

QCVN 30:2012/BTNMT

NATIONAL TECHNICAL REGULATION ON INDUSTRIAL WASTE INCINERATOR

Foreword

QCVN 30:2012/BTNMT is prepared by the team drafting the *Circular on promulgation of National technical standard on solid health care waste incinerator and National technical standard on industrial waste incinerator*, submitted by the Department of Science and Technology and Department of Legal Affairs to obtain approval from, and promulgated together the Circular No. 27/2012/TT-BTNMT dated December 28, 2012 by, the Minister of Agriculture and Rural Development.

NATIONAL TECHNICAL REGULATION ON INDUSTRIAL WASTE INCINERATOR

1. GENERAL

1.1. Scope

This document provides for technical and environmental requirements for industrial waste incinerators.

1.2. Regulated entities

This document applies to producers, importers, traders (distributors) and users of industrial waste incinerators within the territory of the Socialist Republic of Vietnam; environment authorities; sample collectors and analyzers and relevant organizations and individuals.

1.3. Definitions

For the purposes of this document, the terms below shall be construed as follows:

1.3.1. **“industrial waste”** (hereinafter referred to as “IW”) means waste generated by industrial processes and includes hazardous waste and non-hazardous waste (normal waste).

1.3.2. **“industrial waste incinerator”** means a system which is used for treatment of IW by burning and equipped with flue gas treatment system.

1.3.3. **“combustion chamber”** means a space where IW is incinerated by high temperature. It consists of:

a) **“primary combustion chamber”** means a space where IW is combusted and reduced into gaseous and solid products (slag, dust);

b) **“secondary combustion chamber”** means a space where non-combusted gases leaving the primary combustion chamber are combusted by high temperature.

1.3.4. **“retention time”** means the length of time that the flue gas moves from the entry point to the exit point of the secondary combustion chamber at the temperature prescribed in the Table 1 of this document.

1.3.5. **“flue gas”** means the mixture of material matters emitted into the air environment from the IW incinerator stack.

1.3.6. **“slag”** means residual solid materials from combustion processes in the IW incinerator.

1.3.7. **“dust”** is a common name for dust and fly ash that are generated during waste incineration and retained during the flue gas treatment.

1.3.8. **“capacity”** means the handling ability of an IW incinerator and is calculated by the maximum quantity of waste that is completely combusted by the IW incinerator per hour (kg/h).

1.3.9. **“licensing authority”** means an authority that issues the license for hazardous waste management or an authority that confirms the construction of works and implementation of environmental protection measures before putting an IW incinerator into operation in case the license for hazardous waste management is not required (the non-hazardous waste incinerator or incinerator only serves the purpose of treating hazardous waste internally generated within an industrial facility)

2. TECHNICAL REQUIREMENTS

2.1. Basic technical requirements for IW incinerators

2.1.1. IW incinerator must operate in the principle of multiple-level combustion and be comprised of at least two combustion chambers (primary and secondary combustion chambers). Combustion chamber volume is calculated according to the capacity and retention time of IW incinerator according to the Appendix I hereof.

2.1.2. Pressure in the IW incinerator must be lower than external pressure (also known as negative pressure) to restrict the amount of smoke emitted into the air from the waste intake gate.

2.1.3. Stack of an IW incinerator must satisfy the following requirements:

a) Stack height must be logically designed so as to satisfy all requirements on ambient air quality when flue gas is released into the air environment provided that it is not less than 20m above the ground level. Within 40m measured from the base of the stack, if there is a fixed obstacle (such as a building, row of trees or hill), the height of the stack must be at least 03m higher than the top of that obstacle;

b) The flue gas sampling porthole on the stack must be at least 10cm in diameter or width of each dimension, covered by a cap for adjusting the opening level; working platform must be safe and convenient for access and sampling. Sampling porthole must be located between the two following locations:

- Lower bound: At a distance of at least 07 times the inner diameter of the stack above the highest point of the joint between the stack and the pipe of the flue gas treatment system;

- Upper bound: At a distance of 03m below the stack flue.

