

ACIRS (Australian Coal Industry Reference Samples)
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Table 1 Certified property values

Element		%, d	
Sulfur (S)	0.711	+/-	0.006
The certified value is expressed as robust mean +/- expanded uncertainty (U). It is the best estimate of the true value and is an unweighted robust mean value of an accepted dataset obtained from an interlaboratory study using ISO/IEC 17025 accredited laboratories, each of whom tested a minimum of three unique samples. The standard test method ISO 19579 was used, as detailed in section 4. Expanded uncertainty (U) is a robust value estimated on the likely range of the true value of each parameter, including estimation of the uncertainty due to characterisation and heterogeneity, and is calculated from $1.25 \times s^* / \sqrt{n} \times k$ where k is a coverage factor of 2 corresponding to a level of confidence of approximately 95%.			

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Previous ACIRS SxB CRM: This is the third in the series and supersedes ACIRS-S2B-2015



Accredited for compliance with ISO 17034
Accreditation Number 21027
*NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates

1. PURPOSE

This reference material is a higher rank bituminous coal. The certified value for Total Sulfur (Table 1) is traceable to SI units and is suitable for calibration purposes.

2. DESCRIPTION OF THE SAMPLE AND PREPARATION

ACIRS-S3B-2026 comprises a sealed jar containing approximately 115 g of coal at a nominal top size of 212 μm . This sample was prepared from 550 kg of a higher rank bituminous coal, obtained at 50mm top size from the Bowen Basin in Queensland, Australia.

The coal was stabilised for several months before being crushed in a swing hammer mill to a nominal top size of 2.36 mm. The material was then repeatedly mixed by rotary sample division (RSD) until lots of approximately 1.5 kg were obtained and then individually air dried and milled to a nominal top size of 212 μm . This pulverised material was further divided by RSD to obtain the representative samples of approximately 115 g each. Each sample was then placed into a plastic bag within sealed HDPE jars.

3. INSTRUCTIONS FOR HANDLING AND USE

Before first use, empty the sample from the inner plastic bag directly into the HDPE jar.

Before each use, the bottle must be thoroughly mixed by end-over-end rotation to re-homogenise the coal sample.

To minimise the risk of compositional changes due to oxidation, store in a cool, dark place in original containers with the lid tightly sealed. ACIRS cannot be held responsible for any changes that occur after the sample bottle has been opened.

The minimum sample intake for ACIRS-S3B-2026 is established in accordance with the standard test methods listed in section 4. Corrections to dry basis values should be in accordance with ISO 1170 or equivalent.

4. HOMOGENEITY ASSESSMENT AND CHARACTERISATION

Homogeneity of the batch was assessed by selecting 18 bottles by stratified random sampling and testing for Ash and Total Sulfur by ISO 1171 and ISO 19579 respectively. Satisfactory sample homogeneity for this coal was established after evaluation in accordance with ISO 33405:2024.

ACIRS-S3B-2026 was analysed as an unknown sample in an interlaboratory testing program. The accepted characterisation dataset included testing by analytical methods in Table 2.

Table 2 Analysis Methods

Parameter	Analysis Method	Number of Results
Total Sulfur, % d	ISO 19579	24

Results were evaluated for technical competency before inclusion in the characterisation dataset, e.g., by meeting standard method precision limits and by outlier identification. Robust statistical techniques were then used in the characterisation process in accordance with the guidelines of:

- IUPAC, 2006 International Harmonized Protocol for the Proficiency Testing of Analytical Chemical Laboratories
- ISO 13528:2022, Statistical methods for use in proficiency testing by interlaboratory comparison, and
- ISO 33405:2024 Reference Materials – Approaches for characterization and assessment of homogeneity and stability

5. METROLOGICAL TRACEABILITY

Traceability of the certified value for Total Sulfur to the SI unit of mass was confirmed through independent analysis by an ISO/IEC accredited laboratory using test method ISO 19579 and demonstrating an unbroken chain of calibrations.

Property values are operationally defined by methods listed in section 4 using only results from laboratories accredited to ISO/IEC 17025. Certified values in Table 1 include metrological traceability with primary (NMI) reference standards NIST SRM 2693a, NIST SRM 2682c and NIST SRM 2692c.

6. PERIOD OF VALIDITY

Property values are considered stable until September 2039. The stability of assigned property values and informational values will be monitored by ACIRS, and it is the responsibility of the user to obtain the most recent documentation for this reference material available at www.acirs.com.au/products/.

7. HEALTH AND SAFETY

Samples shall be handled in accordance with the Safety Data Sheet available from www.acirs.com.au/products/.

8. LEGAL NOTICE

To the extent permitted by law, ACIRS disclaims all warranties whether expressed or implied regarding merchantability, non-infringement, or fitness for a particular purpose. In no event will ACIRS be liable for incidental damage or consequential loss arising from the use of this product.

Where the product does not conform to assigned property values or informational values, giving due consideration to the stated uncertainties and accepted tolerances, the total liability of ACIRS shall be limited at ACIRS' absolute discretion to either replacement of the product or refund of the purchase price.

9. REVISION HISTORY

Document Number	Summary	Date
ACIRS-S3B-2026-CoA-rev00	Original	18/09/2026

10. AUTHORISATION

Approved by: Andrew Swanson (ACIRS Commercial Director)
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