3.4 VOC-measures

3.4.1 Measures to limit VOC emissions

3.4.1.1 Introduction

This Section considers the VOC emission abating measures about which agreements were made in the context of the KWS2000 hydrocarbon project. The background of this project and the manner in which the agreements made are laid down in the NeR are described in §2.8.

3.4.1.2 Relationship to the European Directive for VOCs

Most of the activities for which VOC emission abating measures are included in this Chapter fall under the scope of the European Directive for VOCs. This Directive imposes, in addition to emission thresholds, a number of other requirements and special regulations, the most important of which are as follows:

- for each activity that falls under the scope of the Directive a solvent accounting system must be kept;
- existing installations that operate with post-treatment equipment and satisfy the emission thresholds of:
  – 50 mg/m_o^3 (total carbon) during combustion;
  – 150 mg/m_o^3 (total carbon) in the case of any other post-treatment equipment are exempted from the emission thresholds for a period of 12 years after the coming into force of the Solvents Decree (see §2.8.2.3);
- use of substances with R-sentences R45, R49, R60 and R61 must be restricted as much as possible.

For more information on the requirements applying to companies which ensue from this Directive, see the Solvents Decree conversion of EC VOC Directive (*Oplosmiddelbesluit omzetting EG-VOS-Richtlijn milieubeheer*) and the associated Explanatory Memorandum. This Decree is published in the Bulletin of Acts, Orders and Decrees of the Netherlands (*Staatsblad 2001 nr. 161*) 19 March 2001. In the year 2001 a number of information sheets will be published in which it is indicated how the Directive must be interpreted and how the requirements of the Directive may be satisfied. For more information on the European Directive for VOCs and the Solvents Decree conversion of EC VOC Directive, you can contact InfoMil.

3.4.1.3 Relationship to the general standards

For situations in which measures are taken in accordance with these special regulations, the general standards of the NeR will not apply. An exception to this are situations in which the measure consists of an end-of-pipe technique. In that case, the general standards for the emissions will apply after the end-of-pipe technique has been installed.

3.4.1.4 Guidelines on how to read this document

The measures are organised in accordance with the source categories distinguished in KWS2000. Information concerning the measures is given in a diagram, including references to relevant information sources. As well as a brief introduction and the possible relationship to the European Directive for VOCs, each measure is described according to a fixed pattern. The table below indicates what sort of information has been included on the measures.

KS2000-number	Short description of the measure
Scope	This indicates for which type of enterprise or activity the measure applies.
Activity	Description of the activity.
Measure	Literal text of the KWS2000 measure, unless mentioned otherwise.
Status of measure	Certain, conditional.
Clarification	A clarification, occasionally including extra information for the licensing authorities.
Relationship to other legislation	What kind of relationships are there to other legislation? It is also indicated whether or not the activity falls under the scope of the European Directive for VOCs.

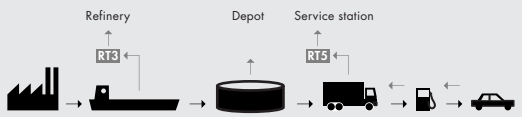
3.4.2 Mineral oil chain: general

3.4.2.1 Introduction

Petrol distribution plays a key role in the mineral oil industry. The directive adopted on 20 December 1994 concerning limiting of emissions resulting from petrol vapour (Council Directive on the control of VOC emissions resulting from the storage of petrol and its distribution from terminals to service stations) was converted in 1995 to the Ministerial Decision on the Environmental Protection of storage, transfer and distribution of petrol (*Regeling op-, overslag en distributie benzine milieubeheer, Staatscourant* 1995, no. 250 and *Staatscourant* 1998, no. 105), hereinafter referred to as the 'Petrol Decision'. This Decision applies to the storage, transfer and transport of petrol between refineries, storage and transfer companies and service stations.

The Petrol Decision lays down measures which in practice are usually referred to as Stage I and Stage II measures. These measures entail that, during storage, transport and transfer of petrol, provisions are made to limit the release of petrol vapour. Measures are, for example, the use of vapour recovery systems in service stations and vapour recovery in petrol depots.
Unlike the Petrol Decision, the agreements in the context of KWS2000 do not only apply to petrol, but also to storage and transfer of all other volatile organic compounds as defined by KWS2000. In that sense the KWS2000 project has a larger scope than the Petrol Decision. Wherever the original measures are fully covered by the Decision or the Petrol Stations Environmental Protection Decree (*Besluit tankstations milieubeheer*) or the Environmental Protection Decree for Motor Vehicle Repair Workshops (*Besluit herstelinrichtingen motorvoertuigen milieubeheer*) (from mid- 2000: Environmental Protection Decree for Motor Vehicle Workshops (*Besluit inrichtingen voor motorvoertuigen milieubeheer*), the measures are not included in the NeR. In all other cases the measures are incorporated in one of the following sections.

Figure 1 Mineral oil chain after implementation of measures regarding petrol distribution



3.4.3 Mineral oil chain: refineries and crude oil terminals

3.4.3.1 Introduction

Refineries and crude oil terminals come within the compass of responsibility of the provincial authorities. After implementation of the measures, efficient seals and internal floating roofs, as well as vapour recovery systems during the loading of lighters and tank lorries, were installed in refineries and crude oil terminals.

The above-mentioned Petrol Decision and hence not the NeR applies to storage, transfer and distribution of petrol between refineries, storage and transfer companies and service stations.

3.4.3.2 Measures

RT1	Installation of internal floating roofs in storage tanks
Scope	Refineries and crude oil terminals.
Activity	Storage of liquids with a vapour pressure in excess of 1kPa in fixed roof tanks, with the exception of petrol.
Measure	Reduction of the filling and breathing losses of fixed roof tanks through installation of internal floating roofs or similar provisions in tanks for storage of liquids with a vapour pressure in excess of 1 kPa.
Status of measure	Certain
Clarification	The measure may be implemented during periodic inspections. On the basis of a specific implementation programme, some of the measures may be implemented at a later stage in consultation with the licensing authority. For more information see fact sheet LF12, Internal Floating Roofs: Construction (1992) and LF22, Internal Floating Roofs: Performance and Monitoring (1995) (both documnts in Dutch only).
Relationship to other legislation	This activity falls outside the scope of the European Directive for VOCs. The Petrol Decision applies to the storage of petrol.

RT2	Installation of efficient seals in floating roof tanks
Scope	Refineries and crude oil terminals.
Activity	Storage of liquids with a vapour pressure in excess of 1kPa in fixed roof tanks, with the exception of petrol.
Measure	Replacement of primary seals or installation of secondary seals to ensure that the width of crack over at least 95% of the periphery of the roof does not exceed 3.2 mm.
Status of measure	Certain
Clarification	The measure may be implemented during periodic inspections. On the basis of a specific implementation programme, some of the measures may be implemented at a later stage in consultation with the licensing authority. For more information see fact sheet LF6, Efficient Seals for Internal Floating Roofs (in Dutch only).
Relationship to other legislation	This activity falls outside the scope of the European Directive for VOCs. The Petrol Decision applies to the storage of petrol.

RT3	Use of vapour recovery system during loading of volatile liquids into lighters
Scope	Refineries and crude oil terminals.
Activity	Loading volatile liquids, such as naphtha, petrol components and crude oil, into lighters.
Measure	Condensation or recovery or destruction by other means (taking into account the connection in the petrol chain) of vapours released as a result of loading volatile liquids such as crude oil, naphtha, etc. into lighters using scaffolds equipped with a vapour recovery system (e.g. on scaffolds where a vapour recover system is mandatory under the Petrol Decision).
Status of measure	Certain
Clarification	For loading petrol into lighters, vapour recovery is required by law. For loading other types of volatile liquids such as naphtha, into lighters it is expected that most naphtha loading activities will take place on scaffolds where petrol is also loaded and where a vapour recovery system, to which the displaced naphtha vapours can be fed, is therefore also present. By mid-2000 the results of an investigation into the emission of this source will become available. The results of this investigation may be grounds for adapting this measure.
Relationship to other legislation	This activity falls outside the scope of the European Directive for VOCs. The Petrol Decision applies to the loading of petrol.

RT5	Use of vapour recovery system during loading of tank lorries and tank wagons
Scope	Refineries.
Activity	Loading volatile liquids such as crude oil, naphtha, etc. into tank lorries and tank wagons, with the exception of kerosene and petrol.
Measure	Condensation or recovery or destruction by other means (taking into account the connection in the petrol chain) of vapours released as a result of loading volatile liquids such as crude oil, naphtha, etc. into tank lorries and tank wagons.
Status of measure	Certain
Clarification	For more information on the techniques available see fact sheet LF9, Vapour Recovery in Service Stations (in Dutch only).
Relationship to other legislation	This activity falls outside the scope of the European Directive for VOCs. The Petrol Decision applies to the loading of petrol. The recovery or destruction of vapours released as a result of loading of lighters and tank lorries must take place in such a way that the concentration of vapours released in the open air does not, as in the Petrol Decision, exceed 35 g/m_0^3. By applying the ALARA principle, however, lower emission concentrations may be imposed as the situation arises.

RT6	Inspection and maintenance to prevent fugitive losses
Scope	Refineries
Activity	Production, mixing, storage and transfer of volatile liquids.
Measure	Preparing and implementing a programme of intensive inspection and maintenance of fugitive sources of emissions such as pumps, valves and the cleaning of tanks.
Status of measure	Certain
Clarification	For more information see fact sheet LF18, Fugitive Process Sources (in Dutch only).
Relationship to other legislation	This activity falls outside the scope of the European Directive for VOCs.

3.4.4 Mineral oil chain: petrol distribution chain

3.4.4.1 Introduction

VOC emissions from the petrol distribution chain are emissions that occur during the distribution of petrol by tank lorries, from the moment they are loaded at the refinery to the moment the petrol is delivered to the underground tanks of petrol stations. The measures relate to the use of vapour recovery during loading of tank lorries (BK1) and the installation of internal floating roofs in storage tanks of petrol depots (BK2). The Decision on the Environmental Protection of storage, transfer and distribution of petrol (*Regeling op-, overslag en distributie benzine milieubeheer, Staatscourant* 1995, no. 250 and *Staatscourant* 1998, no. 105) applies to these activities. Apart from petrol, no loading of other types of volatile liquids occurs in petrol depots. The measures BK1 and BK2 are therefore not included in the NeR.

3.4.5 Mineral oil chain: petrol stations

3.4.5.1 Introduction

In the KWS2000 strategy two measures have been defined for service stations, namely, vapour recovery during filling of underground tanks (measure BS1, Stage I) and use of vapour recovery during tanking of vehicles (measure BS2, Stage II). A lower limit applies to Stage II at an annual throughput of 500 m^3 of petrol.

Most petrol stations fall under the scope of the Petrol Stations Environmental Protection Decree (*Besluit tankstations milieubeheer*) or the Environmental Protection Decree for Motor Vehicle Repair Workshops (*Besluit herstelinrichtingen motorvoertuigen milieubeheer*). The requirements with respect to VOC emissions are included in those Decrees.
The Petrol Decision applies to the rest of the service stations for road traffic motor vehicles which are not intended for public sale of petrol to third parties. For petrol stations, the Stage I measure has been included in the Petrol Decision. This measure is directly in force and need not be included in the environmental permit. However, no Stage II measure has been included in the Petrol Decision. That is why only the Stage II measure (BS2) has been included in the following Section.