2.1.4. During its normal operation, an IW incinerator must meet basic specifications provided in Table 1 below:

Table 1. Basic specifications for an IW incinerator

No.	Specifications	Measurement unit	Required value
1	Capacity of the incinerator ⁽¹⁾	kg/h	≥ 100
2	Primary combustion chamber temperature ⁽²⁾	°C	≥ 650
3	Secondary combustion chamber temperature	°C	
	<i>In case of combustion of non-hazardous waste (normal waste)</i>		≥ 1.000
	<i>In case of combustion of hazardous waste that does not contain organic halogens in excess of hazardous waste thresholds⁽³⁾</i>		≥ 1.050
	<i>In case of combustion of hazardous waste that contains organic halogens in excess of hazardous waste thresholds⁽³⁾</i>		≥ 1.200
4	Retention time of the secondary combustion chamber	s	≥ 2
5	Residual oxygen (measured at the sampling porthole)	%	6 - 15
6	Temperature on the outside of the IW incinerator (or the thermal barrier coating)	°C	≤ 60
7	Temperature of flue gas released into the air (measured at the sampling porthole)	°C	≤ 180
8	Average heating value used to combust 01 (one) kg of waste ⁽⁴⁾⁽⁵⁾	Kcal	≤ 1.000
9	Uninterrupted operation ability (while mechanical stability and technical parameters are ensured) ⁽⁵⁾	h	≥ 72
<p>Note:</p> <p>⁽¹⁾ Capacity of 100 kg/h is equivalent to the minimum volume of the primary combustion chamber, which is 1.4 m³.</p>			

(2) In special cases (such as anaerobic thermal combustion or combustion for recovery of metals with a low boiling point from waste), the primary combustion chamber may operate at a temperature of below 650°C provided that trial operation meets requirements and such operating temperature is approved by a licensing authority.

(3) According to QCVN 07:2009/BTNMT - National technical regulation on hazardous waste thresholds (hereinafter referred to as "QCVN 07:2009/BTNMT").

(4) 1.000 Kcal is equivalent to the heating value obtained after burning 0,1 kg of diesel.

(5) The assessment of those specifications is only applied during the inspection and supervision by a licensing authority.

2.1.5. It is not allowed to use the air outside the incinerator to dilute the flue gas from the exit point of the secondary combustion chamber to the point at a distance of 02m above the sampling porthole on the stack.

2.1.6. The IW incinerator must be equipped with a flue gas treatment system that operates according to the following stages:

a) Cooling (quickly lowering temperature). It is not allowed to mix the air outside directly into the flue gas flow for cooling purposes;

b) Dust handling (dry or wet);

c) Handling of hazardous components in flue gas (such as absorption).

Some of the treatment stages may be completed within one device, or one stage may be completed by more than one device in a flue gas treatment system.

2.2. Maximum allowable values of parameters of pollutants in flue gas of IW incinerator

During its normal operation, values of parameters of pollutants in flue gas of IW incinerator must not exceed those provided in Table 2 below when they are released into the air:

Table 2. Maximum allowable values of parameters of pollutants in flue gas

No	Parameters of pollutants	Measurement unit	Maximum allowable value	
			A	B
1	Total particulate matter	mg/Nm ³	150	100
2	Hydrochloric acid, HCl	mg/Nm ³	50	50
3	Carbon monoxide, CO	mg/Nm ³	300	250
4	Sulfur dioxide, SO ₂	mg/Nm ³	300	250
5	Nitrogen oxide (NO _x) (expressed as NO ₂)	mg/Nm ³	500	500
6	Mercury and its compounds (Hg)	mg/Nm ³	0,5	0,2
7	Cadmium and its compounds (Cd)	mg/Nm ³	0,2	0,16
8	Lead and its compounds (Pb)	mg/Nm ³	1,5	1,2
9	Other total heavy metals (As, Sb, Ni, Co, Cu, Cr, Sn, Mn, Tl, Zn) and respective compounds	mg/Nm ³	1,8	1,2
10	Total hydrocarbon (HC)	mg/Nm ³	100	50
11	Total PCDDs/PCDFs	ngTEQ/Nm ³		
	<i>Incinerator with a capacity of less than 300 kg/h</i>		2,3	1,2
	<i>Incinerator with a capacity of at least 300 kg/h</i>		1,2	0,6

Where:

- Column A is applied to all IW incinerators until December 31, 2014;

- Column B is applied to all IW incinerators from January 01, 2015.

