



BSI Standards Publication

## AEROSPACE SERIES

**Specification for nickel-  
chromium-cobalt-molybdenum-  
titanium-aluminium  
heat-resisting alloy plate, sheet  
and strip (Nickel base, Cr 18,  
Co 14, Mo 7, Ti 2.2, Al 2.1)**

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### Summary of pages

This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 4, an inside back cover and a back cover.

## Foreword

### Publishing information

This British Standard is published by BSI and came into effect on 31 January 2011. It was prepared by Panel ACE/61/-/48, *Heat resisting alloys for aerospace purposes*, under the authority of Technical Committee ACE/61, *Metallic materials for aerospace purposes*. A list of organizations represented on this committee can be obtained on request to its secretary.

### Supersession

This standard supersedes BS HR 209:1989, which is withdrawn.

### Information about this document

This is a full revision of BS HR 209. The principal change from the previous edition is that requirements are stated in tabular format in accordance with EN 4500-1 and EN 4500-3.

### Hazard warnings

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It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

### Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

*Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.*

### Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

**Compliance with a British Standard cannot confer immunity from legal obligations.**

## 1 Scope

This British Standard specifies requirements for nickel-chromium-cobalt-molybdenum-titanium-aluminium heat-resisting alloy plate, sheet and strip.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

*BS HR 100, Procedure for inspection, testing and acceptance of wrought heat resisting alloys*

## 3 Technical requirements

Material to this standard shall conform to Table 1.

*NOTE The format and symbols used in Table 1 are derived from EN 4500-1 and EN 4500-3.*

Table 1 Technical requirements for nickel-chromium-cobalt-molybdenum-titanium-aluminium plate, sheet and strip

1	Material designation		BS HR 209								
2	Chemical composition %	Element	C	Si	Mn	S	Ag	Al	B	Bi	Co
		Min.	—	—	—	—	—	1.7	—	—	12.0
		Max.	0.07	0.5	0.5	0.015	5 ppm	2.5	0.005	1 ppm	16.0
		Element	Cr	Cu	Fe	Mo	Pb	Ti	Zr	Ni	
		Min.	16.0	—	—	6.0	—	1.5	—	Base	
Max.	20.0	0.2	1.5	8.0	10 ppm	3.0	0.06				
3	Method of melting		Air melted, vacuum refined and cast in air								
4.1	Form		Plate, sheet and strip								
4.2	Method of production		Rolled								
4.3	Limit dimension(s)	mm	0.5 a ≤ 10								
5	Technical specification		Sections 1 and 5 of BS HR 100								

6.1	Delivery condition		0.5 ≤ a ≤ 3: cold rolled + solution treated + descaled				3 < a ≤ 10: hot rolled + solution treated + descaled				
	Heat treatment		1080 °C ≤ θ ≤ 1120 °C / 3 ≤ t ≤ 30 min / AC or OQ or WQ								
6.2	Delivery condition code		W								
7	Use condition		Solution treated + precipitation treated								
	Heat treatment		Delivery condition + θ = (850 ± 10) °C / 2 h ≤ t ≤ 6 h / AC								

## Characteristics

8.1	Test sample(s)		See Section 5 of BS HR 100								
8.2	Test piece(s)		See Section 5 of BS HR 100								
8.3	Heat treatment		Delivery condition				Use condition				
9	Dimensions concerned	mm	0.5 ≤ a ≤ 3		3 < a ≤ 10		0.5 ≤ a ≤ 10				
10	Thickness of cladding on each face	%	—								
11	Direction of test piece		—				L or LT				
12	T	Temperature	θ	°C	—				600		
13		Proof stress	R <sub>p0.2</sub>	MPa	—				≥ 600		
14		Strength	R <sub>m</sub>	MPa	—				≥ 925		
15		Elongation	A	%	—				≥ 12		
16		Reduction of area	Z	%	—						
17	Hardness		HV ≤ 270		HV ≤ 270		—				
18	Shear strength	R <sub>c</sub>	MPa	—							
19	Bending	κ	—	3.0 ; α = 180°		—		—			
20	Impact strength		—								
21	C	Temperature	θ	°C	—				700		
22		Time	h		—				t <sub>R</sub> ≥ 23		
23		Stress	σ <sub>a</sub>	MPa	—						
24		Elongation	a	%	—						
25		Rupture stress	σ <sub>R</sub>	MPa	—				430		
26		Elongation at rupture	A	%	—				≤ 0.1		
27	Notes (see line 98)		—								



## Bibliography

### Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 4500-1, *Metallic materials – Rules for the drafting and presentation of material standards – Part 1: General rules*<sup>1)</sup>

EN 4500-3, *Metallic materials – Rules for the drafting and presentation of material standards – Part 3: Specific rules for heat resisting alloys*<sup>1)</sup>

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<sup>1)</sup> Published as ASD-STAN Prestandard at the date of publication of this standard.





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## BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

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