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NEWBUILDINGS  
SPECIAL EQUIPMENT AND SYSTEMS – ADDITIONAL CLASS

# Centralised Cargo Control for Liquid Cargoes

JANUARY 2003

*This chapter has been amended since the main revision (January 2003), most recently in July 2011.  
See “Changes” on page 3.*

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## CHANGES

### General

This booklet is a reprint of the previous edition and apart from clarifications of text and the inclusion of amendments and corrections, published in the July 2002 edition of Pt.0 Ch.1 Sec.3, no other changes have been made.

Text affected by the main rule changes is highlighted in red colour in the electronic pdf version. However, where the changes involve a whole chapter, section or sub-section, only the title may be in red colour.

This chapter is valid until superseded by a revised chapter.

### Amendments July 2011

- **General**

- The restricted use legal clause found in Pt.1 Ch.1 Sec.5 has been added also on the front page. In addition, the layout has been changed to one column in order to improve electronic readability.

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## SECTION 1 GENERAL REQUIREMENTS

### A. Classification

#### A 100 Application

**101** The Rules in this chapter apply to cargo handling systems, cargo related systems and ballast systems in the cargo area arranged for centralised operation and surveillance.

**102** The Rules in this chapter are applicable to vessels assigned one of the following class notations:

- **Tanker for Chemicals**
- **Tanker for Oil Products**
- **Tanker for Oil.**

#### A 200 Class notation

**201** Vessels having their cargo systems and ballast systems built and equipped, surveyed and tested in accordance with the requirements of this chapter, may be given the additional class notation **CCO**.

### B. Documentation

#### B 100 Plans and particulars

**101** The following plans and particulars are to be submitted for approval:

- arrangement of control room
- schematic diagrams showing arrangements for segregation of piping systems for various cargo loading and operational modes
- functional description of remotely controlled operations and monitoring systems
- operational procedures including emergency procedures
- description of the information systems, including user interface, logic diagrams, extent of available information, procedure for updating stored information and as applicable, interface to other instrumentation.

## **SECTION 2 ARRANGEMENTS FOR CENTRALISED OPERATION AND SURVEILLANCE**

### **A. General**

#### **A 100 Extent of remote control and surveillance**

**101** All main operations related to cargo loading and discharging, ballasting and de-ballasting are to be arranged for centralised operation from a cargo control room.

Preparatory tasks as starting machinery, connecting loading hoses, opening of cargo manifold valves may be arranged for local control only.

Similarly, tasks to be carried out after loading/unloading is ended may be arranged for local control only.

Table A1 lists operations required to be arranged for remote control. Other solutions will be accepted if same level of operation safety is maintained.

**102** Indication of parameters necessary for control and supervision of cargo handling and ballasting operations is to be provided in the cargo control room. For critical parameters alarm monitoring is to be provided.

#### **A 200 Cargo control room**

**201** Controls and indications as given in 100 are to be located in a cargo control room fitted with air condition capable of maintaining a temperature between 20°C and 30°C.

**202** The cargo control room is to be so located and arranged that direct visual surveillance of the cargo loading and discharge manifold area is possible.

**203** Cargo control rooms located within the cargo area are to have boundaries insulated to «A-60» standard. The entrance(s) is to be located and arranged with a view to safest possible escape in a case of emergency. Three sets of emergency escape masks (breathing apparatuses) and protective clothing are to be stored in the cargo control room.

### **B. Arrangement of Piping Systems**

#### **B 100 General**

**101** The Rules of Pt.5 Ch.3 and Pt.5 Ch.4 apply in general for oil carriers or chemical carriers respectively.

#### **B 200 Cargo tank cleaning**

**201** Tank cleaning machines are to be permanently installed.

**202** Portable means (e.g. short hoses) for connecting individual machines to the tank washing main line may be accepted.

**203** In the case of particular cargoes requiring extraordinary high cleanliness standards for commercial reasons, additional portable washing machines may be used.

#### **B 300 Cargo tank gasfreeing**

**301** A fixed cargo tank gasfreeing system is to be fitted.

**302** Portable means for connecting the inlet to cargo tanks to the supply main, e.g. by means of short hoses, may be accepted provided such connecting may easily be performed by one person only.

**303** For smaller vessels the use of portable ventilation fans may be accepted provided the arrangement facilitates easy and quick connecting.

#### **B 400 Segregation of piping systems**

**401** Segregation of cargo systems required for incompatible cargoes or between cargo systems and other systems required for safety purposes is to be achieved by means of separate piping systems. For tank cleaning

systems, inert gas systems and gasfreeing/dry air systems, segregations by means of portable pipe sections or short lengths of hoses may be accepted.

<b>Table A1 Remotely controlled operations</b>	
<i>Operation</i>	<i>Comments</i>
Starting/stopping of cargo pumps and operation of valves	Manual start of cargo pumps in case of pump room cargo system may be accepted
Remote operation of valves in loading/unloading system	Cargo manifold valves are to be manually operable locally independent of any remote control
Cargo tank washing operations	Connecting of water supply may be carried out locally
Inerting	Connecting of actual tank(s) to i.g. main may be done locally
Ballasting/de-ballasting	
Bilge drainage for cargo pump room	
Fire extinguishing for cargo pump room	
Start of fire pump and start of cargo deck foam extinguishing system and water spray system (if provided)	

### **C. Monitoring and Remote Control Systems**

#### **C 100 General**

**101** The Rules in Pt.4 Ch.9 apply in general. In the case of computer based systems the requirements contained in Pt.4 Ch.9 Sec.4 are to be complied with.

**102** Means for local manual operation of valves and machinery in the event of failure of the remote control system are to be provided.

#### **C 200 Alarm and remote reading**

**201** The extent of alarm and indication are to be according to Table C1 as applicable.

#### **C 300 Emergency stop/shut down arrangements**

**301** Arrangement for emergency stop of cargo pumps from the cargo loading/unloading manifold area is to be fitted.

**302** Arrangements for emergency closing of valves in the cargo loading lines are to be fitted in cargo control room and at the loading manifolds.

