



---

**Ministry of Defence**

---

**Defence Standard**

**01 - 8 / Issue 1**

**8 August 1985**



**STEEL SPECIFICATIONS**

**(GROUP SYSTEM)**

This Defence Standard supersedes  
DEF-13-B  
dated May 1960

**OBSOLESCENT**

**THIS DEFENCE STANDARD WILL NOT BE UPDATED AND IS  
NOT TO BE USED FOR THE PURCHASE OF NEW EQUIPMENT**

---

AMENDMENTS ISSUED SINCE PUBLICATION

AMD NO	DATE OF ISSUE	TEXT AFFECTED	SIGNATURE & DATE

Revision Note

This Defence Standard supersedes information contained in DEF-13-B. It has been revised and updated to reflect changes in steel specification.

Historical Record

DEF/13 dated 1 January 1953  
DEF-13-A dated 7 October 1957  
DEF-13-B dated May 1960

DEF STAN 01-8/1

STEEL SPECIFICATIONS (GROUP SYSTEM)

This Defence Standard supersedes DEF-13-B dated May 1960
---

- 1 This Defence Standard provides a choice of alternative steel specifications for Ministry of Defence use.
- 2 Tables I(A) to I(E) list a standard range of steel specifications for use in all future designs of equipment and, wherever acceptable, for the maintenance of existing equipment.
- 3 There is no Table II or III to this Standard.
- 4 This Standard has been agreed by authorities concerned. It is to be implemented, wherever practicable, in all designs, contracts, orders, etc commencing after its date of publication. If any difficulty arises which prevents application of the Defence Standard, the Directorate of Standardization shall be informed so that a remedy can be sought.
- 5 Any enquiries regarding this Standard in relation to an invitation to tender or a contract in which it is invoked are to be addressed to the responsible technical or supervising authority named in the invitation to tender or contract.
- 6 This Standard has been devised for the use of the Crown and of its contractors in the execution of contracts for the Crown and, subject to the Unfair Contract Terms Act 1977, the Crown will not be liable in any way whatever (including but without limitation negligence on the part of the Crown its servants or agents) where the Standard is used for other purposes.

<u>LIST OF CONTENTS</u>		<u>PAGE</u>
0	INTRODUCTION	5
1	SCOPE	5
2	GENERAL	5
3	DEFINITIONS	7
4	RELATED DOCUMENTS	9
5	SUPPLY AND QUALITY ASSURANCE	10
6	SCHEDULE OF STEEL SPECIFICATIONS IN THE GROUP SYSTEM	11
TABLE	I(A) CARBON, CARBON MANGANESE AND ALLOY STEELS	12
	GROUP M - MILD STEEL (NO PROPERTIES INCLUDED)	12
	GROUP NA - 430 MPa TENSILE, 215 MPa YIELD, CARBON AND CARBON MANGANESE STEEL (WITH NO SPECIFIED IMPACT PROPERTIES)	12
	GROUP NB - 430 MPa TENSILE, 320 MPa YIELD, COLD DRAWN CARBON STEEL (WITH NO SPECIFIED IMPACT PROPERTIES)	12
	GROUP O - 500 MPa TENSILE, 280 MPa YIELD, CARBON AND CARBON MANGANESE STEEL	12
	GROUP P - 550 MPa TENSILE, 310 MPa PROOF, CARBON AND CARBON MANGANESE STEEL	13
	GROUP Q - 625 MPa TENSILE, 355 MPa PROOF, CARBON, CARBON MANGANESE AND ALLOY STEEL	13
	GROUP R - 700 MPa TENSILE, 450 MPa PROOF, CARBON, CARBON MANGANESE AND ALLOY STEEL	14
	GROUP S - 775 MPa TENSILE, 510 MPa PROOF, CARBON MANGANESE AND ALLOY STEEL	15
	GROUP T - 850 MPa TENSILE, 620 MPa PROOF, CARBON MANGANESE AND ALLOY STEEL	15
	GROUP U - 925 MPa TENSILE, 725 MPa PROOF, ALLOY STEEL	16
	GROUP V - 1000 MPa TENSILE, 820 MPa PROOF, ALLOY STEEL	16
	GROUP W - 1075 MPa TENSILE, 910 MPa PROOF, ALLOY STEEL	17
	GROUP X - 1150 MPa TENSILE, 1005 MPa PROOF, ALLOY STEEL	17
	GROUP Y - 1225 MPa TENSILE, 1080 MPa PROOF, ALLOY STEEL	17
	GROUP Z - 1550 MPa TENSILE, 1125 MPa PROOF, ALLOY STEEL	17

		<u>PAGE NO</u>
TABLE I(B)	CASE HARDENING STEELS	18
	GROUP NC - 430 MPa TENSILE, CASE HARDENING CARBON AND CARBON MANGANESE STEEL	18
	GROUP QC - 620 MPa TENSILE, CASE HARDENING CARBON MANGANESE AND ALLOY STEEL	18
	GROUP SC - 770 MPa TENSILE, CASE HARDENING ALLOY STEEL	18
	GROUP TC - 850 MPa TENSILE, CASE HARDENING ALLOY STEEL	18
	GROUP UC - 930 MPa TENSILE, CASE HARDENING ALLOY STEEL	18
	GROUP WC - 1080 MPa TENSILE, CASE HARDENING ALLOY STEEL	18
	GROUP XC - 1160 MPa TENSILE, CASE HARDENING ALLOY STEEL	19
	GROUP YC - 1310 MPa TENSILE, CASE HARDENING ALLOY STEEL	19
TABLE I(C)	THROUGH-HARDENING NITRIDING STEELS	20
	GROUP QN - 625 MPa TENSILE, 430 MPa PROOF, ALLOY STEEL	20
	GROUP RN - 700 MPa TENSILE, 480 MPa PROOF, ALLOY STEEL	20
	GROUP SN - 775 MPa TENSILE, 540 MPa PROOF, ALLOY STEEL	20
	GROUP TN - 850 MPa TENSILE, 635 MPa PROOF, ALLOY STEEL	20
	GROUP UN - 925 MPa TENSILE, 740 MPa PROOF, ALLOY STEEL	21
	GROUP VN - 1000 MPa TENSILE, 835 MPa PROOF, ALLOY STEEL	21
	GROUP WN - 1075 MPa TENSILE, 925 MPa PROOF, ALLOY STEEL	21
	GROUP YN - 1310 MPa TENSILE, 1110 MPa PROOF, ALLOY STEEL	21
TABLE I(D)	FREE MACHINING STEELS	22
	GROUP MF - 360 MPa TENSILE, 215 MPa YIELD, NON-ALLOY FREE-CUTTING STEEL	22
	GROUP NF - 430 MPa TENSILE, 340 MPa YIELD, 300 MPa PROOF, NON-ALLOY FREE-CUTTING STEEL	22
	GROUP PF - 550 MPa TENSILE, 340 MPa YIELD, 310 MPa PROOF, NON-ALLOY FREE-CUTTING STEEL	22

