Metal Casting Alloys

Gray Iron

General Characteristics	Applications & Specifications
➢ Relatively low mechanical strength ➢ Good vibration dampening ➢ Typically, used as-cast (i.e. not heat treated) ➢ Sand and investment casting	➢ Brake & engine components, general machinery ➢ Classified by U.T.S. ➢ ASTM A48 ➢ Grades: Class 20, 25, 30, 35 & 40

Ductile Iron

General Characteristics	Applications & Specifications
➢ Moderate mechanical strength ➢ Ductility comparable to that of some lower grade steels ➢ As-cast and heat treated materials ➢ Sand casting *Welding is NOT recommended	➢ Widely used in many industrial & commercial applications ➢ Classified by tensile, yield strength and elongation ➢ ASTM A536 ➢ Grades: 60-40-18, 65-45-12, 80-55-06 and 100-70-03 ➢ SiMo – for use in elevated temperature applications

Austempered Ductile Iron

General Characteristics	Applications & Specifications
➢ Produced by heat treating as-cast ductile iron ➢ Superior mechanical strength and ductility comparable to higher strength steels ➢ Good impact strength and wear resistance ➢ Sand casting	➢ Automotive, agriculture, light truck and railroad ➢ Classified by tensile, yield strength and elongation ➢ ASTM A897 - Grades: 110-70-11, 130-90-09, 150-110-07, 175-125-04, 200-155-02 and 230-185-01

Metal Casting Alloys

Ductile Ni-Resist

General Characteristics	Applications & Specifications
➢ Austenitic family of ductile irons ➢ High temperature service, high wear properties ➢ Non-magnetic properties available ➢ Sand casting	➢ Military and specialty application ➢ Classified by chemistry and tensile properties ➢ ASTM A439 ➢ Grades: D2, D2B, D2C, D3, D3A, D4, D5, D5B & D5S

Aluminum

General Characteristics	Applications & Specifications

➢ Tensile strengths ranging from 19 ksi to over 60+ ksi
➢ Typically heat treated to achieve desired mechanical properties
➢ Variety of processes used to manufacture parts
  ➢ Sand, investment, permanent mold & die casting
	➢ Widely used in many industrial & commercial applications
	➢ Classified by chemical and mechanical properties
	➢ ASTM B26
	  ➢ 201, 206, 319, 336, 355, 356, 357 & 535 aluminum alloys
	  ➢ T4, T5, T6 & T7 tempers

Zinc & Copper Base

General Characteristics	Applications & Specifications

➢ Excellent corrosion resistance
➢ Easily alloyed to modify properties
➢ Variety of processes used to manufacture parts
  ➢ Sand, investment & die casting
	➢ Pumping system and saltwater marine applications
	➢ Classified primarily by chemical properties
	  ➢ Brass & Bronze
	  ➢ Zinc ZA3, ZA12 and ZA27 are most common

Metal Casting Alloys

Carbon Steels

General Characteristics	Applications & Specifications
➢ Wide variety of applications ➢ Tensile/yield strengths ranging from 60/30 ksi up to 260/210 ksi are possible, exceptional high/low temperature and impact strength properties possible ➢ Typically heat treated to achieve mechanical properties ➢ Sand and casting	➢ Classified by chemical AND/OR mechanical properties ➢ ASTM A27 (Low alloy, general application) ➢ ASTM A148 (High strength castings) ➢ ASTM A216 (Castings that will be welded) ➢ ASTM A352 (Low temperature service) ➢ ASTM A732 (Investment castings) ➢ ASTM A915 (Chemical specification for alloys similar to wrought grades)

Stainless Steels

General Characteristics	Applications & Specifications
➢ Best suited for corrosive environments. ➢ Tensile/yield strengths ranging from 60/30 ksi up to 260/210 ksi are possible, exceptional high/low temperature and impact strength properties ➢ Typically heat treated to achieve mechanical properties ➢ Expensive alloying materials ➢ Sand and investment casting	➢ Classified by chemical AND/OR mechanical properties ➢ ASTM A217 (High temperature & pressure applications) ➢ ASTM A297 (Heat resistant, general application) ➢ ASTM A351 (High pressure service) ➢ ASTM A352 (Low temperature service) ➢ ASTM A743 (General application) ➢ ASTM A744 (Severe corrosion conditions) ➢ ASTM A747 (High strength)