BS 2HR 505:2010

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Specification for nickel-chromium-iron-titanium-niobium-aluminium heat-resisting alloy round wire with a maximum diameter of 2 mm for thread inserts (nickel base Cr 15.5, Fe 7.0, Ti 2.5, Nb/Ta 0.95, Al 0.70)

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Contents

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 2010. 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This standard supersedes BS HR 505:1981, which is withdrawn.

Information about this document

This standard is a full revision of BS HR 505. 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

WARNING. This British Standard calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Use of this document

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 methods are expressed either as a set of instructions or 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-titanium-niobium-aluminium heat-resisting alloy round wire with a maximum diameter of 2 mm for thread inserts.

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-iron-titanium-niobium-aluminium heat-resisting alloy round wire for thread inserts**

1	**Material designation**			**BS HR 505**						
2	**Chemical composition %**	**Element**		C	Si	Mn	P	S	Al	Nb + Ta
		Min.		—	—	—	—	—	0.40	0.70
		Max.		0.08	0.50	1.00	0.015	0.010	1.00	1.20
		Element		Co	Cr	Cu	Fe	Ti	Ni + Co	
		Min.		—	14.00	—	5.00	2.25	70.00	
		Max.		1.00	17.00	0.50	9.00	2.75	—	
3	**Method of melting**			Induction melted and cast in air; induction melted, vacuum refined and cast in air; vacuum melted; consumable electrode remelted.						
4.1	**Form**			Wire						
4.2	**Method of production**			Cold drawn						
4.3	**Limit dimension(s)**		mm	D ≤ 2.0						
5	**Technical specification**			Sections 1 and 7 of BS HR 100						
6.1	**Delivery condition**			Cold drawn						
	Heat treatment			—						
6.2	**Delivery condition code**			F						
7	**Use condition**			Delivery condition						
	Heat treatment			—						

Characteristics

8.1	**Test sample(s)**			See Section 7 of BS HR 100			
8.2	**Test piece(s)**			See Section 7 of BS HR 100			
8.3	**Heat treatment**			Delivery condition			Reference (see line 29)
9	**Dimensions concerned**		mm	D ≤ 1.75	1.75 < D ≤ 2.0		D ≤ 2.0
10	**Thickness of cladding on each face**		%	—			
11	**Direction of test piece**			L			L
12	**T**	**Temperature**	θ °C	Ambient			Ambient
13		**Proof stress**	$R_{p0.2}$ MPa	—	—		—
14		**Strength**	R_m MPa	$1\,210 \leq R_m \leq 1\,420$	$1\,100 \leq R_m \leq 1\,310$		≥1 240
15		**Elongation**	A %	—	—		—
16		**Reduction of area**	Z %	—			
17	**Hardness**			—			
18	**Shear strength**		R_c MPa	—			
19	**Bending**		κ —	—			
20	**Impact strength**			—			
21	**C**	**Temperature**	θ °C	—			
22		**Time**	h	—			
23		**Stress**	σ_a MPa	—			
24		**Elongation**	a %	—			
25		**Rupture stress**	σ_R MPa	—			
26		**Elongation at rupture**	A %	—			
27	**Notes** (see line 98)			[1]			

Table 1 **Technical requirements for nickel-chromium-iron-titanium-niobium-aluminium heat-resisting alloy round wire for thread inserts *(continued)***

29	**Reference heat treatment**	—	Precipitation treated θ = (705 $\pm$5) °C/t = 4 h/AC
34	**Grain size**	—	See Section 1 of BS HR 100
		2	One per coil
		3	Transverse sample
		5	Delivery condition [1)]
		7	Average transverse grain size diameter $\leq$ 0.035 mm
42	**Torsion test**	—	See Section 7 of BS HR 100
		5	Reference (see line 29)
		6	Length between grips: 100D
		7	No failure after ten turns in one direction
43	**Wrapping test**	—	See Section 7 of BS HR 100
		5	Delivery condition
		6	Mandrel diameter: D
		7	No failure after eight turns
44	**External defects**	—	See Section 7 of BS HR 100
		7	Uniform in quality and condition, clean and free from kinks, twists, scrapes, splits, pipes, cold shuts and other injurious imperfections
51	**Macrostructure**	—	See Section 7 of BS HR 100
95	**Marking**	—	See Section 7 of BS HR 100
96	**Dimensional inspection**	—	See Section 7 of BS HR 100
98	**Notes**	—	[1)] Sample may be treated in accordance with Line 29 to facilitate grain size evaluation.

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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