Comparing Propane Autogas Regulatory and Code Requirements in the United States and Canada

Propane Autogas Technology Forum
June 13, 14 2017, Arlington, Virginia

Dick Kauling – Principle
KauliNG Solutions

CANADA 150

 www.kaulingsolutions.com

Propane Autogas Fuel Storage System Mounting – Requirements? versus Execution!

What might be wrong with this approach? Several things can come to mind!

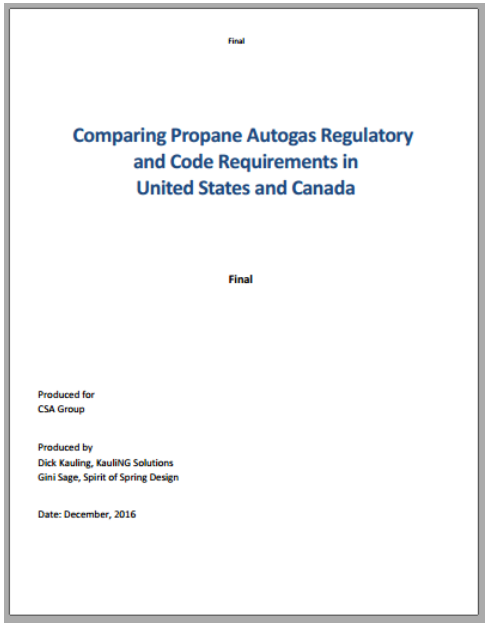
Just because there are standards and they are even drawn into codes and/or regulation it still requires a certain level of enforcement and due care to be sure they are being followed.

Not a “best practise” under any scenario!

http://www.imgrum.net/media/1303053510254729231_3054754956

Comparing Propane Autogas Regulatory and Code Requirements in United States and Canada

- CSA Group funded project
  ANSI accredited standards development organization
- Available through CSA Communities of Interest
- Several hardcopies of report here today


Final

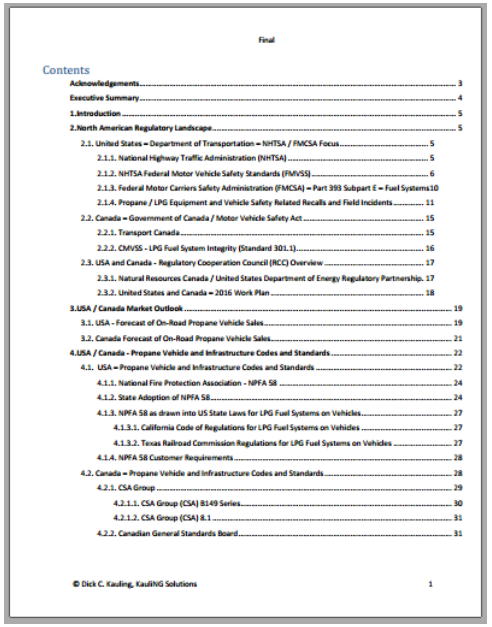
Comparing Propane Autogas Regulatory and Code Requirements in United States and Canada

Final

Produced for
CSA Group

Produced by
Dick Kauling, KauliNG Solutions
Gini Sage, Spirit of Spring Design

Date: December, 2016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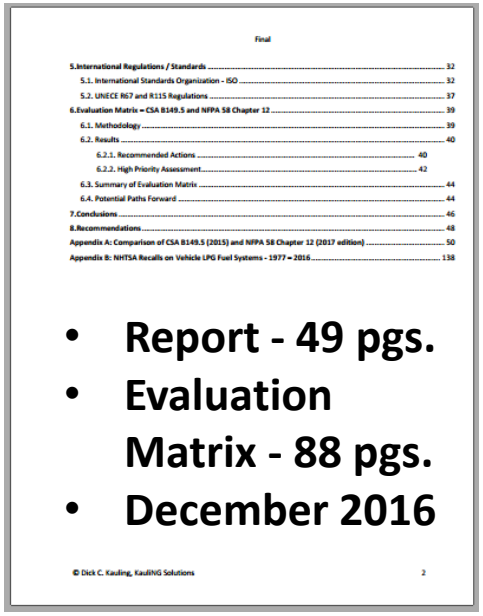
Contents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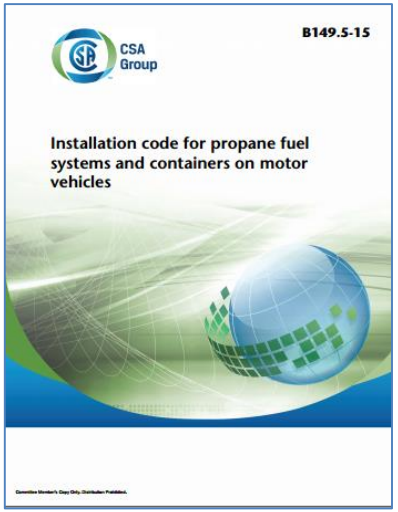
- **Report - 49 pgs.**
- **Evaluation Matrix - 88 pgs.**
- **December 2016**

CSA Sponsored Study – Propane On Road Vehicle – Comparison Matrix



Overarching purpose was to compare and contrast NFPA 58, *Liquefied Petroleum Gas Code*, 2017 edition, Chapter 12 against the 2015 edition of CSA B149.5, ***Installation code for propane fuel systems and containers on motor vehicles,*** published by CSA Group**,** as they relate specifically to "over-the-road propane vehicles" for the purposes of

(1) identifying common and/or similar requirements;
(2) identifying differing and/or unique requirements; and
(3) recommending a potential strategy to achieve an industry supported common approach.

A discussion of this material can be found in Chapter 6 and the detailed review is included as Appendix A.

Highlights framework of relevant federal regulation in the US and Canada:

- Canada-United States Regulatory Cooperation Council
- National Highway Traffic Safety Administration (NHTSA)
- Federal Motor Vehicle Safety Standards (FMVSS)
- Federal Motor Carrier Safety Administration (FMCSA)
- Transport Canada (TC), Canada Motor Vehicle Safety Standards (CMVSS)

Evaluation of LPG / propane safety related recalls and field incidents in the US

Outlook on propane autogas growth in North America

Reviews US and Canadian codes and Standards Development Organizations, specific documents that they publish as they apply to LPG vehicles, and the influence of European regulations and international standards

This report specifically recommended the establishment of a new document: a recommended practice and potential future standard that captures the on-road vehicle fuel system requirements for liquefied petroleum gas (LPG) fueled vehicles for both jurisdictions. That document would include all common and unique requirements; provide a structure and format for future **harmonization** of requirements; include a structure for the identification and development of appropriate component standards (CSA Group, UL, ISO, or others); and provide language to effectively support standards development within the existing code adoption framework in the United States and Canada.

