

REGULATIONS AND PRESCRIPTIONS FOR THE NAVIGATION ON THE RHINE

an example for a complete Regulation Act
for International Inland Navigation

Summary

The Rhine ist the most important inland waterway in Western Europe having a very high navigation density which can be characterized by an amount of nearly 300 Millions of goods carried each year.

Vessels of all nations are allowed to navigate on this natural waterway which is navigable on more than 850 kilometers from the port of Basle in Switzerland up to the open see, nevertheless the flags of the CCNR member States dominate. In order to organize an international uniform navigation system for the Rhine the Central Commission of the Rhine Navigation, the first international river commission in Europe has been founded in 1816 after the Congress of Vienna. In the year 1868 the convention for the Rhine navigation has been signed in the city of Mannheim, the so-called convention of Mannheim which has settled the principles of a liberal navigation system on the Rhine still being in force today.

In order to issue uniform regulations for the Rhine navigation the CCNR has created since the year 1850 a complete Regulation Act for inland navigation

1. THE CENTRAL COMMISSION OF THE RHINE NAVIGATION

1.1 Occasion for founding an International Rhine Commission

The Rhine has been as in the Middle Ages as in the coming modern times, when there didn't yet exist any rail-roads, the most important international way of exchanging goods in the Middle Europe. Only few people know that in these times the numerous castles along the Rhine had been very annoying and burdened toll stations where the boatman had to pay countless duties to the numerous principalities. So it is said that between Mainz and Cologne there had existed more than 32 toll stations.

Therefore it was requested early in the nineteenth century to come to international rules and to a free traffic with the equal rights to all waterway users. The Congress of Vienna created finally the Central Rhine Commission, which hold its first session on 5th August 1816 in form of a diplomatic conference.

1.2 History

The first task of the new Central Rhine Commission was to lay down the principles for free navigation by drafting an international Rhine Convention. The task was finished when in the year 1831 the so-called, Convention of Mainz was adopted. However this Convention was soon amended by a new more practical Convention, the revised Convention for Rhine Navigation signed at Mannheim on

interlocutor between the CCNR and the navigation.

After preparation and discussion in special comitees and working groups the decision is made by a resolution of the plenary meeting, where every member state has one vote. Resolutions having passed unanimously are binding all member states and the states have to bring the contents in their national legislation. Resolutions having passed only with majority have a character of recommandation.

The CCNR has set since the year 1920 an own secretary at Strasbourg, which is filled with the three international officers coming from the member states.

1.5 The future tasks of the CCNR

The CCNR has established in the last 100 years a complete regulation act for navigation on the Rhine, which has been uniformly applied by the member states. This work comprises international requirements for vessels and their cargo, the ship's leading and the crew as well as the behaviour and the communication during navigation, which are binding the authorities of member states. Divergences have to be approved by the CCNR's groups and committees.

The CCNR has also set during the time some proceedings which ensure development of the rules according to the technical standards as well as to the changing needs of navigation. The unified application and interpretation of the rules is guarranted by regularly meetings of the concerned authorities of member states. The observance of the rules is controlled by the national shipping police, however the uniform jurisdiction for the Rhine navigation ensures the rather equal treatment of violations of the rules in the member states. It is sure, that an efficient international regulation act doesn't work, if the field of proceedings for development, application, interpretation and controll is not uniformly arranged.

Therefore the CCNR having a wide experience for establishing an international regulation act for inland navigation will have to play a major part in the future when a unified regulation for the Rhine and the Danube and all other european inland waterways will be relevant.

2. THE REGULATION ACT FOR INTERNATIONAL NAVIGATION ON THE RHINE

2.1 General

The regulation act for navigation on the Rhine consists in numerous prescriptions adopted unanimously by the CCNR which are put in force by the member states. All prescriptions are coordinated with each other, so that it is impossible to take one prescription out without creating gaps in the regulation act.

2.2 Survey of the regulations

The regulation work consists in (figure 4)

- the Inspection Regulations for vessels on the Rhine,
- the Police Regulations for the Navigation on the Rhine,
- the Regulations of boatmaster's patent for the Rhine navigation,
- the Prescriptions for the Transport of Dangerous Goods on the Rhine (ADNR),

and, in addition to these regulations, a number of prescriptions which contain special technical rules.

2.3 The Police Regulations for the Navigation on the Rhine

This regulation is addressed in the first line to the ship's leader. Each vessel have to be commanded by a boatmaster possessing a Rhine boatmaster's patent (licence). He is the only responsible person on board of vessels and convoys and has to stay there during any navigation. He may not be affected by alcohol, fatigue or medicaments. The crew has to follow his instructions. Each boatmaster has to make all precautions necessary to comply with the general obligation of carefulness, to avoid risks for human life, average, hindrance of navigation or impairment of the environment.

There are numerous provisions concerning averages, lost of objects, damage of waterway and accurate regulations prescribing

- the rules of navigation, for instance the meeting, crossing and overtaking,

Commissions of the member states. To obtain this certificate the ship's owner has to follow the same proceedings as for the ship's attest.

In the annexe A all dangerous goods and materials were defined. This annexe has been taken from the ADR and agreed with the worldwide international prescriptions for dangerous goods worked out by the working groups of the United Nations.

The annexe B1 contains the prescriptions for the transport of dangerous cargo in bulk cargo or ordinary goods.

There are construction and equipment rules additional to the Inspection regulations as well as additional to the police regulations for the behaving during navigation, the loading and discharging.

The annexe B2 deals with tank vessels for inland navigation transporting dangerous cargo in the liquid or gaseous form.

