

For Comments Only

**BUREAU OF INDIAN STANDARDS**

**Draft Indian Standard**

**DESIGNATION SYSTEM FOR STEELS — STEEL NAMES  
BASED ON LETTER SYMBOLS**

(Second Revision of IS 1762)

**ICS 77.080.20**

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**FOREWORD**

(Formal clauses will be added later)

In formulation of this standard, assistance has been derived from ISO 4949:2003 Steel names based on letter symbols and EN 10027-1:2005.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

**1 SCOPE**

**1.1** This Indian Standard specifies the rules for designating steel grades by means of symbolic letters and numbers to express application and principal characteristics (e.g. mechanical, physical, chemical) so as to provide an abbreviated identification of steels.

**1.2** A system of numerical designation of steels known as steel numbers is specified in IS 1762-2.

**2 REFERENCES**

The standards listed below contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
7598:1990	Classification of Steels
Doc:MTD 4 (4731)	Steel Products — Definitions and Classifications

**3 TERMS AND DEFINITIONS**

For the purpose of this document, the terms and definitions in IS 7598 and IS 1956 apply.

## **4 PRINCIPLES**

### **4.1 A Unique Steel Name**

There shall be one unique steel name for each steel.

### **4.2 Formulation of Steel Names**

Steel names allocated in accordance with this Indian Standard shall comprise principal symbols as specified in 7.1.

In order to avoid ambiguity, it may be necessary to supplement these principal symbols by additional symbols identifying additional characteristics of the steel or steel product, e.g. suitability for use at high or low temperatures, surface condition, treatment condition, deoxidation. These additional symbols are given in 7.2.

Unless otherwise specified in this Indian Standard, the symbols used in the steel name shall be written without spaces.

### **4.3 Allocation of Steel Names**

For steels specified in Indian Standards, steel names shall be allocated by the relevant committee of MTD-4.

## **5 REFERENCE TO PRODUCT STANDARDS**

The complete designation of a steel product when quoted in orders or similar contractual documents, shall include, in addition to the steel name, an indication of the technical delivery requirement in which the steel is specified. For steels specified in standards this shall be the reference number of the relevant product standard.

Details of the structure of the steel name for the steel or steel product shall be provided in the relevant product or dimensional standard.

## **6 CLASSIFICATION OF STEEL NAMES**

For the purpose of designation, steel names are classified into two main groups.

- Group 1: Steels designated according to their application and mechanical or physical properties (see 7.3).
- Group 2: Steels designated according to their chemical composition (see 7.4).

## **7 STRUCTURE OF STEEL NAMES**

### **7.1 Principal Symbols**

Principal symbols for steels designated according to their application and its mechanical and physical properties shall be assigned in accordance with 7.3.

Principal symbols for steels designated according to the chemical composition of the steel shall be assigned in accordance with 7.4.

Where a steel is specified in the form of a steel casting, its name as specified in 7.3 and 7.4 shall be preceded by the letter G.

Where a steel is specified in the form of a steel casting, its name as specified in 7.3 and 7.4 shall be preceded by the letter PM.

## **7.2 ADDITIONAL SYMBOLS**

Additional symbols may be added to the principal symbols and assigned in accordance with 7.3 and 7.4.

Additional symbols are divided into two groups, i.e. group 1 and group 2 (see 7.3 and 7.4). If the symbols for group 1 are inadequate to describe the steel fully, then additional symbols from group 2 may be added. Symbols of group 2 shall only be used in conjunction with and follow symbols of group 1.

Further additional symbols for steel products may follow the additional symbols of group 1 and group 2 and shall be selected in accordance with 7.3 and 7.4 from tables 16, 17 and 18. These symbols shall be separated from the preceding symbols by the plus sign (+).

## **7.3 Steels Designated According To Their Application And Mechanical Or Physical Properties**

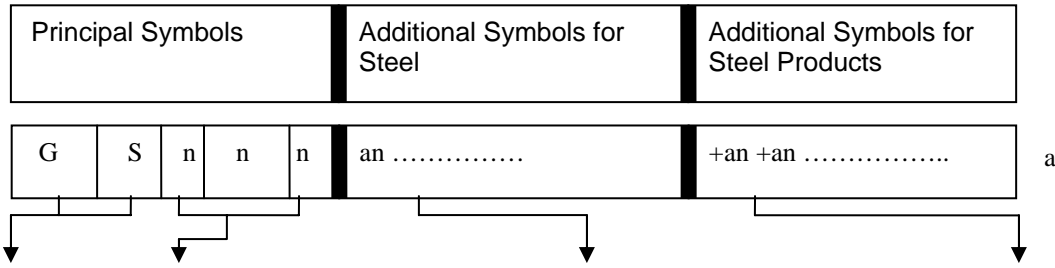
The designation of steel according to their application and mechanical or physical properties shall be made in accordance with Table 1 to Table 11.

