

**Twenty-First Ordinance Implementing the Federal Immission Control Act – Ordinance on the Limitation of Hydrocarbon Emissions during Refuelling of Motor Vehicles (*Einundzwanzigste Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes – Verordnung zur Begrenzung der Kohlenwasserstoffemissionen bei der Betankung von Kraftfahrzeugen – 21. BImSchV*)**

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The present Ordinance transposes Directive 2009/126/EC of the European Parliament and of the Council of 21 October 2009 on Stage II petrol vapour recovery during refuelling of motor vehicles at service stations (OJ EC L 285 of 31 October 2009, p. 36).

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Annex 1  
(to sections 3 and 5)

Determination of the efficiency and the leak-tightness of vapour recovery systems in accordance with VDI Guideline: VDI 4205 page 4, August 2005 edition

**Section 1 Area of application**

The present Ordinance shall apply to the construction, characteristics and operation of service stations where fuel tanks of motor vehicles are filled with petrol or fuel blends and the service stations do not require a licence in accordance with section 4 of the Federal Immission Control Act (*Bundes-Immissionsschutzgesetz*).

## Section 2 Definitions

The following definitions shall apply in the present Ordinance:

1. waste gas purification facility:  
a vapour recovery system for the central recovery of petrol and fuel blends from fuel vapours;
2. automatic monitoring system:  
a system which automatically detects faults in the equipment of the vapour recovery system of the fuel vapour/air mix, indicates them and automatically triggers the deactivation function after 72 hours;
3. qualified person:  
the person qualified in accordance with section 2 subsection (7) of the Workplace Safety Ordinance (*Betriebssicherheitsverordnung*) of 27 September 2002 (Federal Law Gazette [BGBl.] Part I p. 3777), most recently amended by Article 5 of the Act of 8 November 2011 (Federal Law Gazette Part I p. 2178);
4. existing service station:  
a service station which was constructed before 1 January 1993;
5. bioethanol:  
ethanol of 100 per cent by volume produced from biomass, or from the biodegradable part of waste, and intended to be used in fuel blends;
6. throughput:  
the total annual quantity of petrol and fuel blends that has been refilled from storage tanks of a service station into fuel tanks of motor vehicles;
7. emissions:  
the air pollution emitted from a facility in terms of fuel vapours; concentration levels shall refer to the undiluted volume of waste gas in the standard state (273 Kelvin, 1,013 hectopascal) after the moisture content of water vapour has been deducted;
8. certified company:  
a company within the meaning of section 3 subsection (2) of the Ordinance of 31 March 2010 on Facilities Handling Substances that are Hazardous to Water (*Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen*) (Federal Law Gazette Part I p. 377) which additionally has appliances and equipment for fire and explosion protection and expert individuals who have the requisite knowledge of fire and explosion protection;
9. vapour recovery system:  
equipment aimed at recovering the petrol vapour displaced from the fuel tank of a motor vehicle during refuelling at a service station and which transfers this petrol vapour to a storage tank at the service station or back to the petrol dispenser;

10. fuel vapour/air mix:  
the ratio between the volume of the petrol vapour which passes through the vapour recovery system and the volume of the refuelled petrol or fuel blend dispensed at atmospheric pressure;
11. correction factor:  
factor taking account of the different densities of air and the fuel vapour/air mix;
12. fuel vapours:  
gaseous compounds evaporating from petrol or fuel blends;
13. fuel blends:  
petroleum derivatives with a share of more than 10 and less than 90 per cent by volume of bioethanol, corresponding to UN Number 3475 of Table A in Part 3 Chapter 3.2.1 of Annexes A and B of the European Agreement of 30 September 1957 concerning the International Carriage of Dangerous Goods by Road (ADR) in the version of the promulgation of 7 April 2009 (Federal Law Gazette [BGBl.] 2009 Part II p. 396), which were most recently amended in accordance with the 21st ADR Amendment Ordinance (*21. ADR-Änderungsverordnung*) of 7 October 2010 (Federal Law Gazette 2010 Part II p. 1134);
14. storage tank:  
a stationary tank or stationary container for the storage of petrol or fuel blends at a service station;
15. publicly appointed and sworn expert:  
a publicly appointed and sworn expert in accordance with section 36 of the Industrial Code (*Gewerbeordnung*) of 22 February 1999 (Federal Law Gazette Part I p. 202), most recently amended by Article 8 of the Act of 23 November 2011 (Federal Law Gazette Part I p. 2298);
16. petrol:  
petroleum derivatives with a share of up to 10 per cent by volume of bioethanol, corresponding to UN Number 1203 of Table A in Part 3 Chapter 3.2.1 of Annexes A and B to the ADR, and which are intended for use as fuel for petrol engines;
17. service station:  
a facility for dispensing petrol and fuel blends from storage tanks into fuel tanks of motor vehicles;
18. efficiency:  
the quantity of the petrol vapour captured using the vapour recovery system compared to the amount of petrol vapour which would otherwise be emitted into the atmosphere in the absence of such a system and expressed as a percentage;
19. approved inspection agency:  
inspection agency which, in accordance with section 17 subsection (5) of the Appliances and Product Safety Act (*Produktsicherheitsgesetz*) of 6 January 2004 (Federal Law Gazette Part I p. 2), most recently amended by Article 3 of the Act of 7 July 2005 (Federal Law Gazette Part I

