

The SCR Hybrid Magnet

by Bakker Magnetics B.V.

- Magnetic switch according ISO 22241-4
- Tested on all available nozzles, worldwide
- Lower price than current magnets
- Lower weight than current magnets
- Stability at all conditions (temperature, opposite magnetic fields, vibrations)

Requirements according to ISO 22241-4

- 1 – Neck
- 2 – Magnet holder
- 3a – Stationary Magnet neck side
- 3b – Magnet switch nozzle side
- 4 – Nozzle

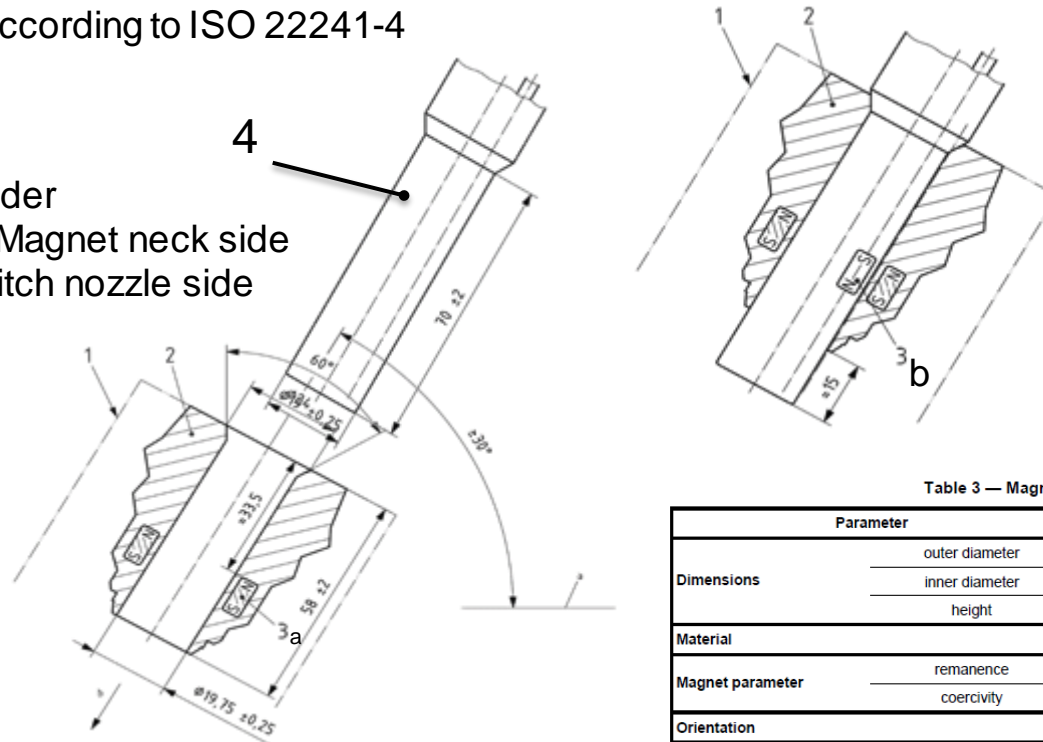


Table 3 — Magnet ring characteristics

Parameter	Requirements	
Dimensions	outer diameter	34 mm
	inner diameter	24 mm
	height	10 mm
Material	Neodymium-Iron-Boron (NdFeB)	
Magnet parameter	remanence	1,2 T to 1,3 T
	coercivity	800 kA/m to 900 kA/m
Orientation	North pole pointing outwards from the tank	