The latest updating of the ADNR has been made in cooperation with the Economic Committee for Europe (ECE) in Geneva and has been adopted by the CCNR in the autumn session 1993 and will be entering in force together with the other updated prescriptions for the 1st January 1995.

3. TECHNICAL REQUIREMENTS FOR VESSELS NAVIGATING ON THE RHINE

3.1 Structural requirements, stability and manoeuvrability

The fundamental rule of all requirements lays down that

- all vessels have to be constructed according to the standard of ship building.

The vessel's hull shall have enough strength to resist to the normal stress caused by navigation. This stress has to be justified by a calculation.

The thickness of the bottom, bilge and side plating has to be verified by given proceedings. So the minimum thickness for vessel of more than 40 m may be calculated by the formula

$$t = 2,3 + 0,04 L \text{ (length of ship)}$$

with some factors for considering the kind of plating, distance of frames and so on. The vessel shall have

- a collision bulkhead arranged at a distance from bow of $0,04 L$ (ship's length) and
- a stern bulkhead if its length is greater than 25 m.

There are special requirements for the engine compartments, their fire extinguishing arrangements, access and noise. The vessel's freeboard shall be calculated by a formula which is also employed by the ECE recommendations.

The updated regulation includes minimum manoeuvrability requirements such as

- minimum speed going ahead,
- stopping,
- going astern,
- change of course and
- turning.

The vessel shall be examined in a special test area with a loading to at least 70 % of the capacity. The vessel shall be able to stop on still water within a distance of 305/350 m or in running water within 480/550 meters according to the ship's length (more or less than 110 m). More details are given in a directive for the Inspection Commissions.

3.2 Machinery and electrical requirements

The machinery prescriptions deal with the main and auxiliary machinery, gas exhaust, fuel system and pumping arrangement. There shall be other installations for gathering of oily water and used oil in order to prevent water pollution. The electrical requirements are based on the standards of the international electric commission's publication.

3.3 Steering gear and wheelhouse, anchors

The vessel's steering gear has to ensure the ability to reach the requirements in manoeuvrability demanded in the special chapter mentioned above.

The steering gear shall be replaced by a second independent installation in case of failure within 5 seconds.

In the wheelhouse monitoring and indicating devices shall be provided. The steersman

- with six barges on the lower Rhine until Coblenz (Dimensions 193 m x 34,5 m or 269,5 x 22,90 m) and
- with four barges on the entire Rhine (Dimensions 186,5 m x 22,90 m).

A great number of pushed convoys consists in a motor vessel of a length of 110 m and one barge of 76,5 m with a beam of 11,40 m.

The convoy's members are generally connected with wire ropes, but other licensed couplings, which meet the special requirements tested during acceptance trials on the Rhine are allowed. The forces between push boat and barges shall be calculated after the strongly simplified formula shown in figure 7.

3.8 Special provisions for sea-going vessels

The basic principle on the Rhine is that every vessel navigating on the Rhine have to meet all regulations, thus also sea-going vessels. However a sea-going vessel in possession of an international certificate issued in accordance with the SOLAS and MARPOL rules may have many facilitations.

3.9 Special provisions for vessels transporting containers

The Rhine is well suited to container transport. The containers are transported in stacks of 4 containers abreast and 3 or 4 containers upon another.

In the year 1982 a container vessel had an serious accident on the Rhine caused by a insufficient fastening and bad loading arrangement of containers. The Rhine had been blocked for five days. Subsequently the CCNR has worked out some rules for vessels transporting containers. Each vessel transporting containers shall calculate the stability at loading and shall have on board special documents proving the stability. The documents have to be authorised by the Inspection Commissions of the member states. The boatmaster shall be able to use these documents in every loading case.

The tables to use when estimating the stability of container vessel are shown in figure 8.

3.10 Special provisions for vessels transporting dangerous goods

All vessels transporting dangerous goods have to meet the ADNR-prescriptions. These prescriptions are so voluminous that provisions separated from the other regulations had to be developed.

The cross-sections of tank vessels provided in the regulation are shown in figure 9.

4. RULES FOR NAVIGATING, BERTHING AND PREVENTING POLLUTION ON THE RHINE

4.1 Dimensions of the navigation channel

The navigation channel on the Rhine has a width as follows (figure 10)

between Basle and Iffezheim approximately 100 m,
between Iffezheim and Mannheim: 88 m to 92 m,
between Mannheim and Koblenz: 120 m
downstream Koblenz: 150 m.

The bridges crossing the Rhine were built with a height for passing above highest navigation water level of 9,10 m downstream of Strasbourg and 7 m upstream. The depth varies in the non canalised section and depends on the water level of the Rhine. The depth at equivalent water level which happens for 21 days in the year is guaranteed to at least 2,10 m. We have not laid down these dimensions in the regulations. Each boatsmaster has to know them and can use them in his own responsibility.

