GUIDELINES FOR THE DISTRIBUTION OF VINYL CHLORIDE - 2003

ECVM

European Council
of Vinyl Manufacturers

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1. INTRODUCTION

The CEFIC (European Chemical Industry Council) Responsible Care Program requires that chemical companies demonstrate their commitment to continuously improve all aspects of performance which relate to protection of health, safety and the environment.

These Guidelines have been prepared by an ECVM Task Force to apply the requirements of Responsible Care in the distribution of Vinyl Chloride. They are consistent with the CEFIC Recommendations on Safe Management Practices in Distribution and establish appropriately high standards of safety for the distribution of Vinyl Chloride.

Although Vinyl Chloride is a dangerous substance in terms of flammability, reactivity, it can be distributed and handled safely provided that appropriate precautions are observed.

The distribution of Vinyl Chloride is already subject to regulations within most countries in Europe. In addition, the international movement of Vinyl Chloride by road, rail, sea and inland waterways is subject to international agreements which lay down specific requirements concerning distribution. These requirements must be observed by all parties involved. National regulations may contain additional requirements.

These Guidelines take into account the distribution of Vinyl Chloride in bulk road tankers, rail tankers, sea going vessels and barges. They cover all aspects of transport activity from loading to delivery point. Reference to existing regulatory controls is only made where this is considered necessary for the purpose of clarification.

Since drum shipments are not carried out by the ECVM member companies, specific distribution risk management, and requirements for drum shipments are not discussed in these guidelines. However, individual companies can offer advice upon request.

ECVM recommends that these Guidelines be adopted by all parties which are involved in the distribution of Vinyl Chloride. This includes commercial transactions, swap, toll or trade agreements and customer collection arrangements.

2. PRODUCT INFORMATION

2.1. GENERAL DATA

UN NUMBER	1086
EINECS NUMBER	200-831-0
EC-Nr.	602-023-00-7
CAS NUMBER	75 - 01- 4
EMS-Nr.	F-D & S-U
SYNONYMS	Vinyl Chloride, VC, VCM, Chloroethylene, Chloroethene, Monochloroethene

At ambient temperature and atmospheric pressure Vinyl Chloride is a colourless, sweet smelling gas, denser than air. It can be liquefied according to the physical conditions (pressure, temperature) and is normally stored as a liquid.

HAZARDS IDENTIFICATION

Refer to section 2.7

WARNING PROPERTIES

The odour of this material is normally inadequate to warn of excessive exposure.

2.2. PHYSICAL PROPERTIES

Formula		CH_2= CHCl
Molar mass		62.5 g/mol
Melting Point (101.3 kPa)		-153.8°C
Boiling Point (101.3 KPa)		-13.9°C
Flash Point (closed cup)		-78°C
Critical Temperature		156.5°C
Critical Pressure		5590 kPa
Auto-ignition temperature in air at 101.3kPa		473°C (DIN 51794)
Explosive limits in air (20°C):	- lower	3.6 vol%
	- upper	33 vol%
Solubility of VC in water (15°C)		9.5 g/l (under the vapour pressure of the VC phase)
Solubility of water in Vinyl Chloride		0,.30 g/kg at -15°C
Density (liquid at 20°C)		0,911 g/cm^3
Relative vapour density (air=1)		2,21
Vapour pressure	-10°C	118 kPa
	0°C	167 kPa
	+10°C	245 kPa
	+15°C	285 kPa
	+20°C	333 kPa
	+40°C	598 kPa

Detectable by smell	200 ppm by volume (highly varying values are quoted in the literature)

2.3 FLAMMABILITY HAZARDS

Vinyl Chloride, a gas that can be smelt, is extremely flammable with a flashpoint of -78°C and a wide explosive range of 3,6 - 33 Vol% in air. The vapour is heavier than air and spreads at ground level, with the risk of ignition in presence of an ignition source at great distance and flash back.

2.4 TOXICOLOGY AND OCCUPATIONAL HEALTH HAZARDS

2.4.1 Acute Toxicity

The experimental data on animals indicates a very low acute toxicity of Vinyl Chloride. Depression of the central nervous system in animals occurs at concentrations of 20.5 mg/l to 25.6 mg/l. Higher concentrations of 256 mg/l for 30 minutes cause a deep narcosis with incidences of death for mice, rats and guinea pigs.

Following inhalation of Vinyl Chloride, the following LC_{50} (2h) values were determined for

mice:	294 mg/l
rats:	390 mg/l
guinea pigs:	595 mg/l
rabbits:	295 mg/l

LD_{50} (oral) rat/: 500 mg/kg

It acts primarily as a narcotic in warm-blooded animals after inhalation at high concentrations. Until the early 1970s, the carcinogenic nature of VCM was unknown. It was, for example, used as an anaesthetic for dental surgery. Liquid Vinyl Chloride causes hypothermia of the skin comparable to second-degree frostbite. Temporary eye damage may also occur. Prolonged or repeated skin contact with liquid VCM will result in the development of chemical burns, blistering and swelling. There are reports that gaseous VCM may also produce allergic dermatitis.

2.4.2 Chronic toxicity

Depending on the exposure period and concentration, subchronic and chronic exposure cause damages to the liver, lung, spleen and kidneys of various species of test animals but not yet proved to humans. In rats, exposure to a Vinyl Chloride concentration of 1.28 mg/l (7 hours daily, 5 days weekly over 4.5 month period) resulted in an increase of the liver weight and histopathological

alterations of the liver (central lobular degeneration) and kidneys (tubular damage).
Vinyl Chloride is classified in the EU as a Category 1 carcinogen (i.e. a substance with cancerogen effects to humans).
Vinyl Chloride itself is a relative weak mutagen. High dosages are necessary in order to induce mutations.
Exposure limit value set by the E.U.: 3 ppm

2.5 EMISSIONS AND DEGRADATION

Data regarding photochemical degration in the atmosphere through direct photolysis are unavailable. But VCM does indirectly degrade by reaction with photochemically produced hydroxyl radicals. The half-life of Vinyl Chloride in the atmosphere resulting from various studies varies between a few hours and a few days. Vinyl Chloride does not contribute to ozone depletion.

Under normal conditions, Vinyl Chloride is gaseous and belongs to the highly volatile substances (Henry's law constant H = ca. $2 * 10^3$ Pa m3 mol^{-1}). The high volatility of Vinyl Chloride leads to a rapid transfer from water into the atmosphere. The evaporation half times of VCM from surface water ranges from several minutes to a few hours, depending on water turbulence, wind speed and temperature.

According to rough estimates of the U.S. Public Health Services (Draft 1988), the half-lives for the evaporation of Vinyl Chloride from water bodies is given as follows:

Pond	43.8 hours
Lake	34.7 hours
River	4.7 hours

Vinyl Chloride is not readily biodegradable in water
Liquid Vinyl Chloride rapidly evaporates from dry surfaces and is moderately volatile from wet surfaces. In soils with 1 to 10 cm infiltration of VCM, the vaporisation half-time has been reported as 0.2 to 0.5 days (Jury et al., J. Env. Qual. No 13, pages 573 – 579 (1984)
VCM can be entrained deeper if large quantities of water are showered onto a spill. Substantial amounts have been detected at depths of 1.5 to 2.5 m several months after such an occurrence.

2.6 INTERNATIONAL TRANSPORTATION REGULATIONS

Road, rail & barge

Proper shipping name:	Vinyl Chloride, stabilized
UN number	UN 1086,
ADR (Road):	class 2, code 2F
RID (Rail):	class 2, code 2F
Hazard Identification Nr.:	239
ADNR (Inland waterways):	class 2, code 2F
ADNR Ship Type:	G 1 1

Sea (IMDG-Code):

Proper shipping name:	Vinyl Chloride, stabilised
IMDG (package goods and Tank container)	class 2.1
Packing Group:	-
UN-number	1086

Sea (IGC-Code):

IGC (Tank ship)	
Proper shipping name:	Vinyl Chloride
Ship type	2G / 2PG

2.7 EEC LABELLING/SPECIAL RISKS/SAFETY ADVICE

Classification according to D 67/548 EEC amended by D 93/72 EEC (19th APT)

	F+	Extremely flammable
	T	Toxic
Risk Phrases	R12	Extremely flammable
	R45	May cause cancer
Safety Phrases	S45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible)
	S53	Avoid exposure. Obtain special instructions before use.

