

# STANDARDS FOR SPIROMETRY TRAINING COURSES

Companion document to Standards for the  
Delivery of Spirometry for Resource Sector Workers

Thoracic Society of Australia and New Zealand

2022

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Developed in partnership with



**Resources Safety & Health**  
Queensland



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## Glossary

ANZSRS	Australian and New Zealand Society of Respiratory Science
ATS	American Thoracic Society
BTPS	Body temperature, ambient pressure saturated with water vapour
CRFS	Certified Respiratory Function Scientist
ERS	European Respiratory Society
FEV <sub>1</sub>	Forced Expiratory Volume in one second
FVC	Forced Vital Capacity
LABA	Long-acting Beta Agonist
SABA	Short-acting Beta Agonist
TSANZ	Thoracic Society of Australia and New Zealand

## Definition

WORKER	A resource sector worker presenting for a health assessment.
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# Background

This document has been developed to accompany the 2022 *TSANZ Standards for Delivery of Spirometry for Resource Sector Workers*<sup>1</sup>. Spirometry operators are required to complete a spirometry training course that meets this standard to achieve compliance with the Standards for Delivery. This document has been developed specifically for use in an accreditation program for spirometry training courses conducted as a requirement for compliance with 2022 *TSANZ Standards for Delivery of Spirometry for Resource Sector Workers*. It draws on the best evidence and is consistent with the recommendations of both TSANZ and ANZSRS with respect to minimum requirements for training in spirometry<sup>2</sup>. As a minimum, spirometry training course content must adhere to the current international ATS/ERS pulmonary function testing standards. At the time of publication this included the 2019 standards for spirometry testing<sup>3</sup> and 2021 guidelines for interpretation<sup>4</sup>.

## Introduction

An independent review of the respiratory component of the Coal Mine Workers' Health Scheme (the Scheme) was undertaken by Monash University in response to the re-emergence of coal workers' pneumoconiosis (Black Lung Disease) in Queensland<sup>5</sup>. The review was published in July 2016 and, with respect to spirometry testing, concluded that:

*Overall, the reported quality control and assurance of spirometry testing needs to be improved. For example, although 79% of spirometers were reported to have had a calibration check, most (66%) had not been calibrated in 2016. **This is a significant inadequacy considering devices used in the study require daily calibration checks.** ... a majority of the spirometry performed under the scheme is likely to be of poor quality and more ongoing training and quality assurance is needed to reach accepted standards<sup>5</sup>*

The 2022 TSANZ Standards for the Delivery of Spirometry for Resource Sector Workers<sup>1</sup> and these TSANZ Spirometry training standards seek to address this issue. This document defines:

1. Core components of spirometry training under the following headings:
  - 1.1 Overview of spirometry.
  - 1.2 Personnel.
  - 1.3 Equipment management, including calibration and quality control.
  - 1.4 Infection prevention.
  - 1.5 Conducting the test/measurement.
  - 1.6 Interpretation and reporting.
2. Course delivery modes.
3. Course duration.
4. Frequency of refresher training.
5. Qualifications and staff ratios of course providers.
6. Assessment requirements.

# 1. Core components of a spirometry training course

## 1.1 Overview of spirometry

Operators are required to understand the purpose of spirometry and be aware of relevant best practice standards. Training must include:

- An explanation of what spirometry is with reference to the ATS/ERS standards spirometry testing<sup>3</sup> and interpretation<sup>4</sup>.
- Definitions of spirometric indices (e.g., FEV<sub>1</sub>, FVC, FEV<sub>1</sub>/FVC).
- Understanding volume time and flow volume curves.
- Explanation of BTPS conditions for reported values.
- Understanding reference values including:
  - o definitions.
  - o the use of the lower limit of normal and percent predicted.
  - o limitations of reference equations and the importance of ethnicity.

## 1.2 Personnel

Training providers must provide participants with a logbook for recording spirometry activity.

