

TSSA DIGESTER, LANDFILL & BIOGAS APPROVAL CODE TSSA-DLB-2016



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TECHNICAL STANDARDS AND SAFETY AUTHORITY

FOREWORD

Definitions in this Code have the same meaning as those contained in the relevant regulations made under the *Technical Standards and Safety Act, 2000*.

This document adopts either in whole or in part the ANSI/CSA B149.6-15 Code for digester gas, landfill gas and biogas generation and utilization published in 2015.

This document was developed in consultation with the TSSA Gaseous Fuels Advisory Council and the TSSA Digester, Landfill and Biogas Risk Reduction Group.

In the event of a conflict between this code and Ontario Regulation 212/01 (Gaseous Fuels), the regulation shall prevail.

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1. Scope of Code and Application Procedures

1.1 Scope and Application

1.1.1

This document establishes TSSA requirements for fuel handling equipment at water pollution control plants, landfill sites and biogas facilities to ensure the safe handling of gas and operation of systems where gas is stored, transmitted or utilized. TSSA has jurisdiction over all fuel handling systems, including fuel handling appliances, equipment and associated piping.

1.1.2

This code applies to the storage, handling and use of gas. TSSA does not review, assess or approve the performance of any appliances or equipment, the handling of any waste material or the passive ventilation of the gas.

1.1.3

For landfill sites, this code applies to the extraction blower and all downstream equipment, appliances and piping used for the storage, handling, transmission or utilization of gas (i.e., the entire positive pressure side of the gas system). This includes landfill flares. This code does not apply to collection systems located within the perimeter of the landfill or aggregating piping upstream of the first blower.

1.2 Approval and Variance Requirements

1.2.1

TSSA approval is required for fuel handling systems at new facilities or at existing facilities where such facilities have been modified, upgraded or expanded. This requirement has been in place since 2007. Systems installed prior to 2007 that have not been modified, upgraded or expanded do not require TSSA approval.

1.2.2

Approvals for appliances shall be obtained before the appliance is operated. Approval may be in the form of a certification or TSSA field approval.

1.2.3

Where a deviation from the requirements of this code is required, the party responsible must make a separate application for a variance to the Director. Unapproved equipment appliances or piping cannot be used until a variance is issued.

1.2.4

The approval process includes:

1. submitting the required documentation to TSSA
2. a technical review
3. site verification and testing.

1.3 Required Documentation

1.3.1

An application for digester, landfill and biogas approval shall be made to the TSSA and shall include:

One set of:

- (a) a completed application;
- (b) an description for the scope of work being conducted;
- (c) engineering drawings;
- (d) a list of fuel burning appliances;
- (e) specifications for valves, controls and components; and
- (f) a bill of materials

If the submission is paper and the drawings are larger than 11" x 17" two sets are required.

1.3.2

The Director or an inspector may require an applicant to provide additional information or documentation.

1.4 Technical Review

1.4.1

The purpose of the technical review is:

- (a) to verify that the design complies with this Code and the Regulations;
- (b) to resolve any conflicts or deviations from this Code or the Regulations; and
- (c) to ensure the documentation is complete.

1.4.2

Upon completion of the technical review, a report will be issued to the applicant/owner, technical contact, invoicee and the assigned TSSA inspector. An invoice will be issued to the invoicee for the review time.

1.5 Site Verification and Testing

1.5.1

The purpose of the site verification and testing is to confirm that:

- (a) the facility is constructed in accordance with the reviewed documentation;
- (b) appliances, equipment and piping are installed in accordance with this code; and
- (c) the facility has the required safety functionality and all equipment, appliances and piping is installed in accordance with the applicable codes and standards.

1.5.2

If requested by an inspector, the applicant/owner of the facility shall perform any tests deemed necessary by the inspector to verify that all equipment and appliances are working properly. The applicant/owner shall have the necessary test equipment available at the time of the test.

1.5.3

The inspector may require that a person with particular knowledge and/or familiarity with the facility and installation to be present during site verification and testing.

1.6 Approval Issuance and Fees

1.6.1

Upon successful completion of the approval process, including technical review and site verification and testing, TSSA will issue a written confirmation of approval. Such approval will be limited to the scope of the project included in the technical review and site verification process.

1.6.2

The fees payable by the invoicee to TSSA under this program shall be applied in accordance with the TSSA fee schedule in effect at the time the relevant activity took place.