3. REGULATIONS ON OPERATION, INCIDENT RESPONSE AND MONITORING

3.1. Operation of IW incinerators

3.1.1. A safe operating procedure for IW incinerator must be established and applied, and consisted of the following contents:

a) Except IW incinerators that adopt a special operating procedure prescribed by manufacturers and seriously considered by licensing authorities, an IW incinerator must be started according to the following steps:

- Step 1: Start the flue gas treatment system;

- Step 2: Start and heat all combustion chambers. Only feed some types of non-hazardous waste with high heating value (like biomass waste) to replace or add traditional fuel after traditional fuel is used to heat the primary combustion chamber and secondary combustion chamber up to 300°C and 800°C respectively. Specify non-hazardous waste used in this process in the procedure;

- Step 3: Feed waste into the IW incinerator. Only feed non-hazardous waste with low heating value and hazardous waste if combustion chamber temperature reaches the value provided in Table 1 of this document.

b) Operation of an IW incinerator must end according to the following steps:

- Step 1: Stop feeding waste into the IW incinerator. Keep mixing remaining waste in the primary combustion chamber and supplying fuel (if necessary) until waste is completely combusted;

- Step 2: Stop supplying fuel to the primary combustion chamber after waste has been completely combusted (no sign of combustion);

- Step 3: Stop supplying fuel to the secondary combustion chamber when there is no smoke in the primary combustion chamber and there is no flue gas emitted through the stack;

- Step 4: Stop the flue gas treatment system and end the operation of the combustion chamber when temperature of the primary combustion chamber falls below 300°C.

3.1.2. Waste must be controlled before being fed into the IW incinerator so as not to influence the normal operation of the IW incinerator. Waste that fails to be treated by the incinerator should not be fed. Every run of the IW incinerator must continuously last for at least 24 hours. Some requirements for waste before being fed into the incinerator are provided in the Appendix 2 hereof.

3.1.3. It is not allowed to combust radioactive waste, waste posing risk of explosion, corrosive waste or waste containing mercury, lead and cadmium in excess of hazardous waste thresholds prescribed in QCVN 07:2009/BTNMT. It is only allowed to combust waste containing organic halogens in excess of hazardous waste thresholds prescribed in QCVN 07:2009/BTNMT in the IW incinerator issued with the license for hazardous waste management by the Vietnam Environment Administration - the Ministry of Natural Resources and Environment.

3.1.4. If the volume of the primary combustion is greater than 20 m³ or the distance between the waste intake gate and the farthest point of the primary combustion chamber is higher than 02m, mechanical equipment must be assembled to feed waste into combustion chambers and mix waste in the primary combustion chamber (except special technologies).

3.1.5. Technical measures should be taken to transport slag or ash from the primary combustion chamber to ensure uninterrupted operation of the IW incinerator.

3.1.6. A log of operation of IW incineration should be kept and include information about the quantity and types of combusted waste, up-time and operator's name.

3.2. Management of waste generated from IW incinerators

3.2.1. Wastewater generated from the process of operating flue gas treatment system (if any) is only released into the environment after it is treated according to QCVN 40:2011/BTNMT - National technical regulation on industrial wastewater.

3.2.2. Slag, ash, dust, waste sludge and other solid waste generated from the process of operating the IW incinerator shall be distinguished and sorted according to QCVN 07:2009/BTNMT.

3.3. Incident prevention and response

3.3.1. A fire prevention and response plan should be formulated in accordance with regulations on fire prevention and fighting under the guidance of the fire authority.

3.3.2. Plans for prevention of and response to other incidents should be formulated and implemented in accordance with regulations (such as regulations on hazardous waste management in case of combustion of hazardous waste).

3.3.3. In addition to manual shutdown mechanism, combustion chambers must provide an automatic shutdown mechanism in case of incident.

3.3.4. Technical measures should be available to reduce temperature of combustion chambers when temperature suddenly rises or any incident occurs.

3.3.5. The IW incinerator must be equipped with by-pass valve so as to release flue gas directly through the stack in case the flue gas treatment system fails. The bypass valve may be operated by a manual or automatic control switch which is designed at a height suitable for the operator and convenient for control of the bypass valve in case of upset. The introduction of waste into the incinerator must be stopped immediately when operating the bypass valve. The incinerator is only allowed to operate after the failure is handled. The bypass valve must bear the seal of the licensing authority and a notification must be sent to the licensing authority within 48 hours after the seal is broken.