	<u>PAGE NO</u>
TABLE I(D)	
(CONTD)	
GROUP QF - 625 MPa TENSILE, 400 MPa YIELD, 370 MPa PROOF, NON-ALLOY FREE CUTTING STEEL	23
GROUP RF - 700 MPa TENSILE, 450 MPa YIELD, 415 MPa PROOF, NON-ALLOY AND ALLOY FREE-CUTTING STEEL	23
GROUP SF - 775 MPa TENSILE, 525 MPa YIELD, 495 MPa PROOF, NON-ALLOY AND ALLOY FREE-CUTTING STEEL	23
GROUP TF - 850 MPa TENSILE, 600 MPa YIELD, 585 MPa PROOF, NON-ALLOY AND ALLOY FREE-CUTTING STEEL	23
TABLE I(E)	
ALTERNATIVE STEELS	24
CARBON, CARBON MANGANESE AND ALLOY STEELS (INCLUDING THROUGH-HARDENING NITRIDING STEELS)	24
CASE HARDENING STEELS	28
FREE CUTTING STEELS	29

STEEL SPECIFICATIONS (GROUP SYSTEM)0 INTRODUCTION

This document constitutes a method of choice of alternative steel specification. It is intended as a guide to design authorities for applications where the most important criteria are the level of mechanical properties required in the finished part. It does not take into account other aspects which may be important, eg low temperature notch toughness and stress relaxation at elevated temperatures. It is not authority for use of the Group System unless it is referred to in the relevant drawing or otherwise directly authorized. BS 970:Part 1:1983 has been used as a basis for this re-issue of the Group steels specification.

1 SCOPE

- 1.1 The Group System applies to carbon, carbon-manganese and alloy steels in the following wrought forms:

Billet or blooms

Slabs

Bars

Rods

Forgings

Plate

- 1.2 The System is not intended to cover steel for use in special applications such as breech rings, breech blocks, shells etc.
- 1.3 The System provides a schedule of steels suitable for use in the final heat treatment condition or for final heat treatment as a part machined or finish machined stage. The appropriate steel Group must be selected with regard to the effect of equivalent ruling section which shall be interpreted in accordance with BS 5046.
- 1.4 When special properties eg flame hardening characteristics, deep drawing qualities, welding or brazing requirements are needed, it may be necessary to specify a particular steel and not allow alternatives as will the Group System.

2 GENERAL

- 2.1 The physical properties developed by steel are influenced by chemical composition, the production processes and the ruling section when heat treated to give the final condition which is defined at clause 3.11.1.

2.2 The System arranges the steels in order of mechanical strength as shown at Table I(A) and below. It does not include steel bought to analytical or hardenability requirements.

<u>Group</u>	<u>Tensile strength range MPa</u>	
N	430-570	Carbon steel (mild steel)
O	500-590	Carbon and carbon-manganese steel
P	550-700	Hardened and tempered carbon and alloy steel
Q-Z	625-725 To 1550 min	Through hardening alloy steels

2.2.1 Attention is drawn to the range of mechanical properties within each Group and the possible loss in design strength, compared with selecting the best single material or material condition within each Group. If for example in Group Z elongation is critical it may be advisable to exclude the cold drawn condition ie g and h.

2.2.2 The following information should be specified on all drawings:

2.2.2.1 The appropriate Group and Subgroup.

2.2.2.2 The Ruling Section where relevant.

2.2.2.3 Excluded specifications, if any, eg Group Z excepting conditions g and h.

2.3 Case hardening steels are listed in Table I(B). In selecting these steels for components having larger section sizes, attention has to be given to the need to achieve the required core properties as well as the surface hardness.

The core properties tabulated below will be achieved only on ruling sections up to 19 mm. When the mechanical properties in the core at equivalent ruling sections other than 19 mm are important, these should be specified on the drawing and assured by appropriate test pieces.

<u>Group</u>	<u>Tensile strength MPa</u>	
NC	430	Case hardening carbon steel
QC	620	Case hardening carbon-manganese steel
SC-YC	770-1310	Case hardening alloy steel

Note: Groups NC-YC correspond broadly to the properties of non-carburizing steels in clause 2.2.

2.4 Through-hardening nitriding steels are entered in Table I(C). Attention is drawn to the special requirements on the content of minor elements as demanded by BS 970:Part 1:1983, Table 6, Notes 21, 22 and 23.

- 2.5 Free machining steels are listed separately in Table I(D) in the same strength ranges as Groups M-T inclusive, but suffixed "F" since these groups shall not be regarded as equivalent to the main groups.

Certain properties of free machining steels eg transverse ductility and toughness, resistance to corrosion or pickling may render these materials less suited to some component shapes and manufacturing processes. Such factors should be taken into account by Design Authorities before including these steels on component drawings or material lists.

- 2.6 This Defence Standard includes a list of alternative steels to other specifications at Table I(E) which may be substituted for the steels listed in Tables I(A), I(B), I(C) or I(D) for the purpose of this Standard/Grouping, provided that the steel selected is processed, tested and shown to fulfil all the requirements of the Group in the appropriate ruling section and all the quality assurance requirements of DEF STAN 95-5/2. The AISI, SAE steels were selected from the Metals Handbook of the American Society for Metals(ASM) and the DIN steels were culled from the Stahl Schlüssel.
- 2.7 Guide on use of Group table, Table I:
- 2.7.1 Select Group with required properties.
- 2.7.2 Exclude steels of insufficient Limiting Ruling Section (LRS).
- 2.7.3 If higher minimum proof, elongation or impact properties are required exclude steels or conditions of product below requirement.
- 2.7.4 If local hardening, welding or reheat treatment of finished part is required obtain metallurgical advice on appropriate Group and any excluded specifications.
- 2.7.5 If material to BS 970:Part 1:1983 is not available alternatives are given in Table I(E).

### 3 DEFINITIONS

- 3.1 Quality Assurance Authority. The authority designated in a contract as responsible for quality assurance matters in relation to that contract.
- 3.2 Billet or bloom. A wrought product of uniform section which may be solid or hollow and which is intended for further hot working.
- 3.3 Slab. Flat semi-finished product of thickness equal to or greater than 50 mm and with a width to thickness ratio equal to or greater than 2.
- 3.4 Bar. A wrought product of uniformly round, square, rectangular or regular polygonal solid section supplied in straight lengths.
- 3.5 Rod. A semi-finished hot rolled or swaged product of section usually 5-15 mm diameter or side and relatively great length, normally produced in coil form for cold drawing.
- 3.6 Forging. A product obtained by hot working under a hammer, press or other machine and not intended for further hot working.

- 3.7 Plate. Flat rolled product of thickness equal to or greater than 3 mm.
- 3.8 Ruling Section. The equivalent diameter of that portion of the object at the time of heat treatment that is most important in relation to mechanical properties.
- 3.9 Limiting Ruling Section (LRS). The largest diameter, for any given composition of steel, in which certain specified mechanical properties can be expected after a specified heat treatment.
- 3.10 Equivalent Diameter (of an object or part of an object). The diameter at the time of heat treatment of a hypothetical very long bar (effectively of infinite length) of uniform circular cross section, which, if subjected to the same cooling conditions as the object, ie same initial and final temperatures and same cooling medium, would have a cooling rate at its axis equivalent to that at the slowest-cooling position in the object or relevant part. For further information see BS 5046.