In **standards**, **harmonization** is the process of minimizing redundant or conflicting **standards** which may have evolved independently. The concept borrows from the process to **harmonize** discordant music. The goal is to find commonalities, identify critical requirements that need to be retained, and provide a common **standard.** https://en.wikipedia.org/wiki/Harmonization_(standards)

Comparing Propane Autogas Regulatory and Code Requirements in United States and Canada

Stated more succinctly this report tries to draw out a need to:

"Develop a binational recommend practice that can ultimately become a standard referenced in the US and Canadian code"

Comparison of CSA B149.5 (2015) and NFPA 58 Chapter 12 (2017 edition)

- Process – Clause by clause (parsing) of NFPA 58 Chapter 12 and CSA B149.5
- Output - 88 page breakdown
  - Observation / Recommendation with rationale
  - Priority assessment (technical)

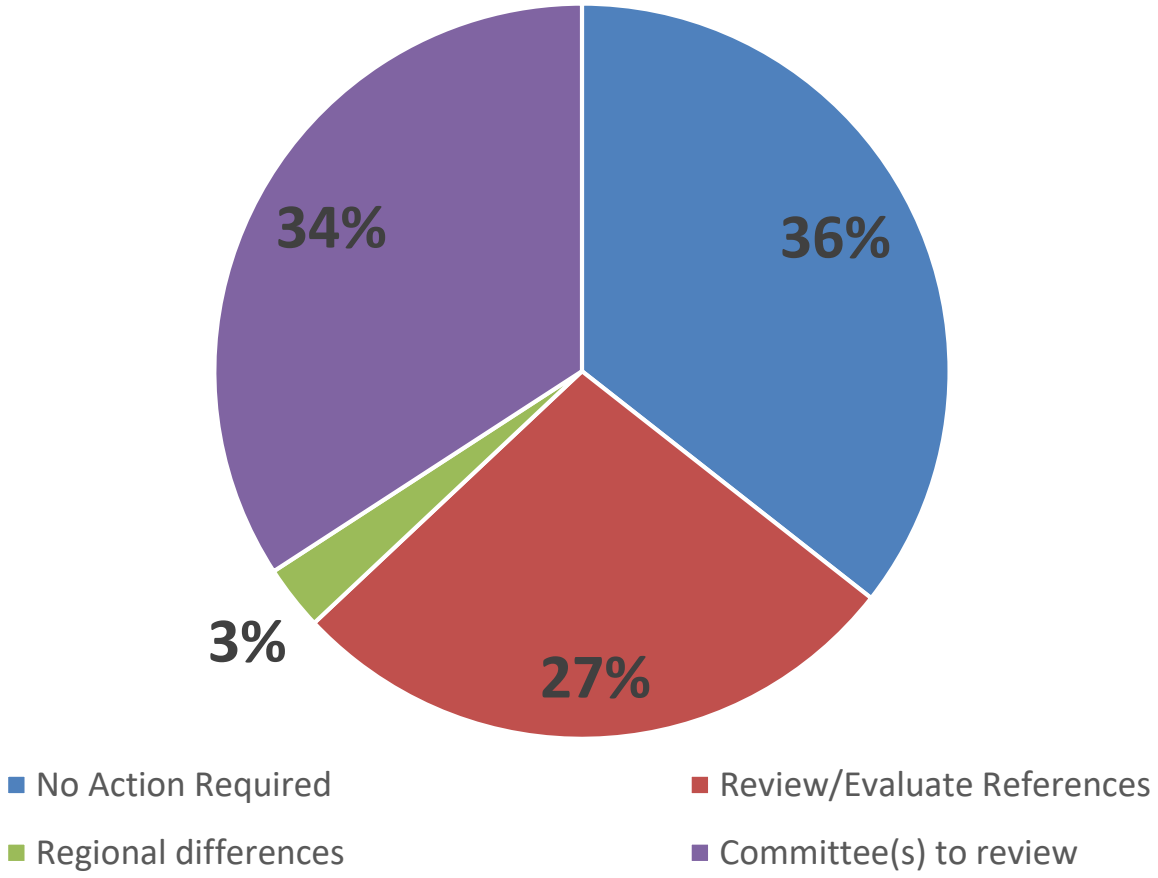
Comparison of CSA B149.5 (2015) and NFPA 58 Chapter 12 (proposed 2017 edition)

Comprehensive "line-by-line" type review of NFPA 58 (proposed 2017 version) against CSA B149.5 (2015) as it relates to "over the road propane vehicles" for the purposes of identifying (a) common and/or similar requirements (b) differing and/or unique requirements and (c) recommending a potential strategy to achieve an industry supported common approach.

