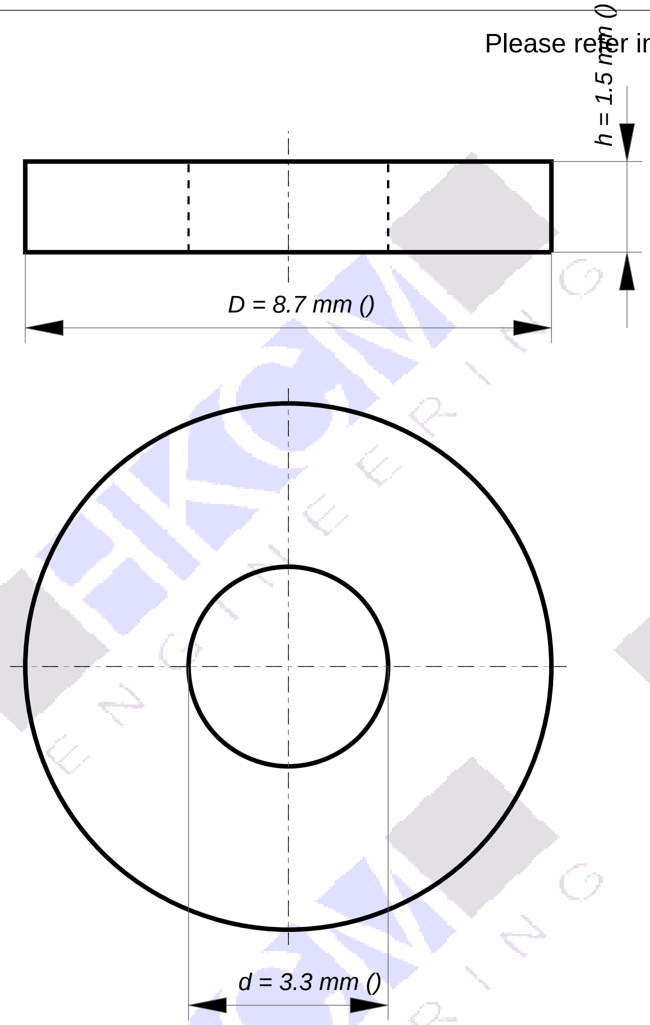
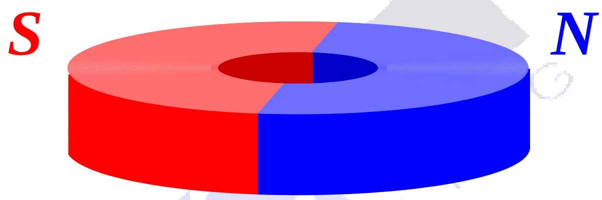
Please refer in correspondence: HKCM-Drawing number 9963-73306

QR-CODE





Magnet-Ring R08.7x03.3x01.5CD-N35

Tolerances : DIN ISO 2768-1m (Website Download Center)
ROHs (2011/65/EU) & REACh (2007/EU)
Outer diameter(D) = 8.7 mm ()
Inner diameter(d) = 3.3 mm ()
Height(H) = 1.5 mm ()
Material/grade: NdFeB / N35
Coating: Chrome
Poles: dia
max.operation temperature = 80°C
Flux density inside the magnet = 1.17 Tesla
Temperature coefficient and flux = 0.11% per 1°K
Dead weight: 0.56 g
Holding force on iron 1.18 Newton
Weight, which the magnet can lift: 0.12 kg

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If not stated otherwise in the respective HKCM drawings our magnets are manufactured according to DIN ISO 2768-1m. The drawings are generated automatically based on the data in our system.

Additional standards
DIN EN ISO 286-1: A basis for tolerances, permissible allowances and fitting tolerances
DIN EN 60404-5: Magnetic materials - Procedures for measurement of magnetic properties

Limits for lenghts, diameters, angles and radius on blocks, cylinders, rings, segments, loafs, trapezoids and spheres

Base measurement	0.5 - 3 mm	>3 - 6 mm	>6 - 30 mm	>30 - 120 mm	>120 mm
D/d/l/w/h -/+	0.1 mm	0.1 mm	0.2 mm	0.3 mm	0.5 mm
Edge roundings)	0.2 mm	0.5 mm	1.0 mm	2.0 mm	4.0 mm
Angle -/+	1°	1°	30 '	20 '	10 '

The permissible deviation of the magnetic field strength at a 0 mm distance is -/+ 10%. It should be taken into consideration that the outside and measurable flux density of the magnetic field is just 1/3 of the inside flux density of the magnet.