3.4.5.2 Measures

BS2	Vapour recovery system during filling of petrol tanks of vehicles
Scope	Service stations for road traffic motor vehicles which are not intended for public sale of petrol to third parties and, if the service station was established before 1 July 1995, whose petrol throughput is in excess of 500 m^3 a year.
Activity	Filling of petrol tanks of vehicles powered by petrol.
Measure	Control of emissions of petrol vapours and spilling losses during filling of petrol tanks of vehicles by means of a vapour recovery system in the filling hoses, to ensure that released petrol vapours are fed back into the petrol storage tank.
Status of measure	Certain
Clarification	For more information see the Petrol Stations Environmental Protection Decree, Annex 1, §I.2.2 Vapour Recovery Stage II. For more information on modified service stations including vapour recovery Stage-II see practice sheet LP2-4, Modified Petrol Station Including Vapour Recovery Stage II, Esso Stolwijkersluis (1997).
Relationship to other legislation	This activity falls outside the scope of the European Directive for VOCs. Service stations for road traffic motor vehicles which are intended for public sale of petrol to third parties fall under the scope of the Environmental Protection Decree for Motor Vehicle Repair Workshops.

3.4.6 Mineral oil chain: storage and transfer companies

3.4.6.1 Introduction

On 1 November 1989 a covenant was agreed between the Ministry of Public Housing, Physical Planning and the Environment (VROM), the provinces of Noord Holland and Zuid Holland and the *Vereniging van Onafhankelijke Tankopslagbedrijven* (VOTOB) (Association of Independent Tank Storage Companies), in which arrangements where laid down concerning the reduction of emissions of volatile organic compounds in general and black list substances in particular. Regarding VOC emissions, it was agreed that the companies in question would reduce them with 50% in 1994 as compared to 1985. After that, on the basis of an action plan, a total reduction of 70% in 2000 was agreed (compared to 1985).
Since this covenant replaces the VOC policy for these companies, reference can be made to the covenant as regards the implementation of measures. Agreements derived from this covenant were also made with a number of non-VOTOB members that also lease storage capacity.
The measures referred to in the Control Strategy are divided into measures relating to the use of efficient seals and various measures relating to emissions from fixed roof tanks and emissions resulting from loading. These measure are similar to those for the handling of storage and transfer in the chemical industry and the petrol distribution chain.

3.4.6.2 Measures

VOTOB1	Emission reduction in storage and transfer companies*
Scope	Storage and transfer companies that lease storage capacity.
Activity	Storage of liquids with a vapour pressure in excess of 1kPa, with the exception of petrol.
Measure	Emission reduction by means of measures which are divided into measures relating to use of more efficient seals and various measures relating to emissions from fixed roof tanks and emissions resulting from loading.
Status of measure	Certain
Clarification	The emission reduction is to occur in phases. Per 1 January 1995 and emission reduction of 50% has been agreed as compared to 1985. From 1 January 1995 a further reduction was agreed of 70% in 2000. For more information see the VOTOB covenant.
Relationship to other legislation	This activity falls outside the scope of the European Directive for VOCs. The Petrol Decision applies to the storage and transfer of petrol.

* A covenant has been agreed with VOTOB concerning the handling of emissions to the air. Agreements derived from this covenant have also been made with non-VOTOB members that lease storage capacity.

3.4.7 Chemical industry

3.4.7.1 Introduction

The chemical industry consists of a very heterogeneous group of companies engaged in a wide range of activities. In general the measures to reduce VOC emissions apply for the following activities:

- preparation of organic liquids other than petrol and naphtha;
- preparation of plastic and rubber by means of polymerisation;
- processing of organic liquids and gases into end-products, such as paint, printing ink, cosmetics, cleaning agents and aerosols;
- preparation of pharmaceutical products;
- preparation of aromatic substances and flavourings;
- purification or refining of fluids or filling them in containers.

The implementation of VOC-reducing measures is part of the Declaration of Intent concerning the implementation of environmental policy for the chemical industry (1993). To implement this covenant chemical companies draw up a company environmental plan (*Bedrijfsmilieuplan,* BMP). Decisions concerning implementation and phasing of measures are arranged in the BMP process. There are also companies in the chemical industry which did not sign the Declaration of Intent. With respect to these companies, the competent authorities will, in consultation with the company in question, determine when which measures should be taken.

European Directive for VOCs
Only companies that manufacture coating preparations, varnishes, inks or adhesives (and have a solvent consumption in excess of 100 tonne/year) and the pharmaceutical industry (with a solvent consumption in excess of 50 tonne/year) are covered by the European Directive for VOCs. Companies in the first category must, by implementing the measures described in §3.4.7.3, be able to comply with the requirements of this Directive. Pharmaceutical companies must investigate with respect to their own specific situation whether they satisfy the Directive by implementing the measures described in §3.4.7.3.

3.4.7.2 Paint and printing ink industry

The paint and printing ink industry is formally part of the chemical industry. Even so, for this branch of industry a different policy applies than for the chemical industry. Due to the switch from solvent-high products to low-solvent products, as initiated in the 1990s, it may be expected that process emissions from paint and printing ink producers will drop. This means that companies in this industry do not have to install end-of-pipe techniques except when there are local problems such as odour nuisance or danger to public health. Such an approach could also be used for producers of other products (such as spray cans or cosmetics) for whom moreover the switch will cause the supplementary measures to reduce emissions to become superfluous.

Issuing of permits
The above means that in the context of authorisation it must be examined whether the company in question has made adequate efforts to bring solvent-free products to the market. The company must prove this by furnishing a statement which indicates how its product package has developed over the past years. This statement may consist of a solvent accounting system which shows that the emission of volatile organic compounds per unit of produced product is trending downwards. If the statement shows that the company's purchase of solvents, related to the scale of production, has decreased and the company can prove that the decrease will continue, no supplementary measures will be required. If in the opinion of the competent authority the company has made inadequate efforts or when there is local nuisance (odour nuisance or risks to public health), the licensing authority may require extra measures to limit the process emissions. In that case the general standards of §3.2 will be used as a starting point. This does not mean, however, that the European Directive for VOCs will no longer apply to this type of company. On the contrary, it must at all times comply with the requirements of this Directive.

3.4.7.3 Measures

CH1a	Installation of internal floating roof in fixed roof tanks
Scope	Chemical industry
Activity	Storage of volatile organic compounds in tanks.
Measure	Reduction of filling and breathing losses from fixed roof tanks with 70–90% through installation of internal floating roofs or similar provisions in tanks of 50 m^3 or more used for storing liquids with a vapour pressure in excess of 1 kPa at storage temperature.
Status of measure	Certain
Clarification	Current Best Available Techniques make it possible in most operating conditions to achieve a reduction of at least 90%. The measure may as much as possible be implemented during periodic inspections. For more information see fact sheets LF12, Internal Floating Roofs: Construction (1992) and LF22, Internal Floating Roofs: Performance and Monitoring (1995) (documents in Dutch only).
Relationship to other legislation	Of the total chemical industry only companies that manufacture coating preparations, varnishes, inks or adhesives (and have a solvent consumption in excess of 100 tonne/year) and the pharmaceutical industry (with a solvent consumption in excess of 50 tonne/year) are covered by the European Directive for VOCs.

CH1b	Installation of efficient seals in floating roof tanks
Scope	Chemical industry.
Activity	Storage of volatile organic compounds in tanks.
Measure	Replacement of primary seals or providing of secondary seals to ensure that the width of crack over at least 95% of the periphery of the roof does not exceed 3.2 mm.
Status of measure	Certain
Clarification	The measure may as much as possible be implemented during periodic inspections. For more information see fact sheet LF6, Efficient Seals for External Floating Tanks (1991) (in Dutch only).
Relationship to other legislation	Of the total chemical industry only companies that manufacture coating preparations, varnishes, inks or adhesives (and have a solvent consumption in excess of 100 tonne/year) and the pharmaceutical industry (with a solvent consumption in excess of 50 tonne/year) are covered by the European Directive for VOCs.

CH1c	Vapour recovery of loading emissions
Scope	Chemical industry
Activity	Handling of volatile organic compounds in process equipment.
Measure	Recovery or destruction of volatile organic compounds released during loading with a vapour pressure in excess of 1 kPa at loading temperature.
Status of measure	Conditional.
Clarification	This is subject to the condition that sufficient technical development has taken place in order to guarantee applicability and safety. The development is sufficient if practical and safe use has been demonstrated once. Another condition is that economic feasibility will be tested in each case.
Relationship to other legislation	Of the total chemical industry only companies that manufacture coating preparations, varnishes, inks or adhesives (and have a solvent consumption in excess of 100 tonne/year) and the pharmaceutical industry (with a solvent consumption in excess of 50 tonne/year) are covered by the European Directive for VOCs.

CH2/3/4	End-of-pipe techniques in point sources
Scope	Chemical industry
Activity	Handling of volatile organic compounds in process equipment.
Measure	Control of emissions from point sources in which the concentrations of gaseous organic compounds exceed 0.05 weight percent (approx. 0.65 g/m^3) with end-of-pipe equipment in accordance with Best Available Techniques.
Status of measure	Certain
Clarification	For the requirements set on end-of-pipe technology see §3.2 of the NeR. A further clarification may be found in fact sheets LF4, Point Sources with over 0.5 Weight Percent of Volatile Organic Compounds (1991) and LF7, Point Sources with a Concentration between 0.05 and 0.5 Weight Percent of Volatile Organic Compounds (1991) (documents in Dutch only).
Relationship to other legislation	Of the total chemical industry only companies that manufacture coating preparations, varnishes, inks or adhesives (and have a solvent consumption in excess of 100 tonne/year) and the pharmaceutical industry (with a solvent consumption in excess of 50 tonne/year) are covered by the European Directive for VOCs.

CH5/6	End-of-pipe techniques in point sources
Scope	Chemical industry
Activity	Handling of volatile organic compounds in process equipment.
Measure	Control of emissions from point sources in which the concentrations of gaseous organic compounds are between 0.05 and 0.005 weight percent (approx. 0.65 to 0.065 g/m^3) in a flow with a volume flow rate of 50,000 m^3/hour or more with end-of-pipe equipment in accordance with Best Available Techniques.
Status of measure	Conditional.
Clarification	The implementation of the measure is subject to the condition that a feasibility study with respect to the specific situation shows that the measure can be implemented in both a technical and cost effective way. It is not possible to lay down a general standard for point sources with high volume flow rates and low concentrations. That is why in each separate situation the technical possibilities as well as the cost effectiveness must be assessed. For the requirements set on end-of-pipe technology see §3.2 of the NeR.
Relationship to other legislation	Of the total chemical industry only companies that manufacture coating preparations, varnishes, inks or adhesives (and have a solvent consumption in excess of 100 tonne/year) and the pharmaceutical industry (with a solvent consumption in excess of 50 tonne/year) are covered by the European Directive for VOCs.

CH7a	Inspection and maintenance to prevent fugitive losses
Scope	Chemical industry
Activity	Handling of volatile organic compounds in process equipment.
Measure	Preparation and implementation of a programme of intensive inspection and maintenance and where possible replacement of valves, etc. for the purpose of controlling fugitive losses from process equipment.
Status of measure	Certain
Clarification	A company annually must draw up a control plan which at least contains information on fugitive losses over the past calendar year, a study on further prevention of fugitive losses and a summary of the measures to be taken. The control plan may be checked using the Guideline on Fugitive Losses—Assessment of Measurement and Control Programme published by the IPO and fact sheet LF19, Fugitive Losses (documents in Dutch only).
Relationship to other legislation	Of the total chemical industry only companies that manufacture coating preparations, varnishes, inks or adhesives (and have a solvent consumption in excess of 100 tonne/year) and the pharmaceutical industry (with a solvent consumption in excess of 50 tonne/year) are covered by the European Directive for VOCs.

