

# **Directive 2009/126/EC of 21.10.2009 on Stage II petrol vapour recovery during refuelling of motor vehicles at service stations**

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**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**

Amended by:

Commission Directive 2014/99/EU of 21 October 2014

## Problem of VOC Emissions at Petrol Service Stations

- Petrol vapour is displaced from a car's fuel tank when it is refuelled at service stations.
- This vapour is vented to the atmosphere unless otherwise controlled.
- This vapour contains benzene and other volatile organic compounds (VOCs) which contribute to local, regional and global air pollution problems

### Goal of Petrol Stage II Directive:

- Ensure the recovery of petrol vapour that would otherwise be emitted to the air during the refuelling of vehicles at service stations
- The Member States have **until 31 December 2011** to transpose the Directive into national law.

## Solution of VOC Emissions at Petrol Service Stations

- **Vapour Recovery** reduces the amount of toxic and smog-forming pollutants released at service stations.
- Service stations emit a large amount of VOCs (volatile organic compounds)
- This pollution is created by petrol vapours escaping from vehicle fuel tanks and underground petrol storage tanks at service stations.
- Petrol evaporates inside these tanks to create vapours which fill the empty space above the fuel.
- As a vehicle or storage tank is refuelled, these vapours are pushed out by the incoming petrol and escape through the top of the vehicle filler pipe or storage tank vents.
- Once in the atmosphere, petrol vapours contribute to the formation of smog in cities as well as localised air pollution immediately adjacent to service stations. Both types of pollution can directly affect our health.
- *Vapour Recovery* is a clean technology which drastically cuts the amount of these vapours escaping into the air.

## Key points in the Petrol Stage II Directive are:

- by **end-2018** all petrol stations with a petrol throughput of  $>3000 \text{ m}^3$  must have **PVRII vapour recovery** fitted
- from **January 2012**, any **new service station** with an actual or intended annual throughput of  $>500 \text{ m}^3$  must be equipped with **PVRII vapour recovery**
- from **January 2012**, any **existing service station** with an actual or intended annual throughput of  $>500 \text{ m}^3$  must be equipped with PVRII if they undergo **“major refurbishment”**
- **petrol vapour capture efficiency must be 85% or more**
- where the recovered petrol vapour is transferred to a storage tank at the service station, the vapour/petrol ratio must be equal to or greater than **0.95 but less than or equal to 1.05.**

## Structure of Petrol Stage II Directive

### *Article*

1. Subject matter
2. Definitions
3. Service stations
4. Minimum level of petrol vapour recovery
5. Periodic checks and consumer information
6. Penalties
7. Review
8. Technical adaptations
9. Committee procedure
10. Transposition
11. Entry into force
12. Addressees

**Art. 1 Subject matter:**

Reducing the amount of petrol vapour emitted to the atmosphere during the **refuelling of motor vehicles at service stations**



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# Technical details: Examples of pistols



[Elexflex video vapour recovery](http://www.elaflex.de/nc/mediathek/videos/videos/?video=EHT-Stage-2-Vapour-Recovery&width=720&height=400)

<http://www.elaflex.de/nc/mediathek/videos/videos/?video=EHT-Stage-2-Vapour-Recovery&width=720&height=400>



# Technical Norms and Standards



European Committee for Standardization

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[Technical Bodies](#) > CEN/TC 393

## CEN/TC 393 - Equipment for storage tanks and for filling stations

General Structure Work programme **Published Standards**

EN

FR

DE

### CEN/TC 393 Published Standards



Reference, Title



Publication date



Sales Points

### [European Technical Norms for Petrol Stations](#)

[https://standards.cen.eu/dyn/www/f?p=204:32:0::::FSP\\_ORG\\_ID,FSP\\_LANG\\_ID:679233,25&cs=1BADB69C183CA36FF1798BADB0B84A51D](https://standards.cen.eu/dyn/www/f?p=204:32:0::::FSP_ORG_ID,FSP_LANG_ID:679233,25&cs=1BADB69C183CA36FF1798BADB0B84A51D)



