



# Hydrogen Maintenance & Conversion facility Guideline

## Introduction

This Plan Review Checklist comprises the subsequent sections, designed to facilitate a comprehensive understanding and compliance with regulations by both TSSA and applicants, with the paramount aim of ensuring public safety.

## Engineering drawings\*

1. Site layout P&ID Showing classified zones, and clearances as per IEC 60079-10.
2. Piping layout and relief vent termination locations as per CGA G-5.5.
3. Protection of tank, piping, and equipment layout as per CGA P-74 and CGA P-50.
4. Location of E stops, and fire protection, gas detection and lightning protection as per IEC 61511, CSA 22.1 and CSA B72.
5. Pressure piping and instrumentation layout Drawings (P&IDs & PFDs)

**\*Drawings and their representative line identification must be stamped by an Ontario Professional Engineer.**

## Checklist instructions

The Checklist contains a summary of the key code requirements of the CAN/BNQ 1784-000/2022 Hydrogen Technologies Code 2022 edition (the Code) in a Checklist format. The Checklist is intended to demonstrate basic site-specific compliance. The TSSA may choose to include additional requirements adhering to the public safety in which the project would be located.

**Note: The requirements for maintenance/ Conversion facilities for compressed hydrogen-fuelled vehicles shall comply with the same requirements as vehicles using compressed natural gas as per the document CSA B401.1.**

No.	Content	Recommendation	Remark
<b>1</b>	<b>Design Documentation</b>		
1.1	Application for permit	Required by ONT/Reg 214	e.g. a statement from the municipality where the Maintenance/Conversion facility is located indicating that the use of the facility for its intended purpose does not contravene the zoning by-laws of the municipality.
1.2	Safety concept	Existing documentation must include risk assessment and preventative maintenance documentation	The facility operator is responsible that the following clauses are included within the overall facility safety concept. The safety concept should be based on the input of the facility manufacturer's analysis of hazards and risk.
1.2.1	Safety devices	Review set pressure of all equipment on the PID and their representative line (e.g. temperature pressure and flow)	all pressurized systems and equipment protected from over-temperature and overpressure by means of one or more pressure-relief devices, either of the self-destructive type like rupture disks or diaphragms, or of the resealable type like spring-loaded pressure-relief valves
1.2.2	Design examination for electrical safety related equipment	Existing documentation must include on a separate drawing hazardous area classification and zones to ensure electrical equipment are rated to their designated zones and comply with local electrical codes and standards.	e.g. IEC60079-10 & CSA 22.1
1.2.3	Protection against the formation of flammable mixtures document/definition of zones incl. protective measures to avoid hazardous atmospheres	Existing documentation include ventilation system, gas sensors, etc.	e.g. ventilation and purging system must have certain air exchanges per volume of room While gas sensors would have LFL limits.
1.2.4	Safety distances	Existing documentation	showing compliance with clearance distances
1.3	Manufacturer's documentation		The facility manufacturer is responsible to provide documentations and certificates
1.3.1	Documentation of conformity of each component	Proven suitability against pressure, temperature and material for given service	e.g. ASME b31.3.
1.3.1.1	Pressure vessel/storage	Proven suitability against pressure,	e.g. ASME B51, B52, B53, CSA B430 or B339



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		temperature and material for given service	
1.3.1.2	Valves	Proven suitability against pressure, temperature and material for given service	e.g. CSA HGV 4.6
1.3.1.3	Dispenser	Proven suitability against pressure, temperature and material for given service	e.g. CSA HGV 4.1, SAE J2601
1.3.1.4	Pumps/compressor	Proven suitability against pressure, temperature and material for given service	e.g. CSA HGV 4.8
<b>2</b>	<b>Manuals, Diagrams, and Instruction</b>		
2.1	Dispenser operation instructions	To verify that the operation of the dispenser is in line with the requirements specified in the operation instructions	Copy of this has to be on site
2.2	Facility operation manual	To verify that the operation of the facility is in line with the requirements specified in the operation instructions	Copy of this has to be on site
2.3	Flow diagrams (P&ID or PFD))	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	Copy of this has to be on site
2.4	Wiring diagrams	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	Copy of this has to be on site
2.5	Installation instructions	Documents should provide safe handling of the components with- in the installation	Copy of this has to be on site
2.6	Facility maintenance manual	Proper procedures for adjustment and replacement of consumables, recommendation on maintenance intervals qualification of personnel and records	Copy of this has to be on site
<b>3</b>	<b>Physical Installation</b>		
3.1	Compliant with manufacturer's instructions		Per manufacturer's instructions
3.2	Layout	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	
3.3	Piping	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	ASME B31.3
3.4	Wiring (especially protective bonding)	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	Field acceptance report (3rd party verification)
3.5	Protection from vehicular impact	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	Local codes
3.6	Fire barriers	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	Local codes
3.7	Fire fighting equipment	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	Local codes
3.8	Safety distances	Documents should be in line with section 1	Measure and confirm distances

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		(design documentation) and fit to the built hydrogen fuelling facility (as built)	
3.9	Equipment enclosures	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	Consider personnel egress and asphyxiation, environment protection
3.10	Personnel access, egress and emergency equipment access	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	Authorized access, emergency escape. CGA P-50
3.11	Flammable gas vent	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	CGA G-5.5 & NFPA 68
3.12	Markings	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	ASME A13.1
3.13	Ventilation system	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	
3.14	Control devices/indications	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	
3.15	Warning Signs	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	
3.16	Equipment plates/label	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	
3.17	Fuelling hose assembly	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	
3.18	Emergency stop	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	
3.19	Emergency contact	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	Operator, gas supplier
3.20	Electrical bonding and protection against lightning	Documents should be in line with section 1 (design documentation) and fit to the built hydrogen fuelling facility (as built)	CSA C22.1 and B72 (should be provided by third party)
3.25	Test of fuelling parameters according to the protocol used	Per applicable clauses of this document	SAE J2601 (should be provided by third party)
<b>4</b>	<b>On-site test/inspection</b>		
4.1	Pressure test	Procedure and TSSA approval are required	Verify pressure test procedures
4.2	Leak test	Procedure and TSSA approval are required	Verify leak test procedures
4.3	ESD system	Site acceptance test is allowed	Verify correct functioning of ESD system. Record inspection.
4.4	Ventilation	Site acceptance test is allowed	Verify correct functioning of ventilation system including visual and audible alarms. Record inspection.

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4.5	Hydrogen detection system	Site acceptance test	Verify correct functioning and calibration of hydrogen detection system including visual and audible alarms. Record inspection.
4.6	Pressure-relief devices		Visually inspect all pressure-relief devices ensuring all tags are in place. Record inspection.
4.7	Dispenser	Site acceptance test is allowed	Observe a fuelling process for each dispenser hose to ensure compliance with this code. Record inspection and noncompliance, if any. Verify that fuelling hoses and nozzles are in good condition. Record inspection and replacement of parts.
4.8	Compressor packages	Site acceptance test is allowed	Verify that compressor shuts down at the correct output pressure. Visually inspect general condition of compressor packages. Check condition of hoses, drive belts, etc. Record inspection and replacement of parts.
4.9	Valves, piping		Visually inspect valves and piping connections for leaks and abnormalities. Record inspection and leaks or abnormalities, if any.
5.0	Site installation		Visually inspect general site including all barriers, fences, walls, doors and other items to verify site compliance with code requirements. Verify that system pressure and temperature are within the design values. Record inspection, pressure and temperature and noncompliance if any.

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