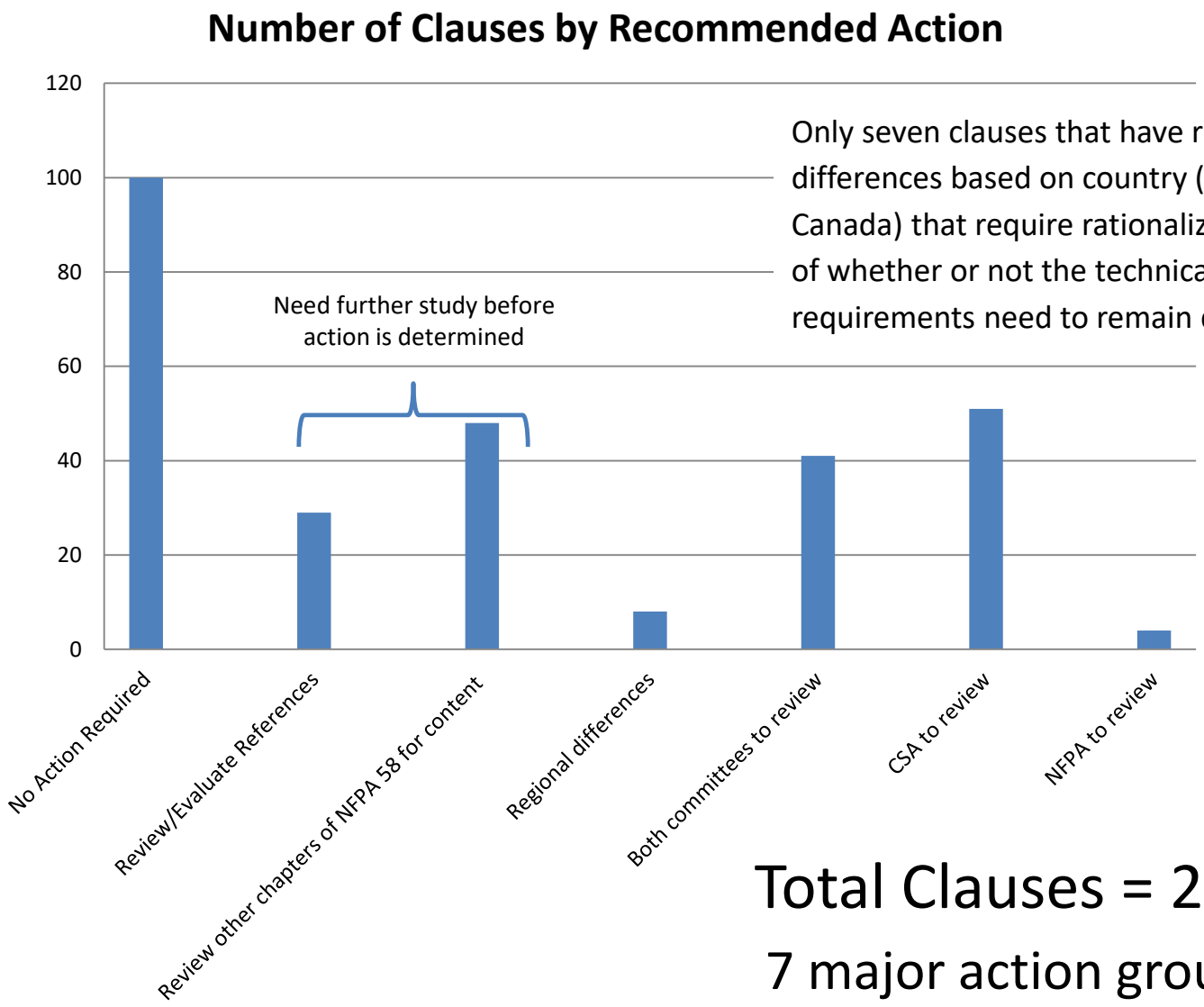
CSA B149.5		NFPA 58 Chapter 12		Observation	Recommendation / Rationale	High Priority
Section /Para.	Requirement	Section /Para.	Requirement			

Definition: parse - analyze (a sentence) into its parts and describe their syntactic roles; analyze (a string or text) into logical syntactic components, typically in order to test conformability to a logical grammar.

Percentage of Clauses by Recommended Action



Clauses by Recommended Action



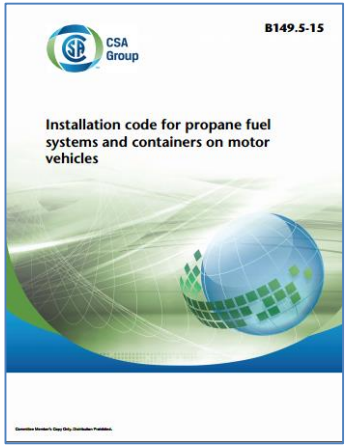
Only seven clauses that have regional differences based on country (USA and Canada) that require rationalization in terms of whether or not the technical requirements need to remain different.

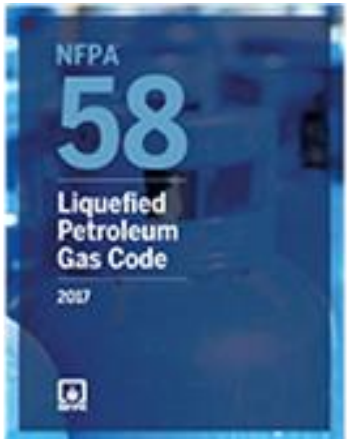
Total Clauses = 281

7 major action groupings

Comparison of CSA B149.5 (2015) and NFPA 58 Chapter 12 (2017 edition)

- Significant Differences
  - Overall scope
  - Definitions
  - Installation of propane fuel systems and tanks on motor vehicles
    - Differences in specifying fuel tanks (and fuel pumps), tank location, mounting, and determination of road clearance
  - Pressure Relief Valve Discharge System
  - Evaporative Emission Control
  - Vehicle marking, labeling and literature
  - Suggested Container Purging Procedure
  - Component requirements
    - Ex: Fill valves, excess flow valves, automatic liquid level control, etc.





Concept Timing – Common Goal

Future Document Development Cycle	Calendar Year				
	2016	2017	2018	2019	2020
NFPA 58 (2020)		D1	D2	D2P TP	
CSA B149.5 (2020)	C			EP	
CSA Binational on-road vehicle standard (new standard development)	R	PM PM PM	TCC	**PP**	
NPGA TS&S Mtg Schedule (March & Sept)	M	M M	M	M	

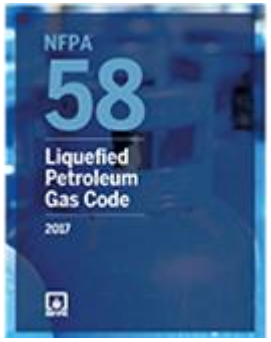
Legend	
CSA B149.5 - Nov. committee meeting	C
CSA B149.5 - estimated publish	EP
NFPA 58 - July - Public Input - 1st Draft	D1
NFPA 58 - May 2018- Public Commnet - 2nd Draft	D2
NFPA 58 - Jan - 2nd Draft Posting Date	D2P
CSA - new document - Resource Commitments	**R**
CSA - new - proposed meeting schedule	PM
CSA - new- Feb 2018- Technical content complete	TCC
CSA - new - Jan 2019 - propose publish (latest)	**PP**
NFPA - Nov. Target publish	**TP**
NPGA TS&S Mtg Schedule (March & Sept)	M

Opportunity to align 2020 version of NFPA 58 Chapter 12 and incorporate by reference with a new CSA binational on-road vehicle standard based on this study (leveraging CSA B149.5, current 2017 NFPA 58 Chapter 12 plus enhancements)

Figure 14: Concept Timing — Common Approach — Future Development Cycle

Given passage of time since report, and currently no clear supported plan to consider a new binational standard in support of 2020 cycle timing may no longer be feasible.

