E-Magnets UK Ltd

A dedicated and specialist supplier of Magnets

Mission Statement –
"Through operational excellence, we will provide our customers with a superior service experience and the highest quality magnet components and assemblies."

Direction of Magnetisation and Magnet drawings – a simple overview

Most magnets are made as blocks, discs or rings. Each magnet is made from a specific grade (e.g. N42SH) of a magnetic material (e.g. Neodymium Iron Boron, NdFeB). Each magnet has a direction of magnetisation within the structure i.e. it will have a North pole face and a South pole face (some magnets have multiple poles e.g. flexible rubber magnets). The information below demonstrates how to define a magnet for bespoke / made-to-measure magnets. We accept pdf, dxf, dwg, jpeg and bmp electronic drawings (SolidWorks, Pro/ENGINEER and AutoCAD files are accepted) and those sent by fax and post. Magnet material data sheets highlighting the available ranges can be sent upon request.

Nomenclature

The Direction of Magnetisation, DoM, is shown by an arrow (*Figure 1*).

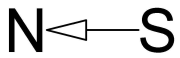


Figure 1:- DoM arrow.

The arrow always points to the North pole face of the magnet. If the magnet were used as a compass, the North pole face of the magnet would point to the geographic North pole. This is the definition of the North pole face of a magnet (this is because the Earth's magnetic South pole is actually located by the geographic North pole and so the rule of unlike poles attracting applies). + and - (positive and negative) poles do not exist and is incorrect terminology. Where it is used, + is regarded as North and - is regarded as South. Where a North pole exists, there will also always be a South pole and vice versa. A letter "A" is often used to denote the dimension that the direction of magnetisation runs parallel with (Alignment).

Rod and Bar magnets

Rod and disc magnets are usually axially magnetised. The poles are at the circular ends of the magnets (*Figure 2*). An example would be D5mm x 30mmA, where the diameter is 5mm, the length is 30mm and the letter "A" associated with the 30mm shows it is axially magnetised in the 30mm direction.

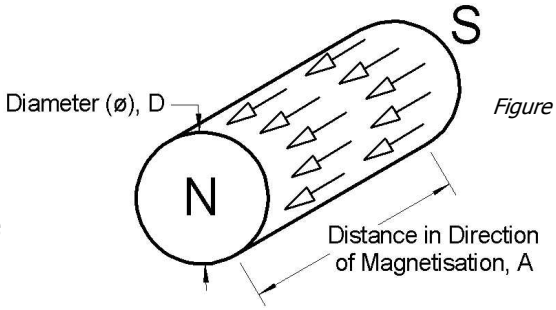


Figure 2:- Axially magnetised rod magnet.

It is possible for the rod and disc magnets to be magnetised across the diameter (diametrically magnetised) but these are not common (*Figure 3*). An example would be D25mmA x 6mm, where the diameter is 25mm, the length is 6mm and the letter "A" associated with the 25mm shows it is magnetised across the diameter.

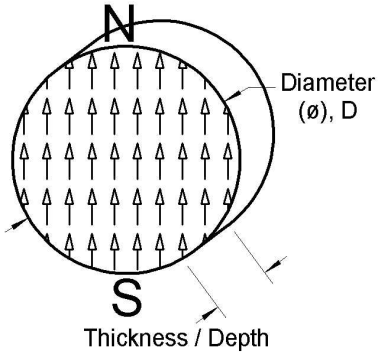


Figure 3:- Diametrically magnetised disc magnet.

Bar or block magnets are usually magnetised in a direction parallel to one of the axes. The letter "A" indicates the direction of magnetisation e.g. 56mm x 17mm x 47mmA (*Figure 4*), 40mm x 10mm x 50mmA (*Figure 5*) and 50mm x 40mm x 11mmA (*Figure 6*) in the examples shown.

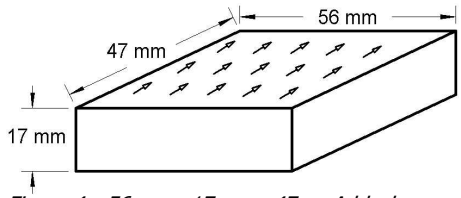


Figure 4:- 56mm x 17mm x 47mmA block magnet.

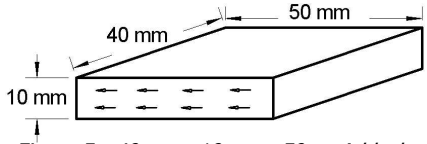


Figure 5:- 40mm x 10mm x 50mmA block magnet.

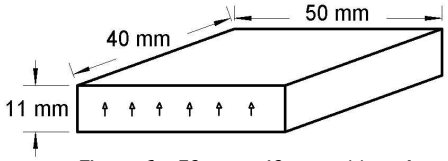


Figure 6:- 50mm x 40mm x 11mmA block magnet.

Ring and Arc magnets

True radially magnetised rings are not practical in the majority of applications as they cannot be made (*Figure 7*). Only bonded magnets and very thin walled NdFeB magnets are possible and these are very expensive due to tooling charges and true radial patterns may not be guaranteed. For most applications, they are not possible.

Radially magnetised arcs (*Figure 8*) may be possible but there are limitations on practicality - some designs are not feasible.

Instead, diametrically magnetised magnets should be considered as alternatives (to build a pseudo-radial arc or ring) (*Figure 9*). A separate document covers these further (***Replicating True Radial Arcs and Rings with Pseudo-Radial Arcs and Rings***).