#### **C 400 Cargo tanks secondary ullaging system**

**401** In addition to the remote ullaging system required by Table C1, arrangements for closed type ullaging by means of portable equipment are to be provided. At least two sets of portable ullaging equipment are to be kept onboard

<b>Table C1 Extent of alarm and indication</b>				
<i>Parameter</i>	<i>Remote reading</i>	<i>Alarm</i>		<i>Comments</i>
		<i>Low</i>	<i>High</i>	
Cargo tank level	x		x	For carriage of certain chemicals an additional high-high level alarm is required
Ballast tank level	x			
Cargo temperature	x			Only for tanks with heating or cooling systems
Cargo tank ullage pressure	x	x	x	For each segregation
Cargo pressure at loading manifold	x			
Cargo pressure at pump discharge	x		x	
Cargo pump rpm	x			Not for constant speed electrically driven pumps. Alternative parameters for hydraulically driven pumps may be considered
Cargo pump housing, cargo pump shaft bearing and bulkhead shaft seal temperatures			x	Not for submerged pumps
Hydraulic and pneumatic power supply	x	x		Supply for hydraulic pump motors, cargo line stripping, valve operation etc.
Inert gas generator				Monitoring as required by Pt.5 Ch.3 Sec.11
Tank washing medium supply pressure	x	x		
Valve's positions				Open/shut indications
Status of pumps and other machinery				Running/stop indications
Oil content of wash-water discharge			x	Automatic changeover to recirculation
Bilge level in cargo pump room			x	
Explosive gas concentration in cargo pump room			x	

## SECTION 3 INFORMATION SYSTEM

### A. General.

#### **A 100 Information retrieval and presentation.**

**101** An information system is to be provided which will enable the operation to easily retrieve and display all information needed for observing limitations and operational requirements set forth by rules and regulations for particular cargo operations.

#### **A 200 Extent of information.**

**201** The information system is to contain the following information as applicable:

- physical data of the product
- pollution categorization of the product
- toxicity information
- carriage requirements and limitations stipulated by certificate
- special operational requirements mandatory for particular cargoes
- mandatory tank washing procedures, general procedures (e.g. cow or prewash for category A chemicals) and specific procedures for particular products
- cargo tank and cargo lines' stripping procedures
- cargo heating requirements/limitations
- discharge procedures for cargo tank washwater
- ship and cargo tank certification data.

**202** It is recommended that information additional to that listed in 201, which may assist the operator in performing the actual operations in an efficient and correct manner be included. E.g. information such as:

- cargo tank coating compatibility guide
- recommended tank washing procedures for particular products
- synonym names/trade names' interpreter
- rules, regulations and industry standards' references for particular products.

#### **A 300 Verification of loading conditions.**

**301** The information system is to enable easy checking of any loading condition and combination of products loaded or planned to be loaded with respect to strength of hull and cargo tanks and to present actual cargo tank filling limits (if any).

**302** The information system is to enable easy checking of any planned loading for compatibility requirements and to provide information of any required piping segregations to be executed.

**303** The information system is to enable easy checking of any planned loading conditions against applicable damage stability requirements (MARPOL Annex I and IBC- Code).

##### **Guidance note:**

- a) Appendix A contains compatibility guidelines for groups of products.
- b) It is anticipated that a computer installation will be necessary for fulfilling required functions of the information system in the case of the most sophisticated tankers (parcel chemical tankers and multi purpose product oil tankers).

For simpler single grade cargo tankers other solutions may suffice.

---e-n-d---of---G-u-i-d-a-n-c-e---n-o-t-e---

## APPENDIX A COMPATIBILITY GUIDE

### A. General.

#### A 100 Definition of hazardous reaction.

**101** As a first approximation, a mixture of two cargoes is considered hazardous when, under specified condition, the temperature rise of the mixture exceeds 25°C or a gas is evolved. It is possible for the reaction of two cargoes to produce a product that is significantly more flammable or toxic than the original cargoes even though the reaction is non-hazardous from temperature or pressure considerations, although no examples of such a reaction are known at this time.

#### A 200 Chart format

**201** There are different degrees of reactivity among the various cargoes. Many of them are relatively non-reactive: for example, aromatic hydrocarbons or paraffins.

Others will form hazardous combinations with many groups: for example, the in-organic acids.

The cargo groups in the compatibility chart (see fig. 1) are separated into two categories: 1 through 22 are «Reactive Groups» and 30 through 43 are «Cargo Groups». Left unassigned and available for future expansion are groups 23 through 29 and those past 43. Reactive Groups contain products which are chemically the most reactive; dangerous combinations may result between members of different Reactive Groups and between members of Reactive Groups and Cargo Groups. Products assigned to Cargo Groups, however, are much less reactive; dangerous combinations involving these can be formed only with members of certain Reactive Groups. Cargo Groups do not react hazardously with one another.

### B. Application of the Compatibility Chart.

#### B 100 Procedure.

**101** The following procedure explains how the compatibility chart should be used to find compatibility information:

- 1) Determine the group numbers of the two cargoes by referring to the alphabetical listing of cargoes and the corresponding groups (Table I). Many cargoes are listed under their parent names; unless otherwise indicated, isomers or mixtures of isomers of a particular cargo are assigned to the same group. For example, to find the group number for Isobutyl Alcohol, look under the parent name Butyl Alcohol. Similarly, the group number for para-Xylene is found under the entry Xylene.
- 2) If both group numbers are between 30 and 43 inclusive, the products are compatible and the chart need not be used.
- 3) If both group numbers do not fall between 30 and 43 inclusive, locate one of the numbers on the left of the chart (Cargo Groups) and the other across the top (Reactive Groups). (Note that if a group number is between 30 and 43, it can only be found on the left side of the chart.) The box formed by the intersection of the column and row containing the two numbers will contain one of the following:
  - i) blank—The two cargoes are compatible
  - ii) «X»—The two cargoes are not compatible
  - iii) a letter other than «X»—Reactivity varies among the group members. Refer to the footnotes following the chart to find whether the products in question are included in the footnotes. Unless the combination is specifically mentioned in these footnotes, it is compatible.

