3.9 Retaining magnets
3.9 Retaining magnets

**GN 50.1**
Retaining magnets without thread
→ Page 1097

**GN 58**
Pot magnets with bore
→ Page 1104

**GN 53.1**
Magnets Plastic
→ Page 1111

**GN 50.2**
Retaining magnets with female thread
→ Page 1098

**GN 51.2**
Retaining magnets with rubber jacket
→ Page 1105

**GN 52.1**
Retaining magnets smooth finish
→ Page 1112

**GN 50.25**
Retaining magnets with female thread Stainless Steel
→ Page 1099

**GN 51.5**
Retaining magnets with rubber jacket
→ Page 1106

**GN 54.1**
Retaining magnets smooth finish Brass
→ Page 1113

**GN 50.3**
Retaining magnets with threaded stud
→ Page 1100

**GN 51.3**
Retaining magnets with rubber jacket
→ Page 1107

**GN 52.2**
Retaining magnets with female thread
→ Page 1114

**GN 50.5**
Retaining magnets with female thread
→ Page 1101

**GN 51.4**
Retaining magnets with rubber jacket
→ Page 1108

**GN 52.3**
Retaining magnets with female thread
→ Page 1115

**GN 50.4**
Retaining magnets with bore / with female thread
→ Page 1102

**GN 51.6**
Retaining magnets with rubber jacket, with two female threads
→ Page 1109

**GN 52.4**
Retaining magnets with stud
→ Page 1116

**GN 50.45**
Retaining magnets with bore Stainless Steel
→ Page 1103

**GN 51.7**
Magnets with ball knob / with key ring
→ Page 1110

**GN 52.5**
Retaining magnets with rubber jacket Stainless Steel
→ Page 1117
3.9 Retaining magnets

**GN 60**
Button-type magnets with bore  
→ Page 1118

**GN 62**
U-Magnets with bore  
→ Page 1119

**GN 251.6**
Setting bolts with retaining magnet  
→ Page 1120

**GN 913.6**
Grub screws with retaining magnet  
→ Page 1121
Retaining magnets are simple problem solvers for no-wear fixings.

Owing to their structure, these magnet systems have only one adhesion level. The magnets and iron poles are optimal arranged such that the whole of the magnetic energy is focused on the adhesive surface.

The spatial effect of the magnetic field is limited in shielded systems, with the effect that surrounding objects are not magnetised.

<table>
<thead>
<tr>
<th>Type</th>
<th>Ø d</th>
<th>h</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat gripper</td>
<td>6</td>
<td>4.5</td>
<td>Housing steel, zinc plated, red lacquered or Stainless Steel</td>
</tr>
<tr>
<td></td>
<td>125</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>6</td>
<td>Housing steel, zinc plated, with rubber jacket</td>
</tr>
<tr>
<td></td>
<td>88</td>
<td>8.5</td>
<td></td>
</tr>
<tr>
<td>Rod gripper</td>
<td>4</td>
<td>10</td>
<td>Housing steel, zinc plated or red lacquered</td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>20</td>
<td>Sandwich configuration of the steel poles, housing brass</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Button-type /</td>
<td>13</td>
<td>10</td>
<td>Cast, unshielded systems, red lacquered</td>
</tr>
<tr>
<td>U-Magnets</td>
<td>32</td>
<td>25.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>79</td>
<td>54</td>
<td></td>
</tr>
</tbody>
</table>
Retaining magnets
Materials of the magnet

Hard ferrite (HF)
SrFe (Strontium ferrite)
Magnets made of hard ferrite (80% iron oxide) are made by sintering process.
Like all ceramic materials, these magnets are very hard and brittle and virtually non-machinable.
The magnetic adhesive force drops when the magnet is heated.

AlNiCo (AN)
Aluminium nickel cobalt
Magnets made of AlNiCo (main constituents include aluminium, nickel, cobalt and iron) are made by sintering or casting process.
The material is very hard and tough, but can be redressed.
These magnets are used in applications in which the magnetic field is to remain as static and stable as possible, also under higher temperature fluctuations.

SmCo (SC)
Samarium cobalt
Magnets made of SmCo (main constituents include samarium and cobalt) are made by sintering process.
The material is very hard and brittle and is virtually non-machinable.
The magnetic adhesive force drops when the magnet is heated.

NdFeB (ND)
Neodymium iron boron
Magnets made of NdFeB (main constituents include neodymium, iron and boron) are made by sintering process.
The material is very hard and brittle and is virtually non-machinable.
This material delivers ultimate magnetic holding power.
The magnetic adhesive force drops when the magnet is heated.

