



# SLOVENSKI STANDARD

## SIST-TS CLC/TS 50625-3-4:2017

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**Zahteve za zbiranje, logistiko in obdelavo odpadne električne in elektronske opreme (WEEE) - 3-4. del: Specifikacija za preprečevanje onesnaženja - Oprema za toplotno izmenjavo**

Collection, logistics & treatment requirements for WEEE - Part 3-4: Specification for de-pollution - temperature exchange equipment

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Exigences de collecte, logistique et traitement pour les déchets d'équipements électriques et électroniques (DEEE) - Partie 3-4: Spécifications relatives à la dépollution - équipements d'échange thermique

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**Ta slovenski standard je istoveten z: CLC/TS 50625-3-4:2017**

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**ICS:**

13.030.99	Drugi standardi v zvezi z odpadki	Other standards related to wastes
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<b>SIST-TS CLC/TS 50625-3-4:2017</b>	<b>en</b>
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SPÉCIFICATION TECHNIQUE  
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**CLC/TS 50625-3-4**

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**Collection, logistics & treatment requirements for WEEE - Part 3-4: Specification for de-pollution - temperature exchange equipment**

Exigences de collecte, logistique et traitement pour les déchets d'équipements électriques et électroniques (DEEE)  
- Partie 3-4: Spécifications relatives à la dépollution - équipements d'échange thermique

Sammlung, Logistik und Behandlung von Elektro- und Elektronik-Altgeräten (WEEE) - Teil 3-4: Spezifikation der Schadstoffentfrachtung - Wärmeüberträger

This Technical Specification was approved by CENELEC on 2017-06-06.

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## CLC/TS 50625-3-4:2017 (E)

## European foreword

This document (CLC/TS 50625-3-4:2017) has been prepared by CLC/TC 111X "Environmental aspects for electrical and electronic products and systems".

This document has been prepared under a mandate M/518 given to CENELEC by the European Commission and the European Free Trade Association.

This Technical Specification part 3-4 is to be used in conjunction with the latest edition of EN 50625-2-3 and CLC/TS 50625-3-1.

This Technical Specification part 3-4 supplements or modifies the corresponding clauses in CLC/TS 50625-3-1, so as to convert that publication into the TS: *Treatment specification for temperature exchange equipment*.

When a particular subclause of part 3-1 is not mentioned in this part 3-4, that subclause applies as far as is reasonable. When this standard states "addition", "modification" or "replacement", the relevant text in part 3-1 is to be adapted accordingly.

NOTE The following numbering system is used:

- Sub-clauses, tables and figures that are numbered starting from 101 are additional to those in Part 3-1;
- unless notes are in a new sub-clause or involve notes in Part 3-1, they are numbered starting from 101, including those in a replaced clause or sub-clause;
- additional annexes are lettered AA, BB, etc.

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## Introduction

In order to support EN 50625-2-3, *Collection, logistics & Treatment requirements for WEEE - Part 2-3: Treatment requirements for temperature exchange equipment* and thereby fulfil the requirement of the European Commission's Mandate M/518, it is necessary to include normative requirements, such as target values and limit values for the analysis, into a document that is able to be revised to take into account both practical experience and changes in treatment technologies.

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**CLC/TS 50625-3-4:2017 (E)****1 Scope**

*This clause of Part 3-1 is replaced with the following:*

This Technical Specification is intended to be used in conjunction with the WEEE Treatment Standard for temperature exchange equipment, EN 50625-2-3, and the Technical Specification for de-pollution, CLC/TS 50625-3-1.

**2 Normative references**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

*This clause of Part 3-1 is replaced with the following:*

CLC/TS 50625-3-1, *Collection, logistics & treatment requirements for WEEE - Part 3-1: Specification for de-pollution - General*

EN 50625-2-3:2017, *Collection, logistics & treatment requirements for WEEE - Part 2-3: Treatment requirements for temperature exchange equipment and other WEEE containing VFC and/or VHC*

EN 15002:2015, *Characterization of waste - Preparation of test portions from the laboratory sample*

ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories*

**3 Terms and definitions**

For the purposes of this document, the following terms and definitions apply.