3.11 Symbols

3.11.1 Final Condition

<u>Condition</u>	<u>Production Process</u>	<u>Finish</u>
a	denotes hot rolled and normalized	Black
b	denotes hot rolled and normalized + turned and ground	Bright
c	denotes hot rolled and cold drawn	Bright
d	denotes hot rolled and cold drawn + ground	Bright
e	denotes hardened and tempered	Black
f	denotes hardened and tempered + turned or ground	Bright
g	denotes hardened and tempered + cold drawn	Bright
h	denotes hardened and tempered + cold drawn and ground	Bright

3.11.2 Tensile Properties

$R_m$	denotes tensile strength
$R_e$	denotes yield strength
$R_{p0.2}$	denotes 0.2% proof stress (non-proportional elongation)
A	denotes percentage elongation after fracture
$S_0$	denotes original cross-sectional area of the gauge length

3.11.3 Impact properties

Izod	denotes Izod V-notch impact value
KCV	denotes Charpy V-notch impact value

3.11.4 Hardness

HB	denotes Brinell hardness
----	--------------------------

3.11.5 Other

LRS	denotes limiting ruling section
min	denotes minimum value

3.12 Units

Strength 1 MPa = 1 N/mm<sup>2</sup> = 0.064749 tonf/in<sup>2</sup>  
 Impact energy 1 Joule (J) = 0.73756 ft.lbf

4 RELATED DOCUMENTS

4.1 Reference is made in this Standard to:

BS 'S' Steels	'Aerospace steels.'
BS 970:Part 1:1983	'Wrought steels for mechanical and allied engineering purposes. General inspection and testing procedures and specific requirements for carbon, carbon-manganese, alloy and stainless steels.'
BS 4360	'Specification for weldable structural steels.'
BS 5046	'Method for the estimation of equivalent diameters in the heat treatment of steel.'
DEF STAN 95-5/2	'Inspection of wrought steel for stressed application.'
ASM(AISI, SAE)	'Metals handbook (American Society for Metals)'  'Metals and alloys in the unified numbering system (Society of Automotive Engineers, Inc.)'
STAHL SCHLÜSSEL	'Standard-number arrangement'
DIN 1652	'Bright unalloyed steel; Technical conditions of delivery.'
DIN 1654 T.4	'Steels for cold heading and cold extruding; Technical conditions of delivery for steels for quenching and tempering.'
DIN 15400	'Lifting hooks for lifting appliances; Mechanical properties, lifting capacities, stresses and materials.'
DIN 17115	'Steels for welded round link chains; Quality specifications.'
DIN 17200	'Quenched and tempered steels; Quality specifications.'
DIN 17210	'Case hardening steels; Quality specifications.'
DIN 17211	'Nitriding steels; Quality specifications.'
DIN 17212	'Flame and induction hardening steels; Quality specifications.'
DIN 17240	'Heat resisting and highly heat resisting materials for bolts and nuts; Quality specifications.'

DEF STAN 01-8/1

4.2 Reference in this Standard to any related document means in any invitation to tender or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated.

4.3 The following series of documents are obtainable from the addresses shown:

4.3.1 BS and DIN  
British Standard Institution  
Sales Department  
Linford Wood  
Milton Keynes MK14 6LE

4.3.2 DEF STAN  
Directorate of Standardization  
Ministry of Defence  
Montrose House  
187 George Street  
Glasgow G1 1YU

4.3.3 ASM (AISI, SAE)  
American Technical Publishers Ltd  
68A Wilbury Way  
Hitchin  
Herts SG4 0TP

Society of Automotive Engineers, Inc  
400 Commonwealth Drive  
Warrendale  
PA 15096

4.3.4 STAHL SCHLÜSSEL  
JMJ Maus  
6-10 Tudor Road  
Hampton  
Middlesex TW12 2NQ

5 SUPPLY AND QUALITY ASSURANCE

5.1 In the use of the Group System it is the responsibility of the main contractor to arrange with the steel supplier the steel specification to be used and to inform the Quality Assurance Authority of the actual specification to which the steel is being ordered.

5.2 Where a part is finally heat treated as a part or finish machined stage then the properties specified on the drawing shall be obtained. Unless otherwise specified on the drawing the achievement of mechanical properties shall be demonstrated by tests on each heat treatment batch performed on longitudinal test pieces from (a) the component or (b) a test bar of equivalent section reference BS 5046 or (c) as detailed on the drawing. The tests shall be conducted in accordance with the standards specified in BS 970:Part 1:1983 unless otherwise specified in the component drawing or specification.

- 5.3 The steel selected shall fulfil all requirements of the relevant specification. The requirements within any one Group may vary and affect the cost of the steel accordingly.
- 5.4 If the contract or order requires that the steel shall be proof stress tested, then the steel supplied shall be tested, as appropriate:
- (a) in accordance with its specification.
  - (b) in accordance with the optional requirement of its specification, and failing such requirements as above.
  - (c) to ensure the 0.2 per cent proof stress is not less than the figure given in the heading of the appropriate Group or Subgroup in the schedule of the specification.
- 5.5 Unless otherwise required by the material specification impact testing will be conducted at  $23 \pm 5^{\circ}\text{C}$ .
- 5.6 In the event of steel being supplied from the Main Contractor's stocks it is the responsibility of the Main Contractor to ensure that the Quality Assurance Authority be notified so that the appropriate tests may be carried out.

6 SCHEDULE OF STEEL SPECIFICATIONS IN THE GROUP SYSTEM

- 6.1 The properties listed in the Table are the minimum mechanical properties specified in the Group, Subgroup or Section immediately following. The elongation values are taken on a gauge length equal to  $5.65 \times \sqrt{\text{area}}$  unless otherwise noted. THE YIELD OR PROOF STRESS FIGURES ARE CONSIDERED TO BE SAFE FOR DESIGN PURPOSES BUT ARE NOT NECESSARILY A CONDITION OF ACCEPTANCE IN THE INDIVIDUAL SPECIFICATIONS.
- 6.2 The mechanical properties are specified for test pieces located in accordance with BS 970:Part 1:1983 and will not necessarily be achieved through the full section.

TABLE I(A)

CARBON, CARBON MANGANESE AND ALLOY STEELS

Condition	LRS	Material	$R_m$	$R_e$	A min on	Impact		HB
	mm		min	min	5.65 $\sqrt{So}$	Izod min	KCV min	
			MPa	MPa	%	ft.lbf	J	

GROUP M - MILD STEEL (NO PROPERTIES INCLUDED)

GROUP NA - 430 MPa TENSILE, 215 MPa YIELD, CARBON AND CARBON MANGANESE STEEL (WITH NO SPECIFIED IMPACT PROPERTIES)

30 MPa,  $R_e \geq 215$  MPa,  $A \geq 17$ , HB  $\geq 126$ )

ab	63	070M26	490	245	20	-	-	143-192
ab	150	070M20	430	215	21	-	-	126-179
ab	150	080M30	490	245	20	-	-	143-192
ab	250	070M26	430	215	20	-	-	126-179
ab	250	080M30	460	230	19	-	-	134-183
ab	250	080M36	490	245	18	-	-	143-192
ab	250	080M40	510	245	17	-	-	146-197
ab	250	120M19	460	265	19	-	-	134-183
ab	250	150M19	510	295	17	-	-	146-197
ab	250	120M28	530	310	17	-	-	149-201

GROUP NB - 430 MPa TENSILE, 320 MPa YIELD, COLD DRAWN CARBON STEEL (WITH NO SPECIFIED IMPACT PROPERTIES)

( $R_m \geq 430$  MPa,  $R_e \geq 320$  MPa,  $A \geq 10$ )

cd	29	080M15	430	320	12	-	-	-
cd	76	070M20	450	325	14	-	-	-
cd	76	070M26	490	355	13	-	-	-
cd	76	080M30	530	385	12	-	-	-
cd	76	080M40	570	430	10	-	-	-

GROUP O - 500 MPa TENSILE, 280 MPa YIELD, CARBON AND CARBON MANGANESE STEEL

( $R_m \geq 500$  MPa,  $R_e \geq 280$  MPa,  $A \geq 16$ , Izod  $\geq 15$  ft.lbf, KCV  $\geq 16$ J, HB  $\geq 143$ )

ab	63	080M36	550	280	16	20	22	152-207
ab	100	120M19	500	295	20	25	28	143-192
ab	150	080M40	550	280	16	15	16	152-207
ab	150	120M28	550	325	16	25	28	152-207
ab	150	150M19	550	325	18	30	35	152-207
ab	150	150M28	590	355	16	25	28	174-223

For definitions of symbols see Page 8, Clause 3.11.