## **7.4 Steels Designated According To Chemical Composition**

The designation of steel according to their chemical composition shall be made in accordance with Table 12 to Table 15.

In order to keep the steel names of alloy steels as short as practical, some digits or symbols may be omitted as there is no risk of confusion with a similar grade.

**Table 1 Structural Steels**



Principal symbols		Additional symbols					For Steel Product	
		For Steel						
Letter	Mechanical Property	Group 1 <sup>b</sup>			Group 2 <sup>c,d</sup>			
G = Steel casting (where necessary)  S = Structural steel	nnn = Specified minimum yield strength <sup>e</sup> in MPa <sup>f</sup> for the smallest thickness range	Impact Property Energy Joules (J)		Test Temperature		C = Special cold forming D = Hot dip coating E = Enameling F = Forgings H = Hollow section L = Low temperature M = Thermomechanically rolled N = Normalized or normalized rolled P = Sheet piling Q = Quenched and tempered S = Ship building T = Tubes W = Weather resistant an = Chemical symbol of specified additional elements, e.g. Cu, together, where necessary, with a single digit representing 10 x the average (rounded to 0.1 %) of that specified range of the content of that element.	Tables 16, 17 and 18	
		27J	40J	60J	°C			
		JR	KR	LR	20			
		J0	K0	L0	0			
		J2	K2	L2	-20			
		J3	K3	L3	-30			
		J4	K4	L4	-40			
		J5	K5	L5	-50			
		J6	K6	L6	-60			
				A = Precipitation hardening  M = Thermomechanically rolled  N = Normalized or normalized rolled  Q = Quenched and tempered  G = Other characteristics followed, where necessary by 1 or 2 digits				

<sup>a</sup> n = numerical characters, a = alpha characters, an = alphanumeric characters

<sup>b</sup> Symbols A, M, N and Q in Group 1 apply to fine grain steels.

<sup>c</sup> Symbols of Group 2, other than chemical symbols, may be sufficed by one or two digits in order to distinguish between qualities in accordance with the relevant product standard.

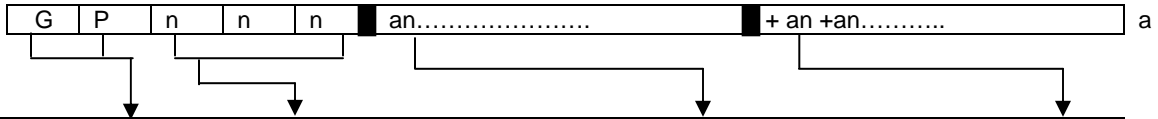
<sup>d</sup> If two of the symbol of this group are needed the chemical symbol shall be the last one.

<sup>e</sup> the term 'yield strength' refers to upper or lower yield strength (R<sub>eH</sub>) or (R<sub>eL</sub>) or proof strength (R<sub>p</sub>) or proof strength total extension (R<sub>t</sub>) depending on the requirement specified in the relevant product standard.

<sup>f</sup> 1 MPa = 1 N/mm<sup>2</sup>

**Table 2 Steels for Pressure Purposes**

Principle symbols	Additional symbols	Additional symbols for steel products
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Principal Symbols		Additional Symbols		
Letter	Mechanical Property	For Steel		For steel products
		Group 1 <sup>b</sup>	Group 2 <sup>c</sup>	
G = steel casting (where necessary)	nnn = specified minimum yield strength <sup>d</sup> in MPa <sup>e</sup> for the Smallest Thickness range	B = gas bottles	H = high Temperature	Tables 16, 17 & 18
P = steels for pressure purposes		M = thermo mechanically rolled	L = Low Temperature	
		N = normalized or normalized rolled	R = Room Temperature	
		Q = quenched and tempered	X = High and Low temperature	
		S = simple pressure vessels		
		T = tubes		
		G = other		
		characteristics followed, Where necessary, by 1 or 2 digits		

<sup>a</sup> n = numerical characters, a = alpha characters, an = alphanumeric characters

<sup>b</sup> Symbols , M N and Q in Group 1 apply to fine grain steels.