*This clause of CLC/TS 50625-3-1 and EN 50625-2-3 is applicable with the following addition:*

**3.108****characteristic number**

value of parameter (except target values and limit values) used to determine VFC and VHC removal and capturing performance for step 1 (e.g.  $q_{Mtot}$ ,  $S_k$ ), step 2 (e.g.  $f_{VFC}$ ,  $f_{VHC}$ ) and step 3 treatment, and value of parameter used to assess certain results of the plant performance test (e.g.  $t_{max}$  in step 1 and  $w_{i,VFC}$  and  $w_{i,VHC}$  in step 2 treatment)

**4 De-pollution monitoring**

*This clause of Part 3-1 is replaced by the following:*

**4.101 Introduction**

The following paragraphs cover de-pollution monitoring and refer to EN 50625-2-3:2017, 5.6. The target values and limit values set in this Technical Specification apply to the three elements stated EN 50625-2-3:2017, 5.6.101.

All target values and limit values stipulated in this Technical Specification take measurement uncertainty in weighing, sampling and analysis procedures into account. Therefore, all actual measured and calculated values are deemed to be final irrespective their variances.

**4.102 Monitoring and evaluation system and regular reporting****4.102.1 General**

According to EN 50625-2-3, 5.6.102, the treatment operator shall monitor the input and output information of step 1, step 2 and step 3 treatment of the plant on a day-to-day basis.



The monitoring system shall demonstrate the performance in daily business. The role of the monitoring system is an internal control system for the treatment operator to measure and evaluate the daily performance of his plants, especially with a view of the removal, capturing and subsequently disposal or recovery of VFC and VHC. Target values and limit values are set as minimum requirements for the day-to-day business.

If the treatment operator doesn't reach the target values, or exceeds the limit values of the day-to-day business, he shall activate corrective actions and monitor and document the related results.

#### 4.102.2 Requirements for day-to-day business of step 1 treatment plants

##### 4.102.2.1 Target values for refrigerant and oil output masses.

The target values (90 % of the expected masses) of removed and captured VFC- and VHC - refrigerants shall be calculated on the basis of the actual weekly input to the plant.

The expected mass of removed and captured VFC refrigerant for class 1 appliances to class 4 appliances is deemed to be 0,113 kg of refrigerant per intact refrigerating system. The expected mass of removed and captured VHC is deemed to be 0,054 kg per intact refrigerating system accordingly for class 1 appliances to class 4 appliances.

If there is evidence that the expected masses of VFC and VHC of class 1 appliances to class 4 appliances are varying locally from the values set above, the actual values have to be taken into account as a base for the calculation of the target values. Performance tests with solely VHC or VFC appliances of class 1 appliances to class 4 appliances are deemed to be clear and comprehensible evidence. For those tests, at least 300 VHC or VFC appliances in each case have to be taken as a sample. For day-to-day monitoring of removed and captured VFC and VHC output from class 5 appliances and class 6 appliances the expected mass of refrigerant shall be based on local key figure values representing the normal supply to the respective plant.

The monitoring data shall give plausible evidence for the values taken as expected VFC and VHC masses.

The expected mass of oil in class 1 VFC appliances to class 4 VFC appliances is deemed to be 0,240 kg oil per VFC containing compressor.

The expected mass of oil in class 1 VHC appliances to class 4 VHC appliances is deemed to be 0,160 kg oil per VHC containing compressor.

If there is evidence that in a country or in a region the expected mass of oil differs to the value of 0,240 kg or 0,160 kg, this value shall be used. Performance tests with solely VHC or VFC appliances of class 1 to 4 are deemed to be clear and comprehensible evidence. For those tests, at least 300 VHC or VFC appliances in each case have to be taken as a sample.

For day-to-day monitoring of oil from class 5-6 VFC and VHC appliances the expected mass of oil shall be based on local values representing the normal supply to the respective plant.

NOTE Since the oil from radiators, which fall under class 6, is required to be kept separate from the oil from refrigerating systems, this oil is not considered in the day-to-day monitoring.

The normal supply of class 5-6 VFC and VHC appliances shall be regularly tested, evaluated and documented in order to fix local key figures.

