Westcoast Receipt Point Pressure Control and Overpressure Protection Standard

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Version 8.1

Standard

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Business Unit: Gas Transmission and Midstream
Functional Owner: Measurement Engineering
Controlled/Published Location: GTM Governance Document Library

ENBRIDGE

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Westcoast Receipt Point Pressure Control and Overpressure Protection Standard

Purpose

This specification outlines the requirements for design, procurement, installation and maintenance of pressure control (PC) and overpressure protection (OPP) systems at receipt points delivering to the Westcoast pipeline (doing business as Enbridge Gas Transmission and Midstream (GTM).

Scope

All receipt points delivering to the Westcoast pipeline.

Abbreviations

Table 1 lists the abbreviations used in this document and their full terms.

Table 1: Abbreviations

ABBREVIATION	FULL TERM
ESDV	Emergency Shutdown Valve
GTM	Gas Transmission and Midstream
kPa	Kilopascal
LPG	Liquid Petroleum Gas
MOP	Maximum Operating Pressure
OPP	Overpressure Protection
P&ID	Piping and Instrumentation Diagram
PC	Pressure Control
PCV	Pressure Control Valve
PDF	Portable Document Format
PID	Proportional Integral Derivative
PLC	Programmable Logic Controller
PRV	Pressure Relief Valve
PSV	Pressure Safety Valve
RTU	Remote Terminal Unit
SME	Subject Matter Expert

Roles and Responsibilities

Table 2 lists the roles and groups affected by this document and what their responsibilities are regarding this document.

Table 2: Roles and Responsibilities

ROLES	RESPONSIBILITIES
Measurement Engineering	Document owner
Measurement Technical Services	Reviewer of receipt point designs to ensure compliance with this document's requirements

Compliance

Table 3 lists all relevant industry standards and regulations that apply to this document.

Table 3: Regulatory Entities and Industry Organizations Codes and Standards

REGULATORY ENTITIES AND INDUSTRY ORGANIZATIONS CODES AND STANDARDS	
CSA Group	
Z662-23	Sections 4.18 and 10.9.5

Requirements

The design, installation and maintenance of receipt point PC and OPP systems must meet or exceed the requirements of CSA Z662-23, Sections 4.18 and 10.9.5, and the following Enbridge specific requirements.

Enbridge Requirements

Enbridge requirements include the following:

1. The use of a pressure safety valve/pressure relief valve (PSV/PRV) for OPP of the Enbridge pipeline at new or existing receipt points is strongly discouraged for numerous reasons. In cases where it cannot be avoided, an assessment to ensure the device(s) is adequate from a capacity standpoint must be stamped, dated and signed by a professional engineer and submitted to Enbridge along with the required documentation below.

2. For new receipt points, a portable document format (PDF) version of the piping and instrumentation diagram (P&ID) drawing detailing the PC/OPP systems designated for protection of the Enbridge pipeline, along with a written description of the PC/OPP operation must be submitted to Enbridge for formal approval before connection to the Enbridge pipeline will be permitted. Enbridge will indicate formal approval by returning copies of the P&ID drawing and written description bearing Enbridge approval markings. To prevent approval delays, the initial design drawings and written description should be submitted to Enbridge for preliminary review and conditional approval.

3. For existing receipt points, an updated PDF version of the P&ID drawing and written description must be submitted to Enbridge upon request. Such requests may be made if the current documents do not meet Enbridge specifications or do not indicate the actual field installation.

4. P&ID drawings must be professionally drafted for clarity and accuracy. Redlined or hand-drawn versions will not be accepted unless stamped, dated and signed by a professional engineer.

5. P&ID drawings must clearly detail the complete PC and OPP systems including device tag numbers, valve fail statuses and valves to be sealed in normal operating positions.

6. P&ID drawings must clearly identify the PC system as “For Enbridge Pressure Control” and have a note stating, “Pressure Control limited to no more than *‘x’* kPa,” where the value *‘x’* will be specified by Enbridge.

7. P&ID drawings must clearly identify the OPP system as “For Enbridge Overpressure Protection” and have a note stating, “Overpressure Protection limited to no more than *‘y’* kPa,” where the value *‘y’* will be specified by Enbridge.

8. For new sites and changes to existing sites, the written description of the PC/OPP operation must include a listing of the equipment manufacturers and model numbers to be used in each system, the set points for devices in each system and a clear explanation of how each system works.