Figure 1 Compatibility Chart																						
	REACTIVE GROUPS																					
	1. Non-oxidizing mineral acids	2. Sulfuric acid	3. Nitric acid	4. Organic acids	5. Caustics	6. Ammonia	7. Aliphatic amines	8. Alkanolamines	9. Aromatic amines	10. Amides	11. Organic anhydrides	12. Isocyanates	13. Vinyl acetate	14. Acrylates	15. Substituted allyls	16. Alkylene oxides	17. Epichlorohydrin	18. Ketones	19. Aldehydes	20. Alcohols, glycols	21. Phenols, cresols	22. Caprolactam solution
<i>REACTIVE GROUPS</i>																						
1. Non-oxidizing mineral acids		x			x	x	x	x	x	x	x	x				x	x		A	E		1
2. Sulfuric acid	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	2
3. Nitric acid		x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3
4. Organic acids		x			x	x	x	x	C			x				x	x			F		4
5. Caustics	x	x	x	x							x	x				x	x		x	x	x	5
6. Ammonia	x	x	x	x						x	x	x	x			x	x		x			6
7. Aliphatic amines	x	x	x	x							x	x	x	x	x	x	x	x	x	x	x	7
8. Alkanolamines	x	x	x	x							x	x	x	x	x	x	x	B	x			8
9. Aromatic amines	x	x	x	C							x	x							x			9
10. Amides	x	x	x			x						x									x	10
11. Organic anhydrides	x	x	x		x	x	x	x	x													11
12. Isocyanates	x	x	x	x	x	x	x	x	x	x						D				x		12
13. Vinyl acetate	x	x	x			x	x	x														13
14. Acrylates		x	x				x	x														14
15. Substituted allyls		x	x				x	x				D										15
16. Alkylene oxides	x	x	x	x	x	x	x	x														16
17. Epichlorohydrin	x	x	x	x	x	x	x	x														17
18. Ketones		x	x				x	B														18
19. Aldehydes	A	x	x		x	x	x	x	x													19
20. Alcohols, glycols	E	x	x	F	x		x					x										20
21. Phenols, cresols		x	x		x		x			x												21
22. Caprolactam solution		x			x		x					x										22
<i>CARGO GROUPS</i>																						
30. Olefins		x	x																			30
31. Paraffins																						31
32. Aromatic hydrocarbons			x																			32
33. Miscellaneous hydrocarbon mixtures			x																			33
34. Esters		x	x																			34
35. Vinyl halides			x																			x
36. Halogenated hydrocarbons					H		I															36
37. Nitriles		x																				37
38. Carbon disulfide							x	x														38
39. Sulfolane																						39
40. Glycol ethers		x										x										40
41. Ethers		x	x																			41

**Figure 1 Compatibility Chart (Continued)**

	REACTIVE GROUPS																						
	1. Non-oxidizing mineral acids	2. Sulfuric acid	3. Nitric acid	4. Organic acids	5. Caustics	6. Ammonia	7. Aliphatic amines	8. Alkanolamines	9. Aromatic amines	10. Amides	11. Organic anhydrides	12. Isocyanates	13. Vinyl acetate	14. Acrylates	15. Substituted allyls	16. Alkylene oxides	17. Epichlorohydrin	18. Ketones	19. Aldehydes	20. Alcohols, glycols	21. Phenols, cresols	22. Caprolactam solution	
42. Nitrocompounds					x	x	x	x	x														42
43. Miscellaneous water solutions		x										x											43
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
<p>x Incompatible groups.</p> <p>A Acrolein (19), Crotonaldehyde (19), and 2-Ethyl-3-propyl acrolein (19) are not compatible with Group 1, Non-Oxidizing Mineral Acids.</p> <p>B Isophorone (18), and Mesityl Oxide (18) are not compatible with Group 8, Alkanolamines.</p> <p>C Acrylic Acid (4) is not compatible with Group 9, Aromatic Amines.</p> <p>D Allyl Alcohol (15) is not compatible with Group 12, Isocyanates.</p> <p>E Furfuryl Alcohol (20) is not compatible with Group 1, Non-oxidizing Mineral Acids.</p> <p>F Furfuryl Alcohol (20) is not compatible with Formic acid.</p> <p>G (Reserved)</p> <p>H Trichloroethylene (36) is not compatible with Group 5, Caustics.</p> <p>I Ethylenediamine (7) is not compatible with Ethylene Dichloride (36).</p>																							

In the accompanying Table I an alphabetic list of cargoes with reference to groups is provided. In Table II a list of cargoes within each group is given.

**TABLE 1 - ALPHABETICAL LIST OF CARGOES** (See footnote at the end of the table)

<b>Alphabetical list of cargoes</b>	
<b>Name</b>	<b>Group No.</b>
Acetaldehyde	19
Acetic Acid	4
Acetic Anhydride	11
Acetone	18
Acetonitrile	37
Acetophenone	18
Acetyl Tributyl Citrate	34
Acrolein (inhibited)	19
Acrylamid Solution	10
Acrylic Acid (inhibited)	4
Acrylonitrile (inhibited)	15
Adiponitrile	37
Alcohols (Mixed)	20
Alkyl Phthalates (n-)	34
Allyl Alcohol	15
Allyl Chloride	15
(2-Aminoethoxy) Ethanol, 2-	8
Aminoethylethanolamine	8
Ammonia, Anhydrous	6
Ammonium Hydroxide (28% or less)	6
Ammonium Nitrate, Urea, Water Solutions (containing Ammonia)	6
Ammonium Nitrate, Urea, Water Solutions (not containing Ammonia)	43
Ammonium Polyphosphate	43
Ammonium Sulfate Solution (20% or less)	43
Amyl Acetate	34
Amyl Alcohol	20
Amyl Tallate	34
Aniline	9
Asphalt	33
Asphalt Blending Stocks:	
Roofers Flux	33
Straight Run Residue	33
Behenyl Alcohol	20
Benzene	33
Benzene, Toluene Xylene (crude)	32
Butadiene (inhibited)	30
Butane	31
Butene	30
Butyl Acrylate (inhibited)	14
Butyl Acetate	34
Butyl Alcohol	20
Butylamine	7
Butyl Benzyl Phthalate	34
Butylene	30
1,3-Butylene Glycol	20
Butylene Oxide	16
Butyl Ether	41
Butyl Heptyl Ketone (iso-)	18
Butyl Methacrylate, Decyl Methacrylate, Cetyl Eicosyl Methacrylate Mixture	14
Butyl Methacrylate (inhibited)	14

