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Dr Peter Fisk
Chief Executive and Chief Metrologist
National Measurement Institute (NMI)
36 Bradfield Road,
Lindfield, NSW 2070
Via email: NMILegalMetrologyPolicy@measurement.gov.au

GEA RESPONSE TO NMI CONSULTATION - DENSITY MEASUREMENT IN THE RETAIL SITES OF LIQUIFIED PETROLEUM GAS

Dear Dr Fisk

I am writing to you on behalf of the members and associates of Gas Energy Australia (GEA) in response to the NMI Density Measurement in the Retail Sale of Liquefied Petroleum Gas (LPG) discussion paper dated November 2016.

GEA offers the following responses to the questions outlined in the discussion paper.

Question 1. Should the current requirement to include a means of density measurement (eg, via a probe) in LPG dispensers be maintained? If so, why?

GEA considers the requirement for automatic density compensation is an unnecessary mandatory regulation that imposes additional costs on consumers without yielding any benefits. It notes the following in support of this position.

A. Dispensers supplying propane only (as is the case in most of rural and regional Australia) do not require density compensation as the density parameter for propane can be directly set at 0.51.

B. Where a mix of propane and butane is supplied, the amount of butane is physically limited to a maximum level of 50% to meet the Australian Fuel Quality Standard for autogas (Motor Octane Number (MON) 90.5). As such, using a density average in between a 50/50 mix and propane or a volume correction factor intermediate between a 50/50 mix and propane, the temperature at which the volume difference exceeds the 0.4% required under the *National Trade Measurement Regulations 2009* is 36 degrees Celsius. **Attachment 1** demonstrates the scope to use temperature correction only to determine LPG volumes sold.

    1) In underground storage tanks, the ground temperature maintains the autogas mixture temperature well below 35 degrees Celsius.

    2) In above ground storage tanks, while the ambient air temperature increases autogas mixture's temperature more than in an underground structure, the product generally will remain well below 35 degrees through a combination of tank design (including mass of the tank and the white coating) and the underground piping to the dispenser. In all but extreme situations, the supply temperature will remain below 35 degrees and where this is exceeded it is the consumer who benefits.

C. The autogas metrology realities noted above have enabled pre-1997 regulated dispensers to be operated effectively without the need for automatic density compensation.

D. Automatic density compensation is not required for:

1) petrol or diesel sold in Australia;

2) the determination of quantities of autogas for fuel excise purposes in Australia; or

3) autogas sold in overseas jurisdictions. (see Measurement Canadian Volume correction factors—liquefied petroleum gas or propane - https://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00136.html).

Question 2. What are the current costs and/or savings incurred by your business as a result of this requirement?

While the financial impact of the current requirement will vary for different businesses, GEA has received feedback from members that it imposes costs in the following areas.

A. Up front capital costs of density probes which are not required.

B. Higher maintenance and operational costs.

C. Additional down time when density probe compensation fails and shuts down refuelling systems.

Question 3. What are the current benefits realised by your business as a result of this requirement?

GEA has received no feedback from its members that this requirement delivers any benefits.

Question 4. Should the current requirement to include a means of density measurement (eg, via a probe) in LPG dispensers be amended? If so, why?

Yes, GEA suggests that the current requirement should be abolished and indeed should never have been included originally as it is unnecessary as noted in relation to Question 1. It should be replaced by the autogas metrology discussed above which has enabled pre-1997 regulated dispensers to operate effectively and maintain correct weight and measure for consumers without the need for automatic density compensation.

Question 5. If so, what alternative methods could be developed and implemented to directly measure, determine or otherwise account for LPG density in order to ensure ongoing correct measure in the retail sale of LPG?

GEA suggests that the Australian Fuel Quality Standard – Autogas which limits the supply composition (propane only) and the nature of the LPG infrastructure (underground and above-ground tank configuration) coupled with the current annual calibration requirements are sufficient to ensure correct weight and measure for consumers.

Question 6. What are the costs and/or savings that would be incurred by your business as a result of such alternative methods?

GEA has received feedback from members that the use of autogas metrology as discussed in our response to Questions 4 and 5 would deliver savings for businesses and consumers by eliminating:

A. the up front capital costs of density probes;

B. the higher costs associated with maintaining and operating density probes; and

C. the additional down time when density probe compensation fails and shuts down refuelling systems.

Question 7. What are the benefits that would be realised by your business as a result of such alternative methods?

GEA has received feedback from members that the use of autogas metrology as discussed in our response to Questions 4 and 5 would deliver the following benefits.

A. Less down time, and greater customer availability and service.

B. Lower maintenance and calibration costs.

Questions 8-12 relate to retail sites and this data would be supported by the NMI calibration reports.

GEA suggests that the NMI has sufficient data in their calibration reports and can compare post and pre-1997 regulated sites to confirm accurate measure is being delivered to the consumer.