Materials of the magnet in comparison:

<table>
<thead>
<tr>
<th>Description</th>
<th>Hard ferrite (HF)</th>
<th>AlNiCo (AN)</th>
<th>SmCo (SC)</th>
<th>NdFeB (ND)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesive force</td>
<td>good</td>
<td>medium</td>
<td>strong</td>
<td>very strong</td>
</tr>
<tr>
<td>Max. working temperature *</td>
<td>≈ 200 °C</td>
<td>≈ 450 °C</td>
<td>≈ 200 °C</td>
<td>≈ 80 °C</td>
</tr>
<tr>
<td>Corrosion resistance</td>
<td>very good</td>
<td>very good</td>
<td>good</td>
<td>less good</td>
</tr>
<tr>
<td>Machineability</td>
<td>not possible</td>
<td>diamond cutting, grinding</td>
<td>not possible</td>
<td>not possible</td>
</tr>
<tr>
<td>Demagnetisation capability</td>
<td>moderate by demagnetising fields</td>
<td>easy by demagnetising fields</td>
<td>very difficult only by large demagnetising fields</td>
<td>difficult only by large demagnetising fields</td>
</tr>
<tr>
<td>Price</td>
<td>very reasonable</td>
<td>high</td>
<td>very high</td>
<td>reasonable</td>
</tr>
</tbody>
</table>

* The max. temperature used is only a guide value because it also depends on the dimensions of the magnet.
Other factors apart from the magnet material and the size of the magnet affecting the magnetic adhesive force are:

- an air gap (magnetically non-conductive materials act like an air gap)
- the quality of the surface (roughness and shape)
- the temperature
- the content of ferro-magnetic material in the steel; the components must also be sufficiently thick to be able to absorb the entire magnetic flux.

The magnetic adhesive force can also be impaired by alternating thermal stress and by chemical factors (aggressive baths, gases, etc.).

The diagrams and graphs below show guide values relating to the impact on the magnetic adhesive force caused by different mechanical specifications.

The nominal magnetic adhesive forces shown in the tables of the standard pages are minimum values which are achieved at:

- room temperature
- perpendicular „tear-off“ under full surface contact of the magnet
- workpieces made of low-carbon steel with a minimum thickness of 10 mm

### Influence of the air gap

![Diagram showing the influence of the air gap on adhesive force]

### Influence of the workpiece surface on the magnetic adhesice force

![Diagram showing the influence of workpiece surface quality on adhesive force]

### Influence of the material (steel grade), examples

<table>
<thead>
<tr>
<th>Material</th>
<th>Adhesive Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% technical pure iron</td>
<td>86% C60, X6Cr17</td>
</tr>
<tr>
<td>95% St37, C15</td>
<td>84% 42CrMo4</td>
</tr>
<tr>
<td>94% St44-2, 34CrNiMo6</td>
<td>75% St50</td>
</tr>
<tr>
<td>93% St52-3</td>
<td>72% X155CrMo12</td>
</tr>
<tr>
<td>92% 90MnV8</td>
<td>65% X210CrW12</td>
</tr>
<tr>
<td>90% C45</td>
<td>50% 20MnCr5</td>
</tr>
<tr>
<td>87% Ck45</td>
<td>30% GG</td>
</tr>
</tbody>
</table>

Hardened workpieces are bad conductors of the magnetic flux. The magnetic adhesive force is therefore lower.

### Displacement force = 20% - 30% of the magnetic adhesive force

![Diagram showing the displacement force]

The displacement force is also influenced by the surface roughness and the adhesion.
GN 50.1 Retaining magnets
disc-shaped, without thread

Retaining magnets GN 50.1 are a shielded magnetic system.
Fixed in place by gluing or side-mounted thrust bolt (e.g. GN 913.2 grub screw with pointed nose).

see also...
• More information to retaining magnets ➔ Page 1094

Specification

- Housing
  Steel, zinc plated

- Materials of the magnet:
  - Hard ferrite (HF)
    temperature resistant up to 200 °C
  - SmCo (SC)
    Samarium, cobalt
    temperature resistant up to 200 °C
  - NdFeB (ND)
    Neodymium, iron, boron
    temperature resistant up to 80 °C

- RoHS compliant

Information

How to order

<table>
<thead>
<tr>
<th>Material of the magnet</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>GN 50.1-SC-13</td>
<td></td>
</tr>
</tbody>
</table>
Retaining magnets GN 50.2 are a shielded magnetic system.

**Materials of the magnet:**
- Hard ferrite, temperature resistant up to 200 °C
- SmCo, Samarium, cobalt, temperature resistant up to 200 °C
- NdFeB, Neodymium, iron, boron, temperature resistant up to 80 °C

**RoHS compliant**

---

### Specification

- **Housing / threaded bush**
  Steel, zinc plated

- **Materials of the magnet:**
  - Hard ferrite, temperature resistant up to 200 °C
  - SmCo, Samarium, cobalt, temperature resistant up to 200 °C
  - NdFeB, Neodymium, iron, boron, temperature resistant up to 80 °C

### Information

Retaining magnets GN 50.2 are a shielded magnetic system.

see also...

- More information to retaining magnets ➔ Page 1094

---

### How to order

GN 50.2-HF-20-M3

1. **Material of the magnet**
2. **d₁**
3. **d₂**
Stainless Steel-Retaining magnets GN 50.25 are a shielded magnetic system.

Owing to the lower magnetic conductivity of the stainless steel housing, the adhesive forces are lower than in steel.

see also...

• More information to retaining magnets → Page 1094

How to order

GN50.25-HF-50

1 Material of the magnet
2 d₁
Retaining magnets GN 50.3 are a shielded magnetic system.

see also...

