

PRECISION ALLOY



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SOFT MAGNETIC ALLOYS

are a class of alloys with high magnetic permeability and low coercive force in a magnetic field. These alloys are mainly used in combination for energy conversion and confidence handling. Widely used in the radio electronics industry, precision instruments, remote control and automatic control systems.

1. Iron-nickel soft magnetic alloy: main grades 1J46, 1J50, 1J54, 1J76, 1J77, 1J79, 1J80, 1J85, 1J86, 1J34, 1J51, 1J52, 1J65, 1J66, 1J67, 1J83, 1J403.

Most of them are used for small transformers, relays, pulse transformers, transformers, electromagnetic clutches, choke coil cores and magnetic shields for weak and medium magnetic fields.

2. Magnetic temperature compensation alloy: main grades 1J30, 1J31, 1J32, 1J33, 1J38

Used for magnetic shunt compensation components in electromagnetic circuits and permanent magnet circuits, etc.

3. Corrosion-resistant soft magnetic alloy: main grades 1J36, 1J116, 1J117

Electromagnetic devices used in oxidizing media and hydrazine media, etc.

4. Soft magnetic alloy with high saturation magnetic induction: main grade 1J22

Used for electromagnet stage heads, telephone headset diaphragms, torque motor rotors, etc.

5. High hardness, high resistance and high magnetic permeability alloy: main grades 1J87, 1J88, 1J89, 1J90, 1J91

It is used to make various high-frequency inductive component chips such as magnetic head chips for tape recorders and tape drives, as well as micro-motor transformers, sensors, and magnetic amplifiers.

6. Soft magnetic alloys for magnetic heads: main grades 1J75, 1J77C, 1J79C, 1J85C, 1J87C, 1J92C, 1J93, 1J94, 1J95

Used to make magnetic head casing, chip, spacer, etc.

软磁合金 Soft magnetic alloy														
Brand 牌号	碳C	硫S	磷P	锰Mn	硅Si	镍Ni	铬Cr	钴Co	钼Mo	铜Cu	铝Al	铌Nb	铁Fe	其他Other
1J06	≤0.04	≤0.015	≤0.015	≤0.1	≤0.15	-	-	-	-	-	5.5-6.5	-	Rest	-
1J12	≤0.03	≤0.015	≤0.015	≤0.1	≤0.15	-	-	-	-	-	11.6-12.4	-	Rest	-
1J17	≤0.03	≤0.02	≤0.02	≤0.6	≤0.2	-	-	15.5-16.5	-	-	-	-	Rest	-
1J18	≤0.03	≤0.02	≤0.02	0.3-0.7	≤0.15	0.5-0.7	17-18.5	-	-	-	-	-	Rest	Ti0.3-0.7
1J22	≤0.04	≤0.02	≤0.02	≤0.3	≤0.3	≤0.5	-	49-51	-	≤0.2	-	-	Rest	V0.8-1.8
1J30	≤0.04	≤0.02	≤0.02	≤0.4	≤0.3	29.5-30.5	-	-	-	-	-	-	Rest	-
1J36	≤0.03	≤0.02	≤0.02	≤0.6	≤0.2	35-37	-	-	-	-	-	-	Rest	-
1J38	≤0.03	≤0.05	≤0.02	0.3-0.6	0.15-0.3	37.5-38.5	-	-	-	-	-	-	Rest	-
1J46	≤0.03	≤0.02	≤0.02	0.6-1.1	0.15-0.3	45-46.5	-	-	≤0.2	-	-	-	Rest	-
1J50	≤0.03	≤0.02	≤0.02	0.3-0.6	0.15-0.3	49-50.5	-	-	≤0.2	-	-	-	Rest	-
1J51	≤0.03	≤0.02	≤0.02	0.3-0.6	0.15-0.3	49-50.5	-	-	≤0.2	-	-	-	Rest	-
1J54	≤0.03	≤0.02	≤0.02	0.3-0.6	1.1-1.4	49.5-51	3.8-2.2	-	≤0.2	-	-	-	Rest	-
1J76	≤0.03	≤0.02	≤0.02	0.3-0.6	0.15-0.3	75-76.5	1.8-2.2	-	4.8-5.2	-	-	-	Rest	-
1J77	≤0.03	≤0.02	≤0.02	0.3-0.6	0.15-0.3	75.5-78	-	-	3.9-4.5	4.8-6.0	-	-	Rest	-
1J79	≤0.03	≤0.02	≤0.02	0.6-1.1	0.15-0.3	78.5-80	-	-	3.8-4.1	≤0.2	-	-	Rest	-
1J80	≤0.03	≤0.02	≤0.02	0.6-1.1	1.1-1.5	79-81.5	2.6-3.0	-	-	≤0.2	-	-	Rest	-
1J85	≤0.03	≤0.02	≤0.02	0.3-0.6	0.15-0.3	79-81.5	-	-	4.8-5.2	≤0.2	-	-	Rest	-
1J87	≤0.03	≤0.02	≤0.02	0.3-0.6	≤0.3	78.5-80.5	-	-	1.6-2.2	-	-	6.5-7.5	Rest	-