<sup>c</sup> Symbols of Group 2, other than chemical symbols, may be suffixed by one or two digits in order to distinguish between qualities in accordance with the relevant product standard.

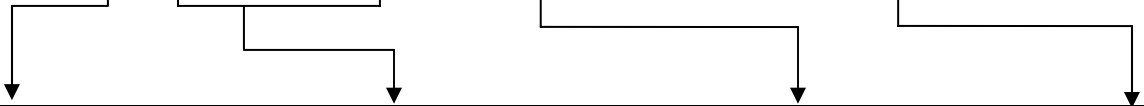
<sup>d</sup> the term `yield strength' refers to upper or lower yield strength ( $R_{eH}$ ) or ( $R_{eL}$ ) or proof strength ( $R_p$ ) or proof strength total extension ( $R_t$ ) depending on the requirement specified in the relevant product standard.

<sup>e</sup> 1 MPa = 1 N/mm<sup>2</sup>

**Table 3 Steels for line pipe**

Principal symbols	Additional symbols for steel	Additional symbols for Steel products
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L	n	n	n	an.....	+an +an.....	a
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Principal Symbols		Additional Symbols		
Letter	Mechanical Property	For Steel		For Steel Products
		Group 1	Group 2	
B = Steels for line pipe.	nnn = specified minimum yield strength b in MPa <sup>c</sup> for the Smallest thickness range	M = Thermomechanically N = Normalised or normalised rolled Q = Quenched and tempered G = Other characteristics followed, where necessary by 1 or 2 digits	a = Class required followed, where necessary, by one digit.	Tables 16, 17 and 18

<sup>a</sup> n = numerical characters, a = alpha characters, an = alphanumeric characters

<sup>b</sup> symbols M,N and Q in group 1 apply to fine grain steels.

<sup>b</sup> the term 'yield strength' refers to upper or lower yield strength ( $R_{eH}$ ) or ( $R_{eL}$ ) or proof strength ( $R_p$ ) or proof strength total extension ( $R_t$ ) depending on the requirement specified in the relevant product standard.

<sup>c</sup> 1 MPa = 1 N/mm<sup>2</sup>

**Table 4 Steels for Engineering**

Principal symbols		Additional symbols for steel		Additional symbols for Steel products	
G	E	n	n	n	an.....
				+an	+an.....
				a	

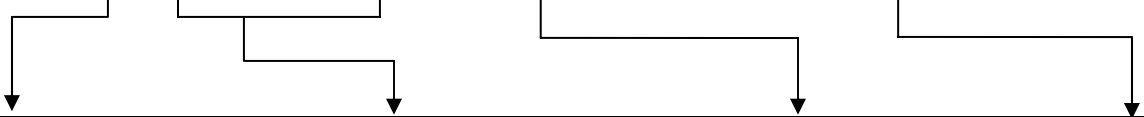
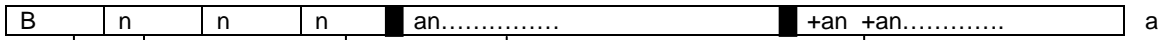
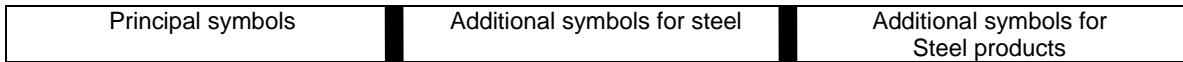
Principal Symbols		Additional Symbols		
Letter	Mechanical Property	For Steel		For Steel Products
		Group 1	Group 2	
G = steel casting (where necessary)  E = Engineering steels	nnn = specified minimum yield strength b in MPA c for the Smallest Thickness range	G = other Characteristics Followed, Where Necessary by 1 or 2 digits  Or In case where impact Properties are specified the rules of Table 1 Group 1 shall be applied	C = suitability for cold drawing	Tables 18

<sup>a</sup>n = numerical characters, a = alpha characters, an = alphanumeric characters

<sup>b</sup> the term 'yield strength' refers to upper or lower yield strength ( $R_{eH}$ ) or ( $R_{eL}$ ) or proof strength ( $R_p$ ) or proof strength total extension ( $R_t$ ) depending on the requirement specified in the relevant product standard.