9. See end of this document section for examples of acceptable P&ID formats.

10. Each receipt point must have entirely separate PC and OPP systems designated for protection of the connecting Enbridge pipeline.

11. Devices used to monitor and control pressure in one system must not be used in the other system (e.g., the use of a single valve with dual activation for PC and OPP or pressure sensing devices using a common sensing tap, etc. are not acceptable).

12. Pressure sensing taps should be located on the downstream (Enbridge side) of the PC/OPP devices.

13. PC/OPP systems must be designed to fail safe and be protected from environmental conditions that could prevent proper operation.

14. Valve actuators must be single acting with spring return (i.e., fail safe). Valve fail positions must be indicated on the P&ID drawings. Pneumatically powered actuators must use dry instrument air, dry natural gas or dry nitrogen. The use of bottled liquid petroleum gas (LPG) to power actuators is not acceptable.

15. Valve actuators must be able to achieve fully closed status within an acceptable timeframe. The time taken for a PC/OPP valve to close may be deemed unacceptable by an Enbridge measurement technician and the actuator may need to be serviced or replaced prior to flowing.

16. Bypasses around main process PC/OPP valves are not acceptable.

17. Any device capable of being manually opened, closed or otherwise operated in order to override a PC/OPP system must be secured and sealed in the normal operating position to prevent

unauthorized operation that would render the system inoperative. Sealed positions must be indicated on the P&ID drawings.

18. Any PC/OPP device with an adjustable set point or calibrated range must be sealed by a qualified shop or contractor after calibration to prevent unauthorized adjustment/calibration. The device must have a calibration tag affixed to it that indicates the device's engineering tag number, calibrated set point and last calibration date.

19. For the inspection of new or modified sites, a "Pressure Control/Overpressure Protection Calibration and Inspection Report" should be completed by the receipt point owner and submitted to Enbridge prior to Enbridge's inspection. This form must be completed fully, including all required signatures, with correct traceability to the PC/OPP devices and tag numbers on the Enbridge-approved PC/OPP P&ID drawings.

20. Any change in designated PC/OPP design, devices, PC or OPP limits, etc., must be reviewed and approved by Enbridge before being implemented. The review and approval process for changes requires submitting "Receipt Point Change Form" to Enbridge describing the proposed change and include updated drawings and written descriptions. The PC/OPP system will be reviewed, formally approved and inspected by Enbridge as described above.

21. Receipt points that can swing gas between the Enbridge pipeline and a third-party pipeline must have PC/OPP systems that are designated for protection of the Enbridge pipeline. If the third-party's maximum operating pressure (MOP) is higher than the Enbridge MOP, then the PC/OPP systems designated for protection of the Enbridge pipeline must be dedicated solely to the Enbridge pipeline and be installed at a location where there is no downstream possibility of pressure communication from the third-party pipeline. If the third-party MOP is equal to or lower than the Enbridge MOP, then the PC/OPP systems designated for protection of the Enbridge pipeline may be located otherwise.

Pressure Control System Requirements

The design and installation of receipt point PC systems must meet or exceed the requirements of Section 4.18 of CSA Z662-23. Additionally, Enbridge allows only the following systems for PC, which must be designed and set to limit the pressure to no more than 100 percent of the Enbridge specified MOP:

1. If a single compressor provides the only source of gas to a receipt point, then either a pressure control valve (PCV), emergency shutdown valve (ESDV), compressor speed control, compressor high pressure re-cycle or compressor high pressure shut down may be used and located as convenient; otherwise
2. A single PCV or ESDV must be located at the receipt point or the tie-in to the Enbridge pipeline (i.e., must be downstream of the point of commingling from the different pressure sources). Sites continuously operating since prior to Jan. 1, 2008, with multiple pressure sources may be allowed to continue using individual PC systems located at each pressure source. Sites reactivated Jan. 1, 2008, or later that have multiple pressure sources must locate the PCV or ESDV at the receipt point or the tie-in to the Enbridge pipeline.

Notes: *A PSV/PRV is not acceptable for PC.*

Programmable logic controllers (PLCs) or remote terminal units (RTUs) may be used for actuation of PC systems if the pressure set point(s) in the device are password protected to prevent unauthorized changes.

If a proportional integral derivative (PID) loop control is used for controlling pressure, it must have automatic override logic programmed into the PLC that will force the PCV fully closed once the set point has been reached, regardless of the PID control.