- More information to retaining magnets → Page 1094

Information

Retaining magnets GN 50.3 are a shielded magnetic system.

Specification

- Housing / threaded stud
  Steel, zinc plated
- Materials of the magnet:
  - Hard ferrite HF
    temperature resistant up to 200 °C
  - NdFeB ND
    Neodymium, iron, boron
    temperature resistant up to 80 °C
- RoHS compliant

How to order

GN 50.3-ND-16-M6

1 Material of the magnet
2 $d_1$
3 $d_2$
Retaining magnets GN 50.5 are a shielded magnetic system. For diameter \( d_1 \geq 50 \) the adhesive surface is lagged with a plastic cover.

To ensure that the magnetic properties (adhesive forces) are not impaired, the fixing screws must be made of non-magnetic material.

### Specification
- **Housing**
  - Steel, zinc plated
- **Material of the magnet**
  - NdFeB
  - Neodymium, iron, boron
  - Temperature resistant up to 80° C
- **Plastic cover**
  - Technopolymer (Polyamide PA)
- **Plastic characteristics** → Page 1141
- **RoHS compliant**

### Nominal adhesive forces in N

<table>
<thead>
<tr>
<th>( d_1 )</th>
<th>( d_2 )</th>
<th>( d_3 )</th>
<th>( h )</th>
<th>( t )</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>M 5</td>
<td>5.5</td>
<td>7</td>
<td>3</td>
<td>330</td>
</tr>
<tr>
<td>40</td>
<td>M 5</td>
<td>10.5</td>
<td>8</td>
<td>6</td>
<td>500</td>
</tr>
<tr>
<td>50</td>
<td>M 8</td>
<td>10.5</td>
<td>10</td>
<td>5.5</td>
<td>800</td>
</tr>
<tr>
<td>63</td>
<td>M 10</td>
<td>11.7</td>
<td>14</td>
<td>8.5</td>
<td>1100</td>
</tr>
<tr>
<td>75</td>
<td>M 10</td>
<td>13</td>
<td>15</td>
<td>8.5</td>
<td>1750</td>
</tr>
</tbody>
</table>

### Information
Retaining magnets GN 50.5 are a shielded magnetic system. For diameter \( d_1 \geq 50 \) the adhesive surface is lagged with a plastic cover.

To ensure that the magnetic properties (adhesive forces) are not impaired, the fixing screws must be made of non-magnetic material.

See also...

- **More information to retaining magnets** → Page 1094

### How to order

**GN 50.5-ND-40**

1. **Material of the magnet**
2. **\( d_1 \)**
Retaining magnets GN 50.4 are a shielded magnetic system. To ensure that the magnetic properties (adhesive forces) are not impaired, the fixing screws of the types for countersunk screws and socket cap screws must be made of non-magnetic material (magnetic not conductive).

### Specification

- Housing
  - Steel, zinc plated

- Materials of the magnet:
  - Hard ferrite
    - temperature resistant up to 200 °C
  - NdFeB
    - Neodymium, iron, boron

- RoHS compliant

### Information

Retaining magnets GN 50.4 are a shielded magnetic system. To ensure that the magnetic properties (adhesive forces) are not impaired, the fixing screws of the types for countersunk screws and socket cap screws must be made of non-magnetic material (magnetic not conductive).

see also...

- More information to retaining magnets → Page 1094
Stainless Steel-Retaining magnets GN 50.45 are a shielded magnetic system.

Owing to the lower magnetic conductivity of the stainless steel housing, the adhesive forces are lower than in steel.

To ensure that the magnetic properties (adhesive forces) are not impaired, the fixing screws must be made of non-magnetic material.

**see also...**

- More information to retaining magnets ➔ Page 1094

---

**Information**

**Specification**

- **Housing**
  - Stainless Steel

- **Materials of the magnet:**
  - Hard ferrite
    - temperature resistant up to 220 °C
  - SmCo
    - Samarium, cobalt
    - temperature resistant up to 350 °C

- **RoHS compliant**

**On request**

- Raw magnets in ring shape in hard ferrite (HF)

---

**How to order**

<table>
<thead>
<tr>
<th>1. Material of the magnet</th>
<th>2. d₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>GN 50.45-HF-50</td>
<td></td>
</tr>
</tbody>
</table>
Pot magnets GN 58 are a shielded magnetic system. To ensure that the magnetic properties (adhesive forces) are not impaired, the fixing screws must be made of non-magnetic material.

For easier handling and/or to avoid demagnetisation, these magnets have an iron plate on their adhesive surface.

**Information**

Pot magnets GN 58 are a shielded magnetic system.

To ensure that the magnetic properties (adhesive forces) are not impaired, the fixing screws must be made of non-magnetic material.

For easier handling and/or to avoid demagnetisation, these magnets have an iron plate on their adhesive surface.

