

EPCA Report No. 29 (January 2007)

Automotive CNG fuel specifications proposed by the committee constituted by EPCA

In the matter of W.P. (C) No.13029 of 1985; M.C. Mehta v/s UOI & others

1. It was brought to EPCA's notice that the government agencies have been unable to formulate and finalise quality standards for the CNG currently being used in the automobile programme in the capital and other cities. This issue was becoming increasingly important as gas quality specifications are critical for both safety, maintenance of on-road vehicles as well as for the development of new technologies of vehicles running on gas.
2. EPCA was informed of ongoing discussions at the Bureau of Indian Standards (BIS) and that it had not yet reached any conclusion even after the 2 year old process.
3. EPCA then set up a mutli-stakeholder committee, which included representatives of the gas companies, vehicle manufacturers, gas distribution companies and senior scientists. This committee set up in October 2006 was tasked with formulating automotive CNG specifications and to propose detailed specifications.
4. In December, the committee finalised the automotive CNG fuel specifications and presented them to EPCA. The report of the committee was unanimous and represents the best fuel-technology standard for gas. EPCA has since then sent the report of the committee with the finalized gas specification standards to the concerned ministries and departments – namely, the Ministry of Petroleum and Natural Gas and the Bureau of Indian Standards – directing them to finalise their gas standards at the earliest.
5. This report is to inform the Hon'ble Court of the work done. EPCA will continue to pursue the matter with the concerned ministries and keep the Hon'ble Court informed.

Environment Pollution (Prevention & Control) Authority
for the National Capital Region

Background

EPCA is monitoring the CNG programme in Delhi on a continuous basis to be able to address the key operational concerns related to safety and emissions. EPCA would like to keep the Hon'ble Supreme Court informed about the key developments and the initiatives in this regard to streamline the operational phase of introduction of the mandated fuel and technology.

During the periodic consultations on the related matter it was brought to the notice of EPCA that the government has not laid down the fuel specifications for CNG fuel even though the CNG programme implementation has been in progress for the past eight years. In view of the vast scale of the programme, the current plans for further augmentation and the prospect of getting more advanced CNG bus technology, urgent finalisation of the fuel norms have become necessary.

EPCA has therefore, held a series of meetings and taken a number of steps with the concerned agencies to expedite the matter. These are as follow:

- i. In a meeting held in September 2006, EPCA asked Indraprastha Gas Limited (IGL) to submit a note on the specifications for CNG fuel supplied in Delhi for motor vehicles and compare these with those suggested in the Auto Fuel Policy.

Expert consultation organised on this issue further showed that the specifications proposed by IGL were inadequate, much more so vis-à-vis the requirement of the next generation CNG buses being put on road by the manufacturers. EPCA was also informed that Bureau of Indian Standards (BIS) in consultation with Ministry of Petroleum and Natural Gas (MoPNG) and Gas Authority of India Limited (GAIL) has prepared a draft proposal for automotive CNG specifications.

- ii. In order to discuss the issue further, a meeting was convened on October 7, 2006 inviting officials of MoPNG, GAIL and the BIS, the agency responsible for formulation of the CNG fuel quality specifications. BIS informed that specifications for automotive CNG fuel were under preparation since 2003 and a draft proposal had been prepared. BIS when asked about the time frame by when it could come up with final specifications, it informed that it could take another 1-2 years. EPCA observed that given the rapid expansion of the CNG programme not only in Delhi but also in other cities, it was not possible to wait for another two years for finalisation of the specifications. It was also the time for graduating from Euro II to Euro III emissions standards for the CNG vehicles especially the buses and significant improvements are needed in the engine technology. More advanced generation technology will require consistent and improved quality of automotive CNG fuel with its composition and relevant properties duly specified.
- iii. Taking note of all this, EPCA constituted a committee to deliberate on the matter, formulate the automotive CNG specifications and submit the CNG fuel specifications within three months. GAIL was given the responsibility to coordinate the work assigned to the committee. The committee included

officials from Automotive Research Association of India (ARAI), Society of Indian Automobile Manufacturers (SIAM), GAIL, IGL, Mahanagar Gas Limited (MGL) and Prof. H. B. Mathur (retired Professor IIT Delhi as EPCA's expert representative). The committee was asked to address the following key issues among others that had emerged from the discussions while framing the fuel specifications:

- The specifications of the general purpose gas may not necessarily meet the requirements for motor vehicle applications. For motor vehicle applications the most important parameter that need to be specified are wobble index (density of gas and heating value of gas), gas composition (methane content, percentage of higher hydrocarbon, CO₂ + N₂, and O₂), and antiknock rating (methane number/octane number). The specifications should also spell out the limits of impurities allowed (particulate matter, oil content, sulphur content, moisture content).
- There exists a wide variation in the composition of CNG that is being supplied by different agencies. Thus for example the minimum methane content of the gas as per IGL specifications is only 80 per cent whereas according to GAIL, the gas being supplied by MGL, GGCL, regasified LNG has methane content as high as 97.9 per cent, 98.18 per cent and 89.9 per cent respectively.
- The specifications proposed by Auto Fuel Policy are inadequate much more so for the next generation CNG buses being put on road by the manufacturers. The natural gas received from GAIL has slightly higher percentage of inerts (CO₂ + N₂). The wobble index was also on the lower side with much wider range of variation than what was specified in the Auto Fuel Policy document. Except MGL and GGCL, the natural gas quality available at other places did not conform to proposed specifications mentioned in Auto Fuel Policy. Stringent quality benchmarks and maintaining consistency in gas composition and relevant gas properties are vital from the viewpoints of performance, emissions and safety of CNG vehicles.
- Additionally, the presence of lube oil in CNG cylinders has been reported. It has been found while degassing the cylinder during their mandatory re-testing that the cylinders contained as much as 500 ml of lube oil.

2. Recommendations of the Committee on CNG fuel specifications

The committee deliberated on the issue and finalised the automotive CNG fuel specifications. This unanimous report of the EPCA appointed committee was presented to EPCA on December 16, 2006 (see Annexure: *Report on Standard Specification for Compressed Natural Gas (CNG) to be used as automobile fuel for the transport sectors*). The committee proposed the following specifications.

Table: Proposed automotive CNG fuel specifications

Constituents	Value	Tolerance
Wobbe number (Btu/ft ³)	1340	Variation shall be limited to ± 30 units during normal operation
Free water, mg/m ³	8	Maximum
Total sulphur including H ₂ S, mg/m ³	20	Maximum
N ₂ + CO ₂ , vol %	3.5	Maximum*
Oil mist content, ppm	Insignificant	
Oxygen, vol. %	0.5	Maximum
Methane (C ₁)	87%	Minimum**
Ethane (C ₂)	6%	Maximum
C ₃ and higher HC	3%	Maximum
C ₆ and higher HC	1%	Maximum
Total unsaturated HC	1%	Maximum
Hydrogen (mole %)	0.1	Maximum
Carbon monoxide (mole %)	0.1	Maximum

Note: *occasionally may go up to 7 per cent when shutdown of a processing/handling plants/facilities happen however such events are to be duly notified and should be limited to 10% of time in a year

** In case of process upset/plant s/d may reach a level of 84 however such events are to be duly notified and should be limited to 10% of time in a year.

These specifications are free from liquids over the entire range of temperature and pressure encountered in the engine and fuel system and free from solid particulate matter

The above CNG specifications unanimously finalised by the committee appointed by EPCA were arrived at taking into account the requirements of vehicle manufacturers and the constraints of the gas supply agencies who all were represented in the committee. They are an improvement over the specifications proposed in the Auto Fuel Policy document and are comparable with the EU standards.

3. Recommendations

EPCA appreciates the work done by the committee and has complimented the stakeholders for arriving at a unanimously agreed set of specifications. EPCA has forwarded a copy of the specifications to the Ministry of Petroleum and Natural Gas and BIS.

These specifications should be mandated to the automotive CNG fuel supply agencies and they can be reviewed after a year based on in-use experience of the CNG vehicle manufacturers and gas supply agencies.

EPCA will take up this issue with concerned ministries of the government and keep the Hon'ble Court informed.