<sup>c</sup> 1 MPa = 1 N/mm<sup>2</sup>

**Table 5 Steels for Reinforcing concrete**



Principal Symbols		Additional Symbols		
Letter	Mechanical Property	For Steel		For Steel Products
		Group 1	Group 2	
B = Steels for Reinforcing concrete	nnn = characteristic yield strength b in MPa <sup>c</sup> for the Smallest Dimensional range	a = ductility class Followed, Where Necessary by 1 or 2 digits	-	Tables 18

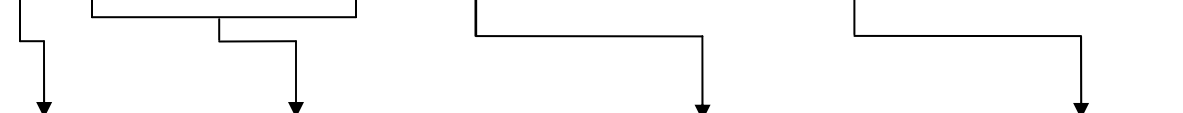
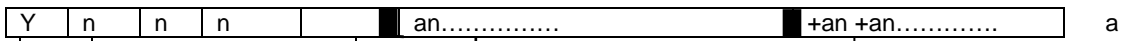
<sup>a</sup> n = numerical characters, a = alpha characters, an = alphanumeric characters

<sup>b</sup> the term 'yield strength' refers to upper or lower yield strength ( $R_{eH}$ ) or ( $R_{eL}$ ) or proof strength ( $R_p$ ) or proof strength total extension ( $R_t$ ) depending on the requirement specified in the relevant product standard.

<sup>c</sup> 1 MPa = 1 N/mm<sup>2</sup>

**Table 6 Steels for Prestressing Concrete**

Principal symbols	Additional symbols for steel	Additional symbols for Steel products
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Principal Symbols		Additional Symbols		
Letter	Mechanical Property	For Steel		For Steel Products
		Group 1 <sup>b</sup>	Group 2	
Y = Steels for prestressing concrete	nnnn = <sup>c</sup> Nominal tensile Strength( $R_m$ ) in MPa <sup>d</sup>	C = Cold drawn wire  H = hot rolled bars or hot rolled and processed bars  Q = quenched and tempered wire  S = strand  G = other characteristics Followed, where necessary by 1 or 2 digits	-	Tables 18

<sup>a</sup> n = numerical characters, a = alpha characters, an = alphanumeric characters

<sup>b</sup> symbols of group 1 may be suffixed by one or two digits in order to distinguish between qualities in accordance with the relevant product standard.

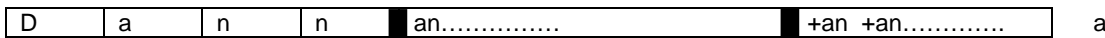
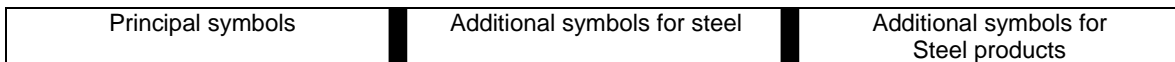
<sup>c</sup> where tensile strength is specified by 3 digits the first digit shall be zero.

<sup>d</sup> 1 MPa = 1 N/mm<sup>2</sup>

**Table 7 Steels for or in the Form of Rails**

Principal symbols					Additional symbols for steel		Additional symbols for Steel products		
R	n	n	n	n	an.....		+an +an.....		
Principal Symbols					Additional Symbols				
Letter	Mechanical Property				For Steel				For Steel Products
					Group 1	Group 2			
R = Steels for or in the form of rails	nnn = specified Minimum Brinell Hardness (HBW)				Cr = chromium yield	HT = Heat treated			-
					Mn = high manganese content	LHT = Low alloy, heat treated			
					an = chemical symbol of specified additional elements, e.g. Cu, together where necessary, with a single digit representing 10 x the average (rounded to 0.1%) of that specified range of the content of that element	Q = Quenched and tempered			
					G = other characteristics Followed, Where Necessary by 1 or 2 digits				
<sup>a</sup> n = numerical characters, a = alpha characters, an = alphanumeric characters									

