

Marcogaz WG “Gas Quality”

Third Position Paper on European Gas Quality Specification for Natural Gas Interchangeability

Domestic appliances have limited ability to tolerate wide variation in natural gas quality and as a result, the quality of supplied gas has to be maintained within defined limits. These limits are currently set nationally and reflect the prevailing local gas quality, and hence the type, age and condition of the appliance population present within each country. The Marcogaz Second Position Paper proposed limit values for gas interchangeability parameters for inclusion in a harmonised European gas quality specification and this Third Position Paper discusses some of the perceived obstacles to adoption of such a specification and proposes further work to address these obstacles.

Background

The European Union is constructing a common European gas market and European Directive 2003/55/EC establishes common rules for the natural gas market. The rules relate to the functioning of the natural gas sector, access to the market, and the criteria and procedures applicable to the granting of authorisations for transmission, distribution, supply and storage of natural gas and the operation of systems.

EASEE-Gas, an association of industry representatives of the natural gas value chain (including all segments of the industry), has been asked by the European Union (through the Madrid Forum) to develop a harmonised European gas quality specification that could be accepted for crossing at any EU border and LNG terminal exit. Marcogaz – the Technical Association of the European Gas Industry – is assisting in recommending suitable parameters and values that might be employed to define gas interchangeability (i.e., whether gases can be freely interchanged without concern over unsafe combustion).

Marcogaz produced a report describing gas quality specifications and legislation across Europe and produced two position papers on natural gas interchangeability. The Marcogaz position on gas interchangeability following these two position papers can be summarised as:

- That the performance of modern, GAD-compliant [2], appliances should provide the basis for a common European gas quality specification.
- Upper and lower Wobbe limits should reflect those of the test gases specified in EN437 “Test Gases – Test Pressures – Appliance Categories”, with some provision for a safety margin that addresses appliance ageing and maintenance.

Marcogaz also noted that few countries would be able to adopt immediately a new European gas quality specification. To do so would require national programmes of work to either ensure that “pre-GAD” appliances present an insignificant additional risk to the public, or to remove such appliances from use. Transitional arrangements and a timetable would also need to be agreed for each country.

The exact values of upper and lower Wobbe limits are still a matter of some debate. The upper Wobbe limit proposed by Marcogaz has been incorporated into the CBP, but the lower limit has been incorporated as a “starting point” for implementation, with a view to investigating the possibility for changing to a lower value.

Marcogaz, in developing its proposed Wobbe range, took account of two key considerations regarding the performance of appliances compliant with the Gas Appliance Directive (GAD) on installation, and how performance may change with time.

This Third Position Paper addresses issues surrounding the selection of appropriate upper and lower limit values. In particular, the two key considerations noted above were discussed with other stakeholders at a Workshop organised by Marcogaz, held on 13th December 2005 in Paris. Information and views expressed at this workshop have been taken into account in formulating the Marcogaz position expressed below.

Interchangeability Parameters

The European Gas Industry enjoys a good safety record with respect to control of mal-operation of gas appliances arising from variation in gas quality. This is due largely because of appropriate control exerted at a National level, of gas quality within each country. Differences in national approach exist, but these largely reflect national practices and appliances and have little impact on appliance safety. The increase in international gas trading has highlighted the need for an efficient European gas transportation system and hence focussed attention on such National differences can be reconciled without adversely impacting on appliance safety.

Marcogaz, in developing its proposed Wobbe range, took account of two key considerations:

- The GAD requires that for all appliances (when normally installed, normally used and maintained, and with normal gas quality) combustion products do not contain unacceptable concentrations of substances harmful to health and have good flame stability. Furthermore, after the declaration by the member state of what was to be intended as normal gas quality and publication of EN 437, CE marking of appliances for use with H gas is demanded in all EU countries except The Netherlands. Thus, for instance, to obtain CE marking for 2H or 2E gas appliances should be tested for incomplete combustion with G21 at 25 mbar.
- Marcogaz recognised that appliances are generally factory set for operation with the reference test gas G20. Furthermore, testing of appliances with the high and low Wobbe test gases is generally performed for only a relatively short period of time. Performance as regards essential safety requirements, particularly at extremes in Wobbe number, may deteriorate as the appliance ages, depending upon external factors such as appliance servicing, etc.