TABLE I(A) (CONTD)

Condition	LRS	Material	$R_{p0.2}$	A min on	Impact	
	mm		min	5.65 $\sqrt{So}$	Izod min	KCV min
			MPa	%	ft.lbf	J

GROUP P - 550 MPa TENSILE, 310 MPa PROOF, CARBON AND CARBON MANGANESE STEEL  
 $(R_m \geq 550 \text{ MPa}, R_{p0.2} \geq 310 \text{ MPa}, A \geq 13, \text{Izod} \geq 25 \text{ ft.lbf}, \text{KCV} \geq 28\text{J}, \text{HB} \geq 152)$

ef	63	080M30	310	18	25	28
gh	63	"	340	13	25	-
e	100	120M19	325	18	35	42
ef	150	150M19	325	18	40	50
gh	150	"	345	13	40	-

GROUP Q - 625 MPa TENSILE, 355 MPa PROOF, CARBON, CARBON MANGANESE AND ALLOY STEEL

$(R_m \geq 625 \text{ MPa}, R_{p0.2} \geq 355 \text{ MPa}, A \geq 12, \text{Izod} \geq 25 \text{ ft.lbf}, \text{KCV} \geq 28\text{J}, \text{HB} \geq 179)$

ef	19	080M30	400	16	25	28
gh	19	"	430	12	25	-
e	29	080M36	370	16	25	28
e	29	120M19	415	16	35	42
ef	63	080M40	355	16	25	28
gh	63	"	380	12	25	-
ef	63	150M19	415	16	40	50
gh	63	"	435	12	40	-
ef	100	120M36	385	18	30	35
gh	100	"	400	13	30	-
e	150	135M44	385	16	35	42
e	150	150M28	370	16	35	42
ef	150	150M36	370	18	35	42
gh	150	"	400	13	35	-
e	150	150M40	370	18	35	42
e	250	708M40	430	15	25	28

For definitions of symbols see Page 8, Clause 3.11.

TABLE I(A) (CONTD)

Condition	LRS	Material	$R_{p0.2}$	A min on	Impact	
	mm		min	5.65 $\sqrt{So}$	Izod min	KCV min
			MPa	%	ft.lbf	J

GROUP R - 700 MPa TENSILE, 450 MPa PROOF, CARBON, CARBON MANGANESE AND ALLOY STEEL

( $R_m \geq 700$  MPa,  $R_{p0.2} \geq 450$  MPa,  $A \geq 11$ , Izod  $\geq 25$  ft.lbf, KCV  $\geq 28$ J, HB  $\geq 201$ )

e	13	080M36	450	16	25	28
ef	19	080M40	450	16	25	28
gh	19	"	460	12	25	-
e	19	120M19	495	16	25	28
ef	29	120M36	480	16	25	28
gh	29	"	450	12	25	-
ef	29	150M19	495	16	30	35
gh	29	"	510	12	30	-
e	63	150M28	450	16	30	35
ef	63	150M36	450	16	30	35
gh	63	"	480	12	30	-
e	63	150M40	450	16	30	35
e	100	135M44	460	15	30	35
ef	100	530M40	510	17	40	50
gh	100	"	525	12	40	-
ef	150	605M36	510	17	40	50
gh	150	"	525	12	40	-
ef	150	708M40	510	17	40	50
gh	150	"	525	12	40	-
gh	150	709M40	510	11	40	-
e	150	905M39	510	17	40	50
ef	150	945M38	510	17	40	50
gh	150	"	525	13	40	50
ef	250	605M36	480	15	25	28
ef	250	708M40	480	15	25	28
ef	250	709M40	480	15	25	28
ef	250	945M38	480	15	25	28

For definitions of symbols see Page 8, Clause 3.11.

TABLE I(A) (CONTD)

Condition	LRS	Material	$R_{m, \min}^{0.2}$	A min on	Impact		
	mm		MPa	5.65/So	%	Izod min	KCV min
						ft. lbf	J

GROUP S - 775 MPa TENSILE, 510 MPa PROOF, CARBON MANGANESE AND ALLOY STEEL  
 $(R_m \geq 775 \text{ MPa}, R_{p0.2} \geq 510 \text{ MPa}, A \geq 10, \text{Izod} \geq 20 \text{ ft.lbf}, \text{KCV} \geq 22 \text{ J}, \text{HB} \geq 223)$

e	13	150M28	555	16	25	28
ef	19	120M36	555	14	25	28
gh	19	"	510	10	25	-
e	29	135M44	550	14	30	35
ef	29	150M36	525	14	30	35
gh	29	"	540	10	30	-
e	29	150M40	525	14	25	28
ef	63	530M40	570	15	40	50
gh	63	"	585	11	40	-
ef	100	605M36	570	15	40	50
gh	100	"	585	11	40	-
ef	100	708M40	570	15	40	50
gh	100	"	585	11	40	-
e	100	905M39	570	15	40	50
ef	100	945M38	570	15	40	50
gh	100	"	585	11	40	50
ef	150	709M40	570	15	40	50
gh	150	"	585	11	40	-
ef	250	"	540	13	20	22

GROUP T - 850 MPa TENSILE, 620 MPa PROOF, CARBON MANGANESE AND ALLOY STEEL  
 $(R_m \geq 850 \text{ MPa}, R_{p0.2} \geq 620 \text{ MPa}, A \geq 9, \text{Izod} \geq 25 \text{ ft.lbf}, \text{KCV} \geq 28 \text{ J}, \text{HB} \geq 248)$

ef	13	150M36	620	12	25	28
gh	13	"	635	9	25	-
e	19	135M44	620	12	25	28
ef	29	530M40	665	13	40	50
gh	29	"	680	9	40	-
ef	63	605M36	665	13	40	50
gh	63	"	680	9	40	-
ef	63	708M40	665	13	40	50
gh	63	"	680	9	40	-
e	63	905M39	665	13	35	42
gh	63	"	680	10	40	50
ef	63	945M38	665	13	40	50
gh	63	"	680	10	40	50
ef	100	709M40	665	13	40	50
gh	100	"	680	9	40	-
ef	150	722M24	665	13	40	50
gh	150	"	680	9	40	-
ef	150	817M40	665	13	40	50
gh	150	"	680	9	40	-
e	150	826M31	665	13	40	50
ef	250	722M24	635	13	30	35
ef	250	817M40	635	13	30	35
e	250	826M31	635	13	30	35

For definitions of symbols see Page 8, Clause 3.11.