<b>Alphabetical list of cargoes</b>	
<b>Name</b>	<b>Group No.</b>
Butyraldehyde	19
Butyric Acid	4
Calcium Bromide Solution	43
Calcium Chloride Solutions	43
Camphor Oil (light)	18
Caprolactam Solution	22
Carbolic Oil	21
Carbon Black Base	33
Carbon Disulfide	38
Carbon Tetrachloride	36
Cashew Nut Shell Oil (untreated)	4
Caustic Potash Solution	5
Caustic Soda Solution	5
Chlorine	(1)
Chlorobenzene	36
Chloroform	36
Chloronitrobenzene, 2-See Nitrochlorobenzene, ortho- Chlorotoluene (m-, o-, p-)	36
Chlorosulphonic Acid	(1)
Choline Chloride Solutions	20
Corn Syrup	43
Creosote, Coal Tar	21
Cresols	21
Cresylate Spent Caustic Solution	5
Cresylic Acid	21
Crotonaldehyde	19
Cumene	32
Cycloaliphatic Resins	31
Cyclohexane	31
Cyclohexanol	20
Cyclohexanone	18
Cyclohexylamine	7
Cyclopentadiene Polymers	7
Cyclopentadiene, Styrene, Benzene Mixture	30
Cymene	32
Decaldehyde	19
Decane	31
Decene	30
Decyl Alcohol	20
Decyl Acrylate (inhibited)	14
Decylbenzene	32
Dextrose Solution	43
Diacetone Alcohol	20
Diammonium Salt of Zinc Ethylene Diamine Tetracetic Acid Solution	43
Dibutylamine	7
Dibutyl Phthalate	34
Dichlorobenzene	36
Dichlorodifluoromethane	36
1,1-Dichloroethane	36
Dichloroethyl Ether	41
Dichloroisopropyl Ether	36
Dichloromethane	36
Dichlorophenol, 2,4-	21
1,1-Dichloropropane	36
1,2-Dichloropropane	36

<b>Alphabetical list of cargoes</b>	
<b>Name</b>	<b>Group No.</b>
Dichloropropane/ 1,3-Dichloropropene Mixture	15
1,3-Dichloropropene	15
Dichloropropionic Acid, 2,2-	4
Dicyclopentadine	30
Diethanolamine	8
Diethylamine	7
Diethylbenzene	32
Diethylene Glycol	40
Diethylene Glycol Monobutyl Ether	40
Diethylene Glycol Monobutyl Ether Acetate	34
Diethylene Glycol Monoethyl Ether	40
Diethylene Glycol Methyl Ether	40
Diethylene Glycol Monophenyl Ether	40
Diethylenetriamine	7
Diethylethanolamine	8
Diethyl Sulfate	34
Diglycidyl Ether of Bisphenol A	41
Diheptyl Phthalate	34
Diisobutylene	30
Diisobutyl Carbinol	20
Diisobutyl Ketone	18
Diisodecyl Phthalate	34
Diisononyl Phthalate	34
Diisooctyl Phthalate	34
Diisopropanolamine	8
Diisopropylamine	7
Diisopropyl Benzene	32
Diisopropyl Naphthalene	32
Dimethyl Acetamide	10
Dimethylamine	7
Dimethylcyclohexylamine	7
Dimethylethanolamine	8
Dimethylformamide	10
Dimethyloctanoic Acid, 2,2-	4
Dimethyl Phthalate	34
Dimethyl Polysiloxane	34
Dimethylpropane-1.3-Diol, 2,2-	20
Dinonyl Phthalate	34
Dioctyl Phthalate	34
1,4-Dioxane	41
Dipentene	30
Dipropylamine	7
Dipropylene Glycol Dibenzoate	34
Diphenyl-Diphenyl Oxide	33
Diphenylmethane Diisocyanate	12
Di-n-propylamine	7
Dipropylene Glycol	40
Distillates:	
Straight Run	33
Flashed Feed Stocks	33
Diundecyl Phthalate	34
Dodecane	31
Dodecanol	20

<b>Alphabetical list of cargoes</b>	
<b>Name</b>	<b>Group No.</b>
Dodecene	30
Dodecylamine, Tetradecylamine Mixture	7
Dodecylbenzene	32
Dodecyl Diphenyl Oxide Disulphonate Solution	43
Dodecyl Pentadecyl Methacrylate	14
Epichlorohydrin	17
Epoxy Resin	18
Ethane	31
Ethanolamine	8
Ethoxylated Alcohols C <sub>11</sub> -C <sub>15</sub>	20
Ethoxy Triglycol	40
Ethyl Acetate	34
Ethyl Alcohol	20
Ethyl Acrylate (inhibited)	14
Ethylamine	7
Ethyl Benzene	32
Ethyl Butanol	20
Ethylbutylamine(n-)	7
Ethyl Chloride	36
Ethylene	30
Ethylene Chlorohydrin	20
Ethylene Cyanohydrin	20
Ethylenediamine	7
Ethylene Dibromide	36
Ethylene Dichloride	36
Ethylene Glycol	20
Ethylene Glycol Monobutyl Ether	40
Ethylene Glycol Monobutyl Ether Acetate	34
Ethylene Glycol Monoethyl Ether	40
Ethylene Glycol Monoethyl Ether Acetate	34
Ethylene Glycol Monoisopropyl Ether	40
Ethylene Glycol Monomethyl Ether	40
Ethylene Glycol Phenyl Ether	40
Ethylene Oxide	(1)
Ethyl Ether	41
Ethylhexaldehyde	19
2-Ethyl Hexanol	20
Ethylhexoic Acid, 2-	4
2-Ethylhexyl Acrylate (inhibited)	14
Ethyl Hexylamine	7
Ethyl Hexyl Tallate	34
Ethylidene Norbornene	30
Ethyl Methacrylate (inhibited)	14
Ethyl-6-Methyl-n-(1-Methyl-2-Methoxy Ethyl) Aniline,2-	9
2-Ethyl-3-Propyl Acrolein	19
Fatty Acid Amides	33
Formaldehyde, Methanol Mixtures	19
Formaldehyde Solution (37-50%)	19
Formic Acid	4
Furfural	19
Furfuryl Alcohol	20
Gas Oil: Cracked	33

