

This reference material was certified by the consensus of a network of expert laboratories using different methodologies, and can be used for calibration, assessment of precision and trueness and, to demonstrate traceability of results in chemical analysis by classical and instrumental methods.

This material is presented in the form of chips, with particle sizes between 0,6 mm and 1,40 mm (sieves 28 and 12).

Properties	Certified Values	Expanded Uncertainties	Unit
Cu	85,2	0,2	%
Pb	4,74	0,02	
Zn	4,73	0,04	
Sn	4,61	0,02	
Ni	0,33	0,01	
Fe	0,211	0,004	
Sb	0,114	0,004	
S	0,068	0,003	
As	0,019	0,003	
P	0,003	0,001	

Lot Number: 01

Valid until : 04/2023

The certified values and uncertainties are assured by the validity period, considering that the material is handled and stored in accordance with the given instructions, except in case of damage or contamination. IPT will monitor periodically the properties of this reference material during its validity period, and any observed significant change will be reported to the user.

Sao Paulo, 02/2012

Chemical Metrology Center
Metrological References Laboratory

Patricia Hama
CRQ IV 04161340 - RE 103941

Researcher

Chemical Metrology Center
Metrological References Laboratory

Ricardo Rezende Zucchini
CREA 195776 - CRQ IV 04362478 - RE 8272.7

Laboratory Coordinator

Uncertainties

The expanded uncertainties of the certified values were estimated by the combination, according to ISO Guide 35:2006, of uncertainties of characterization and homogeneity, obtained experimentally from the interlaboratory certification program data, and where relevant, with the contributions of stability of material, estimated at IPT. The coverage factor used is approximately 2, providing a confidence level of 95%.

Traceability

The certified values of the properties of this material were obtained by means of measurements performed at IPT and by a network of collaborating laboratories, using one or more methods for each property studied. These methods were verified using reference materials with certified values and standards with values traceable to the International System of Units (SI) through NIST and other qualified producers. The measuring instruments were calibrated with standards traceable to SI through Inmetro and the Brazilian Calibration Network (RBC).

Mass of samples

The mass of sample required for the proper realization of the determinations depends on the particular methodology, levels of analytes, and other factors. It is recommended using the masses established in the most current editions of recognized standard methods. However, to guarantee the validity of all the certified values stated herein and their respective uncertainties, should not be employed samples with masses less than 0,1 g for determination of Ni and Fe, at least 0,5g for determination of Sulfur and at least 1,0 g for the

other elements. These limits were estimated from the sample masses used in the study of homogeneity of this material.

Handling and storage

Handling: The withdrawal of samples of this material must be accomplished in appropriate environment with clean accessories. Never return material to the bottle. Keep the material in its original bottle, tightly closed. Storage: This material should be stored in a clean place, at room temperature. The ideal relative humidity for storage is under 60% RH.

Technical Notes

None.

Additional Information

The certification of this material was coordinated by João Marcos de Almeida Bispo.

Collaborating Laboratories

CECIL S.A. – LAMINAÇÃO DE METAIS – Itapevi, SP
José Tatsuya Nagata, Tamara Pimentel Perissinoto, Jackson Nascimento Santos, Joel Justi.

CENTRO DE CARACTERIZAÇÃO E DESENVOLVIMENTO DE MATERIAIS – CCDM – UFSCar/UNESP -São Carlos, SP
Telma Blanco Matias

CENTRO TÉCNICO AEROESPACIAL – INSTITUTO DE AERONÁUTICA E ESPAÇO – DIVISÃO DE MATERIAIS – LABORATÓRIO DE ANÁLISES QUÍMICAS – CTA/IEA - São José dos Campos, SP
Dalcy Roberto dos Santos, Júlio Cesar dos Santos, Roseli de Fátima Cardoso, Rui de Araújo Ribeiro.

COMPANHIA SIDERÚRGICA DE TUBARÃO – CST- Serra, ES
Lourival Alves Gomes, Welington de Castro Rodrigues, Aylton Coelho.

ELUMA S.A. INDÚSTRIA E COMÉRCIO – Santo André, SP
José Francisco Caetano, Rui Pedro Aparecido Russo, Zildo Zanoli, Auzimar Donizete Sanches, Antônio dos Santos Botelho, Edson Luiz Martins da Rocha.

INSTITUTO DE PESQUISAS TECNOLÓGICAS DO ESTADO DE SÃO PAULO S.A. – IPT – São Paulo, SP
Alcides Carrafa, Maria Salete de Lima Franco Soares, Patricia Mayumi Hinata.

INSTITUTO DE TECNOLOGIA DO PARANÁ – LABORATÓRIO DE MATERIAIS METÁLICOS – TECPAR – Curitiba, PR
Sílvia de Fátima Martins Rossetti, João Carlos Ribeiro, José Luiz Olkuszewski, Ladislau Nelson Zempulski.

TERMOMECANICA SÃO PAULO S.A. – São Bernardo do Campo, SP
Valdir Mrocoski, Silmara Tucci Chior, Adilson Santos Soares, Christiane Pinto Davi, Cleber Segantini.

Methodologies Employed in the Certification of CRM IPT 10B

As	Optical Emission Spectrometry (inductively coupled plasma) Turbidimetry (sodium hypophosphite) Titrimetry (distillation - iodometry)
Cu	Titrimetry (iodometry) Electrogravimetry
Fe	Optical Emission Spectrometry (inductively coupled plasma) Atomic Absorption Spectrometry
Ni	Atomic Absorption Spectrometry Gravimetry (dimethylglyoxime) Optical Emission Spectrometry (inductively coupled plasma)
P	UV-Visible spectrophotometry (yellow - molibdovanadate) Titrimetry (sodium hydroxide - Acidimetry) UV-Visible spectrophotometry (molybdenum blue)
Pb	Gravimetry (potassium dichromate) Electrogravimetry Atomic Absorption Spectrometry
S	Titrimetry (evolution) Direct combustion (infrared)

Sb	Atomic Absorption Spectrometry Optical Emission Spectrometry (inductively coupled plasma) Titrimetry (sulfite - permanganate)
Sn	Titrimetry (hypophosphorous acid-iodate) Optical Emission Spectrometry (inductively coupled plasma) Gravimetry (Tin (IV) oxide) Atomic Absorption Spectrometry
Zn	Gravimetry (ammonium hydrogen) Optical Emission Spectrometry (inductively coupled plasma) Atomic Absorption Spectrometry

The latest version of the Certificates of IPT Reference Materials are available for download at: www.ipt.br/nmr.htm

Mod.060811