4.2 Rules of the road

Vessels sailing on the Rhine are allowed to have the following maximum dimensions

length: 110 m
beam: 22,80 m

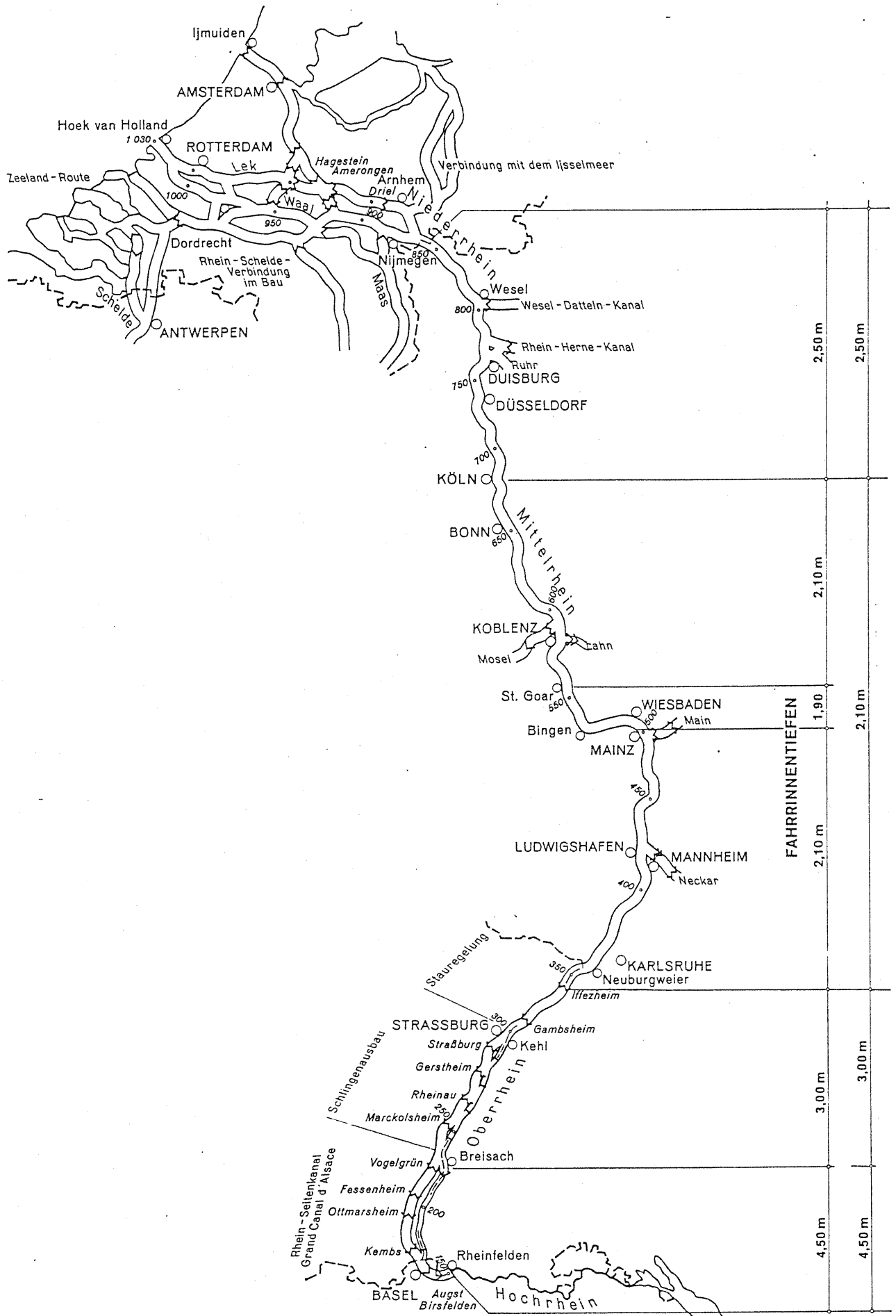
Each vessel can cross or overtake another vessel, if there are no forbidding markings or signs.

A vessel has been defined as an inland waterway craft with a hull of more than 20 meters.

Small crafts with a hull less than 20 m have to observe particular rules.