3. TRANSPORT OPERATIONS

3.1. General

1. The distribution operations of any road tanker, tank container, rail tanker or barge/sea going vessel with dangerous goods is a potential hazard. It is therefore important that loading / unloading facilities and transport equipment are correctly designed and constructed, and properly used and maintained.
2. Equipment which meets the requirements of the ADR, ADNR, RID and IMO Regulations is subject to periodic inspection and testing requirements as laid down in these Regulations. Official inspection and testing are carried-out by the competent authorities in the particular country of registration.
3. Written safety operating instructions should be available for all filling points covering the loading of Vinyl Chloride stabilized into bulk road tankers, tank containers, rail tankers, barges or sea going vessels, and the personnel

involved should be fully trained in their implementation. The instructions should recognise the specific hazards of Vinyl Chloride stabilized, and ensure the correct operation of filling equipment in both normal and emergency situations.

4. All necessary personal protection clothing and emergency equipment should be available for loading / unloading operations. The personnel should be trained in the correct use of such equipment.
5. It is not the intention in this Section of these Guidelines to attempt to set detailed operating instructions for filling Vinyl Chloride stabilized, since these will depend upon local operating instructions. However, as part of the operating instructions, an inspection of the transport equipment should be carried out by the loading terminal staff before, during and after loading. This inspection does not replace nor diminish the responsibility of the owner of the road tanker, tank container, rail tanker, barge or sea going vessel to ensure that the equipment is properly tested, maintained and fit for its purpose. It is meant to ensure that the transport of Vinyl Chloride stabilized is conducted as safely as possible. A proposal for a loading / unloading Checklist for rail and road transport is given in Chapters 3.2 and 3.3. National requirements have to be taken into account. Barges and sea going vessels have specific checklists according ADNR and IMO regulations. (Appendix 1)
6. The conditions for discharge of Vinyl Chloride stabilized at a customer's premises are normally the customer's responsibility. The customer himself should evaluate whether his premises, especially his reception and storage facilities, meets the requirements.

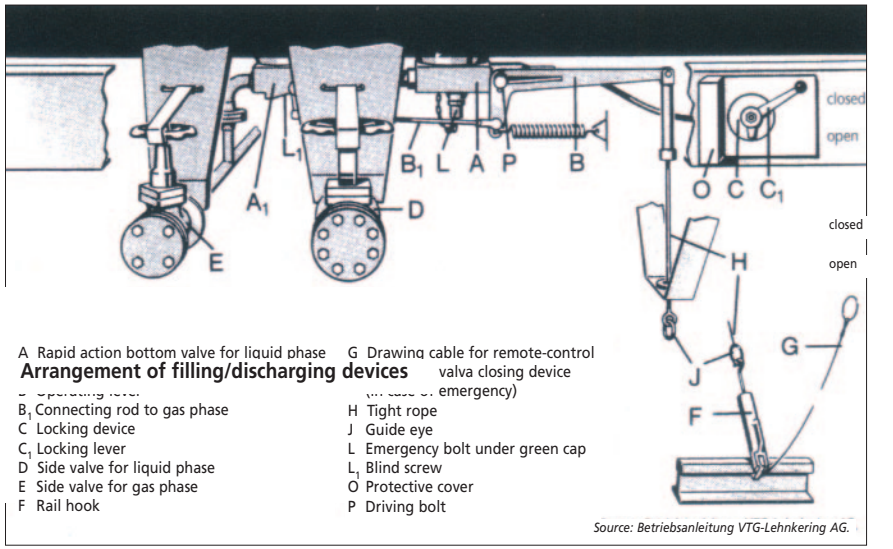
   As customer requires, the consignor will provide him with technical advisory and safety service, which may include a safety visit.
7. Normally VCM is stable without addition of an inhibitor. As polymerisation cannot be excluded in case of high temperature and/or long duration of shipment, small amounts of a suitable inhibitor (e.g. alpha methyl styrene or hydroquinone) may be added.
8. Since 1st January 2000 all chemical companies in Europe have to appoint or hire a safety adviser for Dangerous Goods. The tasks of the safety adviser are listed in the EU-directive 96/35/EC.

3.2. TRANSPORT OF VINYL CHLORIDE BY RAIL

3.2.1 Design and construction of rail tankers

Rail tankers for the transport of Vinyl Chloride must fulfil the requirements of the following regulations with regard to design and construction:

- national provisions or the regulations of the respective rail company in the case of national shipments.
- international provisions, such as the international regulation for the conveyance of dangerous goods by rail (RID) within EU Member States and in international shipments.



Arrangement of filling/discharging devices

A Rapid action bottom valve for liquid phase
B_1 Connecting rod to gas phase
C Locking device
C_1 Locking lever
D Side valve for liquid phase
E Side valve for gas phase
F Rail hook
G Drawing cable for remote-control valva closing device emergency)
H Tight rope
J Guide eye
L Emergency bolt under green cap
L_1 Blind screw
O Protective cover
P Driving bolt

Source: Betriebsanleitung VTG-Lehnkering AG.

Fig. 3-1 Schematic diagram of a rail gas tanker for Vinyl Chloride stabilized

Fig. 3-2 Rail tanker for Vinyl Chloride stabilized

3.2.2 Requirements at loading / unloading points

Precautions should be taken to prevent movement of the tanker during the loading / unloading operations and to prevent movement of other equipment on the same rail track. Entering the loading area should be restricted by work plant instructions.

The filling equipment must consist of a suitable material. Moreover the following equipment should be installed:
- loading / unloading arm or arms
- devices for leak detection testing
- an overfilling safeguard
- rail tanker vapour return connections
- emergency switch to stop loading operations
- earthing connection

3.2.3 Responsibilities for filling rail tanker

Before a rail tanker is used for the first time (or the first time after revision) the following tests should be done:
- a leak test
- an oxygen test
- a moisture test

3.2.3.1 Checklists

The loading of tankers should be carried out and documented in each plant on the basis of checklists. A typical checklist is reproduced in Fig. 3-3. The typical checklist still needs to be supplemented by items specific to the plant.

In the following sub-sections the obligations set out in the checklists are explained.

General information Status: Date:.....

Order Number:	Tanker Number:
Material shipped: Vinyl Chloride, stabilized	Quantity shipped: (Observe loading limit on information plate).
Operational details:	

Actions/Checks:

I) Before filling

1.	Is it the tanker to be filled (Order Number, Tanker Number)?
2.	Is the tanker provided for filling certified for Vinyl Chloride (details of permitted loads on information plate)? In the case of folding indicator plates, are the plates with the correct name of the product and information exposed and secured against flipping over?
3.	Is the tanker duly secured against collision and/or unintended movements?
4.	Is there enough time for transport due to the next tanker test?
5.	Is the tanker as well as filling and discharge equipment (including cocks and valves) clean? Applies especially after the inspection of the rail tanker.
6.	Is the tanker free of damage and suitable with respect to accessory equipment (e.g. sun roof) for taking on Vinyl Chloride? (visual inspection)
7.	Do the seals on the filling openings meet the requirements for Vinyl Chloride and are they free of mechanical damage?
8.	Are liquid phase and gas phase and earthing connection correctly connected?
9.	Check observance of maximum permissible filling factor, 0.81 kg/l according to RID.

II) During filling

10.	Check the sealing of valves for the liquid and gas phases and of the manhole (visual inspection).
11.	Has the prescribed shipment quantity been observed? [Must not exceed the load limit and filling level according to RID (Item 9)]

III) After filling

12.	Have all closure devices been properly closed (all seals inserted, all screws and nuts present and tightened, fittings [hand-wheel, hand-lever, etc.] secured) and protective caps or blank-off flanges (especially at discharge points) been fitted?
13.	Have outer seals been fitted?
14.	Have weatherproof product labels been fitted at the outlets?
15.	Have old danger labels, orange-coloured plates or product labels unrelated to the material being shipped been removed?
16.	Have the prescribed orange-coloured plates bearing the numbers 239 / 1086 been duly fitted on both sides of the tanker or have existing identifiers been checked?
17.	Have the prescribed danger labels N° 3 and 13 been duly attached on both sides of the tanker (not in label boxes) or have existing dangerous good labels been checked?
18	Have all loose objects (e.g. screws, bolts, gaskets) been removed from the rail tankers?