Next Edition Timelines
NFPA 58 – CSA B149.5



Current edition: 2017

NFPA 58: Next Edition: 2020

First Draft
Public Input Closing Date:
6/28/2017
First Draft Report Posting Date:
2/28/2018

Second Draft
Public Comment Closing Date:
5/9/2018
Second Draft Report Posting Date:
1/23/2019

First Draft Meeting Notice October 17-19, 2017, Tampa, FL

Current edition: 2015

CSA B149.5: Next Publication: January 2020

Public Review: December 2018
Technical Committee Ballot: July 2019

National Fire Protection Association — NPFA 58

- With no over arching set of Federal regulations for LPG vehicles, manufactures have to look to State adoption of vehicle requirements.
- States that would automatically adopt the 2017 edition (when available) was not captured in this report.

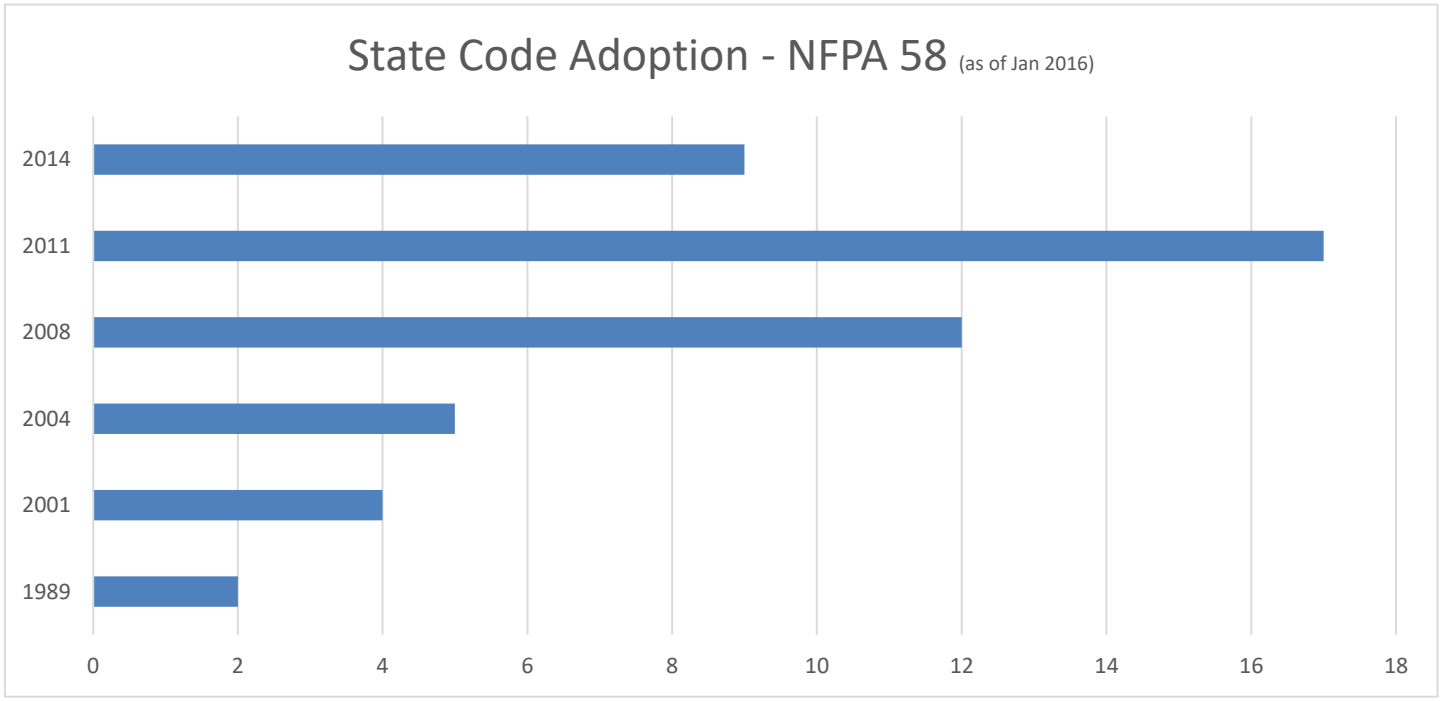


Figure 6: State Code Adoption — NFPA 58 by Edition

National Fire Protection Association — NPFA 58

- Process and rationale by which each state maintains a certain version, adopts a newer version or adds additional unique requirements not assessed
- Specific information obtained through the National Propane Gas Association (NPGA)

State	Edition of NFPA 58 Adopted
Alabama	2011
Alaska	1989
Arizona	2001
Arkansas	State Code
California	2011
Colorado	2011
Connecticut	2011
Delaware	2014
Florida	2011
Georgia	2008
Hawaii	1989 (by county)
Idaho	2004
Illinois	2011
Indiana	2004
Iowa	2014
Kansas	2008
Kentucky	2011
Louisiana	2008
Maine	2011
Maryland	2011
Massachusetts	2011
Michigan	2014
Minnesota	2011
Mississippi	2014
Missouri	2014

State	Edition of NFPA 58 Adopted
Montana	2008 (by reference through IFC)
Nebraska	2001
Nevada	2014
New Hampshire	2008
New Jersey	2011
New Mexico	2001
New York	2008
North Carolina	2014
North Dakota	2014
Ohio	2011
Oklahoma	2014 (Latest)
Oregon	2008
Pennsylvania	2008
Rhode Island	2004
South Carolina	2011
South Dakota	2004
Tennessee	2008
Texas	2008
Utah	2008
Vermont	2011
Virginia	2008
Washington	2001
West Virginia	2011
Wisconsin	2011
Wyoming	2014 (Most Current)

Table 3: Edition of NFPA 58 Adopted by State

Propane / LPG Equipment and Vehicle Safety Related Recalls and Field Incidents

- 80% increase in LPG-vehicle-related recalls from 2000/2009 to the last 6 ½ years (2010 to mid-2016)
- No attempt to correlate the expanded number of LPG vehicle offerings against an increasing number of LPG vehicle recalls is assumed
- Data from last half of 2016 and fist half of 2017 not captured in this report but data publicly available (approx. 9)