When tested, the PC system must trip and respond such that the downstream pressure does not exceed 100 percent of the Enbridge specified MOP. Therefore, the response time of the entire system (e.g., controller delay, hysteresis, valve transit time, repeatability) must be accounted for in the set point of the system.

If a PC system is located at the Enbridge pipeline tie-in to account for pressure losses in the lateral between the receipt point and tie-in location, then a pressure transmitter must be installed downstream of the PC location with a signal sent back to the Enbridge RTU for communication to Enbridge Gas Control.

Overpressure Protection System Requirements

The design and installation of receipt point OPP systems must meet or exceed the requirements of CSA Z662-23, Section 4.18. Additionally, Enbridge allows only the following systems for OPP, which must be designed and set to limit the pressure to no more than 110 percent of the Enbridge specified MOP:

1. If a single compressor provides the only source of gas to a receipt point, then either a PSV/PRV sized to handle the full production or compressor discharge capacity for the receipt point, or an ESDV isolating the Enbridge pipeline may be used and located as convenient; otherwise,
2. a PSV/PRV sized to handle the full production or compressor discharge capacity from all sources simultaneously, or an ESDV must be located at the receipt point or tie-in to the Enbridge pipeline (i.e., must be downstream of the point of commingling from the different pressure sources). Sites continuously operating since prior to Jan. 1, 2008, with multiple pressure sources may be allowed to continue using individual OPP systems located at each pressure source. Sites reactivated Jan. 1, 2008, or later that have multiple pressure sources must locate the PSV/PRV or ESDV at the receipt point or the tie-in to the Enbridge pipeline.

Notes: *Compressor speed control, re-cycle or shut down is not acceptable for OPP.*

OPP systems shall not use a PLC or RTU for sensing and/or activation. OPP systems must be completely standalone and of electric, pneumatic or mechanical fail-safe design and operation.

Sites that presently use a PLC or RTU for OPP shall change the device or re-assign OPP function to another existing device before or during its next outage.

OPP systems must not have auto- or remote-reset capabilities. When actuated they must latch in the closed position and require a manual reset at the valve location.

The use of a PSV or PRV for OPP is strongly discouraged as Enbridge will require these devices to be removed and recertified on an annual basis. Testing in place and/or frequency exemptions per CSA Z662-23, Section 10.9.5.3 (b) will not be accepted.

When tested, the OPP system must trip and respond such that the downstream pressure does not exceed 110 percent of the Enbridge specified MOP. Therefore, the response time of the entire system (e.g., controller delay, hysteresis, valve transit time, repeatability) must be accounted for in the set point of the system.

Operation and Maintenance

The operation and maintenance of receipt point PC/OPP systems must meet or exceed the requirements of CSA Z662-23, Section 10.9.5, and the following Enbridge specific requirements:

- Broken PC/OPP seals must be replaced as soon as possible.

- Only dry gas test mediums shall be used to calibrate and test the operation of PC/OPP systems designed for gas service, liquid test mediums shall not be used.
- PC/OPP systems must be fully function tested upon initial commissioning, after any change/replacement of system equipment or devices and following the adjustment or change in pressure set points.
- Prior to Oct. 1 of each calendar year, with a maximum interval of 12 months from the previous year's inspection calibration, PC/OPP systems must be:
    - Inspected to ensure they are properly installed to protect from dirt, ice, snow or other conditions that could prevent proper operation.
    - Inspected to ensure they are sealed to protect from unauthorized operation.
    - Inspected and assessed to ensure they are reliable for the service in which they are used.
    - Assessed to ensure they are adequate from a capacity standpoint (i.e., PSV/PRVs).
    - Calibrated and fully function tested as complete systems to ensure they are in good operating condition and limiting the downstream pressures as required.
- All inspection and calibration results must be documented and submitted to Enbridge using its standard "Pressure Control/Overpressure Protection Calibration and Inspection Report." The form must be fully completed, including all required signatures and with correct traceability to the PC/OPP devices and tag numbers on the Enbridge-approved PC/OPP P&ID drawings.

It is the Receipt Point Owner's responsibility to perform annual inspections and submit the results to Enbridge. Completed reports must be received by Enbridge within 12 months of the previous year's report but in no case later than Oct. 1.