HARD MAGNETIC, SEMI-HARD MAGNETIC ALLOY

Hard magnetic alloy is an alloy with strong coercive force (coercive force is usually greater than 10kA/m), can maintain the magnetized state after magnetization, and generate a sufficiently strong and stable magnetic field around it. Semi-hard magnetic alloys are alloys whose magnetic properties are between hard magnetic and soft magnetic, and whose coercive force (Hc) is in the range of 800-24000A/m (10-3000e).

硬磁、半硬磁合金 Hard, Semi-hard Magnetic Alloy													
Brand 牌号	碳C	硫S	磷P	锰Mn	硅Si	镍Ni	铬Cr	钴Co	钒V	钼Mo	钛Ti	铁Fe	其他Other
2J04	≤0.12	≤0.02	≤0.025	≤0.7	≤0.7	5.3-6.7	-	44-46	3.5-4.5	-	-	Rest	-
2J07	≤0.12	≤0.02	≤0.025	≤0.7	≤0.7	≤0.7	-	51-53	6.5-7.6	-	-	Rest	-
2J09	≤0.12	≤0.02	≤0.025	≤0.7	≤0.7	≤0.7	-	51-53	8.5-9.5	-	-	Rest	-
2J10	≤0.12	≤0.02	≤0.025	≤0.7	≤0.7	≤0.7	-	51-53	9.5-10.5	-	-	Rest	-
2J31	≤0.12	≤0.02	≤0.025	≤0.7	≤0.7	≤0.7	-	51-53	10.8-11.7	-	-	Rest	-
2J53	≤0.08	≤0.03	≤0.03	11.5-12.5	≤0.5	3.0-4.0	-	-	-	2.5-3.5	-	Rest	-
2J84	≤0.03	≤0.02	≤0.02	≤0.2	-	-	25.5-27	14.5-16	-	3-3.5	0.5-0.8	Rest	-
2J85	≤0.03	≤0.02	≤0.02	≤0.2	0.8-1.1	-	23.5-25	11.5-13	-	-	-	Rest	-

ELASTIC AND GOLD

Elastic alloy is a type of precision alloy, which is used to make elastic components such as elastic sensitive components, energy storage components and frequency components in precision instruments. In addition to good elastic properties, it also has properties such as non-magnetic properties, high resistance to microplastic deformation, high hardness, low resistivity, small temperature coefficient of elastic modulus, and low internal friction.

1. Elastic component alloys: main grades 3J21, 3J01, 3J53

It is mainly used to make various diaphragms in instruments, diaphragm bellows, springs and other elastic sensitive components and watch hairsprings, etc.