Figure 1

The river Rhine from Rheinfelden to the Nord sea



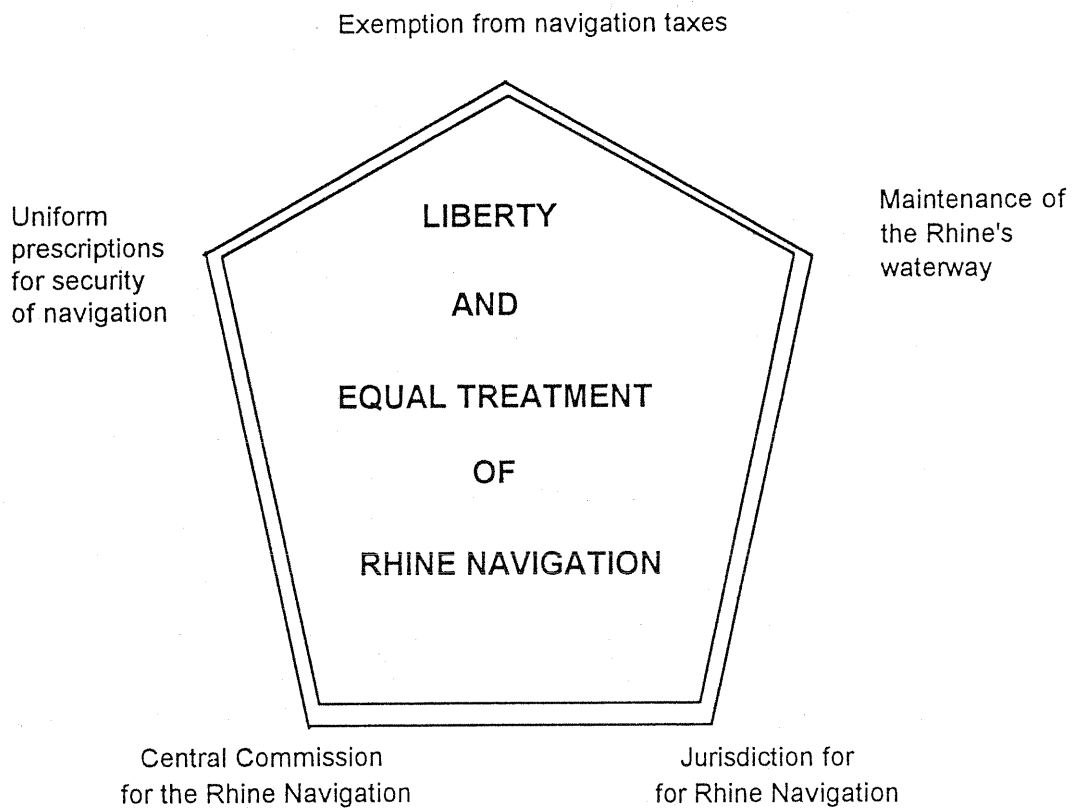


Figure 2

**Fundamental elements of the Rhine Convention
(signed at Mannheim 1868)**

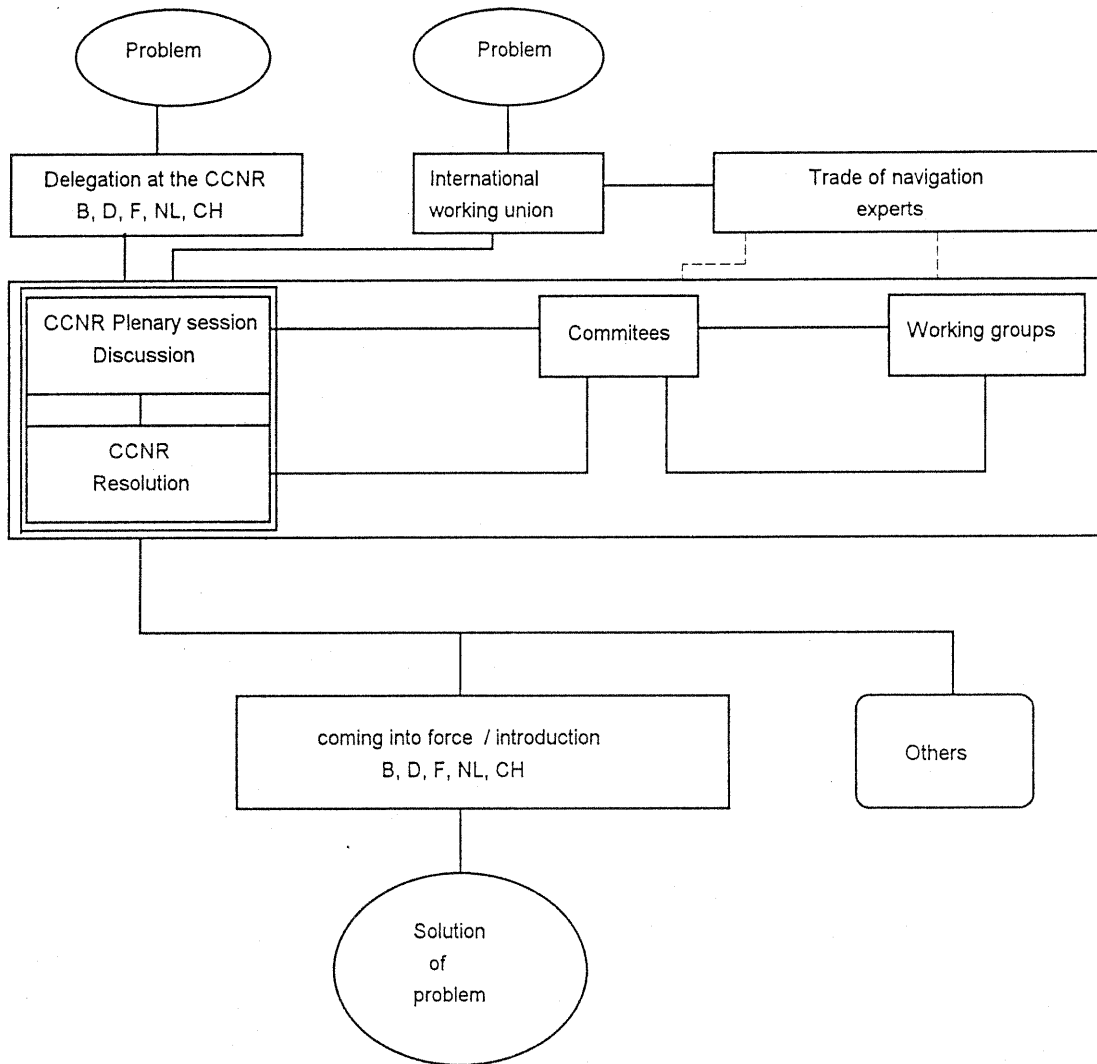


Figure 3

Functions of the CCNR

Inspection Regulations for vessels on the Rhine (proceedings, technical provisions, equipment and manning)	A (construction equipment)
Police Regulations for the Navigation on the Rhine (vessel's operation, navigation rules, local provisions, prevention of pollution)	D (operation)
Regulations of boatmaster's Patent for the Rhine navigation (training, examination)	N (formation)
	R (substances, packing)