Function Testing

Function testing of PC and OPP systems is required to ensure each system operates to prevent the downstream pressure from exceeding 100 percent (for PC) or 110 percent (for OPP) of the Enbridge specified pipeline MOP. Enbridge reserves the right to witness function testing to ensure compliance with this standard. The requirements are as follows:

- Technicians performing PC/OPP function testing must be qualified to perform the work and understand the complete systems designated for protection of the Enbridge pipeline.
- An end-to-end function test must be performed to ensure proper operation of all components in the system and to determine its full response time. It is not acceptable to test only one component (e.g., transmitter) without considering the system's other components (e.g., RTU, valve, actuator). However, if the system response time has already been determined, it may be acceptable to individually function test each component in the system if they are tested in a sequential and traceable manner.
- When performing a function test, it should be performed more than once to confirm device repeatability and system response time.
- Device manufacturer's recommended operating, maintenance and function testing procedures shall be followed.

The following examples outline Enbridge expectations with respect to function testing of various systems.

PC System – Pressure Control Valve

- Technician must witness full valve closure once the set point has been reached.
- If a PID loop control is used, it must have automatic override logic programmed into the PLC that will force the PCV fully closed once the set point has been reached, regardless of the PID control.
- The response time of the PCV from time of high set point being reached to full closure must be deemed reasonable at the time of the function test.

PC System – Compressor Trip

- Technician must witness the compressor tripping to recycle, idle or shutdown once the set point has been reached.
- If compressor shutdown is used, the function test does not need to be performed during normal operation. Instead, the compressor can be taken down through an appropriate procedure (i.e., a manually controlled stop) to avoid a hard stop actuated by the PC system. In this case, annunciation of the shutdown on the control panel will be accepted.

PC and OPP Systems – Emergency Shutdown Valve

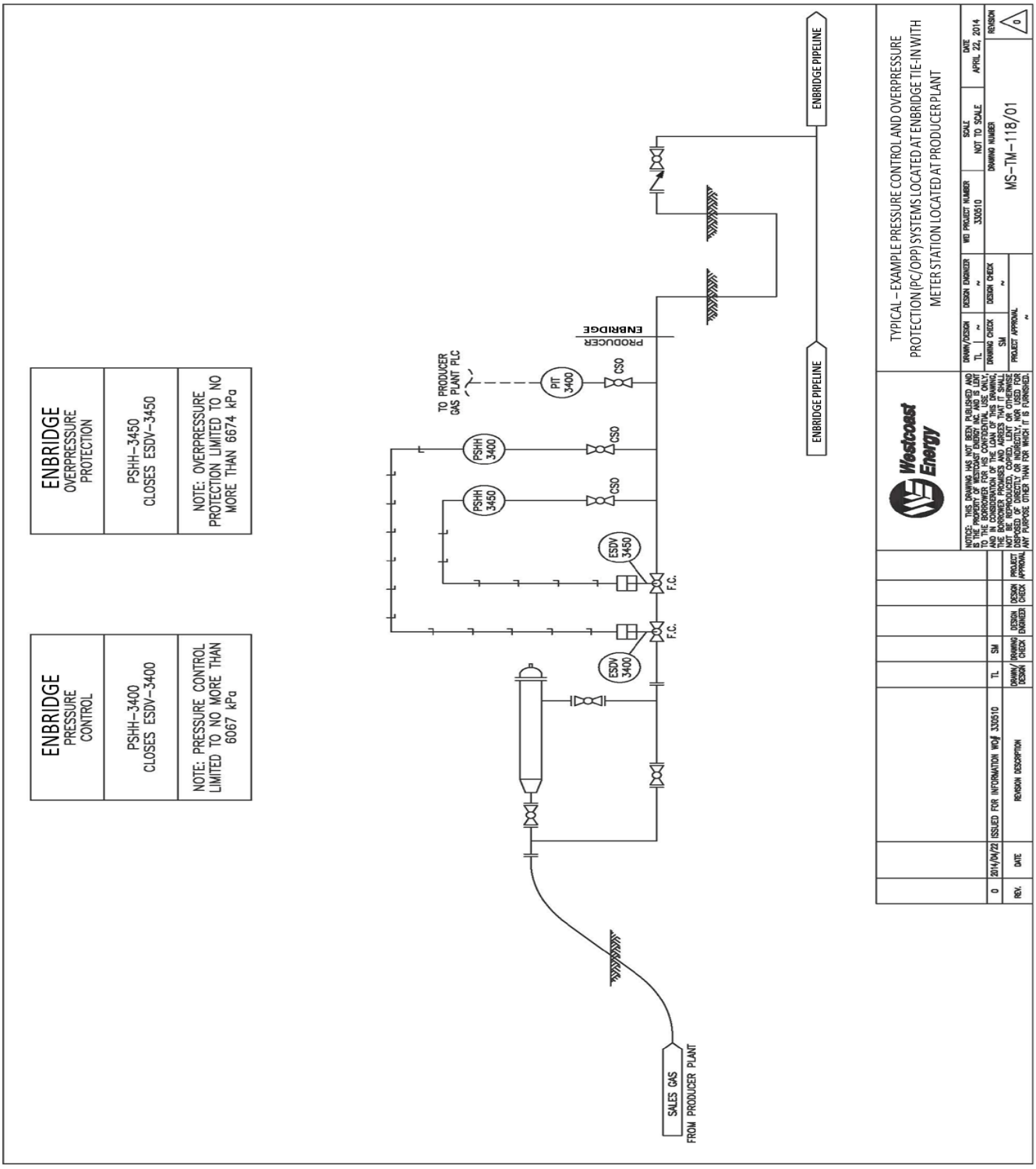
- Technician must witness full ESDV closure once the set point has been reached.
- Auto and remote reset functions are not permitted for OPP systems, the valve must remain latched closed until it is manually reset.
- Technician must confirm the ESDV is fail safe for its application.
- The response time of the ESDV from time of high set point being reached to full closure must be deemed reasonable at the time of the function test.