The permissible deviation of the field direction from the symmetrical axis at a 2 mm distance is -/+ 10%. This does not apply for other positions. It is impossible to reach a homogeneous magnetic field in practical conditions due to a multiplied chaining of tolerances.

Therefore measuring and adjusting the fitting position and that of the relevant components (Hall, Reed) in their surroundings (ferritic materials) is a pre-condition for using permanent magnets for sensoring purposes.

The max. permissible operating temperature given for each type of magnet should only be reached for a short period. The same applies for temperatures reached at certain mounting and fitting procedures (casting, bonding, soldering). Permanently Neodymium and Samarium-Cobalt magnets should only be used at 2/3 of their max. operating temperature.

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Area of application for material & coating

Area of application for the coating

Coating	Description	Properties
Parylene	<0.05mm Pc, polymere applied in vaccum chamber, optically opaque, surface beneath visible	best none metallic protection against corrosion, hydrophobe, watertight & gastight, non-soluble, barrier against organic & anorganic substances, strong acids & alkaline solution, gas & steam, structure-preserving, low friction coefficient, di-electric, meets MIL-I-46058C, non-toxic, fungus & bacteria tight, bio-compatible, physiologically & toxicologically harmless, anti-allergic
Teflon	>0.02mm NiTf, plastic layer, blue, soft and elastic surface	good protection against corrosion, water-repellent, barrier against organic & anorganic substances, strong acids & alkaline solution, gas & steam, structure-preserving, low friction coefficient, di-electric, mechanically sensitive
Epoxy	>0.05mm Ep, plastic layer in dip-coating process, black, soft and elastic surface	good protection against corrosion, water-repellent, mechanically sensitive
Gold	>0.01mm Ni+Cu+Ni+Au, galvanically applied golden surface, Industry-Gold or 24Karat	best metallic protection against corrosion, very good electrical conductivity, no negative effect at body contact
Silver	>0.01mm Ni+Cu+Ni+Ag, galvanically applied silver, soft surface	very good protection against corrosion, very good electrical conductivity, typical black oxid can be removed with cleaning cloth, no negative effect at body contact, pay attention to the right magnet material (max.op.temp.) if soldering is planned
Tin	>0.01mm Sn, galvanically applied silver, soft and tight surface	very good protection against corrosion, good electrical conductivity, no negative effect at body contact, pay attention to the right magnet material (max.op.temp.) if soldering is planned
Chrome	**>0.01mm Ni+Cu+Ni+Cr, galvanically applied dark silver-like, tight and hard surface**	**very good protection against corrosion**
Zinc	>0.006mm Zn, galvanically applied blue silver-like, tight and even surface	good protection against corrosion
Nickel	>0.01mm Ni+Cu+Ni, galvanically applied silver or dark silver-like, porose and hard surface	Industrial standard, good work stability, sufficient protection against corrosion in dry ambients, possible allergic reaction on sensible persons
not coated	Magnet material grey metallic	acceptable for SamariumCobalt - but no good mechanical protection, not acceptable for Neodymium - oxidation in wet ambients, dissolution in acids, lightly resistant in alkaline suspensions. Sealing neccessary.