**Table 8 Flat Products for Cold Forming (Except those in Table 9)**



Principal Symbols		Additional Symbols		
Letter	Mechanical Property	For Steel		For Steel Products
		Group 1 <sup>b</sup>	Group 2	
D = Flat Products for Cold Forming	Cnn = Cold Rolled followed by 2 symbols <sup>c</sup>  Dnn = hot rolled for direct cold forming followed by 2 symbols <sup>c</sup>  Xnn = product where rolled condition are not specified followed by 2 symbols <sup>c</sup>	D = for hot dip coating  ED = for direct enameling  EK = for conventional enameling  H = for hollow sections  T = for tubes  an = chemical symbol of special additional element e.g. Cu, together, where necessary, with a single digit representing 10 x the average (rounded to 0.1%) of that specified range of the content of that element  G = other characteristics followed, where necessary, by 1 to 2 digits.	-	Table 17 & 18

<sup>a</sup> n = numerical characters, a = alpha characters, an = alphanumeric characters

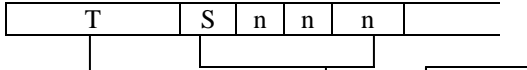
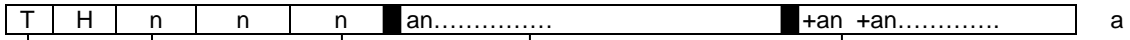
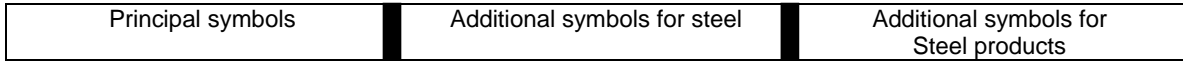
<sup>b</sup> Symbols of Group 1, other than chemical symbols, may be suffixed by one or two digits in order to distinguish between qualities in accordance with the relevant product standard.

<sup>c</sup> These symbols are assigned by the responsible body (see 4.3) in order to characterize the steel.

**Table 9 High Strength Steel Flat Products for Cold Forming**

Principal symbols		Additional symbols for steel		Additional symbols for Steel products	
H	a	n	n	n	an.....
H	a	T	n	n	(n)
Principal Symbols		Additional Symbols			
Letter	Mechanical Property	For Steel		For Steel Products	
		Group 1 <sup>b</sup>	Group 2 <sup>b</sup>		
H = Flat Products of High Strength for Cold Forming	<p>Cnn = Cold Rolled followed by specified minimum yield strength<sup>c</sup> in MPa<sup>d</sup></p> <p>Dnnn = hot rolled for direct cold forming followed by specified minimum yield strength<sup>c</sup> in MPa<sup>d</sup></p> <p>Xnnn = product where the rolling condition is not specified followed by minimum yield strength<sup>c</sup> in MPa<sup>d</sup></p> <p>CTnnn (n) = Cold Rolled followed by minimum tensile strength in MPa<sup>d</sup></p> <p>DTnnn(n) = hot rolled for direct cold forming followed by specified minimum tensile strength in MPa<sup>d</sup></p> <p>XTnnn(n) = product where the rolling condition is not specified followed by specified minimum tensile strength in MPa<sup>d</sup></p>	<p>B = bake hardening</p> <p>C = complex-phase</p> <p>I = isotropic</p> <p>LA = low alloyed</p> <p>M = thermo mechanically rolled</p> <p>P = with phosphorus</p> <p>T = trip (Transformation induced plasticity)</p> <p>X = dual phase</p> <p>Y = interstitial free</p> <p>G = other characteristics followed, where necessary, by 1 or 2 digits</p>	D = for hot dip coating	Table 17	
<p><sup>a</sup>n = numerical characters, a = alpha characters, an = alphanumeric characters</p> <p><sup>b</sup> Symbols of Group 1, other than chemical symbols, may be suffixed by one or two digits in order to distinguish between qualities in accordance with the relevant product standard.</p> <p><sup>c</sup> the term 'yield strength' refers to upper or lower yield strength (R<sub>eH</sub>) or (R<sub>eL</sub>) or proof strength (R<sub>p</sub>) or proof strength total extension (R<sub>t</sub>) depending on the requirement specified in the relevant product standard.</p> <p><sup>d</sup> 1 MPa = 1 N/mm<sup>2</sup></p>					

