

# VOLKSWAGEN

AKTIENGESELLSCHAFT



## Environmental Group Principles

production plants

## Preamble

ENSURING THE SUSTAINABLE FUTURE OF OUR COMPANY IS THE CORE MANAGEMENT MISSION. IN THIS, ENVIRONMENTAL PROTECTION DOES NOT STAND DETACHED ALONGSIDE OTHER TARGETS; ON THE CONTRARY, IT IS AN ESSENTIAL ELEMENT OF OUR CORPORATE STRATEGY AIMED AT LONG-TERM GROWTH IN VALUE. THIS FRAMEWORK REQUIREMENT IS FIRMLY ANCHORED IN OUR CORPORATE ENVIRONMENTAL POLICY.

IN ORDER TO ENSURE A SUSTAINABLE SECURE FUTURE, WE COMMIT OURSELVES TO AN INTEGRATED APPROACH TO ENVIRONMENTAL PROTECTION, WHICH ASSESSES THE IMPACT OF PRODUCTION PROCESSES AND PRODUCTS ON THE ENVIRONMENT IN ADVANCE AND TAKES THEM INTO CONSIDERATION FROM THE OUTSET. THE IMPLEMENTATION OF THESE REQUIREMENTS IS GUIDED BY OUR CORPORATE ENVIRONMENTAL PRINCIPLES WHICH WE PRESENT TO YOU IN THIS BROCHURE.

THESE CORPORATE ENVIRONMENTAL PRINCIPLES CONTAIN BOTH STRATEGIC GUIDELINES AND TECHNICAL SPECIFICATIONS, IN ORDER TO ENSURE GLOBALLY COMPATIBLE ENVIRONMENTAL STANDARDS IN OUR PRODUCTION PROCESSES. IN THIS, IT IS OUR PRIMARY TARGET TO IMPLEMENT SOLUTIONS THAT MAKE SENSE BOTH ECONOMICALLY AND ECOLOGICALLY, IN ORDER TO MINIMIZE THE USE OF RESOURCES AND TO CONTRIBUTE TOWARDS A LONG-TERM REDUCTION IN COSTS.

OUR MANAGEMENT STAFF IN THE CENTRAL DEPARTMENTS AND AT THE PRODUCTION SITES ARE REQUESTED TO TAKE THESE CORPORATE ENVIRONMENTAL PRINCIPLES, PASSED BY THE HEADS OF PLANNING MEETING, INTO ACCOUNT IN ALL THEIR DECISIONS. THESE ENVIRONMENTAL PRINCIPLES WITH THEIR CONSTRUCTIVE COMBINATION OF ECONOMY AND ECOLOGY CONTRIBUTE TO THE SUSTAINABLE CORPORATE SUCCESS.



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# A. General principles and principles for infrastructure

## 1. Environmental management

### **Problem**

Environmental management systems are of increasing importance for a successful further development in the field of global competition; they have to be implemented at new locations from the very beginning.

### **Target**

The establishment of environmental management systems at all manufacturing locations guarantees on the one hand the compliance on site with all environmental laws. On the other hand, it allows a saving on valuable resources and in addition to minimise potential risks to the company.

### **Implementation**

The implementation of all environmental targets requires both global and local measures. Of primary importance is the establishment of certified environmental management systems – in conformity with EMAS and/or ISO 14001 – at all of the company's manufacturing locations.

At smaller locations and depending on local conditions, it may also be possible to cover the extensive tasks of an effective environmental management system within an integrated management approach.



## 2. Dealings with business partners

### Problem

As a result of the increasing percentage of outside manufacturing the importance of environmental and social welfare requirements is ever increasing.

The identification with external partners plays a significant part in the appraisal by customers, investors, rating agencies and the general public.

### Target

In this context, the target must be the integration of suppliers and service providers into the Volkswagen Group's environmental management systems and the implementation of the Group's social charter by these same partners.

### Implementation

One of the essential requirements is the detailed information of the business partners about these company-specific sustainability requirements.

In the long-term, these requirements are to be implemented through the introduction of environmental management systems by all partner enterprises. These measures will be supplemented by local expert advice as well as by an intensive exchange of experience with the business partners.

