

# 一般信息

## General Information

### 金属磁粉心及材料简介

#### Brief introduction of magnetic powder cores and its materials

金属磁粉心是由金属软磁合金粉末与无机绝缘剂组成的一种可以在很宽的频率范围内使用的磁心，在高频下功率损耗比较低。由于在磁心内部有均匀分布的气隙，所以磁心有很强的抗饱和和磁化能力，在一个很宽的磁场范围内磁导率保持恒定，非常适合在大直流条件下使用。金属磁粉心的磁导率从19到125不等，磁导率越低，磁心的抗饱和能力越强，相同磁导率的磁心，材料的Bs值越大，其抗饱和能力也越强。

常用的主要材料有铁硅铝合金粉末、铁硅合金粉末、铁镍合金粉末以及它们的复合材料，以上粉末均具有球形形貌，其中铁硅铝粉末还具有另外一种形貌，即不规则多边形。

下面分别为大家介绍如下：

Magnetic Powder Cores consist of powders of soft magnetic materials and insulations. It can be used in a wide frequency range. It has lower power losses at high frequencies. As the air gaps are evenly distributed in the cores, it is very difficult to be fully magnetized. Therefore the apparent permeability is kept stable in a quite wide range of magnetizing field. The permeability range of the cores is from 19 to 125. The lower the permeability is, the stronger the antisaturation is. For the core with same permeability but different material, the higher the Bs is the stronger the antisaturation is.

The major materials being used currently are silicon aluminum iron alloy powder, silicon iron alloy powder, nickel iron alloy powder and their compounds. All the alloy powder have the round morphology, the silicon aluminum iron alloy powder also has another morphology which is irregular polyhedron. Please see the details in the following:

#### ■ NCD 铁硅铝磁粉心

##### NCD FeSiAl powder core

NS磁粉心是由铁硅铝合金粉末制成的。由于铁硅铝材料的磁致伸缩系数接近于零，铁硅铝磁粉心成为消除滤波电感器中可听噪音的理想选择。铁硅铝磁粉心的损耗明显低于铁粉心。特别是铁硅铝E型磁粉心，其储能能力比带气隙的铁氧体E型磁心要高得多。气隙损耗和涡流损耗均比带气隙的铁氧体E型磁心要低得多。铁硅铝磁粉心是PFC电路的明智选择，其它主要应用有开关稳压电感器、串联噪音滤波器、脉冲和反激变压器。铁硅铝磁粉心的成品表面涂层是黑色树脂。可提供的磁导率范围为26-125。

NS powder cores are made from alloy powders of iron, silicon and aluminum. Near-zero magnetostriction makes Sendust cores ideal for eliminating audible noise in filter inductors. Core losses of Sendust cores are significantly lower than those of powdered iron cores. Especially Sendust E shapes provide a higher energy storage capability than gapped Ferrite E cores. Gap losses and eddy current losses are minimized with Sendust E cores compared to gapped ferrite E shapes. Sendust cores are a smart choice for PFC circuits. Other major applications include switching regulator inductors, In-line noise filters, pulse transformers and flyback transformers. Finished Sendust cores are coated in a black epoxy. The permeability range of the cores is from 26-125.

#### ■ NCD 铁镍磁粉心

##### NCD FeNi powder cores

NH磁粉心是由直流叠加特性最好的铁镍50合金粉末制成的。与相同尺寸的带气隙的铁氧体磁心和铁粉心相比，饱和磁通密度为15000高斯的高磁通磁粉心，具有更高的储能能力和有效磁导率。由于高磁通磁粉心具有极佳的直流叠加特性和很低功率损耗，所以在缩小磁心尺寸降低线圈匝数的情况下仍能保持优越的电磁特性。NCD的高磁通磁粉心在功率因数校正器、开关校正电感器、串联噪音滤波、脉冲和反激变压器等应用领域给予广大客户极好的选择机会。高磁通磁粉心的成品表面涂层是卡其色树脂，根据客户需求提供各种尺寸和形状的磁心。可提供的磁导率范围为26-125。

# 一般信息

## General Information

NH alloy powder cores are made from a 50% nickel -50% iron alloy powder for the highest available biasing capacity of any powder core material. The 15,000 Gauss saturation level of High Flux cores has a higher energy storage capability and more effective permeability when compared to the performance of gapped ferrite or powdered iron cores of a similar size. The excellent DC bias characteristics and low core losses of High Flux cores offer a reduction in size and the number of winding turns as well as superior magnetic properties. NCD's High Flux cores give an excellent choice for applications such as PFC reactors, switching regulator inductors, in-line noise filters, pulse transformers and fly-back transformers. Finished High Flux cores are coated with a Khaki epoxy and come in a variety of shapes and sizes. The permeability range of the cores is from 26-125.