p. 1970), or with section 37 subsection (5) of the Product Safety Act of 8 November 2011 (Federal Law Gazette Part I p. 2178), in each case in conjunction with section 21 subsection (2) of the Industrial Safety Ordinance of 27 September 2002 (Federal Law Gazette Part I p. 3777), most recently amended by Article 5 of the Act of 8 November 2011 (Federal Law Gazette Part I p. 2178), has been designated by the competent *Land* authority for the testing of facilities requiring inspection in accordance with section 1 subsection (2), sentence 1, numbers 3 and 4 of the Industrial Safety Ordinance to the Federal Ministry of Labour and Social Affairs, and has been published by the latter in the Joint Ministerial Gazette (*Gemeinsames Ministerialblatt*).

### **Section 3 Construction and operation of service stations**

(1) Service stations shall be constructed and operated in such a way that, when refuelling motor vehicles with petrol or a fuel blend, fuel vapours which are displaced in the motor vehicle tank are collected in accordance with the state-of-the-art using a vapour recovery system and fed into the storage tank of the service station.

(2) Service stations may only be operated if it has been proven by a manufacturer's certificate for the vapour recovery system used that its efficiency does not fall below 85 per cent when measured by an approved inspection agency or a publicly appointed and sworn expert under test conditions in accordance with the procedure contained in Annex 1 number 1. The certificate shall be kept at the place of operation and presented to the competent authority on request.

(3) Vapour recovery systems without low-pressure support systems shall be constructed and operated in such a way that

1. only fuel nozzles for vapour recovery are used where the filler neck is suited to create a leakproof transition to the tank of the motor vehicles,
2. the flow of gas in the recovery system is guaranteed and there is sufficiently low flow resistance,
3. the counter pressure at the fuel nozzle does not exceed the maximum value according to the manufacturer's stipulation,
4. the recovery pipes from the petrol dispensers to the storage tank have a constant descending gradient of at least 1 per cent, and
5. the seal sleeves of the fuel nozzles are free of cracks, holes or other faults that could cause leaks.

(4) Vapour recovery systems with low-pressure support systems shall be constructed and operated in such a way that

1. the volume ratio of the returned fuel vapour/air mix to fuelled petrol does not fall below 95 and does not exceed 105 per cent in accordance with the procedure described in section 5 subsection (2), sentence 3,
2. no external air enters the vapour recovery pipes via auxiliary equipment of the petrol dispenser, hence ensuring that the entire vapour recovery system is leakproof,
3. during vapour recovery, no fuel vapours are emitted into the atmosphere via the vapour recovery system and the connected auxiliary equipment, notwithstanding safety-related releases, and
4. the functioning of the vapour recovery system is continuously tested by an automatic monitoring system which meets at least the requirements in accordance with subsection (5).

(5) The automatic monitoring system in accordance with subsection (4) number 4 shall

1. automatically detect faults in the functioning of the vapour recovery system and indicate the faults that have been detected to the service station staff,
2. automatically interrupt the flow of fuel in the case of faults in the functioning of the vapour recovery system which are indicated to the service station staff for more than 72 hours,
3. automatically detect faults in its own functioning and indicate them to the service station staff, and
4. automatically interrupt the flow of fuel when faults occur in its own functioning which are indicated to the service station staff for longer than the period stated in number 2.

