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PART I CHEMICAL COMPOSITION

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BUREAU OF INDIAN STANDARDS
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Indian Standard

RATIONALIZED STEELS FOR THE AUTOMOBILE AND ANCILLARY INDUSTRY

PART I CHEMICAL COMPOSITION

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Indian Standard

RATIONALIZED STEELS FOR THE AUTOMOBILE AND ANCILLARY INDUSTRY

PART I CHEMICAL COMPOSITION

0. FOREWORD

0.1 This Indian Standard (Part I) was adopted by the Indian Standards Institution on 22 June 1979, after the draft finalized by the Co-ordinating Committee on Materials for Automobiles Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 In order to effect variety reduction and to promote economic production of alloy and special steels in the country, IS : 1570-1961* was published as a part of the Steel Economy Programme of Indian Standards Institution. It has served as the basic standard for specifying steel composition in all the Indian Standards relating to material specification. As a further aid to industry, ISI also attempted industry-wise rationalization. The list of rationalized steels for the automobile and ancillary industry was prepared as a part of this programme.

The list has been in existence for quite some time. The automobile industry consumes substantial tonnage of steel and it was, therefore, felt that in order to make the list more popular and thereby help the automobile industry to rationalize its requirements within these grades, it should be printed as an Indian Standard. Further, the Government of India through a Gazette Notification issued in 1972 made it compulsory for consumers to place order in terms of 30 categories of Indian Standard steels and also directing the producers to confine the booking of order in terms of these steels.

The list of steels has been reviewed by the concerned Sectional Committee and the following five additional steels have been included in view of their production, use and application in the automobile industry:

a) 35C16Mo3S15,

b) 46C8S10,

c) 42Cr6V10,

*Schedules for wrought steels for general engineering purposes.

d) 14CrNi6, and

e) 20Ni7CrMo2.

Further the following steels have been deleted:

a) C50 because it was felt that the purpose could be served by using either C45 or C55Mn75, and

b) 16NiCr1Mo20 as it could easily be replaced by 14CrNi6 and also result in saving of molybdenum.

0.3 Accordingly Part I of this standard covering chemical composition of 33 rationalized steels is being brought out. Separate parts covering mechanical properties, hardenability and isothermal transformation characteristics of each of the steels will be published in due course.

0.4 The steels have been included in this list on the basis of their application/tonnage consumed by the automobile and ancillary industry.

1. SCOPE

1.1 This standard (Part I) covers rationalized list of steels for use by automobile and ancillary industry.

1.1.1 This list does not include the following categories of steels:

a) Spring steels,

b) Stainless and heat-resisting steels,

c) Ball-bearing steels, and

d) Tool steels.

2. CHEMICAL COMPOSITION

2.1 The chemical composition of the rationalized steels is given in Table 1. The Indian Standards which cover the detailed requirements for these steels are also indicated in the Table.

