Ductile Iron in SAE J434

Ductile Iron, also known as spheroidal or nodular iron, is described as cast iron in which the graphite is present as spheroids, instead of flakes as in gray iron or temper carbon nodules as in malleable iron. Ductile iron is most popular metal material.

Reference Casting Standards:

SAE J434: Automotive Ductile (Nodular) Iron Castings

Ductile Iron castings can be produced in Casting Quality Industrial:

- **n** Sand Casting
- **n** Shell Casting
- **n** Lost Form Casting

Ductile iron standard grades in SAE J434

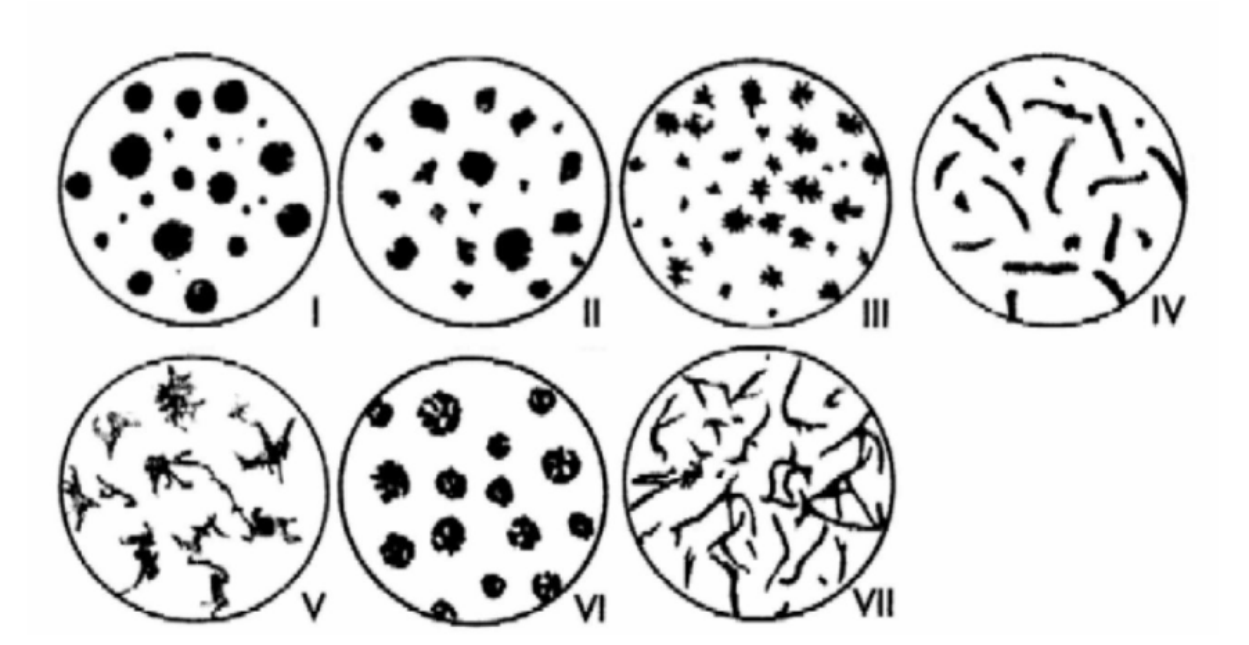
Casting Grade	Typical Hardness Range (MPa)	Description	Relative Wall Thickness	Tensile Strength, min		Yield Strength, min		Elongation, min
				Mpa	Ksi	Mpa	Ksi	%
SAE J434 D400 (D4018)	143-170HBW (1402-1667) or as agreed	Ferrite	<=20	400	58	275	40	18
			>20-<=40			260		
			>40-<=60			250		
SAE J434 D450 (D4512)	156-217HBW (1530-2128) or as agreed	Ferrite Pearlite	<=20	450	65	310	45	12
			>20-<=40			295		
			>40-<=60			285		
SAE J434 D500 (D5006)	187-229 HBW (1834-2246) or as agreed	Ferrite Pearlite	<=20	500	73	345	50	6
			>20-<=40			330		
			>40-<=60			320		
SAE J434 D550 (D5504)	217-269 HBW (2128-2638) or as agreed	Pearlite Ferrite	<=20	550	80	380	55	4
			>20-<=40			365		
			>40-<=60			350		
SAE J434 D700 (D7003)	241-302 HBW (2363-2961) or as agreed	Pearlite	<=20	700	102	450	65	3
			>20-<=40			435		
			>40-<=60			425		
SAE J434 D800	255-311 HBW (2501-3050) or as agreed	Pearlite or Tempered Martensite	<=20	800	116	480	70	2
			>20-<=40			465		
			>40-<=60			455		
SAE J434 DQ&T	Range specified by agreement	Tempered Martensite	A wide variety of properties are possible. Minimum properties are specified by agreement between manufacture and purchaser					