A fault in the functioning of the vapour recovery system shall be deemed to have occurred when, during continuous evaluation of the refuelling events, the automatic monitoring system reveals that the volume ratio of the returned fuel vapour/air mix to fuelled petrol falls below 85 per cent or exceeds 115 per cent averaged over the duration of the refuelling with ten refuellings in a row. The evaluation in accordance with sentence 2 shall only include refuelling events the duration of which is 20 seconds or more and where the fuel volume flow reaches 25 litres per minute or more.

(6) In derogation from subsection (1), service stations may also be constructed and operated such that petrol vapours displaced from the fuel tank of a motor vehicle are collected and fed into a vapour recovery system with a fuel recovery level of not lower than 97 per cent. It shall be permissible to combine this system technology with that in subsection (1).

(7) Subsection (1) shall not apply to

1. existing service stations within the meaning of section 2 number 4 which have an annual throughput of petrol or fuel blends of 500 cubic meters or less,
2. existing service stations within the meaning of section 2 number 4 which are located under permanent living quarters or working areas and have an annual throughput of petrol or fuel blends of 100 cubic metres or less,

3. the refuelling of motor vehicles which cannot be filled using a vapour recovery system,
4. service stations used to fill new vehicles in car plants.

## **Section 4 Measuring openings**

Prior to taking up operations, the operator of a service station shall establish suitable measuring openings that can be sealed tightly in order to test the requirements in accordance with section 3 subsection (3) number 2 or 3 or subsection (4) number 1.

## **Section 5 Monitoring**

(1) The operator shall notify the competent authority prior to taking up operations at the service station.

(2) The operator shall have compliance with the requirements in accordance with section 3 subsection (3) or (4) certified at the following intervals by an approved inspection agency or by a publicly appointed and sworn expert:

1. for the first time by six weeks after taking up operation of the vapour recovery system, and thereafter
2. every two-and-a-half years where fuel blends are dispensed, and
3. every five years where petrol is dispensed.

Sentence 1 shall apply subject to the proviso that compliance with the requirement in accordance with section 3 subsection (4) number 3 is to be certified by the approved inspection agency or by a publicly appointed and sworn expert by means of a leak-tightness test in accordance with the procedure contained in Annex 1 number 2. Compliance with the requirement in accordance with section 3 subsection (4) number 1 shall be certified by one measurement being taken at each pipe of the petrol dispenser; this requirement shall be deemed to have been complied with when each individual measurement of the volume ratio, averaged over the duration of the refuelling, of the returned fuel vapour/air mix to fuelled petrol remains within the tolerance stipulated in accordance with section 3 subsection (4) number 1. The test shall be carried out in accordance with VDI Guideline: VDI 4205 Page 2, July 2003 edition, and VDI Guideline: VDI 4205 Page 3, November 2003 edition.

(3) The operator shall have compliance with the requirements as to the fuel recovery level of a vapour recovery system in accordance with section 3 subsection (6) certified by an approved inspection agency notified in accordance with section 26 of the Federal Immission Control Act at the following intervals:

1. for the first time at the earliest three months and at the latest six months after taking up operation of the vapour recovery system, and thereafter
2. every three years.

(4) If an inspection in accordance with subsection (2) or (3) reveals that the requirements have not been adhered to,

1. the service station shall be repaired promptly, and
2. a repeat inspection shall be carried out by an approved inspection agency, by a publicly appointed and sworn expert or by an agency according to section 26 of the Federal Immission Control Act within six weeks after the inspection.

(5) The operator shall have a report drawn up on the result of each inspection in accordance with subsections (2) to (4). The operator shall keep the respective report at the place of operation for five years after being drawn up. The operator shall submit a copy of the respective report to the competent authority within four weeks after the inspection.

(6) Notwithstanding the requirements of subsections (2), (4) and (5), the operator shall have a vapour recovery system inspected by a qualified person for its proper functioning at the following intervals, and promptly repaired by a certified company should any faults be detected:

1. at least once every two-and-a-half years where there is a low-pressure support system and an automatic monitoring system in accordance with section 3 subsection (4), and
2. at least once per quarter where there is no low-pressure support system in accordance with section 3 subsection (3).