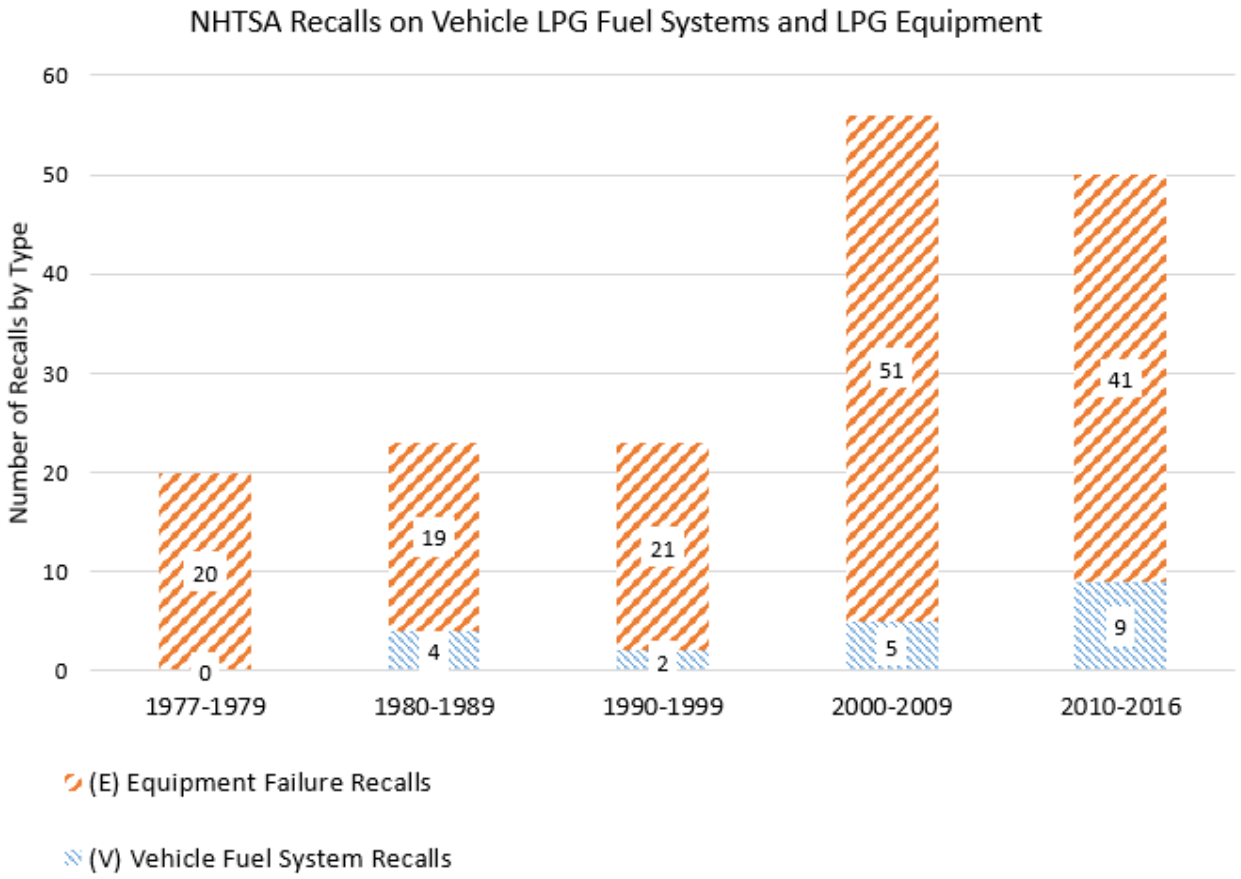


Figure 1: NHTSA Recalls on Vehicle LPG Fuel Systems and LPG Equipment — Frequency by Decade

Propane / LPG Equipment and Vehicle Safety Related Recalls and Field Incidents

- Although the frequency of LPG incidents is an important factor, the underlying cause of single events generates opportunities to learn from field experiences and to better understand lessons learned that can be used to improve codes, standards, and regulations.
- More often than not, the media and the expanded ability for social media to bring incidents to light offers the industry an ability to gain early learnings and helpful additional data to support technical understanding surrounding often complex situations, sequences of events, and potentially rare scenarios

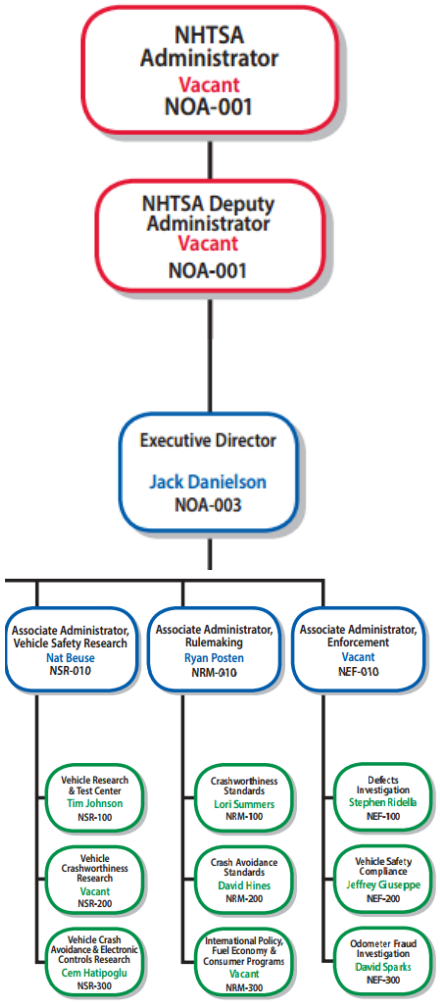
Figure 2: Example — LPG Vehicle Accidents — Field Incidents

NHTSA Related Activity

(not part of report)

- NHTSA is considering requirements for LPG vehicles
- Under the current presidential executive orders, NHTSA is considering voluntary industry standards (and maybe ECE R.67) without being design restrictive provided safety hazards associated with LPG fuel are addressed
- Have highlighted that the previous priority plans may not be valid under the new administration
- Perhaps they will know what the priorities are when they get an administrator
- Continue to appreciate being kept informed on updates to codes and standards

Reference:
Shashi Kuppa – Division Chief of the Special Vehicles and Systems Division, Office of Crashworthiness Standards at NHTSA – June 2017



Source; NHTSA Feb 2017

NHTSA – 2018 Budget Estimates Note: Total $899M

U.S. Department of Transportation

BUDGET ESTIMATES

FISCAL YEAR 2018

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

RULEMAKING **Safety Standards Support**

Program Activity	FY 2017 ANNUALIZED CR	FY 2018 REQUEST	CHANGE FY 2017 - 2018
Safety Standards Support	$2,095,000	$2,041,000	($54,000)

Support the Department's safety priority through regulatory reviews and deregulation involving Federal Motor Vehicle Safety Standards (FMVSSs) and other regulations to identify opportunities for reducing regulation and controlling regulatory costs in alignment with the President's Executive Orders.