2. Constant elastic alloy for frequency components: main grades 3J53, 3J58

Used to make various frequency components, such as oscillators in mechanical wave filters, tuning forks in frequency resonators, and reeds in resonant relays, etc.

3. High elastic alloy for clockwork: main grade 3J09.

Used to make various clock and watch springs and various elastic components.

弹性和金 Elastic Alloy													
Brand 牌号	碳C	硫S	磷P	锰Mn	硅Si	镍Ni	铬Cr	钴Co	铝Al	钼Mo	钛Ti	铁Fe	其他Other
3J01	≤0.05	≤0.02	≤0.02	≤1	≤0.8	34.5-36.5	11.5-13	-	1-1.8	-	2.7-3.2	Rest	-
3J09	0.22-0.26	≤0.02	≤0.03	1.8-2.2	1.3-1.7	9-10.5	19-20.5	-	-	1.6-1.85	-	Rest	-
3J21	0.07-0.12	≤0.01	≤0.01	1.7-2.3	≤0.6	14-16	19-21	39-41	-	6.5-7.5	-	Rest	-
3J53	≤0.05	≤0.02	≤0.02	≤0.8	≤0.8	41.5-43.5	5.2-5.8	-	0.5-0.8	-	2.3-2.7	Rest	-
3J58	≤0.05	≤0.02	≤0.02	≤0.8	≤0.8	43-43.6	5.2-5.6	-	0.5-0.8	-	2.3-2.7	Rest	-



EXPANSION ALLOY

A precision alloy with abnormal thermal expansion characteristics, also known as thermal expansion alloy, is widely used in the fields of electronics industry, precision measuring tools, precision instruments and cryogenic engineering.

Expansion alloys are divided into low-expansion alloys and fixed-expansion alloys, the latter also known as sealing alloys.

In addition to having a specific coefficient of thermal expansion, expansion alloys also require good sealing properties, weldability, corrosion resistance, machinability and ease of cutting according to different uses, and expansion characteristics are not allowed within the operating temperature range. Significantly changing phase transitions.

膨胀合金 Expansion Alloy								
牌号 Brand	热处理 Heat Treatment	平均线膨胀系数, 10 ⁻⁶ /°C Average linear expansion coefficient a, 10 ⁻⁶ /°C						
		20-100°C	20-300°C	20-400°C	20-450°C	20-500°C	20-530°C	20-600°C
4J29	在氢气气氛中加热至900±20°C, 保温1小时, 再加热至1100±20°C, 保温15min, 以≤5°C/min的速度冷却至200°C一下出炉 Heating to 900±20°C in a hydrogen atmosphere, hold for 1 hour, then heat to 1100±20°C, hold for 15 minutes, cool to 200°C at a rate of ≤5°C/min	-	-	4.6-5.2	5.1-5.5	-	-	-
4J44	在氢气气氛中加热至900±20°C, 保温1小时, 以≤5°C/min的速度冷却至200°C一下出炉	-	4.3-5.1	4.6-5.2	-	-	-	-
4J33	在氢气气氛中加热至900±20°C, 保温1小时, 以≤5°C/min的速度冷却至200°C一下出炉	-	-	6-6.8	-	6.6-7.4	-	-
4J34	在氢气气氛中加热至900±20°C, 保温1小时, 以≤5°C/min的速度冷却至200°C一下出炉	-	-	6.3-7.1	-	-	-	7.8-8.5
4J06	在氢气气氛中加热至1100±20°C, 保温15分钟, 以≤5°C/min的速度冷却至200°C一下出炉	-	7.6-8.3	9.5-10.2	-	-	-	-
4J47	在氢气气氛中加热至1100±20°C, 保温15分钟, 以≤5°C/min的速度冷却至200°C一下出炉	-	-	8.1-8.7	-	-	-	-
4J49	在氢气气氛中加热至1100±20°C, 保温15分钟, 以≤5°C/min的速度冷却至200°C一下出炉	-	8.6-9.3	9.4-10.1	-	-	-	-
4J42	在氢气气氛中加热至900±20°C, 保温1小时, 以≤5°C/min的速度冷却至200°C一下出炉	-	4.0-5.0	-	6.5-7.5	-	-	-
4J45	在氢气气氛中加热至900±20°C, 保温1小时, 以≤5°C/min的速度冷却至200°C一下出炉	-	6.5-7.2	6.5-7.2	-	-	-	-
4J50	在氢气气氛中加热至900±20°C, 保温1小时, 以≤5°C/min的速度冷却至200°C一下出炉	-	9.2-10.0	9.2-9.3	-	-	-	-
4J32	将半成品加热至840±10°C, 保温1小时, 淬水, 再将金属加工成成品, 在350±10°C保温1小时, 空气冷却至室温	≤1	-	-	-	-	-	-
4J36	将半成品加热至840±10°C, 保温1小时, 淬水, 再将金属加工成成品, 在350±10°C保温1小时, 空气冷却至室温	≤1.5	-	-	-	-	-	-
4J38	将半成品加热至840±10°C, 保温1小时, 淬水, 再将金属加工成成品, 在350±10°C保温1小时, 空气冷却至室温	≤1.5	-	-	-	-	-	-
4J40	将半成品加热至840±10°C, 保温1小时, 淬水, 再将金属加工成成品, 在350±10°C保温1小时, 空气冷却至室温	-	≤2	-	-	-	-	-
4J28	将半成品加热至1100±20°C, 空气冷却至室温	-	-	-	-	-	10.8-11.4	-