CH7b/c	Reduction of fugitive and incidental emissions
Scope	Chemical industry
Activity	Handling of volatile organic compounds in process equipment.
Measure	Application of various control measures in the case of other types of fugitive emissions and incidental emissions.
Status of measure	Certain
Clarification	This measure is a collection of different measures which may be applied to less well-defined sources. The competent authority, in consultation with the company in question, must make arrangements concerning the handling of these emissions. It is recommended that the company take an inventory of the emissions and submit a proposal for handling them. The method for carrying out such a compulsory inquiry is described in §2.8.4.8.
Relationship to other legislation	Of the total chemical industry only companies that manufacture coating preparations, varnishes, inks or adhesives (and have a solvent consumption in excess of 100 tonne/year) and the pharmaceutical industry (with a solvent consumption in excess of 50 tonne/year) are covered by the European Directive for VOCs.

3.4.8 Industrial use of glue

3.4.8.1 Introduction

Product development in the period 1981–1990 has achieved that the percentage of volatile organic compounds in industrially applied glues has decreased from an average of 10% to 5%. Despite this development, companies using industrial-scale glues may release a substantial amount of volatile organic compounds.

European Directive for VOCs
This activity is covered by the European Directive for VOCs if solvent consumption is more than 5 tonnes a year. It concerns lamination of wood and plastic, manufacture of footwear and production of self-adhesive materials. By implementing the measures described in the following section, a company will satisfy the requirements of this Directive.

3.4.8.2 Measures

LIJ1	Use of low-VOC glues and adhesives
Scope	Various industries
Activity	Use of VOC-containing glues and adhesives on an industrial scale.
Measure	Reduction of the emissions through use of low-VOC glues and adhesives.
Status of measure	Conditional
Clarification	The possibility to use low-VOC glues and adhesives is dependent on a number of factors, such as the sort of material to be glued, the conditions during the gluing process, drying time, safety requirements during the gluing process and performance requirements on the joint, such as type of load and resistance to ageing, heat, solvents (incl. water) and weather influences. Per individual company it will have to be investigated whether low-VOC glues and adhesives may be applied and, if so, which ones. An action plan drawn up by the company in question must describe the inquiry into the possible use of low-VOC glues and adhesives. If these systems cannot be applied, for instance, because there are too many environmental, technical or economic disadvantages, the grounds for this must be duly stated in the action plan. In these cases the use of process-integrated/ end-of-pipe technology should be considered (see measure LIJ2). The action plan must indicate when the switch (or acquisition) will be made. The action plan must be updated annually. The method for carrying out such a compulsory inquiry is described in §2.8.4.8.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 5 tonnes a year.

LIJ2	Recovery or destruction of VOC from industrially applied glues
Scope	Various industries
Activity	Use of VOC-containing glues and adhesives on an industrial scale.
Measure	Reduction of emissions arising from use of glues through recovery or destruction of solvents from industrially applied glues.
Status of measure	Certain
Clarification	When use of low-solvent glues and adhesives is not possible, the released solvents must be recovered or destroyed. For the requirements on end-of-pipe technology see §3.2 of the NeR.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 5 tonnes a year.

3.4.9 Printing industry: general

3.4.9.1 Introduction

In the printing industry volatile organic compounds are released in various processes. Possible sources are inks, varnishes and glues, cleaning agents and additives to the damping solution in the offset.

The implementation of VOC reduction measures in the printing industry is part of the Environmental Policy Agreement (MBO) for the Printing Industry and Packaging Printing Firms. In this agreement the printing industry and the authorities involved have specified how the industry will define the goals specified in the National Environmental Policy Plan (NMP).

With respect to cleaning agents and the following printing techniques, agreements have been made concerning which VOC reduction measures may be taken:
- Cleaning agents (general)
- Publication rotogravure
- Packaging printing (intaglio and flexo printing)
- Web offset
- Sheet offset
- Screen printing

3.4.9.2 Measures relating to cleaning agents

In the printing industry cleaning agents are used in various printing techniques and processes. Examples are cleaning of screen printing frames, cleaning of washing equipment in the case of mould making for flexo printing and cleaning of printing presses for various printing techniques.
Below we describe three measures to reduce VOC emissions.

GI7c	Ban on di/trichloromethane and volatile mono-aromatics
Scope	Making of moulds for flexo printing, offset printing and screen printing.
Activity	Cleaning in the case of making flexo printing moulds and cleaning / diluting in the case of offset and screen printing.
Measure	Ban on di/trichloromethane and volatile mono-aromatics.
Status of measure	Certain
Clarification	Volatile mono-aromatics are mono-aromatics with a vapour pressure in excess of 0.1 mbar at 20°C, such as benzene, toluene, xylene, trimethyl-benzene and isopropylbenzene. If mono-aromatics are present as a contaminant in the production process, a maximum of 0.1% will apply. For more background information on this measure see the Manual on Environmental Measures for the Printing Industry and Packaging Printing Firms, fact sheet module 80 (Mould Making for Flexo Printing), fact sheet module 120 (Mould Making and Printing: Screen Printing), fact sheet module 140 (High-Relief / Offset Printing: General) (documents in Dutch only).
Relationship to other legislation	Apart from sheet offset printing and sheet screen printing, the various printing activities fall under the scope of the European Directive for VOCs. When consumption of solvents is above the threshold, the requirements on all activities associated with the printing process, including the cleaning of equipment, will apply.

GI7a	Use of less volatile cleaning agents
Scope	Web offset and sheet offset.
Activity	Cleaning of equipment.
Measure	Use of less volatile cleaning agents
Status of measure	Certain from a date still to be determined.
Clarification	No K1 and K2 agents may be used to clean rubber blankets, plates and ink rolls on a daily basis. For this application there are sufficient K3 agents, VCAs (Vegetable Cleaning Agents) or HBS (High Boiling Solvents) available. In a number of exceptional cases (non-daily cleaning) use of K1 / K2 agents may be required, such as during major overhaul of the press, colour change and cleaning of bare wet rolls. For more background information on this measure and the time it can be implemented as a certain measure see the Manual on Environmental Measures for the Printing Industry and Packaging Printing Firms, fact sheet module 140 (High-Relief / Offset Printing: General) (documents in Dutch only).
Relationship to other legislation	Web offset falls under the scope of the European Directive for VOCs. When consumption of solvents is above the threshold, the requirements on all activities associated with the printing process, including the cleaning of equipment, will apply.

GI7b	Good housekeeping
Scope	Publication rotogravure, packaging printing (intaglio and flexo printing), web offset, sheet offset and screen printing.
Activity	Cleaning of equipment.
Measure	Good housekeeping measures.
Status of measure	Certain
Clarification	Good housekeeping by storing cleaning rags with solvents in a closed container with a self-closing cover and by saving contaminated cleaning agents separately and not pouring them on dirty cleaning rags. For more background information on this measure see the Manual on Environmental Measures for the Printing Industry and Packaging Printing Firms, fact sheet module 80 (Mould Making for Flexo Printing), fact sheet module 120 (Screen Printing), fact sheet module 140 (High-Relief / Offset printing: General), fact sheet module 180 (High-Relief / Offset Printing: Web), fact sheet module 220 (Publication Rotogravure: Printing), fact sheet module 240 (Packing Printing: Printing) and fact sheet module Gha (Raw Materials, Additives and Waste Products) (documents in Dutch only).
Relationship to other legislation	Apart from sheet offset printing and sheet screen printing, the various printing activities fall under the scope of the European Directive for VOCs. When consumption of solvents is above the threshold, the requirements on all activities associated with the printing process, including the cleaning of equipment, will apply.

3.4.10 Printing industry: publication rotogravure

3.4.10.1 Introduction

All publication rotogravure firms have a toluene recovery system. In order to restrict VOC emissions, the measures mentioned below impose requirements regarding the efficiency of the recovery system.

Publication rotogravure firms are divided into three categories according to type of air control they use.

- Category 1: Both drying air and all, or nearly all, ventilation of areas where toluene is used can be fed through the recovery system.
- Category 2: The presses are in a small closed area. Both drying air and air from the press area can be fed through the recovery system.
- Category 3: Only drying air can be fed through the recovery system. Companies in this category have a recovery system, but have not yet taken all the measures that may be expected from such firms.

European Directive for VOCs

This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 25 tonnes a year. In addition to a fugitive emission threshold, this Directive also includes a concentration threshold. This means that in each specific situation it must be examined whether the measures described in the following section satisfy the requirements of the Directive.

3.4.10.2 Measures relating to publication rotogravure

GI1	Toluene recovery
Scope	Publication rotogravure firms with a toluene input > 100 tonnes per year.
Activity	Publication rotogravure process.
Measure	Toluene recovery system and good housekeeping, up to a maximum toluene input loss of 8.5% in cat. 1 firms and of 12% in cat. 2 and 3 firms.
Status of measure	Certain
Clarification	Individual firms may determine the percentage of loss using a toluene balance. In order to realise the maximum percentages of loss various measures may be implemented depending on the specific situation of the company: • Technical measures, including: – Automation of recovery system – Modification of ventilation system – Returning of strip air to recovery system • Good housekeeping measures, including: – Optimising of air control – 'Sealing' of printing units – Discipline For more background information on this measure and the working method applying to the purchase of new presses see the Manual on Environmental Measures for the Printing Industry and Packaging Printing Firms, fact sheet module 220 (Publication Rotogravure: Printing) (in Dutch only).
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs when solvent consumption is more than 25 tonnes a year.

3.4.11 Printing industry: packaging printing firms

3.4.11.1 Introduction

The purpose of the measures applying to packaging printing firms is to reduce the loss percentage of solvents. To this end, the firms have three options depending on the quantity of solvents consumed:

- incineration;
- recovery; or
- switch to low-solvent alternatives.

The percentage of loss must be determined using a solvent balance.
In the case of packaging printing firms with a solvent consumption in excess of 150 tonnes per year, one of the above-mentioned measures must be chosen.

In the case of packaging printing firms with a solvent consumption of less than 150 tonnes per year the same measures will in principle apply as those applying to larger packaging printing firms (>150 tonne/year). The ALARA principle will also apply. The parties involved in the Environmental Policy Agreement (MBO) will in this connection seek to align themselves with the European Directive for VOCs, on the basis of which existing packaging printing firms must have taken emission reduction measures by 2007. The intention is to maintain the preference for source measures and not to make an end-of-pipe technique obligatory before 2007, unless this is deemed necessary due to odour nuisance or danger to public health.

Regarding mould making for flexo printing, the following measures apply:

- replacement of perchloroethylene as a washing agent;
- reduction of solvent evaporation.

European Directive for VOCs
This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 15 tonnes a year. In the case of packaging printing firms with a solvent consumption in excess of 150 tonnes a year, the measures described in the followings section are certainly sufficient to comply with the requirements of this Directive. In accordance with the agreements made in the KWS2000 hydrocarbon project, the Dutch policy for these firms goes further than the Directive.
In the case of packaging printing firms with a solvent consumption between 15 and 150 tonnes a year, no measures have been included in the next section, whereas pursuant to the Directive for these firms emission requirements will apply. This means that in each specific situation it must be examined how the requirements of the Directive may be satisfied.

3.4.11.2 Measures relating to packaging printing firms

GI3a1	Incineration
Scope	Packaging printing firms with a solvent consumption in excess of 150 tonnes a year
Activity	Printing, varnishing, lamination.
Measure	To restrict the maximum solvent loss percentage to 15% by means of an incinerator or another type of end-of-pipe technique.
Status of measure	Certain
Clarification	Packaging printing firms may choose one of the following measures or a combination thereof: • Incineration • Solvent recovery system • Use of low-solvent alternatives Solvent loss is that part of the input that evaporates and is not recovered or destroyed. The loss is equal to the difference between input and output. The quantity of loss is expressed in percentages of the input without application of a VOC reducing measure. By means of a solvent accounting system, it must be demonstrated that the requirement is being complied with. For more background information on this measure see the Manual on Environmental Measures for the Printing Industry and Packaging Printing Firms, fact sheet module 240 (Packaging Printing: Solvent Containing) (documents in Dutch only).
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs.