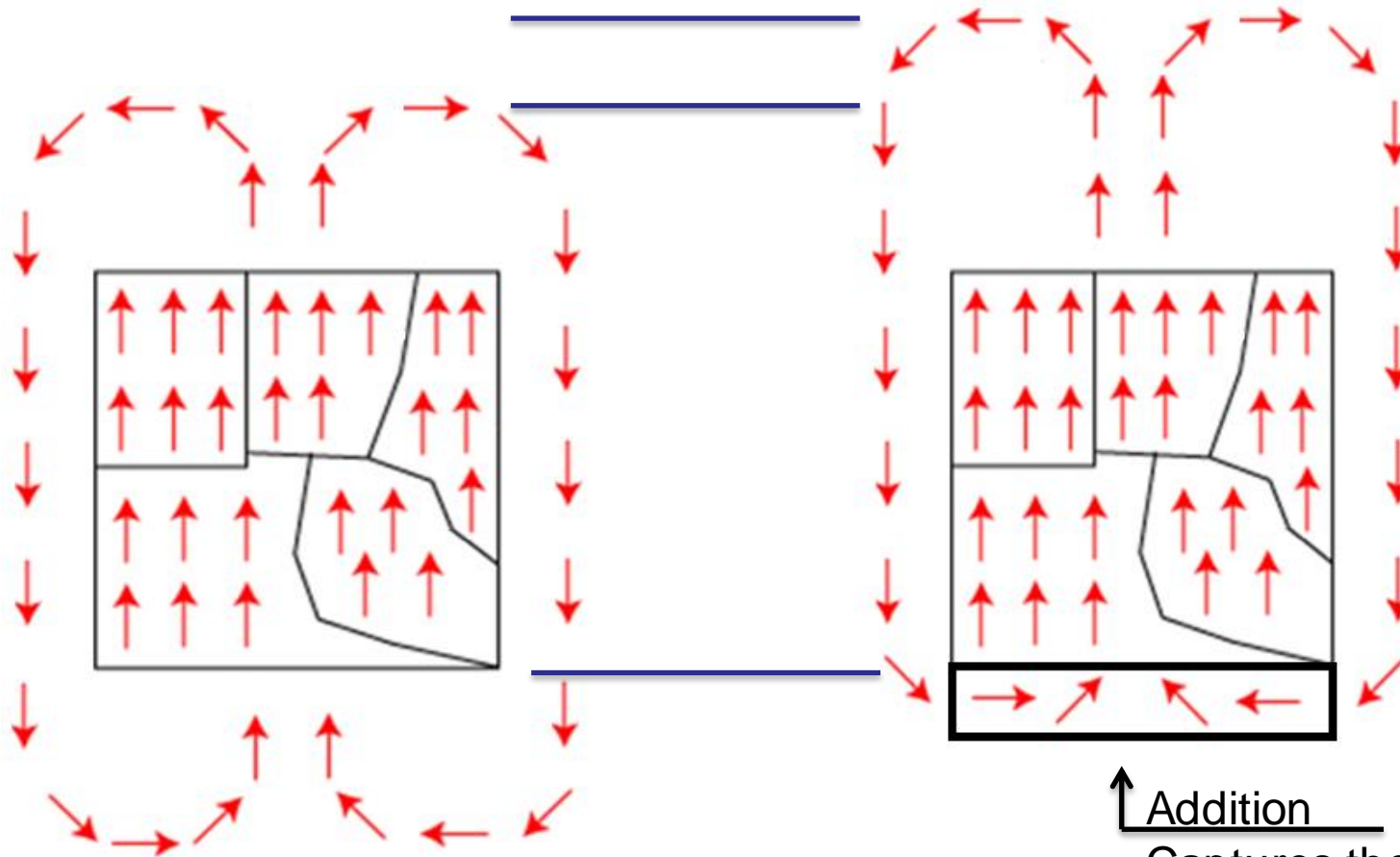
The reasons for ISO to specify a Neodymium magnet:

- 1- High power density
- 2- Stability against vibrations and demagnetization
- 3- Life-time guarantee

