

The guide to utilization of FLUBOX® IBCs was written for supplying to all users a general approach for his correct utilization, stocking, maintenance and transport.

***IMPORTANT: It is essential to respect the instructions provided with this document, to ensure personal safety and to prevent breakage and accidental spillage of product!***

The filler and shipper are responsible for determining the suitability of the package (FLUBOX® IBC) for the product to be filled, stored, transported and emptied. The shipper is also responsible for investigating and complying with all local and national and international regulatory codes.

We suggest to read ADR point 7.5.7 and EN 12195 standard



## **GENERAL INDEX**

### **1. SHIPPER'S RESPONSIBILITY**

### **2. INFORMATION ABOUT CORRECT HANDLING**

*General Instructions*

*Filling*

*Closing*

*Dynamic Stacking*

*Static Stacking*

*Shipment*

*Emptying*

### **3. CORRECT USE OF FUSTIPLAST PLASTIC INNER RECEPTACLE**

### **4. CHEMICAL COMPATIBILITY HD PE**

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## 1. SHIPPER'S RESPONSIBILITY

According to all hazardous materials transportation codes, both domestic and international, the shipper has the responsibility to know the level of danger of his products, to communicate that hazard to carriers, to emergency response personnel, to customers and, in emergency cases, to the general public; he is also responsible of the selection of appropriate packaging among the range of alternative packaging types authorized by laws.

The organization shall appoint a consultant for the safe transport of dangerous goods, whose skills contains also "state of packaging and periodic inspection".

( Decreto Legislativo n. 40 del 4 febbraio 2000)

It is important that shipper don't mix up the "duration of UN Homologation" (5 years from the production date, plus a test of leak absence after 2,5 years from the production date) with the duration of the container or with "the duration of responsibilities": who ships once again the container IBC has the responsibility to proof the suitability for re-use.

ADR 1.2.1 - letter R :

"Reused packaging" means a packaging which has been examined and found free of defects affecting the ability to withstand the performance tests. The term includes those which are refilled with the same or similar compatible contents and are carried within distribution chains controlled by the consignor of the product

ADR 4.1.1.9 :

New, remanufactured or reused packagings, including ibcs and large packagings, or reconditioned packagings and repaired or routinely maintained ibcs shall be capable of passing the tests prescribed in 6.1.5, 6.3.2, 6.5.6 OR 6.6.5, as applicable. Before being filled and handed over for carriage, every packaging, including ibcs and large packagings, shall be inspected to ensure that it is free from corrosion, contamination or other damage and every IBC shall be inspected with regards to the proper functioning of any service equipment

Any packaging which shows signs of reduced strength as compared with the approved design type shall no longer be used or shall be so reconditioned that it is able to withstand the design type tests. Any IBC which shows signs of reduced strength as compared with the tested design type shall no longer be used or shall be so repaired or routinely maintained that it is able to withstand the design type tests.

ADR 4.1.1.15 :

For plastics drums and jerricans, rigid plastics IBCs and composite IBCs with plastics inner receptacles, unless otherwise approved by the competent authority, the period of use permitted for the carriage of dangerous substances shall be five years from the date of manufacture of the receptacles, except where a shorter period of use is prescribed because of the nature of the substance to be carried.

**According to the law, no container manufacturer or carrier in any mode of transportation can relieve the shipper from these basic obligations.**

Fustiplast FLUBOX® IBC has been designed, engineered and tested for the safe and efficient handling of both hazardous and non-hazardous liquids. Composed by modular components, the FLUBOX® IBC consists of a galvanized square tubular steel cage, secured to a wooden, steel or polyethylene pallet which encloses a co-extruded blow molded bottle of UV stabilized high molecular weight, high density polyethylene (HD HMW PE). The bottle includes as standard a 6" (150 mm) opening at its top and a 2" (50 mm) outlet at its bottom.

FLUBOX® IBC is available in versions which are suited for food grade and products for personal use, corresponding to REGULATION (EC) No 1935/2004 and REGULATION (EU) No 10/2011

Moreover, FLUBOX® is conform to directive 94/62/CE on packaging and packaging waste

The operating instructions cover all models and use FLUBOX ®.

Should you have any question, please contact Fustiplast technical service department, your local sales representative, or visit our web site [www.fustiplast.it](http://www.fustiplast.it)

**Note:**

The inner receptacle of composite IBCs shall be marked in conformity to ADR 6.5.2.2.4

## **2. INFORMATION ABOUT CORRECT HANDLING**

### **2.1. General instructions**

- Be sure that FLUBOX® is stored on a level surface, free from foreign objects
- Maintain complete support on the bottom of the FLUBOX® at all times
- All agitators, pumps and other equipment must be mounted on independent structural support, not in direct contact with the cage.
- FLUBOX® is a container addressed to transportation of liquids, therefore its discharging valve is designed for the emptying of all the product at one time; the use of FLUBOX® as stocking container for the next drawing of partial quantities of product has to be considered an improper use
- Any piping, strainers, shut-off valves or hoses connected to the FLUBOX® valve must be independently supported. Failure to do so may cause damage to the valve itself or the valve connection area
- It is important to use expansion joints to help provide relief from expansion and contraction of external piping and the FLUBOX® IBC. This relief is necessary to help to prevent damage to the fittings
- It is essential to protect FLUBOX® IBC from impact or abrupt contact with other objects, particularly at temperatures below 0°C / 32°F
- To ensure safe handling of hazardous materials use Chemical Resistance Chart as a guide for product compatibility. See Chapter 4, Compatibility
- The FLUBOX® IBC whether empty or full, should always be handled by means of its pallet using a forklift or pallet jack. Be sure that the forks extend across the entire bottom of the unit. Never try to lift the FLUBOX® IBC from the top-side of the cage or tie bars

- During moving or opening operations on FLUBOX® use always safety protection devices (gloves, shoes, etc.)