OPP System – Pressure Safety or Relief Valve

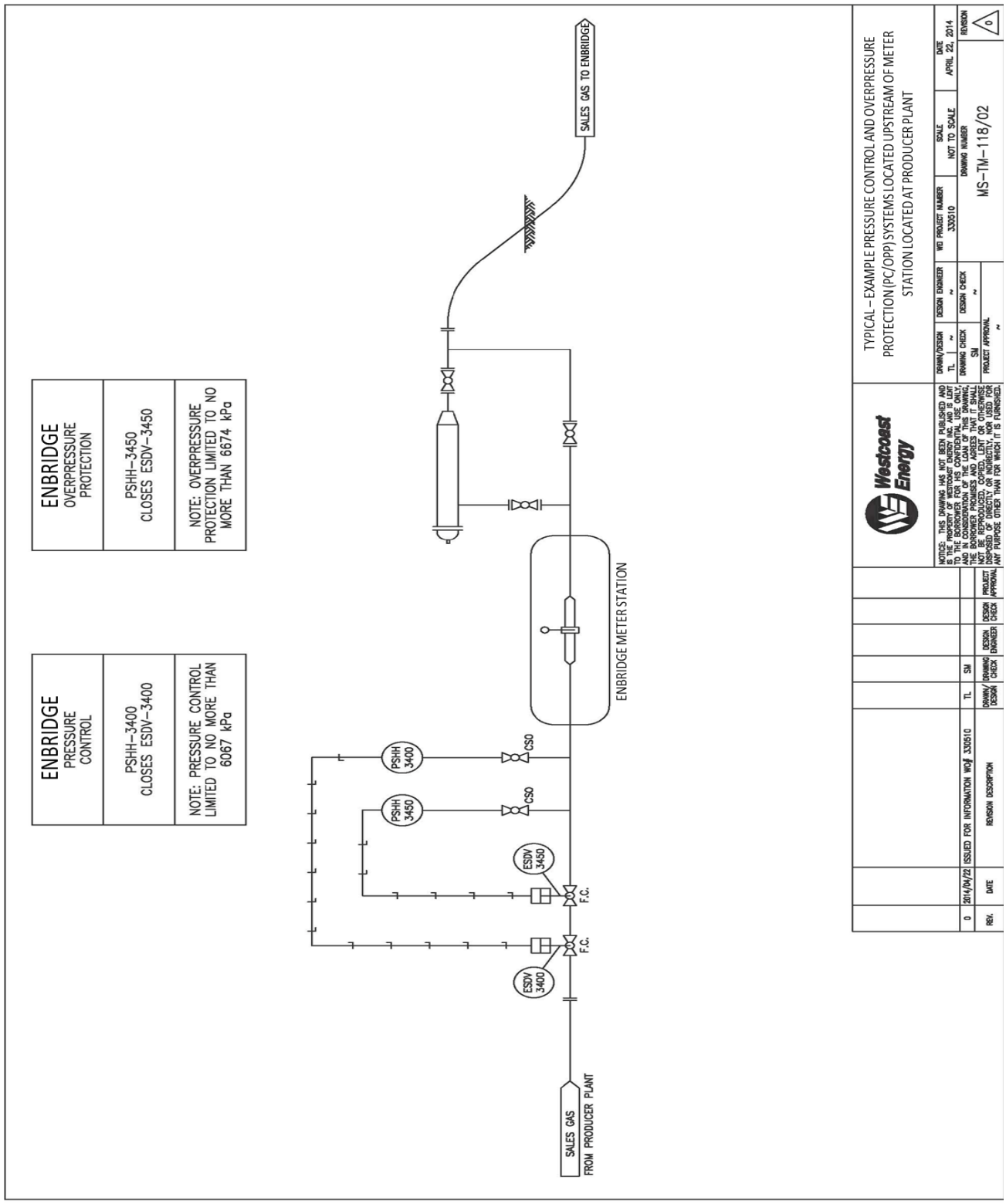
- Technician must have the Receipt Point Operator engineer fully complete Section D of the Enbridge Pressure Control/Overpressure Protection Calibration and Inspection Report.
- Technician must confirm the device has a calibration tag affixed to it that indicates the device's engineering tag number, calibrated set point and last calibration date.
- Technician must confirm the device has a name plate or tag affixed to it by an authorized service provider that indicates the name of the service organization, date of service and the set pressure.
- Technician must confirm the date of last service is not earlier than 18 months of the coming Oct. 1.