Fig. 3-3: typical checklist for filling rail tankers with Vinyl Chloride

3.2.3.2 Suitability of the rail tanker (Items 1, 2, 4 to 7 of the checklist)

The following points must be ensured:

- The tank is the one, which has been certified for Vinyl Chloride stabilized. The first time a rail tanker car is used for the transportation of Vinyl Chloride stabilized the certification of the tanker has to be checked. For further transportation with this rail tanker it is enough to check the appropriate tanker number and the name "Vinyl Chloride" on the tanker plate. If Vinyl Chloride stabilized is not listed in the folding plates a change of freight must be sought from the user and if need be carried out by the competent authority

  In the case of rail tankers, the date for the next tanker inspection has also to be checked. The date is recorded on the outer casing of the tank. A tanker must not be filled or transported if the deadline for the next inspection has already passed or could be passed before unloading.

  Note: empty tankers which have been cleaned may be transported for the purpose of taking them for inspection even when the test deadline has expired.

- The tank is clean and dry.

  Tanks may be filled with hazardous substances only if there is no possibility of a dangerous reaction with the residual contents. The last product shipped has to be determined either from waybill information or by analysis. If necessary the tank should be cleaned and nitrogen purged to a defined oxygen content before loading.

- The tank and its equipment are free of damage

  Tanks which are damaged must not be used for shipping Vinyl Chloride stabilized. Therefore before filling a check has to be made that the tank is free from mechanical damage such as dents and cracks. If an obvious defect becomes apparent at the loading point the tank must not be filled.

  Apart from mechanical damage to the tank, the equipment on the tank can also exhibit shortcomings. When filling, particular attention has to be paid to the seals. All seals must be present, suitable and free of damage. Missing, damaged or defective seals must be replaced.

  The quick-action bottom valves for the liquid and gas phases should be fitted with suitable seals (e.g. PTFE) in the case of Vinyl Chloride. If there are grounds for doubt about the seal material the seals must be examined in a tanker workshop.

  Missing equipment parts must be replaced before shipping. This is especially the case for screws, nuts, securing pegs, etc. in tankers.

  A check has to be made before filling that the tank and fittings are leak proof and serviceable.

3.2.3.3 Maximum permissible filling weight per litre of capacity (Items 9 and 11 of the checklist)

Maximum filling factors for gases (highest permissible weight of loading per litre of capacity) are laid down in the Dangerous Goods regulations. The filling factor takes into account the expansion of the product when the temperature rises. The maximum filling factor depends on the product. For Vinyl Chloride it is 0.81 kg/l.

The mass of the remainder of the load has to be determined (e.g. by weighing) and must be taken into account when determining the amount to be loaded so that the tanker is not overfilled or overloaded.

If the tanker might have been overfilled, a check must be made immediately with suitable control equipment (e.g. by means of weighing on a calibrated weigher). Overfilled or overloaded tankers have to be securely discharged immediately to the permitted filling levels.

3.2.3.4 Checking the tanks for leaks (Items 8, 10 and 12 of the checklist)

Rail tanker fittings for the liquid Vinyl Chloride stabilized phase

The set of fittings for the liquid Vinyl Chloride consists of an internal quick-action bottom valve and a side valve arranged on each of the ends of the distributor.

Rail tanker fittings for the gaseous Vinyl Chloride stabilized phase

The set of fittings for the gaseous Vinyl Chloride stabilized consists of a pressure-equalising pipe located in the tank, a quick-action valve, which can be linked to the bottom valve for the liquid phase, and a side valve arranged on each of the ends of the distributor.

Before filling, all valves, apertures and shut-off devices not needed for the filling process must be correctly closed. During filling, the tank must be checked for leaks.

After filling, all closure devices must be checked for leaks. This also involves apertures and valves which are not used during filling. It is particularly necessary to check whether the internal shut-off devices are adequately sealed. For this purpose the leak proofing of the valves must be checked. Any leaks must be repaired by suitable means. Subsequently, blank-off flanges or other

equally effective devices should be fitted to the valve outlets. These closures must be provided with suitable gaskets (e.g. Reinz AFM34 or equivalent). They must be sealed using all elements provided for their type of construction.

3.2.3.5 Marking and labelling of the tank (Items 13 to 17 of the checklist)

Responsibilities for marking and labelling the rail tanker cars and tank containers filled with Vinyl Chloride stabilized during rail transport are illustrated in Figure 3-4. The labels can be painted or made of plastic sheet. Old placards, shunting labels and orange coloured plates which do not relate to the product to be transported or are damaged must be removed before shipment. The proper identification should then be attached.

Rail transport: orange-coloured plate 239 / 1086, placard 2.1 and shunting label 13

Tank containers (sea): placard 2.1 with 1086 in the lower part.

Transportation unit	**Provision of placards and shunting labels**	**Identification using orange-coloured plates with numbers**
Rail car with tank container (one chamber)	On the four sides of the tank container (size according to RID; 5.3.1.7.4	On both longitudinal sides of the tank container
Rail car with tank container (several chambers)	On both longitudinal sides of each chamber containing dangerous goods and one placard of each model shown on each side at both ends (size according to RID 5.3.1.7.4	On both longitudinal sides of each chamber containing dangerous goods
Rail tanker (one chamber)	On both longitudinal sides of the tanker (size according to RID 5.3.1.7.4) NOT IN THE LABEL BOX!!!	On both longitudinal sides of the tanker

Fig. 3-4 Marking and labelling in the case of shipment by rail

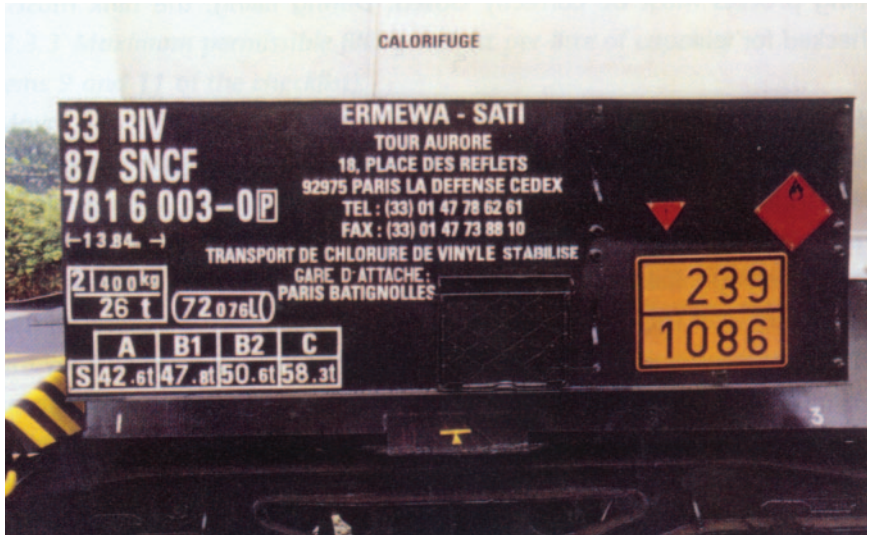


Fig 3-5 Photo of labelled rail tanker (Regulations applying since 2003 require that the digit 2 must appear on the bottom part of the red lozenge and triangle)

3.2.3.6 Further obligations when filling tanks (Item 3 of the checklist)

- The provisions of the operating instructions of the compressed gas tanker (e.g. from VTG [Vereinigte Tanklager Gesellschaft]) have to be observed during loading.
- In accordance with the RID section 4.3.3.4.3b, the excess pressure in the gaseous Vinyl Chloride phase may amount at most to 100kPa above vapour pressure of the liquid phase at the temperature of the liquid phase.
- Tankers have to be secured against collision and/or unintended movement.
- Connecting elements to filling devices must fulfil the same safety requirements as the means of transport.
- On completion of filling a visual final inspection of the tank, the equipment and the labelling has to be carried out and it has to be checked that none of the material loaded is escaping.
- Any problems on the safety of the tank must be reported and registered

3.2.4 Responsibilities of railroad operator

The relevant railway company operator is responsible for the safe transport and for shunting operations in marshalling from the loader to the receiver.

3.2.5 Combined modes of transport

When tank containers are transported by several modes of transport (road/rail/road) and are not accompanied during the rail segment by the driver or by the trailer, particular care must be taken that the road vehicle for subsequent transport to the destination is duly provided with the appropriate identifying hazard plates and that the corresponding papers (e.g. tremcard, way bill) are carried along with the freight.

