

Precautions when Using Magnets

Safety Precautions

In using magnets, pay sufficient attention to the following precautions and use them safely. If the magnets are used incorrectly, the functions may be damaged, possibly leading to accidents. Before using these products, be sure to read the product catalog or technical materials such as the product manuals.

! Warning

1. Bringing magnets near a person fitted with an electronic medical device such as a pacemaker and other electronic medical devices is extremely dangerous. This may affect the normal operation of the medical device and put the life of the person at risk.
2. Make sure that magnets are not swallowed. Seek immediate medical attention if swallowed. Do not place magnets within the reach of children.

! Caution

- Adhere to the following precautions so that injuries and malfunctions do not occur.

1. Precautions Common to All Magnets

◎ Precautions for Magnet Users

Design

- (1) Magnetic properties differ greatly depending on the magnetization direction in anisotropic magnets. Take note of the anisotropic direction in the design.
- (2) The magnetic property values in the catalog are not guaranteed. Depending on the dimensions, shapes, and environment when using the magnet, the magnetic property values in the catalog may not be attained. Check in advance using samples, etc.
- (3) Generally, the magnetization magnitude drops as a magnet is heated. If it drops, it will also vary greatly depending on the operating point. Refer to the temperature properties and make sure the temperature does not rise by too much during assembly or use. In addition, design the magnetic circuit so that demagnetization is minimized as much as possible.
- (4) If magnetization of the magnets is performed by the customer, apply a sufficient magnetic field according to the material and coercivity. If the strength of magnetic field is insufficient, the magnetic properties may not be derived as designed. Consult us regarding the magnitude of the magnetic field required for magnetization.
- (5) Depending on the type of magnets (material) and magnetic circuit, the magnets may be difficult to magnetize after insertion (assembly). Generally, the larger the coercivity, the harder it is for magnetization to be carried out after insertion.
- (6) Avoid using and storing magnets in the following environments. This may result in corrosion of the magnets and a deterioration in the strength and properties of the magnets.
 1. Corrosive gas atmosphere (Cl, NH₃, SO_x, NO_x etc.)
 2. Environment high in electrical conductivity (e.g. in water containing electrolytes)
 3. Environment containing hydrogen
 4. Acids, alkalis, organic solvents, etc.
 5. In water or oil
- (7) When magnets are cut or divided by the customer, this may cause magnetization defects or deterioration in the magnetic properties. Consult us regarding your processing conditions. Breaking and chipping shall not be guaranteed during use and processing if processing is carried out by the customer.
- (8) The materials of most magnets are hard and brittle. When using magnets in applications subject to vibration such as in a vehicle, besides maintaining the strength by bonding the magnet to the yoke, pay attention to the design so that the magnet does not get detached even if it breaks.
- (9) When using adhesives between magnets and on joints with the yoke, pole piece, etc., study the type, quantity, conditions, strength of the adhesive carefully and check their reliability.
- (10) In high speed rotating bodies such as motors, the magnets may be damaged sometimes. During the design, adopt measures to prevent fragments from scattering even if the magnets are damaged.
- (11) When performing processes such as press fitting and shrink fitting, the properties of the magnet may deteriorate, or the magnet and the partner material may break. Be sure to check in advance using samples.
- (12) As leaking magnetic flux may exert an impact on other devices, design the magnetic circuit so that leakage is minimized as much as possible.

Assembly and Handling

- (13) A large magnetized magnet will generate an extremely strong attractive force (or repulsive force between magnets) with a magnetic body such as a piece of iron or another magnet. During the transport and assembly of magnets, your hands may get crushed, or unforeseen injuries may result when you lose your body balance as a result of the attractive and repulsive forces. Therefore pay sufficient attention when handling magnets by using an appropriate tool.
- (14) Injuries to the fingers and other parts of the body may be caused by sharp edges in the magnets. Pay adequate attention when handling magnets.
- (15) When magnetizing using a hollow core coil, the magnet may suddenly fly out of the coil and pose a danger. For safety reasons, place and secure the magnet in the center of the coil.
- (16) When laying magnetized magnets on top of one another, the magnets may chip or become difficult to separate. In this case, insert corrugated paper in between the magnets to act as a spacer.
- (17) When processing a magnet for cutting use, the machining dust may self-ignite. Take note of the following precautions regarding machining dust.
1. Never allow flames and flammable objects to get near magnets.
 2. Do not use electric vacuum cleaners.
 3. Ensure that powder extinguishers, sand, etc., are prepared in case of fire.
- (18) Some magnets may be surface treated (plating or painting) for rust prevention purposes. Rust will occur on magnets when the plating or painting peels off due to external impact such as attraction. Before use, check that the plating or painting is not peeled off when a magnet is knocked or dropped. Do not use magnets whose plating or painting is peeled off either.
- (19) Do not allow a magnetized magnet to be attracted to an iron plate and do not allow it to be attracted to or repulsed by another magnet as it may be demagnetized.
- (20) A magnetized magnet may be demagnetized when brought near a direct current or alternating current magnetic field.
- (21) As magnetized magnets will attract dirt such as iron powder, take the magnets out of the packaging case in an environment free of dust.
- (22) Be careful when handling magnets as fine magnetic bodies may be attached even if the magnets have not been magnetized. In addition, when using magnets in precision motors, clean the magnets first before use and after they have been assembled.
- (23) Magnets have a specific Curie point for each respective material. If magnets are heated near the Curie point, they will lose their magnetism. Consult us if heating cannot be avoided during assembly.
- (24) When bonding a magnet to the yoke, choose an adhesive and bonding method that will not leave behind mechanical distortions after bonding. If magnets are used with residual stress still acting on them, the magnets may break upon minor impact.
- (25) Be careful when handling magnets as they are weak against impact and break or chip easily. If a magnet is broken or chipped during handling, it may result in a deterioration of the properties and strength.