The overall target value in kg for the classes 1-6 appliances regarding the day-to-day monitoring for step 1 treatment plants [expected mass refrigerant in kg] shall be calculated on base of the following:

$$\text{TargetValue}_{\text{VFC};\text{VHC};\text{step 1}} = \text{TargetValue}_{\text{VFC};\text{step1},1-4} + \text{TargetValue}_{\text{VHC};\text{step1},1-4} + \text{TargetValue}_{\text{VFC};\text{step1},5-6} + \text{TargetValue}_{\text{VHC};\text{step1},5-6}$$

In cases where the output refrigerants are not captured in vessels but converted in a step 3 plant, the output raw gas data (mass flow of VFC and VHC) of step 1 treatment shall be taken to calculate output masses during the day-to-day performance according to Annex HH. In those plants the value for  $\text{TargetValue}_{\text{VFC};\text{VHC};\text{step1}}$  shall be calculated analogously to those step 1 treatment plants where the refrigerants are captured in vessels.

**The mass of actual weekly removed and captured or converted refrigerant shall be equal or higher than  $\text{TargetValue}_{\text{VFC};\text{VHC};\text{step 1}}$ .**

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The monitoring of the oil output masses from classes 1-6 appliances shall be done analogously to the monitoring of the refrigerant masses.

The target value for the removal and capturing of oil shall be calculated analogously to the target value for refrigerants.

**4.102.2.2 Further requirements concerning step 1 treatment****4.102.2.2.1 Monitoring of input and output masses in step 1 treatment**

The overall weekly mass balance of all input masses and all output fraction masses in step 1 treatment shall not differ more than **5 %**.

**4.102.2.2.2 Limit value for residual refrigerant content in oil**

According to EN 50625-2-3:2017, 5.6.102.9, the treatment operator shall take samples of oil and send them to the laboratory. Sampling and analysing shall be done on the basis of Clause 12 of this Technical Specification.

The limit value for the residual refrigerant (VFC / VHC) in the output oil is **0,2 %**.

**4.102.2.2.3 Limit value for residual oil in compressors**

According to EN 50625-2-3:2017, 5.6.102.9, there shall be a monthly analysis of remaining oil masses in compressors directly after leaving the step 1 suction process and compressors designated to send for further treatment at an acceptor facility.

All oil shall be considered removed in step 1 treatment if the residual amount of oil in the compressors is in average less than **15 g** (=limit value) directly after the suction process. Compressors leaving the treatment plant for further treatment shall have no oil to the greatest possible extent (non-dripping). All oil removed from the compressors (including the oil removed before the compressors are leaving the treatment plant) shall be degassed.

NOTE It is acknowledged that current techniques do not remove the oil that is caught in the compression chambers.

For the purpose of these requirements, the treatment operator shall control at least 3 compressors directly after the suction process and at least 3 compressors leaving the plant. For the evaluation of the evacuation performance, the evacuated compressors shall be opened horizontally. That has to be done at a height of approximately 2/3 with a flexible-blade saw so that the motor can be removed. The remaining quantity of oil shall be determined and recorded. The procedure shall be documented by photographing it.

If the average residual amount of oil in the opened compressors directly after the suction process exceeds the limit value of in average 15 g then the residual amount of 10 further compressors shall be determined. If the limit value is still exceeded, measures to optimize the suction process have to be taken. The measures shall be documented and photographed and a new analysis shall be performed to verify their efficiency until the problem is solved.

**4.102.2.2.4 Limit value for residual VFC in output refrigerants and oil at VHC step 1 treatment plants**

According to EN 50625-2-3:2017, 5.6.102.4 and 5.6.102.9, all output refrigerant and oil vessels of step 1 treatment plants, designated to remove and capture entirely VHC, shall be controlled regarding the content of VFC. Sampling and analysing of the vessels shall be done in accordance with Clause 12 of this Technical Specification. The limit value for residual VFC in output VHC refrigerants and oil in the vessel is **0,01 %**.

NOTE This limit value is derived by taking into account the lower detection limit.

This requirement is also applicable for the VHC stream of step 1 treatment plants where VFC and VHC appliances are treated in separate batch streams.

All measurement procedures shall be subject of documentation.