## 1.3 Equipment management, including calibration and quality control

Training will ensure the following items are addressed:

- Minimum requirements for spirometers that meet ATS/ERS standards including performance requirements, calibration procedures, reporting reference values and values expressed in BTPS conditions<sup>3,4</sup>.
- Calibration and calibration verification definitions.
- Frequency of calibration and/or calibration verification.
- Spirometer accuracy in accordance with ATS/ERS standards, using a calibrated, certified 3L syringe at variable flows<sup>3</sup>.
- Preventative maintenance.
- Conducting biological controls.
- Managing new software versions.
- Troubleshooting equipment.

Training must ensure that participants are able to develop and maintain an equipment maintenance log that includes:

- Equipment history—with noted use and any changes in hardware, software and prediction equations.
- Equipment calibration and calibration verification records, including error reports and any resulting actions
- Preventative maintenance.

## 1.4 Infection prevention and medical emergencies

Training must address infection prevention and management of medical emergencies or adverse events arising from spirometry. The training must include the following components:

- Regular equipment cleaning.
- Hand-washing hygiene between workers and following equipment handling.
- Cough etiquette for staff and workers.
- Single-use versus reusable consumables.
- Use of viral/bacterial filters and spacers.
- Use of personal protective equipment (e.g. gloves).
- Understanding local protocols for medical emergency management.
- Understanding of management of an infectious worker.

## 1.5 Conducting the test/measurement

The training should cover all steps set out in the TSANZ Standards<sup>1</sup> and comply with the 2019 ATS/ERS standards for spirometry<sup>3</sup>, as follows:

### Step 1. Determine the test indication and any contraindications

Training must address:

- Pre-appointment instructions relating to withholding of short and long-acting beta agonists.
- Indications and relative contraindications to testing.
- Management of communicable disease.

### Step 2. Equipment preparation

Training must address:

- Checking equipment is correctly set up and calibrated/accuracy check is conducted where required.
- Attachment of mouthpieces and/or filters.

### Step 3. Worker preparation

Training must address:

- Importance of accurate recording of worker's height, weight, age, gender and ethnicity.
- Worker posture during testing.
- How to explain and demonstrate the test.

### Step 4: Conducting the test

Training must address:

- Performance of the test as per the ATS/ERS standards for spirometry<sup>3</sup>.
- Acceptability and repeatability criteria<sup>3</sup>.
  - Identifying manoeuvres that meet acceptability and repeatability criteria.
  - Bronchodilator responsiveness assessment including choice of bronchodilator, method of administration and the appropriate waiting time prior to re-testing.
  - Troubleshooting instrument errors.
- Troubleshooting worker manoeuvres to achieve acceptability and repeatability criteria and identifying common causes of unacceptable manoeuvres.

### Steps 5 & 6: Finalising the test and operator comment

Training must address:

- When testing is complete in terms of maximum number of test attempts or when acceptability and repeatability criteria are achieved<sup>3</sup>.
- Selection of suitable reference equations.
- Selection of best test data for reporting purposes.
- Technical comments to describe test quality.

## 1.6 Interpretation and reporting

Training must address:

- Interpretation of results, according to the most recent ATS/ERS standards<sup>4</sup> and relevant clinical guides within the worker's jurisdiction, including:
  - Pattern recognition: Normal; Obstructive; or Restrictive patterns.
  - Assessing severity of obstruction.
  - Bronchodilator responsiveness.
- Longitudinal monitoring.
- Limitations of spirometry, including when other tests or referral pathways may be required.
- Reporting and storing results.

## 2. Course delivery modes

Spirometry training courses may be face-to-face, virtual, or a mixture of e-learning modules combined with face-to-face, or virtually delivered practical modules. All modules must include education and assessments on test performance, result selection and interpretation of reported results.

Whilst face-to-face training is preferable for the practical component of both initial and refresher spirometry, training can be delivered virtually provided the trainer actively reviews post-training outcomes.

To ensure quality training outcomes, providers must have a specific documented process detailing how their virtual training delivery will:

- effectively instruct on, and assess, the practical components of spirometry training remotely (e.g. structure of sessions, use of application); and
- be reviewed to ensure training outcomes are achieved.

