoid breathing vapor. Avoid contact with skin and clothing. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. Do not enter confined spaces unless adequately ventilated. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Conditions for safe storage: Store under cover in a dry, clean, cool, well ventilated place away from sunlight. Do not handle or store near an open flame, heat, or sources of ignition. Keep container tightly closed when not in use. Do not store in: Aluminum. Aluminum alloys. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact. Ask for a product brochure.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure limits are listed below, if they exist.

Component	Regulation	Type of listing	Value/Notation
Ethene, tetrachloro-	Dow IHG	TWA	10 ppm
	ACGIH	TWA	25 ppm
	ACGIH	STEL	100 ppm
	ACGIH	TWA	BEI
	OSHA Z-2	TWA	100 ppm
	ACGIH	STEL	BEI
	OSHA Z-2	CEIL	200 ppm
	OSHA Z-2	Peak	300 ppm

Exposure controls

Engineering controls: Use engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only in enclosed systems or with local exhaust ventilation. Exhaust systems should be designed to move the air away from the source of vapor/aerosol generation and people working at this point. Lethal concentrations may exist in areas with poor ventilation.

Individual protection measures

Eye/face protection: Use safety glasses (with side shields).

Skin protection

Hand protection: Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl alcohol ("PVA"). Viton. Examples of acceptable glove barrier materials include: Butyl rubber. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Other protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use an approved respirator. Selection of air-purifying or positive-pressure supplied-air will depend on the specific operation and the potential airborne concentration of the material. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus. In confined or poorly ventilated areas, use an approved self-contained breathing apparatus or positive pressure air line with auxiliary self-contained air supply.

The following should be effective types of air-purifying respirators: Organic vapor cartridge.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state	Liquid.
Color	Colorless

Odor	Characteristic
Odor Threshold	No test data available
pH	Not applicable
Melting point/range	-22 °C (-8 °F) *Literature*
Freezing point	-22 °C (-8 °F) *Literature*
Boiling point (760 mmHg)	121.4 °C (250.5 °F) *Literature*
Flash point	**closed cup** *ASTM D 56* (none)
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	Not Applicable
Lower explosion limit	Not applicable
Upper explosion limit	Not applicable
Vapor Pressure	13 mmHg at 20 °C (68 °F) *Literature*
Relative Vapor Density (air = 1)	5.76 *Literature*
Relative Density (water = 1)	1.619 at 25 °C (77 °F) *Literature*
Water solubility	0.015 % at 25 °C (77 °F) *Literature*
Partition coefficient: n-octanol/water	log Pow: 2.53 *Measured*
Auto-ignition temperature	Not combustible.
Decomposition temperature	No test data available
Kinematic Viscosity	0.52 mm2/s at 25 °C (77 °F) *Estimated.*
Explosive properties	No
Oxidizing properties	No
Molecular weight	165.8 g/mol *Literature*
Percent volatility	100 % *Literature*

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity: No data available

Chemical stability: Stable under recommended storage conditions. See Storage, Section 7.

Possibility of hazardous reactions: Polymerization will not occur.

Conditions to avoid: Exposure to elevated temperatures can cause product to decompose. Avoid open flames, welding arcs, or other high temperature sources which induce thermal decomposition. Avoid direct sunlight or ultraviolet sources.

Incompatible materials: Avoid contact with: Strong bases. Strong oxidizers. Avoid contact with metals such as: Zinc powders. Zinc. Aluminum powders. Magnesium powders. Potassium. Sodium. Avoid unintended contact with: Amines.

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Hydrogen chloride. Decomposition products can include trace amounts of: Chlorine. Phosgene.

11. TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

Acute toxicity

Acute oral toxicity
Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.

LD50, Rat, > 3,000 mg/kg OECD 401 or equivalent

Acute dermal toxicity
Prolonged skin contact is unlikely to result in absorption of harmful amounts.