In addition, these company sites will receive the best possible support for the early detection of potential risks as well as for performing supplier qualifications.



### 3. Reduction in land consumption

**Problem**

The ever increasing need for industrial sites across the globe has a negative impact on environment. In the areas concerned, this may result in a scarcity of suitable sites coupled with an increase in the price of land.

**Target**

For the best possible consideration of ecological aspects, soil sealing by building constructions is to be kept as low as possible. If buildings are planned on previously undeveloped sites, attention must be paid to the nature of the ground to make

sure whenever possible that only sites of low soil quality are selected for development.

**Implementation**

In the construction of new manufacturing sites, preference is to be given to sites that have already been used industrially or to industrial wasteland sites respectively. Soil sealing has to be restricted to a minimum both currently and in future.



## 4. Preference of low-emission carriers

### **Problem**

The expansion and ever increasing internationality of a successful large company bring with them an increasing requirement of transport resources. Road transport by lorries leads to an increased burden on the environment and also on residents; at times more problems result from congestions of existing transportation routes.

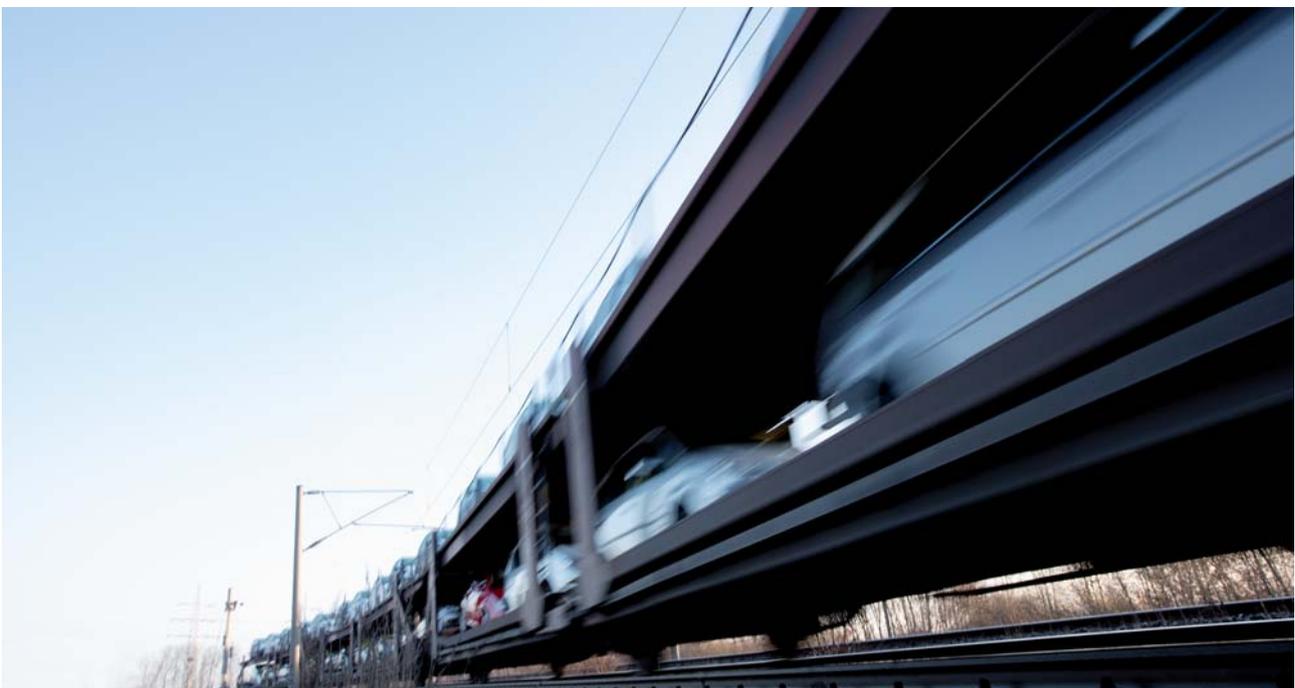
### **Target**

In order to effect a significant reduction in environmental pollution and harm to residents in future, road transport by lorries is to be considerably reduced and the main transport focus increasingly transferred to other infrastructures.