N	**N35**	M	H	SH	UH	EH	YX	YXG	FCC *)
60°C 140°F	**80°C 176°F**	100°C 212°F	120°C 248°F	150°C 302°F	180°C 356°F	200°C 392°F	250°C 482°F	350°C 662°F	500°C 932°F

- Iron Chrome Cobalt (FeCrCo), soft magnetic, machinable
- Samarium Cobalt Sm2Co17, very brittle, not machinable
- Samarium Cobalt Sm2Co5, brittle, not machinable
- Sintered Neodymium, very strong & hard, not machinable
- Bonded magnets, machinable

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Magnet-Ring R08.7x03.3x01.5CD-N35

ROHs (2011/65/EU) & REACh (2007/EU)
Material/grade: NdFeB / N35 / 279kJ/m3
Coating: Chrome
max.operation temperature = 80°C
Temperature coefficient and flux = 0.11% per 1°K

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Properties Neodymium (NdFeB)

Neodymium is the strongest magnet material available.
It has up to 1.43 Tesla and can resist up to 200°C depending on the specification.
Neodymium is very hard and brittle. It is nearly impossible to machine it.
Neodym magnets are manufactured from rare powder materials under high pressure and are then coated with thin metal layers.
The material is brittle and can easily break or be damaged on the surface when two or more magnets come in contact.
The basic material can create sparks through contact, and sparking may ignite.
Mostly these magnets are covered with a metallic coating which does not protect against corrosion in humid conditions.
Parylene coating is the only efficient protection.

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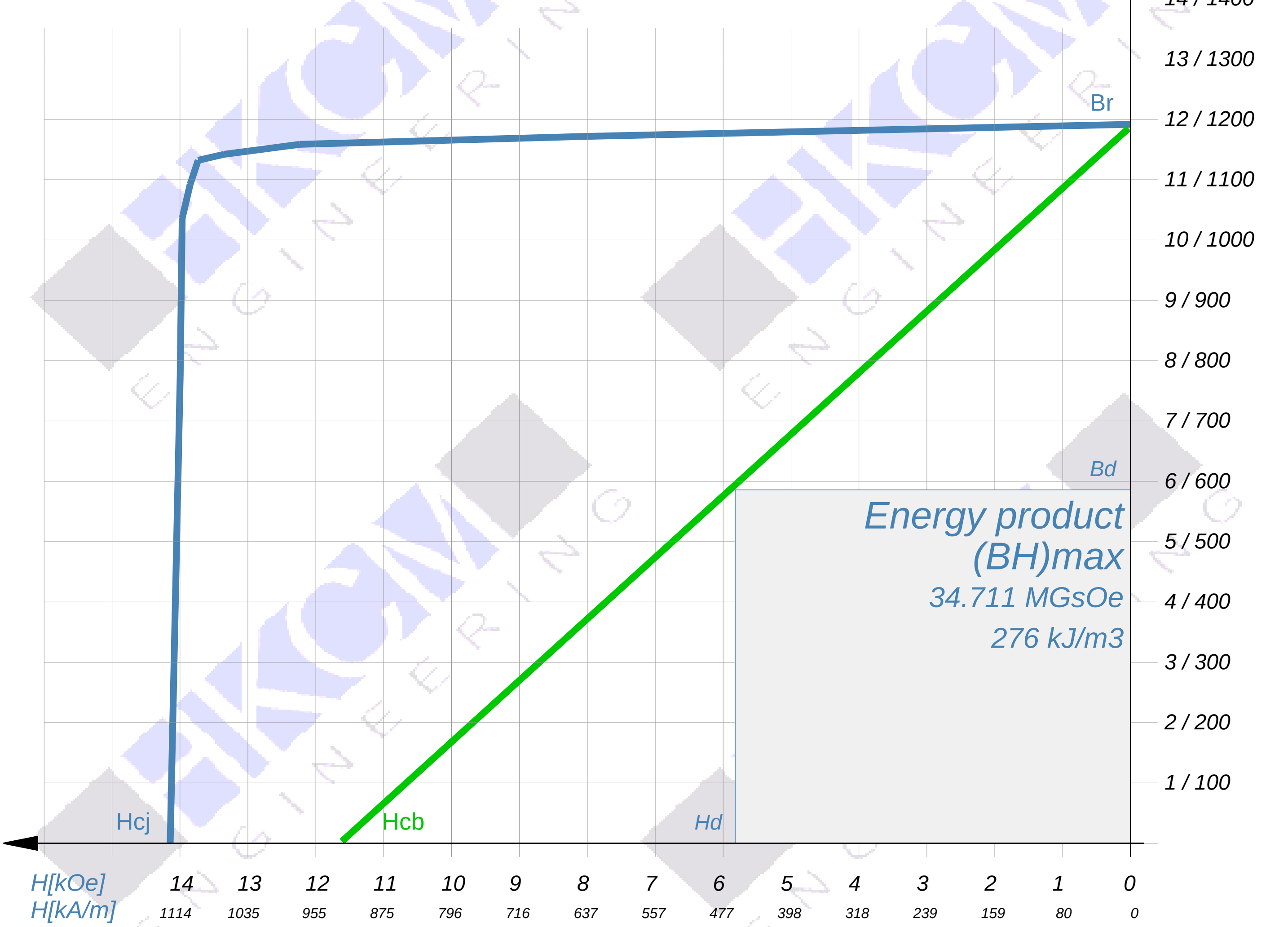
NdFeB, N35 - IEC 260/95