TABLE I(A) (CONTD)

Condition	LRS	Material	R <sub>p0.2</sub>	A min on	Impact	
	mm		min	5.65 √So	Izod min	KCV min
			MPa	%	ft.lbf	J

GROUP U - 925 MPa TENSILE, 725 MPa PROOF, ALLOY STEEL  
 (R<sub>m</sub> ≥ 925 MPa, R<sub>p0.2</sub> ≥ 725 MPa, A ≥ 9, Izod ≥ 25 ft.lbf, KCV ≥ 28J,  
 HB ≥ 269)

ef	29	605M36	740	12	35	42
gh	29	"	755	9	35	-
ef	29	708M40	740	12	35	42
gh	29	"	755	9	35	-
ef	29	945M38	740	12	35	42
gh	29	"	755	9	35	42
ef	63	709M40	740	12	35	42
gh	63	"	755	9	35	-
ef	100	817M40	740	12	35	42
gh	100	"	755	9	35	-
e	150	720M32	740	12	35	42
ef	150	722M24	740	12	35	42
gh	150	"	755	9	35	-
e	150	826M31	740	12	35	42
ef	150	826M40	740	12	35	42
gh	150	"	755	9	35	-
e	250	720M32	740	12	30	35
e	250	826M31	725	12	25	28
ef	250	826M40	725	12	25	28

GROUP V - 1000 MPa TENSILE, 820 MPa PROOF, ALLOY STEEL  
 (R<sub>m</sub> ≥ 1000 MPa, R<sub>p0.2</sub> ≥ 820 MPa, A ≥ 9, Izod ≥ 25 ft.lbf, KCV ≥ 28J,  
 HB ≥ 293)

ef	19	605M36	835	12	35	42
gh	19	"	850	9	35	-
ef	19	708M40	835	12	35	42
gh	19	"	850	9	35	-
ef	29	709M40	835	12	35	42
gh	29	"	850	9	35	-
ef	29	945M38	835	12	35	42
gh	29	"	850	9	35	42
ef	63	817M40	835	12	35	42
gh	63	"	850	9	35	-
e	150	720M32	835	12	35	42
e	150	826M31	835	12	35	42
ef	150	826M40	835	12	35	42
gh	150	"	850	9	35	-
ef	250	"	820	12	25	28

For definitions of symbols see Page 8, Clause 3.11.

TABLE I(A) (CONTD)

Condition	LRS	Material	R <sub>p0.2</sub>	A min on	Impact	
	mm		min	5.65/So	Izod min	KCV min
			MPa	%	ft.lbf	J

GROUP W - 1075 MPa TENSILE, 910 MPa PROOF, ALLOY STEEL  
 (R<sub>m</sub> ≥ 1075 MPa, R<sub>p0.2</sub> ≥ 910 MPa, A ≥ 8, Izod ≥ 20 ft.lbf, KCV ≥ 22J,  
 HB > 311)

ef	13	708M40	925	12	30	35
gh	13	"	940	8	30	-
ef	19	709M40	925	12	30	35
gh	19	"	940	8	30	-
ef	29	817M40	925	11	30	35
gh	29	"	940	8	30	-
e	100	720M32	925	11	30	35
e	100	826M31	925	11	30	35
ef	150	826M40	925	11	30	35
gh	150	"	940	8	30	-
ef	250	"	910	11	20	22

GROUP X - 1150 MPa TENSILE, 1005 MPa PROOF, ALLOY STEEL  
 (R<sub>m</sub> ≥ 1150 MPa, R<sub>p0.2</sub> ≥ 1005 MPa, A ≥ 7, Izod ≥ 25 ft.lbf, KCV ≥ 28J,  
 HB ≥ 341)

ef	29	817M40	1005	10	25	28
gh	29	"	1020	7	25	-
e	63	826M31	1005	10	25	28
ef	150	826M40	1005	10	25	28
gh	150	"	1020	7	25	-

GROUP Y - 1225 MPa TENSILE, 1080 MPa PROOF, ALLOY STEEL  
 (R<sub>m</sub> ≥ 1225 MPa, R<sub>p0.2</sub> ≥ 1080 MPa, A ≥ 7, Izod ≥ 18 ft.lbf, KCV ≥ 21J,  
 HB ≥ 363)

e	29	817M40	1080	10	18	21
ef	150	826M40	1080	10	25	28
gh	150	"	1095	7	25	-

GROUP Z - 1550 MPa TENSILE, 1125 MPa PROOF, ALLOY STEEL  
 (R<sub>m</sub> ≥ 1550 MPa, R<sub>p0.2</sub> ≥ 1125 MPa, A ≥ 3, Izod ≥ 8 ft.lbf, KCV ≥ 9J,  
 HB ≥ 444)

ef	29	817M40	1125	5	8	9
gh	29	"	1235	3	8	-
e	63	826M31	1125	5	8	9
ef	100	826M40	1125	7	10	11
gh	100	"	1235	5	10	-
e	150	835M30	1125	7	15	16

For definitions of symbols see Page 8, Clause 3.11.

TABLE I(B)  
CASE HARDENING STEELS

(PROPERTIES FOR 19mm BLANK CARBURIZED BAR)

Material	$R_m$	A min on	Impact	
	min	5.65 $\sqrt{S_0}$	Izod min	KCV min
	MPa	%	ft.lbf	J

GROUP NC - 430 MPa TENSILE, CASE HARDENING CARBON AND CARBON-MANGANESE STEEL  
 $(R_m \geq 430 \text{ MPa}, A \geq 16, \text{Izod} \geq 30 \text{ ft.lbf}, \text{KCV} \geq 35\text{J})$

045M10	430	18	35	42
080M15	460	16	30	35
210M15	460	16	30	35

GROUP QC - 620 MPa TENSILE, CASE HARDENING CARBON-MANGANESE AND ALLOY STEEL  
 $(R_m \geq 620 \text{ MPa}, A \geq 12, \text{Izod} \geq 25 \text{ ft.lbf}, \text{KCV} \geq 28\text{J})$

523M15	620	13	25	28
130M15	650	14	30	35
214M15	650	12	30	35

GROUP SC - 770 MPa TENSILE, CASE HARDENING ALLOY STEEL  
 $(R_m \geq 770 \text{ MPa}, A \geq 12, \text{Izod} \geq 15 \text{ ft.lbf}, \text{KCV} \geq 16\text{J})$

527M17	770	12	15	16
665M17	770	12	30	35
805M17	770	12	20	22

GROUP TC - 850 MPa TENSILE, CASE HARDENING ALLOY STEEL  
 $(R_m \geq 850 \text{ MPa}, A \geq 11, \text{Izod} \geq 15 \text{ ft.lbf}, \text{KCV} \geq 16\text{J})$

805M20	850	11	15	16
665M20	850	11	20	22

GROUP UC - 930 MPa TENSILE, CASE HARDENING ALLOY STEEL  
 $(R_m \geq 930 \text{ MPa}, A \geq 10, \text{Izod} \geq 15 \text{ ft.lbf}, \text{KCV} \geq 16\text{J})$

637M17	930	10	15	16
708M20	930	10	15	16
808M17	930	10	20	22
590M17	930	10	15	16

GROUP WC - 1080 MPa TENSILE, CASE HARDENING ALLOY STEEL  
 $(R_m \geq 1080 \text{ MPa}, A \geq 8, \text{Izod} \geq 20 \text{ ft.lbf}, \text{KCV} \geq 22\text{J})$

815M17	1080	8	20	22
832M13	1080	8	25	28

For definitions of symbols see Page 8, Clause 3.11.