**see also...**

- More information to retaining magnets → Page 1094

### Specification

- Housing Steel
- Material of the magnet AlNiCo AN Aluminium, nickel, cobalt temperature resistant up to 280 °C
- Lacquering red temperature resistant up to 180 °C
- RoHS compliant

### Table of Nominal Adhesive Forces

<table>
<thead>
<tr>
<th>d₁</th>
<th>d₂</th>
<th>d₃</th>
<th>h</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>3,7</td>
<td>7,5</td>
<td>7,5</td>
<td>30</td>
</tr>
<tr>
<td>29</td>
<td>4,7</td>
<td>10</td>
<td>9</td>
<td>50</td>
</tr>
<tr>
<td>38</td>
<td>4,7</td>
<td>11</td>
<td>10,5</td>
<td>130</td>
</tr>
</tbody>
</table>

### How to order

<table>
<thead>
<tr>
<th>1</th>
<th>Material of the magnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>d₁</td>
</tr>
</tbody>
</table>

**GN 58-AN-29**
Retaining magnets GN 51.2 are a shielded magnetic system with rubber jacket.

They are preferably used for sensitive surfaces. Also, the coefficient of friction is increased, with the effect that high lateral retaining forces are achieved.

**Specification**
- Steel part zinc plated
- Material of the magnet NdFeB Neodymium, iron, boron temperature resistant up to 80 °C
- Rubber jacket Elastomer (TPE) 73 shore, black
- **Elastomer characteristics** → Page 1140
- RoHS compliant

<table>
<thead>
<tr>
<th>d₁</th>
<th>d₂</th>
<th>d₃</th>
<th>h</th>
<th>Length I</th>
<th>t min.</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>M 4</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>22</td>
<td>M 4</td>
<td>8</td>
<td>6</td>
<td>5,5</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>31</td>
<td>M 4</td>
<td>8</td>
<td>6</td>
<td>5,5</td>
<td>5</td>
<td>75</td>
</tr>
<tr>
<td>43</td>
<td>M 4</td>
<td>8</td>
<td>6</td>
<td>4,5</td>
<td>5</td>
<td>85</td>
</tr>
<tr>
<td>66</td>
<td>M 5</td>
<td>10</td>
<td>8,5</td>
<td>6,5</td>
<td>8</td>
<td>180</td>
</tr>
<tr>
<td>88</td>
<td>M 8</td>
<td>12</td>
<td>8,5</td>
<td>8,5</td>
<td>11</td>
<td>420</td>
</tr>
</tbody>
</table>

**Information**
Retaining magnets GN 51.2 are a shielded magnetic system with rubber jacket.

They are preferably used for sensitive surfaces. Also, the coefficient of friction is increased, with the effect that high lateral retaining forces are achieved.

see also...
- **More information to retaining magnets** → Page 1094

**How to order**
- GN51.2-ND-66
- 1 Material of the magnet
- 2 d₁
Retaining magnets GN 51.5 are a shielded magnetic system with rubber jacket. They are preferably used for sensitive surfaces. Also, the coefficient of friction is increased, with the effect that high lateral retaining forces are achieved.

see also...
• More information to retaining magnets ➔ Page 1094

Specification

- Steel part zinc plated
- Material of the magnet NdFeB Neodymium, iron, boron temperature resistant up to 80 °C
- Rubber jacket Elastomer (TPE) 73 shore, black
- Elastomer characteristics ➔ Page 1140
- RoHS compliant

<table>
<thead>
<tr>
<th>d₁</th>
<th>d₂</th>
<th>h</th>
<th>t₁</th>
<th>t₂</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>M 4</td>
<td>6</td>
<td>4,5</td>
<td>0,8</td>
<td>35</td>
</tr>
<tr>
<td>31</td>
<td>M 5</td>
<td>6</td>
<td>4,5</td>
<td>0,8</td>
<td>75</td>
</tr>
<tr>
<td>43</td>
<td>M 4</td>
<td>5,5</td>
<td>4</td>
<td>0,8</td>
<td>85</td>
</tr>
<tr>
<td>66</td>
<td>M 6</td>
<td>8,5</td>
<td>6</td>
<td>1,8</td>
<td>180</td>
</tr>
<tr>
<td>88</td>
<td>M 6</td>
<td>8,5</td>
<td>6</td>
<td>1,8</td>
<td>420</td>
</tr>
</tbody>
</table>

Information

How to order

GN 51.5-ND-88

1 Material of the magnet
2 d₁
Retaining magnets GN 51.3 are a shielded magnetic system with rubber jacket. They are preferably used for sensitive surfaces. Also, the coefficient of friction is increased, with the effect that high lateral retaining forces are achieved.

**Specification**

- Steel part zinc plated
- Material of the magnet: NdFeB (Neodymium, iron, boron), temperature resistant up to 80 °C
- Rubber jacket: Elastomer (TPE), 73 shore, black
- **RoHS compliant**

**Information**

Retaining magnets GN 51.3 are a shielded magnetic system with rubber jacket. They are preferably used for sensitive surfaces. Also, the coefficient of friction is increased, with the effect that high lateral retaining forces are achieved.