This diagram is based on the extensive data collection of HKCM Engineering e.K. It is a representative example for magnets made of material with grade CGS N35 / IEC 260/95

The y axis gives values of the magnetic flux density B in the magnet and the magnetic polarisation J.



The x axis shows the values of the externally applied coercitive field strength H.

The energy product is the largest possible rectangular area below the Br/Hcb curve
acc. to official SI-standard (based on IEC 60404-8-1): (BH)max = Vs/m2 * A/m = [kJ/m3]
acc. to CGS-standard (common use): (BH)max = (BH)max = kGauss * kOersted = [MGsOe]
These figures are used for the description and identification of the grade of magnets.

Magnet-Ring R08.7x03.3x01.5CD-N35

Energy product	(BH)max	34.711 MGsOe	276 kJ/m3
Flux density	Br	11.917 kGs	1192 mT / 1.19 Vs/m2
	Bd	5.9095 kGs	591 mT / 0.59 Vs/m2
	Hcb	11.625 kOe	925 kA/m
	Hcj	14.144 kOe	1126 kA/m
	Hk	13.854 kOe	1102 kA/m
	Hk/Hcj	97.9 %	97.9 %
	Hd	5.8737 kOe	467 kA/m
	max.operation temperature = 80°C		
	Temperature coefficient and flux = 0.11% per 1°K		