- The pallet on the FLUBOX® IBC, whether galvanized steel, wood or plastic provides four-way entry. Forklift operators need to take care to not damage the unit with the forks while approaching the pallet
- The FLUBOX® IBC should never be moved by sliding across the floor (pushed or pulled by a forklift, for example)
- When transporting with forklift, limit the speed: in case of sudden braking inertia of the IBC (especially when full) may cause the falling from the forklift.
- In the event of damage or loss of integrity the container should immediately be taken out of service and properly disposed
- Avoid any impact or applying stress to the valve

## 2.2. Filling

- Fill the FLUBOX® through the opening at atmospheric pressure
- All the valves of FLUBOX® are equipped with 3 seals of guarantee:

1) safety screw

2) welded aluminium seal



**Do not remove any seal of the valve during filling, stocking and transport.**

- Before filling any container be sure that the bottom discharge valve is properly tightened and that the handle is in the closed position
- When filling the container with a hot liquid (max. temperature of content 60°C/140°F), the cooling of internal air and the consequent decrease in volume could cause deformation or the implosion of the HDPE bottle if entry of air into the bottle is not allowed: don't tighten fully the lid until the content is completely cooled or use venting systems integrated in the lid.

- After filling, tighten the top screw cap with the proper hand wrench before storing or shipping. Screw cap wrench are available for the correct closure of the upper lid (for further details please contact the commercial department of Fustiplast)
- If the container has been stocked completely closed under the sun, eventual deformation of the steel cage are due to the increase of volume or the air inside the FLUBOX® and to the following pressure which develops internally



### 2.3. Closing

All the accessories shall be hand-tightened according to the following torque settings, for these reasons

- 1 – excessive tightening could distort gaskets and cause leakings
- 2 – the appropriate tightening satisfy the UN requirements

- |                             |        |
|-----------------------------|--------|
| • Lid □ 150mm / 6" :        | 140 Nm |
| • Lid □ 225mm / 9" :        | 180 Nm |
| • Safety cap for valve 2" : | 30 Nm  |

### 2.4. Dynamic Stacking (during the transport)

- Stacking of empty or filled (up to 1.5 specific gravity) FLUBOX® is authorized up to 2 high, on condition that the stability of the stack is secure. The shipper must be responsible for the proper loading and securing of all units.



- Note: due to the asymmetry of the pallets, the containers shall always be stacked in the same direction and the top container properly centered "nested" on the one below.

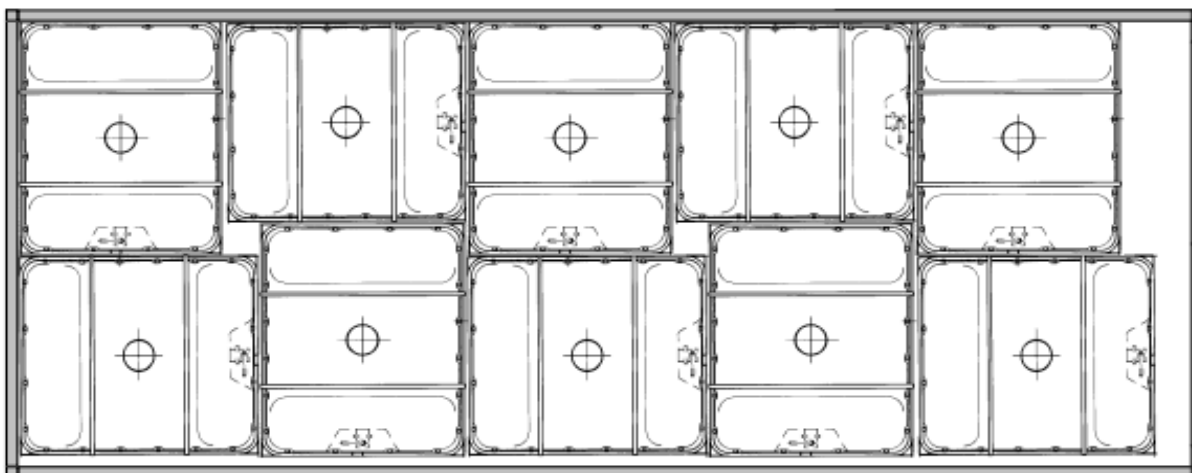
### 2.5. Static stacking (storage)

- *IBCs stacking must respect both following limits:*
  - *Maximum stackable weight indicated in approval inscription reported on marking plate must never be overdue*
  - *Maximun stack height is 4 pieces*
- *Stacking of full FLUBOX® IBCs is allowed on conditions that :*
  - *All limits to stacking height are respected*
  - *The support surface is perfectly horizontal*
  - *IBCs are properly nested*
  - *Only IBCs of the same type/model are stacked together*
  - *All conditions which guarantee stability of the stack, are ensured*

- *Compliance with the weights indicated on the approval markings is ensured*
- *Was performed by the customer a risk analysis that ensures the safety of the solution, taking into account all the possible variables that can affect the stability of the stack and of all the risks present on-site Storage*
- *FLUBOX® IBCs with plastic pallet cannot be stacked if exposed to the sun or to temperatures able to reduce significantly mechanical performances of polyethylene.*
- *The stacking of empty FLUBOX® IBCs shall be limited in height on the basis of risk analysis (to be done by the customer) that takes into account all the possible variables that can affect the stability of the stack and of all the risks present on the site storage, including:*
  - *Storage location (internal or external)*
  - *Climatic conditions, with particular attention to the wind that can move easily empty containers*
  - *Lifting devices available.*

## 2.6 Shipment

- The FLUBOX® IBC has been designed to be suitable for common means of transport for both domestic and international markets.
- The standard measures (1.000 x 1.200 mm.) allow to load in an ISO 20' container till 20 FLUBOX® (10 standard FLUBOX® on the floor, 8 standard FLUBOX®+ 2 lower FLUBOX®piled up).