### ■ NCD 铁硅磁粉心

#### NCD FeSi powder cores

NK磁粉心是由FeSi6.5合金粉末制成的。由于FeSi6.5的硅含量高于硅钢片，所以其电阻率高于硅钢片。可以对铁硅合金粉末进行三个维度的绝缘包覆，而硅钢片只能进行一个维度的绝缘包覆，所以包含颗粒内和颗粒间的所有涡流损耗，磁粉心要明显小于硅钢片。铁硅磁粉心可以设计尺寸更小的磁心以承受更高的电流并具备更大的储能能力。以仅次于铁镍磁心的直流叠加特性提供了高性价比的应用设计方案，例如大功率电源升降电感器，电动车车载逆变器和电感器用平滑扼流圈等。铁硅磁粉心不含有有机粘剂，其损耗明显低于铁粉心和带绕硅钢片磁心。具有很好的抗热老化性。铁硅磁粉心的表面涂层是深棕色树脂。可提供的磁导率范围为19-90。

NK powder cores are made from 6.5% silicon iron powder. Since the silicon content level of 6.5% silicon iron powder is higher than silicon steel sheet, the resistivity of silicon iron powder is higher than silicon steel sheet. The silicon iron powder also could be insulated in three dimensions instead of one dimension for silicon steel sheet, so the total eddy current loss in the particle and between particles are much lower than silicon steel sheet. The design of the NK powder cores includes a smaller size, higher current and higher energy storage capability. The excellent DC bias characteristics which only second to High Flux cores provides the best cost effective solution for high end applications including buck/boost inductors for high power supply systems, smoothing chokes for inverters and reactors for electric vehicles. NK powder cores are pressed without organic binders and have significantly lower core losses than powdered iron cores and Fe-Si strip cores. They also present excellent thermal properties with no thermal aging effects. Finished NK powder cores are coated with a dark brown epoxy. The permeability range of the cores is from 19-90.

除了以上传统的磁粉心材料，为了适应日益增长的新能源汽车、高端服务器及终端以及高频通讯等领域的新的应用需求，我司及时推出了几款金属磁粉心新材料，具体介绍如下：

Besides the above traditional powder core material, NCD released some new material in time for upper grade application area such as new energy automobile, upper grade server and computers, higher frequency communication areas. Details in the following introductions:

### ■ NCD NKS磁粉心

#### NCD NKS powder cores

NKS磁粉心是由高磁通铁硅铝材料制成。该磁心的功耗与sendust磁粉心相近，大大低于FeSi磁粉心；直流叠加特性明显优于sendust磁粉心，略低于FeSi磁粉心，是一种性能价格比很高的磁粉心材料，能够满足对于高直流叠加特性及低功耗的双重要求。NKS的综合电磁性能与目前市场上的非晶磁粉心相近，但比非晶磁粉心具有更好的热稳定性，既无老化问题，也无噪音的困扰。NKS磁粉心的表面涂层是天蓝色树脂。可提供的磁导率范围为26-90。

NKS powder core is made of high flux silicon aluminum iron alloy material. The core loss is similar to sendust powder core but much lower than FeSi powder core. The DC bias is a little bit lower than FeSi powder core but much better than sendust powder core. It offers the best cost performance ratio compared to any other core material. The overall magnetic characteristics of NKS powder core is similar to the amorphous powder core. Compared with amorphous powder core, NKS powder core has better thermal stability, neither aging nor noise problem. Finished NKS cores are coated with a sky blue epoxy. The permeability range of the cores is from 26-90.

# 一般信息

## General Information

### ■ NCD NSW磁粉心

#### NCD NSW powder cores

NSW磁粉心是由高磁通低损耗铁硅铝材料制成，其损耗和直流叠加特性要远优于传统的Sendust。在磁导率26-90范围内，磁心的损耗和直流叠加特性甚至优于铁镍钼磁粉心。是高效能PFC电路的不二之选，主要应用有开关稳压电感器、串联噪音滤波器、脉冲和反激变压器。NSW磁粉心的成品表面涂层是蓝色。磁导率范围为26-90。

NSW powder core is made of high flux low loss silicon aluminum iron alloy material. Both core loss and DC bias are much better than sendust, and they are even better than the MPP powder core when the permeability is from 26 to 90. NSW cores are a smart choice for higher PFC circuits. Other major applications include switching regulator inductors, In-line noise filters, pulse transformers and flyback transformers. Finished NSW cores are coated in a blue epoxy. The permeability range of the cores is from 26-90.

### ■ NCD NSWL磁粉心

#### NCD NSWL powder cores

NSWL 磁粉心是由高频铁硅铝材料制成，可以在更高的频率下使用，磁导率应用范围为26-90。是高频PFC电路的首选，其它主要应用有较高频率的开关稳压电感器、串联噪音滤波器、脉冲和反激变压器。NSW-L磁粉心的成品表面涂层是蓝色。

NSWL powder core is made of high frequency silicon aluminum iron alloy material. It could be applied at higher frequency. NSWL cores are a smart choice for higher frequency PFC circuits. Other major applications include switching regulator inductors, In-line noise filters, pulse transformers and flyback transformers in higher frequency area. Finished NSWL cores are coated in a blue epoxy. The permeability range of the cores is from 26-90.