<b>Alphabetical list of cargoes</b>	
<b>Name</b>	<b>Group No.</b>
Gasoline Blending Stocks:	
Alkylates	33
Reformats	33
Gasolines:	
Casing head (natural)	33
Automotive (containing over 4.23 grams lead per gallon)	33
Aviation (containing not over 4.86 grams lead per gallon)	33
Polymer	33
Straight Run	33
Glutaraldehyde Solution	19
Glycerine	34
Glyceryl Triacetate	34
Glycidyl Ester of Versatic Acid	34
Glycol Diacetate	34
Glycols, Resins, and Solvents Mixture	33
Glyoxal Solution	19
Heptane	31
Heptanoic Acid(n-)	4
Heptene, 1	30
Herbicide (C <sub>12</sub> H <sub>22</sub> NO <sub>2</sub> Cl)	33
Hexamethyleneimine	7
Hexane	31
Hexanol	20
Hexene	30
Hexylene Glycol	20
Hydrochloric Acid	1
Hydrofluoric Acid	1
Hydrofluorosilicic Acid	1
Isophorone	18
Isoprene (inhibited)	30
Jet Fuels:	
JP-1 (Kerosene)	33
JP-3	33
JP-4	33
JP-5 (Kerosene, Heavy)	33
Kaolin Clay Slurry	43
Kerosene	33
Latex, Liquid Synthetic	43
Lignin Liquor (Calcium Ligno-Sulphonate, Water Solution)	43
Magnesium Nonyl Phenol Sulfide	33
Maleic Anhydride	11
Maleic Anhydride Copolymer	33
Mesityl Oxide	18
Methacrylic Acid	4
Methane	31
Methoxy Triglycol	40
Methyl Acetate	34
Methyl Acetoacetate	34
Methyl Acetylene, Propadiene Mixture (Stabilized)	30
Methyl Acrylate (inhibited)	14
Methyl Alcohol	20
Methylamine	7

<b>Alphabetical list of cargoes</b>	
<b>Name</b>	<b>Group No.</b>
Methylamine Solutions	7
Methyl Amyl Acetate	34
Methyl Amyl Alcohol	20
Methyl Bromide	36
3-Methyl Butyraldehyde	19
Methyl Chloride	36
Methyl-6-Ethyl Aniline, 2-	9
Methyl Ethyl Ketone	18
2-Methyl-5-Ethyl Pyridine	9
Methyl Formal (Dimethyl Formal)	41
Methyl Heptyl Ketone	18
Methyl-2-Hydroxy-3-Butyne, 2-	20
Methyl iso-Amyl Ketone	18
Methyl Isobutyl Ketone	18
Methyl Isobutyl Carbinol	20
Methyl Methacrylate (inhibited)	14
Methyl Naphthalene	32
Methylolureas (20% Free Formaldehyde)	19
Methyl Pyridine,2	9
Methyl Pyridine,3	9
Methyl Pyrrolidone (N-)	9
(alpha-) Methyl Styrene (inhibited)	30
Methyl tert-Butyl Ether	41
Mineral Spirits	33
Molasses	20
Monochlorodifluoromethane	36
Morpholine	7
Motor Fuel Antiknock Compounds Containing Lead Alkyls	(1)
Naphtha:	
Coal Tar	33
Cracking Fraction	33
Solvent	33
Stoddard Solvent	33
Varnish Markers' and Painters' (75%)	33
Naphthalene (molten)	32
Naphthenic Acid	4
NHric Acid (70% or less)	3
Nitric Acid (95%)	(1)
Nitrobenzene	42
Nitrochlorobenzene, ortho-	42
1- or 2-Nitropropane	42
Nitrotoluene	42
Nonane	31
Nonene	30
Nonyl Alcohol	20
Nonyl Phenol	21
Nonyl Phenol (ethoxylated)	40
Nonyl Phenol Sulfide	33
Octadecene-1	30
Octadecenoamide (Oleamide)	10
Octane	31
Octene	30
Octyl Alcohol	20
Octyl Aldehyde	19

<b>Alphabetical list of cargoes</b>	
<b>Name</b>	<b>Group No.</b>
Octyl Epoxytallate	34
Oils:	
Aliphatic	33
Clarified	33
Coal Oil	33
Crude Oil	33
Diesel Oil	33
Oiticica	34
Residual	33
Road	33
Seal	34
Soapstock	34
Transformer	33
Tung	34
White (Mineral)	33
Edible Oils, including:	
Babassu	34
Castor	34
Coconut	34
Coconut, Methyl Ester	34
Corn	34
Cotton Seed	34
Cotton Seed Fatty Acid	34
Fish	34
Lard	34
Olive	34
Palm	34
Peanut	34
Rapeseed	34
Rice Bran	34
Safflower	34
Soya Bean	34
Soybean, Epoxidized	40
Sunflower Seed	34
Tucum	34
Vegetable	34
Fuel Oils:	
No. 1 (Kerosene)	33
No. 1-D	33
No. 2	33
No. 4	33
No. 2-D	33
No. 5	33
No. 6	33

<b>Alphabetical list of cargoes</b>	
<b>Name</b>	<b>Group No.</b>
Miscellaneous Oils, including:	
Absorption	33
Aromatic	33
Coal Tar	33
Heartcut Distillate	33
Linseed	33
Lubricating	33
Mineral	33
Mineral Seal	33
Motor	33
Neatsfoot	33
Penetrating	33
Range	33
Resin	33
Resinous Petroleum	33
Rosin	33
Sperm	33
Spindle	33
Spray	33
Tall	34
Tanner's	33
Turbine	33
Oleic Acid	4
Oleum	(1)
Pentadecanol	20
Pentadiene, 1,3-	30
Pentane	31
Pentene	30
Pentenitrile (crude), 3-	37
Pentyl Aldehyde	19
Perchloroethylene	36
Petrolatum	33
Petroleum Naphtha	33
Phenol	21
Pentachloroethane	36
Phosphoric Acid	1
Phosphorus	(1)
Phthalic Anhydride (molten)	11
Pinene	30
Polybutene	30
Polyethylene Glycols	40
Polyethylene Polyamines	7
Polymethylene Polyphenyl isocyanate	12
Polypropylene	30
Polypropylene Glycol Methyl Ether	40
Polypropylene Glycols	40
Polyvinylbenzyltrimethyl Ammonium Chloride Solution	43
Propane	31
Propanolamine	8
Propionaldehyde	19
Propionic Acid	4
Propionic Anhydride	11
Propionitrile	37
Propyl Acetate	34
Propyl Alcohol	20
Propylamine	7
Propylene	30
Propylene Butylene Polymer	30