*More information to retaining magnets ➔ Page 1094*

<table>
<thead>
<tr>
<th>d₁</th>
<th>d₂</th>
<th>h</th>
<th>Length I</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>M 4</td>
<td>6</td>
<td>6,5</td>
<td>50</td>
</tr>
<tr>
<td>43</td>
<td>M 6</td>
<td>6</td>
<td>15</td>
<td>85</td>
</tr>
<tr>
<td>66</td>
<td>M 8</td>
<td>8,5</td>
<td>15</td>
<td>180</td>
</tr>
<tr>
<td>88</td>
<td>M 8</td>
<td>8,5</td>
<td>15</td>
<td>420</td>
</tr>
</tbody>
</table>

**How to order**

- Material of the magnet: **GN 51.3-ND-43**
- d₁
Retaining magnets GN 51.4 are a shielded magnetic system with rubber jacket. They are preferably used for sensitive surfaces. Also, the coefficient of friction is increased, with the effect that high lateral retaining forces are achieved.

**Specification**

- Steel part zinc plated
- Material of the magnet NdFeB Neodymium, iron, boron temperature resistant up to 80 °C
- Rubber jacket Elastomer (TPE) 73 shore, black
- **Elastomer characteristics** ➔ Page 1140
- RoHS compliant

<table>
<thead>
<tr>
<th>d₁</th>
<th>d₂</th>
<th>d₃</th>
<th>t</th>
<th>h</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>4</td>
<td>8</td>
<td>3,5</td>
<td>6</td>
<td>35</td>
</tr>
<tr>
<td>31</td>
<td>6</td>
<td>9</td>
<td>3,5</td>
<td>6</td>
<td>75</td>
</tr>
<tr>
<td>57</td>
<td>8</td>
<td>25,3</td>
<td>3,5</td>
<td>7,5</td>
<td>175</td>
</tr>
<tr>
<td>66</td>
<td>5,5</td>
<td>25</td>
<td>3,5</td>
<td>8,5</td>
<td>210</td>
</tr>
</tbody>
</table>

**Information**

Retaining magnets GN 51.4 are a shielded magnetic system with rubber jacket. They are preferably used for sensitive surfaces. Also, the coefficient of friction is increased, with the effect that high lateral retaining forces are achieved.

**How to order**

- **Material of the magnet**
- **d₁**

**GN51.4-ND-31**

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**Page 1108 | 3.9 Retaining magnets**
Retaining magnets GN 51.6 are a shielded magnetic system with rubber jacket. The rubber jacket protects sensitive surfaces from being damaged by the magnet and also delivers a higher friction coefficient, resulting in high lateral adhesion forces.

Its dimensions, especially the drill hole spacing m and the thread d₂, match the clamp mountings GN 473, GN 477 and GN 480.

### Specification
- Steel part zinc plated
- Material of the magnet NdFeB Neodymium, iron, boron temperature resistant up to 80 °C
- Rubber jacket Elastomer (TPE) 73 shore, black
- Elastomer characteristics → Page 1140
- RoHS compliant

### Information
Retaining magnets GN 51.6 are a shielded magnetic system with rubber jacket.

The rubber jacket protects sensitive surfaces from being damaged by the magnet and also delivers a higher friction coefficient, resulting in high lateral adhesion forces.

Its dimensions, especially the drill hole spacing m and the thread d₂, match the clamp mountings GN 473, GN 477 and GN 480.

#### How to order
- Material of the magnet
- d₁
- m
- d₂
- d₃

GN 51.6-ND-43-22-M4

#### Table
<table>
<thead>
<tr>
<th>d₁</th>
<th>m</th>
<th>d₂</th>
<th>d₃</th>
<th>h</th>
<th>t min.</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>22</td>
<td>M 4</td>
<td>39</td>
<td>10,3</td>
<td>6</td>
<td>85</td>
</tr>
<tr>
<td>43</td>
<td>27</td>
<td>M 5</td>
<td>39</td>
<td>10,3</td>
<td>7</td>
<td>85</td>
</tr>
<tr>
<td>57</td>
<td>32</td>
<td>M 6</td>
<td>53</td>
<td>11,3</td>
<td>7</td>
<td>175</td>
</tr>
<tr>
<td>57</td>
<td>36</td>
<td>M 6</td>
<td>53</td>
<td>11,3</td>
<td>7</td>
<td>175</td>
</tr>
</tbody>
</table>

See also...
- Foot clamp mountings GN 473 → Page 1076
- Clamp mountings GN 477 → Page 1077
- Flanged bolts GN 480 → Page 1084
- More details to retaining magnets → Page 1094
3.9 Retaining magnets

Magnets GN 51.7 are a shielded magnetic system with rubber jacket. The rubber jacket protects sensitive surfaces from being damaged by the magnet and also delivers a higher friction coefficient, resulting in high lateral adhesion forces.