## Technical Norms and Standards

### **EN 16321-1:2013:**

Petrol vapour recovery during refuelling of motor vehicles at service stations - Part 1: Test methods for the type approval efficiency assessment of petrol vapour recovery systems

### **EN 16321-2:2013:**

Petrol vapour recovery during refuelling of motor vehicles at service stations - Part 2: Test methods for verification of vapour recovery systems at service stations

### **DIN EN 13012: 2010**

Petrol filling stations – Construction and performance of automatic nozzles for use on fuel dispensers

## Art. 3 Service stations

**new service station** shall be equipped with a Stage II petrol vapour recovery system:

- its actual or intended throughput is **greater than 500 m<sup>3</sup> /year**; or
- its actual or intended throughput is greater than 100 m<sup>3</sup> /year and it is situated under permanent living quarters or working areas.

**existing service station** which undergoes a major refurbishment shall be equipped with a Stage II petrol vapour recovery system at the time of the refurbishment:

- its actual or intended throughput is **greater than 500 m<sup>3</sup> /year**; or
- its actual or intended throughput is **greater than 100 m<sup>3</sup> /year** and it is situated under permanent living quarters or working areas

existing service station with a **throughput in excess of 3 000 m<sup>3</sup> /year** shall be equipped with a Stage II petrol vapour recovery system by no later than **31 December 2018**.

## Art. 4 Minimum level of petrol vapour recovery

- Petrol vapour capture efficiency of such systems is equal to or greater than **85 %** as **certified by the manufacturer in accordance with Standard EN 16321-1:2013**
- Where the recovered **petrol vapour is transferred to a storage tank at the service station**, the **vapour/petrol ratio** shall be:  
 **$0.95 \leq x \leq 1.05$**

### **Note:**

≤ 1.05 to avoid excessive pressure build up and consequent release through the pressure relief valves.

## Art. 5 Periodic checks and consumer information

- **In-service petrol vapour capture efficiency** of Stage II petrol vapour recovery systems is tested at least once each year either by checking that the vapour/petrol ratio in accordance with Standard **EN 16321-2:2013**
- **automatic monitoring system:**  
petrol vapour capture efficiency is tested at least once every three years.  
Any such automatic monitoring system shall automatically detect faults in the proper functioning of the Stage II petrol vapour recovery system and in the automatic monitoring system itself, indicate faults to the service station operator and **automatically stop the flow of petrol** from the faulty dispenser if the fault is not rectified **within seven days**.

## **Article 5 No 3: Labelling**

### **Service station with Stage II petrol vapour recovery system:**

Display by a sign, sticker or other notification on, or in the vicinity of, the petrol dispenser, informing consumers of that fact.

## Technical Solutions for Controlling the VOC Emissions at Petrol Service Stations

# Two types of vapour recovery systems

- **passive system**
- **active system** with automatic monitoring system

## Active vapour recovery using a vacuum pump

### Generally used:

### Active Vapour Recovery with Return of Vapours to Underground Storage Tank

When petrol enters the vehicle tank, an active vapour recovery system (open active petrol vapour recovery system) uses a **vacuum pump to suck a corresponding volume of vapours back into a storage tank.**

**Components** of an open active petrol vapour recovery system may include:

- A vapour recovery nozzle;
- A hose through which vapours are collected (coaxial or similar) and a pipe through which the vapours are returned (this may be separate from the fuel line or may be inserted into the fuel line);
- A vacuum pump;
- A system to control the ratio of the volume of vapour recovered to the volume of petrol dispensed into the vehicle tank;
- A vapour storage tank (i.e. the petrol storage tank).

## Automatic monitoring systems according to EU Directive

- EU Directive 2009/126/EC **demands no automatic monitoring system**
- But if such a system is installed:

The petrol vapour capture efficiency has to be tested at least once every three years according to in accordance with Standard **EN 16321-2:2013**

Any such automatic monitoring system shall **automatically detect faults in the proper functioning of the Stage II petrol vapour recovery system** and in the **automatic monitoring system itself**, **indicate faults to the service station operator** and **automatically stop the flow of petrol** from the faulty dispenser if the fault is not rectified within **seven days**.