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3.2.6. Responsibilities for unloading tanks

3.2.6.1 Checklists

It is recommended that the emptying of the tanks also be documented using checklists. The typical checklist in Figure 3-3 can also be used for this purpose after deletion of the items relevant only to loading. The typical checklist must if necessary be supplemented by items specific to the plant.
In the following sub-sections the obligations enumerated in the checklists are described.

3.2.6.2 Checks before emptying tanks

Before emptying the tanks it has to be ensured that
- the product is the one required (especially that the correct tank chamber is being emptied) and
- emptying only takes place using materials, seals, fittings and external protective clothing which in contact with Vinyl Chloride do not react dangerously, produce hazardous substances or can be appreciably weakened by the dangerous good/substance.

The suitability of the tanks needs no longer be checked at discharge. Only in cases of partial discharge of a tank chamber does the suitability of the tank have to be checked once more in accordance with Section 3.2.3.2 before transport continues.

3.2.6.3 Maximum permissible filling weight per litre of capacity

Is checked on filling.

3.2.6.4 Sealing of the emptied tanks

Empty tanks which have not been cleaned have to be sealed just as tightly as full tanks (cf. Section 3.2.3). During emptying, particular care has to be taken that:
- dangerous quantities of gases and vapours are not liberated;
- after emptying the shut-off devices located closest to the product are closed first to prevent, e.g. accumulation of the product between the bottom valve and discharge valve

3.2.6.5 Labelling the emptied tanks

Empty tanks which have not been cleaned have to be labelled in accordance with the specifications for full tanks (cf. Section 3.2.3.5).

When empty tanks are clean the dangerous goods labels and warning plates are to be covered or removed.

3.2.6.6 Further obligations when emptying tanks

- Before emptying the tank car has to be secured against collision and/or unintended movement.
- The connecting elements to discharge devices must meet the same safety conditions as the means of transport.

3.2.7 Documentation

For transportation by rail the CIM-Document is used. The description of the goods in the CIM shall conform to one of the identification numbers and one of the names printed in capital letters in Table A of chapter 3.2 of RID. The CIM-document must contain following information: UN number preceded by the letters UN, the proper shipping name and the class. For tanks the number of the danger has to be reported (RID 5.4.1.1.1)

239, UN 1086 VINYL CHLORIDE, STABILIZED, 2

For empty tanks the description in the CIM shall conform to one of the names printed in capital letters in paragraph 5.4.1.1.6. In this case the last load has to be added.
EMPTY TANK CONTAINER, 2, last load: 239, UN 1086 VINYL CHLORIDE, STABILIZED
EMPTY RAIL TANK-CAR, last load: 239, 1086 VINYL CHLORIDE, STABILIZED

In some cases the sender has to add further information (e.g. following maritime carriage: Carriage under RID 1.1.4.2). Details are listed in the RID.

3.3 TRANSPORT OF VINYL CHLORIDE BY ROAD

Road transport of VINYL CHLORIDE stabilized is regulated by the ADR code. The ADR code is normally incorporated into the individual country's own legislation and thus made compulsory also for domestic transportation.

3.3.1. Design and construction of road tankers

Road tankers for the transport of Vinyl Chloride stabilized must fulfil the requirements of the following regulations with regard to design and construction

- National provisions or regulations in the case of national shipments
- International provisions, such as the international regulation for conveyance of dangerous goods by road (ADR) within EU Member States and in international shipments.
    - The tank must be approved and the ADR-Tank certificate must be on board (the so called B.3-certificate).
    - Tank vehicles must have rear bumpers as specified, and there are rules for the engine, exhaust, and fuel systems of vehicles when carrying Vinyl Chloride in tanks.

3.3.2 Suitability of the haulage contractor: Assessment and monitoring

All Vinyl Chloride manufacturers should use the service of haulage contractors to transport their product. It is highly recommended for the chemical company to carry out checks to ensure that the appointed haulage company is competent and operates in accordance with relevant regulations and safety standards. Contractual agreements with haulage companies should stipulate explicitly that no transport is to be passed on to subcontractors without the prior written consent of the consignor.

3.3.3 Safety audit of the haulage contractor

Safety audits should be carried out by consignors or third parties to their appointed haulage company on a regular basis. Every consignor can thus be assured of the suitability of the appointed haulage company and can ensure that the appropriate safety standards are complied with. The safety audit does not replace or reduce the basic responsibility of the haulage company to ensure that its equipment complies with the appropriate safety regulations and standards and that it is kept in a properly maintained condition.

3.3.4 General training requirements for road tanker drivers

National and international regulations on transporting dangerous goods (for example ADR) stipulate that all drivers of road tankers or transport units transporting dangerous goods in permanently connected tanks, or attached tanks with a total volume of more than 3000 litres, must prove that they have taken part in a special training course for the transportation of dangerous goods in tanks. The ADR certificate is proof of participation in such a special training course and of having passed the examination set by the competent authority. The course has to be repeated every 5 years (ADR 8.2.1.3 and 8.2.1.5).

3.3.5. Requirements for loading and unloading

Equipment for the loading and unloading stations
Take precautions to prevent the movement of the tanker during the loading and unloading operations. Restrict entry to the loading area to that required to follow the work instructions.

Working platform
The working platform of the loading station should have folding steps and the following equipment should be at least installed on the working platform:
- the filling arm or arms
- leak detection testing devices
- road tanker gas return connections
- safety equipment such as eye shower and emergency shower
- emergency switch to stop the loading operation

3.3.6 Checklists

Tank loading and unloading should always be carried-out and documented during the respective operation using checklists.

Prior to loading ensure that:
- the tank has been approved for Vinyl Chloride
- the tank is clean
- the tank equipment is suitable for Vinyl Chloride
- the tank and equipment is undamaged

Prior to unloading ensure that:
- the tank contains the desired product
- emptying takes place using only approved equipment
- the receiving tank has enough space to receive the quantity

3.3.7 Marking and labelling of the tank

Apart from orange plates, tank vehicles, vehicles carrying tank-containers, and vehicles or container carrying Vinyl Chloride in bulk must also show Class placards. Tanks and bulk vehicles must show placards on both sides and at the rear, container on both sides and both ends .

Road tankers carrying only Vinyl Chloride stabilized must show the Hazard identification number and the UN-Number on the orange plates at the front and rear of the vehicle.

If the orange plates are covered, the covering shall be total and remain effective after 15 minutes engulfment in fire (ADR 5.3.2.1.8). However, on a container they may be replaced by a self-adhesive sheet, paint, or equivalent process, provided it is weather resistant and durable, and in this case the fire resistance rule does not apply.

Fig.3.6. Road Tanker with Vinyl Chloride labelled according to UK regulations

The plates and placards must remain in place until the units have been emptied and cleaned out or purged to make them safe, and then be removed or covered over.

3.3.8. DOCUMENTS TO BE CARRIED ON THE VEHICLE (ADR 8.1.2)

Transport document and declaration
All Vinyl Chloride consignments must be accompanied by a transport document. There is no special format for this (normally the CMR-Document is used). The consignor must give the carrier the necessary information in writing before the journey in time for him to prepare it. If the consignment is carried on more than one vehicle, there must be separate documents for each vehicle.
The name must be the one in the Class list, preceded by the UN substance identification number and followed by the Class number, e.g.

UN 1086, VINYL CHLORIDE; STABILISED,

This document must be in an official language of the forwarding country, and if that is not English, French or German, then in one of those languages as well. The consignor also has to declare, either on the transport document or separately, that Vinyl Chloride is allowed to be carried under ADR, and that all the applicable rules in the Class chapter of Annex A have been complied with. Please note that national authorities may impose severe national restrictions upon the road transport of Vinyl Chloride stabilized in bulk (prohibited roads, tunnels, etc.).

Instructions to the driver

The driver must be given instructions in writing stating for each substance or article.
A set of instructions must be kept in the vehicle cab and be in a language known to the driver and in the language of the countries of origin, transit and destination .

3.4 TRANSPORT OF VINYL CHLORIDE BY SEAGOING VESSELS AND BARGES ON INNER WATERWAYS

3.4.1. Design and construction of sea going vessels and barges on inner waterways

Transport of Vinyl Chloride stabilized by sea and inner waterways can be executed by the following type of ships:
Fully refrigerated seagoing gas carriers
Semi refrigerated seagoing gas carriers
Pressurised seagoing gas carriers and barges

NB: For transport over the inner waterways, pressurised ships are normally used.

