Categorizing Steel

Basics

General Remarks

All commercial steels have some **steel code** that identifies to some extent what kind of steel it is. Unfortunately, there is no universal system. Much in use is the system of the "**British Standard Institute**" (***BSI***), now replaced (I hope) by the ***EN*** , the European Norm. But then we have "old" and "new" "**BSI**" identifiers; and the Americans, Chinese, Indians, and so on have, of course, there own systems.
The most commonly used system of designation in the United States is that of the **Society of Automotive Engineers** (**SAE**), that of the **American Iron and Steel Institute** , ***AISI***, or the combined **SAE-AISI** system.

- We also have the names the steel producing companies give their products and common names like "stainless steel". It also goes without saying that people stick to the norms only loosely if at all.
  In short:

Steel codes are an awful mess!

- In what follows I'll cover just the basics—and give no guarantee that everything is correct.

No, I won't

- After spending several hours, trying to come up with a comprehensive and clear overview of just one system, I gave up. It can't be done. I prove that by giving you just one quote:

  "*The European Committee for Iron and Steel Standardisation is responsible for producing the European Standards (ENs) for structural steels. The first of these standards, EN 10025, was published in the UK by BSI as EN 10025 : 1990, partly superseding BS 4360 : 1986, which was re-issued as BS 4360 : 1990. In 1993, a second edition of EN 10025 was made available together with EN 10113 : parts 1, 2 & 3 and EN 10155. In June 1994, EN 10210 : part 1 was published and at the same time BS 4360 was officially withdrawn. The balance of the BS 4360 steels not affected by these ENs were re-issued in new British Standards BS 7613 and BS 7668. In 1996, with the publication of EN 10137, BS 7613 was withdrawn. BS 7668 will remain until an EN for atmospheric corrosion resistant hollow sections is available. In 2004 the standard EN 10025 was revised to address the provisions of EU Construction Products Directive (89/106/EEC). It is now published in six parts to bring together almost all the 'Structural Metallic Products' into one comprehensive standard*."
- Here is a taste treat of what that means:

EN 10025 (actual)	EN 10025 (old)	DIN 17100 (Former German)	Remarks (shortened and simplified)
S235JR+AR	S235JRG2	RSt 37-2	Killed steel, $R_P \approx 235$ N/mm² Quality class 2, not normalized.
S355J2+N	S355J2G3	St 52-3 N	Killed steel, $R_P \approx 355$ N/mm² Quality class J2, normalized.

- The quote is from **Tata Steel Europe** (formerly **Corus**), the second largest steel producer in Europe. It's treatise on EN norm steel nomenclature is the best I found (thank you, Tata steel), this link leads to it.

Norms of Other Countries

- Here is what concerns the USA (I quote from Wikipedia):

  *The Society of Automotive Engineers (**SAE**) designates **SAE steel grades**. These are four digit numbers which represent chemical composition standards for steel specifications. The American Iron and Steel Institute (**AISI**) originally started a very similar system. Over time they used the same numbers to refer to the same alloy, but the AISI system used a letter prefix to denote the steelmaking process. The prefix "C" denoted open-hearth furnace, electric arc furnace or basic oxygen furnace, while "E" denotes electric arc furnace steel. Prior to 1995 the AISI was also involved, and the standard was designated the AISI/SAE steel grades. The AISI stopped being involved because it never wrote any of the specifications.*

  - Here is an appetizer:

SAE classifications of major steels	
SAE designation	**Type and examples**
1xxx	Carbon steels 10xx: Plain carbon (Mn 1.00% max) 12xx: Resulfurized and rephosphorized (whatever that means)
2xxx	Nickel steels 23xx: Ni 3.50% 25xx: Ni 5.00%
3xxx	Nickel-chromium steels 31xx: Ni 1.25%, Cr 0.65% or 0.80% 33xxNi 3.50%, Cr 1.50% or 1.57%
4xxx	Molybdenum steels
5xxx	Chromium steels 50xxx: Cr 0.50%, C 1.00% min 50Bxx: Cr 0.28% or 0.50%
6xxx	Chromium-vanadium steels
7xxx	Tungsten steels
8xxx	Nickel-chromium-vanadium steels
9xxx	Silicon-manganese steels 92xx: Si 1.40% or 2.00%, Mn 0.65% or 0.82% or 0.85%, Cr 0.00% or 0.65%

- All that remains to do is to look up how India, China, Japan, Korea, Russia, and so on handle it.

  - It is clear now why the steel industry, besides needing huge amounts of ore, coal and so on, also relies on large quantities of alcoholic beverages. It ain't easy to stay sane while sober in this business.