This will allow a long-term reduction in road congestion and also alleviate the negative impact on the affected population.

### **Implementation**

The implementation of these targets requires a logistic restructuring on an enormous scale, which cannot be put into place overnight. A wide range of factors need be taken into account in order to ensure a smooth transition in terms of efficiency and profitability. The main focus in the future will be on the gradual shifting of transport from road to rail or ship.



## 5. Prohibition of the use of substances particularly harmful to health

### Problem

The use of hazardous substances in plant construction and in building infrastructure can have a negative impact on the health of employees as the environment.

For a company such as Volkswagen, it is obligatory to accept its responsibility for environmentally friendly production and processing techniques.

### Target

Company wide the primary objective in this has to be the widest possible dispensation with the use of hazardous substances and materials harmful to health. This also requires the identification of environmentally-friendly alternative solutions that are effective in the long-term.

### Implementation

With its prohibition of the use of asbestos, polychlorinated biphenyls (PCBs), chlorinated hydrocarbons (CHCs) and fluorinated chlorinated hydrocarbons (CFCs), Volkswagen stands for a comprehensive commitment in the field of environmentally friendly production. In addition, whenever possible, other environmentally objectionable substances are also widely dispensed with, e.g. CFCs and substances containing phenolic resin (release of formaldehyde). Sulphur hexafluoride (SF<sub>6</sub>) in medium voltage switch gears must be avoided unless leakage containment and environmentally-friendly production and disposal can be guaranteed one hundred percent.



## 6. Use of environmentally-friendly refrigerants in air-conditioning systems

### Problem

The release of refrigerants as a result of leakages or during maintenance work constitutes a serious long-term negative impact on our environment. Once released, their ozone-damaging or climate-changing properties have an impact on global climate change.

### Target

The primary objective is to avoid the emission of environmentally objectionable refrigerants in order to rule out any damage to the ozone layer or the climate. It is also necessary to develop concepts for existing plants and systems to facilitate the future switch to environmentally-friendly refrigerants. For new plants, the use of alternative refrigerants must be examined.

### Implementation

Apart from developing and maintaining industrial plant cadastral inventories including a record of the quantities consumed, there are also statutory requirements which have to be met during the operation and preventive maintenance. In this, the obligation is as much the avoidance of refrigerant loss during repairs as are regular checks of the leak tightness in large-scale plants and systems. For new plants and systems, no refrigerants will be used that are currently or will be subject to regulation by international treaties on the protection of the ozone layer or for combating climate change. Regarding the refitting of existing plants and systems or the procurement of new plants and systems, consideration must be given both to the economic and the ecological efficiency of any measures.



## 7. Energy savings

### Problem

The globally ever decreasing reserve of primary energy sources inevitably results in shortages and accordingly enormous cost increases for any type of energy. In addition, the Kyoto Protocol obliges all signatory nations to reduce their CO<sub>2</sub> emissions drastically.

### Target

The identification of potential savings in all areas of the company shall lead to a significant reduction in energy consumption and thus also of all energy-related emissions to a minimum level.

### Implementation

Apart from due consideration of energy consumption costs during the planning and procurement stages, checks of

energy consumption after the commissioning of the plant or system are as essential as the development of a company specific energy management scheme. Further measures are the use of energy-saving power units and plant machinery, intermittent operation of ventilation systems, the installation of measuring instruments as well as the comprehensive avoidance of compressed air ( 6 bar maximum; where required, decentralized generation of higher pressures in exceptional cases only).

Of equal importance in the paint shop: the widest possible decoupling of heating for dryers and the treatment of exhaust air.

The generation of energy and heat is to be increasingly based on regenerative sources (solar energy /geothermy) and waste heat must be used as far as economically viable.



## 8. Noise emissions

### **Problem**

Noise exposure and its environmental and human impact constitute an essential aspect within the environmental context. This may be caused by the production sites themselves, but also by infrastructural factors which have the effect of generating or respectively intensifying noise. It is not only due to the increasing freight traffic that the increase in noise pollution has moved ever more to the centre of the public and political interest as an environmental and health concern.