**Table 10 Tin Mill Products (Steel Products for Packaging)**



Principal Symbols		Additional Symbols		
Letter	Mechanical Property	For Steel		For Steel Products
		Group 1	Group 2	
<i>T = Tin Mill Products (Steel Products for Packaging)</i>	Hnnn = nominal yield strength ( $R_e$ ) in MPa <sup>b</sup> for continuous annealed grades  Snnn = nominal yield strength ( $R_e$ ) in MPa <sup>b</sup> for batch annealed grades	-	-	Table 17 And 18
				NOTE – No symbol is assigned to blackplate

<sup>a</sup>n = numerical characters, a = alpha characters, an = alphanumeric characters

<sup>b</sup> 1 MPa = 1 N/mm<sup>2</sup>

**Table 11 Electrical Steels**

Principal symbols      Additional symbols

M   n   n   n   n   -   n   n   a   a

Principal Symbols			Additional Symbols
Letter	Property	Type of Product	
M = Electrical Steel	<p>Nnn(n) = max specified loss in w/kg x 100</p> <p>Nn = 100 x nominal thickness in mm</p> <p>A hyphen shall separate the two properties</p>	<p>For magnetic polarization at 50 Hz of 1.5 Tesla:</p> <p>A = non-oriented</p> <p>D = non-alloy semi-finished (not finally annealed)</p> <p>E = alloy semi-finished (not finally annealed)</p> <p>For magnetic polarization at 50 Hz of 1.7 Tesla:</p> <p>P = high permeability grain oriented</p> <p>S = conventional grain oriented</p>	-
<sup>a</sup> n = numerical characters, a = alpha characters, an = alphanumeric characters			

**Table 12 Non-alloy Steels (except cutting steels) with an Average Manganese Content , 1%**

Principal symbols		Additional symbols for steel		Additional symbols for Steel products	
G	C	n	n	n	an.....
				+an	+an.....
				a	
Principal Symbols			Additional Symbols		
			For Steel		For Steel Products
Letter	Carbon Content <sup>b</sup>	Group 1 <sup>cd</sup>	Group 2		
G = Steel casting (where necessary)  C = Carbon	nnn = 100 x specified average carbon percentage content  Where the carbon content is not specified by a range, a suitably representative value shall be selected by the responsible body (see 4.3)	C = for cold forming, e.g. cold heading, cold extrusion  D = for wire drawing  E = with specified max sulphur content  R = with specified sulphur content range  S = for springs  U = for tools  W = for welding rod  G = other characteristics followed where necessary by, 1 or 2 digits	an = chemical symbol of special additional element(s), e.g. Cu together, where necessary, with a single digit representing 10 x the average (rounded to 0.1%) of that specified range of the content of that element.	Table 18	
<sup>a</sup> n = numerical characters, a = alpha characters, an = alphanumeric characters <sup>b</sup> to distinguish between two similar steel grades, the number indicating carbon content may be increased by 1 <sup>c</sup> Symbols of group 1, other than E and R, may be suffixed by one or two digits in order to distinguish between qualities in accordance with the relevant product standard. <sup>d</sup> The symbols E and R of group 1 may be followed by 1 digit representing 100 x the maximum or average sulphur content rounded to the nearest 0.01%					

**Table 13 Non-alloy Steels with an Average Manganese Content  $\geq 1\%$ , Non-alloy Free-cutting steels and Alloy Steels (except high speed steels) where the Content, by Weight, of Every Average Alloying Element is  $<5\%$**

Principal symbols	Additional symbols for steel	Additional symbols for Steel products
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G	n	n	n	a..	n-n	+an +an.....	a
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Principal Symbols			Additional Symbols												
Letter	Carbon content <sup>b</sup>	Alloying elements	For Steel		For products steel										
			Group 1	Group 2											
G = Steel casting (where necessary)	nnn = 100 x specified average carbon percentage content. Where the carbon content is not specified by a range, a suitably representative value shall be selected by the responsible body (see 4.3)	a = chemical symbols Indicating alloying Elements c that characterize the steel followed by:  n-n = numbers, separated by hyphens, representing respectively the average percentage content of the elements multiplied by the following factors	-	-	Table 16 & nd 18										
		<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%;">Element</th> <th style="width:50%;">Factor</th> </tr> </thead> <tbody> <tr> <td>Cr, Co, Mn, Ni, Si, W</td> <td style="text-align:center;">4</td> </tr> <tr> <td>Al, Be, Cu, Mo, Nb, Pb, Ta, Ti, V, Zr</td> <td style="text-align:center;">10</td> </tr> <tr> <td>Ce, N, P, S</td> <td style="text-align:center;">100</td> </tr> <tr> <td>B</td> <td style="text-align:center;">1000</td> </tr> </tbody> </table>	Element	Factor	Cr, Co, Mn, Ni, Si, W	4	Al, Be, Cu, Mo, Nb, Pb, Ta, Ti, V, Zr	10	Ce, N, P, S	100	B	1000			
Element	Factor														
Cr, Co, Mn, Ni, Si, W	4														
Al, Be, Cu, Mo, Nb, Pb, Ta, Ti, V, Zr	10														
Ce, N, P, S	100														
B	1000														