## Technical Norms and Standards

### **EN 16321-1:2013:**

Petrol vapour recovery during refuelling of motor vehicles at service stations - Part 1: Test methods for the type approval efficiency assessment of petrol vapour recovery systems

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Petrol filling stations – Construction and performance of automatic nozzles for use on fuel dispensers

# German Country Experience

## Einundzwanzigste Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Verordnung zur Begrenzung der Kohlenwasserstoffemissionen bei der Betankung von Kraftfahrzeugen - 21. BImSchV)

21. BImSchV

Ausfertigungsdatum: 07.10.1992

Vollzitat:

"Verordnung zur Begrenzung der Kohlenwasserstoffemissionen bei der Betankung von Kraftfahrzeugen in der Fassung der Bekanntmachung vom 18. August 2014 (BGBl. I S. 1453), die durch Artikel 7 der Verordnung vom 28. April 2015 (BGBl. I S. 670) geändert worden ist"

**Stand:** Neugefasst durch Bek. v. 18.8.2014 | 1453

Geändert durch Art. 7 V v. 28.4.2015 | 670

## Country Study: German Permission Situation for service stations

The **local authority** (provincial directorate or municipalities) will issue construction licences and/or operating licences on condition that the **new service stations** will meet the required provisions of technical standard.

This also applies to modification of **existing service stations**.

## Service station with Stage II petrol vapour recovery system:

Display by a sign, sticker or other notification on, or in the vicinity of, the petrol dispenser, informing consumers of that fact.



Reference:  
<http://tokheim.com/de/dispenser/gasruckfuhrung/>



Reference:  
<http://www.uniti.de/publikationen/etiketten-zapfsaeulen-gebilde/fuer-die-umwelt-automatisch-ueberwachte-gasrueckfuhrung/>

# German Country Experience

## 1. Requirements

- Requirements on filling of vehicles from service station in 21th BImSchV from **07.10.1992, new version from 18.08.2014, amended 28.04.2015**
- **Before start of operation the operator has to notify the petrol station to the competent authority (§ 5 (1))**
- Detailed requirements for **passive vapour recovery systems** (without vacuum) on tightness (§ 3 (3))
- Service station may only be operated if the manufacturer of vapour recovery confirms **an efficiency of minimum 85% (§ 3 (2))**. This efficiency must be **tested by an authorized technical expert** referring on special requirements in Annex 1

## § 3 (2): Check of efficiency of vapour recovery of 85 %

- **Confirmation of manufacturer** that efficiency is  $\geq 85\%$  **verified by an authorized inspection body** under conditions described in Annex 1 No 1
- The confirmation has to be stored at site of operation and must be shown to the competent authority on demand.
- Verification is proceeded according to Technical Note “System check on active gas recovery systems”

Certificate: **System check** of active gas vapour recovery systems:

Pistol: ..... [type]

Tube:.....[type]

Control valve:.....[type]

Gas recovery pump:....[type]

**Control of efficiency according to EN 16321-1:2013**

The following conditions have to met on installation:

- maximum volume flow of petrol: ..... [l/min]
- maximum counter pressure in recovery tube:..... [mbar]
- correction factor for system alignment with air: ..[mbar]

**The required efficiency of minimum 85 % has been verified.**

The vapour recovery system refers to the Best Available Techniques in meaning of 21. BImSchV.