LD50, Rabbit, > 10,000 mg/kg Other guidelines

Acute inhalation toxicity
In confined or poorly ventilated areas, vapor can readily accumulate and can cause unconsciousness and death. Dizziness may occur at 200 ppm perchloroethylene; progressively higher levels may also cause nasal irritation, nausea, incoordination, drunkenness, and over 1000 ppm, unconsciousness and death. A single brief (minutes)inhalation exposure to levels above 6000 ppm perchloroethylene may be immediately fatal. Based on structural analogy and/or equivocal data in animals, excessive exposure may potentially increase sensitivity to epinephrine and increase myocardial irritability (irregular heartbeats). Alcohol consumed before or after exposure may increase adverse effects.

LC50, Rat, 4 Hour, vapour, > 20 mg/l

Skin corrosion/irritation
Brief contact may cause moderate skin irritation with local redness.
Repeated contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage.
Prolonged or repeated exposure may cause defatting of the skin leading to drying or flaking of skin.

Serious eye damage/eye irritation
May cause pain disproportionate to the level of irritation to eye tissues.
May cause slight temporary eye irritation.
Low vapor concentrations may cause eye irritation; these concentrations are easily attainable at room temperature.

Sensitization
Has demonstrated the potential for contact allergy in mice.

For respiratory sensitization:
No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)
May cause drowsiness or dizziness.
Route of Exposure: Inhalation
Target Organs: Central nervous system

Specific Target Organ Systemic Toxicity (Repeated Exposure)
In humans, effects have been reported on the following organs:
Central nervous system.
In animals, effects have been reported on the following organs:
Central nervous system.
Kidney.
Liver.
Observations in animals include:
Anesthetic or narcotic effects.

Carcinogenicity
Perchloroethylene has been shown to increase the incidence of tumors in certain strains of mice and rats. Other long-term inhalation studies in rats failed to show tumorigenic response. Human data are limited and have not established an association between perchloroethylene exposure and cancer. Perchloroethylene is not believed to pose a measurable carcinogenic risk to man when handled as recommended.

Teratogenicity
Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Did not cause birth defects in laboratory animals.

Reproductive toxicity
In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals. In animal studies, did not interfere with fertility.

Mutagenicity
In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

Aspiration Hazard
Based on physical properties, not likely to be an aspiration hazard.

Carcinogenicity

Component	**List**	**Classification**
Ethene, tetrachloro-	IARC	Group 2A: Probably carcinogenic to humans
	US NTP	Reasonably anticipated to be a human carcinogen
	ACGIH	A3: Confirmed animal carcinogen with unknown relevance to humans.

12. ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

Toxicity
Acute toxicity to fish

Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

LC50, Oncorhynchus mykiss (rainbow trout), flow-through test, 96 Hour, 5 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), static test, 48 Hour, 8.5 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants
EC50, Green algae (Chlamydomonas reinhardtii)., 72 Hour, Growth rate inhibition, 3.64 mg/l, OECD Test Guideline 201 or Equivalent

EC50, Green algae (Chlamydomonas reinhardtii)., 72 Hour, Growth rate inhibition, 1.77 mg/l

Toxicity to bacteria
IC50, Bacteria, 24 Hour, 112 mg/l

Chronic aquatic toxicity
Chronic toxicity to aquatic invertebrates
NOEC, Daphnia magna (Water flea), semi-static test, 28 d, number of offspring, 0.51 mg/l

Toxicity to soil-dwelling organisms
EC50, Eisenia fetida (earthworms), 24 Hour, 113.4 mg/kg

Persistence and degradability

Biodegradability: Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions. Biodegradation may occur under anaerobic conditions (in the absence of oxygen). Biodegradation rate may increase in soil and/or water with acclimation.

Theoretical Oxygen Demand: 0.19 mg/mg

Photodegradation
Sensitizer: OH radicals
Atmospheric half-life: 50 d
Method: Estimated.

Bioaccumulative potential

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 2.53 Measured
Bioconcentration factor (BCF): 49 Lepomis macrochirus (Bluegill sunfish) 21 d Measured

Mobility in soil

Potential for mobility in soil is high (Koc between 50 and 150).
Partition coefficient (Koc): 141 Estimated.

13. DISPOSAL CONSIDERATIONS

Disposal methods: DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Recycler. Reclaimer. Incinerator or other thermal destruction device. DISPOSAL OF CONTACT WATER: Process water in contact with solvent and/or water separators of cleaning or distillation equipment should be treated as hazardous waste. Do not discharge water from water separators to drain.