### **Target**

The primary concern is the reduction of noise emissions at the various production sites, including relevant noise pollution by freight traffic from external suppliers.

### **Implementation**

To minimize noise exposure levels in the environment and to people from the outset, noise protection measures are taken in to consideration as early as the planning of production processes and also during the modification or reconstruction of existing sites.

In this process, the drawing up of noise maps for the individual locations and their regular review guarantee the best possible implementation of the technical regulations pertaining to noise pollution.

In addition, noise reduction is taken into consideration for the entire company in the development of logistics concepts in order to take into account the significance of this topic in the public awareness.



## 9. Preventive groundwater and soil protection

### **Problem**

Some production processes require special materials, which, if improperly handled, can turn into environmental risks, thus also constituting a risk potential to the company. Substances and waste products harmful to water can cause underground pollution and damage as well as future financial risks.

### **Target**

All measures necessary to prevent a possible contamination of the soil and the groundwater have to be taken in order to exclude any risks to the environment and the company caused by water-pollution.

### **Implementation**

In order to ensure the best possible prevention of potential environmental hazards, not only all new plants and systems have to be equipped with comprehensive safety measures, but existing production sites must also be checked to identify potential risks. The establishment and maintenance of industrial plant cadastral inventories ensures the complete inclusion of all relevant sites and risk potentials and helps towards an optimization of the plants.

Comprehensive safety and control measures (2 barrier principle) are to be provided for existing plants and systems.



## 10. Identification and handling of underground pollution

### **Problem**

The construction of new manufacturing facilities or respectively the modification of existing ones in existing locations and also the building of new production facilities on new sites can result in the discovery of previously unknown underground pollution. This gives rise to additional costs and often also to deadline shifts with a potentially detrimental impact on the company in a variety of ways.

### **Target**

The fundamental requirement is the compilation of comprehensive information about all existing and new locations in order to acquire a complete knowledge of the groundwater and ground situation. In that way, it is not only possible to as-

sess and prevent risks early, but also to minimize costs and to secure the economic future of the site.

### **Implementation**

In view of the possible contamination of ground and groundwater, detailed historic searches have to be carried out for existing locations, prior to the purchase of further land or in the case of business takeovers.

If there is any suspicion of an existing risk, analyses of the soil and the groundwater are required and must be documented. If harmful pollutions have been assessed, protection and remedial action programmes have to be set out and realized in compliance with environmental legislation and other official regulations.



## 11. Sustainable water use

### Problem

Drinking water is in increasingly short supply worldwide. On the one hand, this is due to ecological causes such as drought in many parts of the world. On the other, the increasing contamination of water resources contributes to the shortage. This has grave consequences for the environment and as well as the economy, because the costs of providing drinking water and fresh water as well as those of treating waste water are on the increase.

### Target

The application of water-saving processes combined with a reduction or rather re-use of process fluids – e.g. through recycling of water in conjunction with filtration processes – will lead to a significant reduction of drinking water quantities

used and thus to a long-term conservation of this valuable resource.

### Implementation

The reduction of the amount of drinking water consumed in-house does not only require the technical optimization but also the information of all employees in order to motivate them for the implementation of measures in this context and increase their environmental awareness.

In the area of production technology, the implementation of these specifications includes the installation of water recycling, cascade rinsing technology, filtration technology and also the increased use of stormwater and process water. In addition, continuous internal material flow analyses ensure optimal transparency both regarding the quantities consumed and the material content.



## 12. Construction and maintenance of a separate sewer system

### **Problem**

The mixing of different waste water flows (storm water, production and domestic) results in high costs for waste water purification. Leakages in the sewer system can cause costly contaminations of the groundwater and also in the ground. In addition, the ingress of extraneous water can result in additional costs for waste water treatment.

### **Target**

The first step for best prevention of ground and groundwater contaminations is the identification and elimination of leakages in the sewer system. Additional cost savings are possible through the separate discharge of undiluted waste water and its special treatment (e.g. the partial flow treatment for production waste water).

