



# CERTIFIED REFERENCE MATERIAL BCR<sup>®</sup> – 661

## CERTIFICATE OF ANALYSIS

NICKEL BASE ALLOY			
	Ambient temperature tensile properties		
	Certified value <sup>2)</sup>	Uncertainty <sup>3)</sup>	Unit
0.2 % Proof stress ( $R_{p0.2}$ ) <sup>1)</sup>	300	8	MPa
0.5 % Proof stress ( $R_{p0.5}$ ) <sup>1)</sup>	318	7	MPa
Tensile strength ( $R_m$ ) <sup>1)</sup>	750	14	MPa
Elongation at fracture (A) <sup>1)</sup>	40.9	0.9	%
Reduction in area at fracture (Z) <sup>1)</sup>	60	4	%

1) As defined in EN 10002-1.  
2) Unweighted mean value of the means of accepted sets of data, each set being obtained in a different laboratory. The certified value and its uncertainty are traceable to the International System of units (SI).  
3) The certified uncertainty is the expanded uncertainty estimated in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM, ISO/IEC Guide 98, 2008) with a coverage factor  $k = 2$ , corresponding to a level of confidence of about 95 %.

This certificate is valid for five years after purchase.

Sales date:

The minimum amount of sample to be used is defined in EN 10002-1.

### NOTE

This material has been certified by BCR (Community Bureau of Reference, the former reference materials programme of the European Commission). The certificate has been revised under the responsibility of IRMM.

Brussels, November 1998  
Latest revision: January 2009

Signed: \_\_\_\_\_

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<b>Indicative Values</b>		
	Ambient temperature tensile properties	
	Indicative value <sup>2)</sup> [GPa]	Uncertainty <sup>3)</sup> [GPa]
Young's modulus E <sup>1)</sup>	206	21
<p>1) As defined in EN 10002-1.</p> <p>2) Unweighted mean value of the means of accepted sets of data, each set being obtained in a different laboratory. The certified value and its uncertainty are traceable to the International System of units (SI).</p> <p>3) The certified uncertainty is the expanded uncertainty estimated in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM, ISO/IEC Guide 98, 2008) with a coverage factor <math>k = 2</math>, corresponding to a level of confidence of about 95 %.</p>		

## DESCRIPTION OF THE SAMPLE

The material is Nimonic 75 nickel base alloy. It is issued in units of three bars each about 150 mm long x 14 mm diameter or as one bar 500 mm long x 14 mm diameter, sufficient for the manufacture of three test-pieces.

## ANALYTICAL METHOD USED FOR CERTIFICATION

Tensile tests according to EN 10002-1.

## PARTICIPANTS

- Centre de Recherches Métallurgiques, Liège (BE)
- Bundesanstalt für Materialforschung und -prüfung (BAM), Berlin (DE)
- Valtion Teknillinen Tutkimuskeskus (VTT), Espoo (FI)
- Force Institute, Copenhagen (DK)
- Materials Ireland, Dublin (IE)
- Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek (TNO), Apeldoorn (NL)
- Statens Provningsanstalt, Borås (SE)
- British Steel, Rotherham (GB)
- National Physical Laboratory, Teddington (GB)
- Strathclyde University, Glasgow (GB)

## SAFETY INFORMATION

The usual laboratory safety precautions apply.

## INSTRUCTIONS FOR USE

The material is intended to demonstrate proficiency of tests according to EN 10002-1.

The operator should undertake a tensile test using BCR 661 in accordance with EN 10002-1. Test-pieces with diameter 10 mm, parallel gauge length 60 mm and extensometer gauge length 50 mm should be machined from the bars supplied, as indicated in certification report EUR 19589 EN. Laboratories may machine the grip ends to suit the grips available on their testing machines. The material has similar machining characteristics to an austenitic stainless steel (conventional turning methods on a lathe will suffice). The strain rate should be  $0.033 \% s^{-1}$  up to 2 % strain to determine modulus and proof stress, followed by cross-head displacement control equivalent to a strain rate of  $0.17 \% s^{-1}$  until fracture. The cross-head speed should be set to  $0.1 mm s^{-1}$  to achieve this. The test temperature should be  $(22 \pm 2) ^\circ C$ . The result of the first test should lie within the certified range. If the result is outside this range, then the testing conditions should be carefully checked, and then two further tests should be undertaken. If the mean of three tests is still outside the certified range, then a closer investigation should be undertaken to determine the sources of error.

## **STORAGE**

BCR-661 shall be stored at a dry place under room temperature.

However, the European Commission cannot be held responsible for changes that happen during storage of the material at the customer's premises, especially of opened samples.

## **LEGAL NOTICE**

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## **NOTE**

A technical report on the production of BCR<sup>®</sup>-661 is available on the internet (<http://www.irmm.jrc.be>). A paper copy can be obtained from IRMM on request.

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