[Place]

[Signatur of authorized expert]

# Test certificate for Petrol Stage II

## Example of a certificate

- Petrol vapour capture efficiency of such systems is equal to or greater than **85 %** as **certified by the manufacturer in accordance with Standard EN 16321-1:2013**

CERTIFICATE ◆ CERTIFICADO ◆ CERTIFIKAT ◆ 認證證書 ◆ CERTIFICATE



Industrie Service

Certificate No. VR2 – 1504– 113 EU

The TÜV SÜD Industrie Service GmbH, test body for vapor recovery systems,  
Westendstr. 199, D-80696 Munich,




certifies having conducted tests according to EN 16321-1  
on the following petrol vapour recovery system:

Type of system:	<i>Active, distributed system with electronic proportional valve</i>
Nozzle:	ELAFLEX ZVA Slimline 2 GR
Hose assembly:	ELAFLEX Slimline 21/8
Proportional valve:	Veeder-Root EPV 10
Control board:	Gilbarco Veeder-Root VRC 390
Vapour recovery pump:	Dürr MEX 0831-10/-11/ MEX 0544

Conditions for installation and operation:  
*Requirements to ensure system performance in use*

Maximum volumetric fuel-flow rate:	38 l/min
Maximum back pressure in petrol vapour pump outlet line with maximum vapour flow:	50 mbar
Correction factor for system settings with simulated petrol-flow of 38 l/min.:	1,11
Measured efficiency:	89 %
Required efficiency by Directive 2009/126/EC	85 %

Average result of each test tank:

VW Golf V:	88,4 %	VW Polo V:	88,2 %	Renault Megane 3:	90,9 %
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Based on ID: "Efficiency 1401 Slimline 2 GR", "System 1504 - 113 EU"

The vapour recovery system corresponds to the state of the art as defined in the  
"Directive 2009/126/EC" last amended by "Directive 2014/94/EU".

Germany, Munich	14/08/2017		Test Body for Vapor Recovery Systems
Expiration date	13/08/2019		 Peter Szalata



## Automatic control of gas balance system - § 3 (4)

**Automatic control** of gas balance system for **all** petrol stations installed after 01.04.2003

### **Transition time periods for stations installed before 01.04.2013**

> 5000 m <sup>3</sup>	From 01.01.2005
2500 m <sup>3</sup> - 5000 m <sup>3</sup> and site in polluted area	From 01.01.2005
2500 m <sup>3</sup> - 5000 m <sup>3</sup>	From 01.01. 2006
1000 m <sup>3</sup> - <2500 m <sup>3</sup>	From 01.01.2007
<1000 m <sup>3</sup>	From 01.01.2008
<1000 m <sup>3</sup> and installed before 01.01.1993	No up-grade necessary

### **New:**

500 – 1000 m <sup>3</sup> and installed before 01.01.1993	01.01.2019
or 1000 m <sup>3</sup> - >100 sited in permanent living or working area	

- Because of difficulties in automatic monitoring -> amendment of Ordinance in 2002: -> in case of signals on faults of function of vapour recovery system **or** in the automatic monitoring system itself > 72 h:  
**-> automatically stop of petrol (§ 3 (5) No 2)**

Faults of self-function must be automatically determined and signaled to petrol station staff (§ 3 (5) No 1)

If during a valid period (fuel flow  $\geq 25$  l/min for more than 20 sec.) faults are recognized (§ 3 (5)):

- counting of those faults
- if number of faults > 10 -> clock starts in combination with a warning optical signal to show problems -> if > 72 hours -> programme stops *Fuel dispenser side* where the faults occurred

### Different systems on market e.g.

- Fafnir – Vaporix (<http://www.fafnir.de/Tankstellen-Umweltschutz-Sensorik/VAPORIX/VAPORIX-Gasrueckfuehung.php>)
- Tokheim – ECVR-SCS: <http://www.tokheim.com/de/p2.htm>
- TST Electronics

## **Definition what a fault of function of vapour recovery is (§ 3 (5)):**

A fault shall be deemed to be present

where continuous monitoring during filling of vehicle petrol tanks indicates

- that the **V/P ratio averaged over the duration of filling** has fallen **< 85%**
- or**
- has exceeded **115%** for **ten consecutive filling operations**.

This only applies to filling operations:

- of at **least 20 seconds duration** and
- where the **rate of petrol dispensed reaches at least 25 litres per minute**.