TABLE I(B) (CONTD)

Material	R <sub>m</sub> min	A min on 5.65√ So	Impact	
	MPa	%	Izod min	KCV min
			ft.lbf	J

GROUP XC - 1160 MPa TENSILE, CASE HARDENING ALLOY STEEL  
 (R<sub>m</sub> ≥ 1160 MPa, A ≥ 8, Izod ≥ 20 ft.lbf, KCV ≥ 22J)

820M17	1160	8	20	22
--------	------	---	----	----

GROUP YC - 1130 MPa TENSILE, CASE HARDENING ALLOY STEEL  
 (R<sub>m</sub> ≥ 1310 MPa, A ≥ 8, Izod 20 ft.lbf, KCV ≥ 22J)

822M17	1310	8	20	22
835M15	1310	8	25	28

For definitions of symbols see Page 8, Clause 3.11.

TABLE I(C)

THROUGH-HARDENING NITRIDING STEELS

Condition	LRS	Material	$R_{p0.2}$	A min on	Impact	
	mm		min	$5.65\sqrt{So}$	Izod min	KCV min
			MPa	%	ft. lbf	J

GROUP QN - 625 MPa TENSILE, 430 MPa PROOF, ALLOY STEEL  
 ( $R_m \geq 625$  MPa,  $R_{p0.2} \geq 430$  MPa,  $A \geq 15$ , Izod  $\geq 15$  ft.lbf, KCV  $\geq 16$ J, HB  $\geq 179$ )

ef	150	708M40	465	18	15	16
ef	250	"	430	15	25	28

GROUP RN - 700 MPa TENSILE, 480 MPa PROOF, ALLOY STEEL  
 ( $R_m \geq 700$  MPa,  $R_{p0.2} \geq 480$  MPa,  $A \geq 15$ , Izod  $\geq 25$  ft.lbf, KCV  $\geq 28$ J, HB  $\geq 201$ )

ef	150	708M40	510	17	40	50
e	150	905M39	510	17	40	50
ef	250	708M40	480	15	25	28
ef	250	709M40	480	15	25	28

GROUP SN - 775 MPa TENSILE, 540 MPa PROOF, ALLOY STEEL  
 ( $R_m \geq 775$  MPa,  $R_{p0.2} \geq 540$  MPa,  $A \geq 13$ , Izod  $\geq 20$  ft.lbf, KCV  $\geq 22$ J, HB  $\geq 223$ )

ef	100	708M40	570	15	40	50
e	100	905M39	570	15	40	50
ef	150	709M40	570	15	40	50
ef	250	"	540	13	20	22

GROUP TN - 850 MPa TENSILE, 635 MPa PROOF, ALLOY STEEL  
 ( $R_m \geq 850$  MPa,  $R_{p0.2} \geq 635$  MPa,  $A \geq 13$ , Izod  $\geq 30$  ft.lbf, KCV  $\geq 35$ J, HB  $\geq 248$ )

ef	63	708M40	665	13	40	50
e	63	905M39	665	13	35	42
ef	100	709M40	665	13	40	50
ef	150	722M24	665	13	40	50
ef	250	"	635	13	30	35

For definitions of symbols see Page 8, Clause 3.11.

TABLE I(C) (CONTD)

Condition	LRS	Material	R <sub>p0.2</sub>	A min on	Impact	
	mm		min	5.65/So	Izod min	KCV min
			MPa	%	ft. lbf	J

GROUP UN - 925 MPa TENSILE, 740 MPa PROOF, ALLOY STEEL  
 (R<sub>m</sub> ≥ 925 MPa, R<sub>p0.2</sub> ≥ 740 MPa, A ≥ 12, Izod ≥ 30 ft.lbf, KCV ≥ 35J,  
 HB ≥ 269)

ef	29	708M40	740	12	35	42
ef	63	709M40	740	12	35	42
ef	150	722M24	740	12	35	42
e	150	720M32	740	12	35	42
e	250	"	740	12	30	35

GROUP VN - 1000 MPa TENSILE, 835 MPa PROOF, ALLOY STEEL  
 (R<sub>m</sub> ≥ 1000 MPa, R<sub>p0.2</sub> ≥ 835 MPa, A ≥ 12, Izod ≥ 35 ft.lbf, KCV ≥ 42J,  
 HB ≥ 293)

ef	19	708M40	835	12	35	42
ef	29	709M40	835	12	35	42
e	150	720M32	835	12	35	42

GROUP WN - 1075 MPa TENSILE, 925 MPa PROOF, ALLOY STEEL  
 (R<sub>m</sub> ≥ 1075 MPa, R<sub>p0.2</sub> ≥ 925 MPa, A ≥ 11, Izod ≥ 30 ft.lbf, KCV ≥ 35J,  
 HB ≥ 311)

ef	13	708M40	925	12	30	35
ef	19	709M40	925	12	30	35
e	100	720M32	925	11	30	35

GROUP YN - 1310 MPa TENSILE, 1110 MPa PROOF, ALLOY STEEL  
 (R<sub>m</sub> ≥ 1310 MPa, R<sub>p0.2</sub> ≥ 1110 MPa, A ≥ 8, Izod ≥ 15 ft.lbf, KCV ≥ 16J,  
 HB ≥ 363)

e	63	897M39	1110	8	15	16
---	----	--------	------	---	----	----

For definitions of symbols see Page 8, Clause 3.11.

TABLE I(D)  
FREE MACHINING STEELS

Condition	LRS	Material	$R_m$	$R_e$	A min on	Impact		$R_{p0.2}$
	mm		min	min	5.65 $\sqrt{S_0}$	Izod min	KCV min	min
			MPa	MPa	%	ft.lbf	J	MPa

GROUP MF - 360 MPa TENSILE, 215 MPa YIELD, NON-ALLOY FREE-CUTTING STEEL  
( $R_m \geq 360$  MPa,  $R_e \geq 215$  MPa,  $A \geq 22$ )

ab	100	220M07	360	215	22	-	-	-
ab	100	230M07	360	215	22	-	-	-

GROUP NF - 430 MPa TENSILE, 340 MPa YIELD, 300 MPa PROOF, NON-ALLOY FREE-CUTTING STEEL

( $R_m \geq 430$  MPa,  $R_e \geq 340$  MPa,  $A \geq 6$ ,  $R_{p0.2} \geq 300$  MPa)

cd	13	220M07	480	400	6	-	-	360
cd	13	230M07	480	400	6	-	-	360
cd	16	220M07	460	380	7	-	-	345
cd	16	230M07	460	380	7	-	-	345
cd	40	220M07	430	340	8	-	-	300
cd	40	230M07	430	340	8	-	-	300

GROUP PF - 550 MPa TENSILE, 340 MPa YIELD, 310 MPa PROOF, NON-ALLOY FREE-CUTTING STEEL

( $R_m \geq 550$  MPa,  $R_e \geq 340$  MPa,  $A \geq 9$ ,  $R_{p0.2} \geq 310$  MPa)

cd	63	216M28	550	355	20	25	28	325
cd	76	216M36	570	420	9	-	-	353
fgh	100	"	550	340	20	25	28	310
fgh	100	212M36	550	360	20	25	28	310

GROUP QF - 625 MPa TENSILE, 400 MPa YIELD, 370 MPa PROOF, NON-ALLOY FREE-CUTTING STEEL

( $R_m \geq 625$  MPa,  $R_e \geq 400$  MPa,  $A \geq 13$ , Izod  $\geq 20$  ft.lbf, KCV  $\geq 22$ J,  $R_{p0.2} \geq 370$  MPa)

e	19	216M28	625	430	18	25	28	415
e	63	212M36	625	400	18	25	28	370
f	63	216M36	625	400	18	25	28	370
g	63	"	625	440	13	25	28	400
e	63	225M36	625	400	18	25	28	370
e	150	216M44	625	400	16	20	22	370

For definitions of symbols see Page 8, clause 3.11.