IRON-NICKEL-COBALT GLASS SEALING ALLOY

1、Iron-nickel-cobalt glass sealing alloy, also called Kovar alloy (Fe54%, Ni29% and Co17%): main grades 4J29, 4J44
It is used to make matching seals with hard glass; it is suitable for electric vacuum devices such as launch tubes, oscillating tubes, ignition tubes, transistors, tube seal plugs, and relay casings.

2、Porcelain seal alloy: main grades 4J42, 4J33, 4J03
Used to make matching seals between electric vacuum devices and 95% Al₂O₃ ceramics.

3、Iron-nickel-chromium, iron-nickel sealing alloy: main grades 4J06, 4J47, 4J49, 4J42, 4J45, 4J50

4、Fe-chrome glass sealing alloy: main grade 4J28
It has a certain linear thermal expansion coefficient in a certain temperature range, and is mainly used for matching and sealing with soft glass or corresponding ceramics in the electric vacuum industry.

5、Low expansion alloy: main grades 4J32, 4J36, 4J40
It is mainly used for various instruments, instrument parts, resonant cavities, adjustment tubes, microwave tubes, thermal bi-metallic passive layers, etc. that require dimensional stability.

膨胀合金 Expansion Alloy																
Brand 牌号	碳C	硫S	磷P	锰Mn	硅Si	镍Ni	铬Cr	钴Co	铝Al	钨W	铜Cu	硼B	硒Se	氮N	铁Fe	其他Other
4J06	≤0.05	≤0.02	≤0.02	≤0.25	≤0.3	41.5-42.5	5.5-6.3	-	≤0.2	-	-	-	-	-	Rest	-
4J28	≤0.12	≤0.02	≤0.2	≤1	≤0.7	≤0.5	27-29	-	-	-	-	≤0.2	-	-	Rest	-
4J29	≤0.03	≤0.02	≤0.02	≤0.5	≤0.3	28.5-29.5	≤0.2	16.8-17.8	-	≤0.2	≤0.2	-	-	-	Rest	-
4J32	≤0.05	≤0.02	≤0.02	0.2-0.6	≤0.2	31.5-33	-	3.2-4.2	-	-	0.4-0.8	-	-	-	Rest	-
4J33	≤0.05	≤0.02	≤0.02	≤0.5	≤0.3	32.1-33.6	-	14-15.2	-	-	-	-	-	-	Rest	-
4J34	≤0.05	≤0.02	≤0.02	≤0.5	≤0.3	28.5-29.5	-	19.5-20.5	-	-	-	-	-	-	Rest	-
4J36	≤0.05	≤0.02	≤0.02	0.2-0.6	≤0.3	35-37	-	-	-	-	-	-	-	-	Rest	-
4J38	≤0.05	≤0.02	≤0.02	≤0.8	≤0.2	35-37	-	-	-	-	-	-	0.1-0.25	-	Rest	-
4J40	≤0.05	≤0.02	≤0.02	≤0.25	≤0.15	32.4-33.4	-	7.0-8.0	-	-	-	-	-	-	Rest	-
4J42	≤0.05	≤0.02	≤0.02	≤0.8	≤0.3	41.5-42.5	-	≤0.1	≤0.1	-	-	-	-	-	Rest	-
