



Austempered Ductile Iron in ASTM A897

Austempered Ductile Iron (ADI) is a ductile iron which is processed by heat treatment of austempering. ADI have very high mechanical property and hardness, but it's cheaper much than hardened steel

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Reference Casting Standards:

ASTM A897/897M: Standard Specification for Austempered Ductile Iron Castings

Ductile Iron castings can be produced in Casting Quality Industrial:

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

Austempered Ductile iron standard grades in ASTM A897



Casting Grade	Tensile Strength, min	Yield Strength, min	Elongation, min	Impact energy	Typical Hardness
Inch-pound units	Ksi	Ksi	%	Ft-lb	HWB
A897 Gr. 110/70/11	110	70	11	80	241-302
A897 Gr. 130/90/09	130	90	9	75	269-341
A897 Gr. 150/110/07	150	110	7	60	302-375
A897 Gr. 175/125/04	175	125	4	45	341-444
A897 Gr. 200/155/02	200	155	2	25	388-477
A897 Gr. 230/185/01	230	185	1	15	402-512

Casting Grade	Tensile Strength, min	Yield Strength, min	Elongation in 50mm, min	Impact energy	Typical Hardness
SI units	MPa	MPa	%	J	HWB
A897 Gr. 750/500/11	750	500	11	110	241-302
A897 Gr. 900/650/09	900	650	9	100	269-341
A897 Gr. 1050/750/07	1050	750	7	80	302-375
A897 Gr. 1200/850/04	1200	850	4	60	341-444
A897 Gr. 1400/1100/02	1400	1100	2	35	388-477
A897 Gr. 1600/1300/01	1600	1300	1	20	402-512



ASMT A897 Ductile Iron Heat treatment requirement:

all castings should be heat treated by an austempering process consisting of heating the castings to a fully austenitic, homogeneous condition or an austenite/ferrite condition for Grade 110/70/11 [750/500/11], cooling (at a rate usually sufficient to avoid the formation of pearlite) to a temperature above the martensite start temperature, and isothermally transforming the matrix structure for a time sufficient to produce the desired properties. This process shall produce a microstructure that is substantially ausferrite or ausferrite/proeutectoid ferrite for Grade 110/70/11[750/500/11].

Microstructure requirement in ASTM A897:

1. The graphite component of the microstructure shall consist of a **minimum 80% spheroidal graphite** conforming to type I and II per ASTM A247
2. The matrix microstructure shall substantially consist of ausferrite (acicular ferrite and high carbon, stable austenite). Proeutectoid ferrite will also be present in grade 110/70/11 (750/500/11)
3. Martensite may be present in minor amounts in the microstructure of Grade 200/155/02 (140/1100/02) and 230/185/01 (1600/1300/01). Acceptable quantities of martensite maybe agreed again.
4. The microsturcture shall be substantially free of underirable microconstituents.



ADI1400/1100/02, 400X

Chemical Composition in ASTM A897:

Chemical requirements may be agreed upon between manufacture, heat treater, and the purchaser. But to achieve the required mechanical property in castings or test coupons, the standard also has some suggestion as below:

1. **Carbon Equivalent (CE) can be approximated by the relationship: $CE = \%C + 1/3(\%Si)$**

Suggested Carbon Equivalent Ranges for various Section Sizes	
Section Size	CE Range
0 to 1/2 in. (0 to 13 mm)	4.4 – 4.6
1/2 to 2 in. (13 to 51 mm)	4.3-4.6
Over 2 in. (51mm)	4.3-4.5

2. **Allying elements such as Molybdenum, Copper, Nickel and additional Manganese above the base metal level should be added only when additional hardenability is required for heavy section:**

Suggested Targets and Control Ranges for Intentionally Added Elements	
Element	Recommended Range
Carbon (C)	3.60% ± 0.20%
Silicon (Si)	2.50% ± 0.20%
Magnesium (Mg)	(%S X 0.76) + 0.025% ± 0.005%



Copper (Cu)	0.80% max, only as needed \pm 0.05%
Nickel (Ni)	2.0% max, only as needed \pm 0.10%
Molybdenum (Mo)	0.20% max, only as needed \pm 0.03%

Suggested Targets and Control Ranges for Trace or Tramp Elements		
Trace or Tramp elements	Suggested Target (or maximum)	Typical Control Range
Tin (Sn)	0.02%, max	\pm 0.003%
Antimony (Sb)	0.002%, max	\pm 0.0003%
Phosphorus (P)	0.04%, max	-
Sulfur (S)	0.02%, max	-
Oxygen (O)	50 ppm, max	-
Chromium (Cr)	0.10%, max	-
Titanium (Ti)	0.04%, max	-
Vanadium (V)	0.10%, max	-
Aluminum (Al)	0.05%, max	-
Arsenic (As)	0.02%, max	-
Bismuth (Bi)	0.002% max	-
Boron (B)	0.0004%, max	-
Cadmium (Cd)	0.005%, max	-
Lead (Pb)	0.002%, max	-
Selenium (Se)	0.030%, max	-
Tellurium (Te)	0.003%, max	-

Austempered Ductile Iron Castings Application:

ADI have high strength and excellent wear resistance property. It's popular used in Gear, crankshafts, axles, guide rollers, railway brake shoes, abrasive liners, bearing/bushing sleeves, camshafts, chain sprockets, pulleys, pump impellers, shredder knives and etc.

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 INDUSTRIAL

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