**Specification**
- Steel part nickel plated
- Material of the magnet NdFeB Neodymium, iron, boron temperature resistant up to 80 °C
- Rubber jacket Elastomer (TPE) 73 shore, black
- Ball knob Plastic Technopolymer (Polyamide PA) black, matt
- Key ring Steel, nickel plated

**Information**

see also...
- More information to retaining magnets → Page 1094

<table>
<thead>
<tr>
<th>d₁</th>
<th>d₂</th>
<th>d₃</th>
<th>h₁</th>
<th>h₂</th>
<th>h₃</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>16</td>
<td>20</td>
<td>6</td>
<td>26</td>
<td>13</td>
<td>35</td>
</tr>
<tr>
<td>31</td>
<td>16</td>
<td>25</td>
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<td>26</td>
<td>14,5</td>
<td>75</td>
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<tr>
<td>43</td>
<td>16</td>
<td>30</td>
<td>5,5</td>
<td>26</td>
<td>17</td>
<td>85</td>
</tr>
</tbody>
</table>

**How to order**

GN51.7-ND-31-A

1 Material of the magnet
2 d₁
3 Type
Magnet GN 53.1 are primarily used for holding drawings and the like. The magnetic material ND is characterized by a high adhesive force.

Specification

- **Housing**
  - Plastic
  - white, RAL 9003
  - grey, RAL 7040
  - red, RAL 3031

- **Material of the magnet**
  - NdFeB (ND)
  - Neodymium, iron, boron
  - temperature resistant up to 80 °C

- **RoHS compliant**

Information

Magnets GN 53.1 are primarily used for holding drawings and the like. The magnetic material ND is characterized by a high adhesive force.

see also...

- More details to magnets → Page 1094

On request

- Magnets with custom imprint

How to order

GN 51.3-ND-30-RT

1 Material of the magnet
2 \(d_1\)
3 Colour
Retaining magnets GN 52.1 are a shielded magnetic system. Attachment options include pressing in, shrinking in or gluing in.

see also...

• More information to retaining magnets ➔ Page 1094

Specification

• Housing
  Steel
  - Identification No. 1: zinc plated
  - Identification No. 2: blank

• Materials of the magnet:
  - AlNiCo
    Aluminium, nickel, cobalt
temperature resistant up to 450 °C
  - NdFeB
    Neodymium, iron, boron
temperature resistant up to 80 °C

• RoHS compliant

Information

How to order

GN52.1-AN-20-1

1 Material of the magnet
2 d
3 Identification No. (Tolerance d)
### Retaining magnets

Retaining magnets GN 54.1 are a shielded magnetic system. The configuration of magnetic and iron poles is known as sandwich magnet system. These retaining magnets deliver ultimate holding power, also with smaller workpieces.

Attachment options include pressing in or gluing in.

* $k_1$ is the maximum dimension by which the retaining magnet can be shortened without losing its properties.

** Mounting these retaining magnets directly in steel components will create a magnetic short circuit which reduces the retaining power by as much as 15%. To avoid this effect, the spacings $k_2$ between brass jacket and steel component should be observed. These spacings should also be maintained if the retaining magnet is shortened.

<table>
<thead>
<tr>
<th>d h6</th>
<th>h</th>
<th>$k_1^*$</th>
<th>$k_2^{**}$</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>20 ±0.2</td>
<td>10</td>
<td>1.5</td>
<td>SC SmCo 8 10</td>
</tr>
<tr>
<td>8</td>
<td>20 ±0.2</td>
<td>10</td>
<td>1.5</td>
<td>SC SmCo 22 22</td>
</tr>
<tr>
<td>10</td>
<td>20 ±0.2</td>
<td>8</td>
<td>2</td>
<td>SC SmCo 40 45</td>
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<tr>
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<td>20 ±0.2</td>
<td>6</td>
<td>2.5</td>
<td>ND NdFeB 60 70</td>
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<tr>
<td>16</td>
<td>20 ±0.2</td>
<td>2</td>
<td>3</td>
<td>ND NdFeB 125 150</td>
</tr>
<tr>
<td>20</td>
<td>25 ±0.2</td>
<td>5</td>
<td>4</td>
<td>ND NdFeB 250 280</td>
</tr>
<tr>
<td>25</td>
<td>35 ±0.3</td>
<td>7</td>
<td>5</td>
<td>ND NdFeB 400 450</td>
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<tr>
<td>32</td>
<td>40 ±0.3</td>
<td>4,5</td>
<td>6</td>
<td>ND NdFeB 600 700</td>
</tr>
</tbody>
</table>

**Information**

Retaining magnets GN 54.1 are a shielded magnetic system. The configuration of magnetic and iron poles is known as sandwich magnet system. These retaining magnets deliver ultimate holding power, also with smaller workpieces.

Attachment options include pressing in or gluing in.

* $k_1$ is the maximum dimension by which the retaining magnet can be shortened without losing its properties.

** Mounting these retaining magnets directly in steel components will create a magnetic short circuit which reduces the retaining power by as much as 15%. To avoid this effect, the spacings $k_2$ between brass jacket and steel component should be observed. These spacings should also be maintained if the retaining magnet is shortened.

see also...

* More information to retaining magnets ➔ Page 1094

**How to order**

GN54.1-SC-13

1. Material of the magnet
2. d

---

**Specification**

- Housing
  - Brass
- Materials of the magnet:
  - SmCo SC
    - Samarium, cobalt temperature resistant up to 200 °C
  - NdFeB ND
    - Neodymium, iron, boron temperature resistant up to 80 °C
- Identification of ND:
  - blue inked adhesive surface area
- RoHS compliant
Retaining magnets GN 52.2 are a shielded magnetic system.