In addition, the training provider must ensure they have a mechanism in place for ensuring individual trainees are assessed as competent post training, regardless of training delivery method (see Section 5: Assessment Requirements).

## 3. Course duration and frequency of training

Initial training must be a minimum of 10 hours training, of which at least 60 percent must be practical hands-on training, regardless of the format used to deliver training.

There is strong evidence that the quality of spirometry improves with regular performance of the procedure and where operators have access to ongoing support and feedback after completion of training. Refresher training ensures that operators remain abreast of changes in technology and research in the field.

Refresher courses should be tailored to review the content of this document with participants and focus on practical skills. As such the course will be one day in duration (containing at least 6 hours of formal training) and should be approximately 50 percent theoretical review with updates to standards and best practice as required and 50 percent practical training.

A one-day refresher course must be attended within 12 months after the successful completion of the initial training course. Operators must complete an additional refresher course every three years thereafter.

## 4. Qualifications and staff ratios of course providers

Spirometry training courses should be delivered by a suitably qualified person(s) i.e., with relevant qualifications and substantial experience in the theoretical and practical aspects of spirometry measurement and interpretation.

A training provider must have the following minimum qualifications and experience:

- A Certified Respiratory Function Scientist (CRFS) qualification certificate; OR
- A Level 7 of the Australian Qualifications Framework (AQF) which included a major in science (for example Bachelor of Science) and graduate qualification relevant to respiratory science.

AND

- 5 years' experience in a respiratory function laboratory, with experience from a TSANZ Accredited Laboratory being highly desirable.
- Qualifications and/or experience in training and assessment is also desirable.

At least one qualified staff member with a dedicated practical station that includes an ATS/ERS-approved spirometer must be available for every five trainees during the practical components.

## 5. Assessment requirements

Assessment should comprise direct observation of the correct conduct of spirometry as well as written theoretical components. A pass mark is required for the theoretical components of the course.

Post-course assessment in the workplace is also required before a trainee can complete the course. This assessment should be both theoretical and practical and will include completion of at least ten spirometry tests in the workplace for review by the course provider. The ten spirometry tests must be conducted on ten different people, including clients and colleagues, where consent has been obtained. A Certificate of Completion may only be issued when the participant has correctly completed workplace spirometry tests and has completed the theoretical assessment.

The course provider is required to provide participants with a Certificate of Completion and to maintain records of participant enrolment and completion of both initial and refresher training in line with the Australian Skills Quality Authority guidelines<sup>7</sup> or relevant jurisdictional requirements.



# References

1. Thoracic Society of Australia and New Zealand. 2022 Standards for the Delivery of Spirometry to Resource Sector Workers.
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7. Australian Skills Quality Authority. Reporting and record keeping. Accessed at <https://www.asqa.gov.au/distance-learning/reporting-record-keeping>.

## REVISION HISTORY

1.	Version 1	2017	TSANZ Laboratory Accreditation and Quality Committee (LAQC)
2.	Version 2	March 2020	TSANZ Laboratory Accreditation and Quality Committee (LAQC)
3.	Version 3	March 2022	TSANZ Laboratory Accreditation and Quality Committee (LAQC)

## AMENDMENTS

1.	February 2020 – Update and reference to 2019 ATS/ERS Spirometry Standards including, but not limited to, terminology (entire document).
2.	February 2020 – Include Revision History table.
3.	December 2020 – Definition of worker changed to resource sector worker from coal mine worker.
4.	December 2020 – DNRME is now Resources Safety and Health Queensland (RSHQ).
5.	December 2020 – Front page change Developed in Partnership With Queensland Government to Developed in Partnership with RSHQ.
6.	December 2020 – Reference list updated to reflect changes to name and date of reference 1.
7.	January 2021 - Removal of Evaluation of compliance with this standard table
8.	January 2021 - Section 5 has been updated with section 5.1 and section 5.2 being included
9.	January 2021 - Course delivery mode changed to also include virtual delivery
10.	June to December 2021 – Update to latest national and international standards; consultation and review with sector.



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