The first consideration implies that all post-GAD appliances of a particular type (i.e., gas boiler, cooker, etc) will show comparable performance, as regards essential safety requirements, across the range in Wobbe number in a harmonised gas quality specification. The second consideration implies that a safety margin inside the Wobbe number limits of EN 437 should be considered, so as to account for change in long-term performance and differing maintenance practices in different countries.

Marcogaz examined these two key considerations in the Paris Workshop. Details of the papers presented at the Workshop, together with session reports, are available from the Marcogaz website (<http://www.marcogaz.org>). The Workshop received a number of slightly conflicting views on these issues, but in general Marcogaz concluded that use of its proposed Wobbe range or use of the wider Wobbe range suggested in the EASEE-gas CBP could not be implemented across all European countries, without addressing a number of issues. These issues are noted and discussed further below.

Key Issues

Non-uniform performance of GAD-compliant appliances. The prevalence of pre-GAD appliances has been assumed to be the major consideration for adoption of harmonised gas interchangeability parameters. However, feedback and discussion at the Paris workshop has highlighted that some GAD-compliant devices may also cause some concern for safe operation when operated across the full Wobbe range of either the Marcogaz or EASEE-gas proposals.

Non-uniform installation practices across European countries. In some countries, the factory-settings are retained whereas in others, some local adjustment of appliance is permitted using the prevailing gas supply. The Wobbe range for acceptable performance might be expected to shift as a result of adjustment on a gas with Wobbe index different from the reference gas.

Non-uniform factory setting employed by manufacturers. Some manufacturers may adjust appliance settings to suit the intended country of destination, whilst retaining the same 2H or 2E marking.

Non-uniform maintenance practices and unclear repair practices across European countries. In some countries, regular maintenance is mandated, whereas in others it is not. In addition, in some countries adjustment during maintenance of appliance is permitted using the prevailing gas supply, whereas in others it is not. Again, the Wobbe range for acceptable performance might be expected to shift as a result of appliance adjustment on a gas with Wobbe index different from the G20 reference gas. Where an appliance is found to require fitting of replacement parts, it is not clear – for those countries where local adjustment is not permitted – how the appliance can be set up without local adjustment using the prevailing gas supply.

Appliance testing does not address stable operation over a long period of time. Most testing of appliances is conducted with the reference gas and very little (especially long-term) testing is required using the limit test gases of EN437. Continued long-term operation at extremes in Wobbe index may be an issue for e.g., more advanced pre-mixed low-NO_x appliances, so some revision of testing and performance standards or the choice of test gas might need to be considered. In addition, questions have arisen regarding the adequacy of the test conditions for new pre-mixed appliances.

In addition, other questions - not specifically related to safety - arise from changing gas quality, such as decreased appliance efficiency and increased emissions of NO_x.

Further Developments Required

Marcogaz has identified key issues that may hinder proposal and, in some countries, adoption of a harmonised specification of gas interchangeability. Further work is therefore proposed to identify a way forward in achieving this aim:

- Further appliance testing across a wider range of appliances taken from a variety of locations in Europe. A collaborative approach, using multiple test laboratories is recommended. Testing of GAD-compliant devices should be the principal aim, since the performance of these devices is recommended by Marcogaz to form the basis of a harmonised specification. Testing should be directed to the changes in performance arising from local adjustment on gases other than the reference test gas. Impacts of operation using gases at the extremes of the Wobbe range need to be quantified.
- Identification, from the testing above, of any changes in appliance testing standards or limit test gases.
- Further clarification of how practices differ across Europe. Marcogaz has identified that practices associated with installation, servicing and repair may differ and further information on those countries where local adjustment is permitted needs to be gathered. The principal route for obtaining this information should be through a collaborative survey across the main European countries.
- Adoption of a harmonised specification may require some changes in the appliance population in a particular country. This may occur naturally (appliance “churn”), or through specific (e.g., Government) initiatives. It may be beneficial to develop decision-making tools/models to assess options and their impact and effectiveness in achieving a given appliance populations, or to predict a timescale to achieve a given population.