- All transportation of the FLUBOX® IBC must be done in compliance with existing local and international regulations. Safety protocol regardless of whether the product is classified as hazardous or non-hazardous must also be observed and followed
- The FLUBOX® IBC must be handled in the upright position and secured to prevent any movement (side to side and/or upwards) during shipment
- The FLUBOX® IBC shall always be stacked in the same direction and properly “nested” on the lower unit
- Do not stack or load any items (drums, crates, equipment, etc.) on top of the FLUBOX® IBC. Any foreign items may damage the inner-bottle.
- Before loading the FLUBOX® IBC make sure that there are no pointed or protruding nails, screws, sharp edges, etc. on the walls or the floor of the transport vehicle which could damage or puncture the container .
- We suggest to read ADR point 7.5.7 and EN 12195 standard



## 2.7. Emptying

- Use bottom discharge valve to empty the FLUBOX® IBC
- Loosen top fill cap to allow air into FLUBOX® IBC to prevent collapse (vacuum) of the HDPE bottle while emptying.
- Remove the dust cap from the valve.
- If applicable, remove the aluminum laminated PE-foil tamper evident seal from the valve. ( Warning: verify that valve is closed before performing this operation )
- To discharge the product follow these instructions:

**Butterfly Valve:** it is equipped by a safety screw, in order to avoid the opening of the butterfly in case of excessive pressure inside the FLUBOX® (as requested by ADR). Attention: remove or break the safety screw from the handle and spin horizontally the valve handle for 90°, avoiding to pull the handle upwardly.



**Plunger Valve:** break the orange PE seal of the handle spinning it counterclockwise (from the left to the right) for 180°.

- Never apply pressure to the FLUBOX® IBC to accelerate the emptying process
- When discharging, any connection to the valve must use a flexible system properly supported to eliminate any mechanical stress or vibration to either the bottle or the valve.
- It is also possible to empty through the top opening by using a suction pump. In this case, the bottle or the surrounding cage must not support the pump and/or other equipment

Note: FLUBOX® IBC, as all the IBC containers, has been designed, built and tested for containment and safety and efficient transport of liquids.

**IBCS, THEIR ATTACHMENTS AND THEIR SERVICE AND STRUCTURAL EQUIPMENT SHALL BE DESIGNED TO WITHSTAND, WITHOUT LOSS OF CONTENTS, THE INTERNAL PRESSURE OF THE CONTENTS AND THE STRESSES OF NORMAL HANDLING AND CARRIAGE.**

ADR 6,5,3,1,6

Therefore Fustiplast don't take charge of any responsibility related to its not correct usage (for example as temporary stock container with continuous and repeated drawing of product).

#### 4. CORRECT USE OF FUSTIPLAST PLASTIC INNER BOTTLE FOR REPLACEMENT

When a new plastic inner receptacle is used to “repair” an IBC (see definition on the ADR 1.2.1), and the repaired IBC is used for dangerous goods transportation, is mandatory to fulfill the requirement indicated in the following ADR chapter: 4.1.1.9, 6.5.4.4, 6.5.4.5, 6.5.6.1, 6.5.2.2.

When a new plastic inner receptacle is used to “remanufacture” an IBC (see definition on the ADR 1.2.1), and the remanufactured IBC is used for dangerous goods transportation, the remanufactured IBC is subject to the same requirements of ADR that apply to the new IBCs of the same type (see also design type definition at ADR chapter 6.5.6.1.1)

#### 5. CHEMICAL COMPATIBILITY OF HDPE

##### Chemical Resistance and Compatibility Chart

The following chart is a reasonable guide to the chemical resistance of HDPE. These data have been drawn from a bulletin published by a resin producer and does not represent actual testing conducted by Fustiplast. This chart is offered as a guide, not a guarantee of compatibility. The chemicals listed on this chart may require the approval of domestic and international competent authorities for handling and shipping. Fustiplast is not responsible for use or misuse of the information contained herein.

**Note: Fustiplast does not guarantee that compliance with recommendations included in this guide represents compliance with UN requirements for compatibility and permeability.**

If you need a sample for your own specific compatibility test, contact Fustiplast commercial department.

Symbols used in the table:

+ = resistant specimen	swelling <3% or alternatively weight loss <0.5%, elongation at break not significantly changed
/ = specimen with limited resistance	swelling <3 – 8% or alternatively weight Resistance only loss <0.5 – 5%, and/or elongation at break decreased by <50%
- = specimen is not resistant	swelling >8% or alternatively weight loss >5%, and/or elongation at break decreased by >50%

D = discoloration

\* = or at the boiling point

\*\* = does not hold for welded joints

Further information may be obtained (including fold welds) directly from us or from the manufacturer of the semi finished article