TABLE 1 CHEMICAL COMPOSITION OF RATIONALIZED STEELS FOR THE AUTOMOBILE AND ANCILLARY INDUSTRY

Sl No.	Designation [*See* IS : 1762 - (Part I)-1974*]	C Percent	Si Percent	Mn Percent	Ni Percent	Cr Percent	Mo Percent	S Percent	P Percent	Relevant Indian Standards	Equivalent Foreign Standard Steels	Suggested Replacement For
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1.	15C 8 (C15Mn75)	0·10-0·20	—	0·60-0·90	—	—	—	—	—	IS : 4432-1967	EN 2, EN 328; SAE 1015, 1018; AISI C 1016 C 1018	
2.	25C 8 (C25Mn75)	0·20-0·30	—	0·60-0·90	—	—	—	—	—	IS : 5517-1978	En 4, SAE 1026, AISI C 1026, GOST 1050 Grade 25	
3.	30C 8 (C 30)	0·25-0·35	0·10-0·40	0·60-0·90	—	—	—	—	—	IS : 1875-1978 IS : 3930-1978 IS : 5517-1978	En 5; SAE 1030; AISI C 1030 GOST 1050 Grade 30	SAE 1033, AISI C 1033
4.	35C 8 (C35Mn75)	0·30-0·40	0·10-0·40	0·60-0·90	—	—	—	—	—	IS : 1875-1978 IS : 3930-1978 IS : 5517-1978	En 6; SAE 1035, 1037; AISI C 1035, C 1037; DIN 1654, 1·1172 Cq35; DIN 17200, 1·0651, C35; DIN 17200, 1·1181, CK 35; German 1·1183 Cf; GOST 1050 Grade 35	SAE 1034, AISI C 1034
5.	40C 8 (C 40)	0·35-0·45	0·10-0·35	0·60-0·90	—	—	—	—	—	IS : 5517-1978	En8, 8K; SAE 1038, 1039, 1040, AISI C 1038, C1039, C 1040; GOST 1050, Grade 40	
6.	45C 8 (C45)	0·40-0·50	0·10-0·40	0·60-0·90	—	—	—	—	—	IS : 1875-1978 IS : 3930-1978 IS : 5517-1978	En43D; SAE 1043, 1045, 1046 AISI C 1043, C 1045, C 1046; DIN 1654 1·1192, Cq 45; DIN 17200, 1·0721, C45; DIN 17200, 1·1191, Ck 45; German 1·1193, Cf 45, GOST 1050 Grade 45	
7.	55C 8 (C55Mn75)	0·50-0·60	0·10-0·35	0·60-0·90	—	—	—	—	—	IS : 1875-1978 IS : 5517-1978	En9, 9K; SAE 1055; AISI C 1055 GOST 1050 Grade 55	
8.	13C10S25 (13S25)	0·08-0·18	0·10 *Max*	0·80-1·20	—	—	—	0·20-0·30	0·060 *Max*	IS : 4431-1978	DIN 1651, 10721, 10S20	SAE 1112, 1113; AISI B 1112, B 1113; DIN 1651; 1·0713, 9Smn 23; DIN 1651
9.	14C14S14 (14Mn1S14)	0·10-0·18	0·05-0·30	1·20-1·50	—	—	—	0·10-0·18	0·060 *Max*	IS : 4431-1967	En 202, En 7A; GOST 1414 Grade A12	SAE 1117 AISI C1117
10.	25C12S14 (25Mn1S14)	0·20-0·30	0·25 *Max*	1·00-1·50	—	—	—	0·10-0·18	0·060 *Max*	IS : 4431-1978	En7; SAE 1120, 1126; AISI C 1120, C 1126	
11.	35C16Mo3S15	0·30-0·40	0·25 *Max*	1·30-1·80	—	—	0·20-0·35	0·20 *Max*	0·060 *Max*		En16 M	
12.	40C15S12 (40Mn2S12)	0·35-0·45	0·25 *Max*	1·30-1·70	—	—	—	0·08-0·15	0·060 *Max*	IS : 4431-1978	1141; C1141	SAE 1139, AISI C 1139, EN15A, AISI C 1137, SAE 1137
13.	46C8S20	0·42-0·49	—	0·70-1·00	—	—	0·20-0·35	0·08-0·13	0·040 *Max*	—		SAE 1146
14.	37C15 (37Mn2)	0·32-0·42	0·10-0·35	1·30-1·70	—	—	—	—	—	IS : 5517-1978	En 15, 15 A 15 B, German 1·5067, 36MnS; SAE 1041, AISI C 1041	C 1335 SAE 1335, AISIC 1335
15.	35Mn6Mo3 (35Mn2Mo28)	0·30-0·40	0·10-0·35	1·30-1·80	—	—	0·20-0·35	—	—	IS : 5517-1978	BS : 970, 60Mn36 (En16)	
16.	35Mn6Mo4 (35Mn2Mo45)	0·30-0·40	0·10-0·35	1·30-1·80	—	—	0·35-0·55	—	—	IS : 5517-1978	BS : 970, 608M38 (En17)	
17.	15Cr3 (15Cr65)	0·12-0·18	0·10-0·35	0·40-0·60	—	0·50-0·80	—	—	—	IS : 4432-1967	BS : 970, 523A14 (En206) SAE 5115; AISI 5115; DIN 17210, 1·7015, 15Cr3	SAE 5015, AISI 5015, AISI 5117, SAE 5120 AISI 5120