With vapour recovery systems in accordance with section 3 subsection (6), the procedure in accordance with section 1 number 1 shall be followed, notwithstanding the requirements of subsections (3) to (5). The outcome of the inspection in accordance with sentences 1 and 2, and the repair measures that have been carried out, shall be recorded in writing, and these results shall be submitted to the approved inspection agency, or to the publicly appointed and sworn expert, during the inspection in accordance with subsection (2).

(7) The operator shall ensure that the faults indicated by an automatic monitoring system in accordance with § 3 subsection (4) number 4 are promptly rectified by a certified company. The faults that have been indicated and the repairs that have been carried out shall be recorded in writing.

(8) The operator shall keep the records in accordance with subsection (7), sentence 2, and subsection (9), sentence 2, at the place of operation for three years after being drawn up, and shall submit them to the competent authority on request.

(9) The operator shall record the annual throughput of petrol and fuel blends as per 1 February of each year for the previous calendar year. These records shall be kept at the place of operation for three years after being drawn up, and presented to the competent authority on request. The obligations in accordance with sentences 1 and 2 shall not apply if the requirements in accordance with section 3 are met.

## **Section 6 Labelling requirement**

(1) The operator shall display an easily visible sign, sticker or other notification affixed to the petrol dispenser by 1 July 2012 at the latest informing consumers that a vapour recovery system and the automatic monitoring system have been installed.

(2) Subsection (1) shall not apply to the service stations designated in section 3 subsection (7).

## **Section 7 Authorisation of exceptions**

At the request of the operator, the competent authority may authorise exceptions to be made from the requirements contained in sections 3 to 6 insofar as, taking the special circumstances of the individual case into consideration, individual requirements contained in the Ordinance cannot be complied with, or only with a disproportionate effort, and no hazards to employees and third parties and no adverse environmental effects are to be anticipated.

## **Section 8 Availability of norms**

VDI Guidelines which are referred to in the present Ordinance can be obtained from the publishers Beuth Verlag GmbH, based in Berlin, and are deposited with the German National Library for safe keeping as an archive document.

## **Section 9 Violations**

Whoever wilfully or negligently performs any of the following actions violates this ordinance within the meaning of section 62 subsection (1) number 7 of the Federal Immission Control Act:

1. fails to construct or operate a service station correctly in violation of section 3 subsection (1),
2. operates a service station in violation of section 3 subsection (2), sentence 1,
3. fails to submit the records described therein, or fails to submit them on time in violation of section 3 subsection (2), sentence 2, or of section 5 subsection (6), sentence 3, subsection (8) or subsection (9), sentence 2,
4. fails to construct a vapour recovery system correctly, or fails to operate it correctly in violation of section 3 subsection (3) or subsection (4),
5. fails to establish a measuring opening, or fails to establish one on time in violation of section 4,
6. fails to give notification, gives incorrect or incomplete notification or fails to give notification on time in violation of section 5 subsection (1),
7. fails to have compliance certified with the requirements specified therein, or fails to have such compliance certified on time in violation of section 5 subsection (2), sentence 1, or subsection (3),



8. fails to repair a service station, or fails to have it repaired on time, or fails to have a repeat inspection carried out, or fails to have a repeat inspection carried out on time in violation of section 5 subsection (4),
9. fails to keep a record describes therein, or fails to keep it for the prescribed period of time in violation of section 5 subsection (5), sentence 2, subsection (8) or subsection (9), sentence 2,
10. fails to submit a copy, or fails to submit a copy on time in violation of section 5 subsection (5), sentence 3,
11. fails to have a vapour recovery system inspected, or fails to have it inspected on time, or fails to have it repaired, or fails to have it repaired on time in violation of section 5 subsection (6), sentence 1,
12. fails to ensure that a fault that has been indicated is repaired promptly in violation of section 5 subsection (7), sentence 1,
13. fails to record the annual throughput, or fails to record the annual throughput correctly or on time in violation of section 5 subsection (9), sentence 1,
14. fails to display a sign, sticker or notification, or fails to display a sign, sticker or notification correctly or on time in violation of section 6 subsection (1).