RESISTANCE OF POLYETHYLENE TO:		68°F/20°C	140°F/60°C
Acetaldehyde + acetic acid		+	
Acetaldehyde, aqueous	all	+	/
Acetamide		+	+
Acetic acid	100%	+	/ D
Acetic acid, aqueous	70%	+	+
Acetic acid ethyl ester		+	+
Acetic anhydride tech. pure	tech. pure	+	/ D
Acetoacetic acid		+	
Acetone tech. pure	tech. pure	+	+*
Acetophenone		+	
Acetylene		+	
Acids, aromatic		+	+
@Acronal dispersions	usual commercial conc.	+	/
Acrylic acid emulsions		+	+
Acrylonitrile	tech. pure	+	+
Adipic acid aqueous	saturated	+	+
Adipic acid ester		+	/
@Aktivin (chloramine, aqueous, 1%)		+	+
Alcohol		+	
Alcoholic beverages		+	
Allyl acetate		+	+to /
Allyl alcohol	96%	+	+
Allyl chloride -		/	-
Alum, aqueous	all	+	+
Aluminum chloride, aqueous	all	+	+
Aluminum chloride, solid		+	+
Aluminum fluoride	conc.	+	+
Aluminum hydroxide		+	+
Aluminum metaphosphate		+	+
Aluminum sulphate, aqueous	saturated	+	+
Aluminum sulphate, solid		+	+
Amino acids		+	+
Ammonia, gaseous	100%	+	+
Ammonia, liquid		+	
Ammonia solution		+	+
Ammonia water (ammonia solution)	all	+	+
Ammonium acetate, aqueous	all	+	+
Ammonium carbonate	all	+	+
Ammonium chloride, aqueous	all	+	+
Ammonium hydrosulphide, aqueous	all	+	+
Ammonium metaphosphate		+	+
Ammonium nitrate, aqueous	all	+	+
Ammonium phosphate, aqueous	all	+	+
Ammonium sulphate, aqueous	all	+	+
Ammonium sulphide, aqueous	all	+	+
Ammonium thiocyanate		+	+
Amyl acetate	tech. pure	+	+
Amyl alcohol	tech. pure	+	+
Amyl chloride	100%	/	-
Amyl phthalate		+	/
Aniline, aqueous	all	+	+
Aniline hydrochloride, aqueous	all	+	+
Animal oils		+	/
Aniseed oil		/	-

RESISTANCE OF POLYETHYLENE TO:		68°F/20°C	140°F/60°C
Anisole		/	/ to-
Anone (cyclohexanone)		+	-
Antifreeze agents (veicles)	usual commercial conc.	+	+
Aqua regia		-	
Anthraquinone sulphonic acid, aqueous		+	+
Antimony chloride, anhydrous		+	+
Antimony pentachloride		+	+
Antimony trichloride		+	+
Arsenic acid anhydride		+	+
Arsenic acid, aqueous	all	+	+
Asphait		+	/ D
@Aspirin		+	
Barium hydroxide, aqueous	all	+	+
Barium salts, aqueous	all	+	+
Battery acid		+	+
Beater glue	usual commercial conc.	+	+
Beef fat		+	+to /
Beer		+	+
Beer coloring agent	usual commercial conc.	+	+
Beeswax		+	/ to -
Benzaldehyde, aqueous	all	+	+ to /
Benzaldehyde in isopropyl alcohol	1%	+	+
Benzene	tech. pure	/	/
Benzenesulphonic acid		+	+
Benzoic acid, aqueous	all	+	+
Benzoyl chloride		/	/
Benzyl alcohol		+	+
Benzyl chlorede		/	-
Bichromate- sulphuric acid	conc.	+	-
Bismuth salts		+	+
Bisulphite solution		+	+
Bitumen		+	/ D
Bleaching liquor containing 12.5% active chlorine**		+ to /	-
Bleaching powder (chloride of lime)		+	+
Bone oil		+	+
Borax, aqueous	all	+	+
Boric acid, aqueous	all	+	+
Boric acid methyl eter		+	/ to -
Boron trifluoride		+	+ to/
Brake fluid		+	+
Brandy-wine		+	
Brine (saturated)	saturated	+	+
Bromic acid	conc.	-	
Bromine fumes		-	
Bromine, liquid	100%	-	
Bromine water	cold saturated	+	
Bromochloromethane		-	
Butanediol, aqueous	all	+	+
Butane, gaseous		+	
Butanetriol, aqueous	all	+	+
Butanol, aqueous	all	+	+
Butanone		+	/ to -
@Butoxyl (methoxybutyl acetate)		+	/

RESISTANCE OF POLYETHYLENE TO:		68°F/20°C	140°F/60°C
Butter		+	
Butyl acetate	tech. pure	+	/
n-Butyl acetate		+	/
Butyl alcohol		+	+
Butyl acrylate		+	/
Butylbenzyl phthalate		+	+
Butylene glycol	tech. pure	+	+
Butyric acid, aqueous	all	+	/
Butylphenol	tech. pure	+	+
Calcium carbide		+	+
Calcium carbonate		+	+
Calcium chloride, aqueous	all	+	+
Calcium hydroxide		+	+
Calcium hypochlorite, aqueous (susp)	all	+	+
Calcium nitrate, aqueous	50%	+	+
Calcium oxide (powder)		+	+
Calcium phosphate		+	+
Calcium sulphate		+	+
Camphor		+	/
Camphor oil		-	
Cane sugar		+	+
Carbazole		+	+
Carbolic acid		+	+ D
Carbolineum for fruit trees, aqueous		+ D	/ D
Carbon dioxide	100&	+	+
Carbon disulphide		/	
Carbonic acid, aqueous	all	+	+
Carbonic acid, dry	100%	+	+
Carbon tetrachloride	tech. pure	/ to -	-
Castor oil		+	+
Caustic potash		+	+
Caustic potash solution	50%	+	+
Caustic soda		+	+
Caustic soda solution	all	+	+
Cetyl alcohol (hexadecanol)		+	+
Chloral hydrate, aqueous	all	+	+ D
Chlorine bleach liquor containing 12.5% active chlorine**		+ to /	-
Chlorine, gaseous, dry		/	-
Chlorine, gaseous, moist		/	-
Chlorine liquid		-	
Chlorine water		+	/
Chloroacetic acid (mono), aqueous	all	+	+
Chlorobenzene		/	-
Chlorocarbonic acid		+	/
Chloroethanol	tech. pure	+	+ D
Chloroform		/ to -	-
Chloropicrin		+ to /	-
Chlorosulphonic acid			-
Chrome anode mud		+	+
Chrome salts, aqueous	all	+	+
Chromic acid, aqueous **	up to 50%	+	- D
Chrome alum, aqueous	all	+	+
Chromium trioxide, aqueous **	up to 50%	+	- D