Magnet

<table>
<thead>
<tr>
<th>$d_1 \pm 0.2$</th>
<th>$d_2$</th>
<th>$h \pm 0.2$</th>
<th>$t_{min}$</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$AN$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$NdFeB$</td>
</tr>
<tr>
<td>6</td>
<td>M 3</td>
<td>20</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>M 3</td>
<td>20</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>M 4</td>
<td>20</td>
<td>7</td>
<td>8,5</td>
</tr>
<tr>
<td>13</td>
<td>M 4</td>
<td>20</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>16</td>
<td>M 4</td>
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<td>7</td>
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</tr>
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<td>M 6</td>
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<tr>
<td>40</td>
<td>M 8</td>
<td>50</td>
<td>12</td>
<td>240</td>
</tr>
<tr>
<td>50</td>
<td>M 10</td>
<td>60</td>
<td>12</td>
<td>400</td>
</tr>
<tr>
<td>63</td>
<td>M 12</td>
<td>65</td>
<td>14</td>
<td>660</td>
</tr>
</tbody>
</table>

Information

Retaining magnets GN 52.2 are a shielded magnetic system.

see also...

- More information to retaining magnets  → Page 1094

Specification

- Housing
  Steel, zinc plated

- Materials of the magnet:
  - AlNiCo
    Aluminium, nickel, cobalt temperature resistant up to 450 °C
  - NdFeB
    Neodymium, iron, boron temperature resistant up to 80 °C

- RoHS compliant

How to order

1. Material of the magnet
2. $d_1$
Retaining magnets GN 52.3 are a shielded magnetic system. For easier handling and/or to avoid demagnetisation, these magnets have an iron plate on their adhesive surface.

**Specification**
- **Housing**
  - Steel
- **Material of the magnet**
  - AlNiCo
  - Aluminium, nickel, cobalt temperature resistant up to 350 °C
- **Lacquering red**
  - temperature resistant up to 180 °C
- **RoHS compliant**

**Information**
Retaining magnets GN 52.3 are a shielded magnetic system.

For easier handling and/or to avoid demagnetisation, these magnets have an iron plate on their adhesive surface.

*see also...*
- More information to retaining magnets ➔ Page 1094

**Nominal adhesive forces in N**

<table>
<thead>
<tr>
<th>d₁ ±0.2</th>
<th>d₂</th>
<th>h ±0.2</th>
<th>t</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5</td>
<td>M 4</td>
<td>16</td>
<td>7</td>
<td>20</td>
</tr>
<tr>
<td>17</td>
<td>M 6</td>
<td>16</td>
<td>5</td>
<td>26</td>
</tr>
<tr>
<td>21</td>
<td>M 6</td>
<td>19</td>
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<td>27</td>
<td>M 6</td>
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<tr>
<td>35</td>
<td>M 6</td>
<td>30</td>
<td>9</td>
<td>150</td>
</tr>
</tbody>
</table>

**How to order**

GN 52.3-AN-21

1. Material of the magnet
2. d₁
Retaining magnets GN 52.4 are a shielded magnetic system.

Type D with smooth stud is designed for attachment with rivets.

see also...

- More information to retaining magnets » Page 1094

### Information

- Housing
  - Steel, zinc plated
- Materials of the magnet:
  - AlNiCo (AN) Aluminium, nickel, cobalt temperature resistant up to 450 °C
  - NdFeB (ND) Neodymium, iron, boron temperature resistant up to 80 °C
- RoHS compliant

### Specification

<table>
<thead>
<tr>
<th>d₁</th>
<th>d₂ ±0.2</th>
<th>d₃</th>
<th>h ±0.2</th>
<th>Length l</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type D</td>
<td>Type E</td>
<td></td>
<td>Type D</td>
<td>Type E</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>M 3</td>
<td>20</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>M 3</td>
<td>20</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>M 4</td>
<td>20</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>M 4</td>
<td>20</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>16</td>
<td>5</td>
<td>M 4</td>
<td>25</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>6</td>
<td>M 6</td>
<td>35</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>25</td>
<td>8</td>
<td>M 6</td>
<td>40</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>32</td>
<td>10</td>
<td>M 8</td>
<td>50</td>
<td>20</td>
<td>15</td>
</tr>
<tr>
<td>40</td>
<td>15*</td>
<td>M 8</td>
<td>60</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>50</td>
<td>18*</td>
<td>M 10</td>
<td>65</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>63</td>
<td>20*</td>
<td>M 12</td>
<td>70</td>
<td>35</td>
<td>20</td>
</tr>
</tbody>
</table>

* not available from stock and requires a minimum order quantity
Stainless Steel-Retaining magnets GN 52.5 are a shielded magnetic system with rubber jacket on the adhesive surface. They are preferably used for sensitive surfaces. Also, the coefficient of friction is increased, with the effect that high lateral retaining forces are achieved.

see also...
• More information to retaining magnets ➔ Page 1094

How to order

<table>
<thead>
<tr>
<th>Material of the magnet</th>
<th>d₁</th>
<th>d₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>GN 52.5-ND-13-M6</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Speciation

- Housing
  Stainless Steel
- Material of the magnet
  NdFeB
  Temperature resistant up to 80°C
- Rubber
  Elastomer (TPE)
  73 Shore, black

Information

Stainless Steel-Retaining magnets GN 52.5 are a shielded magnetic system with rubber jacket on the adhesive surface.