1.6.3

TSSA will issue all reports to the applicant (owner of the facility), invoicee and the technical contact.

PART 2: Construction, Installation and Control

2.

ANSI/CSA-B149.6-15 entitled "Code for digester gas, landfill gas and biogas generation and utilization" published by the Canadian Standards Association is hereby adopted with the following amendments:

2.1.

Clause 1.1.4 is revoked and the following is substituted for it:

This Code applies to piping systems in which the maximum operating pressures for piping used in digester systems, landfill gas systems, or biogas systems do not exceed 125 psig (860 kPa) for piping installed outdoors or 66 psig (450 kPa) for piping installed indoors. For applications above these pressures the requirements of high pressure piping shall apply.

2.2

Clause 4.7.4 is revoked

2.3

Clause 4.7.7 is revoked

2.4

Clause 8.1.4 is added:

All above ground pipe and components located in an unheated space shall be protected from freezing where there is a potential for condensate to accumulate and freeze.

2.5

Clause 8.6.11 is revoked and the following is substituted for it:

Buried pipe shall not be installed with threaded fittings or flanges.

Note: *This is a prohibited practice.*

2.6

Clause 8.8.4 is revoked and the following is substituted for it:

Lubricated plug valves shall be **approved** to CGA 3.11 and be suitable for use.

2.7

Clause 8.8.5 is revoked and the following is substituted for it:

Non-Lubricated valves shall be **approved** to CGA 3.11 and be suitable for use.

2.8

Clause 8.8.6 is revoked and the following is substituted for it:

High-performance butterfly valves shall be **approved** to CGA 3.16 and be suitable for use and be

- (a) corrosion resistant;
- (b) suitable for the gas composition;
- (c) suitable for the temperatures of service; and
- (d) of full lug design or flanged ends.

When used as **burner test firing valves** or as isolation **valves** on **waste gas burners**, **high-performance butterfly valves** shall also comply with API 607.

2.9

Clause 8.8.7 is revoked and the following is substituted for it:

Valves larger than 8 inch (200 mm) shall have the level of intended safety specified in CGA 3.11 or CGA 3.16 and be suitable for use.

2.10

Clause 8.10.2 is revoked and the following is substituted for it:

A manometer or other suitable vacuum/pressure device which does not require external power shall be provided to indicate the pressure

- (a) in each **digester**;
- (b) to the **waste gas burner** upstream from the **overpressure control valve**;
- and
- (c) to the **boilers** upstream from the backpressure control device (if provided).

2.11

Clause 13.2.2 is revoked and the following is substituted for it:

To maintain surveillance over any internal corrosion of a **digester gas** system, periodic internal inspections of the system shall be conducted. The inspection spools and other means of pipe inspection that are provided shall be opened for examination of the inside of the piping. This requirement is not applicable for systems that use type 316 or 316L stainless steel piping.

2.12

Clause 14.1.5 is added:

The following clauses are of no force and effect for components located upstream of the extraction blower on the vacuum side of the gas system.

- 18.1 General,
- 18.2 Material,
- 18.3.1 Stainless steel pipe, tubing and fittings,
- 18.3.2 Plastic pipe and fittings,
- 18.4 Purging,
- 18.6 Buried piping,
- 18.7 Gas piping identifications,
- 18.8 Manual shut-off valves upstream from the appliance valve train,
- 18.9 Drip Traps upstream from the appliance valve train, and
- 22 Operation and maintenance of landfill gas systems

2.13

Clause 14.7.4 is revoked

2.14

Clause 14.7.6 is revoked and the following is substituted for it:

All pressure vessels shall comply with the requirements of CSA B51.

2.15

Clause 16.2.1.1 is revoked and the following is substituted for it:

When gas blowers are installed indoors in other than **hazardous areas** (e.g., **boiler** rooms), they shall be of the **sealed type**. When open type blowers are installed outdoors they shall be at least 3 meters from any source of ignition or flammable vapours.

2.16

Clause 18.1.5 is added:

All above ground pipe and components located in an unheated space shall be protected from freezing where there is a potential for condensate to accumulate and freeze.

2.17

Clause 18.2.3(e) is revoked and the following is substituted for it:

Flexible metallic hose approved for the application (e) shall be made of Type 316 stainless steel or other material resistant to wet **landfill gas**.