### **Implementation**

In order to ensure the long-term optimization of wastewater management, advanced measures are to be taken.

For example, separate sewer systems are specified for all newly planned production buildings. Sewer conditions are to be monitored at regular intervals. If this highlights the need for repairs or modernization, effective redevelopment plans for the implementation are to be drawn up and implemented promptly wherever possible.



## 13. Sustainable waste management

### Problem

The use of unsuitable waste disposal facilities can result in a potential risk to the environment associated with high liability risks.

### Target

Sustainable waste management includes the reduction of risk potential associated with waste, the implementation of manufacturing processes low in waste and harmful substances, and the optimal separation of waste. An additional requirement is the optimization of logistics through the use of safe and sustainable disposal routes.

### Implementation

Even at the planning stage of production technologies, it must be the goal to work towards processes that are low in waste and also in harmful materials.

A well-working waste management and materials flow management system must be aimed for in order to separate waste as effectively as possible, thus ensuring that the cost of disposal does not increase and also that the highest possible added value as high as possible can be achieved as the result of the recycling. Regular monitoring and controls of the disposal plants are essential, and the transparency of company waste flows should be guaranteed at any time e.g. by using barcode or transponder systems.



## 14. Use of re-usable packaging and re-usable transport

### Problem

The use of disposable packaging can entail the unnecessary consumption of resources. This will lead not only to an increase in the impact on the environment, but also in costs of procurement and disposal.

### Target

In order to minimize any negative impact on the environment as well as additional financial charges caused by disposable packaging, re-usable packaging and containers are to be used to a larger extent. Disposable packaging and containers may only be preferred if their use is more sensible both ecologically and economically. Furthermore, it is imperative to reduce the quantity of generated waste and – as far as possible – to use recyclable packaging only.

### Implementation

With the aim of comprehensively avoiding disposable packaging of any kind or respectively any non-recyclable materials, it is vital to set the right track at the earliest possible stage. For that reason, compliance with the in-house packaging guidelines must already be ensured when a contract is awarded by the logistics planning department. This guideline is disseminated by the purchasing and logistics departments, with the aim of providing partners with comprehensive information regarding the principles for the reduction of packaging materials as specified by the company.



## B. Environmental principles in the manufacturing processes

### 15. Processes in the press shop

#### Problem

Pressing operations, hot-forming and cooling processes are associated with a high risk potential. On the one hand, materials harmful to the environment can cause contaminations of soil and groundwater; on the other, large quantities of energy or respectively compressed air are used.

In addition, presses, being damped insufficiently can cause damage to buildings and noise pollution.

#### Target

Besides the use of low-energy forming or separating processes and the abandonment of processing media or materials hazardous to the environment, measures must be taken to avoid environmental contaminations as well as protect employees and neighbours.

#### Implementation

The use of compressed air is to be avoided as far as possible. The 2-barrier principle has to be implemented in all plant and storage facilities housing liquids harmful to the environment, as well as the monitoring of leak tightness. Refrigeration should be implemented by way of combined power / heat / cold generation. Biodegradable hydraulic oils are to be used wherever possible or economically reasonable.

Vibration analysis or oscillation-damping respectively measures also have to be taken into consideration.

In addition, the observance of principles 7 (Energy savings) and 9 (Preventive groundwater and ground protection) is important.



## 16. Assembly plant

### Problem

The process of assembling at times requires processes that are potentially hazardous to health and the environment. For instance, the refrigeration of plants and systems causes an increase in energy and water consumption. As a further consequence, welding or soldering processes generate fumes harmful to human health.

Also, grinding work on vehicle bodies generates dust that is explosive and harmful to health.

### Target

The production processes are to be optimized through the use of energy-efficient assembly processes combined with energy- and water-saving refrigeration processes.

Harmful emissions (smoke, dust) are to be eliminated by means of capturing and filtering.

### Implementation

Of primary importance is the incorporation of alternative assembly methods as early as during the product development. Alongside, the installation of efficient refrigeration processes – e.g. through closed processes as well as combined power / hot / cold generation – is to be enforced. The capturing and centralized abstraction of welding fumes is to be ensured everywhere; additional dust filters are to be used for laser gas and inert gas shielded arc welding procedures.