3.4. Monitoring of IW incinerators

3.4.1. IW incinerators must install automatic and continuous monitoring equipment to measure and record combustion chamber temperature and post-treatment temperature of flue gas.

3.4.2. Cameras or monitoring doors must be installed to monitor the process of combusting waste in the primary combustion chamber with at least 05cm in diameter or width of each dimension.

3.4.3. Periodic environmental monitoring of the IW incinerator shall be carried out in accordance with applicable regulations and at the request of the licensing authority at least every 03 months.

3.4.4. The automatic and continuous monitoring of certain parameters in flue gas and sampling of PCDDs/PCDFs shall be only carried out in case of combustion of waste containing organic halogens in excess of hazardous waste thresholds prescribed in QCVN 07:2009/BTNMT or in other special cases at the request of the licensing authority.

4. DETERMINATION METHODS

4.1. Methods for determination of parameters of pollutants in the IW incinerator are provided in the following national standards:

- TCVN 5977:2009 - Stationary source emissions – Manual determination of mass concentration of particulate matter;
- TCVN 6750:2000 - Stationary source emissions – Determination of mass concentration of sulfur dioxide - Ion chromatography method;
- TCVN 7172:2002 - Stationary source emissions – Determination of the mass concentration of nitrogen oxides - Naphthylethylenediamine photometric method;
- TCVN 7242:2003 - Health care solid waste incinerators - Determination method of carbon monoxide (CO) concentration in flue gas;
- TCVN 7244:2003 - Health care solid waste incinerators - Determination method of hydrochloric acid (HCl) concentration in flue gas;
- TCVN 7557-1:2005 - Health care solid waste incinerators - Determination of heavy metals in flue gas – Part 1: General requirements;
- TCVN 7557-2:2005 - Health care solid waste incinerators - Determination of heavy metals in flue gas – Part 2: Determination of mercury concentrations by cold vapour atomic absorption method;
- TCVN 7557-1:2005 - Health care solid waste incinerators - Determination of heavy metals in flue gas – Part 3: Determination of cadmium and lead concentrations by flame and electrothermal atomic absorption spectrometric method.

- TCVN 7556-3:2005 - Health care solid waste incinerator - Determination of the mass concentration of PCDDs/PCDFs - Part 3: Identification and quantification.

4.2. International standards that have their accuracy proved equal to or higher are accepted to determine concentration of parameters of pollutants in flue gas in IW incinerators or when national standards are not available.

5. IMPLEMENTATION

5.1. This document comes into force from March 01, 2013 and replaces QCVN 30:2010/BTNMT - National technical regulation on industrial waste incinerator.

5.2. Users of IW incinerators within the territory of the Socialist Republic of Vietnam must comply with all regulations specified in this document except in the cases where:

5.2.1. Any IW incinerator operating before March 01, 2013 shall be temporarily exempt from compliance with certain regulations (except those specified in Section 2.2) of this document until December 31, 2014 if such regulations require upgrade, improvement, adjustment or addition of its current design, structure, equipment and materials.

5.2.2. During the period when particular technical regulations on new incinerators applying technological advances such as plasma incinerators are not available, these incinerators shall be exempt from compliance with certain regulations (except those specified in Section 2.2) of this document if such exemption is certified in the report on technology assessment or the written approval for the environmental impact assessment report and the license for hazardous waste management is granted.

5.2.3. Where necessary, the licensing authority shall make a final decision on whether permission for exemption from some regulations (except those specified in Section 2.2) of this document is granted.

5.3. IW incinerators that comply with regulations of this document are used to combust waste other than IW waste such as health care waste without complying with regulations on incinerators that combust waste other than IW waste (if any) such as QCVN 02:2012/BTNMT - National technical regulation on solid health care waste incinerator.

5.4. In the cases where any of the national technical regulations and national standards referred to in this document is amended or replaced, the newest one shall apply.