#### 4.102.2.5 Limit value for phased out VFCs in non-phased out VFCs claimed for recycling

According to EN 50625-2-3:2017, 5.6.102.4, all output refrigerant and oil vessels of step 1 treatment plants, designated to remove and capture only non-phased out VFC, shall be controlled regarding the content of phased out VFC. Sampling and analysing of the vessels shall be done on in accordance with Clause 12 of this Technical Specification. The limit value for phased out VFCs in non-phased out VFCs refrigerants in the vessel is **0.01 %**

NOTE This limit value is derived by taking into account the lower detection limit.

#### 4.102.3 Requirements for day-to-day business of step 2 treatment plants

##### 4.102.3.1 Monitoring of input and output masses in the step 2 treatment

The overall weekly mass balance of all input masses and all output fraction masses in step 2 treatment shall not differ more than **5 %**.

##### 4.102.3.2 Target value for blowing agent output masses

###### 4.102.3.2.1 General

The expected masses of removed and captured VFC- and VHC - blowing agents shall be calculated on base of the actual weekly input to the plant.

Starting point for the calculation is the actual mix of VFC- and VHC - class 1 appliances to class 6 appliances, the respective foam weight  $w_i$  of the different classes and the potential concentration of the blowing agent ( $f_{VFC}$  and  $f_{VHC}$ ) in the original polyurethane foam before treatment. Missing doors have to be considered as being 20 % of the foam mass of the respective appliance and the respective appliance class.

Furthermore, other VFC/VHC sources in the input have to be considered for the calculation.

The following values for the concentration of VFC in VFC-polyurethane (input) and values for the concentration of VHC in VHC-polyurethane (input) ( $f_{VFC}$  /  $f_{VHC}$ ) are applicable in all European countries:

- $f_{VFC} = 82 \text{ g/kg}$
- $f_{VHC} = 38 \text{ g/kg}$

For class 1 appliances to class 6 appliances the mass of expected VFC- blowing agent during the weekly evaluation period on base of the number ( $C_i$ ) of VFC –polyurethane containing appliances per class treated is to be calculated as follows:

$$M_{VFC;1-6} = \sum_{i=1}^6 w_{i,VFC} \times f_{VFC} \times C_{i,VFC}$$

Analogously the mass of expected VHC- blowing agent during the weekly evaluation period on base of the number ( $C_i$ ) of VHC –polyurethane containing appliances per class treated is to be calculated as follows:

$$M_{VHC;1-6} = \sum_{i=1}^6 w_{i,VHC} \times f_{VHC} \times C_{i,VHC}$$

For other materials containing VFC or VHC the expected mass of blowing agents are to be calculated on base of the actual total foam mass ( $w_{VFC;other}$  and  $w_{VHC;other}$ ) and the concentration of VFC and VHC in the polyurethane before treatment as follows

$$M_{VFC;other} = w_{VFC;other} \times f_{VFC}$$

$$M_{VHC;other} = w_{VHC;other} \times f_{VHC}$$

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The total mass of expected blowing agents as result of the treatment of all input foam sources is to be calculated as:

$$M_{\text{tot}} = M_{\text{VFC};1-6} + M_{\text{VHC};1-6} + M_{\text{VFC};\text{other}} + M_{\text{VHC};\text{other}}$$

The target values in kg for the VFC- and VHC masses to be removed and captured during the weekly evaluation period to be calculated as follows:

$$T_{\text{VFC};\text{step2}} = [M_{\text{VFC};1-6} + M_{\text{VFC};\text{other}}] \times 0,9$$

$$T_{\text{VHC};\text{step2}} = [M_{\text{VHC};1-6} + M_{\text{VHC};\text{other}}] \times 0,9$$

Consequently, the target value for the total mass of minimum to be achieved removal and capturing of blowing agents is  $T_{\text{tot};\text{step2}} = M_{\text{tot}} \times 0,9$

In cases where the output blowing agents are not captured in vessels but converted in a step 3 treatment plant, the output raw gas data (mass flow of VFC and VHC) of step 2 treatment shall be taken to calculate output masses during the day-to-day performance according to Annex HH. In those plants, the value for  $t_{\text{VFC};\text{VHC};\text{step 2}}$  shall be calculated analogously to those step 2 treatment plants where the blowing agents are captured in vessels.