GI3a2	Solvent recovery system
Scope	Packaging printing firms with a solvent consumption in excess of 150 tonnes a year.
Activity	Printing, varnishing, lamination.
Measure	To restrict the maximum solvent loss percentage to 17.5% by means of a solvent recovery system.
Status of measure	Certain
Clarification	Packaging printing firms may choose one of the following measures or a combination thereof: • Incineration • Solvent recovery system • Use of low-solvent alternatives Solvent loss is that part of the input that evaporates and is not recovered or destroyed. The loss is equal to the difference between input and output. The quantity of loss is expressed in percentages of the input without application of a VOC reducing measure. By means of a solvent accounting system, it must be demonstrated that the requirement is being complied with. For more background information on this measure see the Manual on Environmental Measures for the Printing Industry and Packaging Printing Firms, fact sheet module 240 (Packaging Printing: Solvent Containing) (documents in Dutch only).
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs.

GI3a3	Use of low-solvent alternatives
Scope	Packaging printing firms with a solvent consumption in excess of 150 tonnes a year.
Activity	Printing, varnishing, lamination.
Measure	To restrict the maximum solvent loss percentage to 20% by means of low-solvent alternatives.
Status of measure	Certain
Clarification	Packaging printing firms may choose one of the following measures or a combination thereof: • Incineration • Solvent recovery system • Use of low-solvent alternatives Solvent loss is that part of the input that evaporates and is not recovered or destroyed. The loss is equal to the difference between input and output. The quantity of loss is expressed in percentages of the input without application of a VOC reducing measure. By means of a solvent accounting system, it must be demonstrated that the requirement is being complied with. For more background information on this measure see the Manual on Environmental Measures for the Printing Industry and Packaging Printing Firms, fact sheet module 240 (Packaging Printing: Solvent Containing) (documents in Dutch only).
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs.

GI3b	Replacement of perchloroethylene
Scope	Making of flexo moulds.
Activity	Mould making for flexo printing.
Measure	Replacement of perchloroethylene as washing agent for flexo moulds by means of a washing agent containing no volatile mono-aromatic or halogenated hydrocarbons.
Status of measure	Certain
Clarification	For more background information on this measure see the Manual on Environmental Measures for the Printing Industry and Packaging Printing Firms, fact sheet module 80 (Mould Making for Flexo Printing) (documents in Dutch only).
Relationship to other legislation	This activity falls outside the scope of the European Directive for VOCs.

GI3c	Limitation of solvent evaporation
Scope	Making of flexo moulds.
Activity	Mould making for flexo printing.
Measure	Various measures to limit the evaporation of solvents, such as modification of equipment, good housekeeping and keeping of a solvent accounting system.
Status of measure	Certain
Clarification	Equipment modification consists of two types of measures: measures relating to the equipment for purposes of replacing washing agents and measures imposed on the equipment in order to reduce evaporation. For more background information on this measure see the Manual on Environmental Measures for the Printing Industry and Packaging Printing Firms, fact sheet module 80 (Mould Making for Flexo Printing) (documents in Dutch only).
Relationship to other legislation	This activity falls outside the scope of the European Directive for VOCs.

3.4.12 Printing industry: heatset web offset

3.4.12.1 Introduction

In the heatset web offset process the ink is dried artificially. This results in emissions to the air due to the evaporation of, for instance, mineral oils in the ink. Agreements have been made to reduce these emissions.

European Directive for VOCs

This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 15 tonnes a year. The emission reduction required by the Directive must be achieved by most companies by means of end-of-pipe technology. As regards the emission thresholds for end-of-pipe techniques still to be installed, the Directive goes further than the measures described in the following section. Companies that have installed end-of-pipe techniques will satisfy the requirements of the Directive, as an exclusion provision has been included with respect to end-of-pipe techniques (see §3.4.1.2). This means that in each specific situation it must be examined how the requirements of the Directive must be satisfied.

3.4.12.2 Measures relating to heatset web offset

GI4a	Cleaning of drying air with end-of-pipe technology
Scope	Heatset web offset, with ink and isopropyl alcohol consumption equal to or more than 45 tonne / year.
Activity	Heatset printing.
Measure	Control of the emission by cleaning the drying air of all heatset presses with an end-of-pipe technique.
Status of measure	Certain
Clarification	The end-of-pipe technique must be geared to the total drying air flow rate or the capacity in m^3/hour of the dryers of all the heatset presses in the company. The end-of-pipe technique most likely to be used is incineration, preferably one that does not require the addition of extra fuel, for example, catalytic or regenerative. For the standards on end-of-pipe technology see §3.2 of the NeR. This is subject to a flue emission concentration limit after incineration of 50 mg/m^3 (total carbon) and after condensation of 150 mg/m^3 (total carbon). For more background information on this measure see the Manual on Environmental Measures for the Printing Industry and Packaging Printing Firms, fact sheet module 180 (High-Relief Printing / Offset Printing: Web (Coldset / Heatset) (documents in Dutch only).
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs. In the case of companies with a solvent consumption in excess of 25 tonne/year an emission threshold of 20 mg C/Nm^3 will apply.

GI4b	In the case of heatset press or dryer replacement: cleaning of drying air or other type of drying technique
Scope	Heatset web offset, with ink and isopropyl alcohol consumption less than 45 tonne / year.
Activity	Heatset printing.
Measure	In the case of heatset or dryer replacement, cleaning of the drying air of the press in question with an end-of-pipe technique or by means of another type of drying technique.
Status of measure	Certain
Clarification	Possible techniques are: • change of drying technique, for instance, coldset or UV; • integrated drying / incineration; • incineration preferably a form of incineration that does not require the addition of extra fuel, for instance, catalytic or regenerative. For the standards on end-of-pipe technology see §3.2 of the NeR. For more background information on this measure see the Manual on Environmental Measures for the Printing Industry and Packaging Printing Firms, fact sheet module 180 (High-Relief Printing / Offset Printing: Web (Coldset / Heatset) (documents in Dutch only).
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 15 tonne/year.

3.4.13 Processing of plasticised PVC

3.4.13.1 Introduction

Polyvinyl chloride to which 20–60% plasticiser has been added is called plasticised PVC. It is used in flexible foils, floor covering, wire and cable insulation, hoses, soft profiles, footwear and coatings for paper and textile. Organic compounds are released both during the printing and coating of plasticised PVC.

European Directive for VOCs

Coating of plasticised PVC falls under the scope of the European Directive for VOCs if solvent consumption is more than 5 tonnes a year (Appendix IIA, category 8). Printing of plasticised PVC also falls under the scope of the Directive if it takes place in combination with coating. Printing activities that are carried out separately fall under the scope of the Directive if more than 15 tonnes of solvent are used per year (Appendix IIa, category 3). By implementing the measure described in the following section, a company will satisfy the requirements of this Directive.

3.4.13.2 Measures

RK1	End-of-pipe technology in the processing of plasticised PVC
Scope	Companies that process plasticised polyvinyl chloride (PVC).
Activity	Printing or coating of plasticised PVC.
Measure	Control of solvent emissions released during printing of plasticised PVC by means of regenerative incineration or similar facility that is in accordance with Best Available Techniques.
Status of measure	Certain
Clarification	With an end-of-pipe facility, an installation can achieve an emission reduction of at least 90%. For the requirements on the end-of-pipe technique see §3.2 of the NeR.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs (Appendix IIa, category 3 and 8).

3.4.14 Polyester resin processing

3.4.14.1 Introduction

In the polyester resin processing industry a number of activities can be distinguished which result in the emission of VOCs: processing of polyester resin resulting in the release of styrene and cleaning of moulds and tools through use, in many cases, of methylene chloride and acetone. This section only includes measures to limit styrene emissions.

3.4.14.2 Measures

RK2	Use of LSE resins
Scope	All companies that process polyester resin.
Activity	Processing of polyester resin.
Measure	Where possible, use of Low Styrene Emission (LSE) resins in the processing of polyester resin so that emissions of styrene are reduced immediately after application.
Status of measure	Certain
Clarification	LSE resins contain film formers which during hardening produce a film on the surface to reduce styrene emissions. LSE resins cannot be applied everywhere. In general LSE can be applied to an unlimited extent in open mould processing. The exception is that LSE resins cannot be used if mechanical requirements are imposed; LSE resin cannot meet these requirements. Examples are products in which tension can result between the various polyester layers, such as tubes, speedboats and large silos. It is pointless to use LSE resin if the film surface is interfered with before hardening-is complete. For more information see fact sheet LF10, Styrene Emission in Polyester Resin Processing (1998) (documents in Dutch only).
Relationship to other legislation	Polyester resin processing does not fall under the scope of the European Directive for VOCs. In the context of the industry target group policy, consultation takes place with the rubber and plastics industry concerning an environmental covenant. In this context an Manual of Environmental Measures will also be prepared.

RK3	Use of LSE resins in critical mechanical applications
Scope	All companies that process polyester resin.
Activity	Processing of polyester resin.
Measure	Where possible, use of Low Styrene Emission (LSE) resins in critical mechanical applications so that also in these applications styrene emissions can be reduced.
Status of measure	Conditional
Clarification	To extend the application possibilities of LSE resins, the resin type must be further developed and accepted by the processors in combination with improvement of the processing techniques used. For more information see fact sheet LF10, Styrene Emission in Polyester Resin Processing (1998) (documents in Dutch only).
Relationship to other legislation	Polyester resin processing does not fall under the scope of the European Directive for VOCs. In the context of the industry target group policy, consultation takes place with the rubber and plastics industry concerning an environmental covenant. In this context an Manual of Environmental Measures will also be prepared.

RK4	Use of closed mould techniques
Scope	All companies that process polyester resin.
Activity	Processing of polyester resin.
Measure	Where possible, use of closed mould or vacuum foil techniques in the processing of polyester resin so that styrene emissions can be avoided.
Status of measure	Certain for flat products and technically non-complex shapes (with limited surface area: 1.5 to 2 m^2).
Clarification	The implementation of this measure is dependent on an individual company's product package. In the context of a licensing procedure the company will have to examine whether use of closed mould techniques is possible. §2.8.4.8 describes how to handle this compulsory inquiry in the context of a licensing procedure. For more information see fact sheet LF10, Styrene Emission in Polyester Resin Processing (1998) (documents in Dutch only).
Relationship to other legislation	Polyester resin processing falls outside the scope of the European Directive for VOCs. In the context of the industry target group policy, consultation takes place with the rubber and plastics industry concerning an environmental covenant. In this context an Manual of Environmental Measures will also be prepared.

3.4.15 Production of polystyrene foam

3.4.15.1 Introduction

Polystyrene is foamed during the shaping process. There are two types of polystyrene foam: expanded polystyrene (EPS) and extruded polystyrene (XPS). In the shaping process both are foamed with blowing agents. These products are, for example, used as insulation material and packaging material for foodstuffs and technical articles.

In the production of EPS, pentane is used as a physical blowing agent in combination with steam as an energy carrier. This fluid is finely distributed in the raw material and, as a result of the added heat (steam), turns into a gas, causing the granules to expand into a foam. Pentane is emitted in this process.

In the production of XPS, pentane is not finely distributed in the raw material, but it is added to it in the extruder. Emission takes place immediately after extrusion. Steam is not used as an energy carrier.

The measures listed in the following section solely apply to the production of EPS.

3.4.15.2 Measures

RK6	Reduction of quantity of blowing agent through recycling of polystyrene waste
Scope	All companies that produce expanded polystyrene (EPS).
Activity	Production of expanded polystyrene (EPS).
Measure	Reduction of the quantity of blowing agent needed by a production unit through recycling of polystyrene waste into raw material.
Status of measure	Certain
Clarification	Implementation of this measure will ensure that for a part of EPS production new pentane-containing raw materials can be replaced with recycled product for at least 20%.
Relationship to other legislation	The production of polystyrene foam falls outside the scope of the European Directive for VOCs. In the context of the industry target group policy, consultation takes place with the rubber and plastics industry concerning an environmental covenant. In this context an Manual of Environmental Measures will also be prepared.