Figure 4

Structure of the technical regulation Act for Rhine navigation

Figure 5

Example for night and day marking of vessels

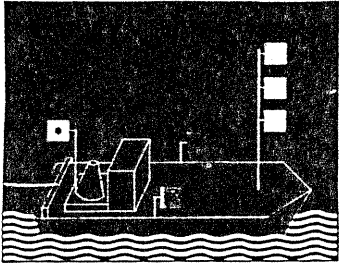
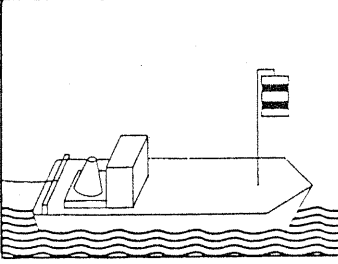
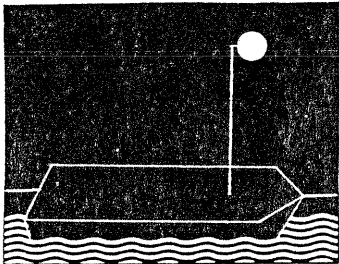
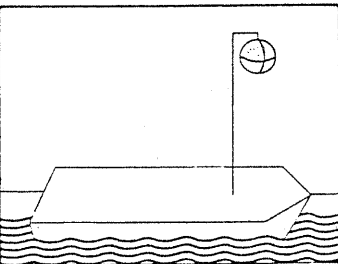
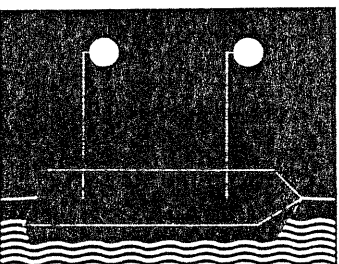
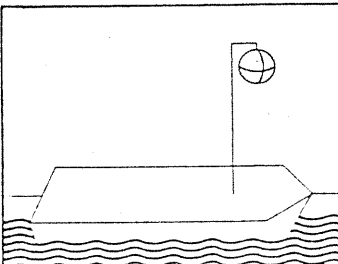
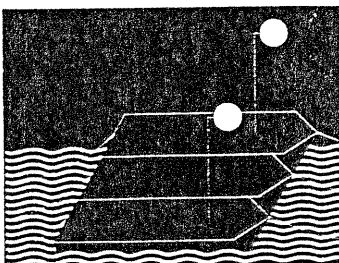
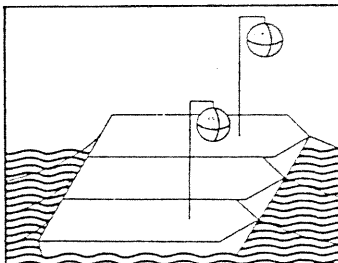
LICHTEN	SCHETS	DAGTEKENS
	<p>5</p>	
<p>Artikel 3.09 Varende slepen Lid 2: Sleep aan de kop waarvan verscheidene motorschepen naast elkaar varen</p>		
	<p>6</p>	
<p>Artikel 3.09 Slepen Lid 3: Gesleepte schepen</p>		
	<p>7</p>	
<p>Artikel 3.09 slepen Lid 3 onderdeel a: Lengte in een sleep langer dan 110 m</p>		
	<p>8</p>	
<p>Artikel 3.09 Slepen Lid 3 onderdeel b: Lengte in een sleep bestaande uit meer dan twee langszijde van elkaar vastgemaakte schepen</p>		

Figure 6

Formations and dimensions allowed for pushed convoys on the Rhine

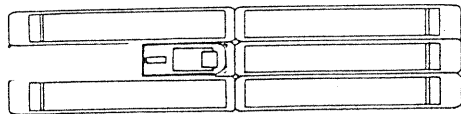
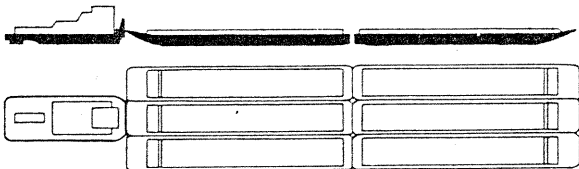
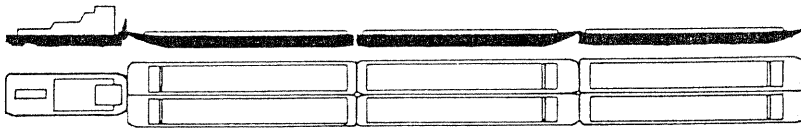
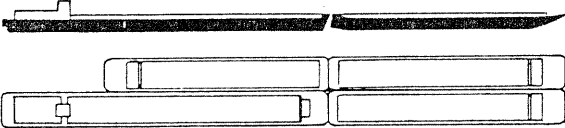
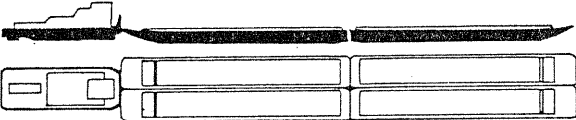
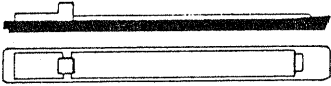
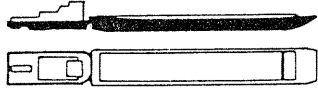
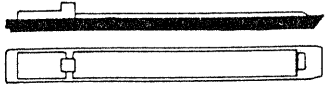
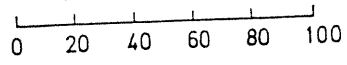


Figure 7

Calculation of forces between the members of a pushed convoy

$$F_{SB} = 270 \cdot P_B \cdot \frac{L_s}{B_s} \cdot 10^{-3} \quad [\text{kN}]$$

$$F_{SF} = 80 \cdot P_B \cdot \frac{L_s}{h_k} \cdot 10^{-3} \quad [\text{kN}]$$

$$F_{SL} = 80 \cdot P_B \cdot \frac{L'_s}{h'_k} \cdot 10^{-3} \quad [\text{kN}]$$