The mass of actual removed and captured or converted blowing agents per week shall be equal or higher than  $T_{\text{tot};\text{step2}}$ .

**4.102.3.2.2 Individual foam masses of class 1 appliances to class 3 appliances containing VFC or VHC**

The individual foam masses  $w_{i,\text{VFC}}$  and  $w_{i,\text{VHC}}$  of class 1 appliances to class 3 appliances containing VFC or VHC are:

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For the Northern European countries:

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- $w_{\text{Ni};\text{VFC}}$ : cl. 1: 3,66 kg; cl. 2: 4,88 kg; cl. 3: 6,10 kg;

- $w_{\text{Ni};\text{VHC}}$ : cl. 1: 3,30 kg; cl. 2: 6,30 kg; cl. 3: 8,30 kg;

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For the Mid European countries:

- $w_{\text{Mi};\text{VFC}}$ : cl. 1: 3,14 kg; cl. 2: 4,18 kg; cl. 3: 5,23 kg;

- $w_{\text{Mi};\text{VHC}}$ : cl. 1: 3,30 kg; cl. 2: 6,30 kg; cl. 3: 8,30 kg;

For the Southern and Eastern European countries:

- $w_{\text{SE};\text{VFC}}$ : cl. 1: 2,45 kg; cl. 2: 3,26 kg; cl. 3: 4,08 kg;

- $w_{\text{SE};\text{VHC}}$ : cl. 1: 3,30 kg; cl. 2: 6,30 kg; cl. 3: 8,30 kg;

NOTE 1 Countries are listed in Annex AA.

NOTE 2 Appliance classes are defined in EN 50625-2-3:2017, 3.111 to 3.116.

If there is clear and comprehensible evidence, that numbers for foam masses  $w_{i,\text{VFC}}$  and  $w_{i,\text{VHC}}$  of class 1-3 VFC- and VHC- appliances are higher or lower than the average numbers in the geographical area these new numbers shall be used in the respective country or at the respective local area.

Dedicated tests with only VHC or VFC appliances of one class are deemed to provide clear and comprehensible evidence. For those tests, at least 300 VHC or VFC appliances in each case of only one class have to be treated. For the calculation of  $w_{\text{VHC}}$  or  $w_{\text{VFC}}$  the actual content of foreign matter in the removed polyurethane foam weight has to be deducted from the gross weight of the polyurethane fraction. Furthermore, the residual VHC or VFC content in the polyurethane, adhering polyurethane masses on metals and plastics fractions and  $f_{\text{VHC}} / f_{\text{VFC}}$  have to be taken into account when calculating the original individual foam

weight of VHC or VFC appliances. All sampling and analysis shall be done in accordance with Clause 12. The results of those tests and analyses shall be monitored and documented.

#### **4.102.3.2.3 Individual foam masses of class 4 appliances to class 6 appliances containing VFC or VHC**

The individual foam masses of class 4 appliances to class 6 appliances shall be based on local key figure values representing the normal supply to the respective plant.

The key figures shall be calculated on base of tests results from the treatment of class 4 appliances to class 6 appliances, where in each case only one class per type of blowing agent (VFC/VHC) is treated. The procedure to calculate the individual foam masses shall be done in the same way as set out for class 1 appliances to class 3 appliances in 4.102.3.2.2.

#### **4.102.3.2.4 Individual foam masses of other input materials containing VFC and/or VHC**

The individual foam masses of other materials containing VFC and/or VHC shall be based on local key figure values representing the normal supply to the respective plant.

If there is evidence that the VFC and/or VHC content ( $f_{VFC}$  and  $f_{VHC}$ ) in other input materials is higher or lower than the values mentioned in 4.102.3.2.1, the actual values can be used for the calculation of the expected mass of blowing agents. Samples and analyses of input materials concerning their VFC and/or VHC content are deemed to be evidence, as long as they are representative for the typical mix of such materials in the respective time period.

### **4.102.3.3 Further requirements concerning step 2 treatment**

#### **4.102.3.3.1 Limit value for residual VFC/VHC content in polyurethane**

According to EN 50625-2-3:2017, 5.6.102.9, the treatment operator shall take samples of polyurethane and send them to the laboratory. Sampling and analysing of remaining VFC and VHC content shall be done in accordance with Clause 12 of this Technical Specification.

