

# Specialty gas calibration mixtures

APAC setting the pace of change

By Stephen B. Harrison, sbh4 consulting

The Greater Mekong sub-region in Southeast Asia is one of the most biodiverse regions on our planet. Six countries from China in the north to Cambodia and Thailand in the south straddle the region. A common approach to environmental protection metrology is therefore essential.

Measurement of pollutant gas emissions is one area where consistency across these six nations can ensure that each country is playing its role in preserving the unique and precious biodiversity and cultural

heritage. Atmospheric pollutant gases can damage forests, crops, historic cultural buildings, and elegant natural rock formations.

Monitoring and controlling industrial emissions of sulfur dioxide and oxides of nitrogen requires high precision specialty gas mixtures to calibrate sensitive gas analysers. To ensure regional harmonisation, these gases must be produced according to internationally recognised standards such as ISO17034. Accreditation of the manufacturing processes for the gas

mixtures is also an essential brick in the wall to ensure that emissions are within acceptable levels.

In many countries, specialty gases calibration mixtures have been produced and certified under accreditation to the ISO17025 standard for the past two decades. ISO17034 is becoming more relevant for these products in several countries. Australia and Brazil are notable leaders in driving this transition. The scope of the ISO17034 accreditation is broader than ISO17025 and covers the gas

mixture stability and homogeneity. That means that every millilitre of gas in the cylinder will have the same composition and that the certified concentrations will remain valid for the stated shelf-life of the cylinder.

## APLAC and NATA – a framework for collaboration in the APAC region

Producing high quality specialty gases calibration mixtures according to ISO17034 is a key component of achieving regional harmonisation. To achieve collaboration within the APAC region, additional structures and mechanisms are also in place.

The Asia Pacific Laboratory Accreditation Cooperation (APLAC) sees its role as improving and harmonising accreditation quality for laboratories, inspection bodies and reference material producers. It also coordinates the regional Mutual Recognition Agreement which guarantees uniformity of measurement and quality standards throughout the region.

Within each country, local bodies collaborate through the regional APLAC network. For example, NATA, the National Association of Testing Authorities, Australia takes on that role. It also extends its services to other APAC countries such as Thailand.

Hugh Jones, Technical Manager – Special Gases for BOC South Pacific, based in Sydney says that, “in the APAC region, BOC operates two NATA-accredited specialty gases production facilities in Australia and one in New Zealand.” Linde plc, of which BOC South Pacific is a subsidiary, operates another NATA accredited specialty gases production facility in Thailand.

Jones adds that, “NATA has played a visionary and leading role in the region to set up fair and rigorous framework in which specialty gases reference material producers can operate. NATA accreditation of our

ISO17034 certified products is the gold standard which means our customers can have the ultimate confidence in the homogeneity, reliability, stability, and reproducibility of our gas mixtures.”

**Calibration gas mixtures and more** Accreditation has generally been required for calibration gas mixtures for many years. There is an emerging trend to apply similar quality standards to a broader range of specialty gases.

Jones picks up the thread “Customers in the Australian clinical sector often specify ISO17034 accredited gas mixtures for medical incubator atmospheres, where cell cultures and IVF embryos are nurtured. Test gases for lung function measurement diagnostic equipment are also requested at this superior quality level.”

The diverse range of quality requirements which are addressed by ISO17034 means that it can also be applied to pure gases. “High purity nitrogen, argon, hydrogen carbon dioxide and air are all in daily use in laboratories to set the zero reading and as carrier gases. In Australia, BOC offers all these specialty gases with ISO17034 accreditation. And we plan to introduce a similar quality of helium soon.”

Processes that are required to produce pure gases to ISO17034 include rigorous cylinder preparation to avoid contamination of the gas from chemicals that may have been adsorbed onto the inner walls of the gas cylinder or valve. Filtration and purification of the gases as they from the bulk source to the cylinder is also common. After filling, analytical procedures are used to quantify the level of impurities within the pure gas. The chemical composition of the final product is then precisely recorded on the certificate, which is signed by a competent person at the specialty gases production facility.