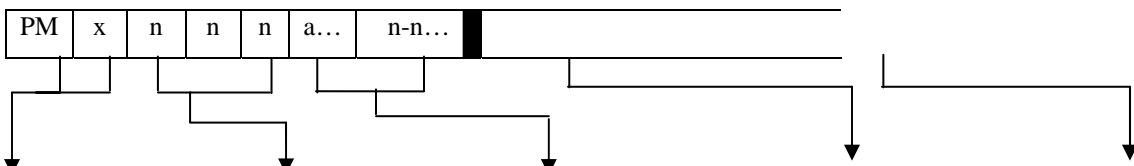
<sup>a</sup>n = numerical characters, a = alpha characters, an = alphanumeric characters

<sup>b</sup> to distinguish between two similar steel grades, the number indicating carbon content may be increased by 1

<sup>c</sup> The sequence of symbols shall be in decreasing order of the values of the average percentage content; where the values of contents are the same for two or more elements, the corresponding symbols shall be indicated in alphabetical order.

**Table 14 Stainless Steels and Other Alloy Steels (except high speed steels)  
where the Average Content by Weight of at Least  
One Alloying Element is  $\geq 5\%$**

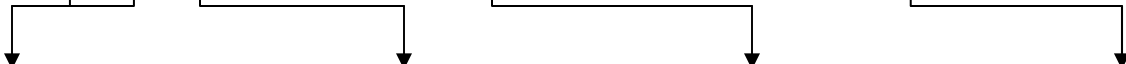
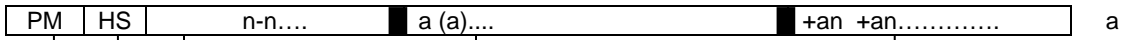
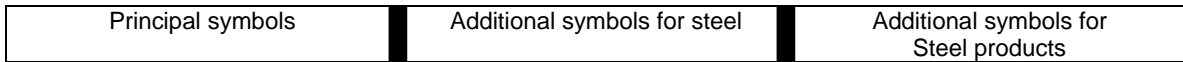
Principal symbols	Additional symbols for steel	Additional symbols for Steel products
G   X   n   n   n   a...   n-n	an.....	+an +an.....



Principal Symbols			Additional Symbols		
Letter	Carbon Content b	Alloying elements	For Steel d		For Steel Products
			Group 1	Group 2	
			<p>G = Steel casting (where necessary)</p> <p>PM = powder metallurgy (where necessary for tool steel)</p> <p>X = the average content of at least one alloying element <math>\geq 5\%</math></p>	<p>nnn = 100 x specified average carbon percentage content.</p> <p>Where the carbon content is not specified by a range, a suitably representative value shall be selected by the responsible body (see 4.3)</p>	

<sup>a</sup>n = numerical characters, a = alpha characters, an = alphanumeric characters  
b to distinguish between two similar steel grades, the number indicating carbon content may be increased by 1  
c The sequence of symbols shall be in decreasing order of the values of the average percentage content; where the values of contents are the same for two or more elements, the corresponding symbols shall be indicated in alphabetical order.  
d An example is given for a steel having high nitrogen content (see below)

**Table 15 High Speed Steels**



Principal Symbols		Additional Symbols		
Letter	Alloy Element Content	For Steel		For Steel Products
		Group 1	Group 2	
PM = powder metallurgy (where necessary)  HS = High speed steel	n-n = numbers b, separated by hyphens, indicating percentage <sup>3</sup> content of alloy elements in the following order:  Tungsten (W) Molybdenum (Mo) Vanadium (V) Cobalt (Co)	a (a) = chemical Symbols(s) of the element(s) with higher content (in case of same steel grade)	-	Table 18

<sup>a</sup>n = numerical characters, a = alpha characters, an = alphanumeric characters

<sup>b</sup> Each number represents the average percentage content of the respective element rounded to the nearest integer.

