STEEL GRADING SYSTEM

Carbon Steel

Although carbon steel and stainless steel are produced from the same elements, which are iron and carbon, the alloy contents are different in the composition of the material. The alloy content is less than 10,5% in the composition of the carbon steel. Carbon steel materials can be classified into three subcategories: low-carbon steels (0,03% - 0,15% carbon content), medium-carbon steels (0,25% - 0,50% carbon content), and high-carbon steels (0,55% - 1,10% carbon content). The increase in the carbon content in the composition leads to the increase in the hardness value of the steel, thus it is hard to bend and weld the steel. Because of their lower production costs, higher ductility, and higher machinability, low-carbon steels are widely used in manufacturing. While low-carbon steels have higher risks of deformation under stress, high-carbon steels are more likely to fracture under pressure. Low-carbon steels are widely used in body panels of automobiles, bolts, fixtures, seamless tubes, and steel plates.

EN steel number	EN steel name	ASTM grade	AISI/SAE grade	UNS	DIN	BS	UNI	JIS
(Europe)	(Europe)	(USA)	(USA)	(USA)	(Germany)	(UK)	(Italy)	(Japan)
11.141	C15D		1010		CK15	040A15	C15	S12C
10.401	C18D		1018		C15	080M15	C16	S15
10.453					C16.8	080A15	1C15	S15CK
						EN3B		S15C
10.503	C45		1045		C45	060A47	C45	S45C
11.191					CK45	080A46	1C45	S48C
11.193					CF45	080M46	C46	
11.194					CQ45		C43	
10.726	35S20		1140/1146		35S20	212M40		
10.727	45S20				45S20	En8M		
10.715	11SMn37		1215		9SMn28	230M07	CF9SMn28	SUM 25
10.736					9SMn36	En1A	CF9SMn36	SUM 22
10.718	11SMnPb30		12L14		9SMnPb28	230M07 Leaded	CF9SMnPb29	SUM 22
10.737	11SMnPb37				9SMnPb36	En1B Leaded	CF9SMnPb36	SUM 23
								SUM 24

Alloy Steel

In technical terms, any kind of steel in these four classifications is an “alloy”, however, the alloy is not the topic of this brief description. In other words, “alloy steel” is different than “steel alloys”. What is the definition of “alloy steel”? As a steel grade, alloy steel refers to steel with an alloying element content of about 5% in its composition. These alloying elements may be chromium, manganese, nickel, tungsten, and vanadium. Alloying elements added into the composition increases the mechanical properties of machinability, tooling, and corrosion resistance. Alloy steel is widely used in the manufacturing of pipes that are particularly used in the energy transfer pipeline. Besides, alloy steel is also used in heating projects.

EN steel number	EN steel name	ASTM grade	AISI/SAE grade	UNS	DIN	BS	UNI	JIS
(Europe)	(Europe)	(USA)	(USA)	(USA)	(Germany)	(UK)	(Italy)	(Japan)
17.218			4130		25CrMo4	708A30	25CrMo4 (KB)	SCM 420
					GS-25CrMo4	CDS110	30CrMo4	SCM 430
								SCCrM1
17.223	42CrMo4		4140/4142		41CrMo4	708M40	41CrMo4	SCM 440
17.225					42CrMo4	708A42	38CrMo4 (KB)	SCM 440H
17.227					42CrMoS4	709M40	G40 CrMo4	SNB 7
13.563					43CrMo4	En19	42CrMo4	SCM 4M
						En19C		SCM 4
16.582	34CrNiMo6		4340		34CrNiMo6	817M40	35NiCrMo6 (KB)	SNCM 447
16.562					40NiCrMo8-4	En24	40NiCrMo7 (KB)	SNB24-1-5
16.543	20NiCrMo2-2		8620		21NiCrMo22	805A20	20NiCrMo2	SNCM 200 (H)
16.523					21NiCrMo2	805M20		
15.415	16Mo3	A240 A/B/C		K12822	15Mo3	1503-243B	15Mo3	STBA12
				K12320		240	16Mo3	
				K12020		243		
				K11820				

Tool Steels

The carbon content of the tool steels ranges between 0,5% - 1,5%. Moreover, other elements such as chromium, molybdenum, tungsten, and vanadium may be added to the composition of the tool steel. They are prominent with their excellent hardness and capability of holding a cutting edge at extreme temperatures. Besides, having superior wear and deformation resistance, tool steel is ideal for use in machining and tooling as well as manufacturing tools.

EN steel number	EN steel name	ASTM grade	AISI/SAE grade	UNS	DIN	BS	UNI	JIS
(Europe)	(Europe)	(USA)	(USA)	(USA)	(Germany)	(UK)	(Italy)	(Japan)
12.363	X100CrMoV5		A-2		X100CrMoV51	BA 2	X100CrMoV5-1 KU	SKD 12
			A-3					
			A-4					
			A-6					
			A-7					
			A-8					
			A-9					
12.365	X32CrMoV3-3		H10		X32CrMoV3-3			SKD 7
	32CrMoV12-28				32CrMoV12-28			
12.379	X153CrMoV12		D-2		X153CrMoV12-1	BD 2	X155CrVMo12-1	SKD 11
12.510			O-1		100MnCrW4	Bo 1	95MnWCr-5 KU	