The limit value for the residual VFC and residual VHC in the output polyurethane is **0,2 %**.

Where VHC appliances are treated separately from VFC appliances the limit value for the residual VFC in the output polyurethane from VHC appliances is **0,01 %**.

NOTE This limit value is derived by taking into account the lower detection limit.

All measurement procedures shall be subject of documentation.

#### **4.102.3.3.2 Limit values for remaining quantities of polyurethane in the metals and plastics fractions**

According to EN 50625-2-3:2017, 5.6.102.9, the treatment operator shall take samples of metals and plastics. Sampling and analysing of remaining quantities of polyurethane on metals and plastics content shall be done in accordance with Clause 12 of this Technical Specification.

The limit value for the remaining content of VFC and VHC containing polyurethane in the metals fraction (loose parts as well as adhesive parts and inclusions) is **0,3 %**.

The limit value for the remaining content of VFC and VHC containing polyurethane in the plastics fraction (loose parts as well as adhesive parts and inclusions) is **0,5 %**.

If plastics are collected in a combined fraction with metals, the limit value for the remaining content of VFC and VHC containing polyurethane in the metals fraction is applicable.

All measurement procedures shall be subject of documentation.

#### **4.102.3.3.3 Limit value for residual VFC in output blowing agents at VHC step 2 treatment plants**

According to EN 50625-2-3:2017, 5.6.102.7, all output blowing agent vessels of step 2 treatment plants, designated to remove and capture entirely VHC, shall be controlled regarding the content of VFCs. Sampling and analysing of the vessels shall be done in accordance with Clause 12 of this Technical Specification.

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The limit value for residual VFC in output VHC blowing agents in the vessel is **0,01 %**.

NOTE This limit value is derived by taking into account the lower detection limit.

All measurement procedures shall be subject of documentation.

This requirement is also applicable for the VHC stream of step 2 treatment plants where VFC and VHC appliances are treated in separate batch streams.

#### **4.102.3.3.4 Limit value residual VFC and VHC concentration and mass flow in the exhausted air stream of step 2 treatment plants**

According to EN 50625-2-3:2017, 5.6.102.1, the treatment operator shall measure VFC concentration in exhausted process air on a continuous base. The VHC concentration, or the total VOC concentration, in the exhausted process air shall be measured at least once every three months. The volume stream has to be determined regularly. Concentration and mass flow shall be monitored, recorded and stored to ensure compliance with applicable limit values.

Analysis of VFC- and VHC content in the exhausted air shall be done in accordance with Clause 12 of this Technical Specification.

The limit value for the concentration of VFC in the exhausted air of the plant is 20 mg/m<sup>3</sup>.

The limit value for the VFC mass flow in the exhausted air of the plant is 0,01 kg VFC/h.

The limit value for the concentration of VHC in the exhausted air of the plant is 50 mg/m<sup>3</sup>.

The limit value for the VHC mass flow in the exhausted air of the plant is 0,05 kg VHC/h.

The limit value for the concentration of VFC in the exhausted air of VHC treatment plants is 4 mg/m<sup>3</sup>.

The limit value for the VFC mass flow in the exhausted air of VHC treatment plants is 0,002 kg VFC/h.

NOTE 1 This limit value is derived by taking into account the lower detection limit.

If VOC emission is measured instead of VHC, the limit values of VHC are applicable to VOC.

NOTE 2 VFC measurements are not replaced by VOC measurements.

All measurement procedures shall be subject of documentation.

NOTE 3 Local authorizations may contain stricter limits than those set in this Technical Specification. In that case, the stricter limit is applicable.

#### **4.102.4 Requirements for day-to-day business of step 3 treatment plants**

##### **4.102.4.1 Measurement of input concentration and mass flow of refrigerants and blowing agents**

According to EN 50625-2-3:2017, 5.6.102.8, input data for raw gas mass flow (concentration and volume stream at standard temperature and pressure) of VFCs and VHCs shall be measured continuously and recorded accordingly. This should be done using measurement systems which are compliant with the Measuring Instruments Directive (2004/22/EC). The measurement system shall be able to measure all essential VFC (R11, R12, R134a, R141b) and VHC (Cyclopentane, iso-Pentane, n-pentane).