RESISTANCE OF POLYETHYLENE TO:		68°F/20°C	140°F/60°C
Chromosulphuric acid		+	-
Cider		+	+
Citric acid, aqueous	saturated	+	+
Citrus juices		+	+
®Clophen A 50 and A 60		+	/ to -
Coal-tar oil		+ D	/ D
Coconut oil		/	/
Coconut oil fatty alcohol	tech. pure	+	/
Codiver oil		+	/
Coffee extract		+	+
Cognac		+	
Cola concentrates		+	+
Common salt, aqueous	all	+	+
Copper chloride, aqueous		+	+
Copper fluoride, aqueous		+	+
Copper nitrate, aqueous		+	+
Copper salts, aqueous	cold saturated	+	+
Copper sulphate, aqueous	all	+	+
Com oil		+	/
Com syrup		+	+
Coumarone resins		+	+
Creosote		+	+ D
Cresol	100%	+	/ D
Cresol, aqueous	diluted	+	+ D
Crop protection agents, aqueous	conc. Normally used in practice	+	+
Crotonaldehyde	tech. pure	+	/
Cyclanone (fatty alcohol sulphonate)	usual commercial conc.	+	+
Cyclohexane		+	+
Cyclohexanol		+	+
Cyclohexanone		+	/
Decahydronaphthalence (®Decalin)	tech. pure	+	/
Defoamers		+	+ to /
Detergents		+	+
Detergents, synthetic	usual	+	+
Dveloper solutions (photographic)		+ D	+ D
Dextrin, aqueous	18%	+	+
Dextrose		+	+
Dextrose, aqueous	all	+	+
1,2-Dibromoethane		/	-
Dibutyl		+ to /	-
Dibutyl phthalate	tech. pure	+	/
Dibutyl sebacate		+	/
Dichloroacetic acid	tech. pure	+	/ D
Dichloroacetic acid	50%	+	+
Dichloroacetic acid methyl ester		+	+
Dichlorobenzene		/	-
Dichloroethane		/	/
Dichlorodiphenyltrichloroethane (DDT, powder)		+	+
Dichloroethylene		-	
Dichloropropane		/	-
Dichloropropene		/	-
Diesel fuel		+	/

RESISTANCE OF POLYETHYLENE TO:		68°F/20°C	140°F/60°C
Diethylene glycol		+	+
Diethyl ether		+ to /	/*
Di (2-ethylhexyl) phthalate (DOP)		+	/
Diethyl ketone		+	/
Diglycolic acid, aqueous	30%	+	+
Disobutyl ketone	tech. pure	+	/ to -
Disopropyl ether		+ to /	-
Dimethylamine		+	/
Dimethyl formamide	tech. pure	+	+ to /
Dimethyl sulphoxide		+	+
Dioctyl phthalate		+	/
Dioxane		+	+
Diphenylamide		+	/
Diphenyl oxide		+	/
Dishwashing liquids	usual	+	+
Disodium phosphate		+	+
Disodium sulphate		+	+
Dispersions, aqueous		+	
Dodecylbenzenesulphonic acid		+	/
Drilling acid		/	/
Drinking water		+	+
Dyes		+ D	+ D
Eau de Javelle		+ to /	-
Electrolyte baths for the plating industry		+ to /	/
Emulsifiers		+	+
Emulsions (photographic)		+	+
®Ephetin, aqueous	10%	+	+
Epichlorohydrin		+	+
Epson salts	all	+	+
Essential oils		-	-
Esters, aliphatic	tech. pure	+	+ to /
Ethane		+	+
Ethanol	96%	+	+
Ether		+ to /	/*
Ethyl acetate	tech. pure	+	/
Ethyl alcohol	96%	+	+
Ethyl alcohol + acetic acid (fermentation mixture)	usual commercial conc.	+	+
Ethylbenzene	tech. pure		
Ethyl chloride	tech. pure	/*	
Ethyl ether	tech. pure	+ to /	/*
Ethylene		+	/
Ethylenediamine	tech. pure	+	+
Ethylenediamine tetraacetic acid		+	+
Ethyl dibromide		/	-
Ethylene dichloride (dichloroethane)		/	-
Ethylene glycol		+	+
Ethylene oxide, gaseous	tech. pure	+	+
2-Ethylhexanol		+	/
®Euron B		/	/
®Euron G		+	+
Fatty acid amides		+	/
Fatty acids (>C6)		+	+ to /
Fatty alcohols		+	/