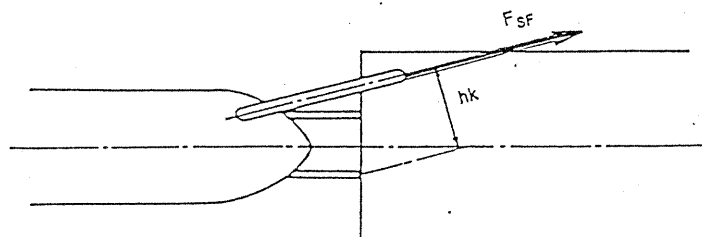
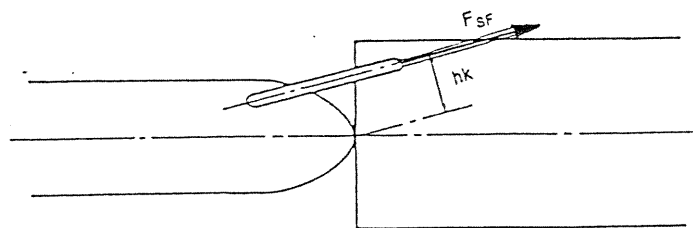
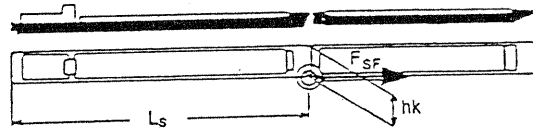
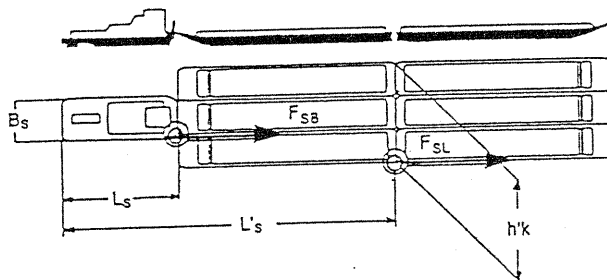
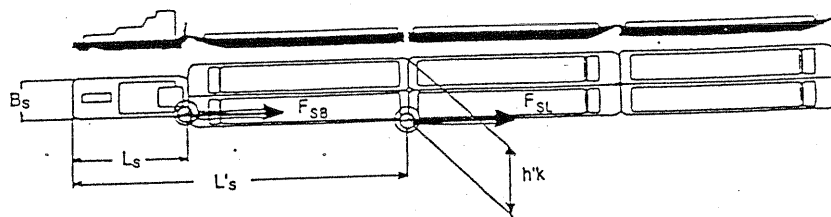
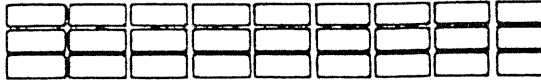


Figure 8

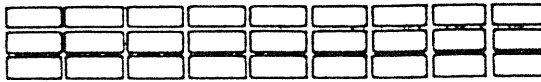
Calculating stability of container vessels

Formblatt zur Bestimmung der Stabilität für ein 4-Lagen-Containerschiff

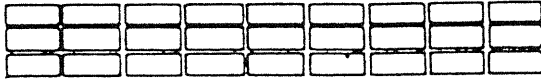
1. Lage



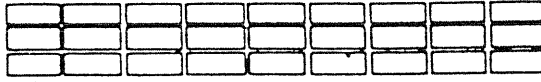
2. Lage



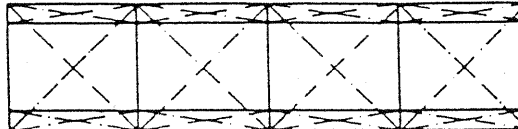
3. Lage



4. Lage



Ballastwassertanks



Bemerkung

Hat das Schiff keine Ballastwassertanks, können die diesbezüglichen Eintragungen entfallen.

In den für die Gewichtsrechnung vorgesehenen Spalten richtet sich die Anzahl der Zeilen nach der Anzahl der Containerstellplätze pro Lage.

Anlage 3 Blatt 2

1. Lage		2. Lage		3. Lage		4. Lage		Ballastwasser			Tabelle der maximal zulässigen Stabilitätskennzahlen	
Stellplatz	Gewicht	Stellplatz	Gewicht	Stellplatz	Gewicht	Stellplatz	Gewicht	Tank	Gewicht	Kennzahl	Gesamtwicht	zulässige
											Cont. + Ballast	Stab.-Kennzahl
Summe I		Summe II		Summe III		Summe IV		Summe V				
				2xSumme III		2xSumme IV		Summe VI				
								+ Summe I				
								+ Summe II				
								+ Summe III				
								+ Summe IV				
								+ Summe V				
								Gesamtwicht				
								Cont. + Ballast				
								Summe II				
								+ 2 x Summe III				
								+ 3 x Summe IV				
								=				
								- Summe VI				
								vorhandene				
								Stab.-Kennz.				
								zul. Stab.-Kennzahl				
								Gesamtwicht				
								zul. Stab.-				
								Cont. + Ballast				
								Kennz. aus Tab.				
Bemerkung:												
Die vorhandene Stab.-Kennzahl darf nicht größer sein als die zulässige Stab.-Kennzahl.												
										Schiffsname		
										Reise von:		
										nach:		
										Datum:		
										Unterschrift:		