Conclusion

GEA thanks the NMI for the opportunity to respond to the NMI Density Measurement in the Retail Sale of Liquefied Petroleum Gas discussion paper and looks forward to a quick resolution of this matter and the removal of the mandatory requirement for density compensation which costs consumers and business and does not add to correct weight and measure for consumers.

Yours sincerely

John Griffiths
Chief Executive Officer

Attachment 1

Using temperature correction only to determine LPG volumes sold

This attachment demonstrates the scope to use temperature correction only to determine LPG volumes sold as is done in Canada and jurisdictions in the United States of America. The *National Trade Measurement Regulations 2009* require that where LPG is sold by volume it must be sold by the amount of litres that it would occupy at a temperature of 15 degrees Celsius. Currently this requires correction using density and temperature. The target is +/-0.4% as the component of the 1% accuracy required under legislation.

The following notes underpin the calculations shown in Table 1 below.

- Volume increase associated with increase in temperature can be calculated from the coefficient of cubical expansion
- Calculated using coefficients of cubical expansion included in typical values of petroleum products published by the Australian Institute of Petroleum
- Coefficient of cubical expansion for propane is 0.0029 per degrees Celsius
- Coefficient of cubical expansion for butane is 0.0020 per degrees Celsius
- Butane is not sold through the bowser except as a component as autogas and is limited to 50% by physical properties such as minimum pressure and octane
- Coefficient of cubical expansion of mix (50/50 propane /butane) is 0.0025 per degrees Celsius
- Density of a 50/50 mix propane/butane at 15 degrees Celsius would be 0.545, average of propane density at 0.510 and butane at 0.580.

The columns in Table 1 below are comprised of the following.

Column 1	temperature in degrees Celsius
Column 2	volume of 1.0000 litres of propane at observed temperature using coefficient of cubical expansion of 0.0029 per degrees Celsius
Column 3	volume of 1.000 litres of 50/50 mix at observed temperature using coefficient of cubical expansion of 0.0025 per degrees Celsius
Column 4	% difference in volume between mix and propane at the nominated temperature to indicate the % variation between mix and propane using the same temperature correction factor for both
Column 5	Temperature correction factor from Canadian propane measurement standard
Column 6	Volume at nominated temperature using a modified temperature correction factor that is between Propane and Mix and is 0.0027 per degrees Celsius
Column 7	% Difference between propane and mix using a modified temperature correction factor of 0.0027

In summary, Table 1 below shows that at 36 degrees Celsius when using an intermediate coefficient of cubical expansion between propane and a 50/50 mix, the difference between the propane volume and that calculated is -0.042% and between the mix and that calculated and reported is +0.42%.

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TABLE 1: Increase in volume from 15 degrees Celsius associated with increase in temperature

Column 1	Column2	Column 3	Column 4	Column 5	Column 6	Column 7
temperature	Propane	Mix	Diff propane and mix %	Propane temp correction factor Used ex Canada	Modified Temp correction factor Part mix/part P	Mod temp correction % diff
15	1.0000	1.000	0			
16	1.0029	1.0025	0.05	0.9971	1.0027	-0.02p +0.02m
15	1.0058	1.0050		0.9942	1.0054	0.04
18	1.0087	1.0075		0.9913	1.0081	0.06
19	1.0116	1.0100		0.9884	1.0108	0.08
20	1.0145	1.0125		0.9855	1.0135	0.1
21	1.0174	1.0150		0.9825	1.0162	0.12
22	1.0203	1.0175		0.9796	1.0189	0.14
23	1.0232	1.0200		0.9766	1.0216	0.16
24	1.0261	1.0225		0.9736	1.0243	0.18
25	1.029	1.0250	0.4	0.9705	1.0270	0.20
26	1.0319	1.0275	0.44	0.9675	1.0297	0.22
27	1.0348	1.0300	0.48	0.9644	1.0324	0.24
28	1.0377	1.0325	0.52	0.9613	1.0351	0.26
29	1.0406	1.0350		0.9582	1.0378	0.28
30	1.0435 (0.9966)	1.0375 (0.9909)	0.57 0.58	0.9551	1.0405 -0.3 (vp) +0.3 mix (0.9611)	0.3 (0.9611)
31	1.0464	1.0400		0.9519	1.0432	0.32
32	1.0493	1.0425		0.9487	1.0459	0.34
33	1.0522	1.0450		0.9495	1.0486	0.36
34	1.0551	1.0475		0.9423	1.0513	0.38
35	1.058	1.0500		0.9391	1.054	0.40
36	1.0609	1.0525		0.9358	1.0567 -0.42 (vp) +0.42(mix)	0.42 (0.9463)
37	1.0638	1.0550		0.9325	1.0594	0.44
38	1.0667	1.0575		0.9292	1.0621	0.46
39	1.0696	1.0600		0.9258	1.0648	
40	1.0725 (0.9893)	1.0625 (0.9800)	0.93 0.94	0.9224	 1.0675	