Have identified several initiatives including:

- NHTSA will continue to develop test procedures and safety performance requirements for alternative fuel vehicles such as compressed natural gas (CNG), liquid petroleum gas (LPG), and liquid natural gas. NHTSA will also work to harmonize FMVSSs with the United Nations Global Technical Regulation (GTR) No. 13 on hydrogen and fuel cell vehicles. Additionally, the agency will initiate regulatory activity to incorporate a GTR on battery electric vehicle safety into the FMVSSs. (not part of report)

https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/fy2018-nhtsa_cj-05162017-final.pdf

Comparing Propane Autogas Regulatory and Code Requirements in United States and Canada

In closing and to reinforce the key message, this report tries to draw out a need to:

"Develop a binational recommend practice that can ultimately become a standard referenced in the US and Canadian code"

Next Steps / Questions / Comments

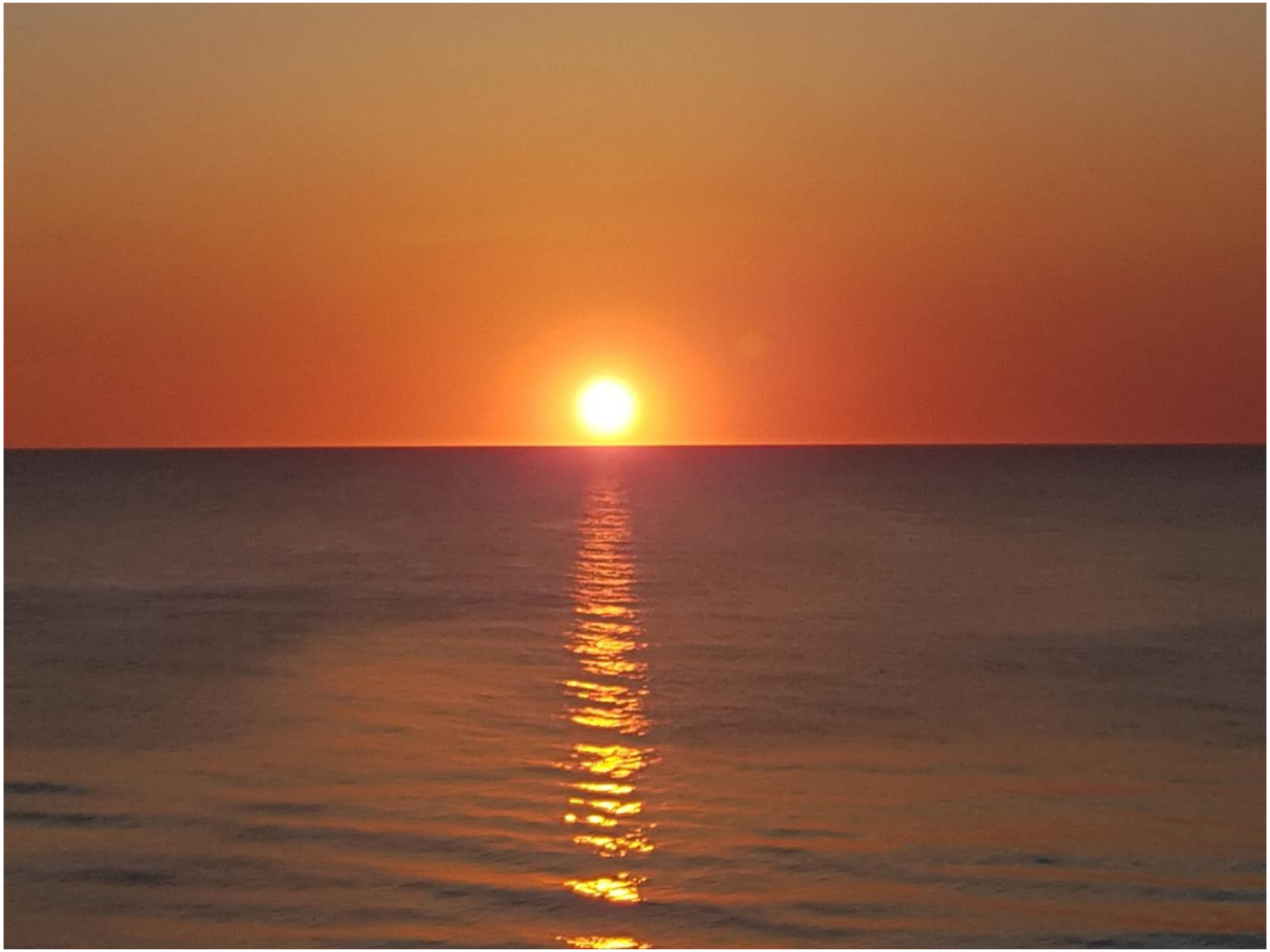
- Share report – available through CSA Communities of Interest
- Discuss results, conclusions and recommendations
- CSA looking for USA industry stakeholders feedback
  - Including NPGA TS&S 1852 committee
  - NHTSA and NFPA
  - Vehicle and equipment providers most involved with autogas technology
  - Explore moving forward in developing a new CSA binational LPG fuel system standard

Dick Kauling
KaulING Solutions
Whitby, Ontario
C 905-447-8404
dick@kaulingsolutions.com

Brent Hartman
Program Manager, Alternative Energy
CSA Group
8501 East Pleasant Valley Road
Cleveland, OH 44131
T 216 524 4990 Ext. 88061
C 216 347 2293
brent.hartman@csagroup.org
www.csagroup.org

Questions

Accidents do happen!



Back-up material not presented today

- Report Recommendations (details)
- Regulatory Cooperation Council - 2016 - Year 2 Work Stream D
- NHTSA Report - Motor Vehicle Fires in Traffic Crashes and the Effects of the Fuel System Integrity Standard
- NHTSA Report - *Review and Analysis of Potential Safety Impacts of and Regulatory Barriers to Fuel Efficiency Technologies and Alternative Fuels in Medium- and Heavy-Duty Vehicles*
- Federal Motor Carrier Safety Administration (FMCSA) — Part 393, Subpart E — Fuel Systems
- UN/ECE R67 / R115
- ISO TC 22 / SC 41 - Specific aspects for gaseous fuels

Report Recommendations (details)