TABLE I(D) (CONTD)

Condition	LRS	Material	$R_{e \min}$	A min on	Impact		$R_{p0.2 \min}$
	mm		MPa	5.65 $\sqrt{So}$	Izod min	KCV min	
					%	ft. lbf	J

GROUP RF - 700 MPa TENSILE, 450 MPa YIELD, 415 MPa PROOF, NON-ALLOY AND ALLOY FREE-CUTTING STEEL  
 ( $R_m \geq 700$  MPa,  $R_e \geq 450$  MPa,  $A \geq 11$ , Izod  $\geq 15$  ft.lbf, KCV  $\geq 16$ J,  $R_{p0.2} \geq 415$  MPa)

e	13	212M36	495	16	25	28	480
e	13	225M36	480	16	25	28	450
ef	29	216M36	480	16	25	28	450
gh	29	"	520	12	25	28	470
e	100	216M44	450	15	15	16	415
ef	100	226M44	450	16	20	22	415
g	100	"	525	12	20	22	435
f	100	606M36	525	15	40	50	510
gh	100	"	540	11	35	42	525

GROUP SF - 775 MPa TENSILE, 525 MPa YIELD, 495 MPa PROOF, NON-ALLOY AND ALLOY FREE-CUTTING STEEL  
 ( $R_m \geq 775$  MPa,  $R_e \geq 525$  MPa,  $A \geq 10$ , Izod  $\geq 15$  ft.lbf, KCV  $\geq 16$ J,  $R_{p0.2} \geq 495$  MPa)

f	29	216M44	525	14	15	16	495
f	29	226M44	525	14	15	16	495
gh	29	"	575	10	15	16	520
f	63	606M36	585	13	35	42	570
gh	63	"	600	10	35	42	585

GROUP TF - 850 MPa TENSILE, 600 MPa YIELD, 585 MPa PROOF, NON-ALLOY AND ALLOY FREE-CUTTING STEEL  
 ( $R_m \geq 850$  MPa,  $R_e \geq 600$  MPa,  $A \geq 8$ , Izod  $\geq 15$  ft.lbf, KCV  $\geq 16$ J,  $R_{p0.2} \geq 585$  MPa)

f	13	226M44	600	12	15	16	585
gh	13	"	630	9	15	16	600
f	29	606M36	680	11	30	35	665
gh	29	"	700	8	30	35	680

For definitions of symbols see Page 8, Clause 3.11.

TABLE I(E)  
ALTERNATIVE STEELS  
CARBON, CARBON MANGANESE AND ALLOY STEELS  
(INCLUDING THROUGH-HARDENING NITRIDING STEELS)

COMPARABLE STEELS, TO 'S' SERIES AND OVERSEAS STANDARDS WHICH IN SOME CASES ARE AVAILABLE TO GROUP PROPERTIES. THESE STEELS ARE SUITABLE FOR FORGING, HOT ROLLING, HEAT TREATING AND TESTING TO THE STATED GROUP REQUIREMENTS OF THE BS 970:PART 1:1983 STEEL.

(NB:- STEELS TO THE ALTERNATIVE SPECIFICATIONS CAN ACHIEVE THE ADDITIONAL MECHANICAL PROPERTIES AND LRS REQUIREMENTS OF A GROUP GIVEN THE APPROPRIATE PROCESSING. THE ATTAINMENT OF THE REQUIRED GROUP PROPERTIES IS TO BE AGREED AND ACHIEVED BY THE SUPPLIER, IT IS NOT A CONDITION OF THE COMPARABLE SPECIFICATION. WHERE STEELS ARE EXCLUDED FROM A GROUP THE MINIMUM PROPERTIES OF THE REMAINING STEELS WILL BE REQUIRED)

BSI			ASM		STAHL SCHLÜSSEL				
BS970: PART 1: 1983	GROUP	LRS (mm)	BS 'S' /	BS 4360	AISI /	SAE	SYMBOL	WKSTOFF	DIN
055M15	M	-	3S91	4360 GR 40D 4360 GR 40E	C1012 C1015	1012 1015	C 15	1.0305 1.0401	17210; 1652
080M15	M NB	150 29	4S14	4360 GR 40D 4360 GR 40E	C1016 C1017	1016 1017	15 Mn 3 15 Mn 3 A1	1.0467 1.0468	17115 17115
070M20	NA NB	150 76	5S21	4360 GR 43E (NORM)	C1021 C1018 C1019 C1022 C1023	1021 1018 1019 1022 1023	Ck 22.8 Ck 22 Cq 22 C 22	1.1150 1.1151 1.1152 1.0402	- 17200; 1652 1654T.4 17200; 1652
070M26	NA NB	250 76	-	4360 GR 43E (NORM)	C1026	1026	GS Ck 25 GS Ck 24	1.1155 1.1156	-
080M30	NA NB P Q	250 76 63 19	-	-	C1030	1030	-	-	-
080M36	NA O Q R	250 63 29 13	-	-	C1033 C1035	1033 1035	Cm 35 Ck 35	1.1180 1.1181	17200 17200; 17240
080M40	NA NB O Q R	250 76 150 63 19	2S116 2S113	-	C1038 C1039 C1040	1038 1039 1040	Ck 40	1.1186	17200

TABLE I(E) (CONTD)

BSI			ASM		STAHL SCHLÜSSEL		
BS970: PART 1: 1983	GROUP	LRS (mm)	BS 'S' / BS 4360	AISI / SAE	SYMBOL	WKSTOFF	DIN
120M19	NA O P Q R	250 100 100 29 19	- 4360 GR 43E (NORM) - 4360 GR 50D (NORM)	- -	20 Mn 5	1.1133	-
120M28	NA O	250 150	- -	- -	-	-	-
120M36	Q R S	100 29 19	- -	C1036 1036	GS-36 Mn 5	1.1167	-
135M44	Q R S T	150 100 29 19	- -	C1048 1048	-	-	-
150M19	NA O P Q R	250 150 150 63 29	2S514 - 2S515 SHEET/STRIP	C1024 1024	20 Mn 6	1.1169	-
150M28	O Q R S	150 150 63 13	- -	- -	28 Mn 6	1.1170	17200
150M36	Q R S T	150 63 29 13	- -	C1335 1335	GS-40 Mn 5	1.1168	-

TABLE I(E) (CONTD)

DEF STAN 01-8/1  
TABLE I(E) (CONTD)