<b>Alphabetical list of cargoes</b>	
<b>Name</b>	<b>Group No.</b>
Propylene Glycol	20
Propylene Oxide	16
Propylene Tetramer	30
Propyl Ether	41
Pseudocumene (1,2,4-Trimethylbenzene)	32
Pyridine	9
Rum	20
Sewap Sludge	43
Sodium Borohydride Solution (15% or less) / Sodium Hydroxide Solution	5
Sodium Carbonate Solutions	5
Sodium Cyanide Solution (30% or less)	5
Sodium Dimethyl Naphthalene Sulphonate, Aq. Solution	34
Sodium Hydrosulfide Solution (45% or less)	5
Sodium Hypochlorite Solution (15% or less)	5
Sodium Polyacrylate Solution	43
Sodium Silicate Solution	43
Sorbitol	20
Stearic Acid	4
Styrene (inhibited)	30
Sulpholane	39
Sulfur (molten)	(1)
Sulfuric Acid	2
Sulfuric Acid, Spent	2
Tall Oil, Fatty Acid	34
Tallow	34
Tallow Fatty Acid	34
Tallow Fatty Alcohol	20
Tallow Nitrile	37
1,1,2,2-Tetrachloroethane	36
Tetradecanol	20
Tetradecene	30
Tetradecylbenzene	32
Tetraethylene Glycol	40
Tetraethylenepentamine	7
Tetrahydrofuran	41
Tetrahydronaphthalene	32
Tetrasodium Salt of EDTA Solution	43
Toluene	32
Toluenediamine	9
Toluene Diisocyanate	12
Toluidine (ortho-)	9
Triarylphosphate	34
Tributyl Phosphate	34
1,2,4-Trichlorobenzene	36
Trichloroethane, 1,1,1-	36
Trichloroethylene	36
Trichloro-1 -2-2-Trifluoroethane, 1,1,2-	36
Tridecane	34
Tridecanol	20
Tridecene	30
Tridecylbenzene	32
Triethanolamine	8
Triethylamine	7
Triethyl Benzene	32

<b>Alphabetical list of cargoes</b>	
<b>Name</b>	<b>Group No.</b>
Triethylene Glycol	40
Triethylene Glycol Butyl Ether Mixture	40
Triethylene Glycol Ether Mixture	40
Triethylenetetramine	7
Triethyl Phosphate	34
Triisooctyl Trimellitate	34
Trimethyl Benzene, 1,2,4	32
Trimethyl Pentanediol-1-3-Diisobutyrate, 2,2,4-	34
Trimethyl-3-Pentanol-1-isobutyrate, 2,2,4-	34
Tripropylene	30
Tripropylene Glycol	40
Turpentine	30
Undecanol	20
Undecene	30
Undecylbenzene	32
Valeraldehyde	19
Vinyl Acetate (inhibited)	13
Vinyl Acetate, Fumarate Copolymer	34
Vinyl Chloride (inhibited)	35
Vinyl Neodecanate	13
Vinylidene Chloride (inhibited)	35
Vinyl Toluene (inhibited)	30
Xylene	32
Zinc Bromide, Calcium Bromide Solution	43
Footnote to Table I: 1) Because of very high reactivity or unusual conditions of carriage, this product is not included in the Compatibility Chart.	

TABLE II — GROUPINGS OF CARGOES

1. *Non-Oxidizing Mineral Acids*  
Hydrochloric Acid  
Hydrofluoric Acid  
Hydrofluorosilicic Acid  
Phosphoric Acid
2. *Sulfuric Acids*  
Spent Sulfuric Acid  
Sulfuric Acid (98% or less)
3. *Nitric Acid*  
Nitric Acid (70% or less)
4. *Organic Acids*  
Acetic Acid  
Acrylic Acid (inhibited)  
Butyric Acid  
Cashew Nut Shell Oil (untreated)  
Dichloropropionic Acid, 2,2-  
Dimethyloctanoic Acid, 2,2-  
Ethylhexoic Acid, 2-  
Formic Acid

Heptanoic Acid (n-)  
Methacrylic Acid  
Naphthenic Acid  
Oleic Acid  
Propionic Acid  
Stearic Acid

5. *Caustics*

Caustic Potash Solution  
Caustic Soda Solution  
Cresylate Spent Caustic Solution  
Sodium Borohydride Solution ( 15% or less)  
Sodium Hydroxide Solution  
Sodium Carbonate Solutions  
Sodium Cyanide Solution (30% or less)  
Sodium Hydrosulfide Solution (45% or less)  
Sodium Hypochlorite Solution (15% or less)

6. *Ammonia*

Ammonia, Anhydrous  
Ammonium Hydroxide (28% or less)  
Ammonium Nitrate, Urea, Water Solutions (containing Ammonia)

7. *Aliphatic Amines*

Butylamine  
Cyclohexylamine  
Dibutylamine  
Diethylamine  
Diethylenetriamine  
Diisopropylamine  
Dimethylamine  
Dimethylcyclohexylamine  
Di-n-propylamine  
Dipropylamine  
Dodecylamine, Tetradecylamine Mixture  
Ethylamine  
Ethylbutylamine (n-)  
Ethylenediamine  
Ethyl Hexylamine  
Hexamethyleneimine  
Methylamine  
Methylamine Solutions  
Morpholine  
Polyethylene Polyamines  
Propylamine  
Tetraethylenepentamine  
Triethylamine  
Triethylenetetramine

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8. *Alkanolamines*
    - (2-Aminoethoxy) Ethanol, 2-
    - Aminoethylethanolamine
    - Diethanolamine
    - Diethylethanolamine
    - Diisopropanolamine
    - Dimethylethanolamine
    - Ethanolamine
    - Propanolamine
    - Triethanolamine
  
  9. *Aromatic Amines*
    - Aniline
    - Ethyl-6-Methyl-n-(1-Methyl-2-Methoxy Ethyl) Aniline, 2-
    - Methyl-6-Ethyl Aniline, 2-
    - Methyl Pyridine, 2
    - Methyl Pyridine, 3
    - Methyl Pyrrolidone (N-)
    - Pyridine
    - 2-Methyl-5-Ethylpyridine
    - Toluenediamine
    - Toluidine (ortho-)
  
  10. *Amides*
    - Acrylamide Solution
    - Dimethyl Acetamide
    - Dimethylformamide
    - Octadecenoamide (Oleamide)
  
  11. *Organic Anhydrides*
    - Acetic Anhydride
    - Maleic Anhydride
    - Phthalic Anhydride
    - Propionic Anhydride
  
  12. *Isocyanates*
    - Diphenylmethane Diisocyanate
    - Polyphenyl Polymethyleneisocyanate
    - Toluene Diisocyanate
  
  13. *Vinyl Acetate*
    - Vinyl Acetate (inhibited)
    - Vinyl Neodecanate
  
  14. *Acrylates*
    - Butyl Acrylate (inhibited)
    - Butyl Methacrylate, Decyl Methacrylate, Cetyl Eicosyl Methacrylate Mixture
    - Butyl Methacrylate (inhibited)
    - Decyl Acrylate (inhibited)
    - Dodecyl Pentadecyl Methacrylate
    - Ethyl Acrylate (inhibited)
-