Figure 9

TYPES OF TANK VESSEL ACCORDING TO ADN

Type G: Tank vessel for the transport of gas under pressure or deep frozen

Type C: Tank vessel for the transport of liquids

Type N: Tank vessels for the transport of liquids

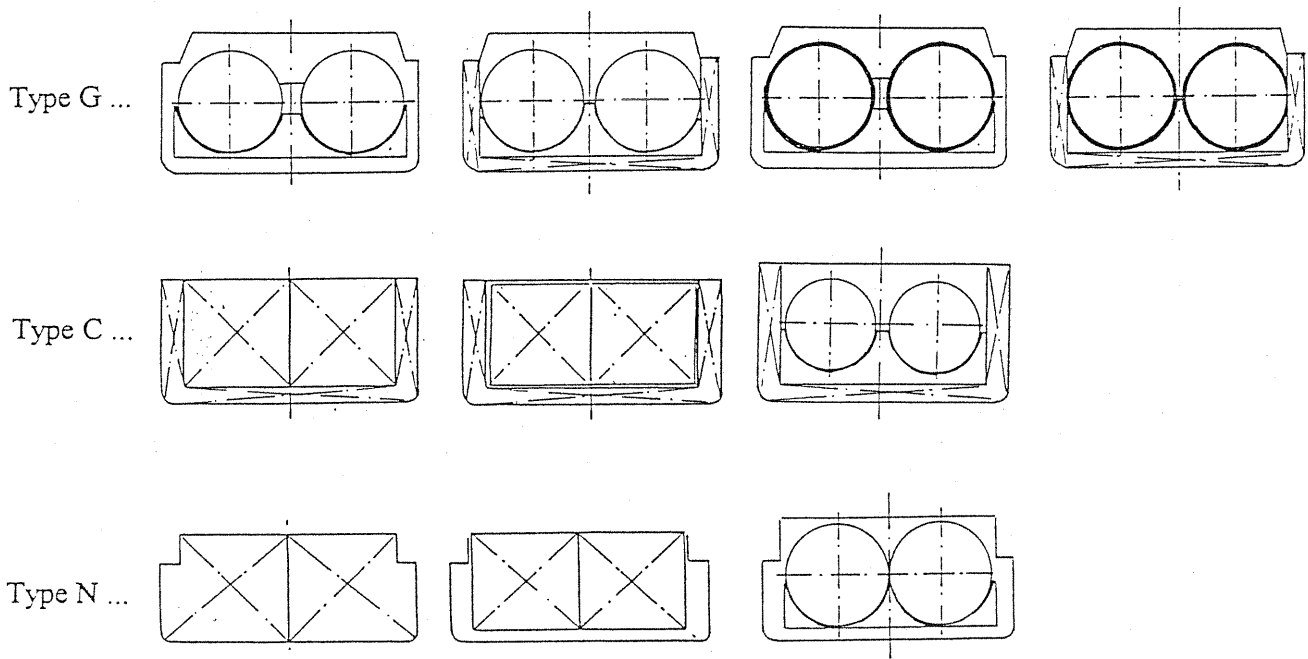
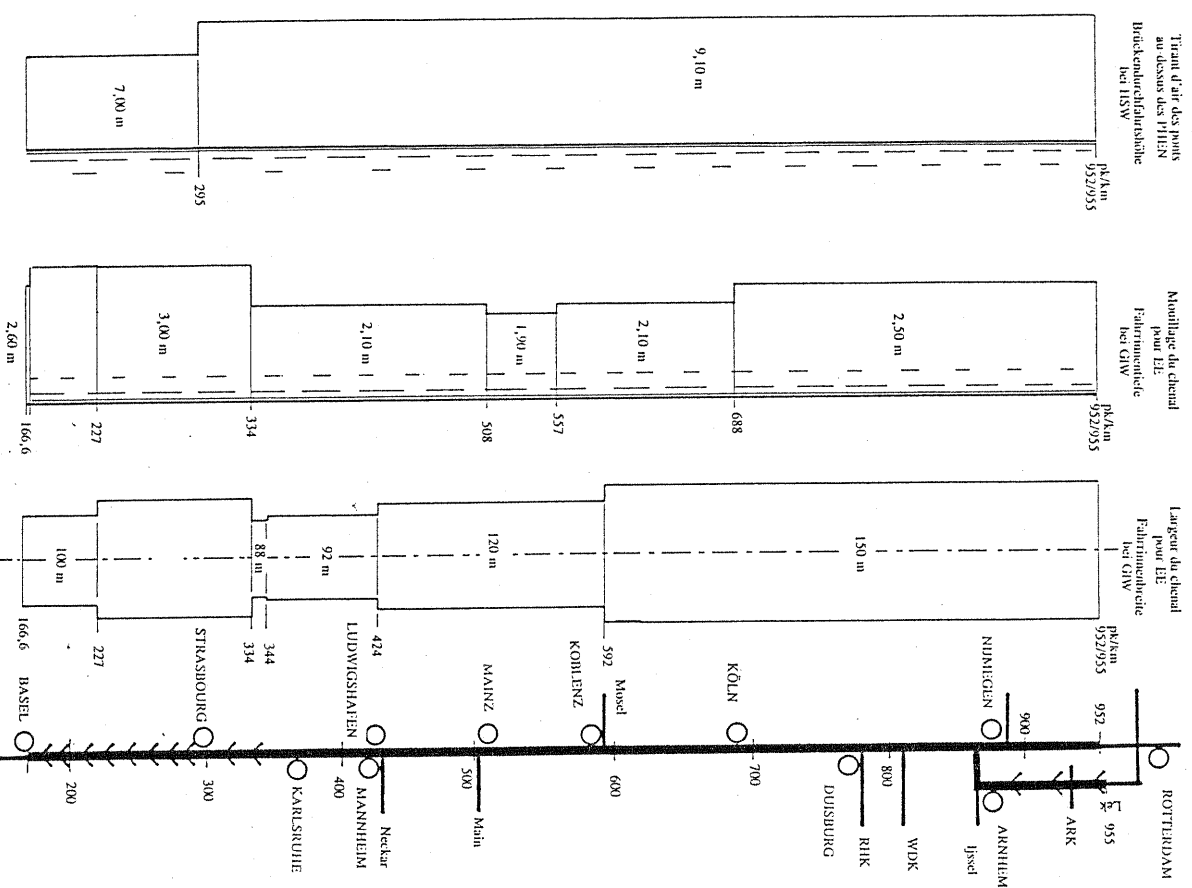