BSI			ASM		STAHL SCHLÜSSEL		
BS970: PART 1: 1983	GROUP	LRS (mm)	BS 'SS / BS 4360	AISI / SAE	SYMBOL	WKSTOFF	DIN
150M40	Q R S	150 63 29	- -	C1041 1041	-	-	-
530M40	R S T	100 63 29	2S117 -	5140 5140	42 Cr 4 41 Cr 4	1.7045 1.7035	17212 1654 17200;1654T.4
605M36	R S T U V	250 100 63 29 19	2S114 -	- -	42 Mn Mo 7	1.5432	-
708M40(1)	Q R S T U V W	250 250 100 63 29 19 13	- -	4140 4140	42 Cr Mo 4	1.7225	17200: 1654T.4
709M40(1)	R S T U V W	250 250 100 63 29 19	- -	- -	GS 42 Cr Mo 4	1.7225	17200: 1654T.4
720M32(1)	U V W	250 150 100	- -	- -	31 Cr Mo 125 32 Cr Mo 12	1.7360 1.7361	- 17200
722M24(1)	T U	250 150	4S106 -	- -	-	-	-

26

TABLE I(E) (CONTD)

BSI			ASM		STAHL SCHLÜSSEL		
BS970: PART 1: 1983	GROUP	LRS (mm)	BS 'S' / BS 4360	AISI / SAE	SYMBOL	WKSTOFF	DIN
817M40	T U V W X Y Z	250 100 63 29 29 29 29	S139 - 2S119	4340 / 4340	40 Ni Cr Mo 6 34 Cr Ni Mo 6	1.6565 1.6582	- 17200; 15400; 1654T.4
826M31	T U V W X Z	250 250 150 100 63 63	2S140 - 2S120 S153(2) S154(2)	- / -	32 Ni Cr Mo 10 4	1.6743	-
826M40	U V W X Y Z	250 250 250 150 150 100	4S99 - 2S98	- / -	40 Ni Mo Cr 10 5	1.6745	-
835M30	Z	150	4S28 -	- / -	30 Ni Cr Mo 16 6	1.6747	-
897M39(1)	NONE: SUITABLE FOR YN CONDITION NITRIDING STEEL		S134 - S138 (RE MELT)	- / -	39 Cr Mo V 13 9	1.8523	17211
905M39(1)	R S T	150 100 63	- -	- / -	41 Cr Al Mo 7	1.8509	17211
945M38	R S T	250 100 63	- -	- / -	-	-	-

27

DEF. STAN 01-8/1  
TABLE I(E) (CONTD)

TABLE I(E) (CONTD)

BSI			ASM		STAHL SCHLÜSSEL				
BS970: PART 1: 1983	GROUP	LRS (mm)	BS 'S' /	BS 4360	AISI /	SAE	SYMBOL	WKSTOFF	DIN
945M38	U	29	-	-	-	-	-	-	-
	V	29							

CASE HARDENING STEELS

045M10	NC		3S91	-	C1010	1010	-	-	-
080M15	NC		4S14	-	C1016	1016	15 Mn 3	1.0467	17115
					C1017	1017	15 Mn 3 Al	1.0468	17115
130M15	QC		-	-	-	-	-	-	-
210M15	NC		-	-	C1117	1117	-	-	-
214M15	QC		-	-	C1118	1118	-	-	-
523M15	QC		-	-	-	-	-	-	-
527M17	SC		-	-	-	5115	-	-	-
590M17	UC		-	-	-	-	-	-	-
637M17	UC		-	-	-	-	-	-	-
665M17	SC		-	-	4615	4615	-	-	-
665M20	TC		-	-	4620	4620	-	-	-
708M20	UC		-	-	-	-	-	-	-
805M17	SC		-	-	8617	8617	-	-	-
805M20	TC		-	-	8620	8620	-	-	-
808M17	UC		-	-	-	-	-	-	-
815M17	WC		-	-	-	-	-	-	-

DEF STAIN 01-5/1  
 TABLE I(E) (CONTD)

TABLE I(E) (CONTD)

BSI			ASM		STAHL SCHLÜSSEL				
BS970: PART 1: 1983	GROUP	LRS (mm)	BS 'S' /	BS 4360	AISI /	SAE	SYMBOL	WKSTOFF	DIN
820M17	XC		-	-	-	-	-	-	-
822M17	YC		-	-	-	-	-	-	-
832M13	WC		S157(2)	-	9310	9310	-	-	-
835M15	YC		5S82 S156(2)	-	-	-	-	-	-

FREE CUTTING STEELS

212M36	QF RF	63 13	-	-	-	-	-	-	-
216M36	PF QF RF	100 63 29	-	-	C1137	1137	-	-	-
216M44	QF RF SF	150 100 29	-	-	-	-	-	-	-
220M07	MF NF	100 40	-	-	C12L14 C1112	12L14 1112	-	-	-
230M07	MF NF	100 40	-	-	C12L14	12L14	-	-	-
226M44	RF SF TF	100 29 13	-	-	C1144	1144	-	-	-
606M36	RF SF TF	100 63 29	-	-	-	-	-	-	-

NOTE: (1) See special provisions for nitriding steels in clause 2.4.  
 (2) Indicates obsolescent.

© Crown Copyright 1985

Published by and obtainable from:  
Ministry of Defence  
Directorate of Standardization  
Montrose House  
187 George Street  
Glasgow G1 1YU

Tel No: 041-552 4455

This Standard may be fully reproduced except for sale purposes. The following conditions must be observed:

- 1 The Royal Coat of Arms and the publishing imprint are to be omitted.
- 2 The following statement is to be inserted on the cover:  
'Crown Copyright. Reprinted by (name of organization) with the permission of Her Majesty's Stationery Office.'

Requests for commercial reproduction should be addressed to MOD Stan 1, Montrose House, 187 George Street, Glasgow G1 1YU

The following Defence Standard file reference relates to the work on this Standard - D/D Stan/337/1/2.

#### Contract Requirements

A Defence Standard does not include all the necessary provisions of a contract. Users of Defence Standards are responsible for their correct application.

#### Revision of Defence Standards

Defence Standards are revised when necessary by the issue either of amendments or of revised editions. It is important that users of Defence Standards should ascertain that they are in possession of the latest amendments or editions. Information on all Defence Standards is contained in Def Stan 00-00 (Part 3) Section 4 Index of Defence Standards published annually and supplemented periodically by Standards in Defence News. Any person who, when making use of a Defence Standard encounters an inaccuracy or ambiguity is requested to notify the Directorate of Standardization without delay in order that the matter may be investigated and appropriate action taken.



## MINISTRY OF DEFENCE

D Stan 5d, Room 1138,  
Kentigern House, 65 Brown Street,  
Glasgow, G2 8EX  
Tel: 0141 224 2679  
Fax: 0141 224 2503

---

Your Ref: Def Stan 01-8/1

Our Ref: D/DStan/337/1/2

Date: 21 January 1997

---

### OBSOLESCEMENT NOTICE

Def Stan 01-8/Issue 1

Steel Specifications (Group System)

This notice has been agreed by the authorities concerned with the use of the above Standard.

This Standard is obsolescent because it is no longer required for the procurement of new equipment, but is retained for maintenance purposes in support of existing in-service equipment.

A handwritten signature in black ink, appearing to read 'H McLernon'.

H McLERNON  
for Directorate of Standardization