Furthermore, it is imperative to implement stricter measures concerning health and safety at work and explosion protection in all processes involving aluminium. Particular consideration has to be given to Principle 7 (Energy savings).



## 17a. Pretreatment in the paint shop: Removal of hazardous substances and the conservation of resources

### Problem

Compound materials potentially harmful to health and the environment are used in the cleaning and pretreatment of vehicle bodies prior to painting. The lack of appropriate recycling measures and of processes to enlarge the useful life of the baths can result in increased demands on waste water treatment and excessive water consumption due to frequent bath changes. An associated problem area is the high energy consumption for heating the bath and drying the vehicle bodies.

### Target

The primary target on the one hand is the reduction in the consumption of energy, water and process fluids and on the other hand the elimination or at least as far as possible reduction of chromium VI compounds, nickel and also accelerators containing nitrites.

### Implementation

An essential aspect is the modification of the phosphating process, i. e. the elimination of chromium VI and nitrite. The development of alternative corrosion protection procedures is to avoid the future generation of phosphating sludges contaminated with nickel and other heavy metals. In addition techniques as cascade rinsing, ultrafiltration, recycling circuits and ion exchangers are to be used during pretreatment. All of these measures are to be taken into consideration during the planning of new plants and systems; existing plants and systems will be provided with these techniques according to long-term conversion programmes. In addition, Principles 7 (Energy savings) and 9 (Preventive groundwater and ground protection) must be taken into consideration.



## 17b. Reduction of PVC in underbody seal and during fine and coarse seam sealing

### Problem

PVC, a material used for a long time in the motor vehicle production, has recently come in for criticism. In addition to its classification as a substance of concern (SOC) in the end-of-life-vehicle, a risk of long-term damage to brand image occurs in connection with the debate about the chlorine chemistry, which similarly applies to the plasticizers contained in the PVC too.

### Target

The reduction of PVC plastisol use takes account of health concerns. The plan is for a general reduction in plasticizers and the switch to less harmful substances. The plan is also for the minimization of the amount of chlorine components in the vehicle (shredder-light fraction SLF) as well as for a

minimization of the cleaning requirements in the paint shop as a result of reduced dirt ingress.

### Implementation

The implementation of all of these targets requires some fundamental changes to the production process.

Alongside the increased use of low-consumption application technologies it is required, particularly for new models.

To investigate whether underbody shells can be used or certain seal seams can be dispensed with. A possible long-term solution to this environmental problem in the manufacturing process could be the relocation of all sealing processes to the body shop.



## 17c. Restriction of solvent emissions by car body paint shops

### **Problem**

The use of solvents in the painting process or in cavity preserving agents can lead to risks by means of the emission of substances harmful to health or the environment.

### **Target**

The implementation of comprehensive measures in the above mentioned areas is to ensure that the generally applicable emission limits are complied with (in Germany: 35g/m<sup>2</sup>, in the EU for new / old plants and systems: 45/60g/m<sup>2</sup>).

### **Implementation**

In addition to constant monitoring, a range of different optimization stages ensures that these targets are met. Amongst them is the use of water-based paint systems (process 5a), and also the continuous improvement in application technology. A sustainable and significant increase in the efficient use of resources can thus be achieved.

In addition, the aforementioned Principle 7 (Energy savings) is to be taken into consideration. The use of regenerative waste-gas cleaning of dryer exhaust air is to be investigated; these systems may consume significantly less energy during partial load operation.



## 18. Assembly processes

### Problem

During assembly, the new vehicle is filled with the necessary fluids. However, some of these are potentially harmful to the environment and carry a potential risk. During the filling process, emissions can arise, which may enter into the atmosphere.

### Target

In order to exclude a possible risk to the environment in these production sectors, measures must be taken to prevent the release of hazardous substances. Contamination of the ground and thus also the groundwater must be prevented and additionally a reduction of the emissions into the atmosphere ensured.