RK8	Process-integrated incineration of pentane
Scope	All companies that produce expanded polystyrene (EPS).
Activity	Production of expanded polystyrene (EPS); prefoaming and moulding.
Measure	Use of process-integrated incineration of that part of the blowing agent which is released during prefoaming and moulding in such a way that the heat released is recovered. The blowing agent recycling process must at least occur in an energy neutral way.
Status of measure	Certain
Clarification	In 1998 the demonstration project 'reduction of pentane emission in the EPS-processing industry' was successfully completed. It was shown that with respect to approximately 43% of the pentane released during prefoaming the intermediate storage and the block form can be incinerated in a process-integrated way (in the steam boiler). The resulting saving on natural gas is well over 10%. This measure can be implemented in each individual company; the reduction of pentane emission may differ for each company. What is important here is that there must be a balance between the demand for steam and the supply of pentane. Another important point for attention is safety.
Relationship to other legislation	The production of polystyrene foam falls outside the scope of the European Directive for VOCs. In the context of the industry target group policy, consultation takes place with the rubber and plastics industry concerning an environmental covenant. In this context an Manual of Environmental Measures will also be prepared.

3.4.16 Processing of soy beans and adipose seeds

3.4.16.1 Introduction

There are a few companies in the Netherlands that produce vegetable oil through extraction with hexane. The most important raw materials are soy beans and to a lesser extent sunflower seeds and rapeseeds. Hexane emission can be reduced through process improvements and recovery of hexane.

European Directive for VOCs

This activity falls under the scope of the European Directive for VOCs if more than 10 tonnes of solvent are used per year. The measures described in the followings section are certainly sufficient to comply with the requirements of this Directive. In accordance with the agreements made in the KWS2000 hydrocarbon project, the Dutch policy for these firms goes further than the Directive.

3.4.16.2 Measures

VG1	Reduction of hexane emission during processing of beans and seeds
Scope	Companies that process soy beans and adipose seeds.
Activity	Extraction of soy beans and adipose seeds using hexane.
Measure	Reduction of the emission factor to 0.65 kg hexane per tonne of seed. Reduction is primarily achieved through process improvements.
Status of measure	Certain
Clarification	A limited number of companies in the Netherlands are engaged in this activity. Agreements concerning the reduction of the emission factor have been laid down in the individual permits for these companies. The said emission factor is an average figure for the processing of seeds for oil production. For production of proteins via so-called white flakes in which ethanol is used, a higher emission factor will generally apply. This activity falls outside the scope of this measure and moreover outside the scope of the European Directive for VOCs.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs. If over 10 tonnes of solvents are used per year, different emission factors will apply depending on the type of seed and the required product.

3.4.17 Textile industry

3.4.17.1 Introduction

The primary emission source of volatile organic compounds in the textile industry is the printing and coating of textile. This VOC emission can be reduced through use of low-VOC raw materials or an end-of-pipe technique*. Companies that print ready-made clothes (such as T-shirts, etc.) are regarded as screen printers and belong to the printing industry. Printing of uncut fabric is placed under the heading of textile finishing.

* In the context of the target group policy a covenant has been entered into with the textile and carpet industry. Various environmental measures are described in the Manual of Environmental Measures for the Textile and Carpet Industry.

European Directive for VOCs

This activity fall under the scope of the European Directive for VOCs if over 5 tonnes of solvent (coating) or over 30 tonnes of solvent (rotary screen printing) are used per year. The measures described in the followings section are certainly sufficient to comply with the requirements of this Directive.

3.4.17.2 Measures

TI1	Use of low-VOC pigment pastes or end-of-pipe techniques
Scope	Textile finishing
Activity	Printing and coating during textile finishing.
Measure	Reduction of emissions of solvent and thinner resulting from the printing and coating of textile.
Status of measure	Certain
Clarification	In the past, fabrics were often printed using terpentol-based pigment pastes. Until 1988, the major part of VOC-emitting textile finishing companies switched to water-based pastes. In many cases this resulted in a sharp reduction or complete elimination of VOC emissions. For the requirements set on end-of-pipe techniques see §3.2 of the NeR.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs. A threshold of 5 tonnes of solvent per year applies for coating processes on textile. A threshold of 30 tonnes of solvent per year applies in the case of rotary screen printing.

3.4.18 Flower dyeing businesses

3.4.18.1 Introduction

Flower dyeing can be divided into dyeing of dried flowers, cut flowers and green leaves. Dried flowers, cut flowers with small vascular bundles and green leaves are dyed by immersing them in a dye bath. Cut flowers with large vascular bundles can also be dyed by means of the draw-out method, in which the flowers with stems are placed in a heated container of dye. The dye is absorbed by the flowers in four to six hours. Before 1990 flowers were dyed in baths of organic solvents, usually acetone and ethanol. Meanwhile a large-scale switch has been made to baths of water-based dyes in combination with additional measures such as keeping a solvent accounting system.

3.4.18.2 Measures

BV1	Dyeing of dried flowers in fully water-based dye baths
Scope	Dried flowers
Activity	Dyeing of dried flowers.
Measure	Dyeing of dried flowers in fully water-based dye baths.
Status of measure	Certain
Clarification	Bunches of dried flowers are immersed in a bath of solvent and dye. The temperature of the bath varies between 40 and 85°C. After the excess dye has been removed, the bunches are placed on a rack in a drying room. Practice has shown that dried flowers can be coloured in water-based dye baths. The operational costs of raw materials and energy are lower than when acetone-based dye baths are used.
Relationship to other legislation	Flower dyeing falls outside the scope of the European Directive for VOCs.

BV2	Dyeing of cut flowers using the draw-out method with fully water-based dye baths
Scope	Cut flowers with large vascular bundles.
Activity	Dyeing of cut flowers using the draw-out method.
Measure	Dyeing of cut flowers using the draw-out method with fully water-based dye baths and colouring agents / pigments which are also used in the food industry.
Status of measure	Certain
Clarification	Cut flowers with large enough vascular bundles can be dyed by placing them in a container of dye, solvent and warm water. The cut flowers absorb the dye in four to six hours. This so-called draw-out method can be carried out on a fully water-based basis using colouring agents which are also used in the food industry. The operational costs are higher than when ethanol-based baths are used.
Relationship to other legislation	Flower dyeing falls outside the scope of the European Directive for VOCs.

BV3	Dyeing of cut flowers using the immersion method with water-based dye baths of maximum 15% VOC
Scope	Cut flowers with small vascular bundles
Activity	Dyeing of cut flowers using the immersion method.
Measure	Dyeing of cut flowers using the immersion method with water-based dye baths of colouring agents in fluid form with, if necessary, spreading agents, moistening agents and anti-foam agents and maximum 15% VOC.
Status of measure	Certain
Clarification	Cut flowers with small vascular bundles can be dyed by immersing them in a dye bath diluted or not diluted with water. After the excess dye has been removed, the bunches are rinsed once or twice, followed by another removal process, and dried. Practical tests have shown that the solvent content of these baths can be reduced to a maximum of 15%. The operational costs are lower than when baths are used having a higher ethanol content.
Relationship to other legislation	Flower dyeing falls outside the scope of the European Directive for VOCs.

3.4.19 Cleaning and degreasing in the metal and electro-technical industry

3.4.19.1 Introduction

In the metal and electrotechnical industry numerous companies carry our cleaning and degreasing activities. These activities include degreasing of metal as a pre-treatment for varnishing, cleaning of parts during manufacturing, cleaning of end products or cleaning of electrical switches. Cleaning or degreasing is part of a production or maintenance process. This process or product determines the requirements that are imposed on cleaning and hence the selection of cleaning agent and the design of the installation.

In the context of the target group covenant with the metal and electrotechnical industry, a Manual of Environmental Measures for the Metal and Electrotechnical industry has been prepared. Module C.4.2 of this Manual gives process descriptions of various cleaning methods and the associated environmental aspects.

European Directive for VOCs

Cleaning and degreasing in the metal and electrotechnical industry falls under the scope of the European Directive for VOCs. When cleaning agents with R-sentences R45, R46, R49, R60 and R61 or halogenated cleaning agents with R40-sentence (like trichloroethylene, perchloroethylene en dichloro-methane) are used, activity 4 of Appendix IIA will apply (threshold > 1 tonne/year). Other cleaning agents are covered by activity 5 (threshold >2 tonne/year). When, if it is technically and economically possible, a switch is made to water-based cleaning agents, this is certainly sufficient to comply with the requirements of this Directive. When solvent consumption is reduced to below the thresholds, the activity in question is no longer covered by the Directive. In other cases it will have to be investigated with respect to a specific situation whether applying the measures described in the following section will satisfy the requirements of the Directive.

3.4.19.2 Measures

RO1 and RO3	Switching to low-VOC cleaning agents
Scope	All companies in the metal and electrotechnical industry.
Activity	Cleaning and/or degreasing of metal (products) in the metal and electrotechnical industry.
Measure	To achieve an emission reduction[1] by switching to low-VOC cleaning agents and/or cleaning systems.[2]
Status of measure	Certain with respect to the industry target; conditional in individual companies.
Clarification	A company can define this measure by, for instance, investigating the necessity of cleaning and/or degreasing, the application of low-VOC agents and the use of closed systems. If the inquiry shows that the use of closed systems is impossible and it is decided to use half-closed emission-low installations, the reason for this must be given. §2.8.4.8 explains how to deal with that in a licensing procedure. For more background information see module C.4.2 of the Manual of Environmental Measures for the Metal and Electrotechnical industry (documents in Dutch only).
Relationship to other legislation	Cleaning and degreasing in the metal and electrotechnical industry falls under the scope of the European Directive for VOCs. When cleaning agents with R-sentences R45, R46, R49, R60 and R61 or halogenated cleaning agents with R40-sentence (like trichloroethylene, perchloroethylene en dichloromethane) are used, activity 4 of Appendix IIA will apply (threshold >1 tonne/year). Other cleaning agents are covered by activity 5 (threshold > 2 tonne/year).

[1] This measure was originally specified as the industry target: 'Achieving an emission reduction of 50% in the year 2000 relative to the emission level of 1988 by switching to water-based cleaning systems.' The reduction percentage applies to the entire industry. Each individual company will, to a greater or lesser extent depending on the specific resources, contribute to the target. See also Appendix 4.12.

[2] The reference to 'water-based cleaning systems' in the original measure is not always the best solution; low-voc cleaning agents better reflect the emission-limiting method chosen in practice.

RO2	Good housekeeping in the case of cleaning & degreasing
Scope	All companies in the metal and electrotechnical industry.
Activity	Cleaning and/or degreasing of metal (products) in the metal and electrotechnical industry.
Measure	Prevention and/or reduction of emissions of volatile organic compounds by carefully and sparingly handling and using solvent-containing products, keeping a solvent accounting system, etc.
Status of measure	Certain
Clarification	In general it applies that specifications regarding careful use of solvents can best be included in a Company Environmental Plan (*Bedrijfsmilieuplan, BMP*) and/or an environmental management system If a company does not have a BMP or environmental management system, various measures may be specified in the permit. In any a case, a solvent accounting system must be kept. In §2.8 the Solvent Accountant System is described in more detail. For more background information on good housekeeping measures see module C.4.2 of the Manual of Environmental Measures for the Metal and Electrotechnical industry (documents in Dutch only).
Relationship to other legislation	Cleaning and degreasing in the metal and electrotechnical industry falls under the scope of the European Directive for VOCs. When cleaning agents with R-sentences R45, R46, R49, R60 and R61 or halogenated cleaning agents with R40-sentence (like trichloroethylene, perchloroethylene en dichloromethane) are used, activity 4 of Appendix IIA will apply (threshold > 1 tonne/year). Other cleaning agents are covered by activity 5 (threshold >2 tonne/year).