## **Section 10 Transitional arrangement**

Existing service stations shall meet the requirements of section 3 subsection (1) by 1 January 2019 at the latest if they

1. have an annual throughput of petrol or fuel blends of more than 500 cubic metres up to 1,000 cubic metres, or
2. are located under permanent living quarters or working areas and have an annual throughput of petrol or fuel blends of more than 100 cubic metres up to 1,000 cubic metres.

The reference year for annual throughput shall be 2012. If the service station is not operated during all of 2012, the actual throughput shall be extrapolated over the year. Service stations which were constructed between 1 January 1993 and 27 April 2012 shall meet the requirements of section 3 subsection (1) from 1 January 2019 at the latest if they dispense fuel blends.

## **Annex 1 (to sections 3 and 5)**

### **Determination of the efficiency and the leak-tightness of vapour recovery systems in accordance with VDI Guideline: VDI 4205 page 4, August 2005 edition**

(source: Federal Law Gazette Part I 2014, 1458)

#### **1. Determination of efficiency**

- 1.1 The efficiency of a vapour recovery system shall be calculated from the difference between the baseline emissions and the residual emissions according to the equation

$$\eta = \frac{EB - ER}{EB} \times 100$$

$\eta$  = efficiency in per cent

EB = baseline emissions (average of the baseline emissions of the motor vehicle group tested, in grams per litre, related to the volume fuelled)

ER = residual emissions (average of the residual emissions of the motor vehicle group tested, in grams per litre, related to the volume fuelled).

- 1.2 The baseline emissions are measured with the vapour recovery system deactivated, whilst residual emissions are measured under the same conditions, but with the vapour recovery activated. Both measurements should be carried out on a sufficiently large, representative motor vehicle group. The residual emissions are to be ascertained per motor vehicle type for two positions of the fuel nozzle on the tank neck of the motor vehicle (normal position and a position turned at least 45 degrees as against the normal position).
- 1.3 The individual measurements for ascertaining the baseline and the residual emissions are to be arithmetically averaged for each series of measurements. The representative motor vehicle group is to be taken from the statistics of new motor vehicles registered in Europe in 2009. The measurements are to be carried out in each case with the maximum flow of fuel specified by the petrol dispenser manufacturer, but at least 38 litres per minute. A fuel nozzle that is widely available should be used.
- 1.4 After holding deliberations with expert representatives of the groups involved, the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety may announce amended representative motor vehicle groups in derogation from number 1.3 for the first time from 1 January 2012, and then at intervals of four years.
- 1.5 The motor vehicle tanks of the motor vehicle group to be tested should be conditioned prior to the measurements in such a way that they contain fuel vapours with saturation concentration. Depending on the season, summer or winter fuel of a constant fuel quality is to be used for the measurements. The fuel temperature is to be kept constant over the entire duration of the

measurement. The fuel temperature may deviate from the reference temperature by a maximum of 2 Kelvin. The ambient temperature should be within a range of more than 5 and less than 25 degrees Celsius for the duration of the measurement.

## 2. **Leak-tightness test of vapour recovery systems**

2.1 A leak-tightness test of the entire vapour recovery system is to be implemented before the operation of a vapour recovery system is taken up for the first time, after every major alteration to the system, and at maximum intervals of two-and-a-half years if fuel blends are dispensed, and of five years if petrol is dispensed.

2.2 In order to carry out a leak-tightness test of the vapour recovery pipes, the entire pipe system between the base of the petrol dispenser and the storage tank is to be pressurised with 200 kilopascal of positive pressure using an appropriate method. A maximum drop in pressure of 100 hectopascal within 30 minutes is permissible.

2.3 The tightness of the vapour recovery system between the base of the petrol dispenser and the fuel nozzle is to be tested with positive or negative pressure depending on the type of system, in accordance with the manufacturer's instructions. The test before taking up operations is not necessary if a certificate from the petrol dispenser manufacturer or the qualified person regarding the leak-tightness test is presented.

## 3. **Adjustment of the correction factor with fuel blends**

With regard to fuel blends, a reduced correction factor (C factor) is required for the adjustment, in-house inspection and monitoring of the vapour recovery systems (for instance dry measurement in accordance with the VDI Guideline: 4205 page 3, November 2003 edition). The necessary reduction of the C factor for fuel blends which have a bioethanol share of more than 5 per cent by volume is to be carried out in accordance with the C factor stated in the certificate for the respective fuel type.