Figure 10

Dimensions of Rhine navigation



Dimensions maximales des bateaux et convois poussés
Höchstzulassungen von Schiffen und Schubverbänden

Bateau/Seilt	L	I	Convois poussés/Schubverbände		I	Formation
			L	L		
Waal	110	22,5	269,5	22,80	1	
			193,0	34,20		
Lek	110	22,5	269,5	22,80	1	
			193,0	34,20		
B	110	22,5	186,5	22,80	1	
			153,50	34,20		
T	110	22,5	186,5	22,80	1	
			153,50	34,20		
T	110	22,5	186,5	22,80	1	
			153,50	34,20		
T	110	22,5	186,5	22,80	1	
			153,50	34,20		
T	110	22,5	186,5	22,80	1	
			153,50	34,20		
T	110	22,5	186,5	22,80	1	
			153,50	34,20		
T	110	22,5	186,5	22,80	1	
			153,50	34,20		

Figure 11

Prevention of Pollution from Inland Navigation Vessels

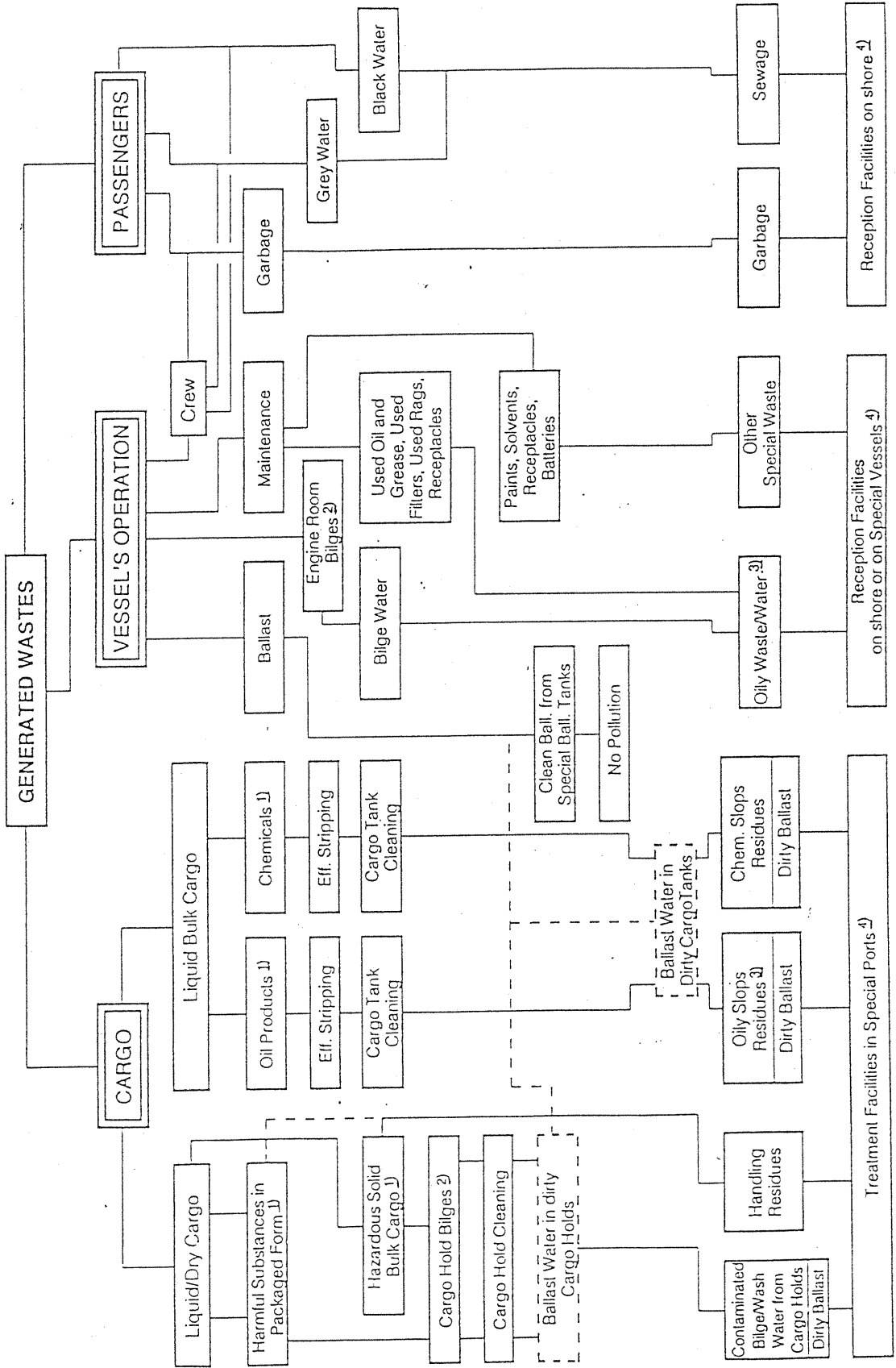


Figure 12

Disposal facilities on the Rhine

