

**IPT 74**

Bronze (80%Cu, 3%Sn, 6%Pb, 10%Zn)

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 Bronze, alloyed with 10% Zn, 6% Pb e 3% Sn, presented in the form of chips.

Properties	Certified Values	Expanded Uncertainties	Unit
Cu	80,41	0,04	%
Zn	9,88	0,05	
Pb	6,24	0,03	
Sn	2,84	0,05	
Fe	0,315	0,003	
Ni	0,15	0,02	
S	0,056	0,003	
Sb	0,016	0,003	
Cd	0,013	0,002	

  

Properties	Informative Values	Expanded Uncertainties	Unit
P	0,002	0,001	%
As	0,002	0,001	

Lot Number: 01

Valid until : 01/2023

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.

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### Uncertainties

The expanded uncertainty of the results was obtained using confidence intervals calculated using Student t distribution. The coverage factor used is approximately 2, providing a confidence level of 95%.

### Traceability

#### 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 100 mg. This limit was 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

Some of the laboratories also determined the phosphorus and arsenic by different methods. The results, however, were insufficient to establish the final certified values for these properties.

### Additional Information

The raw material for the preparation of this reference material was provided by Termomecânica São Paulo S/A. The certification of this reference material was coordinated by Tsai Soi Mui Lee and Mirtis Irene Ariza.

### Collaborating Laboratories

INSTITUTO DE PESQUISAS TECNOLÓGICAS DO ESTADO DE SÃO PAULO S.A. – IPT – São Paulo, SP  
Vagner Tadeu Vallerde, Maria Salete de Lima Franco Soares.

COMPANHIA SIDERÚRGICA NACIONAL – CSN – Volta Redonda, RJ  
Sebastião Vitor Baliza, Carlinhos Mesquita da Silva, José Maria da Silva.

COMPANHIA SIDERÚRGICA DE TUBARÃO – CST – Planalto de Carapina, ES  
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TERMOMECANICA SÃO PAULO S/A – São Bernardo do Campo, SP  
Tereza Buccheri.

INSTITUTO NACIONAL DE TECNOLOGIA - INT – Rio de Janeiro, RJ  
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ELUMA S/A INDÚSTRIA E COMÉRCIO – DIVISÃO ISAM – Santo André, SP  
Valdir Mrocoski, José Rodrigues de Godoy.

### Methodologies Employed in the Certification of CRM IPT 74

As	UV-Visible spectrophotometry (molybdenum blue) Atomic Absorption Spectrometry
Cd	Atomic Absorption Spectrometry
Cu	Electrogravimetry
Fe	UV-Visible spectrophotometry (ortho-phenanthroline) Titrimetry (tin (II) chloride - potassium dichromate) Atomic Absorption Spectrometry
Ni	UV-Visible spectrophotometry (dimethylglyoxime) Gravimetry (dimethylglyoxime) Atomic Absorption Spectrometry
P	UV-Visible spectrophotometry (molybdenum blue) Titrimetry (sodium hydroxide - Acidimetry) UV-Visible spectrophotometry (yellow - molibdovanadate)
Pb	Atomic Absorption Spectrometry Gravimetry (chromate) Titrimetry (EDTA complexometry) Gravimetry (sulfate) Electrogravimetry
S	Direct combustion (infrared)
Sb	Atomic Absorption Spectrometry UV-Visible spectrophotometry (Rhodamine B)
Sn	Gravimetry (oxide) Titrimetry (hypophosphorous acid-iodate) Titrimetry (aluminum-iodate) Atomic Absorption Spectrometry
Zn	Gravimetry (phosphate) Gravimetry (oxide)

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