SAE J434 Ductile Iron Heat treatment requirement:
Generally the heat treatment of castings and specimens in SAE J434 in order to meet the hardness or mechanical property requirements is permissible only with the express approval of the casting purchaser.

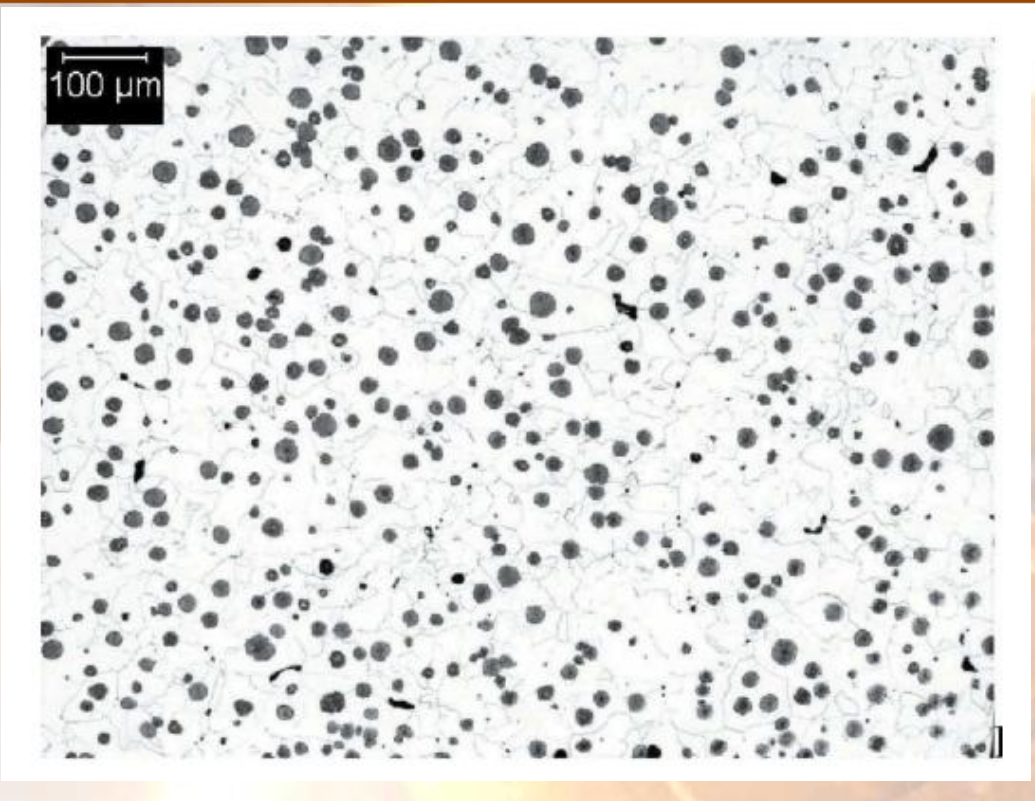
But the typical microstructures of the grade of ductile iron as follows (for reference only):
D400(D4018) is a ferritic ductile iron most commonly made by annealing.
D450 (D4512) is ferritic ductile iron supplied either as cast or heat treated.
D500 (D5006) is ferritic-pearlite ductile iron supplied either as cast or heat treated.
D550 (D5504) is pearlitic-ferritic ductile iron supplied either as cast or heat treated.
D700 (D7003) is either as cast or qir quenched to a specified hardness range.
D800 is either as cast or air or liquid quenched and tempered to a specified hardness range.
DQ&T is liquid quenched and tempered grade.