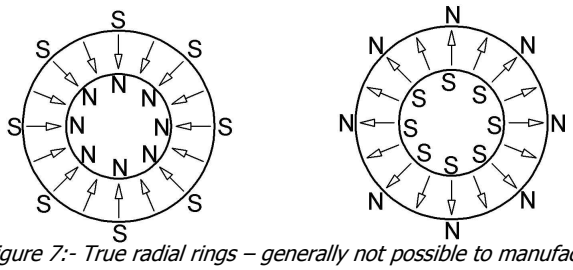


Figure 7:- True radial rings – generally not possible to manufacture.

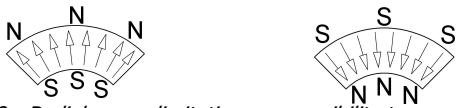


Figure 8:- Radial arcs – limitations on possibility to manufacture.

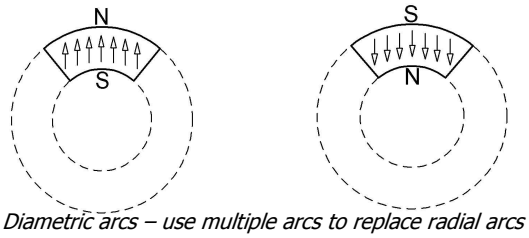


Figure 9:- Diametric arcs – use multiple arcs to replace radial arcs and rings.

Flexible and bonded magnets

These are made from magnetic powder in a binder (plastic or rubber) and can (subject to magnetising fixture availability) be magnetised with multiple magnetic pole configurations / pole patterns because they are isotropic (unlike sintered and cast magnets which are almost always anisotropic and hence have a single fixed direction of magnetisation). Due to very high tooling costs and the need for expensive dedicated magnetising fixtures very high volumes are required to make such magnets cost effective. Examples include fridge magnets and magnetic tape (*Figures 10* and *11*), coloured vinyl magnetic sheets, rotary position rubber bonded magnets (*Figure 12*), etc.

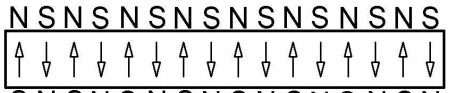


Figure 10:- Double-sided flexible Magnetic sheet.

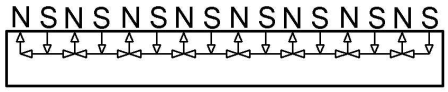


Figure 11:- Single-sided flexible Magnetic sheet.

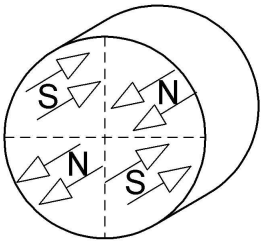


Figure 12:- Example of a multi-pole bonded magnet.

Special shape magnets

Subject to being able to manufacture the magnets, bespoke shapes (e.g. *Figures 13*, 14 and *15*) can be produced (e.g. triangle, trapezoid). There may be a significant tooling cost for some shapes, including magnetising fixture costs. Lower yield rates may occur for certain shapes which may be reflected in the price. Minimum order quantities may apply. Examples of bespoke magnets include Halbach array magnets (*Figure 16*) where the direction of magnetisation is non-standard and magnets with tight tolerances (e.g. +/- 0.05mm).

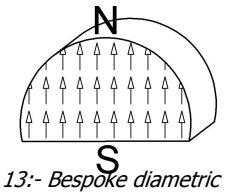


Figure 13:- Bespoke diametric magnet.

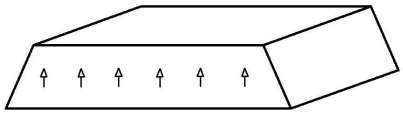


Figure 14:- Bespoke trapezoid magnet.

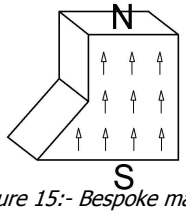


Figure 15:- Bespoke magnet.

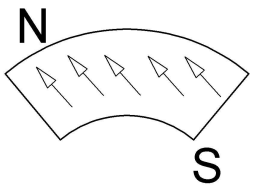
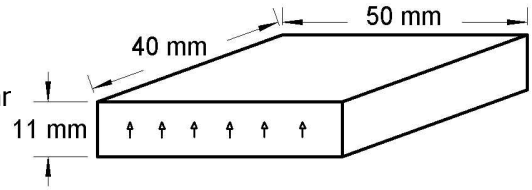


Figure 16:- Bespoke Halbach array magnet.

Summary

If we are given a magnet drawing detailing the dimensions, direction of magnetisation and magnet grade, we can confirm if the magnet car be produced and we can provide a quotation if we have been given the quantity or quantities. An ideal description is shown opposite (*Figure 17*). Unless requested otherwise, all magnets are supplied in the fully magnetised state.



50mm x 40mm x 11mmA NdFeB N42SH
Block of size 50mm x 40mm x 11mm magnetised in the 11mm direction.
Tolerances +/- 0.1mm.
Magnet grade NdFeB N42SH
Ni-Cu-Ni plated. Supplied magnetised.
Qty = 500, 1000, 10000

Figure 17:- Example drawing and description that would be ideal for quotation purposes.

How to contact us:

We believe in listening to, understanding and working with our customers. We have a dedicated, expert sales team who are available Monday to Friday from 8.30am to 5.30 pm (GMT). If you have any queries or would like us to visit you, please get in touch.

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