Storage

- (26) Care is required in handling magnets as there are many materials that chip easily in general. Store them in a location where they will not be subject to impact forces.
- (27) Ensure that rainwater and other water does not splash onto the magnets in order to prevent rust.
- (28) Besides clearly indicating that magnetized magnets are magnetized, cover the magnets with a non-magnetic material such as a wooden box.

Others

- (29) Do not bring magnets near floppy disks, magnetic cards, magnetic tape, prepaid cards, tickets, cathode ray tubes, etc., as they may damage the data in the magnetic recording media.
- (30) Do not bring magnets near electronic devices as they may affect the instrument and control panels, leading to accidents and malfunctions.

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- (31) If a magnet is brought near a magnetic tape, floppy disk, prepaid card, ticket, or electronic clock, the magnetic recording may be damaged or magnetized, making the device unusable. In addition, do not place electronic keys, cards and tickets together in the pocket as an electronic key may cause them to become unusable.
- (32) Make sure that magnets are not swallowed. Seek immediate medical attention if swallowed. Do not place magnets within the reach of children.
- (33) For those with allergies who react sensitively to metals, the skin may become red and rough upon contact with a magnet. Stay away from magnets if such symptoms appear.
- (34) In general, the components of a magnet may dissolve in water. Therefore, never drink water that has been in contact with a magnet.
- (35) Bringing magnets near a person fitted with an electronic medical device such as a pacemaker is extremely dangerous. Be careful as this may affect the normal operation of the medical device.
- (36) Magnets break easily in general. Be careful of broken fragments getting into your eyes or causing injuries.
- (37) Since magnets exert a strong attractive force, be careful not to crush your hands.

2. Specific Precautions regarding Each Type of Magnet

Rare Earth Magnets

- (1) Depending on the operating environment, the surface of a magnet may oxidize and thus surface treatment such as plating is necessary to prevent oxidization. In particular, surface treatment is often required in neodymium magnets. Use magnets that have been surface treated to suit the operating conditions.
- (2) The alloy powders of rare earth magnets are designated as Category 2 (flammable solids) Type I dangerous goods under the Fire Services Act. The fine powder generated by friction during the use of the magnets may ignite or catch fire. Therefore, do not use magnets in situations where there is a risk of magnetic powder being generated.
- (3) The fine powder of a rare earth magnet may self-ignite. Therefore, if the magnet is processed by the customer, do not leave the machining dust and powder hanging in the air and be sure to store them in a vessel containing water. Ensure that sand is prepared in case of fire. Cover the fire with sand immediately if a fire breaks out and keep flammable objects away.
- (4) Among rare earth magnets, the rate of decline of the magnetic properties versus a rise in the temperature may be large in some neodymium magnets so sufficient care needs to be exercised during the design.
- (5) As the magnetic properties of neodymium magnets drop near the temperature of liquid nitrogen, exercise sufficient care during the design.
- (6) Avoid storing magnets in hot and humid places.

Ferrite Magnets

- (1) Take note of materials that may demagnetize at low temperatures such as anisotropic ferrite magnets. Be sure to check the operating temperature.
- (2) Although ferrite magnets are widely used in electrical components, they break very easily and thus adequate measures to withstand impact forces must be taken.

Bonded Magnets (Rubber Magnets and Plastic Magnets)

- (1) When a bonded magnet is heated above a certain temperature, it may be demagnetized, deteriorate in its properties, become soft or deformed and thus care is required. Consult us regarding the range of temperatures in which the magnet can be used.
- (2) Bonded magnets may drop in mechanical strength due to a reduction in brittleness not only at high temperatures but when the temperature is lowered as well. Take note of the operating temperature in the design.
- (3) Compared to general magnets, bonded magnets are weaker and care is required in handling and using them.
- (4) Corrosive gases may be generated due to the organic substances used in the binder, paint, etc. Consult us in advance to select the appropriate material.
- (5) As rare earth bonded magnets use metallic powders that rust easily, appropriate surface treatment (plating and painting, etc.) may be required. Consult us in advance before use.
- (6) Depending on the type of binder used, bonded magnets may undergo changes in dimension and a drop in mechanical strength due to swelling caused by water absorption or organic solvents. Consult us in advance.
- (7) When a bonded magnet is magnetized or demagnetized using a hollow core coil, the magnet may become hot depending on the magnetization conditions, resulting in burns upon contact. Be careful when handling the magnets.
- (8) The magnetic powder of a bonded magnet may get detached depending on the manufacturing conditions and result in severe damage when used in HDD and other devices. Use magnets that are surface treated even if there is no need for rust prevention.
- (9) When bonding a bonded magnet to a yoke, the desired bonding strength may not be obtained depending on the condition of the bonding surface and type of resin. Be sure to check with the adhesive to be used.