SAE J434 Microstructure:

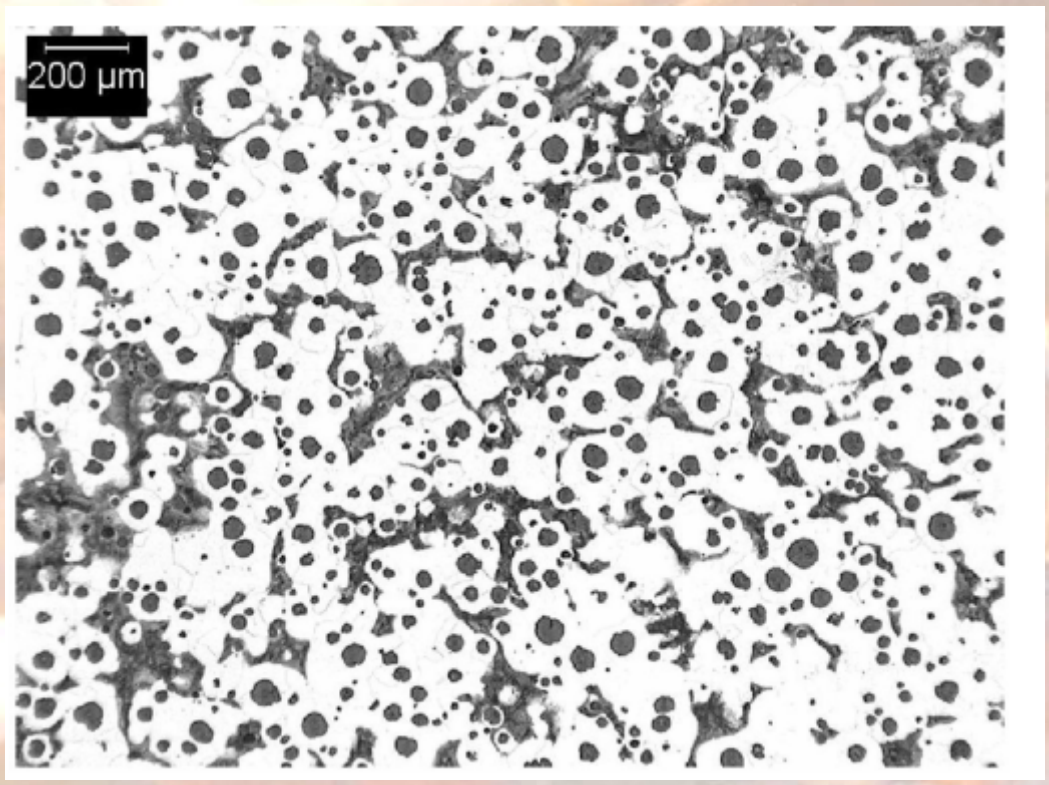
The graphite component of the microstructure shall consist of at least 80% spheroidal graphite conforming to types I and II (per ASTM A247):



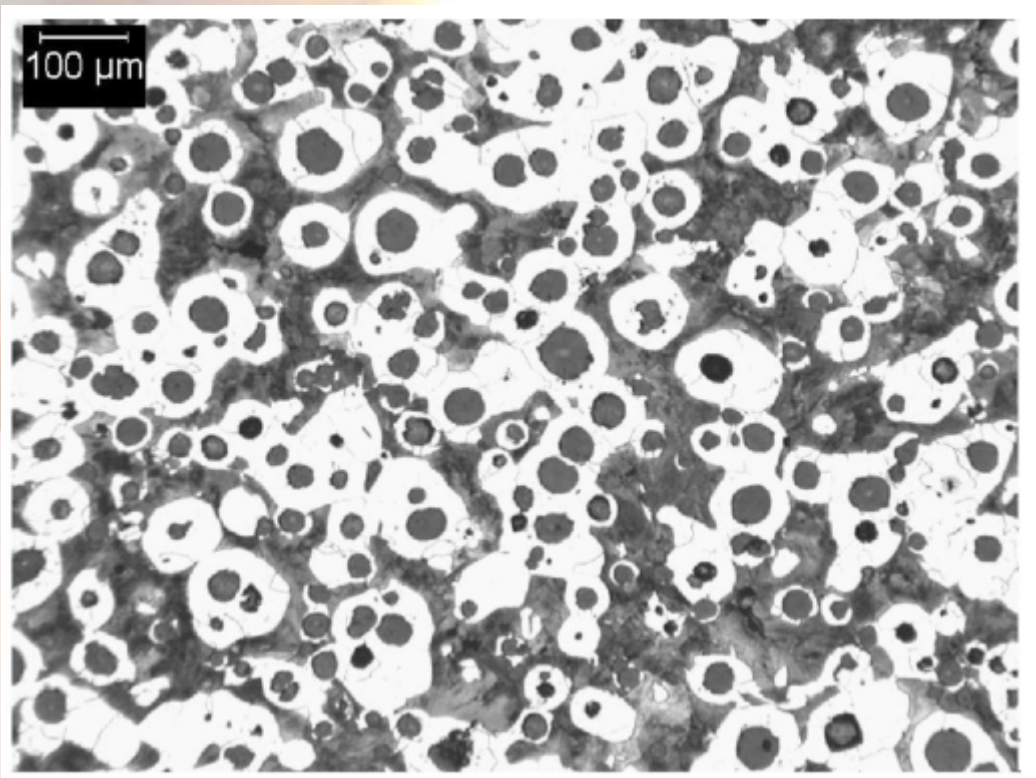
The matrix microstructure shall consist of ferrite, ferrite and pearlite, pearlite, tempered pearlite, or tempered martensite, or a combination of those.