4J44	≤0.03	≤0.02	≤0.02	≤0.5	≤0.3	34.2-32.5	≤0.2	8.5-9.5	-	≤0.2	≤0.2	-	-	-	Rest	-
4J45	≤0.05	≤0.02	≤0.02	≤0.8	≤0.3	44.5-45.5	-	-	≤0.1	-	-	-	-	-	Rest	-
4J47	≤0.05	≤0.02	≤0.02	≤0.4	≤0.3	46.8-47.8	0.8-1.4	-	-	-	-	-	-	-	Rest	-
4J49	≤0.05	≤0.02	≤0.02	≤0.4	≤0.3	46-48	5.0-6.0	-	-	-	-	≤0.02	-	-	Rest	-
4J50	≤0.05	≤0.02	≤0.02	≤0.8	≤0.3	49.5-50.5	-	-	≤0.1	-	-	-	-	-	Rest	-

OTHER PRECISION ALLOYS

1、Manganese-copper alloy: main grade 6J12

Manganese copper is a precision resistance alloy. Manganese copper has good piezoresistive effect and is widely used in pressure measurement in high temperature and high pressure environments such as detonation, high-speed impact, dynamic fracture, and new material synthesis.

2、Constantan alloy: main grade 6J40

Constantan alloy is a resistance alloy mainly composed of copper and nickel, which is suitable for making variable resistance and strain resistance elements of AC instruments. Constantan alloy has the characteristics of low temperature coefficient of resistance, wide temperature range, good machinability, corrosion resistance and easy brazing. It can be used to make resistors and components in instruments, electronics, and industrial equipment. It is suitable for use in AC circuits, as precision resistors, sliding resistors, and resistance strain gauges. It can also be used as a material for thermocouples and thermocouple compensation wires.

其他精密合金 Other Precision Alloys										
Brand 牌号	碳C	硫S	磷P	锰Mn	硅Si	镍Ni	铬Cr	铝Al	铜Cu	铁Fe
6J10	≤0.05	≤0.01	≤0.01	≤0.3	≤0.2	Rest	9.0-10.0	-	≤0.2	≤0.4
6J15	≤0.05	≤0.02	≤0.03	≤1.5	0.4-1.3	55-61	15-18	≤0.3	-	Rest
6J20	≤0.05	≤0.01	≤0.01	≤0.9	0.4-1.3	Rest	20-23	≤0.3	-	-
6J22	≤0.04	≤0.01	≤0.01	0.5-1.5	≤0.2	Rest	19-21.5	2.7-3.2	-	-
6J23	≤0.04	≤0.01	≤0.01	0.5-1.5	≤0.2	Rest	19-21.5	2.7-3.2	2.0-3.0	-
6J24	≤0.04	≤0.01	≤0.01	1.0-3.0	0.9-1.5	Rest	19-21.5	2.0-3.2	-	-
6J40	-	-	-	1.0-2.0	-	-	-	-	Rest	-
6J12	-	-	-	11.0-13.0	-	-	-	-	Rest	-