<b>RESISTANCE OF POLYETHYLENE TO:</b>		<b>68°F/20°C</b>	<b>140°F/60°C</b>
Ferric chloride, aqueous	all	+	+
Ferrous sulphate, aqueous	all	+	+
Fertilizer salts, aqueous	all	+	+
Fir wood oil		+	/
Fluoboric acid, aqueous		+	/
Fluorine, gaseous		-	
Fluosilicic acid	32%	+	+
Formic acid, aqueous	10%	+	+
Formic acid, aqueous	85%	+	+
Formaldehyde, aqueous	up to 40%	+	+
Formamide		+	+
@Frigen 12 (@Freon 12)	100%	/	-
Fruit juices, fermented	all	+	+
Fruit juices, unfermented		+	+
Fruit pulp		+	+
Fuel oil		+	/
Furfural		+	/
Furfuryl alcohol		+	+ D
Gases from roasting, dry	all	+	+
Gases liquor (ammoniacal)		+	+
Gasoline	tech. pure	+	+ to /
Gelatin		+	+
@Genantin		+	+
Gin		+	
Glacial acetic acid	tech. pure	+	/ D
Glauber' s salt, aqueous	all	+	+
Glucose, aqueous	all	+	+
Glue		+	+
Glycerine, aqueous	up to 100%	+	+
Glycerol chlorohydrin		+	+
Glycine		+	+
Glycol, aqueous	usual commercial conc.	+	+
Glycolic acid, aqueous	up to 70%	+	+
Glycolic acid butyl ester		+	+
@Glystantin		+	+
@Grisiron 8302		/	/
@Grisiron 8702		+	+
Halothane		/	/ to -
Heptane		+	/
Hexane		+	/
Hexanetriol		+	
Honey		+	+
Hydraulic fluid		+	/
Hydrazine hydrate		+	+
Hydrobromic acid, aqueous	50%	+	+
Hydrochloric acid, aqueous	all	+	+
Hydrogen chloride gas, dry and moist		+	+
Hydrocyanic acid		+	+
Hydrofluoric acid, aqueous	40%...85%	+	/
Hydrofluosilicic acid, aqueous	all	+	+
Hydrogen	100%	+	+
Hydrogen peroxide, aqueous	10%	+	+
Hydrogen peroxide, aqueous	30%	+	+
Hydrogen peroxide, aqueous	90%	+	+



RESISTANCE OF POLYETHYLENE TO:		68°F/20°C	140°F/60°C
Hydrogen peroxide, aqueous	saturated	+	+
Hydrogen sulphide, dry	100%	+	+
Hydroquinone		+ D	+ D
Hydrosulphide, aqueous	up to 10%	+	+
Hydroxylamine sulphate, aqueous	12%	+	+
Hypochlorous		+	/
Ink		+	+
Iodine - potassium iodide	3% iodide	+	+
Iron (III) chloride, aqueous	all	+	+
Isobutyl alcohol		+	+
Isoctane		+	/
Isopropanol (isopropyl alcohol)	tech. pure	+	+
Isopropyl acetate	100%	+	/
Isopropyl ether	tech. pure	+ to /	-
Jam		+	+
Kerosene		+	/
Ketones		+ to /	/ to -
Labarraque's solution		+ to /	
Lactic acid, aqueous	10%...96%	+	+
Lactose		+	+
Lanolin (wool fat)		+	+
Latex		+	+
Lead acetate, aqueous	all	+	+
Lead tetraethyl		+	
Lime		+	+
Limewater		+	+
Linseed oil	tech. pure	+	+
Liqueur		+ to /	-
Liquid manure		+	+
Liquid paraffin		+	+
Liquid soaps		+	+
Lithium bromite		+	+
Lubricating oils	tech. pure	+	+ to /
@Lysol		+	/
Machine oil		+	/
Magnesium carbonate		+	+
Magnesium chloride, aqueous	all	+	+
Magnesium fluosilicate		+	+
Magnesium hydroxide		+	+
Magnesium iodide		+	+
Magnesium salts, aqueous	all	+	+
Magnesium sulphate, aqueous	all	+	+
Maleic acid, aqueous	up to 100%	+	+
Malic acid, aqueous	50%	+	+
Manganese sulphate		+	+
Margarine		+	+
Mash		+	+
Mayonnaise		+	
Menthol		+	/
Mercuric chloride (corrosive sublimate)		+	+
Mercury		+	+
Mercury salts		+	+
Metallic mordants		+	
Metal soaps		+	+



RESISTANCE OF POLYETHYLENE TO:		68°F/20°C	140°F/60°C
Methacrylate		+	+
Methacrylic acid		+	+
Methanol	tech. pure	+	+
Methoxy butanol		+	/
Methoxybutyl acetate (®Butoxyl)		+	/
Methyl alcohol		+	+
Methylbenzene		/	-
Methyl bromide, gaseous	tech. pure	/	-
Methyl chloride		/	
Methyl chloride, gaseous	tech. pure	/	-
Methylcyclohexane		/	/ to -
Methylene chloride**		/	/ *
Methyl ethyl ketone	tech. pure	+	/ to -
Methyl glycol		+	+
Methyl isobutylketone		+	/ to -
Methyl methacrylate		+	+
4-Methyl-2-pentanone		+	+ to / D
Methyl propyl ketone		+	/
n-Methyl pyrrolidone		+	+
Methyl salicylate (salicylic acid methyl ester)		+	/
Methyl sulphate	50%	+	+
Milk		+	+
Mineral oil	without additives	+	+ to /
Mineral spirits			
Mineral water		+	+
Molasses		+	+
Molasses wort		+	+
Monochloroacetic acid		+	+
Monochloroacetic acid ethyl ester		+	+
Monochloroacetic acid methyl ester		+	+
Monochlorobenzene		/	-
Morpholine		+	+
Motor oil (HD oil)		+	+ to /
Mold-release agents		+	+
Mowilith polymer emulsions		+	+
Mustard		+	+
Nail polish remover		+	/
Naphtha		+	/
Naphthalene		+	/
Nickel chloride		+	+
Nickel nitrate		+	+
Nickel salts, aqueous		+	+
Nickel sulphate, aqueous	all	+	+
Nicotine		+	+
Nitric acid **	25%	+	+
Nitric acid **	50%	/	-
Nitrobenzene		+	/
Nitrocellulose		+	
o-Nitrotoluene		+	/
Nonyl alcohol (nonanol)		+	+
Octyl cresol	tech. pure	/	-
Oils, animal and vegetable		+	+ to /
Oils, essential		/	-