3.4.20 Use of paint: metal products

3.4.20.1 Introduction

In the metal products industry a large number of very diverse metal products are manufactured. Many of these products are provided with an organic finishing coat to protect them from corrosion or to embellish them. These finishing layers may be composed of paint, varnish or powder coating and are applied after possible pre-treatment. Pre-treatment may consist of a mechanical treatment (grinding, brushing or grit blasting) or a chemical treatment (phosphating, chromating, cleaning and/or degreasing). Measures to limit VOC emissions in the case of cleaning or degreasing are included in §3.4.19.2. Measures to reduce VOC emissions in the case of steel preservation activities are dealt with in §3.4.21.2.

The implementation of measures to limit VOC emissions is part of the statement of intent of the Metal and Electrotechnical industry. The Manual of Environmental Measures for the Metal and Electrotechnical industry published as a results of this contains in module C.5.4 useful background information on emission-reducing measures.

European Directive for VOCs
If carried out inside installations, the application of organic coatings to metal falls under the scope of the European Directive for VOCs when solvent consumption is more than 5 tonnes a year. If water-based paints are used or powder coatings, as in the case of metal furniture and office machines, this is certainly sufficient to comply with the requirements of the Directive. In these cases, the Dutch policy goes further than the Directive in accordance with the agreements made in the context of the KWS2000 hydrocarbon project. In other cases it will have to be investigated with respect to a specific situation whether the measures described in the following section are sufficient to comply with the requirements of the Directive. If source-oriented measures fail to satisfy the reduction plan, the concentration standards of the Directive will apply.

The concept of low-solvent
Where the text mentions low-solvent paint products, products are meant which satisfy a limit of 250 gram of VOC per litre of paint, excluding water and colour pastes. It designates organic products such as VOC which at 25 °C have a vapour pressure in excess of 13.3 Pa. This is a limit proposed by the CEPE and is meant as a communication tool in the European paint industry. This limit was originally introduced for construction paints and DIY paints. It is only meant to give guidance in the case of industrial paints and varnishes which are more tailored to specific company situations.

3.4.20.2 Measures

MT1 and MT3	Use of low-solvent coatings
Scope	Metal companies.
Activity	Application of paints and varnishes to metal.
Measure	To achieve an emission reduction by using low-solvent coatings*
Status of measure	Certain with respect to the industry target; certain with respect to companies that paint metal furniture and office machines; conditional with respect to other activities in individual companies.
Clarification	Per individual company it will have to be investigated whether low-solvent paint systems can be applied, and if so, which ones. An action plan drawn up by the company in question must describe the inquiry into the possible use of low-solvent paint systems. If these systems cannot be used, for example, because there are too many environmental, technical or economic disadvantages, it must be explained in the action plan. In these cases it may be decided to use process-integrated / end-of-pipe techniques. If there is sufficient certainty about this, the action plan may indicate when the switch (acquisition) will take place. The action plan must be updated annually. The working method used for such a compulsory investigation is described in §2.8.4.8. For more information see fact sheet LF16, Alternative Choice of Materials / Alternative Paint Systems (1994), which contains a matrix of examples of the use of alternative materials and paint systems. For a detailed explanation see module C.5.4 of the Manual of Environmental Measures for the Metal and Electrotechnical industry (documents in Dutch only).
Relationship to other legislation	If carried out inside installations, the application of organic coatings to metal falls under the scope of the European Directive for VOCs when solvent consumption is more than 5 tonnes a year.

* Measures MT1 and MT3 were originally specified as the industry target. See Appendix 4.12.

MT2	Good housekeeping in the case of applying organic coatings
Scope	Metal companies.
Activity	Application of paints and varnishes to metal inside an installation.
Measure	Good housekeeping, i.e. carefully and sparsely handling and using solvent-containing products, keeping of a solvent accounting system, etc.
Status of measure	Certain
Clarification	These companies use a wide range of processing methods. An evaluation of the output system is important in order to reduce solvent consumption. This evaluation may be linked to setting up a system of good housekeeping, which may be included in a Company Environmental Plan (BMP) and/or an in-house environmental management plan. A detailed explanation is contained in module C.5.4 of the Manual of Environmental Measures for the Metal and Electrotechnical industry (documents in Dutch only).
Relationship to other legislation	If carried out inside installations, the application of organic coatings to metal falls under the scope of the European Directive for VOCs when solvent consumption is more than 5 tonnes a year.

MT3 AS2/3b	Switching from solvent-containing paints and varnishes to low-solvent paints and varnishes
Scope	Factory coating of passenger cars and busses.
Activity	Coating
Measure	To achieve an emission reduction by switching from solvent-containing paints and varnishes to low-solvent paints and varnishes.
Status of measure	Certain
Clarification	Emission reduction can be achieved by: • applying a base coat with low-solvent products; • applying a low-solvent base coat / clear coat system for metallic / pearl colours (consisting of a low-solvent base coat and a solvent-based clear coat); • applying a low-solvent underbody coating; at this moment these low-solvent underbody coatings still contain PVC, which is undesirable in some situations due to market factors; in these cases the most suitable alternative must be chosen in consultation with the competent authority.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 0.5 tonne a year. If solvent consumption is ≤15 tonnes a year, the requirements of activity 6 ('coating of vehicles') of part I of Appendix IIA will apply. If solvent consumption is more than 15 tonnes a year, the requirements of part II of Appendix IIA will apply ('the vehicle coating industry').

MT4 AS2/3c	Switching from solvent-containing paints and varnishes to low-solvent paints and varnishes
Scope	Factory coating of lorries.
Activity	Coating
Measure	To achieve an emission reduction by switching from solvent-containing paints and varnishes to low-solvent paints and varnishes.
Status of measure	Certain
Clarification	Low-solvent varnishes can be used to coat cabins, with the exception of the top coat in two-layer systems. Other types of products are used to coat the chassis and axles.
Relationship to other legislation	Coating of cabins falls under the scope of the European Directive for VOCs if solvent consumption is more than 0.5 tonne a year. If solvent consumption is ≤15 tonnes a year, the requirements of activity 6 ('coating of vehicles') of part I of Appendix IIA will apply. If solvent consumption is more than 15 tonnes a year, the requirements of part II of Appendix IIA will apply ('the vehicle coating industry'). Coating of chassis and axles fall under the scope of the European Directive for VOCs if solvent consumption is more than 5 tonnes a year (category 8, Appendix IIA).

MT5 AS2/3d	Switching from solvent-containing paints and varnishes to low-solvent paints and varnishes
Scope	Coating of newly built trailers.
Activity	Coating
Measure	To achieve an emission reduction by switching from solvent-containing paints and varnishes to low-solvent paints and varnishes.
Status of measure	Certain
Clarification	Low-solvent paints can be used to coat the enclosure of trailers. Other types of products are used to coat the chassis.
Relationship to other legislation	Coating of the enclosure of trailers falls under the scope of the European Directive for VOCs if solvent consumption is more than 0.5 tonne a year. Coating of the chassis falls under the scope of the European Directive for VOCs if solvent consumption is more than 0.5 tonne a year (category 8, Appendix IIA).

MT6 AS2/3e	Switching from solvent-containing paints and varnishes to low-solvent paints and varnishe
Scope	Factory coating of busses
Activity	Coating
Measure	To achieve an emission reduction by switching from solvent-containing paints and varnishes to low-solvent paints and varnishes.
Status of measure	Conditional
Clarification	Condition: it will have to be investigated for each individual company which low-solvent paints can be used. Emission reduction can be achieved by using low-solvent paints for the enclosure, with the exception of the top coat in two-layer systems and the primer if glued window panes are used.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 0.5 tonne a year. If solvent consumption is ≤15 tonnes a year, the requirements of activity 6 ('coating of vehicles') of part I of Appendix IIA will apply. If solvent consumption is more than 15 tonnes a year, the requirements of part II of Appendix IIA ('the vehicle coating industry') will apply.

3.4.21 Use of paint: steel preservation

3.4.21.1 Introduction

Steel preservation comprises the following sources: preservation of metal constructions, construction parts and vessels and application of welding and shop primers to construction steel. These activities can take place both inside and outside installations. However, the environmental permit may only specify requirements on activities that take place inside installations.

In steel preservation a number of protection systems are used. Constructions requiring a great deal of welding are usually provided with a thin layer of paint, the so-called shop primer. Shop primers offer temporary protection during construction, particularly that of vessels, bridges, etc. After construction, the primer is generally not entirely removed but included in the preservation system. After application or non-application of a shop primer, a preservation system can be selected which is based on organic binders or on a metallic top coat in combination with one or two layers of paint, the so-called duplex systems. Paints based on alkyd, chlorine rubber, epoxy or polyurethane are used as organic top coats.

The Dutch paint industry has indicated that in 1999 it can supply for use in normal circumstances the following low-solvent metal preservation products (ready-for-use product in gram VOC / litre):

Product	VOC content
Shop primer (1 and 2-components)	450 g/l
Rust resistant primer 1 component	335 g/l
Rust resistant primer 2 components	250 g/l
Build coats 1 component	335 g/l
Build coats 2 components	200 g/l
Top coats 1 component	335 g/l
Top coats 2 components	250 g/l

In the context of the target group covenant with the metal and electrotechnical industry, a Manual of Environmental Measures for the Metal and Electrotechnical industry has been drawn up. For a detailed process description and further information on possible measures to limit emissions to the air, refer to this Manual.

European Directive for VOCs

If they are carried out inside installations, steel preservation activities fall under the scope of the European Directive for VOCs when solvent consumption is more than 5 tonnes a year. Use of solely water-based paints, as in the case of welding and shop primers, is certainly sufficient to comply with the requirements of the Directive. In these cases, the Dutch policy goes further than the Directive as agreed in the context of KWS2000. In other cases, it has to be investigated with respect to a specific situation whether the measures described in the following section are sufficient to comply with the requirements of the Directive.

If no switch is made to low-solvent paints, an end-of-pipe technique must be installed on the basis of the Directive.

3.4.21.2 Measures

SC1/3	Use of low-solvent preservation systems
Scope	Steel preservation companies.
Activity	Application of preservation systems to metal inside installations.
Measure	To achieve an emission reduction by applying low-solvent preservation systems.*
Status of measure	Certain for welding and shop primers; 'conditional' for other systems.
Clarification	The possibility to use low-solvent preservation systems is dependent on a number of factors, such as the purpose of preservation, the environment to which the object will be exposed and the required durability. With respect to each individual company it will have to be investigated which low-solvent paint systems can be applied. An action plan drawn up by the company in question must describe the inquiry into the possible use of low-solvent preservation systems and state when the switch to these systems will take place. If it is impossible to use these systems, this must be explained in the action plan. The action plan must be updated annually. The method for carrying out such a compulsory inquiry is described in §2.8.4.8. The brochure 'System Choice in Steel Preservation' (KWS2000, SSM, 1993) lists the factors that play a role in the choice of a preservation system. Practice sheet LP3-2, Low-solvent Varnish in Steel Preservation, gives a practical example of the use of low-solvent preservation systems. Module C.5.4 of the Manual of Environmental Measures for the Metal and Electrotechnical industry provides more background information (documents in Dutch only).
Relationship to other legislation	If they are carried out inside installations, steel preservation activities fall under the scope of the European Directive for VOCs when solvent consumption is more than 5 tonnes a year.

* This measure was originally specified as the industry target. See also Appendix 4.12.