2.18

Clause 18.3.2.5 is revoked and the following is substituted for it:

With the exception of drain traps referenced in 18.9.6, mechanical-compression type, flexible or non-flexible, joining methods and fittings shall not be acceptable for use with plastic pipe (except for earth-buried installations) and when used shall be acceptable to the authority having jurisdiction.

2.19

Clause 18.6.6 is added:

Buried pipe shall not be installed with threaded fittings or flanges on the positive pressure side of the system.

2.20

Clause 18.8.3 is revoked and the following is substituted for it:

Lubricated plug valves shall be **approved** to CGA 3.11 and be suitable for use.

2.21

Clause 18.8.4 is revoked and the following is substituted for it:

Non-Lubricated valves shall be **approved** to CGA 3.11 and be suitable for use.

2.22

Clause 18.8.5 is revoked and the following is substituted for it:

High-performance butterfly valves shall be **approved** to CGA 3.16 and be suitable for use and be

- (a) corrosion resistant;
- (b) suitable for the gas composition;
- (c) suitable for the temperatures of service; and
- (d) of full lug design or flanged ends.

When used as **burner test firing valves** or as isolation **valves** on **waste gas burners**, **high-performance butterfly valves** shall also comply with API 607.

2.23

Clause 18.8.6 is revoked and the following is substituted for it:

Valves larger than 8 inch (200 mm) shall have the level of intended safety specified in CGA 3.11 or CGA 3.16 and be suitable for use.

2.24

Clause 18.9.4 is revoked

2.25

Clause 18.9.6 is added:

Sumps that use pumps to remove condensate shall:

- a) Use intrinsically safe electric pumps or compressed air operated pumps constructed to withstand the corrosive nature of condensate
- b) Be equipped with level controls
- c) Be designed to suit the pressure or vacuum conditions
- d) Be accessible for maintenance

2.26

Clause 18.9.7 is added:

Drip traps in a landfill gas system to remove condensate shall:

- a) Allow for gravity drainage of condensate
- b) Be designed to suit the pressure
- c) Be accessible for maintenance and monitoring of liquid levels

2.27

Clause 23.7.4 is revoked

2.28

Clause 23.7.6 is revoked and the following is substituted for it:

All pressure vessels shall comply with the requirements of CSA B51.

2.29

Clause 23.8 is revoked and the following is substituted for it:

Prohibited practices for biogas systems

In this Code the following Clauses are designated with a note stating "This is a listed prohibited practice":

- (a) [Clause 23.4.1](#): use of open flame;
- (b) [Clause 23.4.2](#): flame, or other source of **ignition** for checking leaks;
- (c) [Clause 23.4.3](#): flashlight or other light for checking leaks;
- (d) [Clause 23.4.4](#): smoking;
- (e) [Clause 23.5](#): isolation of safety devices;
- (f) [Clause 23.6](#): use of deteriorated **appliances, accessories, components, equipment**, and materials;
- (g) [Clause 24.5.1](#): damaged **appliances**;
- (h) [Clause 25.4.2](#): exhausting unburned gas;
- (i) [Clause 27.3.2.6](#): plastic pipe
- (j) [Clause 27.3.3.3](#): copper solder-joint fittings and connections;
- (k) [Clause 27.6.1](#): buried piping;
- (l) [Clause 27.6.11](#): buried threaded fittings;
- (m) [Clause 27.8.2](#): non-**lubricated plug** or eccentric-type plug **valve**; and
- (n) [Clause 28.8.3.3](#): **valve** upstream from relief.

2.30

Clause 25.1.1 is revoked and the following is substituted for it:

An **appliance** utilizing **biogas** separately, dual-fired, or in combination with natural gas, propane, or fuel oil shall be approved by the **authority having jurisdiction** for the application and shall have affixed an **approval** label acceptable to the **authority having jurisdiction**.

2.31

Clause 26 is revoked and the following is substituted for it:

Air for combustion, venting, and ventilation in biogas systems

2.32

Clause 27.1.4 is added:

All above ground pipe and components located in an unheated space shall be protected from freezing where there is a potential for condensate to accumulate and freeze.

2.33

Clause 27.6.11 is revoked and the following is substituted for it:

Buried pipe shall not be installed with threaded fittings or flanges.

Note: *This is a listed prohibited practice.*

2.34

Clause 27.8.4 is revoked and the following is substituted for it:

Lubricated plug valves shall be **approved** to CGA 3.11 and be suitable for use.