## Volume ratio of fuel volume flow and gas flow:

- Control of gas recovery pumps by an electronic regulation proportional to fuel flow
- Gas recovery is influenced by ambient air conditions like temperature
- In **case of ratios < 95%**: efficiency decreases and less vapours are captured
- In **case of ratios > 105%**: more vapours are captured but there will be emissions at ventilation stack outlet

## § 5 Inspection:

- (1) Operator has to prove compliance to requirements on **vapour recovery system (§ 3 (3) – passive system - or § 3 (4) – active system** **latest 6 weeks after taking into operation** and then **every 5 years by an authorized technical body**.  
By a minimum of 3 single individual measurements the compliance to permitted V/P ratios have to be demonstrated over the time period of refuelling. Operator has to send report to competent authority within 4 weeks after expert inspection latest.
- **In Annex I No 1 of Ordinance:** Requirements on determination of efficiency relevant for manufacturers of vapour recovery systems.
- **Annex I No 2 of Ordinance:** Obligatory proceeding to check of tightness of total petrol vapour recovery system by authorized technical expert.

## **§ 5 Inspection:**

(9) The operator has to register the annual dispensed quantity of petrol with deadline 01.02. of each year.

The documentations have to be stored at least 3 years at site of operation and must be presented to the competent authorities on demand.

These requirements are obsolete if requirements according to § 3 are complied.

## **Inspection confirmation on gas vapour recovery systems according to 21. BImSchV: Periodic inspection according to § 5 (2)**

Following checks have been carried out:

- Formal (e.g. certifications available) and technical check
- Consistence with system description
- Measurement of volume rates
- Check of tightness of gas balance tubes
- Function checks of gas vapour recovery system
- Check of automatic monitoring system

Requirements according to 21. BImSchV and VdTÜV Technical Note 908 are complied. No faults have been detected.

Next periodic check:.....

Date of check:

## Annex of inspection report

Pulsing rate for the vapour recovery control, pulses/litre: ... impulses/litre

Used measurement instruments: Manual control unit.....

Checks on Tightness: Tubes from feet of petrol station up to the tanks, proportional valves

### Function checks:

Gas recovery: Functional test with petrol flow

Monitoring system:

a) Test of fault triggering after 10 faulty refuellings

b) Test of switch-off after 72 hours

### Results of measurements:

Pulsing rate set on the handheld control: ...pulses/litre

Ambient air temperature during measurement: ..



## EN 16321-2:2013

### Measurement and test methods for the **assessment of vapour recovery systems** on filling stations – **Dry method**

- Dry measurement method for checking and adjusting the volume ratio on vapour recovery systems, with **simulation of the petrol flow**
- A measuring adapter is usually slipped over the vapour spout and connected with a connecting hose to a bellows-type gas meter
- A handheld control directly acts on the control of the vapour recovery system.
- The handheld control is connected to the vapour recovery control in the fuel dispenser.
- Two-way signal transmission between the handheld control and the vapour recovery control.
- The simulated petrol volumetric flow programmed in the handheld control causes the vapour recovery system to deliver a corresponding air volumetric flow. At the start of simulation of the petrol flow, the vapour recovery system receives electrical signals from the handheld control and starts operating.
- The bellows-type gas meter connected to the petrol spout measures this volumetric flow and compares it with the petrol volumetric flow programmed in the handheld control.

## § 5 (6): **Inspection by a specialized person**

- The operator of a petrol station with a passive vapour recovery has to check the functioning of at least quarterly.
- The operator of a petrol station with an active vapour recovery and automatic control has to check the **functioning of at least every 2,5 years.**
- In case of faults the system has to be repaired immediately.
- The results of the tests as well as faults and repair works have to be documented.

## Check on tightness: Annex I in combination with § 3 (4) No 3 and § 6

2.1 **Before taking into operation** of a gas recovery system, after **each significant change** of the system as well as **every 5 years** a test of tightness has to be carried out of **complete gas recovery system**

2.2 To test of the tightness of gas recovery hoses the complete hose system between base point of fuel dispenser and storage tank has to be charged with an **excess pressure of 200 kPa** in an appropriate way. Within **30 minutes** a **maximum drop pressure of 100 hPa** is permitted.

