# PG66(A)BP Guideline on the role of the anaesthetist in commissioning medical gas pipelines Background Paper 2021

## Short title: Gas pipeline commissioning BP

### 1. Purpose

From time to time anaesthetists as a requirement of their employment or by arrangement with other healthcare facilities may be invited to participate in testing and certification of medical gas pipeline systems (MGPS) in healthcare facilities. The accompanying guideline is intended to assist anaesthetists in undertaking this task.

### 2. Scope

The document applies to anaesthetists involved in the testing and certification of the results of operational testing at the terminal units of the gas identity, gas-specific connection and labelling during the commissioning of a MGPS.

Other Clinical Practitioners who may also be involved in commissioning MGPSs may wish to refer to the guideline.

### 3. Background

The demand for access to medical and surgical care has seen construction of new healthcare facilities, expansion or redevelopment of existing ones. In each case, medical gases will be delivered to a range of locations including theatre suites, critical care units, and wards.

Instances have arisen where incorrect gases have been administered resulting in serious consequences. Such errors may occur anywhere along the delivery system and it is imperative to correctly identify and label gases emerging from the gas outlets to guarantee safety. Gas-specific connections at the gas outlet reduce the risk of incorrect gas administration.

ANZCA has received requests from fellows whose services have been sought in the commissioning process for MGPSs. This demonstrated the clear need for developing a guideline for this purpose.

### 4. Discussion of issues

The proposal to develop a guideline was approved in November 2018 and development proceeded in July 2019. The first version of the guidelines was based on the relevant standard AS 2896:2011 *Medical gas systems – Installation and testing of non-flammable medical gas pipeline systems.*

Meanwhile the responsible committee of Standards Australia (HE-017) was undertaking a major review of the standard. ANZCA through its representative on the Standards Australia committee was involved in the

review. The latest edition of the standard was published in 2021, AS 2896-2021 *Medical gas systems – Installation and testing of non-flammable medical gas pipeline systems.*

The accompanying guideline has subsequently been updated to ensure consistency and compliance with AS 2896:2021.

The changes in AS 2896:2021 and the ANZCA guidelines include the following:

- Definition with more clarity of the roles of personnel, anaesthetists in particular, as well as responsibilities.
- Gas-specific connection and labelling at the terminal unit is required as a test in the new standard.
- The standard defines three categories of 'health facility representatives. Only anaesthetists can be HFR1, however, they can take on duties of HFR2.
- Level 1 and Level 2 works are specified. Level 1 works require an anaesthetist for terminal unit testing for gas identification, gas-specific connection and labelling. Level 2 works require at least HFR2 (or HFR1 can still do this).
- The term 'special care areas' is carefully defined. Testing MGPS supplying these areas require HFR1, for example an anaesthetist.
- A hard copy of as-installed drawings is now required to be given to the anaesthetist to confirm which terminal units need to be tested.
- Requirement for labelling uncommissioned terminal units as well as the supply of gas to staff training or patient simulation rooms and labelling of terminal units at these locations.
- Revised limits for gas analyser measurements.
- Consequences of failure of testing at terminal units is spelt out. Failure of such testing requires recommissioning.

Cross-connection is sometimes used synonymously with gas identity testing. Testing at the terminal unit is NOT the 'Test for cross-connection', which is done before the MGPS has been connected to the working gas.

Confusion about pressure and flow testing resulted from the poorly worded 2011 version of the standard. It was never intended to be the responsibility of an anaesthetist but was sometimes interpreted to be so by some contractors. This was due to a) the tests on the terminal units being done at the same time (pressure and flow testing performed before gas identification) and b) the lack of clarity and apparent contradictions in the 2011 standard. The 2021 standard is now clear about which tests require anaesthetist involvement and the form for recording the tests highlight this. Anaesthetists are not obliged to be involved in the testing or completion of any additional information that may be included on the form. Nor may anaesthetists sign of on any tests that have not been personally witnessed.