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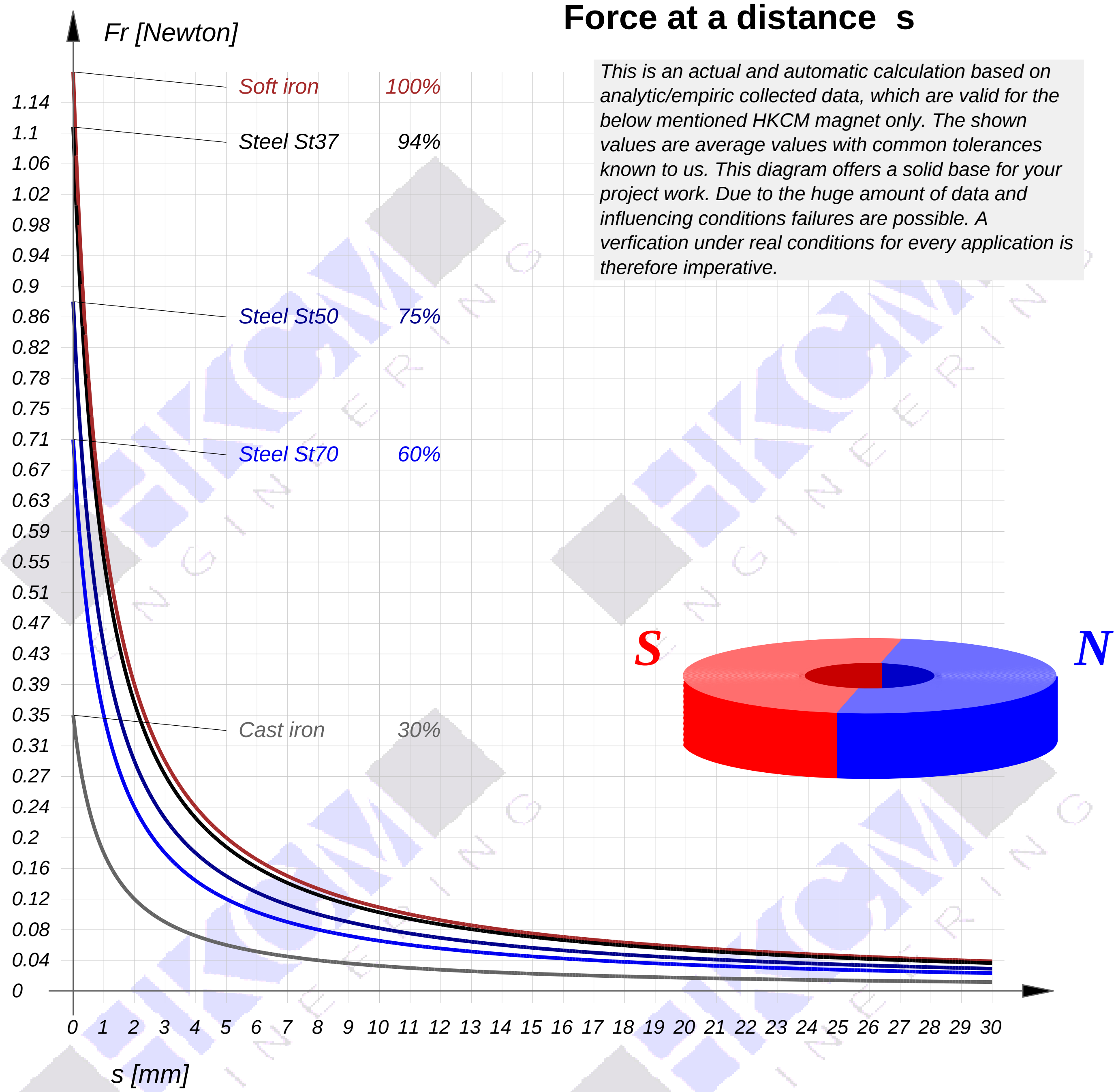

Force at a distance s

This is an actual and automatic calculation based on analytic/empiric collected data, which are valid for the below mentioned HKCM magnet only. The shown values are average values with common tolerances known to us. This diagram offers a solid base for your project work. Due to the huge amount of data and influencing conditions failures are possible. A verfication under real conditions for every application is therefore imperative.

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Holding force on iron 1.18 Newton
Weight, which the magnet can lift: 0.12 kg

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Measurement of the magnetic force

The measurement of the magnetic force is a technical challenge if there is no suitable measurement system available (e.g. test machine Houndsfield HTE).

With the help of test equipment and assisting measures in a workshop an estimate can be determined but no exact and verifiable measurement. The magnetic characteristics, volume and form of the magnet and the ambient conditions are decisive for the force leading to an attraction of ferruginous material. The resulting magnetic force probably comes from its centre of mass. To get an exact measurement the magnet should be hanged on a cardan suspension at this centre of mass to eliminate any other force directions and shearing strength. This is virtually impossible.

For a makeshift measuring equipment at least a calibrated spring balance, a counterpart made of pure iron and a cardan suspension for magnet and counterpart are necessary. Any other ferruginous items or magnets must be kept away from the measuring set.

Common mistakes:

- ferruginous material in the vicinity
- characteristics of the counterpart (e.g. wrong size, quality, geometry, rough surface)
- air gaps (e.g. dirt, paint, coats or other distancing matters)
- shear forces e.g. made by wrong set installation, tension by wrong clamping or locking
- damages on the magnet or counterpart (mechanical or corrosive)
- disregard of the temperature (21°C)

Typical deviations at magnet measurements result from technical characteristics of magnets (graininess, dimensions, surface, magnetization) and their interaction with the ambient situation. Measuring tolerances should be considered as multiplicatively as with any other technical articles.

The values given in our data sheets are based on current and automatic calculations with the help of analytically and empirically captured data. The values given are means in view of tolerances from practical work and as such form a solid basis for your planning. Errors cannot be ruled out based on the amount of various influences and data. A verification in practice is a matter of urgent necessity.

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