5.5. Environment authorities shall provide guidelines, inspect and supervise the implementation of this document./.

APPENDIX 1

GUIDANCE ON DETERMINATION OF VALUES OF CERTAIN SPECIFICATIONS OF INDUSTRIAL WASTE INCINERATORS

(Enclosed with QCVN 30:2012/BTNMT – National technical regulation on industrial waste incinerators)

1. Determination of volume of primary combustion chamber

Volume of the primary combustion chamber is calculated according to the following formula:

$$V_{sc} = \frac{Q \cdot C_{tk}}{q}$$

Or:

$$0,04 \cdot C_{tk} \geq V_{sc} \geq 0,014 \cdot C_{tk}$$

Where:

- V_{sc} : Volume of the primary combustion chamber (m^3);
- C_{tk} : Design capacity of the incinerator (kg/h);
- Q : Low heating value of waste (2.800 - 4.000 kcal/kg);
- q : Volumetric heat release rate of the combustion chamber (100.000 - 200.000 kcal/ m^3h).

For example: In case the incinerator has a design capacity of 100 kg/h, the corresponding volume of the selected primary combustion chamber is 1,4 - 4 m³ depending on the manufacturer.

2. Determination of volume of secondary combustion chamber

Volume of the secondary combustion chamber is calculated according to the following formula:

$$V_{tc} = t_{tk} \cdot L$$

Where:

- V_{tc} : Volume of the secondary combustion chamber (m³);
- t_{tk} : Design retention time (≥ 2 s);
- L : The volumetric air flow in the secondary combustion chamber (m³/s).

3. Determination of actual capacity of the incinerator

Actual capacity of an IW incinerator may vary with its design capacity and change depending on characteristics of each type of waste fed into the incinerator. Actual design is calculated according to the following formula:

3.1. In case of availability of heating value of waste

$$C = \frac{V_{sc} \cdot q}{Q}$$

Where:

- C : Actual capacity of the incinerator (kg/h);
- V_{sc} : Volume of the primary combustion chamber (m³);
- q : Volumetric heat release rate of the combustion chamber (kcal/m³h);
- Q : Low heating value of DSW (kcal/kg).

3.2. Calculation of actual capacity based on operating status of the incinerator

Amount of waste fed into the incinerator shall be supervised and adjusted until the incinerator operates stably according to the specifications provided in Table 1 and Table 2 of this document and waste is completely combusted in the incinerator over a specific length of time (e.g. 24 hours) so as to obtain a reliable result.

4. Determination of actual retention time

In case of unavailability of measurement method with high accuracy such as measurement of moving time of materials (particulate matters) indicated in the secondary combustion chamber, actual retention time of the incinerator shall be calculated according to the following formula:

$$t = V_{tc} / L$$

Where:

- t : Actual retention time (s).
- V_{tc} : Actual volume of the secondary combustion chamber (m³).
- L : The volumetric air flow in the secondary combustion chamber (m³/s). Q may be extrapolated according to the flow of flue gas measured at the sampling porthole on the stack or the flow of exhaust fan behind the secondary combustion chamber.

APPENDIX 2

REQUIREMENTS FOR WASTE BEFORE BEING FED INTO INCINERATORS (Enclosed with QCVN 30:2012/BTNMT – National technical regulation on industrial waste incinerators)

In special cases, waste must be prepared or preliminarily treated before being fed into an incinerator. To be specific:

1. Solid waste must be of appropriate size to be quickly combusted and have a thickness not exceeding 10 cm in any side.
2. Hazardous waste must be mixed together or mixed with non-hazardous waste or appropriate additives to obtain a stable flow of waste, except in the case mixed waste reacts with each other, thereby posing danger or creating a new component that makes it difficult to treat waste.
3. Waste that is sticky, has low porosity or is hard to ignite must be mixed with waste or appropriate additives (such as sawdust, rice husk, etc.) to reduce stickiness, increase porosity and ignitability.
4. Waste with high humidity such as waste sludge must have its humidity reduced or be mixed with dry waste or additives.
5. Liquid waste must be sprayed directly into combustion chambers using a separate nozzle or mixed with solid waste or additive to be fed into the primary combustion chamber.
6. Waste with low heating value must be mixed or combusted together with waste or additive with high low heating value to maintain a low heating value of 2.800 - 4.000 kcal/kg to save fuel and ensure normal operation and capacity of the IW incinerator.