



Tech Alert

Magnet Material Safety

General

In accordance with the above act, every precaution is taken to ensure that the products supplied by MagDev Limited are, when properly used, safe and without risk.

Important Note

Keep magnetised material away from heart pacemakers and magnetically stored data such as computer discs, credit cards, audio, visual and computer tapes. Such stored data can be corrupted by relatively weak magnetic fields, and some electronic equipment damaged by stronger fields.

Attractive forces & Impact Damage

Most permanent magnet materials are hard and brittle. Care must be taken when handling magnetised magnets to avoid damage caused by impact of two magnets or magnet/ferrous objects. With larger magnets, fingers can become trapped and can result in crush injuries (blisters, bruising and possible bone fracture). Very sharp splinters and chips can fly off magnets upon impact and can cause cuts to skin or eyes. Care must be taken to avoid such injuries and measures to separate and secure components are required.

Transport

Care must be taken when packing and shipping magnets to avoid physical and magnetic damage. Adequate protection is required against shock and magnetic damage, both to product and to outside instruments and magnetically recorded data. Sufficient air gap (non-magnetic packaging) or mild steel shielding is required, particularly for air transport. The International Air Transport Association (IATA) insist on a maximum external field of 0.00525 Gauss at the outer carton surface, and below 0.8 mG at a distance of 2.1m from the carton. Wherever possible, warning labels should be attached to consignments of permanent magnets.

Machining

Rare Earth magnets (bonded or sintered) must be machined with great care as the dust generated is pyrophoric when dry. Grinding must be carried out under suitable coolant and any debris cleaned off machinery and stored under water.

Neodymium-Iron-Boron (bonded or sintered) is prone to rusting, so should be dried thoroughly or coated with a water dispersion medium and allowed to dry.

Storage

Store magnetised magnets away from magnetically stored data (see note above). Store magnetised magnets in non-metallic packaging, preferably in a similar manner to their packed state upon receipt. Direct contact with steel racking, bins and other ferrous components should be avoided. Some materials (Alcomax grades) can be seriously demagnetised by pushing like poles together in repulsion. Most materials are unaffected by this but the practice is to be discouraged as one magnet can easily flip round and cause physical damage and personal injury upon impact.

Larger pieces of brittle magnets should have non-magnetic dividers to ease separation and help to avoid physical damage (chipped edges).

Toxicity

Alcomax alloys can contain up to 35% by weight Cobalt and up to 16% by weight Nickel. Samarium Cobalt contains up to 67% by weight Cobalt. When machining, additional control over airborne dust is required to keep exposure within Occupational Exposure Limits (1989) for these elements. Wet grinding eliminates this problem - see note on machining.

Sintered Ferrite material has two compositions, containing in addition to iron and oxygen, barium or strontium. The barium composition is prohibited for use in the Toy Industry or in any product where there is a risk of over exposure or ingestion, e.g. in direct contact with drinking water supply. (EC Toy Safety Directive 1988).

The elements used in permanent magnet manufacture are classified non-hazardous with respect to radioactivity. However, those containing cobalt may become active if exposed to strong ionising radiation sources. Such practice is not recommended unless the user is familiar with the regulations covering the handling and disposal of radioactive substances.

Summary of Risk Potential of Permanent Magnet Materials

Material	Physical Nature	Magnetic Strength	Damage Risk	Injury Risk ¹
Bonded Ferrite	Powder in flexible Rubber/Plastic	Low	Very Low	Very Low
Sintered Ferrite	Very brittle (ceramic)	Medium	High	Low/High
Alcomax	Brittle (cast alloy)	Medium ²	Medium	Low
Bonded SmCo5	Powder in Rubber binder	Medium/High	Low	Low/Medium
Bonded NdFeB	Metal Flake in Epoxy binder	Medium/High	Medium	Low/Medium
Sintered SmCo ₅	Very brittle intermetallic	High	High	High
Sintered Sm ₂ Co ₁₇	Extremely brittle intermetallic	High	Very High	High/Very High
Sintered NdFeB	Brittle intermetallic	High/Very High	High	High/Very High

Notes

¹Injury Risk depends on size of magnets involved, increasing with larger sizes.

²For Alcomax magnets, magnetic damage (i.e. loss of magnetism) is easily caused by bad storage/handling. See paragraph on storage.