



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.*

The content of this service document is the subject of intellectual property rights reserved by Det Norske Veritas AS (DNV). The user accepts that it is prohibited by anyone else but DNV and/or its licensees to offer and/or perform classification, certification and/or verification services, including the issuance of certificates and/or declarations of conformity, wholly or partly, on the basis of and/or pursuant to this document whether free of charge or chargeable, without DNV's prior written consent. DNV is not responsible for the consequences arising from any use of this document by others.

FOREWORD

DET NORSKE VERITAS (DNV) is an autonomous and independent foundation with the objectives of safeguarding life, property and the environment, at sea and onshore. DNV undertakes classification, certification, and other verification and consultancy services relating to quality of ships, offshore units and installations, and onshore industries worldwide, and carries out research in relation to these functions.

The Rules lay down technical and procedural requirements related to obtaining and retaining a Class Certificate. It is used as a contractual document and includes both requirements and acceptance criteria.

The electronic pdf version of this document found through <http://www.dnv.com> is the officially binding version
© Det Norske Veritas AS January 2003

Any comments may be sent by e-mail to rules@dnv.com
For subscription orders or information about subscription terms, please use distribution@dnv.com
Computer Typesetting (Adobe Frame Maker) by Det Norske Veritas

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million.
In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.

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.

CONTENTS

Sec. 1	General Requirements	5
A.	Classification.....	5
A 100	Application.....	5
A 200	Class notation.....	5
B.	Documentation	5
B 100	Plans and particulars	5
Sec. 2	Arrangements for Centralised Operation and Surveillance	6
A.	General	6
A 100	Extent of remote control and surveillance	6
A 200	Cargo control room	6
B.	Arrangement of Piping Systems	6
B 100	General.....	6
B 200	Cargo tank cleaning	6
B 300	Cargo tank gasfreeing	6
B 400	Segregation of piping systems	6
C.	Monitoring and Remote Control Systems.....	7
C 100	General.....	7
C 200	Alarm and remote reading	7
C 300	Emergency stop/shut down arrangements	7
C 400	Cargo tanks secondary ullaging system.....	7
Sec. 3	Information System.....	9
A.	General	9
A 100	Information retrieval and presentation.....	9
A 200	Extent of information.....	9
A 300	Verification of loading conditions	9
App. A	Compatibility Guide.....	10
A.	General	10
A 100	Definition of hazardous reaction.....	10
A 200	Chart format.....	10
B.	Application of the Compatibility Chart.	10
B 100	Procedure.	10

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.

Table A1 Remotely controlled operations	
<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

Table C1 Extent of alarm and indication				
<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 hazariously 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	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		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	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	35
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)

Alphabetical list of cargoes	
Name	Group No.
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

Alphabetical list of cargoes	
Name	Group No.
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

Alphabetical list of cargoes	
Name	Group No.
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 Monomethyl 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

Alphabetical list of cargoes	
Name	Group No.
Dodecene	30
Dodecylamine, Tetradsecylamine 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 ₁₁ -C ₁₅	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

Alphabetical list of cargoes	
Name	Group No.
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 ₁₂ H ₂₂ NO ₂ 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

Alphabetical list of cargoes	
Name	Group No.
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

Alphabetical list of cargoes	
Name	Group No.
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

Alphabetical list of cargoes	
Name	Group No.
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

Alphabetical list of cargoes	
Name	Group No.
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

Alphabetical list of cargoes	
Name	Group No.
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

-
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)
-

-
- 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 C₁₁-C₁₅
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 (C₁₅H₂₂NO₂Cl)

Jet Fuels

Kerosene

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 Versatic 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-Pentanediol-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.

Member of reactive group	Compatible with
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