### ■ NCD NSH复合磁粉心

#### NCD NSH compound powder core

NSH材料是一种复合材料，含有铁、镍、铝和硅等元素。其Bs值为1.2T，其损耗与气雾化铁硅铝接近，直流叠加特性与NKS材料接近。是铁镍钼及纳米晶磁粉心的理想替代材料，是高效能PC机之PFC电感的首选。NSH磁粉心的成品表面涂层是蓝色。磁导率范围为026-090。

NSH is a kind of compound material which contents Fe, Si, Al and Ni elements. Its Bs is about 1.2T. The core loss is similar to NSW material. The DC Bias is similar to NKS material. It is a good alternative of MPP and nanocrystalline powder core. It's a top choice for high energy efficiency PFC for computers. Finished NSH cores are coated in a blue epoxy. The permeability range of the cores is from 26-90.

### ■ NCD NHU超磁通磁粉心

#### NCD NHU powder core

NHU超磁通磁粉心是在传统的铁镍磁粉心基础上，进一步优化粉末及磁心制造工艺而制成的。其主要成分是铁和镍。在所有金属磁粉心材料中，具有最优异的直流叠加特性，其 $\mu 060$ 磁心在1000e的直流叠加接近90%。与传统的高磁通铁镍磁粉心相比，损耗更是降低近30%。主要用于高效率、高电流密度的电动汽车充电器（OBC）及通讯电源、服务器电源等领域。用超磁通替代高磁通磁粉心，器件可以获得更高的效率。超磁通磁粉心的成品表面涂层是卡其色，根据客户需求提供各种尺寸和形状的磁心。可提供的磁导率范围为26-125。

NHU powder cores offer the best DC bias of all alloy powder core which up to near 90% of the  $\mu 060$  core at 100 Oe magnetizing field. The power loss of NHU core is 30% lower than NH core. The composition is nickel and iron. It's the upgrade version of traditional high flux. It could be applied in higher energy efficiency and higher power density inductor such as automobile OBC, telecom power system and computer server power system. You would get the highest efficiency as an alternative of traditional high flux cores. Finished High Flux cores are coated with a Khaki epoxy and come in a variety of shapes and sizes. The permeability range of the cores is from 26-125.

# 一般信息

## General Information

### ■ NCD NHS复合磁粉心

#### NCD NHS compound powder core

NHS材料是一种复合材料，含有铁、镍、铝和硅等元素，合金Bs值为1.4T，直流叠加特性与铁镍接近。026等低磁导率磁心的损耗明显优于其他任何材料的磁心，甚至低于铁镍钼磁心，在大电流的UPS应用中显示其卓越的抗饱和能力。由于其低损耗及优越的抗饱和能力，成为追求高效能的UPS、ESS、电脑及服务器等领域PFC电感等磁性元器件的首选。NHS磁粉心的成品表面涂层是卡其色，可提供的磁导率范围为26-90。

NCD has recently released its new NHS series of alloy powder core which contents iron、nickel、aluminum and silicon elements. The 1.4 Tesla saturation level of NHS cores exhibits similar DCB characteristics to high flux cores. NHS cores with permeability of 26 $\mu$  show outstanding DCB performance for high current application such as UPS. Especially, the core losses of 19 $\mu$  and 26 $\mu$  are significantly lower than any other material, even lower than MPP. NHS cores offer good solutions for applications requiring high efficiency such as UPS、ESS and similar industry uses. Finished NHS cores are coated with a Khaki epoxy. The permeability range of the cores is from 26-90.

### ■ NCD NKH复合磁粉心

#### NCD NKH compound powder core

NKH材料是一种复合材料，主要含有铁、镍和硅等元素。该材料的Bs为1.5T，与铁镍有着相似的直流叠加特性，其损耗要明显优于铁硅材料，在UPS（不间断电源）及ESS（储能系统）中有较为广泛的应用。NKH磁粉心的成品表面涂层是棕色。磁导率范围为26-90。

NKH is another new material released recently. It contents iron、nickel、and silicon elements. The 1.5 Tesla saturation level of NKH cores exhibits similar DCB characteristics to high flux cores. NKH cores have lower losses than NK cores. Most suitable for applications of UPS、ESS and similar industry uses. Finished High Flux cores are coated with a brown epoxy. The permeability range of the cores is from 26-90.

### ■ NCD NHK复合磁粉心

#### NCD NHK compound powder core

NHK材料是一种复合材料，主要含有铁、镍和硅等元素。该材料的Bs为1.5T，与铁镍有着相似的直流叠加特性，其损耗低于NKH材料，与NKS材料接近，与铁镍材料相比，有明显的价格优势，在UPS（不间断电源）及ESS（储能系统）中有较为广泛的应用。NHK磁粉心的成品表面涂层是棕色。磁导率范围为26-90。

NHK is another new material released recently. It contents iron、nickel、and silicon elements. The 1.5 Tesla saturation level of NHK cores exhibits similar DCB characteristics to high flux cores. NHK cores have lower losses than NKH cores. Most suitable for applications of UPS、ESS and similar industry uses. Finished High Flux cores are coated with a khaki epoxy. The permeability range of the cores is from 26-90.