SC2	Good Housekeeping in steel preservation
Scope	Steel preservation companies; stationary application.
Activity	Application of preservation systems to metal inside installations.
Measure	Good housekeeping, i.e. carefully and sparsely handling and using solvent-containing products, keeping of a solvent accounting system, etc.
Status of measure	Certain
Clarification	Good housekeeping for this branch of industry is described in the Practical Manual of Environmental Management for Painters of the Trade Organisation for Painting Firms, the module for grit blasting and preservation companies in the VOM care system, the brochure 'Good Housekeeping in Steel Preservation' (KWS2000 – SSM, 1992) and fact sheets LF11, Good Housekeeping in Painting Firms and LF17, Low-solvent Paint Systems for Steel and Metal Preservation (1994). Descriptions can also be found in the Manual of Environmental Measures for the Metal and Electrotechnical industry (documents in Dutch only).
Relationship to other legislation	If they are carried out inside installations, steel preservation activities fall under the scope of the European Directive for VOCs when solvent consumption is more than 5 tonnes a year.

SC4	Overspray reduction
Scope	Steel preservation companies; stationary application.
Activity	Application of preservation systems to metal inside installations.
Measure	Reduction of VOC emissions arising from overspray during spraying of objects by using improved application techniques rather than the conventional pneumatic spraying technique.
Status of measure	Certain
Clarification	Limiting the amount of overspray increases the spraying efficiency, causes less VOC to be released and reduces the amount of waste. In addition to the conventional pneumatic spraying technique, there are many improved spraying techniques. The choice of a more efficient spraying system is determined by several factors: aesthetic requirements, flexibility, working speed, shape of the object to be sprayed and type of material. For more information on application techniques see module C.5.4 of the Manual of Environmental Measures for the Metal and Electrotechnical industry (documents in Dutch only).
Relationship to other legislation	If they are carried out inside installations, steel preservation activities fall under the scope of the European Directive for VOCs when solvent consumption is more than 5 tonnes a year. The Decree on Volatile Organic Compounds, Environmentally Hazardous Substances Act (Besluit vluchtige organische stoffen Wet milieugevaarlijke stoffen), which came into force in the autumn of 1999, stipulates requirements concerning the efficiency of high-efficiency spraying equipment (spraying regulation) and the professionalism of sprayers (diploma regulation). The purpose of these requirements is, for instance, to reduce overspray.

3.4.22 Use of paint: car respraying shops

3.4.22.1 Introduction

Emissions caused by car respraying shops are ascribed to cleaning / degreasing (as pre-treatment) and use of VOC-containing car repair products. The car respraying shops source category includes professional paint spraying in car repair works and car body works.

European Directive for VOCs

This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 5 tonnes a year. By implementing the measures described in the following section, a company will satisfy the requirements of this Directive. If no switch is made to low-solvent paints, an end-of-pipe technique must be installed on the basis of the Directive.

CEPE table

On the international level the paint industry has adopted a Technology Guideline for Vehicle Refinishes (CEPE, 1994: Solvent emission reduction in the vehicle refinishing industry). It specifies the maximum permissible solvent content in gram per litre for ready-to-spray car repair paints.

These solvent contents are included in a covenant between the FOCWA, VVVH and VVVF and adjusted to the latest Best Available Techniques. When the term 'low-solvent' is used in the measures in the following section, it means the maximum permissible VOC content.

Most car respraying shops fall under the scope of the Environmental Protection Decree for Motor Vehicle Repair Workshops (*Besluit herstelinrichtingen motorvoertuigen milieubeheer*). In the year 2000 this Decree will be replaced with the Environmental Protection Decree for Motor Vehicle Workshops (*Besluit inrichtingen voor motorvoertuigen milieubeheer*). In the latter Decree, measures AS1b and AS2/3a will also be included.

Product type	VOC content (ready-to-spray) between 10 and 25°C (gram/litre)
Cleaners	
Sprayer cleaning agents	850
Surface cleaners	200
Primers	
Wash primers	780
Primer surfacer	540*
Sealer	540
Top coats	
1-layer finish coating system (2K paint)	420
2-layer finish coating system (base coat + clear coat)	420
Special products	*840*
Other products	*150*

* Pursuant to the Environmental Protection Decree for Motor Vehicle Workshops (*Besluit inrichtingen voor motorvoertuigen milieubeheer* [*Staatsblad 262, June 2000*]), from 1 October 2003 the primer / surfacer product group may contain no more than 250 grams of voc per ready-for-use product.

Explanation of the table

- The values in the table are expressed in the VOC content of the ready-for-use product including water content.
- For a multi-coat system, the average VOC content is calculated by means of the following formula: (a.L1 + b.L2)/(a+b) is equal to or less than 420 g/l, where L1 is the VOC content of the base coat and L2 the VOC content of the clear coat; a and b stand for the number of grams of paint that has been used. In a multi finishing coat system neither the base coat nor the clear coat may as ready-for-use product contain more than 480 grams of VOC per litre. In practice this generally means that the base colour coat is a water-based product and the clear coat a VOC-containing product with a high solid material content).
- *Special products* for car paints are paint additives, such as restrainers, accelerators, matting agents, elastification agents, anti-silicon agents, blowing thinners, special design or effect colours, spray cans and cleaners for special surfaces such as plastics, adhesive primers.
- *Other products* are polishing preparations, fillers, kits, glues and surfacers.

3.4.22.2 Measures

AS1a	Good housekeeping measures
Scope	Car repair works and car body works.
Activity	Washing, degreasing, cleaning, priming, spraying, undercoating (anti-corrosion) and polishing.
Measure	Prevention of emissions of solvents and thinners through careful handling of paint application techniques and prevention of overspray.
Status of measure	Certain
Clarification	A system of good housekeeping has been developed for the professional spraying of cars. This system is incorporated in environmental management systems of the relative branch organisation. The key recommendations are: • washing: use shampoo, soap or water-based degreaser; • degreasing: good dosing, store used cleaning clothes in a closed container; • cleaning: close containers of thinner, pre-rinse with fouled thinner, post-rinse with clean thinner, regenerate as much as possible; • priming: good dosing, avoid spraying losses; • spraying: good dosing, mix beneath suction device, observe spraying specifications; • spraying: use high-efficient spraying equipment; • anti-corrosion: only use low-solvent agents; • polishing: only use low-solvent agents.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 0.5 tonne a year.

AS1b	Keeping a solvent accounting system
Scope	Car repair works and car body works.
Activity	Cleaning and paint spraying.
Measure	Keeping a solvent accounting system, so that the installation owner can show that the actual VOC contents correspond to the particulars contained in the product information sheets.
Status of measure	Certain
Clarification	For purposes of checking the contents listed in Table §3.4.22.1, the installation owner must indicate by means of product information sheets what the VOC contents are of the ready-for-use products. The Paint and Printing Ink Manufacturers Association (VVVF) has pledged that information on VOC contents of ready-for-use products will be given in these sheets. By keeping a solvent accounting system, the installation owner can indicate that the actual VOC contents correspond to the particulars contained in the product information sheets. In this way, it can be checked whether a company uses more thinner than necessary according to the product information sheet. Registration must be set up in such a way that it can be demonstrated that only VOC-containing repair products are used in the installation which are in accordance with the requirements given in the table.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 0.5 tonne a year.

AS2/3a	Switching from solvent-containing car repair products to low-solvent car repair products
Scope	All repair categories (in car repair companies).
Activity	Spraying activities.
Measure	To achieve an emission reduction by switching from solvent-containing car repair products to low-solvent car repair products.*
Status of measure	Certain
Clarification	Emission reduction is achieved through: • applying a low-solvent priming coat; • applying a low-solvent base coat in the case of two-layer systems; • degreasing with low-solvent cleaner (geared to the applied paint system). The term low-solvent means that the products used satisfy the VOC contents given in the table in §3.4.22.1.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 0.5 tonne a year.

* This measure was originally specified as the industry target. See also Appendix 4.12.

3.4.23 Use of paint: carpentry industry

3.4.23.1 Introduction

In the carpentry industry different timber products are made for use in construction. Reduction of VOC emissions in this branch of industry can be achieved by switching to low-VOC primers and varnishes. Most of the buyers of carpentry firm products require a guarantee certificate of the Foundation for the Guarantee Fund for Carpentry (SGT). Up to the beginning of 1998 a guarantee certificate could not be obtained for softwood joinery treated with water-based varnish. In 1998 this situation came to an end: The Foundation for the Certification of Timber, Timber Products and Timber Constructions (SKH) publication 98-10 contains an updated list of permissible (priming) paints for use on hardwood or softwood facade elements (with KOMO product certificate). Up to now, due to a number of different product properties (including water vapour permeability) and the much higher sensitivity of softwood to moisture in comparison with hardwood, these products were only allowed to be used on softwood. Because it then became evident that the processing of water-based paint (including drying) was more critical than in the case of solvent-containing products, the SKH also imposed conditions on the processing circumstances in a carpentry firm (SKH publication 98-04).
From 1 August 1998, the Foundation for the Guarantee Fund for Carpentry (SGT) extended the guarantee plan to cover the use of water-based paints. The guarantee certificate is issued if the conditions specified in SKH publication 98-04 are satisfied.

In order to determine whether a carpentry firm is able to switch to water-based paint, a Quick Scan may be conducted. This is a method with which in a single day it can be determined to what extent the application process in a carpentry factory allows for a switch to water-based paint.

European Directive for VOCs
Carpentry firms fall under the scope of the European Directive for VOCs if solvent consumption is more than 15 tonnes a year. If low-solvent paints are used, such as in the case of interior stairs, the requirements of the Directive will certainly be satisfied. In this case, the Dutch policy goes further than the Directive as agreed in the context of KWS2000. By implementing the measures described in the following section, a company will satisfy the requirements of the Directive. If no switch is made to low-solvent paints, an end-of-pipe technique must be installed on the basis of the Directive.

3.4.23.2 Measures

BW 4/5/6	Use of low-solvent paint systems
Scope	Carpentry factories
Activity	Application of paint to timber products used in the construction industry.
Measure	To achieve an emission reduction by using low-solvent paints.*
Status of measure	Certain for wooden interior stairs; conditional for hardwood facade elements and interior woodwork and other situations.
Clarification	Per individual company it will have to be investigated which low-solvent paints can be used. An action plan drawn up by the company in question must describe the inquiry into the possible use of low-solvent paints and state when the switch will take place. Performing a Quick Scan to determine whether a company is able to switch to water-based paints (see Introduction) may be part of the inquiry. If it is impossible to use these paints, this must be explained in the action plan. The action plan must be updated annually. The working method for such a compulsory inquiry is described in §2.8.4.8. Practice sheet LP3-6, Water-Based Paint on Hardwood or Softwood Facade Carpentry, gives a practical example (in Dutch only).
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 15 tonnes a year. The Decree on Volatile Organic Compounds, Environmentally Hazardous Substances Act (*Besluit vluchtige organische stoffen Wet milieugevaarlijke stoffen*) states that is forbidden to use paint containing over 250 grams of VOC / litre (water not taken into account) in the manufacture of wooden interior stairs.

* This measure was originally specified as the industry target. See also Appendix 4.12.

3.4.24 Use of paint: wooden furniture industry

3.4.24.1 Introduction

The wooden furniture industry produces a wide range of products and has a diversity of product requirements. Aesthetic requirements combined with the required quality and durability are important factors that play a role in the choice of a paint system.

European Directive for VOCs
Painting of wooden falls under the scope of the European Directive for VOCs if solvent consumption is more than 15 tonnes a year. If use is made of low-solvent paints, such as in the case of clear paint on deal furniture, the requirements of the Directive will certainly be satisfied. In these cases, the Dutch policy goes further than the Directive in accordance with the agreements made in the context of the KWS2000 hydrocarbon project. By implementing the measures described in the following section, a company will satisfy the requirements of this Directive. If no switch is made to low-solvent paints, an end-of-pipe technique must be installed on the basis of the Directive.