2.3 The tightness of the gas recovery system between base point and nozzle has to be checked by excess or low-pressure dependent from system on the hand of the specifications of manufacturer. The check before taking into operation has not to be applied if a confirmation of the manufacturer of the fuel dispenser or of the specialist company on test of tightness is available.

## Check on tightness: Annex I No 2 in combination with § 3 and § 5

Leakage tests:

- Vapour recovery lines between nozzle and vapour recovery pump
- Vapour recovery lines between vapour recovery pump and fuel dispenser base
- Vapour recovery lines from fuel dispenser base to tank
- On/Off valves

### *Specialist company*

Company having the necessary equipment and trained personnel to ensure the risk-free and correct construction, maintenance and repair of vapour recovery systems and that is inspected annually by an authorized test organization

## **Directive 1994/63/EC storage of petrol and its distribution from terminals to service stations**



**EUROPEAN PARLIAMENT AND COUNCIL DIRECTIVE 94/63/EC**

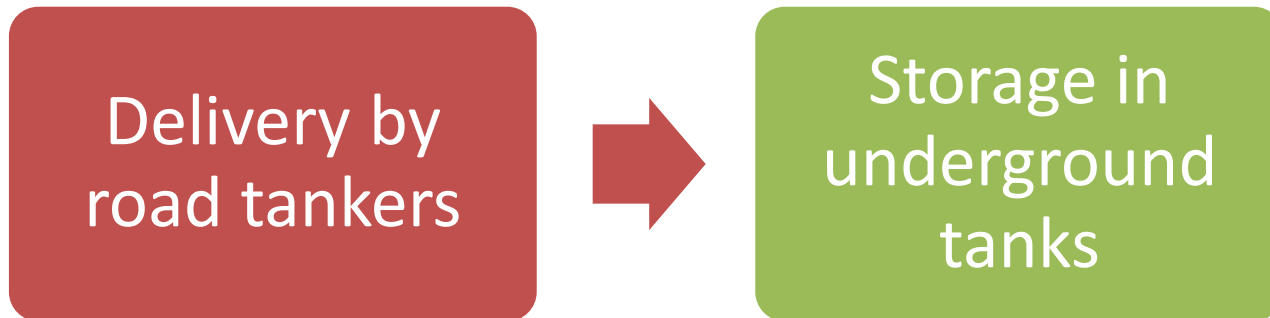
**of 20 December 1994**

**on the control of volatile organic compound (VOC) emissions resulting from the storage of petrol and its distribution from terminals to service stations**

(OJ L 365, 31.12.1994, p. 24)

## **Petrol Stage Ib**

## Scope of Petrol Stage I Directive (“Ib”):



## **Petrol Stage I B – Best Practice on Article 6 – Loading into storage installations at service stations**

**Loading of storage tanks of a service station:**

**gas balance system at service stations**

**Annex III:**

- **Vapour-tight connection line for returning the displaced vapours from the storage tank to the road tanker during the filling the storage tank**
- **Loading operations may not take place unless the arrangements are in place and properly functioning**

## Petrol Stage I B– Best Practice on Article 6 – Loading into storage installations at service stations

Ensuring the “vapour-tightness” of the gas balance line:

**German 20<sup>th</sup> BImSchV:**

Vapour balancing systems shall be deemed to comply with **the state-of-the-art** if in particular

1. the flow of fuel is only released if the vapour balancing system is connected using an **electronic locking device**, and
2. the vapour balancing system and the connected installations do not permanently release vapours into the atmosphere during the vapour displacement, apart from releases which occur for safety reasons.