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- 2-Ethylhexyl Acrylate (inhibited)
  - Ethyl Methacrylate (inhibited)
  - Methyl Acrylate (inhibited)
  - Methyl Methacrylate (inhibited)
15. *Substituted Allyls*
- Acrylonitrile (inhibited)
  - Allyl Alcohol
  - Allyl Chloride
  - Dichloropropane/ 1,3-Dichloropropene Mixture
  - 1,3-Dichloropropene
16. *Alkylene Oxides*
- Propylene Oxide
  - Butylene Oxide
17. *Epichlorohydrin*
- Epichlorohydrin
18. *Ketones*
- Acetone
  - Acetophenone
  - Butyl Heptyl Ketone (iso-)
  - Camphor Oil
  - Cyclohexanone
  - Diisobutyl Ketone
  - Epoxy Resin
  - Isophorone
  - Mesityl Oxide
  - Methyl iso-Amyl Ketone
  - Methyl Ethyl Ketone
  - Methyl Heptyl Ketone
  - Methyl Isobutyl Ketone
19. *Aldehydes*
- Acetaldehyde
  - Acrolein (inhibited)
  - Butyraldehyde
  - Crotonaldehyde
  - Decaldehyde
  - Ethylhexaldehyde
  - 2-Ethyl-3-Propyl Acrolein
  - Formaldehyde
  - Formaldehyde, Methanol Mixtures
  - Furfural
  - Glutaraldehyde Solution
  - Glyoxal Solution
  - Methylbutyraldehyde
  - Methylolureas (20% free Formaldehyde)
  - Octyl Aldehyde
-

Pentyl Aldehyde

Propionaldehyde

Valeraldehyde

20. *Alcohols, Glycols*

Alcohol Diisobutyl Carbinol

Alcohols (Mixed)

Behenyl Alcohol

Amyl Alcohol

Butyl Alcohol

1,3-Butylene Glycol

Choline Chloride Solutions

Cyclohexanol

Decyl Alcohol

Diacetone

Dimethylpropane-1-3-Diol, 2,2-

Dodecanol

Ethanol

Ethoxylated Alcohols C<sub>11</sub>-C<sub>15</sub>

Ethyl Alcohol

Ethylbutanol

Ethylene Chlorohydrin

Ethylene Cyanohydrin

Ethylene Glycol

2-Ethyl Hexanol

Furfuryl Alcohol

Glycerin

Hexanol

Hexylene Glycol

Methanol

Methyl Alcohol

Methylamyl Alcohol

Methyl-2-Hydroxy-3-Butyne, 2-

Methylisobutyl Carbinol

Octyl Alcohol

Nonyl Alcohol

Pentadecanol

Propyl Alcohol

Propylene Glycol

Sorbitol

Tallow Fatty Alcohol

Tetradecanol

Tridecanol

Undecanol

21. *Phenols and Cresols*

Carbolic Oil

Creosote, Coal Tar

Cresols

Cresylic Acid  
Dichlorophenol, 2,4-  
Nonyl Phenol  
Phenol

22. *Caprolactam Solution*  
Caprolactam Solution

23-29. *Unassigned*

30. *Olefins*  
Butadiene (inhibited)  
Butene  
Butylene  
Cyclopentadiene Polymers  
Cyclopentadiene, Styrene, Benzene Mixture  
Decene  
Dicyclopentadiene  
Diisobutylene  
Dipentene  
Dodecene  
Ethylene  
Ethylidene Norbornene  
Heptene, 1-  
Hexene  
Isoprene (inhibited)  
Methyl Acetylene, Propadiene Mixture (stabilized)  
(alpha-) Methyl Styrene (inhibited)  
Nonene  
Octadecene-1  
Octene  
Pentadiene, 1,3-  
Pentene  
Pinene  
Polybutene  
Polypropylene  
Propylene  
Propylene Butylene Polymer  
Propylene Tetramer  
Styrene (inhibited)  
Vinyl Toluene (inhibited)  
Tetradecene  
Tridecene  
Tripropylene  
Turpentine  
Undecene
31. *Paraffins*  
Butane  
Cycloaliphatic Resins

Cyclohexane  
Decane  
Dodecane  
Ethane  
Heptane  
Hexane  
Methane  
Nonane  
Octane  
Pentane  
Propane

32. *Aromatic Hydrocarbons*

Benzene  
Benzene, Toluene, Xylene (crude)  
Cumene  
Cymene  
Decylbenzene  
Diethylbenzene  
Diisopropyl Benzene  
Diisopropyl Naphthalene  
Dodecylbenzene  
Ethylbenzene  
Methyl Naphthalene  
Naphthalene  
Pseudocumene (1,2,4-Trimethylbenzene)  
Tetradecylbenzene  
Tetrahydronaphthalene  
Toluene  
Tridecylbenzene  
Triethylbenzene  
Trimethyl Benzene, 1,2,4-  
Undecylbenzene  
Xylene

33. *Misc. Hydrocarbon Mixtures*

Asphalt  
Asphalt Blending Stocks  
Carbon Black Base  
Diphenyl-Diphenyl Oxide  
Distillates  
Fatty Acid Amides  
Gas Oil, Cracked  
Gasoline Blending Stocks  
Gasolines  
Glycols, Resins, and Solvents Mixture  
Herbicide (C<sub>15</sub>H<sub>22</sub>NO<sub>2</sub>Cl)  
Jet Fuels  
Kerosene

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Magnesium Nonyl Phenol Sulfide  
Maleic Anhydride Copolymer  
Mineral Spirits  
Naphtha  
Naphtha, Cracking Fraction  
Naphtha, Varnish Makers' and Painters (75%)  
Nonyl Phenol Sulfide  
Oils, Aliphatic  
Oils, Clarified  
Oils, Coal  
Oils, Crude  
Oils, Diesel  
Oils, Fuel (No. 1 through No. 6)  
Oils, Miscellaneous  
Oils, Residual  
Oils, Road  
Oils, Transformer  
Oils, White (Mineral)  
Petrolatum  
Petroleum Naphtha