All ships carrying Vinyl Chloride are expected to be constructed and operated according to various conventions.

IGC	Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk
ADN	Regulations concerning the Transport of Dangerous goods on inland waterways.
ADNR	See ADN. The R indicating rules for the Rhine.

3.7 and 3.8 - Photos from Ships

3.4.2. Suitability of the contractors and the ships

Because of the nature of the transport, a number of different parties may be involved in the transport of Vinyl Chloride stabilized from producer to customer. These may include the shipping company, storage companies, port or harbour authorities and other local and international authorities/organisations.

Prior to the beginning of each shipment the producer should make sure that all parties involved have adequate safety standards. The safety performance should be checked preferably by means of SQAS system where available.

Ships unknown to the charterer should be inspected by a Marine Surveyor to verify compliance with local and international conventions and regulations prior to it being loaded. Inspection of all seagoing vessels to confirm general safety of a ship and its operating procedures as well as a satisfactory condition of the cargo system prior to loading is recommended. The CDI's inspection scheme[1] is a useful means whereby a charterer can have access to the most recent data on chemical and liquid gas ships inspection results. The Chemical Distribution Institute (CDI) is an organisation comprising more than 40 Petrochemical manufacturers who, through their own accredited marine inspectors conduct inspections of ships. The inspection reports are available to all CDI members. By this scheme all members have the opportunity to obtain the current status of an individual ship (less than 12 months). Each charterer has then the necessary information available to decide whether or not the ship in question is suitable for his product and intended voyage. CDI was established in 1994 and has currently a large number of ships on its active list.

It is recommended to charter ships from reputable owners with documented experience in moving liquid gases. To monitor the owners' day-to-day operation of ships carrying Vinyl Chloride it is recommended that the charterer includes a Dangerous Incidence Clause in his Charter Party Document requiring the owner to report all dangerous or potentially dangerous incidents.

3.4.3. Checklists

A typical Check List for loading and unloading of a ship will at least include the following items:

<u>Further General Safety points</u>

Ship safely moored alongside?
Safe access between ship and shore?
Ship ready to be towed or move under own machinery in case of emergency?
Agreed and understood ship/shore communication system operative?

1/ Its Administrative Office is located in the UK, (phone: +44(0) 1483281268, fax +44(0) 1483285474) but is incorporated under Dutch law.

Loading/discharge procedures agreed upon?
Fire fighting equipment on ship and on land in working order?
Spray water system ready for use?
All remote control valves in working order?
Cargo tank safety valves lined up to ships venting systems?
Gas detection equipment in working order?
Cargo system gauges and alarms correctly set?
Emergency shut-down system working properly?

Cargo Transfer Agreement

Ships/shore tanks clean and ready to receive Vinyl Chloride?
Product temperature and quantities for each tank agreed upon?
Regular reporting of loading/discharging quantity?
Is the cargo handling rate compatible with automatic shut-down system?
Are cargo pumps and compressors in good working order?
Have max working pressure been agreed upon between ship and shore personnel?
Do the shore personnel know closing rate of ships automatic valves?
Does ship's personnel have details of shore system?

Purging Agreement

Previous 3 cargoes ?
Method of cleaning ?

Tank Entry Agreement

Previous Cargoes ?
Oxygen analysis before entering ?
Equipment to be used and entering stand-by team agreed upon?

All items on the Check List should be jointly checked by representatives from the ship and personnel from the terminal and signed by both parties.

3.4.4. Requirements for loading and unloading

The producer should put at the disposal of the ship owner the Material Safety Data Sheet (MSDS) and other special safety and loading instructions.

Loading of Vinyl Chloride stabilized occurs always under full recovery of Vinyl Chloride by the way of the own refrigeration installation on board of the sea going vessels or with a vapour return line to the shore installation. No vapours are allowed to escape to the atmosphere at loading/unloading point. Unloading of Vinyl Chloride occurs by pumps on board of the seagoing vessels. By barges it occurs by means of pumps or nitrogen pressure or by Vinyl Chloride vapour pressure from the shore installation.

If the vessel's last cargo was Vinyl Chloride it is normal to allow loading provided it arrives under such vapour. If the last cargo was made of products other than Vinyl Chloride , the vessel should be presented under breathable air ready for visual inspection. The cargo tank will be entered for inspection to ensure freedom from contamination, including significant deposits, polymerisation or accumulations of rust.

A seagoing gas-carrier in continuous Vinyl Chloride service will be re-inspected following the completion of any significant repairs or alterations or a minimum of twice in a five years period. A barge should be subject to a special ADNR survey as a minimum once every five years.

Air should be removed from the cargo tanks and associated piping before loading and then subsequently excluded by:

1. Introducing inert gas (preferably nitrogen) to maintain a positive pressure. Storage or production capacity of the inert gas should be sufficient to meet normal operating requirements and relief valve leakage. The oxygen content of the inert gas should at no time be greater than 0,1% by volume; or
2. Control of cargo temperatures such that a positive pressure is maintained at all times.
3. To avoid any misunderstanding and costs, it is recommended also to purge the sample points/connections in a proper way.

The nitrogen used to purge the cargo tanks should have such a dew point thatthe dew point in the tanks after purging is max - 25°C, to keep the water content in the Vinyl Chloride at a minimum.

If the previous cargo was not Vinyl Chloride stabilized it is recommended that the instructions will be followed which are mentioned in the applicable charter parties. This depends on the local circumstances of the different producers.

3.4.5. Preparation for loading/discharging

Line of communication between a ship and loading facility on shore must be established prior to operations, and must be continuously maintained during the whole operation. If an interruption in this communication occurs, the transfer operations should be stopped immediately.

It is not allowed to open the cargo system to the atmosphere once the loading operations have started.

Normally a sample is taken from every tank on board of the vessel after some Vinyl Chloride has been loaded on board of the ship (foot-sample). This is to ascertain that ships cargo tanks and associated piping have been properly cleaned. If after analysing the foot-sample the Vinyl Chloride does not

correspond to specifications, the loading operation will be stopped for consulting and/or corrective measures.

All loading and discharge of Vinyl Chloride is to take place with vapour return lines except if the ship uses its own refrigeration unit for recovery of Vinyl Chloride.
To minimise the possibility of accidents during the loading and discharge of Vinyl Chloride, most companies and/or local authorities have established a Ship/Shore Safety CheckList to be used in conjunction with the loading/discharge operations. Such a CheckList establishes a common understanding between the shore personnel and the ships crew as to how the loading/discharge of Vinyl Chloride is to take place in accordance to ADNR and IMO (Appendix 1).

3.4.6. Inhibitor

Care should be taken to ensure that the Vinyl Chloride does not polymerise during the voyage.

For a voyage of extended length it might be necessary to add an inhibitor to the Vinyl Chloride.

In cases where polymerisation of Vinyl Chloride is prevented by the addition of an inhibitor, air should be removed from the cargo tanks and associated piping before loading and then subsequently excluded. Furthermore a Certificate of Inhibition should be issued to the ship, stating:

1. Name and amount of inhibitor added;
2. Date inhibitor was added and the normally expected duration of its effectiveness
3. Any temperature limitations affecting the inhibitor;
4. The action to be taken should the length of the voyage exceed the effective lifetime of the inhibitor.

In cases where no or insufficient inhibitor has been added, any inert gas used for purging should contain not more oxygen than 0.1 %.

4. EMERGENCY PROCEDURES

4.1 EMERGENCY PLANNING

All companies involved in producing handling and transporting Vinyl Chloride stabilized in Europe should have an established system, preferably tested by simulations, for receiving transport incident reports, or emergency messages, and for providing expert advice by telephone as the first step.

If required by the Emergency Services, the expert may have to go to the scene in order to minimise any danger arising from the incident and to deal with the situation as quickly and appropriately as possible.

The CEFIC document "Distribution Emergency Response - Guidelines for Use by the Chemical Industry" provides some advice on setting up a Company Emergency Plan.

It is also useful to know the telephone - fax numbers of the owners or drivers of the tanks, of the maintenance workshops, round the clock.