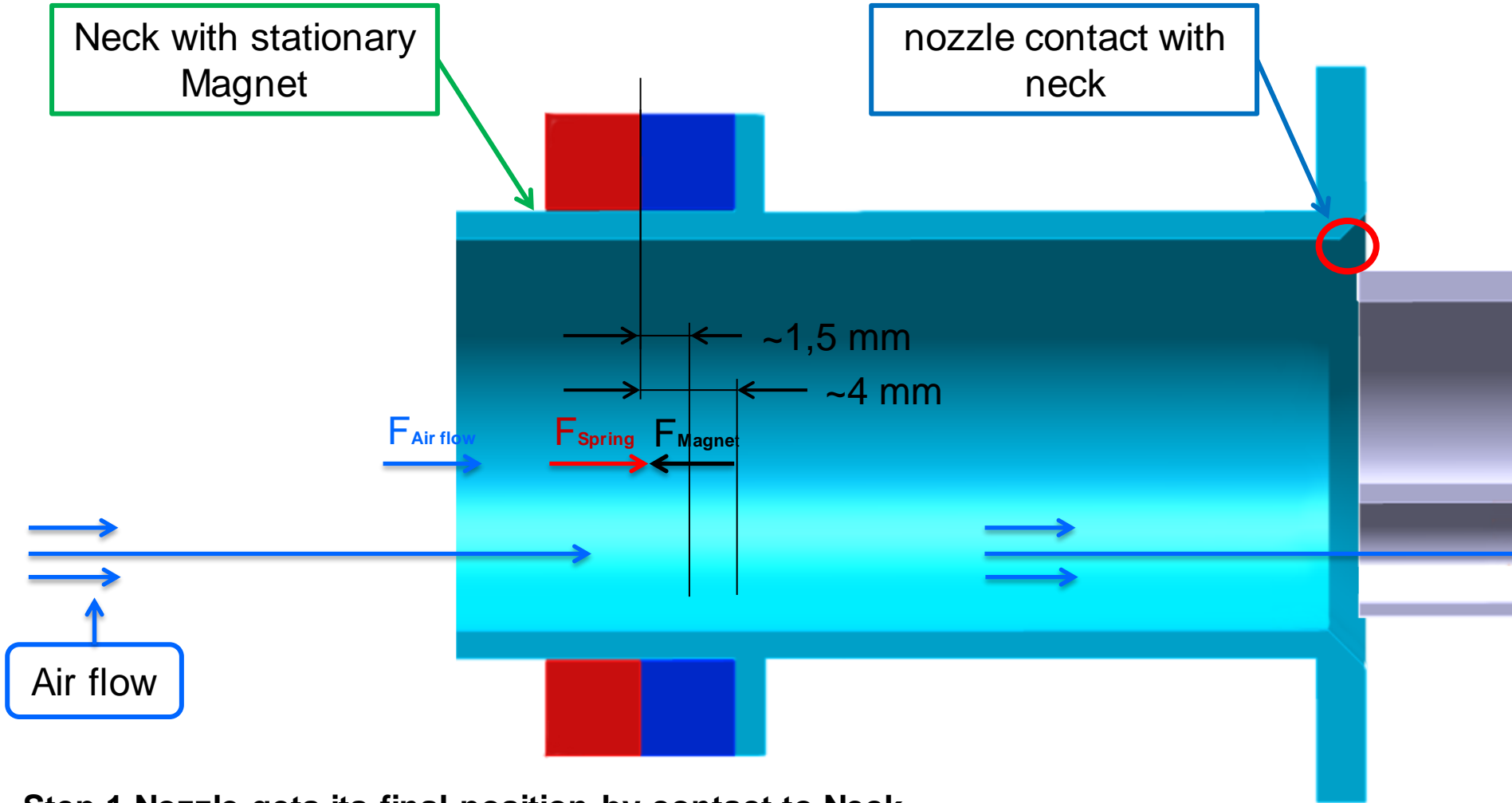
Optimizing the forces, concentrating the magnetic flux at the side and location where we need it