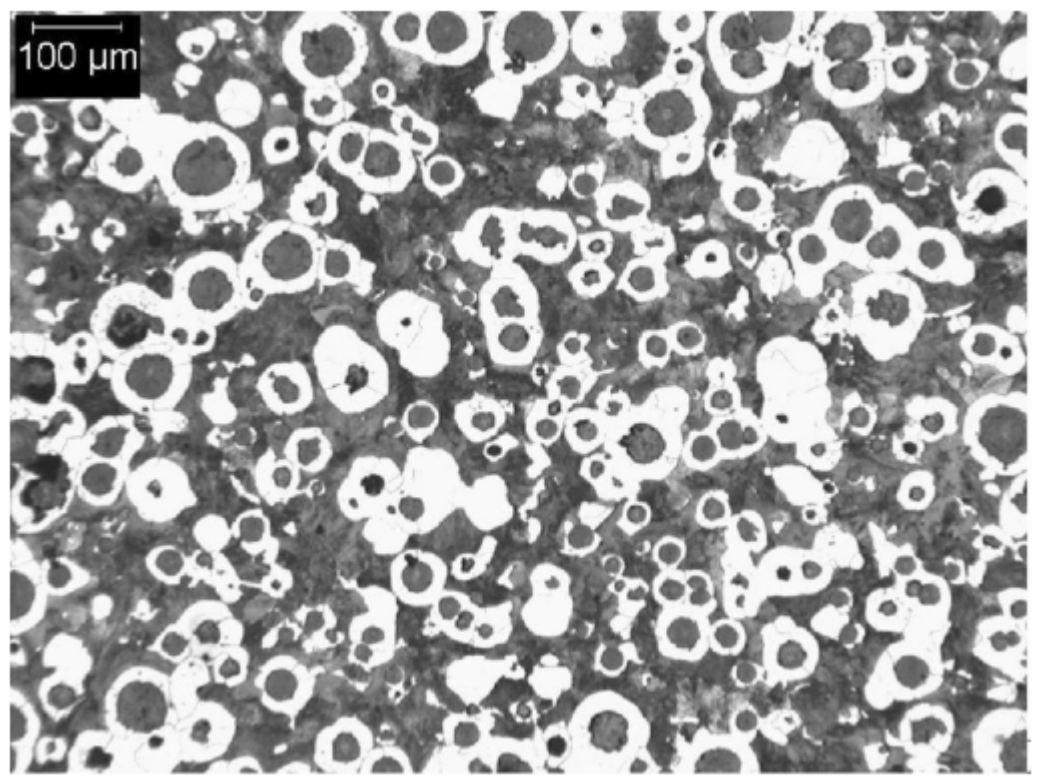
D400 Typical Matrix Microstructures



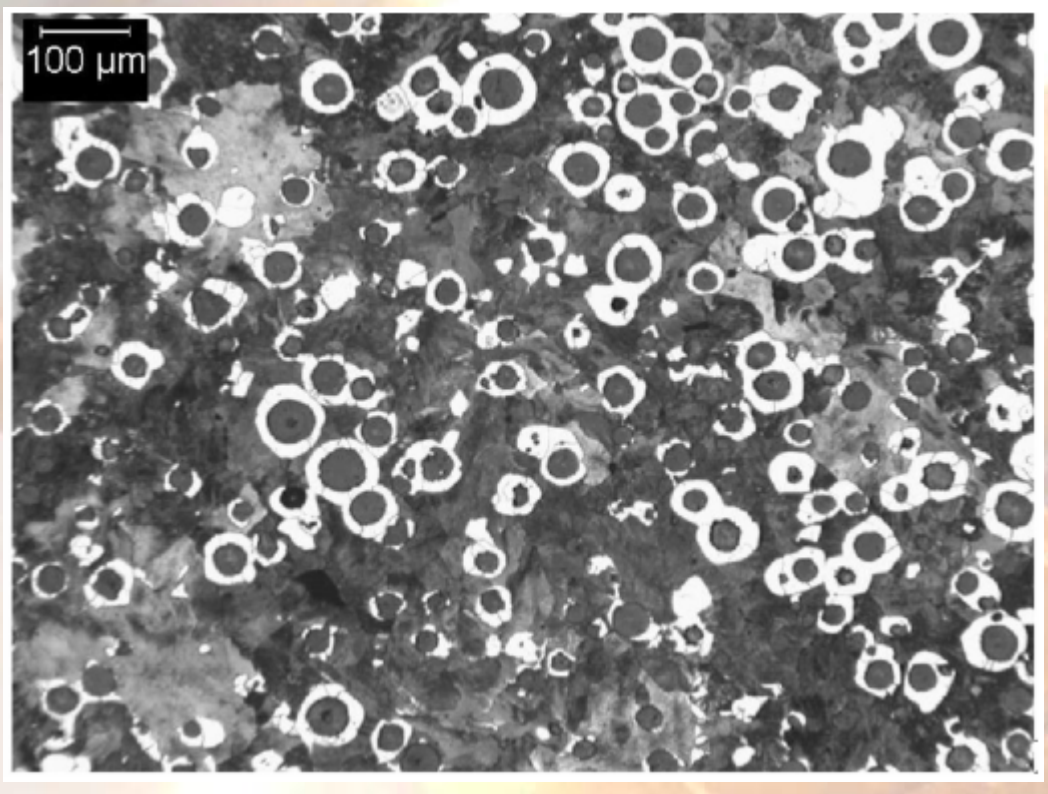
D450 Typical Matrix Microstructures



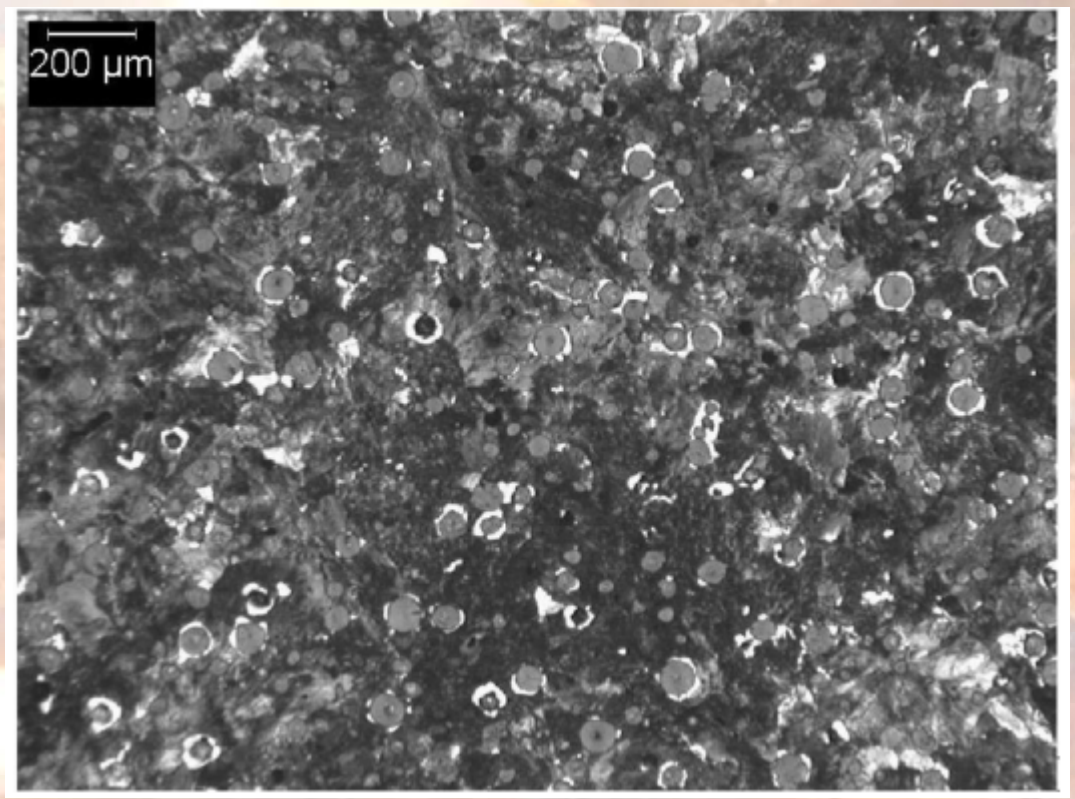
D500 Typical Matrix Microstructures



D550 Typical Matrix Microstructures



D700 Typical Matrix Microstructures



D800 Typical Matrix Microstructures

Chemical Composition in SAE J434 (for information only): The typical chemical composition of unalloyed iron generally confirms to following range**.** The spheroidal graphite structure is produced by alloying the molten iron with small amounts of one or more elements such as magnesium or cerium. The matrix microstructure may be controlled by addition of other alloying elements, such as: copper, tin, nickel, chromium and molybdenum.

Carbon: 3.20-4.10%
Silicon: 1.80-3.00%
Manganese: 0.10-1.00%
Phosphorus: 0.050% max
Sulfur: 0.035% max
Magnesium: 0.025-0.060%

Typical un-notched Charpy impact energy properties are from low residual element content iron, impact values are affected by microstructure and section size:

Grade	TYPICAL IMPACT VALUE (For information only)	
	JOULES	FT-LBS
SAE J434 D400 (D4018)	120	90
SAE J434 D450 (D4512)	80	60
SAE J434 D500 (D5006)	54	40
SAE J434 D550 (D5504)	40	30
SAE J434 D400 (D4018)	27	20

SAE J434 Ductile Iron Typical Casting Application
Machinery, valve, truck, railway, gearbox, flywheels etc.