4.2. ICE International Chemical Environment

ICE is a co-operative programme between chemical companies to prevent chemical transport accidents and to respond effectively if and when they do occur. It was started in May 1990 by CEFIC.

Within this system the chemical industry offers three levels of assistance:

Level 1: remote information and general advice by telephone or fax
Level 2: presence of an expert who will provide advice after having carried out an assessment/inspection
Level 3: equipment and personnel at the scene of an incident

When a transport incident happens, the Fire Brigade normally contacts the supplier of the goods if assistance is required. If this fails ICE offers the authorities the possibility to contact other companies which have committed themselves to provide assistance for a range of products. In every country of the ICE-System a national centre may facilitate mutual assistance between companies, especially when incidents occur to international movements.

Those national centres will look for assistance across country boundaries, by using English as the common language between national centres.

In 2003 sixteen national schemes already exist in West-Europe. Other countries are being progressively added and the ultimate aim is to cover the whole of Europe.

5. PERSONAL PROTECTION, FIRST AID AND MEDICAL TREATMENT

5.1. PERSONAL PROTECTION

Personal protection equipment should be worn in accordance to national regulations and to company standards with respect to the use of:
- Respiratory equipment
- Eye Protection
- Protective clothing
- Protective gloves and
- Adequate ventilation

5.2. FIRST AID AND MEDICAL TREATMENT

5.2.1 Symptoms and effects
Irritating to eyes and respiratory system. Causes frost bite. May cause cancer after repeated exposures.

5.2.2 First aid General
In case of accident or if you feel unwell, seek medical advice immediately (show the label and/or UN-number where possible)

5.2.3 Inhalation
Move to fresh air, rest, in half upright position, loosen clothing. Oxygen or artificial respiration if there is difficulty in breathing. Seek medical advice after significant exposure.

5.2.4 Skin
In case of frostbite: Do not remove clothing, but first thaw frosted parts with water (never use warm water!). Then remove clothing carefully and seek medical advice.

5.2.5 Eye
Rinse immediately and as long as possible with plenty of water. Eyelids should be held away from the eyeball to ensure through rinsing. Seek medical advice if irritation persists.

5.2.6 Ingestion
Rinse mouth. Give water to drink. Induce vomiting. Never induce vomiting in unconscious or confused persons. Always seek medical advice.

5.2.7 Advice to physician
Symptomatic treatment is advised.

APPENDIX 1 – IMO

The following section is made of Appendixes 3 and 4 excerpted from "IMO Resolution A.862(20) adopted on 27 November 1997 - Code of Practice for the safe loading and unloading of bulk carriers"

APPENDIX 3
SHIP/SHORE SAFETY CHECKLIST
For Loading or Unloading Dry Bulk Cargo Carriers

==========

Date.....
Port.....Terminal/Quay.....
Available depth of water in berth ..... Minimum air draught ..... *
Ship's name.....
Arrival draught (read/calculated).....Air draught.....
Calculated departure draught.....Air draught.....

The Master and terminal manager, or their representatives, should complete the checklist jointly. Advice on points to be considered is given in the accompanying guidelines. The safety of operations requires that all questions should be answered affirmatively and the boxes ticked. If this is not possible, the reason should be given, and agreement reached upon precautions to be taken between ship and terminal. If a question is considered to be not applicable write "N/A", explaining why if appropriate.

SHIP TERMINAL

1. Is the depth of water at the berth, and the air draught, adequate for the cargo operation?	☐	☐
2. Are mooring arrangements adequate for all local effects of tide, current, weather, traffic and craft alongside?	☐	☐
3. In emergency, is the ship able to leave the berth at any time?	☐	☐
4. Is there safe access between the ship and the wharf? *Tended by Ship/Terminal* *(cross out the appropriate)*	☐	☐
5. Is the agreed ship/terminal communications system operative? *Communication method...Language.....* *Radio channels/phone numbers.....*	☐	☐
6. Are the liaison contact persons during operations positively identified? *Ship contact persons.....* *Shore contact person(s).....Location.....*	☐	☐

7. Are adequate crew on board, and adequate staff in the terminal, for emergency? ☐ ☐

8. Have any bunkering operations been advised and agreed? ☐ ☐

9. Have any intended repairs to wharf or ship whilst alongside been advised and agreed? ☐ ☐

10. Has a procedure for reporting and recording damage from cargo operations been agreed? ☐ ☐

11. Has the ship been provided with copies of port and terminal regulations, including safety and pollution requirements and details of emergency services? ☐ ☐

12. Has the shipper provided the Master with the properties of the cargo in accordance with the requirements of chapter VI of SOLAS? ☐ ☐

SHIP TERMINAL

13. Is the atmosphere safe in holds and enclosed spaces to which access may be required, have fumigated cargoes been identified, and has the need for monitoring of atmosphere been agreed by ship and terminal? ☐ ☐

14. Have the cargo handling capacity and any limits of travel for each loader/unloader been passed to the ship/terminal? ☐ ☐
Loader.....
Loader.....
Loader.....

15. Has a cargo loading or unloading plan been calculated for all stages of loading/deballasting or unloading/ballasting? ☐ ☐
Copy lodged with.....

16. Have the holds to be worked been clearly identified in the loading or unloading plan, showing the sequence of work, and the grade and tonnage of cargo to be transferred each time the hold is worked? ☐ ☐

17. Has the need for trimming of cargo in the holds been discussed, and the method and extent been agreed? ☐ ☐

18. Do both ship and terminal understand and accept that if the ballast programme becomes out of step with the cargo operation, it will be necessary to suspend cargo operation until the ballast operation has caught up? ☐ ☐

19. Have the intended procedures for removing cargo residues lodged in the holds while unloading, been explained to the ship and accepted? ☐ ☐

20. Have the procedures to adjust the final trim of the loading ship been decided and agreed? ☐ ☐
Tonnage held by the terminal conveyor system ....

21. Has the terminal been advised of the time required for the ship to prepare for sea, on completion of cargo work? ☐ ☐

Time..... Date.....
For Ship..... For Terminal.....
Rank..... Position/Title.....

APPENDIX 4

GUIDELINES FOR COMPLETING THE SHIP/SHORE SAFETY CHECKLIST

The purpose of the Ship/Shore Safety Checklist is to improve working relationships between ship and terminal, and thereby to improve the safety of operations. Misunderstandings occur and mistakes can be made when ships' officers do not understand the intentions of the terminal personnel, and the same applies when terminal personnel do not understand what the ship can and cannot safely do. Completing the checklist together is intended to help ship and terminal personnel to recognize potential problems, and to be better prepared for them.

1 Is the depth of water at the berth, and the air draught,* adequate for the cargo operations to be completed ?

The depth of water should be determined over the entire area the ship will occupy, and the terminal should be aware of the ship's maximum air draught and water draught requirements during operations. Where the loaded draught means a small underkeel clearance at departure, the Master should consult and confirm that the proposed departure draught is safe and suitable.
The ship should be provided with all available information about density and contaminates of the water at the berth.
* The term air draught should be construed carefully: if the ship is in a river or an estuary it usually refers to maximum mast height for passing under bridges, while on the berth it usually refers to the height available or required under the loader or unloaders.

2 Are mooring arrangements adequate for all local effects of tide, current, weather, traffic and craft alongside?

Due regard should be given to the need for adequate fendering arrangements. Ships should remain well secured in their moorings. Alongside piers or quays, ranging of the ship should be prevented by keeping mooring lines taut; attention should be given to the movement of the ship caused by

tides, currents or passing ships and by the operation in progress.
Wire ropes and fibre ropes should not be used together in the same direction because of differences in their elastic properties.

3 In emergency, is the ship able to leave the berth at any time ?
The ship should normally be able to move under its own power at short notice, unless agreement to immobilise the ship has been reached with the terminal representative, and the port authority where applicable. In an emergency a ship may be prevented from leaving the berth at short notice by a number of factors. These include low tide, excessive trim or draught, lack of tugs, no navigation possible at night, main engine immobilised, etc. Both the ship and the terminal should be aware if any of these factors apply, so that extra precautions can be taken if need be. The method to be used for any emergency unberthing operation should be agreed taking into account the possible risks involved. If emergency towing-off wires are required, agreement should be reached on their position and method of securing.