Standard magnet

Hybrid magnet



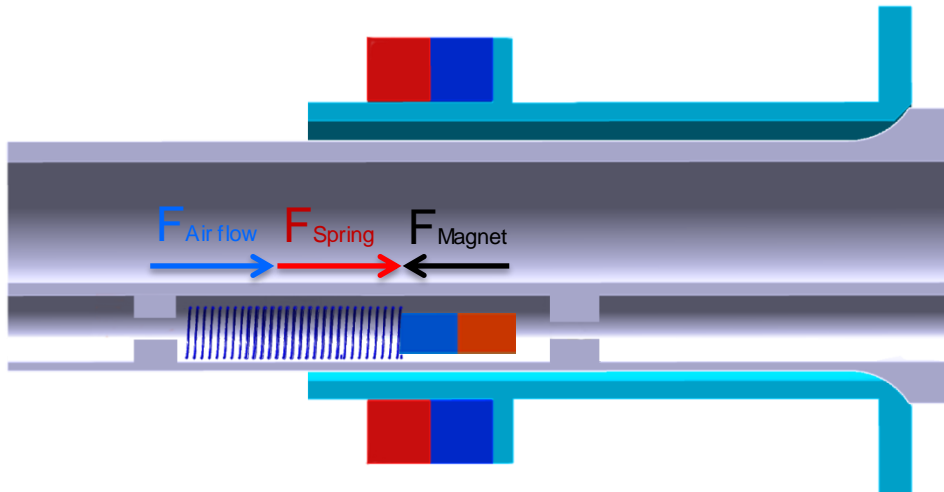
↑ Addition
Captures the lower flux



Step 1 Nozzle gets its final position by contact to Neck

Step 2 Magnet switch starts to move from around 4mm (distance to neck magnet)

Step 3 Magnet switch stops at equilibrium point around 1,5mm (distance to neck magnet)



Equilibrium estimation



1) Minimum required Force of Magnetic field

$$F_{\text{Magnet}} = F_{\text{Spring}} (0,15 \text{ N}) + F_{\text{Air flow}} (0,20 \text{ N}) + F_{\text{Friction / Gravity / Vibration}} (0,15 \text{ N})$$

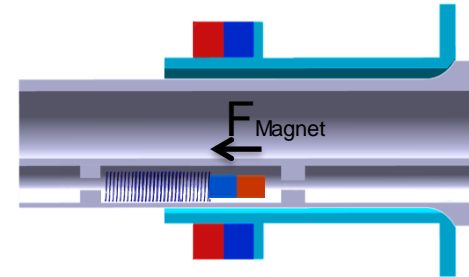
$$F_{\text{Magnet}} = 0,5 \text{ N}$$

2) Ensure the necessary Force of Magnet field on right position:

Distance = 1,5 mm (from middle to middle of magnets)

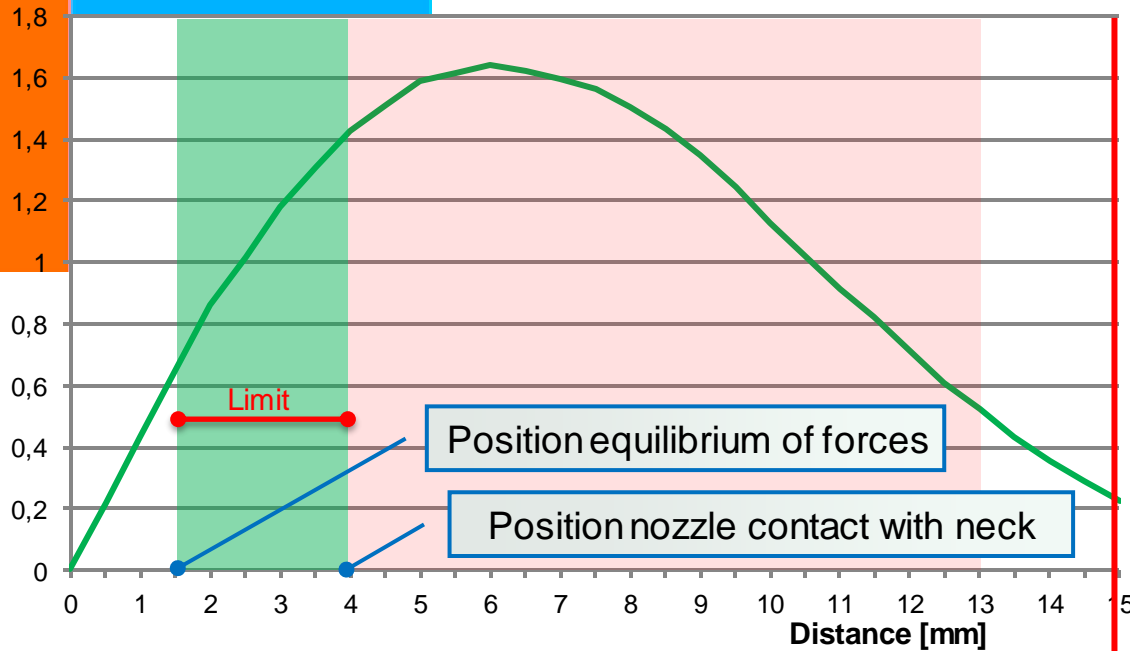
3) Ensure that the force at 1,5 mm is the same as the standard magnet