##### **4.102.4.2 Limit value for VFC content in the input of VHC converting plants**

According to EN 50625-2-3:2017, 5.6.102.8, the VFC content of the input raw gas to step 3 treatment shall be measured continuously and recorded in those cases where the step 1 and/or step 2 treatment plants are designated to treat only VHC appliances and the subsequent converting of VHC output is done onsite. If the VFC content is above the limit value, the raw gas should be treated in accordance with Regulation (EC) No 1005/2009 as long as the limit value is exceeded.

The limit value for this case is **4 mg VFC/m<sup>3</sup>** in the input raw gas to the VHC converting plant. The limit value for the VFC mass flow in the input raw of the plant is 0,002 kg VFC/h.

#### 4.102.4.3 Limit value residual VFC and VHC concentration and mass flow in the exhausted air stream of step 3 treatment

The limit value for the concentration of VFC and VHC (in total) in the exhausted air of the step 3 treatment plant is 4 mg/m<sup>3</sup>.

The limit value for the VFC and VHC (in total) mass flow in the exhausted air of the step 3 treatment plant is 0,002 kg/h.

#### 4.102.5 Documentation

According to EN 50625-2-3:2017, 5.6.101, all results of the monitoring system shall be documented.

The tables in Annex II of this Technical Specification show an example of the structure of the documentation for the monitoring activities of step 1 and step 2 treatment.

#### 4.103 Performance tests for step 1, step 2 and onsite step 3 treatment

##### 4.103.1 General

The following refers to the annual performance tests according to EN 50625-2-3:2017, 5.6.103. During the performance tests the plants have to meet the entire target values and limit values for step 1, step 2 and step 3 treatment using characteristic numbers laid down in this Technical Specification.

All sampling and analysing measures concerning the performance tests shall be done in accordance with the respective requirements in Clause 12 of this Technical Specification.

The evaluation of the test data shall follow the formula given in Annexes AA and BB of EN 50625-2-3:2017 and the requirements of **Annex BB** in this Technical Specification.

##### 4.103.2 Step 1 performance tests (standards.iteh.ai)

###### 4.103.2.1 General

[SIST-TS CLC/TS 50625-3-4:2017](https://standards.iteh.ai/catalog/standards/sist/218b54ff-c92c-4726-9116-4982c3711c42/sist-ts-50625-3-4-2017)

[https://standards.iteh.ai/catalog/standards/sist/218b54ff-c92c-4726-9116-](https://standards.iteh.ai/catalog/standards/sist/218b54ff-c92c-4726-9116-4982c3711c42/sist-ts-50625-3-4-2017)

According to EN 50625-2-3:2017, AA.3, the performance test is passed if the removal and capturing of refrigerants is compliant with the respective target values and limit values.

###### 4.103.2.2 Target value for refrigerants to be removed and captured in performance test

The actual mass of removed and captured pure VFC (outR) from at least 100 intact VFC appliances shall be equal or higher than 90 % of the mass of VFC as indicated on the rating plates of these appliances (R<sub>i</sub>).

Compressed air and substances other than VFC in the refrigerant should not be taken into account.

The target value  $tv_{VFC;step1-test}$  for the removal of VFC during the test is 0,9 ( $outR/R_i \geq 0,9$ ).

In cases where the output refrigerants are not captured in vessels but converted in a step 3 treatment plant, the output raw gas data (mass flow of VFC and VHC) of the step 1 treatment plant shall be taken to calculate output masses during the performance test. In those plants the value for  $tv_{VFC;step1-test}$  shall be calculated analogously to those step 1 treatment plants where the refrigerants are captured in vessels. During the step 1 performance test no step 2 treatment of appliances is allowed.

###### 4.103.2.3 Limit value for residual refrigerant content in oil

The limit value for the residual refrigerant in the output oil, removed and captured during the performance test, is 0,2 % refrigerant of the oil.

If the oil, removed and captured during the performance test, does not represent the oil which has been treated in a full step 1 treatment process, oil from the production of the day before the test can be used to send to the laboratory.