**Example:**

[NoMix System](#)

<http://www.fmctechnologies.com/en/MeasurementSolutions/Technologies/LiquidProducts/TruckMeterPkgs/NoMix.aspx#>

<http://www.fmctechnologies.com/en/MeasurementSolutions/Technologies/LiquidProducts/TruckMeterPkgs/NoMixMN.aspx>



## **Petrol Stage I B– Best Practice on Article 6 – Loading into storage installations at service stations**

**Ensuring the “vapour-tightness” of the gas balance line:**

**German 20<sup>th</sup> BImSchV:**

**Verification by an approved inspection agency or by a publicly appointed and sworn expert:**

**Total system check including functioning and tightness**

- First time before putting system into operation and
  - than every 5 years
- > report of expert body has to be submitted to competent authority by operator

## Who carries out the technical control?

**Approved inspection agency:** inspection agency which, in accordance with Appliances and Product Safety Act (*Produktsicherheitsgesetz*) in each case in conjunction with Industrial Safety Ordinance (*Betriebssicherheitsverordnung*) has been designated as an inspection agency by the competent *Land* authority for the testing of facilities requiring supervision in accordance with 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*);

**publicly appointed and sworn expert:**

a publicly appointed and sworn expert in accordance with section 36 of the Industrial Code (Gewerbeordnung)

## Petrol Stage I – Best Practice on Article 6 – Loading into storage installations at service stations

### German 20<sup>th</sup> BImSchV: Basis for the verification and regularly inspection:

#### VDI 2291 (June 2016): Emission control: Test criteria for monitoring vapour recovery systems

ICS 13.040.40	VDI-RICHTLINIEN	Juni 2016 June 2016
VEREIN DEUTSCHER INGENIEURE	Emissionsminderung Prüfkriterien für die Überwachung von Gaspendelsystemen  Emission control Test criteria for monitoring vapour recovery systems	VDI 2291  Ausg. deutsch/englisch Issue German/English

This standard also applies to the storage and filling of storage tanks at service stations pursuant to Section 6 Subsection 1 Sentence 1 of the 20th BImSchV. This standard describes the inspection of relevant components for the unloading of petrol into service station storage tanks, including their associated entities such as interlocking devices, as well as for the filling of vehicle tanks on the forecourt, including adapters and connecting hoses.

## **VDI 2291 (June 2016): Emission control: Test criteria for monitoring vapour recovery systems**

### **Formal check:**

- Description of system existing?
- System is according system description?
- Confirmation on tightness check available?
- Confirmation on correct installation available?
- Confirmation on correct functioning available?
- Confirmation on check of electrical installations available?
- Marking of system correct?
- Check on leakages of connection hoses carried out regularly by operator?

## **VDI 2291 (June 2016): Emission control: Test criteria for monitoring vapour recovery systems**

The inspection includes the vapour balancing system from **vapour balance coupling at gantry via corresponding lines up to an existing vapour storage tank as well as components of inter-locking device**, as far as existing. The check includes following control steps:

- Visual check of connectors and components of vapour recovery as well as interlocking device especially according to correct installation and damages
- Check of compliance of incidental provisions of permits, licences etc.
- As part of inspection before taking into operation check of tightness of lines with an overpressure of 1 bar
- As part of periodical inspections tightness checks of detachably joining lines
- Check on system according to specification of manufacturer

# VDI 2291 (June 2016): Emission control: Test criteria for monitoring vapour recovery systems

## Inspection report

An inspection report must include following information:

- Name and address of operator
- Site of operation
- Occasion of inspection
- Initial inspection, periodically inspection or re-inspection
- Inspection with consecutive number as well as number of manufacturer of tank, the content in m<sup>3</sup> and type of stored liquid
- Control steps
- Data on check of tightness (control of lines with 1 bar as well of detachably joining connections), list of deficits, remarks

# VDI 2291 (June 2016): Emission control: Test criteria for monitoring vapour recovery systems

## Inspection report

Data on interlocking device of vapour balance system existing

Manufacturer:

Type:

Check of interlocking device in case of electronic systems according provisions of manufacturer (measured values)

Function test carried out:    yes            no

Result of inspection:

Declaration of deficits

Declaration if re-inspection necessary

Remarks

Point of time for next inspection

Site, date, name and signature of responsible for inspection

## **Petrol Stage I B – Service Stations: Best Practice – P/V Valves at storage tank for petrol**

EU Petrol Stage I Directive regulates only loading of the storage tank of the service station

**But**

**not the breathing of the storage tank!**

There are pressure/vacuum valves for the underground tanks. For the correct functioning of the whole “vapour” system the P/V valves must work correctly.



