

Specification for

**2½ % nickel-chromium-
molybdenum steel tubes
(1160 MPa)**

ICS 49.035

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee ACE/15, Wrought and cast steels for aerospace, upon which the following bodies were represented:

British Forging Industry Association
British Industrial Fasteners Federation
British Investment Casting Trade Association
British Iron and Steel Producers' Association
British Steel Industry
British Steel Industry (Wire Section)
Civil Aviation Authority (Airworthiness Division)
Institute of British Foundrymen
Minsistry of Defence
National Association of Steel Stockholders
Seamless Steel Tube Association
Society of British Aerospace Companies Limited
Spring Research and Manufacturers' Association
Stainless Steel Wire Industry Association
Steel Casting Research and Trade Association

This British Standard, having been prepared under the direction of the Aerospace Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 May 1997

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Published by BSI Standards Limited 2013

The following BSI references relate to the work on this standard:

Committee reference ACE/61
Drafts for comment
93/710141 DC,
12/30273424 DC

ISBN 978 0 580 81048 0

Amendments/corrigenda issued since publication

Amd. No.	Date	Comments
A1	April 2013	See Foreword

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Foreword

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This British Standard has been prepared under the direction of the Aerospace Standards Policy Committee and is a conversion and revision of MOD (PE) specification DTD 713, which it supersedes.

BS T 79:1997+A1:2013 supersedes BS T 79:1997, which is withdrawn.

Text introduced or altered by Amendment No. 1 is indicated in the text by tags **A1** and **A1**. Minor editorial changes are not tagged.

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Summary of pages

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

Specification

1 Scope

This British Standard specifies the inspection and testing procedures, chemical composition, heat treatment and mechanical properties for 2½ % nickel-chromium-molybdenum steel supplied in the form of tube for aerospace purposes.

2 References

2.1 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies; any subsequent amendments to, or revisions of, the cited publication apply to this British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back page, but reference should be made to the latest editions.

3 Technical requirements

3.1 Tube shall conform to the technical requirements specified in table 1. All tube supplied shall conform to the requirements appropriate to its dimensions and condition as specified in line 5 of table 1.

3.2 Symbols and units used in table 1 shall be interpreted in accordance with A1 BS ISO 80000-1. A1

NOTE. The format and symbols of table 1 are derived from A1 BS EN 4500-001 and BS EN 4500-005. A1

Table 1. Technical requirements for 2½ % Ni-Cr-Mo steel tubes (1160 MPa)													
1	Material designation				T 79								
2	Chemical composition %			Element	C	Si	Mn	P	S	Cr	Mo	Ni	Fe
				min.	0.27	0.10	0.5	—	—	0.5	0.4	2.3	Base
				max.	0.35	0.35	0.7	0.025	0.015	0.8	0.7	2.8	
3	Method of melting			Electric (air melted)									
4	Form Method of production Limit dimensions (mm)			Tube									
5	5.1 Technical specification			BS T 100									
	5.2 Dimensional standard			See table 2									
	5.3 Dimensional standard code												
6	6.1 Delivery condition and heat treatment			Softened				—					
	6.2 Delivery condition code							—					
7	Use condition and heat treatment							Hardened and tempered (see note 1) $\theta \leq 850$ °C/OQ or WQ or AC + temper to meet mechanical properties					
8	Sample Test piece Heat treatment			Use condition									
9	Dimensions concerned		mm	—				—					
10	Thicknesses of cladding on each face		%	—				—					
11	Direction of test piece			—				<i>L</i>					
12	Tensile	Temperature	θ	°C	Ambient temperature			Ambient temperature					
13		Proof stress	$R_{p0.2}$	MPa	—								
14		Strength	R_m	MPa	—			≥ 1160					
15		Elongation	<i>A</i>	%	—			≥ 14					
16		Reduction of area	<i>Z</i>	%	—			—					
17	Hardness		HB	—				—					
18	Shear strength		R_C	MPa	—				—				
19	Bending		<i>k</i>	—	—				—				
20	Impact strength			—				≥ 25 ft lbf (Izod) (see note 2)					
21	Creep	Temperature	θ	°C	—			—					
22		Time	<i>t</i>	h	—			—					
23		Stress	σ_a	MPa	—			—					
24		Elongation	<i>a</i>	%	—			—					
25		Rupture stress	σ_R	MPa	—			—					
26		Elongation at rupture	<i>A</i>	%	—			—					
97	Designation												
98	NOTE 1. The heat treatment temperatures and cooling employed shall be stated in the test certificate. NOTE 2. Test in accordance with BS 131 : Part 1.												

Nominal size of bore		Tolerance on bore	Wall thickness		Tolerances on wall thickness
in	mm		in	mm	
4	101.6	$\pm \frac{1}{8}$ in ± 3.18 mm	$\frac{3}{4}$	19.1	$+ 20 \%$ $- 5 \%$
4¼	107.9		$\frac{3}{4}$	19.1	
4½	114.3		$\frac{3}{4}$	19.1	
4¾	120.6		$\frac{3}{4}$	19.1	
5	127.0		1	25.4	
5½	139.7		1	25.4	
6	152.4		1	25.4	
6½	165.1		1	25.4	
7	177.8	1	25.4		

List of references (see clause 2)

Normative references

BSI publications

BRITISH STANDARDS INSTITUTION, London

BS T 100

Procedure for inspection, testing and acceptance of seamless steel tubes and tubestock

BS 131 :

Notched bar tests

BS 131 : Part 1 : 1961

The Izod impact test of metals

BS ISO 80000-1

Quantities and units – Part 1: General

Informative references

BS EN 4500-001

Aerospace series – Metallic materials – Rules for drafting and presentation of material standards – Part 1: General rules

BS EN 4500-005

Aerospace series – Metallic materials – Rules for drafting and presentation of material standards – Part 5: Specific rules for steels

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