### Implementation

In order to protect the workplace against the release of hazardous substances, comprehensive preventative measures are to be implemented during the filling of vehicles with fuels and lubricants, the storage of hazardous substances (storeroom, filling facility) and also in conjunction with hydraulic plants and systems. For example, in order to reduce the emission of volatile organic substances in fuel filling facilities, the fumes must be captured. The waste air then has to be treated in accordance with statutory environmental regulations.

Furthermore full account has to be taken of Principle 9 (Preventive groundwater and ground protection).



## 19. Use of solvent-free transport protection systems

### **Problem**

Special protective measures to ensure the external integrity of new motor vehicles during transport after manufacture are indispensable. Transport protection materials must be applied to protect the paint quality during transport from the factory to the customer.

These can adversely affect the environment because of their composition and their form of application.

### **Target**

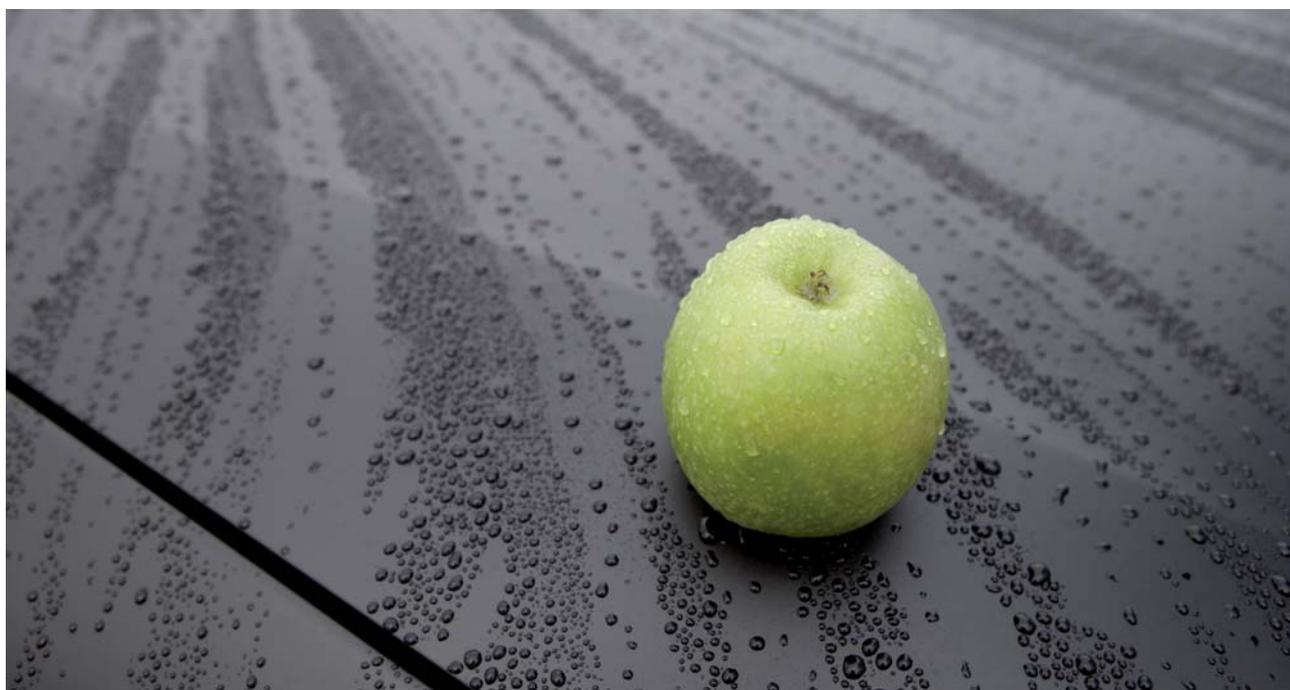
Both during the application of the transport protection and also during its removal at the premises of the dealer, only such substances are to be used that are harmless in terms of environmentally responsible production.

This allows a significant reduction in the emission of solvents, the volume of solid waste and of waste water.

### **Implementation**

In order to safeguard the paint quality during transport, various protective measures can be applied. To this end, substances such as acrylate or water wax can be used as protective components.