- Report should be supported and used by the NPGA Technology, Standards, and Safety Committee addressing future changes to NFPA 58, Chapter 12 (target 2020 edition) and the current CSA B149.5 Technical Committee working on the 2020 edition. It is hoped, regardless of consideration of the over-arching recommendations, that the detailed "line-by-line" assessment of the current code documents can provide thoughts for both committees to address visible disconnects, look for additional actions that could be taken independently to clarify, and attempt harmonization through their best efforts.
- Establishment of a new document: a recommended practice and potential future standard that captures the on-road vehicle fuel system requirements for LPG fueled vehicles for both jurisdictions. That document would include all common and unique requirements; provide a structure and format for future harmonization of requirements; include a structure for the identification and development of appropriate component standards (CSA Group, UL, ISO or others); and provide language to effectively support standards development within the existing code adoption framework.
- A new standard could then be incorporated by reference within the existing code documents recognized in the US and Canada. The development of a new standard would need to be recognized as an industry need, supported by the industry through the active allocation of resources, and specifically charged to CSA Group to actively develop under their existing Alternative Energy for Transportation structure, balanced participation, and consensus-based process.
- It is also recommended that if the strategy to develop this new LPG vehicle fuel system standard were to be supported by all critical stakeholders, including NFPA, a "seed document" should be prepared on an urgent basis. Under the guidance of a new CSA Group Committee, the cross jurisdictional document could be developed in time to be included by reference in the next planned editions of NFPA 58 and CSA B149.5. The creation of this "seed document" would be a specific additional work product strategically structured with a vehicle and fuel system focus, leveraging this report as well as knowledge and access to additional technical content and industry detailed insights. It is recommended that the document would need to be produced in parallel with establishing the committee structure and staffing the technical contributors that would develop the specific standard over the next 18 months.

RCC – Year 2 NRCan/DOE Work Plan - Work Stream D

REGULATORY COOPERATION COUNCIL – JUNE 2016 WORK PLAN

Work stream D - Other Alternative Fuels	Objective: To have comprehensive consultation with industry stakeholders, in order the identify priority gaps and misalignments in the codes and standards for the other market ready alternative fuels currently used in transportation (e.g. hydrogen, electricity, propane, etc.) Rationale: This is a new initiative, which builds on the decision to expand the scope of this work to include all alternative fuels for on-road transportation, at the May 4th event. Once this first step is completed, the individual activities will be included in the relative work streams, in a revised work plan.		
		United States	**Canada**
Department/ Agency		Department of Energy	Natural Resources Canada
Planned Initiatives and Sub-deliverables			**Date**
Initiative A – Stakeholder Consultation			
1	• Consult with stakeholders from the various alternative fuels (e.g. propane, electricity, hydrogen, etc.) to identify the priority gaps and misalignments in the relevant codes and standards, pertaining to each fuel		• June 2016 – October 2016
2	• Develop a comprehensive list of additional activities to address the issues.		• November 2016
3	• Revise work plan to include these new activities.		• December 2016

http://trade.gov/rcc/documents/2016_RCC_Alternative_Fuel_Use_in_Transportation_Work_Plan.pdf

Motor Vehicle Fires in Traffic Crashes and the Effects of the Fuel System Integrity Standard

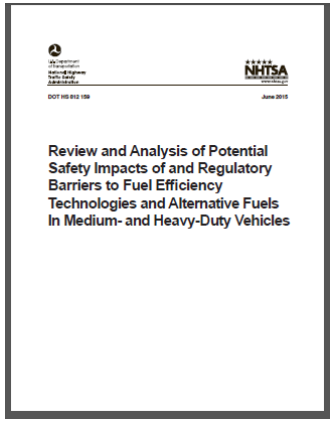
The Fuel System Integrity Standard is intended to reduce the chances of injury and fatality due to fires which result from motor vehicle crashes.

Though crashes with fires are relatively rare, fires in motor vehicle crashes have long been a topic of interest and concern. By its very nature, the occurrence of fire can significantly increase the risk of injury in motor vehicle crashes. Fire is of particular concern in crashes where entrapment of the vehicle occupants has occurred, due to jammed doors, or other collapsed vehicle structures that may have pinned the occupants inside the vehicle. Fire is also of concern in crashes where the nature or extent of injury prohibits occupants from extricating themselves. In both of these instances, the presence of fire has the significant potential for increasing injury beyond that caused by crash impact forces.

Due to the hazard it creates, and the speed with which it can spread, it is obviously preferable to attempt to reduce the risk of crash fires occurring rather than to rely on potential rescue efforts, once a fire has started. This is the aim of FMVSS 301. The requirements of this Standard are intended to strengthen and protect the vehicle's fuel system, so that in a crash event, the chances of fuel leakage, and consequently the chances of fire and occupant injury, will be reduced. Because of the highly flammable properties of gasoline, it is an obvious first choice as the source of combustible material in motor vehicle crash fires.

http://www.nhtsa.gov/cars/rules/regrev/evaluate/807675.html

NHTSA, Federal Motor Vehicle Safety Standards (FMVSS) – *Currently there are no LPG fuel system integrity requirements*



In June 2015, NHTSA published DOT HS 812 159**, *Review and Analysis of Potential Safety Impacts of and Regulatory Barriers to Fuel Efficiency Technologies and Alternative Fuels in Medium- and Heavy-Duty Vehicles*.**

The report offers the following summary:

> *The heavy-duty vehicle category, which spans from ¾-ton pickup trucks and vans up to the largest tractor-trailers, represents a major opportunity to cut transportation oil use and carbon pollution. […] The findings suggest that the **potential safety hazards identified during** operation, maintenance, and **crash scenarios can be prevented or mitigated by complying with safety regulations, voluntary standards, and industry best practices**.*

Section 2.2.3 of the report specifically focuses on liquefied petroleum gas (propane), and Section 2.2.3.4 of the report offers conclusions and recommendations. Although the report offers a generally neutral point of view, with limited specifics on LPG vehicles based on the level of analysis performed as part of the study, it might be suggested that **additional lessons learned do in fact exist that may not fully be captured in today's codes, standards and regulations**.

Federal Motor Carrier Safety Administration (FMCSA) — Part 393, Subpart E — Fuel Systems

FMCSA has specific regulations in terms of liquefied petroleum fuel systems as they pertain to commercial motor vehicles, requirements over and above what NHTSA specifies

§393.69 Liquefied petroleum gas systems.

(a) A fuel system that uses liquefied petroleum gas as a fuel for the operation of a motor vehicle or for the operation of auxiliary equipment installed on, or used in connection with, a motor vehicle must conform to the "Standards for the Storage and Handling of Liquefied Petroleum Gases" of the National Fire Protection Association, Battery March Park, Quincy, MA 02269, as follows:

(1) A fuel system installed before December 31, 1962, must conform to the 1951 edition of the Standards.