3.4.24.2 Measures

MI1/2	Use of low-solvent paint systems
Scope	Wooden furniture industry.
Activity	Application of paint to wood.
Measure	To achieve an emission reduction by using low-solvent paints.*
Status of measure	Certain for electrostatic spraying of clear paint on deal furniture; 'conditional' for other situations.
Clarification	Per individual company it will have to be investigated which low-solvent paints can be used. An action plan drawn up by the company in question must describe the inquiry into the possible use of low-solvent paints and state when the switch will take place. If it is impossible to use these paints, this must be explained in the action plan. The action plan must be updated annually. The working method for such a compulsory inquiry is described in §2.8.4.8 In report O19, Reduction of Hydrocarbon Emissions in the Wooden Furniture Industry (1994), the results are listed of an inquiry into the possible uses of low-solvent paints in this industry. Practice sheets LP3-1, Acid-Curing Varnish Leads to Reduction of VOC Emissions and Better Products (1999), and LP 3-4, UV-Drying Varnishes on Wooden Panels (1999), give various practical examples of the use of low-solvent varnishes in the wooden furniture industry.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 15 tonnes a year.

* This measure was originally specified as the industry target. See also Appendix 4.12.

MI3	Good housekeeping
Scope	Wooden furniture industry.
Activity	Application of paint to wood.
Measure	Prevention of emission of solvents and thinners by carefully handling paint and application techniques and prevention of overspray of paint by implementing an in-house environmental management system.
Status of measure	Certain
Clarification	In general it applies that specifications concerning the safe use and handling of solvents can best be incorporated an environmental management system. If a company does not have such a system, various measures may be specified in the permit. In any event, a solvent accounting system must be kept. In §2.8.4.8 the Solvent Accounting System is explained in greater detail. Furthermore, an evaluation must take place of how to use and handle organic solvents with the aim of preventing improper use and wastage. The applied spraying systems must be evaluated on their efficiency and they must be replaced if necessary.
Relationship to other legislation	This activity falls under the scope of the European Directive for VOCs if solvent consumption is more than 15 tonnes a year.

History
In 1995 with the support of the then current KWS2000 hydrocarbon project subsidy scheme, a study was carried out on possibilities to limit the emission of volatile organic compounds (VOC) released during internal cleaning of tank containers and trailers. During the project a system was developed in which the released VOCs were removed from the tank by means of steam distillation, after which the condensed steam was post-treated. The results of this study induced the KWS2000 Steering Committee to establish in 1995 this technology as a certain measure.
According to the branch organisation ATCN, however, this measure cannot be generally applied because the current working method of tank cleaning companies usually differs markedly from the working method on which the measure was based at the time.

In the year 2000 the Netherlands Organisation for Applied Scientific Research (TNO) carried out a study on VOC emissions within the tank lorry cleaning industry. The emission of volatile organic compounds by the tank lorry cleaning industry amounts on average to 250 tonnes annually. On the basis of this study the Ministry of Housing, Spatial Planning and the Environment (VROM) together with InfoMil and in consultation with the industry have specified a number of alternative measures, which have been established by the KWS2000 Steering Committee and have now been included in these special regulations. As a result, the above-mentioned existing measure has been annulled.

3.4.25 Cleaning of tank lorries

These regulations were included in the NeR in May 2001. Unless specific requirements for emissions are explicitly mentioned in the following, the general provisions of the NeR will apply.

3.4.25.1 Introduction

In the Netherlands a limited number of companies are engaged in cleaning tank lorries. During the cleaning of tank lorries in which volatile organic compounds* have been transported, a significant amount of emission may occur in the pre-treatment phase and after the cleaning phase. In the pre-treatment phase during the opening of the tank; after cleaning when the rinse water with the dissolved organic compounds flows in frequently open channels to the waste water transport system. Cleaning is usually done with rinse water containing additives to increase solubility. In some cases solvents are used in which the volatile organic compounds dissolve.

Background information
At CUWVO level, in the period 1998–2000 an integral study on Best Available Techniques for the tank lorry cleaning industry was carried out in which not only water but all environmental compartments were considered. The results are given in the report: 'Integral Industry-wide Study of Tank Lorry Cleaning', that will be established in 2001 by the Integral Water Management Committee (CIW). This report describes the activities of the industry and their impact on the environment. In addition to this, the possible measures to limit the negative consequences for the environment are specified.

* Volatile organic compounds (VOCs) in this context mean: organic compounds with a vapour pressure in excess of 1 kPa (10 mbar) at cleaning temperature.

In the year 2000 the Netherlands Organisation for Applied Scientific Research (TNO) carried out a study on VOC emissions within the tank lorry cleaning industry[4]. The results of this study have been established in the form of a VOC mass balance on the entire tank lorry cleaning process.

3.4.25.2 Measures

In establishing the measures to limit VOC emissions a distinction is made between two types of companies: companies without and companies with their own waste water treatment plant for the rinse water.

Companies without waste water treatment plant
In this type of company, waste water is discharged into the sewer system without further post-treatment other than a sand catcher and/or an oil-water sludge separator. These companies carry out a minority of the total amount of VOC cleaning. Usually VOC cleaning activities are a small part of the total amount of cleaning done at these companies.

Companies with waste water treatment plant
These companies have their own waste water treatment plant (with at least a flocculation flotation unit (FFU) or a flocculation sedimentation unit [FSU]), possibly extended with a biological treatment plant. These companies, estimated to be about ten, account for about 70% of VOC cleaning according to the branch organisation ATCN.

The available facilities for waste water treatment also have an influence on VOC emissions. That is why different sets of measures have been established for these two types of companies.

Below the different measures are listed for both types of companies. In explanatory notes 2 and 3 it is indicated for both types of companies in the form of an indicative mass balance (on a single tank lorry) what influence the different measures have on VOC emissions during tank lorry cleaning. The efficiency given for the measure relates to the total input (about 12 kg VOC per tank lorry).*

Alternative measures with similar efficiency
In all cases taking alternative measures is also permitted provided they have a similar efficiency. The company must moreover prove that a similar efficiency is indeed achieved.

TR1	Tapping of residual liquid load
Scope	All tank lorry cleaning companies.
Activity	Internal cleaning of tank lorries, cleaning of tank trailers and tank containers in which volatile organic compounds (VOCs) have been transported.
Measure	Tapping of residual liquid load. This load is captured, stored and transported in such a way that VOC emissions are prevented as much as possible.
Status of measure	Certain
Clarification	Tapping of the residual load must be regarded as part of the cleaning process. The Integral Industry-wide Study devotes extensive attention to the discussion concerning whether the residual load from tank cleaning must be considered a waste product coming from outside the facility. The efficiency of this measure averages about 26%.
Relationship to other legislation	Cleaning of tank lorries falls outside the scope of the European VOC Directive.

* Follow-up study on emissions of volatile hydrocarbons in tank lorry cleaning in the Netherlands (TNO-MEP – R 2000/280). September 2000

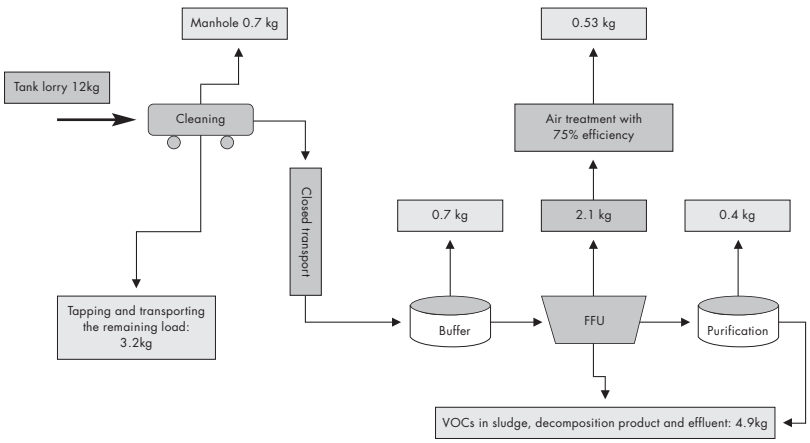
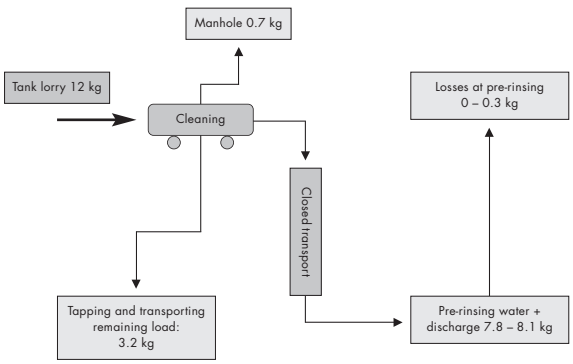
TR2	Capture of rinse water
Scope	Tank lorry cleaning companies without a waste water treatment plant.
Activity	Internal cleaning of tank lorries, cleaning of tank trailers and tank containers in which volatile organic compounds (VOCs) have been transported.
Measure	Pre-rinsing. Rinse water must be captured separately and stored and transported in such a way that VOC emissions are prevented as much as possible.
Status of measure	Certain
Clarification	Companies without a waste water treatment plant do not have the possibility to prevent VOC emissions from rinse water. These companies should therefore not let VOCs get into the rinse water. That is why these companies must pre-rinse in VOC cleaning and separately capture, store and transport the rinse water contaminated with VOCs. The efficiency of this measure averages about 66%.
Relationship to other legislation	Cleaning of tank lorries falls outside the scope of the European VOC Directive.

TR3	Closed transport of rinse water
Scope	Tank lorry cleaning companies with a waste water treatment plant.
Activity	Internal cleaning of tank lorries, cleaning of tank trailers and tank containers in which volatile organic compounds (VOCs) have been transported.
Measure	Closed transport of rinse water to the waste water channel by connecting a drain hose to the outflow opening of a tank so that the end of the hose is under the water level in the channels.
Status of measure	Certain
Clarification	In the situation without measures about 16% of the VOCs present in a tank lorry is released at the cleaning site. This measure prevents the evaporation of VOCs from the heated rinse water flowing from a tank lorry to the cleaning site. The efficiency of this measure averages about 12%.
Relationship to other legislation	Cleaning of tank lorries falls outside the scope of the European VOC Directive.

TR4	Ventilation and VOC removal in FFU
Scope	Tank lorry cleaning companies with a waste water treatment plant.
Activity	Internal cleaning of tank lorries, cleaning of tank trailers and tank containers in which volatile organic compounds (VOCs) have been transported.
Measure	Air evacuation of a physical / chemical waste water purification plant, such as a flocculation flotation unit (FFU), in which the extracted air is removed by means of an air treatment facility with an efficiency of at least 75%.
Status of measure	Certain
Clarification	The efficiency of this measure averages about 33%. If, instead of an FFU, a flocculation sedimentation unit (FSU) is used which is not evacuated in a forced way, air treatment to remove VOCs does not have to take place. This, however, does not change the fact that post-treatment for other reasons, such as in case of odour nuisance, may be required.
Relationship to other legislation	Cleaning of tank lorries falls outside the scope of the European VOC Directive.

TR5	Closed capture, storage and transport of liquid sludge
Scope	Tank lorry cleaning companies with a waste water treatment plant.
Activity	Internal cleaning of tank lorries, cleaning of tank trailers and tank containers in which volatile organic compounds (VOCs) have been transported.
Measure	The sludge formed in a waste water treatment plant (both FFU and FSU) must be stored and transported (to a qualified processor) so that VOC emissions are prevented as much as possible.
Status of measure	Certain
Clarification	The TNO study shows that about 42% of the VOCs present in the waste water are left behind in the sludge formed during the various cleaning stages. To prevent these VOCs from being released, the sludge must be handled carefully. This means that it must be transported by means of a closed system and stored in closed storage facilities. The efficiency averages about 40%.
Relationship to other legislation	Cleaning of tank lorries falls outside the scope of the European VOC Directive.

Note 2 Indicative mass balance on a single tank lorry: company with waste water treatment plant



Note 3 Indicative mass balance on a single tank lorry: company without waste water purification plant