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Tetrachloroethylene
UN number	UN 1897
Class	6.1
Packing group	III
Marine pollutant	Tetrachloroethylene
Reportable Quantity	Tetrachloroethylene

Classification for SEA transport (IMO-IMDG):

Proper shipping name	TETRACHLOROETHYLENE
UN number	UN 1897
Class	6.1
Packing group	III
Marine pollutant	Tetrachloroethylene
Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Proper shipping name	Tetrachloroethylene
UN number	UN 1897
Class	6.1
Packing group	III

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. REGULATORY INFORMATION

OSHA Hazard Communication Standard
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312
Acute Health Hazard
Chronic Health Hazard

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313
This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Components	**CASRN**
Ethene, tetrachloro-	127-18-4

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Section 103

Components	**CASRN**	**RQ**
Ethene, tetrachloro-	127-18-4	100 lbs RQ

Pennsylvania Worker and Community Right-To-Know Act:
The following chemicals are listed because of the additional requirements of Pennsylvania law:

Components	**CASRN**
Ethene, tetrachloro-	127-18-4

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)
WARNING: This product contains a chemical(s) known to the State of California to cause cancer.

Components	**CASRN**
Ethene, tetrachloro-	127-18-4
Trichloromethane	67-66-3
Carbon tetrachloride	56-23-5
1,1,1,2-Tetrachloroethane	630-20-6
1,1,2,2-Tetrachloroethane	79-34-5
Dichloromethane (methylene chloride)	75-09-2
1,1,2-Trichloroethylene	79-01-6
1,1,1,2,2,2-Hexachloroethane	67-72-1

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)
WARNING: This product contains a chemical(s) known to the State of California to cause birth defects or other reproductive harm.

Components	**CASRN**
Trichloromethane	67-66-3

United States TSCA Inventory (TSCA)
All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

16. OTHER INFORMATION

Revision
Identification Number: 101198869 / A476 / Issue Date: 05/10/2016 / Version: 13.0
Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

ACGIH	USA. ACGIH Threshold Limit Values (TLV)
BEI	Biological Exposure Indices
CEIL	Acceptable ceiling concentration
Dow IHG	Dow Industrial Hygiene Guideline
OSHA Z-2	USA. Occupational Exposure Limits (OSHA) - Table Z-2
Peak	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift
STEL	Short-term exposure limit
TWA	8-hour time weighted average

Information Source and References
This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

BLUE CUBE OPERATIONS LLC urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

INFORMATION

LAST UPDATE: MAY 2020

All About "PER" … in a nutshell
Today's number one dry-cleaning solvent in Europe

The substance perchloroethylene, simply called PER, has been a dry-cleaning solvent in Europe for more than 70 years. Today, it is still the number one substance for this application. There are many good reasons for that. We explore them in this Information Sheet in the light of current legislative developments in Europe.

PERCHLOROETHYLENE

PER is the solvent of choice due to its efficiency, applicability to almost all garments, recyclability, energy efficient usage and (very importantly) its non-flammability.

THE "P" IN PER STANDS FOR *PEOPLE*

PER is one of the most studied solvents. It has been risk assessed under the existing chemicals regime in 2007 and since 2010 under REACH[1].

Numerous epidemiological studies of a very large number of people over many years have shown that PER is safe in dry-cleaning when properly used.

PER also demonstrated no clear association between its exposure and subsequent cancer morbidity in around 10,000 workers in dry-cleaning and laundry over more than 20 years in a recent study in Sweden.

PER is recognised as a hazardous substance, but workers' exposure to PER today is well controlled due to closed machine technology.

ECSA, the European Chlorinated Solvent Association, has developed recommendations for the safe handling of PER[2].

THE "P" IN PER STANDS FOR *PERFORMANCE*

PER labelling: 95 % of all garments are labelled for the use of PER cleaning technology.

It is seen as the **best choice for cleaning fine, delicate or sensitive garments**.

Perchloroethylene remains to be the benchmark for **high quality dry-cleaning**. It rapidly penetrates fibres to dissolve soils, stains, fat and oils without shrinkage or damage of garments.