## Petrol Stage I B – Service Stations: Best Practice



## Petrol Stage I B – Service Stations: Best Practice

### Germany:

- The requirements according to the pressure values of the P/V valves are not given by air pollution control regulations like EU Petrol Stage II or German 21th of BImSchV but generally by occupational health and safety regulations:
- In Germany: TRBS 3151. Due to the occupational health and safety regulations there are regularly checks

According to German TRBS 3151 following rules have to be complied:

Reference: [http://www.baua.de/de/Themen-von-A-Z/Anlagen-und-Betriebssicherheit/TRBS/pdf/TRBS-3151.pdf?\\_\\_blob=publicationFile](http://www.baua.de/de/Themen-von-A-Z/Anlagen-und-Betriebssicherheit/TRBS/pdf/TRBS-3151.pdf?__blob=publicationFile).

## Petrol Stage I B – Service Stations: Best Practice

### *„4.2.1.3 Ventilation Installation*

*(8) Storage tanks and containers for storage of fuel must be operated in such way that dangerous under- and overpressure cannot occur, e.g., by aeration and ventilation equipment or safety devices to prevent excess pressure.*

*(9) Ventilation ducts must be dimensioned so that dangerous under- or overpressures in the tank cannot occur. ....*

*(10).*

*The displaced vapours during filling of storage tanks for liquid fuels and containers for the storage of fuel vapour and air mixture must be discharged in such way that risks to employees and other persons cannot arise.*

*(11) The ventilation lines must discharge in that way to the atmosphere that risks to employees and other persons cannot arise by discharging fuel vapour and air mixtures.*

*This is exemplified satisfied when the ventilation mast is at least 4 m above ground level and ending carryover of escaping steam-air mixtures or gases to adjacent areas, which are intended for residence of persons is not possible.*

*(12) Paragraph 9, sentence 1 during the filling of storage tanks for liquid fuels using the vapor recovery technique shall be considered to be met if the ventilation takes place only via the vapour recovery line and vents of storage tanks are closed to the outside during the vapour recovery process. Excepted are safety required openings. This requirement is to be regarded in underground storage tanks to be met if the ventilation pipe is fitted with a pressure / vacuum valve or a throttle, which is sufficient as a throttle an opening of 10 mm internal diameter or a tubular section with a comparable flow resistance.”*

The integrated pressure/vacuum valve limits the storage tank pressure up to the adjusted pressures.

### Switch pressure setting

Over pressure: + 30 mbar

Under pressure: - 5 mbar

Example: [Flammer](#)

Influence of temperature: see

[http://www.flammergmbh.de/englisch/videosection/8Erwaermung\\_mp4.mp4](http://www.flammergmbh.de/englisch/videosection/8Erwaermung_mp4.mp4)

# Breathing lines with over/underpressure valves

<b>Standard vacuum</b>	- 2,5 mbar
<b>Standard pressure</b>	+ 35 mbar
<b>Arrester element width/diameter</b>	10 mm / 90 mm

<http://www.ridart.it/wordpress/wp-content/uploads/2015/07/10-certificato-EN-16852-rev-2.pdf>

<http://www.ridart.it/en/work/deflagration-pressure-vacuum-vent-model-197-enp/>

# Breathing lines with over/underpressure valves

<http://www.ridart.it/wordpress/wp-content/uploads/2014/05/197-ENP.pdf>



**Pressure Vacuum Vent  
with Flame Arrester**

Mod. 197 EN-P



II G IIA



EN 16852:2010

# Breathing lines with over/underpressure valves

<http://www.ridart.it/wordpress/wp-content/uploads/2014/05/197-ENP.pdf>

**P/V valves should be checked once a year on function according to instruction of manufacturer**

**Recommendation:  
Check documentation of P/V maintenance (function check) +  
certificate EN-16852**



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