The relevant clauses in AS 2896:2021 include the following:

- 5.6.5 **Test for gas identity**

- Figure G.1 **Logistic diagram for testing of a new pipeline system**
- Figure G.2 **Logistic diagram for testing of an extension to an existing pipeline system**
- Table G.1 **— Example of terminal unit test form**

Advice: Anaesthetist's signature on the terminal unit test form is for witnessing and confirming the test results. This is done on behalf of the healthcare facility. A copy of the terminal unit test form is handed to the healthcare facility and it the responsibility of the facility to sign off any test certificate forms.

### 4.1 Personnel

For the purposes of an ANZCA guideline, it was developed with anaesthetists in mind, however it is applicable to other Clinical Practitioners who may be involved in the testing of terminal units in the final commissioning of a MGPS.

Verification of final operating tests performed on terminal outlets requires a Clinical Practitioner experienced in administration of medical gases to patients to be present and witness the tests determining that the identification of the medical gas at the terminal unit is correct. In cases where only non-asphyxiating gases, such as oxygen, medical air and suction are supplied by the MGPS an anaesthetist is not required. However, where asphyxiating medical gases, such as nitrous oxide, carbon dioxide and/or non-medical gases are piped, a delegated anaesthetist must participate in the identification tests at the terminal unit.

According to AS 2896:2021, healthcare facility representatives (HFR) are people trained in the understanding of the requirements of the MGPS commissioning process. They are authorised by the healthcare facility to carry out or supervise testing and checking. They may be either employees of the healthcare facility or a qualified independent consultant.

HFR1 personnel is a qualified and experienced person such as the anaesthetist-in-charge or a delegated anaesthetist.

HFR 2 personnel are required to have experience in the administration of medical gases to patients and to have the requisite training for MPGS commissioning.

HFR 3 personnel are usually from the engineering or building services with training in checking, testing, and verification of MPGS, and whose involvement in commissioning of the MPGS is to confirm and certify to healthcare management that test results conform to the standard.

## 5. Procedure

This is described in detail in the guideline.

### 5.1 Identification and concentration of gas at the gas terminal outlet

The gas at each terminal outlet must be the correct gas at the correct concentration for that outlet.

Where only one asphyxiating gas is piped, such as nitrous oxide or carbon dioxide or one non-medical gas an oxygen analyser is used. If more than one asphyxiating gas is piped an oxygen analyser cannot differentiate between the two gases and another method of positive identification must be used such as a gas analyser.

Using various gas analysers the following readings for the specific gas should be as given in Table 1.

### 5.2 Confirmation of gas-specific connection and labelling at the terminal unit

Each terminal unit must connect only to the correct gas-specific probe and be permanently labelled with the designated gas and the correct colour code for that gas.

The terminal unit should be inspected to confirm that it is correctly labelled for the designated gas, and with the correct colour, and by using the range of gas specific probes that only the correct probe can be connected.

## 6. Documentation

A copy of Form 1, which is equivalent to Appendix Table G.1 of AS 2896:2021, or an equivalent form must be used to document the results of testing is included in the guideline.

## 7. Summary

The following is a summary of the role and responsibility of an anaesthetist in testing for commissioning a medical gas pipeline system, according to AS 2896:2021 *Medical gas systems—Installation and testing of non-flammable medical gas pipeline systems*.

An anaesthetist is required to confirm the identification of the gas at the terminal unit, gas specific outlet [inlet for suction] and labelling of the terminal unit in a MGPS at which the user makes connection or disconnection) when there are piped gases in addition to air, oxygen and suction. Otherwise, another Clinical Practitioner (non anaesthetist) may undertake this task.

Other tests of the medical gas pipeline system required by the standard do not require an anaesthetist. It is the responsibility of the healthcare facility to find a person with the relevant training and skills for the testing, such as a biomedical engineer.

An anaesthetist is not obliged to take on testing beyond confirmation of the gas identity, gas-specific connection and labelling at the terminal unit and should not engage in other testing unless confident to do so.

The accompanying guideline specifies the minimum required according to AS 2896:2021 and describes the process. If Fellows agree to be involved with other additional testing this is done in their own capacity but not in the role of anaesthetist as a requirement of AS 2896:2021.

Anaesthetists and other healthcare facility designated persons should not certify results of tests that were not personally observed.

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