PER has also **triggered technology progress**: closed machines have been implemented with on-site recycling technology, being a standard today, resulting in significant reduction of transport costs and related CO_2 emissions.

PER, combined with modern cleaning machines, also leads to **very high cleaning efficiency**: less than 10 g of PER per kg garment is used in latest machine technology.

[1] https://echa.europa.eu/regulations/reach/legislation

2 (https://www.chlorinated-solvents.eu/safety-technology/storage-handling/).

THE "P" IN PER STANDS FOR *PLANET*

PER use in modern machines is designed to fulfil all the emission requirements of the EU Industrial Emissions Directive (IED) [3] and REACH.

PER's overall eco-efficiency is currently unmatched because of its unique recycling properties when used in modern equipment.

PER is recycled many times internally in the dry-cleaning machine and, once its cleaning efficiency has been exhausted, it is usually brought to external recyclers that distil off the virgin PER to be reused. Hence, PER is a good example for the reuse of products as requested in a circular economy.

PER AND ITS LEGAL SITUATION IN EUROPE

PER use in dry-cleaning is regulated by REACH and the European IED, as well as several national regulations.

The use of PER in dry-cleaning was registered under REACH in 2010. The risk assessment for the use of PER in dry-cleaning under REACH demonstrates safe use in this application with modern closed equipment.

The use of PER in modern closed equipment used in dry-cleaning fulfil the emission requirements of the EU IED.

ECSA strongly recommends the use of modern closed equipment in its recommendations for cleaning machines: https://www.chlorinated-solvents.eu/publications/recommendations-for-cleaning-machines.

For details on handling PER, see the ECSA Guidance on Storage and Handling: https://www.chlorinated-solvents.eu/safety-technology/storage-handling.

ECSA recommends using the latest machine generations (type V) and respective safe-handling practices, which suffices to meet the even more stringent German, Dutch and French national maximum air concentration limits for the general population of 100-250 µg. The EU recommendation for an Occupational Exposure Limit (OEL) by the Scientific Committee on Occupational Exposure Limits (SCOEL) is 20 ppm for workers. Within the REACH registration dossier, all risk assessments are based on this peer-reviewed OEL and, on this basis, an OEL for the general public was derived as being a quarter of the worker OEL.

In conclusion, new machines allow the adequate control of emissions and exposure; together with properly-trained staff, PER can be used in the same safe way as other solvents.

The REACH dossier for PER has been evaluated by EU national authorities (Latvia) in 2013 and concluded that further regulatory action is not necessary based on this current REACH dossier. Hence the REACH dossier properly reflects the hazards of PER, as well as describing the related risk management measures (RMM's). These RMM's can be found in the exposure scenarios attached to your supplier's safety datasheet.

NATIONAL REGULATION

FRANCE

In December 2012, France updated its regulation (arrêté 2345) concerning the use of PER in dry-cleaning machines in shops adjacent to inhabited buildings. All machines located in workplaces adjacent to inhabited buildings have to be phased out by 2022. PER can still be used in dry-cleaning facilities in industrial areas.

[3] https://ec.europa.eu/environment/industry/stationary/ied/legislation.htm

IS “PER" BANNED ELSEWHERE IN THE EU?

Most EU countries have implemented stringent requirements for the use of PER in dry-cleaning.

No EU country has banned PER for use in dry-cleaning – a proper enforcement of existing regulations sets out to ensure the safe handling and protection of workers and the general public around dry-cleaning shops.

Denmark also implemented measures, which are often mentioned as a ban on PER, as part of strict measures for all solvents used in dry-cleaning. The majority of Danish dry-cleaners use PER, according to the Danish Dry-Cleaning Association.

In the USA, according to the US EPA, dry-cleaning machines located in residential areas (i.e. in buildings co-located with residents) will be phased out by 2020.

This ban only affects a smaller number of dry-cleaning shops and only some big cities. For instance, dry-cleaning machines in the majority of the US federal states located in commercial centres, industrial areas and serving "cold-shops", do not face prohibition.

European Chlorinated Solvents Association
https://www.chlorinated-solvents.eu/

ECSA Product Group Manager:
Angelica Candido — ecsa@cefic.be