34. *Esters*

Acetyl Tributyl Citrate  
Alkyl Phthalates (n-)  
Amyl Acetate  
Amyl Tallate  
Butyl Acetate  
Butyl Benzyl Phthalate  
Castor Oil  
Coconut Oil  
Cottonseed Oil  
Dibutyl Phthalate  
Diethylene Glycol Monobutyl Ether Acetate  
Diethyl Sulfate  
Diheptyl Phthalate  
Diisodecyl Phthalate  
Diisononyl Phthalate  
Diisooctyl Phthalate  
Dimethyl Phthalate  
Dimethyl Polysiloxane  
Dinonyl Phthalate  
Dioctyl Phthalate  
Dipropylene Glycol Dibenzoate  
Diundecyl Phthalate  
Ethyl Acetate  
Ethylene Glycol Monobutyl Ether Acetate  
Ethylene Glycol Monoethyl Ether Acetate  
Ethylhexyl Tallate  
Fish Oil

Glyceryl Triacetate  
Glycidyl Ester of Varsatic Acid  
Glycol Diacetate  
Lard  
Methyl Acetate  
Methyl Acetoacetate  
Methyl Amyl Acetate  
Octyl Epoxy Tallate  
Oils, Edible, Babassu  
Oils, Edible, Coconut, Methyl Ester  
Oils, Edible Corn  
Oils, Edible Cotton Seed Fatty Acid  
Oils, Edible, Rapeseed  
Oils, Edible, Rice Bran  
Oils, Edible, Sunflower Seed  
Oils Oiticica  
Oils Seal  
Oils, Soapstock  
Oils, Tung  
Olive Oil  
Palm Oil  
Peanut Oil  
Propyl Acetate  
Safflower Oil  
Sodium Dimethyl Naphthalene Sulphonate, Aq. Solution  
Soybean Oil  
Tall Oil, Fatty Acid  
Tallow  
Tallow Fatty Acid  
Triarylphosphate  
Tributyl Phosphate  
Tridecane  
Triethyl Phosphate  
Triisooctyl Trimellitate  
Trimethyl Pentanediol-1-3-Diisobutyrate, 2,2,4-  
Trimethyl-3-Pertanol-1-Isobutyrate, 2,2,4-  
Tucum Oil  
Vegetable Oil  
Vinyl Acetate, Fumarate Copolymer

35. *Vinyl Halides*

Vinyl Chloride (inhibited)  
Vinylidene Chloride (inhibited )

36. *Halogenated Hydrocarbons*

Carbon Tetrachloride  
Chlorobenzene  
Chlorodifluoromethane (mono-)  
Chloroform

Chlorotoluene (m-, o-, p-)  
Dichlorobenzene  
Dichlorodifluoromethane  
1,1-Dichloroethane  
Dichloroisopropyl Ether  
Dichloromethane  
1,1-Dichloropropane  
1,2-Dichloropropane  
Ethyl Chloride  
Ethylene Dibromide  
Ethylene Dichloride  
Methyl Bromide  
Methyl Chloride  
Pentachloroethane  
Perchloroethylene  
1,1,2,2-Tetrachloroethane  
1,2,4-Trichlorobenzene  
Trichloroethane, 1,1,1-  
Trichloroethylene  
Trichloro-1-2-2-Trifluoroethane, 1,1,2-

37. *Nitriles*

Acetonitrile  
Adiponitrile  
Pentenenitrile (crude), 3-  
Propionitrile  
Tallow Nitrile

38. *Carbon Disulfide*39. *Sulpholane*40. *Glycol Ethers*

Diethylene Glycol  
Diethylene Glycol Monobutyl Ether  
Diethylene Glycol Monoethyl Ether  
Diethylene Glycol Monomethyl Ether  
Diethylene Glycol Monophenyl Ether  
Dipropylene Glycol  
Ethoxy Triglycol  
Ethylene Glycol Monobutyl Ether  
Ethylene Glycol Monoethyl Ether  
Ethylene Glycol Monoisopropyl Ether  
Ethylene Glycol Monomethyl Ether  
Ethylene Glycol Phenyl Ether  
Methoxy Triglycol  
Nonylphenol, Ethoxylated  
Oils, Edible, Soybean (epoxidized)  
Polyethylene Glycols  
Polypropylene Glycols

Polypropylene Glycol Methyl Ether  
Soybean Oil, Epoxidized  
Tetraethylene Glycol  
Triethylene Glycol  
Triethylene Glycol Butyl Ether Mixture  
Triethylene Glycol Ether Mixture  
Tripropylene Glycol

41. *Ethers*

Butyl Ether  
Dichloroethylether  
Diglycidyl Ether of Bisphenol A  
1,4-Dioxane  
Ethyl Ether  
Methyl Formal (Dimethyl Formal)  
Methyl tert-Butyl Ether  
Propyl Ether  
Tetrahydrofuran

42. *Nitrocompounds*

(mono-) Nitrobenzene  
Nitrochlorobenzene, ortho-  
1- or 2-Nitropropane  
Nitrotoluene

43. *Miscellaneous Water Solutions*

Ammonium Nitrate. Urea, Water Solutions (not containing Ammonia)  
Ammonium Polyphosphate  
Ammonium Sulfate Solution (20% or less)  
Calcium Bromide Solution  
Calcium Chloride Solutions  
Corn Syrup  
Dextrose Solution  
Diammonium Salt of Zinc Ethylene Diamine Tetraacetic Acid Solution  
Dodecyl Diphenyl Oxide Disulphonate Solution  
Kaolin Clay Slurry  
Latex Solutions  
Lignin Liquor (Calcium Ligno-Sulphonate, Water Solution)  
Polyvinylbenzyltrimethyl Ammonium Chloride Solution  
Sewage Sludge  
Sodium Polyacrylate Solution  
Sodium Silicate Solution  
Tetrasodium Salt of EDTA Solution  
Zinc Bromide, Calcium Bromide Solution

*Exceptions to the chart*

The binary combinations listed below have been tested and found not to be dangerously reactive. These combinations are exceptions to the Compatibility Chart (Figure 1) and may be stowed in adjacent tanks.

<b>Member of reactive group</b>	<b>Compatible with</b>
Caustic soda 50% or less	Butyl Alcohol Diacetone Alcohol Diethylene Glycol Diethylene Glycol, Ethylene Glycol mixture Ethylene Glycol (pure) Ethyl Alcohol Ethyl Hexanol (Octyl Alcohol) Methyl Alcohol Propyl Alcohol Propyl Alcohol, Water mixture Propylene Glycol.
Ethylene Diamine	Ethyl Hexanol Isophorone Propyl Alcohol Creosole Propylene Glycol Methyl Ethyl Ketone
Sulfuric Acid, 98% or less	Choice White Grease
Acrylonitrile	Triethanolamine
Dodecyl and Tetradecylamine mixture	Tall Oil Fatty Acid