“Declaring that a pure gas is pure might be a strong claim, but for some critical applications, strong evidence is required to back up such a statement,” says Jones. “This is the power of accreditation to the relevant ISO standards. Nothing is left to chance and our specialty gases customers can have confidence in the products that they purchase.”

“For gas mixtures and pure gases where the peak levels of precision are not so critical to the process, such as welding gas mixtures, other production quality assurance can be applied as a ‘fit for purpose’ solution.” It is common to fill multiple cylinders of such mixtures ►







► at the same time in a pallet and then analyse one cylinder to validate the batch. This results in a leaner process and the savings can be passed on to the types of customers who must carefully balance quality requirements against a tight procurement budget.

“For research, laboratory and instrumentation applications, quality is generally the top priority,” says Jones. “In some other manufacturing applications, cost considerations tend to play a greater role. That is no issue – at BOC, we offer pure gases and gas mixtures at many levels of the quality hierarchy to meet the full breadth and depth of market requirements.”

#### Setting the pace for change

Uptake of the ISO17025 standard for certified calibration gas mixtures has been higher in some countries and regions than others.

Considering major European economies, penetration in the UK, for example, is much higher than in Germany. The transition from ISO17025 to ISO17034 is also subject to national variations.

Implementation of ISO17034 for the manufacture of certified reference materials is not to the exclusion of ISO17025. Many specialty gas production facilities maintain dual accreditations. And regular commercial

certificates of analysis without any level of accreditation, where the producer's brand underpins the promise, are also still common for mid-tier quality applications.

“Calibration gas mixtures used in sectors such as ambient air quality monitoring, car emissions testing, natural gas calorific value measurement and industrial stack emissions monitoring are the products that will most typically be specified as ISO17034,” confirms Jones.

The driving force behind change and a progressive move towards higher tiers of metrological certainty is often the national metrological institute or accreditation body. In the UK, UKAS and NPL have guided the uptake of the ISO standards. Similarly, INMETRO in Brazil has rigorously stipulated that ISO17034 should be used for a wide range of calibration gas mixtures. In Australia and the APAC region, that role has been played by NATA.

Jones expresses a personal view on this topic, “I regard the approach that has been taken in Australia as exemplary to the APAC region and the world. I respect the vision that NATA has set and followed through on. It is an honour to be part of the front-line in maintaining the highest level of metrological standards.”

Despite the pace-setting role that

Australia has played in the international metrological community, not all primary reference materials are made locally. The National Measurement Institute (NMI), Australia produces a wide range of primary standards and beyond that, some products are sourced from renowned institutes such as NPL in the UK.

Sourcing reference materials from other countries is also useful to maintain international harmonisation. Many national measurement institutes and commercial specialty gases producers participate in international proficiency testing schemes. This is a way to compare the preparation of calibration gas mixtures and the accuracy of their analysis to ensure that consistently high quality-standards are maintained around the world.

“In some rare cases, I have tried to source accredited primary reference materials that are produced according to ISO17034 overseas, because they were not available from NMI Australia or we could not produce them under our own accreditation scope,” adds Jones.

“In some cases, I have been able to find them. In other cases, products were only available with accreditation to ISO17025. This is one of the pieces of evidence that tells me that Australia is definitely one of the pace setters when it comes to implementing ISO17034.” **gw**

## MASS FLOW CONTROLLERS

for Air and Specialty Gases



- ◆ High accuracy and reproducibility
- ◆ Gas flow ranges from 1 mL/min up to 500 m<sup>3</sup>/h
- ◆ Pressure rating up to 700 bar

[www.bronkhorst.com](http://www.bronkhorst.com)



## KESSELS

CATALINA CYLINDERS

World Class Products.  
First Class Service.™



WEST COAST

☎ 714.890.0999

EAST COAST

☎ 757.896.9100

[sales@catalinacylinders.com](mailto:sales@catalinacylinders.com)  
[www.catalinacylinders.com](http://www.catalinacylinders.com)

HIGH PURITY SPECIALTY GAS  
ALUMINUM CYLINDERS