D400 (D4018 is used in moderately stressed parts requiring high ductility and good machinability.
D450 (D4512) and D500 (D5006) are used for moderately stressed parts where machinability is less important.
D550 (D5504) is used for more highly stressed parts.
D700 (D7003) and D800 are used where high strength and/or improved wear resistance are required and where selective hardening is to be employed.
DQ&T is used where the uniformity of a heat treated material is required to control the range of mechanical properties or machinability.

As a professional casting manufacture, Qingdao Casting Quality Industrial pay much attention to the quality and technology, our products are much more casting and forging parts. We are mainly doing Sand Casting, Investment Casting (Lost Wax Casting or Precision Casting) and Die Casting. Today, its products are marketed globally through many countries.

Our Services

Casting Quality focus on Metal Parts industry, we provide professional service in Metal Casting field.

Sand Casting
Investment Casting
Shell Casting
CNC Machining
CAD Design
Tools/Mold Design

Many buyers from all over the world purchase products from China. But do you know the quality of products in China? Maybe you only pay the surface and price, but the inner quality is lost.

Housing Casting Design in Solidworks

What makes Casting Quality the best?

Innovation

Our engineers are more than just designers….they're pioneers. Our team use CAD/CAM to do the simulation of casting parts. Through the advanced technology, we can know the weight and structure. We also visited so many factories to know their difference and improve our products every year.

Quality

We're obsessed with quality. Casting Quality constantly strives to exceed our customers' expectations in durability and performance. In fact, we will control the whole process from the original material to the finished parts, include the technology. Uniquely-designed Quality Control System focuses on ensuring four product goals: 1) Eligible Chemistry, 2) Hardness 3) Property and 4) Affordable Pricing. The result is the best casting products value in the industry.

Service

We're in Qingdao, China, it has convenient transportation of road and sea. Courteous service is part of who we are, and we do it better than anyone in the industry. With Casting Quality you can expect friendly, knowledgeable, and prompt customer service.

Fulfillment

Shipping orders complete and on-time is of paramount importance to our customers. We will count the delivery date and result before accept your order. Casting Quality consistently ranks as one of the best in speed of delivery and fill rates.

SERVICE IN QINGDAO CASTING QUALITY INDUSTIRAL

- **SAND CASTING**
- **INVESTMENT CASTING**
- **SHELL CASTING**
- **PERMANENT MOLD CASTING**
- **CNC MACHINING**
- **CAD/CAM DESIGN**