Properties & Applications of Iron Castings

	Standard Specifications	Characteristics	Applications
Gray Iron	• ASTM A48: gray iron castings • ASTM A74: cast iron soil & pipe fittings • ASTM A126: gray iron castings for valves, flanges & pipe fittings • ASTM A159: automotive gray iron castings • SAE J431: automotive gray iron castings • ASTM A278 & ASME SA278: gray iron castings for pressure-containing parts for temperatures up to 650F (343C) • ASTM A319: gray iron castings for elevated temperatures for non-pressure-containing parts • ASTM A823: statically cast permanent mold castings • ASTM A834: common requirements for iron castings for general industrial use	Several strength grades; vibration damping; low rate of thermal expansion & resistance to thermal fatigue; lubrication retention; and good machinability.	Automobile engine blocks & heads; manifolds for internal combustion engines; gas burners; machine tool bases; dimensionally stable tooling subjected to temperature variations, such as gear blanks & forming die covers; cylinder liners for internal combustion engines; intake manifolds; soil pipes; counterweights; and enclosures & housings.
Ductile Iron	**Standard Specifications**	**Characteristics**	**Applications**
	• ASTM A395 & ASME SA395: ferritic ductile iron pressure-retaining castings for use at elevated temperatures • ASTM A439: austenitic ductile iron castings • ASTM A476 & ASME SA476: ductile iron castings for paper mill dryer rolls • ASTM A536 & SAE J434: ductile iron castings • ASTM A571 & ASME SA571: austenitic ductile iron castings for pressure-containing parts suitable for low-temperature service • ASTM A874: ferritic ductile iron castings suitable for low-temperature service • ASTM A897: austempered ductile iron castings	Several grades for both strength & ductility; high strength, ductility & wear resistance; contact fatigue resistance; ability to withstand thermal cycling; and production of fracture-critical components	Steering knuckles; plow shares; gears; automotive & truck suspension components; brake components; valves; pumps; linkages; hydraulic components; and wind turbine housings.
CGI	**Standard Specifications**	**Characteristics**	**Applications**
	• ASTM A842: CGI castings	A compromise of properties between gray & ductile iron	Diesel engine blocks & frames; cylinder liners; brake discs for trains; power generators; exhaust manifolds; pump housings; and brackets
White Iron	**Standard Specifications**	**Characteristics**	**Applications**
	• AST A532: abrasion-resistant white iron castings	Extremely hard & wear-resistant	Crushing & grinding applications; and grinding balls.
Malleable Iron	**Standard Specifications**	**Characteristics**	**Applications**
	• ASTM A47 & ASME SA47: ferritic malleable iron castings • ASTM A197: cupola malleable iron • ASTM A220: pearlitic malleable iron • ASTM A338: malleable iron flanges, pipe fittings & valve parts for railroad, marine & other heavy-duty service up to 650F (343C) • ASTM A602 & SAE J158: automotive malleable iron castings	Soft & extremely ductile	Chains; sprockets; tool parts & hardware; connecting rods; drive train & axle components; and spring suspensions.

	Standard Specifications	Characteristics	Applications
Alloyed Iron	• ASTM A436: austenitic gray iron castings • ASTM A518: corrosion-resistant high-silicon iron castings	Corrosion resistant; retains strength & dimensions during elevated-temperature exposure; and able to withstand thermal cycling.	Chemical processing; petroleum refining; food handling & marine service; control of corrosive fluids; and pressure valves