(2) A fuel system installed on or after December 31, 1962, and before January 1, 1973, must conform to Division IV of the June 1959 edition of the Standards.

(3) A fuel system installed on or after January 1, 1973, and providing fuel for propulsion of the motor vehicle must conform to Division IV of the 1969 edition of the Standards.

(4) A fuel system installed on or after January 1, 1973, and providing fuel for the operation of auxiliary equipment must conform to Division VII of the 1969 edition of the Standards.

(b) When the rules in this section require a fuel system to conform to a specific edition of the Standards, the fuel system may conform to the applicable provisions in a later edition of the Standards specified in this section.

(c) The tank of a fuel system must be marked to indicate that the system conforms to the Standards.

[36 FR 15445, Aug. 14, 1971, as amended at 37 FR 4342, Mar. 2, 1972; 41 FR 53031, Dec. 3, 1976; 53 FR 49400, Dec. 7, 1988]

Regulation refers to "'Standards for the Storage and Handling of Liquefied Petroleum Gases' of the National Fire Protection Association". That Standard is currently NFPA 58, *Liquefied Petroleum Gas Code*.

Placeholder -

UNECE - UN Regulation No. 67 and UN Regulation No. 115 Activity:
- any relevant or critical or relevant activity / changes

note: not the intent to get into the status surrounding all this activity but to create awareness of potential ongoing changes as they may impact NFPA 58, Chapter 12 and CSA B149.5 activities

ISO/TC 22/SC 41 Activity
- focus on any upcoming meetings or key activity

note: not the intent to get into too much detail but to provide audience a sense of activity at ISO (where CSA has the USA and Canada vote) on activity that might influence NFPA 52 Chapter 12 (and other chapters) and B149.5.

UN/ECE Regulation 67 / 115

UNECE

World Forum for Harmonization of Vehicle Regulations (WP.29)

New Vehicles

Regulation No 67 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning:

I. Approval of specific equipment of motor vehicles using liquefied petroleum gases in their propulsion system;
II. Approval of a vehicle fitted with specific equipment for the use of liquefied petroleum gases in its propulsion system with regard to the installation of such equipment

Retrofit

Regulation No 115 of the Economic Commission for Europe of the United Nations (UN/ECE) Uniform provisions concerning the approval of:

I. specific LPG (liquefied petroleum gases) retrofit systems to be installed in motor vehicles for the use of LPG in their propulsion system;
II. specific CNG (compressed natural gas) retrofit systems to be installed in motor vehicles for the use of CNG in their propulsion system

UN Regulation No. 67 | Liquefied Petroleum Gas Equipment

Proposed changes submitted

- 5 - April(2017),
- 2 – February (2017)
- 2 – October (2016)
- 1 – July (2016)

Note: Contracting parties – 41 countries BUT does NOT include the United States and Canada

Status of incorporation, adoption unknown- minutes of meetings not released to the best of my knowledge

Application Scope
M: Passenger vehicles
N: Commercial vehicles

Text (Addenda to the 1958 Agreement)
Revision 3 (2012)
Revision 3 | Corrigendum 1 (2012)
Revision 3 | Corrigendum 2 (2012)
Revision 3 | Amendment 1 (2013)
Revision 3 | Amendment 2 (2013)
Revision 3 | Amendment 3 (2014)
Revision 4 (2014)

Earlier texts may be available through the UN Official Document System.

26 Apr	The importance of the type definition in the UN Regulation No. 67 type-approval process (GRSG-112-37)
24 Apr	Proposal for amendments to UN Regulation No. 67 (GRSG-112-32)
24 Apr	Proposal for amendments to UN Regulation No. 67 (GRSG-112-31)
24 Apr	Proposal for amendments to Regulation No. 67 (GRSG-112-22)
24 Apr	Proposal for amendments to the 01 series of amendments to Regulation No. 67 (GRSG-112-21)
24 Apr	AEGPL comments on Poland's Supplement proposal for UN R67 (GRSG/2017/10) (IGPG-112-20)
24 Apr	Proposal for Supplement 15 to the 01 series of amendments to Regulation No. 67 (GRSG-112-19)
03 Feb	Proposal for Supplement 15 to the 01 series of amendments to Regulation No. 67 (GRSG/2017/10)
03 Feb	Proposal for Supplement 15 to the 01 series of amendments to Regulation No. 67 (GRSG/2017/3)
14 Oct 2016	Updated proposal for amendments to UN Regulation No. 67 (GRSG-111-19/Rev.1)

https://globalautoregs.com/rules/78

UN Regulation No. 67 | Liquefied Petroleum Gas Equipment

April and February 2017 Initiatives

- Proposal to establish a requirement for easy access to the LPG container installation in order to permit visual (periodical) inspection as a means to reduce the safety risks, such as refueling explosion, due to corrosion.
- Proposal to require that components connecting the pressure relief device with the gaseous phase be made of metal.
- Proposal to introduce a maximum service life requirement of 15 years and for the location of the filling unit of the LPG tank on vehicles.
- Proposal to introduce tolerances for dish, bayonet, and acme filling units in order to reduce risks of misuse in connecting these filling units with nozzles.
- Proposal to allow for the approval of systems using non-seamless double and single wall tubes subject to testing for high pressure and high resistance to pressure pulses. The proposal would also add general test requirements for LPG fuel lines and couplings based on ISO Standard 15500 for compressed natural gas equipment.
- Proposal to clarify the definitions of LPG container accessories to facilitate coordination between the separate, independent approvals required for the LPG container and for its accessories. The proposal aims to ensure proper coordination between container approvals (which involve testing with accessories attached) and accessory approvals (which may be subsequent to the original container approval and therefore, relevant to its validity).
- Proposal to establish procedures for the approval of non-seamless double and single wall gas tubes provided they can withstand the applicable tests according to Annex 15.

ISO/TC 22/SC 41

Specific aspects for gaseous fuels

- TC – Road Vehicles / SC 41 - Specific aspects for gaseous fuels
- ISO/TC 22/SC 41 - directly responsible for 64 published standards (six work groups)
- 1 published and 8 draft LPG standards under development +
- 16 participating countries, 10 observing countries
- CSA Group manages TC22/SC41 for USA (ANSI)++ and Canada - Standard Council of Canada (SCC)

++ ANSI assigned to CSA (was SAE)

+ published - tank, draft - refuelling connector, General requirements and definitions, Performance and general test methods, 80% tank valve, Level indicator, Float, Pressure relief valves (PRV), Pressure relief device (PRD)