4 Is there safe access between the ship and the wharf ?
The means of access between the ship and the wharf must be safe and legal, and may be provided by either ship or terminal. It should consist of an appropriate gangway or accommodation ladder with a properly fastened safety net underneath it. Access equipment must be tended, since it can be damaged as a result of changing heights and draughts; **persons responsible for tending it must be agreed between the ship and terminal, and recorded in the checklist**.
The gangway should be positioned so that it is not underneath the path of cargo being loaded or unloaded. It should be well illuminated during darkness. A lifebuoy with a heaving line should be available on board the ship near the gangway or accommodation ladder.

5 Is the agreed ship/terminal communications system operative ?
Communication should be maintained in the most efficient way between the responsible officer on duty on the ship and the responsible person ashore. The selected system of communication and the language to be used, together with the necessary telephone numbers and/or radio channels, should be recorded in the checklist.

6 Are the liaison contact persons during operations positively identified?
The controlling personnel on ship and terminal must maintain an effective communication with each other and their respective supervisors. **Their names, and if appropriate where they can be contacted, should be recorded in the checklist**.
The aim should be to prevent development of hazardous situations, but if such a situation does arise, good communication and knowing who has proper authority can be instrumental in dealing with it.

7 Are adequate crew on board, and adequate staff in the terminal, for emergency ?
It is not possible or desirable to specify all conditions, but it is important that a sufficient number of personnel should be on board the ship, and in the terminal throughout the ship's stay, to deal with an emergency.
The signals to be used in the event of an emergency arising ashore or on board should be clearly understood by all personnel involved in cargo operations.

8 Have any bunkering operations been advised and agreed ?
The person on board in charge of bunkering must be identified, together with the time, method of delivery (hose from shore, bunker barge, etc.) and the location of the bunker point on board.
Loading of bunkers should be co-ordinated with the cargo operation. The terminal should confirm agreement to the procedure.

9 Have any intended repairs to wharf or ship whilst alongside been advised and agreed?
Hot work, involving welding, burning or use of naked flame, whether on the ship or the wharf may require a hot work permit. Work on deck which could interfere with cargo work will need to be

coordinated. In the case of combination carrier a gas free certificate (including for pipelines and pumps) will be necessary, issued by a shore chemist approved by the terminal or port authority.

10 Has a procedure for reporting and recording damage from cargo operations been agreed?
Operational damage can be expected in a harsh trade. To avoid conflict, a procedure must be agreed, before cargo operations commence, to record such damage. An accumulation of small items of damage to steel work can cause significant loss of strength for the ship, so it is essential that damage is noted, to allow prompt repair.

11 Has the ship been provided with copies of port and terminal regulations, including safety and pollution requirements and details of emergency services ?
Although much information will normally be provided by a ship's agent, a fact sheet containing this information should be passed to the ship on arrival, and should include any local regulations controlling the discharge of ballast water and hold washings.

12 Has the shipper provided the master with the properties of the cargo in accordance with the requirements of chapter VI of SOLAS?
The shipper should pass to the master, for example, the grade of cargo, particle size, quantity to be loaded, stowage factor, and cargo moisture content. The IMO BC Code gives guidance on this.
The ship should be advised of any material which may contaminate or react with the planned cargo, and the ship should ensure that the holds are free of such material.

13 Is the atmosphere safe in holds and enclosed spaces to which access may be required, have fumigated cargoes been identified, and has the need for monitoring of atmosphere been agreed by ship and terminal?
Rusting of steelwork or the characteristics of a cargo may cause a hazardous atmosphere to develop.
Consideration should be given to: oxygen depletion in holds; the effect of fumigation either of cargo to be discharged, or of cargo in a silo before loading from where gas can be swept on board along with the cargo with no warning to the ship; and leakage of gases, whether poisonous or explosive, from adjacent holds or other spaces.

14 Have the cargo handling capacity and any limits of travel for each loader/unloader been passed to the ship/terminal ?
The number of loaders or unloaders to be used should be agreed, and their capabilities understood by both parties. **The agreed maximum transfer rate for each loader/unloader should be recorded in the checklist.**
Limits of travel of loading or unloading equipment should be indicated. This is essential information when planning cargo operations in berths where a ship must be shifted from one position to another due to loading. Gear should always be checked for faults and that it is clear of contaminates from previous cargoes. The accuracy of weighing devices should be ascertained frequently.

15 Has a cargo loading and unloading plan been calculated for all stages of loading/deballasting or unloading/ballasting?
Where possible the ship should prepare the plan before arrival. To permit her to do so the terminal should provide whatever information the ship requests for planning purposes. On ships which require longitudinal strength calculations, the plan should take account of any permissible maxima for bending moments and shear forces.
The plan should be agreed with the terminal and a copy passed over for use by terminal staff. All watch officers on board and terminal supervisors should have access to a copy. No deviation from the plan should be allowed without agreement of the master.
According to SOLAS regulation VI/7, it is required to lodge a copy of the plan with the appropriate authority of the port State. The person receiving the plan should be recorded in the checklist.

16 Have the holds to be worked been clearly identified in the loading or unloading plan, showing the sequence of work, and the grade and tonnage of cargo to be transferred each time the hold is worked ?
The necessary information should be provided in the form as set out in appendix 2 of this Code.

17 Has the need for trimming of cargo in the holds been discussed, and the method and extent been agreed ?
A well-known method is spout trimming, and this can usually achieve a satisfactory result. Other methods use bulldozers, front-end loaders, deflector blades, trimming machines or even manual trimming. The extent of trimming will depend upon the nature of the cargo, and must be in accordance with the BC Code.

18 Do both ship and terminal understand and accept that if the ballast programme becomes out of step with the cargo operations, it will be necessary to suspend cargo operations until the ballast operation has caught up ?
All parties will prefer to load or discharge the cargo without stops if possible. However, if the cargo or ballast programmes are out of step a stop to cargo handling must be ordered by the master and accepted by the terminal to avoid the possibility of inadvertently overstressing the ship's structure.
A cargo operations plan will often indicate cargo check points, when conditions will also allow confirmation that the cargo and ballast handling operations are in alignment.
If the maximum rate at which the ship can safely accept the cargo is less than the cargo handling capacity of the terminal, it may be necessary to negotiate pauses in the cargo transfer programme or for the terminal to operate equipment at less than the maximum capacity. In areas where extremely cold weather is likely, the potential for frozen ballast or ballast lines should be recognized.

19 Have the intended procedures for removing cargo residues lodged in the holds while unloading been explained to the ship and accepted ?
The use of bulldozers, front-end loaders or pneumatic/hydraulic hammers to shake material loose should be undertaken with care, as wrong procedures can damage or distort ships' steel work. Prior agreement to the need and method intended, together with adequate supervision of operators, will avoid subsequent claims or weakening of the ship's structure.

20 Have the procedures to adjust the final trim of the loading ship been decided and agreed ?
Any tonnages proposed at the commencement of loading for adjusting the trim of the ship can only be provisional, and too much importance should not be attached to them. The significance lies in ensuring that the requirement is not overlooked or ignored. The actual quantities and positions to be used to achieve final ship's trim will depend upon the draft readings taken immediately beforehand. **The ship should be informed of the tonnage on the conveyor system since that quantity may be large and must still be loaded when the order "stop loading" is given. This figure should be recorded in the checklist.**

21 Has the terminal been advised of the time required for the ship to prepare for sea, on completion of cargo work?
The procedure of securing for sea remains as important as it ever was, and should not be skimped. Hatches should be progressively secured on completion so that only one or two remain to be closed after cargo work is finished.
Modern deep water terminals for large ships may have very short passages before the open sea is encountered. The time needed to secure, therefore, may vary between day or night, summer or winter, fine weather or foul weather. Early advice must be given to the terminal if any extension of time is necessary.

APPENDIX 2 – ADNR

The following section is made of chapter 8.6.3 excerpted from the ADNR "Reglement pour le transport des matières dangereuses sur le Rhin" / "Verordnung über die Beförderung gefährlicher Güter auf dem Rhien" dated 2003 as available on its Web site http://www.ccr-zkr.org . This document is only available in French, German and Dutch. The French version is provided here as an example.

8.6.3 Liste de contrôle ADNR

1

LISTE DE CONTROLE ADNR

concernant l'observation des prescriptions de sécurité et la mise en oeuvre des mesures nécessaires pour le chargement ou le déchargement.