RESISTANCE OF POLYETHYLENE TO:		68°F/20°C	140°F/60°C
Oleic acid		+	/
Oleum	all	-	
Olive oil		+	+
Optical brighteners		+	+
Orange juice		+	+
Oxalic acid, aqueous	all	+	+
Oxygen	all	+	+
Ozone	50ppm	/	-
Palmitic acid		+	+
Palmityl alcohol		+	+
Palm-kemal oil		+	+
Paraformaldehyde		+	+
Pentanol		+	
Peppermint oil		+	
Perchloric acid, aqueous	20%	+	+
Perchloric acid, aqueous	50%	+	/
Perchloric acid, aqueous	70%	+	-
Perchloroethylene		/	-
Perfume oil		+	/ to -
Petrol	tech. pure	+	+ to /
Petrol/benzene mixture	80/20	+	/
Petroleum		+	/
Petroleum ether		+	/
Phenol		+	+ D
Phenolic resin molding materials		+	+
Phenylethyl alcohol		+	+
Phenylhydrazine	tech. pure	/	/ to -
Phenylhydrazine hydrochloride		+	-
Phenylsulphonate (sodium dodecylbenzenesulphonate)		+	+
Phosgene, gaseous	100%	-	
Phosgene, liquid	100%	-	
Phosphorus oxichloride		+	/
Phosphates, aqueous	all	+	+
Phosphoric acid, aqueous	50%	+	+
Phosphoric acid, aqueous	80%...95%	+	/ D
Phosphorus pentoxide	100%	+	+
Phosphorus trichloride		+	/
Photographic developer		+ D	+ D
Phthalic acid, aqueous	50%	+	+
Phthalic acid ester		+	+ to /
Picric acid, aqueous	1%	+	
Pineapple juice		+	+
Pine-needle oil		+	/
Plasticizers		+	/
Polyester plasticizers		+	+ to /
Polyester resins		/	-
Polyglycols		+	+
@Polysolvan O (glycolic acid n-butyl ester)		+	+
Potash alum, aqueous	all	+	+
Potassium bicarbonate, aqueous	all	+	+
Potassium bisulphate, aqueous	all	+	+
Potassium borate, aqueous	1%	+	+

**RESISTANCE OF POLYETHYLENE TO:****68°F/20°C****140°F/60°C**

Potassium bromate, aqueous	up to 10%	+	+
Potassium bromite, aqueous	all	+	+
Potassium carbonate, aqueous	all	+	+
Potassium chlorate, aqueous	all	+	+
Potassium chloride, aqueous	all	+	+
Potassium chromate, aqueous	40%	+	+
Potassium cyanide, aqueous	all	+	+
Potassium dichromate, aqueous	all	+	+
Potassium ferricyanide, aqueous	all	+	+
Potassium ferricyanide and ferrocyanide, aqueous	all	+	+
Potassium fluoride, aqueous	all	+	+
Potassium hydroxide, aqueous	30%	+	+
Potassium iodine, aqueous	all	+	+
Potassium nitrate, aqueous	all	+	+
Potassium perborate		+	+
Potassium perchlorate, aqueous	1%	+	
Potassium perchlorate, aqueous	up to 10%	+	/
Potassium permanganate		+	+
Potassium permanganate, aqueous	up to 6%	+	+ D
Potassium persulphate, aqueous	all	+	+
Potassium sulphate, aqueous	all	+	+
Potassium sulphide		+	+
Potassium sulphite		+	+
Potassium tetracyanocuprate		+	+
Potassium thiosulphate		+	+
Propanol		+	+
i-Propanol (i-propyl alcohol)	tech. pure	+	+
n-Propanol (n-propyl alcohol)		+	+
Propargyl alcohol, aqueous	7%	+	+
Propionic acid, aqueous	all	+	+
Propylene dichloride	100%	-	
Propylene glycol		+	+
Propylene oxide		+	+
Pseudocumene		/	/
Pyridine		+	/
Quinine		+	+
Rubber dispersions (Latex)		+	+
®Sagrotan		+	/
Salicylic acid		+	+
Saturated steam condensate		+	+
Sauerkraut		+	+
Seawater		+	+
Silicicacid, aqueous	all	+	+
Silicone oil	tech. pure	+	+
Silver nitrate		+	+
Silver nitrate, aqueous	all	+	+
Silver salts, aqueous	cold saturated	+	+
Soap solution, aqueous	all	+	+
Soda, aqueous	all	+	+
Sodium acetate, aqueous	all	+	+
Sodium aluminum sulphate		+	+