Further innovative options are the application of adhesive protecting films of reusable covers (full body cover – FBC).



## 20. Foundry Processes

### Problem

Casting processes can be associated with environmental problems. The environment may be endangered by high energy requirement for smelting, heat-keeping and regeneration processes, by the emissions of hazardous materials and odours during core making and casting, by considerable amounts of waste as well as by hazardous process fluids. In addition to the high water consumption due to cooling processes and the generation of waste water requiring treatment (filter cleaning, sealing and monitoring, leakage of liquids), there is a risk of ground and groundwater contamination.

### Target

Avoidance and/or replacement of process fluids and auxiliary materials harmful to the environment, minimization of waste generation, increased use of energy and water-saving, low-emission and low-odour processes as well as the avoidance of ground contamination.

### Implementation

Scrupulous forecasts of the emissions of harmful substances, odours and noise have to be prepared. Natural gas should be prepared as the primary source of energy (electricity only for selected processes). Specific cleaning of waste air is necessary wherever there is no alternative of using low-emission and low-odour processes. Central generation of refrigeration is preferable, wherever possible in form of combined power / heat / cold generation. The use of coreless casting procedures is to be increased; processing or recycling of foundry sands, recirculation materials and waste can reduce the amount of material which has to be disposed of. Waste water should be reduced by bath maintenance measures for rinsing processes and by ultra-filtration technologies. In addition, Principles 7 (Energy savings) and 9 (Preventive groundwater and ground protection) are to be taken into consideration.



## 21. Processes in mechanical manufacturing

### Problem

Certain manufacturing processing steps are associated with environmental problems due to the substances involved. These include the use of lubricants harmful to soil and water, but also the high consumption of cooling lubricant and emulsions in some production sectors. Further potential risks are associated with the possible escape of oil mist / fumes at the workplace, with skin contact with cooling lubricants and emulsions and with the generation of explosive mixtures in the application of micro lubrication technology.

### Target

Primarily, measures need to be taken in order to avoid ground and groundwater contaminations and to further environmental targets through the use processes low in energy and lubricants.

In addition, possible health risks have to be excluded through the capture and, if necessary, the filtering of oil mist / fumes; skin contact to emulsions and oils has to be avoided.

### Implementation

The comprehensive introduction of processes using small amounts of emulsion or working free of cooling lubricants will make a significant contribution towards meeting these targets as well as near net shape manufacturing. In addition, hazardous oil mist / fumes are to be captured, discharged centrally and, wherever necessary neutralized through the installation of additional filters.

Special protective mechanisms are to be used to protect the employees in the production process (prohibition of cooling lubricants harmful to the skin). In particular consideration has to be paid to Principles 7 (Energy savings) and 9 (Preventive groundwater and ground protection).



## 22. Processes in the manufacture of plastic components

### Problem

Some processing stages in the manufacture of plastic components are associated with environmental problems. These include the high energy and water consumption for cooling and heating processes and also for drying as well as the risk of ground or groundwater contamination by substances harmful to the environment.

### Target

The primary intention is the use of energy- and water-saving procedures as well as the avoidance of environmental damage by dispensing with or substituting process fluids and auxiliary materials harmful to the environment.

### Implementation

The first requirement is the installation of waste water-free

or rather low-level waste water cooling systems and, as far as possible, the conversion of the central refrigeration generation to a combined power / heat / cold generation. The use of electrical heating systems and pneumatic systems for drying and transporting granulates is to be avoided as far as possible. Halogen-based materials as foaming agents are to be replaced by inert gases ( $\text{CO}_2$ ,  $\text{N}_2$ ), pentane or similar alternatives. Solvent-based adhesives must be substituted by hot sealants or dispersion adhesives or similar.

Furthermore, development is required of alternatives for the following areas: PVC use (end-of-life vehicle recycling), tank fluorination, PU foaming using polyolefins and isocyanate, brominated flame retardants and solvent-based primers. In addition, consideration is to be given to Principles 7 (Energy savings) and 9 (Preventive groundwater and ground protection).



# Imprint

More information about the environmental Group Principles you can find in Volkswagen intranet-portal themes/environment.

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