They are preferably used for sensitive surfaces. Also, the coefficient of friction is increased, with the effect that high lateral retaining forces are achieved.

see also...
• More information to retaining magnets ➔ Page 1094

Elastomer characteristics ➔ Page 1140
• RoHS compliant

<table>
<thead>
<tr>
<th>d₁</th>
<th>d₂</th>
<th>h</th>
<th>Length L</th>
<th>A/F</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>M 6</td>
<td>16</td>
<td>10</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>16</td>
<td>M 8</td>
<td>18</td>
<td>12</td>
<td>13</td>
<td>23</td>
</tr>
<tr>
<td>20</td>
<td>M 10</td>
<td>20</td>
<td>14</td>
<td>17</td>
<td>46</td>
</tr>
</tbody>
</table>
The button-type magnets GN 60 have a split adhesive surface. These are non-shielded magnetic systems made by casting method.

To ensure that the magnetic properties (adhesive forces) are not impaired, the fixing screws must be made of non-magnetic material.

For easier handling and/or to avoid demagnetisation, these magnets have an iron plate on their adhesive surface.

see also...

• More information to retaining magnets ➔ Page 1094

### Specification

- Material of the magnet
  • AlNiCo AN
  • Aluminium, nickel, cobalt temperature resistant up to 280 °C
- Lacquering red temperature resistant up to 180 °C
- RoHS compliant

### Information

The button-type magnets GN 60 have a split adhesive surface. These are non-shielded magnetic systems made by casting method.

To ensure that the magnetic properties (adhesive forces) are not impaired, the fixing screws must be made of non-magnetic material.

For easier handling and/or to avoid demagnetisation, these magnets have an iron plate on their adhesive surface.

### How to order

GN 60-AN-19

1. Material of the magnet
2. d₁
The U-Magnets GN 62 have a split adhesive surface. These are nonshielded magnetic systems made by casting method.

To ensure that the magnetic properties (adhesive forces) are not impaired, the fixing screws must be made of non-magnetic material.

For easier handling and/or to avoid demagnetisation, these magnets have an iron plate on their adhesive surface.

Information

- Material of the magnet
  - AlNiCo
  - Aluminium, nickel, cobalt temperature resistant up to 350 °C
  - Lacquering red temperature resistant up to 180 °C
  - RoHS compliant

Information

- More information to retaining magnets → Page 1094

How to order

<table>
<thead>
<tr>
<th>1</th>
<th>Material of the magnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>b₁</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b₁</th>
<th>b₂</th>
<th>d max. Ø screw head</th>
<th>h₁</th>
<th>h₂</th>
<th>m</th>
<th>s</th>
<th>Nominal adhesive forces in N</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>25</td>
<td>7</td>
<td>17</td>
<td>9</td>
<td>-</td>
<td>8</td>
<td>30</td>
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<td>5</td>
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<td>11</td>
<td>-</td>
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<td>4,7</td>
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<td>17</td>
<td>-</td>
<td>23</td>
<td>120</td>
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<tr>
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<td>54</td>
<td>36</td>
<td>43</td>
<td>38,5</td>
<td>470</td>
</tr>
</tbody>
</table>
Setting bolts GN 251.6 with retaining magnets are a shielded magnetic system. Suitable e.g. as workpiece stop, with the magnet holding the workpiece in place.

The lock nut (included) can be used to secure the stop screw after positioning.

see also...
- More information to retaining magnets → Page 1094
- Setting bolts GN 251 (without magnet) → Page 584

### Specification

- Screw Steel
  - Tensile strength class 5.8 (500 N/mm²)
  - zinc plated, blue passivated
- Hexagon nut Steel
  - Tensile strength class 04 (400 N/mm²)
  - zinc plated, blue passivated
- Material of the magnet
  - NdFeB
  - Neodymium, iron, boron
  - temperature resistant up to 80 °C
- RoHS compliant

### Information

Nominal adhesive forces in N

<table>
<thead>
<tr>
<th>d₁ *</th>
<th>l₁</th>
<th>d₂</th>
<th>e</th>
<th>k₁ −1</th>
<th>k₂</th>
<th>l₂ max.</th>
<th>s</th>
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<td>M 8</td>
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<td>17,8</td>
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</tr>
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<td>50</td>
<td>60</td>
<td>80</td>
<td>24</td>
<td>26,8</td>
</tr>
</tbody>
</table>

*thread: nut mobility

### How to order

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>d₁</td>
<td>l₁</td>
<td>Material of the magnet</td>
</tr>
</tbody>
</table>

GN251.6-M6-12-ND
Grub screws GN 913.6 with retaining magnets are a shielded magnetic system.

Suitable e.g. as workpiece stop, with the magnet holding the workpiece in place.

see also...

• More information to retaining magnets ➔ Page 1094