

BS 2HR 204:2009



BSI British Standards

AEROSPACE SERIES

**Specification for nickel-
chromium-iron-molybdenum-
cobalt-tungsten heat-resisting
alloy plate, sheet and strip
(Nickel base, Cr 21.7, Fe 18.5,
Mo 9, Co 1.5, W 0.6)**

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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 30 November 2009. It was prepared by Panel ACE/61/-/48, *Heat resisting alloys*, 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This standard supersedes BS HR 204:1972, which is withdrawn.

Information about this document

This is a full revision of BS HR 204. The principal change from the previous edition is that the 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-iron-molybdenum-cobalt-tungsten 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 and testing 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-iron-molybdenum-cobalt-tungsten heat-resisting alloy plate, sheet and strip

1	Material designation		BS HR 204						
2	Chemical composition %	Element	C	Si	Mn	P	S	B	Co
		Min.	0.05	—	—	—	—	—	0.50
		Max.	0.15	1.0	1.0	0.040	0.015	0.010	2.5
		Element	Cr	Fe	Mo	Pb	W	Ni	
		Min.	20.5	17.0	8.0	—	0.20	Base	
Max.	23.0	20.0	10.0	0.005 0	1.0				
3	Method of melting		Air melted, vacuum melted; air melted and vacuum refined; consumable electrode remelted						
4.1	Form		Plate, sheet and strip						
4.2	Method of production		Rolled						
4.3	Limit dimension(s)	mm	—						
5	Technical specification		Sections 1 and 5 of BS HR 100						

6.1	Delivery condition		Softened and descaled						
	Heat treatment		1 160°C ≤ θ ≤ 1 190 °C / AC or OQ or WQ						
6.2	Delivery condition code		U						
7	Use condition		Delivery condition						
	Heat treatment		—						

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								
9	Dimensions concerned	mm	a ≤ 0.5		0.5 < a ≤ 5		a > 5				
10	Thickness of cladding on each face	%	—								
11	Direction of test piece		L and LT								
12	Temperature	θ	°C	Ambient							
13	T	Proof stress	R _{p0.2}	MPa	—		≥ 310		≥ 275		
14		Strength	R _m	MPa	≥ 720		≥ 720		≥ 690		
15		Elongation	A	%	—		≥ 35		≥ 35		
16		Reduction of area	Z	%	—						
17	Hardness		HBW ≤ 255 or HV ≤ 260								
18	Shear strength	R _c	MPa	—							
19	Bending	κ	—	a ≤ 1.3: 0.75 ; α = 180°			a > 1.3: 1.0 ; α = 180°				
20	Impact strength		—								
21	Temperature	θ	°C	815							
22	Time		h	t _R ≥ 15 (0.3 mm ≤ a ≤ 0.5 mm);			t _R ≥ 23 (a > 0.5 mm)				
23	C	Stress	σ _a	MPa	—						
24		Elongation	a	%	—						
25		Rupture stress	σ _R	MPa	110						
26	Elongation at rupture	A	%	≥ 3 (0.3 mm ≤ a ≤ 0.5 mm)			≥ 8 (a > 0.5 mm)				
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*¹⁾

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

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

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