18.	16Mn5Cr4 (17Mn1Cr95)	0·14-0·19	0·10-0·35	1·00-1·30	—	0·80-1·10	—	—	—	IS : 4432-1967	DIN 17210, 1·7131	
19.	20MnCr5 (20MnCr1)	0·17-0·22	0·10-0·35	1·00-1·40	—	1·00-1·30	—	—	—	IS : 4432-1967	DIN 17210, 1·7147, 20MnCr5	SAE 5120, AISI 5120,
20.	40Cr4 (40Cr1)	0·35-0·45	0·10-0·35	0·60-0·90	—	0·90-1·20	—	—	—	IS : 3930-1978 IS : 5517-1978	BS : 970, 530M40, 530A36, 530A40 (En18, 18 C&D); DIN 17200, 1·7034, 37Cr4; DIN 1654, 17200, 1·7035, 41Cr4; JIS G 4104, Class 45Cr4	DIN 17200, 1·7033, 34Cr4, SAE 5140, AISI 5140
21.	40Cr4Mo3 (40Cr1Mo28)	0·35-0·45	0·10-0·35	0·50-0·80	—	0·90-1·20	0·20-0·35	—	—	IS : 3930-1978	BS : 970, 709M40, 708M40 (En19 & 19A), DIN 17200; 1·7225, 12CrMo4	SAE 4140, AISI 4140
22.	25Cr13Mo6 (25Cr3Mo55)	0·20-0·30	0·10-0·35	0·40-0·70	0·30 *Max*	2·90-3·40	0·45-0·65	—	—	IS : 5517-1978	BS : 970, 722M 4 (En 40B)	
23.	35Ni5Cr2 (35NiCr60)	0·30-0·40	0·10-0·35	0·60-0·90	1·00-1·50	0·45-0·75	—	—	—	IS : 3930-1978 IS : 5517-1978	BS : 970, 640 (En 111), SAE 3135; AISI 3135; German 1·5710 36NiCr6	
24.	15Ni5Cr1Mo1 (15NiCr1Mo12)	0·12-0·18	0·10-0·35	0·60-1·00	1·00-1·50	0·75-1·25	0·08-0·15	—	—	IS : 4432-1967	BS : 970, 815M17 (En 353)	DIN 17210, 15CrNi6
25.	16Ni3Cr2 (16Ni80Cr60)	0·12-0·20	0·10-0·35	0·60-1·00	0·60-1·00	0·40-0·80	—	—	—	IS : 4432-1967	BS : 970, 635M15 (En 351)	BS : 970 (En 33) 665M17, (En 34) SAE 4023, AISI 4023, SAE 8615, 8617, 3115, 3120, AISI 3115, 3120, 8615, 8617
26.	15Ni7Cr1Mo2 (15Ni2Cr1Mo15)	0·12-0·18	0·10-0·35	0·60-1·00	1·50-2·00	0·75-1·25	0·10-0·20	—	—	IS : 4432-1967	BS : 970, 820M17 (En 354)	SAE 4320, AISI 4320
27.	40Ni6Cr4Mo3 (40Ni2Cr1Mo28)	0·35-0·44	0·10-0·35	0·40-0·70	1·25-1·75	0·90-1·30	0·20-0·35	—	—	IS : 3930-1978 IS : 5517-1978	BS : 970, 817M40 (En 24)	SAE 4310, AISI 4340
28.	40Ni10Cr3Mo6 (40Ni3Cr65Mo55)	0·36-0·44	0·10-0·35	0·40-0·70	2·25-2·75	0·50-0·80	0·40-0·70	—	—	IS : 3930-1978 IS : 5517-1978	BS : 970, 826M10 (En 26)	
29.	20Ni7CrMo2	0·17-0·22	0·20-0·35	0·45-0·65	1·65-2·00	0·40-0·60	0·20-0·30	—	—		SAE 4320, AISI 4320	
30.	20Ni7Mo2 (20Ni2Mo25)	0·17-0·22	0·15-0·35	0·40-0·65	1·65-2·00	—	0·20-0·30	—	—	IS : 4432-1967	BS : 970, 665M20; SAE 4620, 4621; AISI 4620, 4621	SAE 4613
31.	20NiCrMo2 (20Ni55Cr50 Mo20)	0·18-0·23	0·20-0·35	0·70-0·90	0·40-0·70	0·40-0·60	0·15-0·25	—	—	IS : 4432-1967	BS : 970, 805A20 (En 362); SAE 8620; AISI 8620	SAE 8622, AISI 8622
32.	42C6V10	0·38-0·46	0·15-0·35	0·50-0·60	—	1·40-1·70	—	—	Vanadium 0·07-0·12		DIN 1654 42Cr V6	
33.	11CrNi6	0·12-0·17	0·15-0·40	0·40-0·60	1·40-1·70	1·40-1·70	—	—	—	—	DIN 17210 15CrNi6	

NOTE 1 — In case of steels other than free cutting steels No. 9, 10, 11 and 12, the limits for sulphur and phosphorus have been specified in the detailed Indian Standards.

NOTE 2 — The new designations of En steels have also been incorporated wherever available according to the latest revision of BS : 970.

NOTE 3 — Designations within parentheses are the old designations based on IS : 1762-1961.

*Code for designation of steel, Part 1 Based on letter symbols (*first revision*)

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