2.35

Clause 27.8.5 is revoked and the following is substituted for it:

Non-Lubricated valves shall be **approved** to CGA 3.11 and be suitable for use.

2.36

Clause 27.8.6 is revoked and the following is substituted for it:

High-performance butterfly valves shall be **approved** to CGA 3.16 and be suitable for use and be

- (a) corrosion resistant;
- (b) suitable for the gas composition;
- (c) suitable for the temperatures of service; and
- (d) of full lug design or flanged ends.

When used as **burner test firing valves** or as isolation **valves** on **waste gas burners**, **high-performance butterfly valves** shall also comply with API 607.

2.37

Clause 27.8.7 is revoked and the following is substituted for it:

Valves larger than 8 inches (200 mm) shall have the level of intended safety specified in CGA 3.11 or CGA 3.16 and be suitable for use.

2.38

Clause 27.9.4(a) is revoked and the following is substituted for it:

A **drip trap** of the **continuous-flow type** shall have a

- (a) reliable gas seal of not less than 1.5 times the maximum operating gas pressure or 1.5 times the relief setting of the **biogas** excess pressure relief **valve**, whichever is greater;

2.39

Clause 27.10 is revoked and the following is substituted for it:

Biogas instrumentation

2.40

Clause 27.10.2 is revoked and the following is substituted for it:

A manometer or other suitable vacuum/pressure device which does not require external power shall be provided to indicate the pressure

- (a) in each **digester**;
- (b) to the **waste gas burner** upstream from the **overpressure control valve**;
- and
- (c) to the **boilers** upstream from the backpressure control device (if provided).

2.41

Clause 27.11.2(a) is revoked and the following is substituted for it:

A check valve, where used, shall meet the following requirements:

(a) Its housing and the internal parts shall be made of a material that is resistant to the corrosive effects of the **biogas**.

2.42

Clause 28.2.2 is revoked and the following is substituted for it:

Structural steel surfaces in contact with **biogas** shall be suitably protected from corrosion to provide long-term gas-tightness.

2.43

Clause 28.6.1 is revoked and the following is substituted for it:

A *liquid overflow* line shall be provided on each digester. In situations where *liquid overflow* is not practical, alternative methods to reliably control substrate level such as pumps and level transmitters may be used.

2.44

Clause 28.7.1b is revoked and the following is substituted for it:

A pair of *flash-back (flame) arresters* and *pressure/vacuum relief valves* shall be provided on *digesters* and shall be:

(b) piped in parallel, with a three-way manual change-over *valve* OR interlocking manual shut-off valves installed in the common supply piping, so that there shall be only one of the *flash-back (flame) arresters* and *pressure/vacuum relief valves* in service at all times.

2.45

Clause 28.7.4 is revoked and the following is substituted for it:

Except as noted in clause 28.7.1b, shut-off **valves**, other shut-off devices, and closures and obstructions of any kind, with the exception of the **flash-back (flame) arresters**, shall not be installed in the gas connection between the **biogas** holding space and the digester excess gas **pressure/vacuum relief valve**.

2.46

Clause 28.8 is revoked and the following is substituted for it:

Biogas storage containers

2.47

Clause 28.10.7 is revoked and the following is substituted for it:

A pressure-relief system shall be provided to prevent overpressure in the gas compartment of the membrane gasholder. The connection shall be a direct connection from the membrane gasholder to the relief system through a trans-flow three-way valve OR interlocking manual shut-off valves. The following requirements for the pressure-relief valve also apply:

- (a) It shall be provided with a flame arrestor, with protection from fouling and freezing, unless the pressure-relief valve is designed to meet requirements of Clause 28.7.3.
- (b) The relief valve shall be accessible for maintenance and the relief pipe opening shall be located such that operating personnel are not injured or otherwise harmed by a sudden release of gas

2.48

Clause 28.10.10 is revoked and the following is substituted for it:

Isolation valves shall be provided on all connections to the flexible inner membrane to allow the **biogas** piping system to be safely isolated from the gasholder.

Additional connections to the inner membrane include

- (a) a purge connection for rapid purging of the interior membrane. The purge connection may be mounted directly on the gasholder or on the piping between the gasholder and the first isolation valve; and
- (b) sampling connections to confirm non-hazardous conditions, prior to entry into the compartment between the inner and outer membrane and the storage compartment using portable monitoring equipment.

2.1.49

Clause 32.4 is revoked and the following is substituted for it:

Biogas system maintenance