RESISTANCE OF POLYETHYLENE TO:		68°F/20°C	140°F/60°C
Sodium benzoate		+	+
Sodium benzoate, aqueous	35%	+	+
Sodium bicarbonate		+	+
Sodium bisulphate		+	+
Sodium bisulphite, aqueous	all	+	+
Sodium borate		+	+
Sodium bromite		+	+
Sodium carbonate, aqueous	all	+	+
Sodium chlorate, aqueous	saturated	+	+
Sodium chloride, aqueous	all	+	+
Sodium chlorite, aqueous	50%	+	+
Sodium chromate		+	+
Sodium cyanide		+	+
Sodium dichromate		+	+
Sodium dodecylbenzenesulphonate		+	+
Sodium ferrocyanide		+	+
Sodium fluoride		+	+
Sodium hexacyanoferrate		+	+
Sodium hydroxide, aqueous	all	+	+
Sodium hydroxide, solid		+	+
Sodium hypochlorite, aqueous with 12.5% active chlorine **		+	-
Sodium hypochlorite, dry		+	+
Sodium nitrate, aqueous	all	+	+
Sodium nitrite, aqueous	all	+	+
Sodium perborate, aqueous	all	+	/
Sodium perchlorate, aqueous		+	+
Sodium peroxide, aqueous	10%	+	+
Sodium peroxide, aqueous	saturated	/	
Sodium phosphate, aqueous	saturated	+	+
Sodium silicate		+	+
Sodium silicate, aqueous	all	+	+
Sodium sulphate, aqueous	cold saturated	+	+
Sodium sulphide, aqueous	saturated	+	+
Sodium thiosulphate, aqueous (fixing salt)	all	+	+
Sodium thiosulphate, aqueous	saturated	+	+
Sodium thiosulphate, solid (fixing salt)		+	+
Soft soap		+	+
Soyabean oil		+	+
Spermaceti		+	/
Spindle oil		+ to /	/
Spirits		+	+
Stain removers		+ to /	/
Standard mineral spirit (DIN 51635)		+	/
Starch, aqueous	up to 100%	+	+
Stearic acid		+	/
Styrene		/	-
Succinic acid, aqueous	50%	+	+
Sulphates, aqueous solutions	all	+	+
Sulphur		+	+
Sulphuric acid, aqueous	up to 50%	+	+
Sulphuric acid, aqueous	70%	+	+

RESISTANCE OF POLYETHYLENE TO:		68°F/20°C	140°F/60°C
Sulphuric acid, aqueous	80%	+	+
Sulphuric acid, aqueous	98%	/	-
Sulphuric ether		+ to /	/ *
Sulphur dioxide, aqueous	all	+	+
Sulphur dioxide, dry & moist	all	+	+
Sulphurous acid		+	+
Sulphur trioxide		-	
Sulphuryl chloride		-	
Syrup		+	+
Tallow	tech. pure	+	+
Tannic acid	10%	+	+
Tartaric acid, aqueous	all	+	+
Tetrabromoethane		/ to -	-
Tetrachloroethane		/ to -	-
Tetrachloroethylene			
Tetrahydrofuran	tech. pure	+ to -	-
Tetrahydronaphthalene (@Tetralin)	tech. pure	+	-
Thioglycolic acid		+	+
Thionyl chloride		-	
Thiophene		/	-
Tin (II) chloride, aqueous	all	+	+
Tincture of iodine, DAB 6 (German pharmacopoeia)	usual commercial conc.	+ / D	
Toluene	tech. pure	/	-
Tomato juice		+	+
Transformer oil	tech. pure	+	/
Tributyl phosphate		+	+
Trichloroacetic acid	tech. pure	+	/ to -
Trichloroacetic acid, aqueous	50%	+	+
Trichloroethylene	tech. pure	+ to /	-
Trichlorobenzene		-	-
Tricresyl phosphate		+	+
Triethanolamine		+	+ D
Triethylene glycol		+	+
@Trilon		+	+
Trimethyl borate		+	/ to -
Trimethylolpropane, aqueous		+	+
Tri-B-chloroethyl phosphate		+	+
Trioctyl phosphate		+	/
Trisodium phosphate		+	+
Turpentine oil	tech. pure	+ to /	/
@Tutogen U		+	+
@Tween 20 and 80		+	-
Two-stroke engine oil		+	/
Urea, aqueous	up to 33%	+	+
Uric acid		+	+
Urine		+	+
Vaseline	tech. pure	+ to /	/
Vaseline oil	tech. pure	+ to /	/
Vinegar (wine vinegar)	usual commercial conc.	+	+
Vinyl acetate		+	+
Viscose spinning solutions		+	+



RESISTANCE OF POLYETHYLENE TO:		68°F/20°C	140°F/60°C
Walnut oil		+	/
Waste gases, containing carbonic acid			
carbonic acid	all	+	+
Waste gases, containing carbon monoxide		+	+
Waste gases, containing hydrochloric acid	all	+	+
Waste gases, containing hydrogen fluoride	traces	+	+
Waste gases, containing nitrosyl sulphuric acid	traces	+	+
Waste gases, containing SO <sub>2</sub>	low	+	+
Waste gases, containing sulphuric acid (moist)	all	+	+
Water, distilled		+	+
Wax alcohols	tech. pure	/	/
Whey		+	+
Whiskey		+	
White spirit	tech. pure	+ to /	/
Wine		+	
Wine vinegar	usual commercial conc.	+	+
Wood stains		+	+ to /
Xylene		/	-
Yeast		+	+
Zinc carbonate		+	+
Zinc chloride, aqueous	all	+	+
Zinc oxide		+	+
Zinc salts, aqueous	all	+	+
Zinc sludge		+	+
Zinc stearate		+	+
Zinc sulphate, aqueous		+	+