Example P&ID Formats

PC/OPP located downstream of Enbridge meter station



PC/OPP located upstream of Enbridge meter station.



Document Control and Maintenance

This section details how this document will be controlled and maintained.

- Changes to this document and related documents will be conducted in accordance with the IMS Element Document and Record Management.
- The archival, retention and disposition of this document and related documents will be conducted in accordance with the Records and Information Management (RIM) Governance Suite as well as the IMS Element Document and Record Management.

Table 4 outlines specific document control details.

Table 4: Document Controls

CONTROL	DESCRIPTION
Business Authority	Director, Engineering, Reliability, and Risk
Periodic Review Frequency	Every four years
Effective Date*	2007-01-01
Controlled/Published Location	GTM Governance Document Library
GDL Document Number	8042
Referenced Documents	"Pressure Control/Overpressure Protection Calibration and Inspection Report" "Receipt Point Change Form"

**Effective Date is the date the document was initially put into service. If the date cannot be determined or is not known, it will be shown as 1900-01-01.*

History of Changes

Changes made to this document are tracked in Table 5.

Table 5: History of Changes

DATE	VERSION*	SUMMARY	APPROVED BY
2007-01-31	0.0	Initial publication	Kerry Checkwitch
2008-03-31	1.0	Updated reference to section 4.18 of Z662-07	Kerry Checkwitch
2013-03-08	2.0	• Updated document and clarified it as it applies to both RGT and BC Pipeline. • Updated reference to CSA Z662-11 sections. • Deleted reference to Spectra seals • Added reference to PC/OPP Inspection Form and a note regarding pressure transmitter requirements at tie-in. • Clarified treatment of legacy sites. • Added new section on Operations and Maintenance requirements. • Updated permissions required for Exceptions.	
2013-05-06	3.0	• Updated note requirements for P&IDs regarding PC/OPP limits. • Removed reference to set points.	
2013-08-09	4.0	Updated general note regarding calibration tag requirements.	
2014-04-27	5.0	• Removed reference to GT&C Article 11 pressure settings • Added requirement to perform PC/OPP inspection prior to Oct. 1. • Changed scope to include SEM. • Clarified P&ID, written description and PSV/PRV assessment requirements for formal approval, including returning approved “marked” documents. • Clarified hand drawn or redlined P&IDs not accepted unless stamped, dated and signed by P.Eng. • Added example P&ID.	
2017-11-28	6.0	• General update • Added requirement to include manufacturer and models in written descriptions • Added requirements for swing sites connected to third parties. • Added password protection of RTUs to prevent unauthorized changes • Added PID loop control over-ride logic • Added manual reset for OPP devices • Added prohibition of liquid mediums for testing. • Added function testing requirements. • Approved through PMOC-17-0076.	
2019-12-07	7.0	Updated references to CSA 662 to account for release of the 2019 version.	
2023-08-16	8.0	• Changed from Engineering Specification to Engineering Standard template • Changed references to document being a specification to a standard	Nathan Feldpausch, Manager, Measurement Engineering
2023-08-18	8.1	• Links updated	Break-fix

**The initial posting of a document in the GTM Governance Document Library will be denoted as Version 1.0.*