- **Informations relatives au bateau**

....
(nom du bateau) (numéro officiel)

.....
(type de bateau-citerne)

- **Informations relatives aux opérations de chargement ou de déchargement**

.....
(poste de chargement ou de déchargement) (lieu)

.....
(date) (heure)

- **Informations relatives à la cargaison**

Quantité m^3	Désignation de la matière	No ONU/Numéro d'identification de la matière	Classe
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

- **Informations relatives à la cargaison précédente *)**

Désignation de la matière	No ONU/Numéro d'identification de la matière	Classe
.....	.....	.....
.....	.....	.....
.....	.....	.....

*) à remplir uniquement lors du chargement

2

Débit de chargement/de déchargement (n'est pas à remplir pour le chargement de gaz)

Désignation de la matière	Citerne à cargaison n°	débit de chargement/déchargement convenu					
		début		milieu		fin	
		débit m^3/h	quantité m^3	débit m^3/h	quantité m^3	débit m^3/h	quantité m^3
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....

La tuyauterie de chargement/déchargement sera-t-elle asséchée après le chargement/déchargement par l'installation à terre / par le bateau* par aspiration ou refoulement ?

refoulement *)

aspiration *)

Si par refoulement, de quelle manière ?

.....
(par ex. air, gaz inerte, manchon)

..... kPa
(pression maximale admissible dans la citerne à cargaison)

..... litres
(quantité résiduelle estimée)

*) rayer la mention inutile

Questions au conducteur ou à la personne qu'il a mandatée et à la personne responsable du poste de chargement et de déchargement

Le chargement ou le déchargement ne peut commencer que lorsque toutes les questions de la liste de contrôle auront été marquées par "X", c'est-à-dire qu'elles auront reçu une réponse **positive** et que la liste aura été signée par les deux personnes.

Les questions sans objet doivent être rayées.

Lorsque les questions ne peuvent pas toutes recevoir une réponse positive le chargement ou le déchargement ne peut commencer qu'avec l'autorisation de l'autorité compétente locale.

	bateau	3 poste de chargement ou de déchargement
1. Le bateau est-il admis au transport de la cargaison ?	O*)	O*)
2. Le conducteur ou la personne qu'il a mandatée a-t-il obtenu du remplisseur les consignes écrites visées au 5.4.3 ?	O*)	O*)
3. Le bateau est-il bien amarré compte tenu des circonstances locales ?	O	/
4. Y a-t-il des moyens appropriés à l'avant et à l'arrière du bateau permettant d'accéder à bord ou de quitter le bateau également en cas d'urgence ?	O	O
5. Un éclairage efficace du poste de chargement ou de déchargement et des chemins de repli est-il assuré ?	O	O
6. Liaison bateau-terre		
6.1 Les tuyauteries de chargement ou de déchargement entre le bateau et la terre sont-elles en bon état ?	/	O
sont-elles bien raccordées ?	/	O
6.2 Toutes les brides de raccordement sont-elles munies de joints appropriés ?	/	O
6.3 Tous les boulons de raccordement sont-ils posés et serrés ?	O	O
6.4 Les bras articulés sont-ils libres dans tous les axes de service et les tuyaux ont-ils assez de jeu ?	/	O
7. Tous les raccordements non utilisés des tuyauteries de chargement ou de déchargement et du collecteur de gaz sont-ils correctement obturés par des flasques ?	O	O
8. Des moyens appropriés sont-ils disponibles pour recueillir des fuites sous les raccords utilisés ?	O	O
9. Les parties démontables entre tuyauteries de ballastage et d'épuisement d'une part et les tuyauteries de chargement et de déchargement d'autre part sont-elles enlevées ?	O	/
10. Une surveillance appropriée permanente est-elle assurée pour toute la durée de chargement ou du déchargement ?	O	O
11. La communication entre le bateau et la terre est-elle assurée ?	O	O
12.1 Pour le chargement du bateau le collecteur de gaz du bateau est-il relié à la tuyauterie de retour du gaz à terre (si nécessaire ou s'il existe) ?	O	O
12.2 Est-il assuré par l'installation à terre que la pression au point de raccordement ne dépasse pas la pression d'ouverture de la soupape d'évacuation à grande vitesse ?	/	O*)
12.3 Lorsque la protection contre les explosions est exigée au 3.2, tableau C, colonne 17, l'installation à terre assure-t-elle que sa conduite de retour des gaz ou sa conduite d'échange de gaz est telle que le bateau est protégé contre les détonations et les passages de flammes provenant de terre ?	/	O

*) à remplir uniquement avant le chargement

	bateau	4 poste de chargement ou de déchargement
13. Les mesures concernant l'arrêt d'urgence et l'alarme sont-elles connues ?	O	O
14. Contrôle des prescriptions de service les plus importantes :		
- les installations et appareils d'extinction d'incendies ont-ils prêts au fonctionnement ?	O	O
- toutes les vannes et toutes les soupapes sont-elles contrôlées en position correcte ?	O	O
- l'interdiction générale de fumer est-elle ordonnée ?	O	O
- tous les appareils de chauffage, de cuisine et de réfrigération à flamme sont-ils hors service ?	O	/
- les installations à gaz liquéfiés sont-elles coupées par le robinet d'arrêt principal ?	O	/
- les installations de radar sont-elles hors tension ?	O	/
- toutes les installations électriques pourvues d'une marque rouge sont-elles coupées ?	O	/
- toutes les fenêtres et portes sont-elles fermées ?	O	/
15.1 La pression de début de la pompe de bord pour le déchargement est-elle réglée sur la pression de service admissible de l'installation à terre ?	O	/
15.2 La pression de début de la pompe à terre est-elle réglée sur la pression de service admissible de l'installation à bord ?	/	O
16. L'avertisseur de niveau est-il prêt à fonctionner ?	O	/
17. Le déclencheur du dispositif de surremplissage est-il branché, prêt à fonctionner et contrôlé ?	O	O
18. A remplir uniquement en cas de chargement ou de déchargement de matières pour le transport desquelles un bateau fermé ou un bateau ouvert avec coupe-flammes est prescrit : Les écoutilles des citernes à cargaison, les orifices d'inspection, de jaugeage et de prise d'échantillons des citernes à cargaison sont-ils fermés ou protégés par des coupe-flammes en bon état ?	O	/

Contrôlé, rempli et signé

pour le bateau :

.....
(nom en majuscules)

.....
(signature)

pour l'installation de chargement ou de déchargement :

....
(nom en majuscules)

.....
(signature)

Explications :

Question 3 :
Par "bien amarré" on entend que le bateau est fixé au débarcadère ou au poste de transbordement de telle manière que sans intervention de tiers il ne puisse bouger dans aucun sens pouvant entraver le dispositif de transbordement. Il faut tenir compte des fluctuations locales données et prévisibles du niveau d'eau et particularités.

Question 6 :
Une attestation de contrôle valable doit être à bord pour les tuyauteries de chargement et de déchargement. Le matériau des tuyaux doit résister aux contraintes prévues et être approprié au transbordement de la matière en cause. Le terme tuyauterie englobe les tuyaux proprement dits et les bras de chargement/déchargement. Les tuyauteries de transbordement entre le bateau et la terre doivent être placés de manière à ne pas être endommagés par des fluctuations du niveau d'eau, le passage de bateaux et le déroulement du chargement/déchargement. Tous les raccordements de brides doivent être munis de joints correspondants et de moyens de fixation suffisants pour que des fuites soient exclues.

Question 10 :
Le chargement ou déchargement doit être surveillé à bord et à terre de manière que des dangers susceptibles de se produire dans la zone des tuyaux de liaison puissent être immédiatement reconnus. Lorsque la surveillance est effectuée grâce à des moyens techniques auxiliaires, il doit être convenu entre l'installation à terre et le bateau de quelle manière la surveillance est assurée.

Question 11 :
Une bonne communication entre le bateau et la terre est nécessaire au déroulement sûr des opérations de chargement/déchargement. A cet effet les appareils téléphoniques et radiophoniques ne peuvent être utilisés que s'ils sont d'un type protégé contre les explosions et installés à portée de la personne chargée de la surveillance.

Question 13 :
Avant le début des opérations de chargement/déchargement les représentants de l'installation à terre et le conducteur ou la personne qu'il a mandatée doivent s'entendre sur les procédures à suivre. Il faut tenir compte des propriétés particulières des matières à charger ou à décharger.