Stationary Magnet

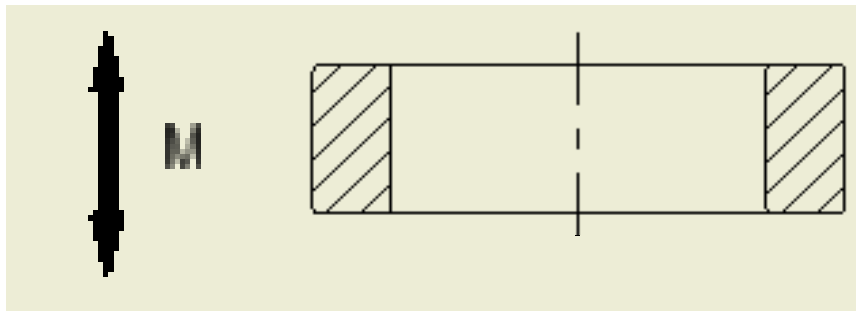


Force [N]

Force / axial distance diagram

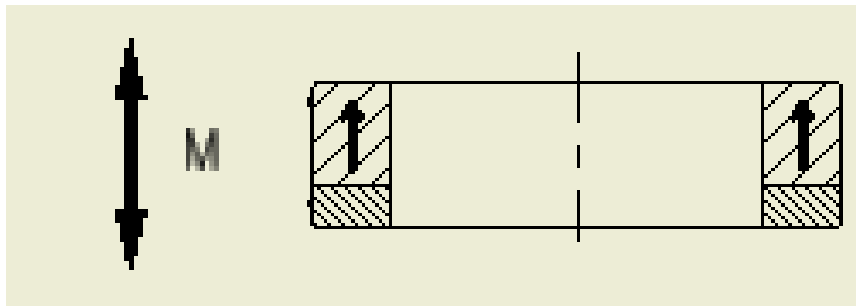


Magnet switch



Standard according ISO 22241:

Nd Fe B



Patented:

Hybrid Magnet

A combination of Nd Fe B magnetic material and ferromagnetic material

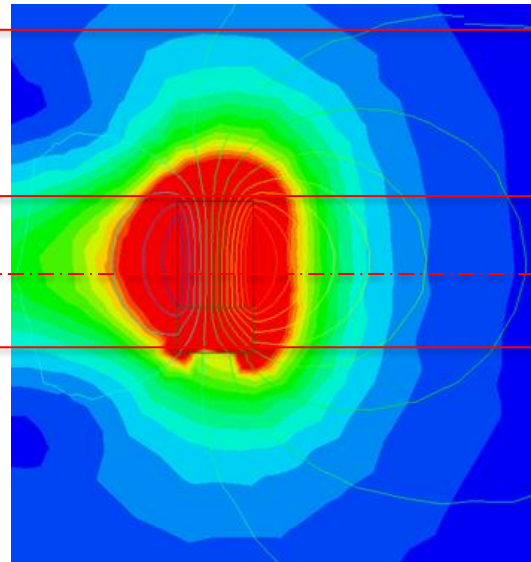
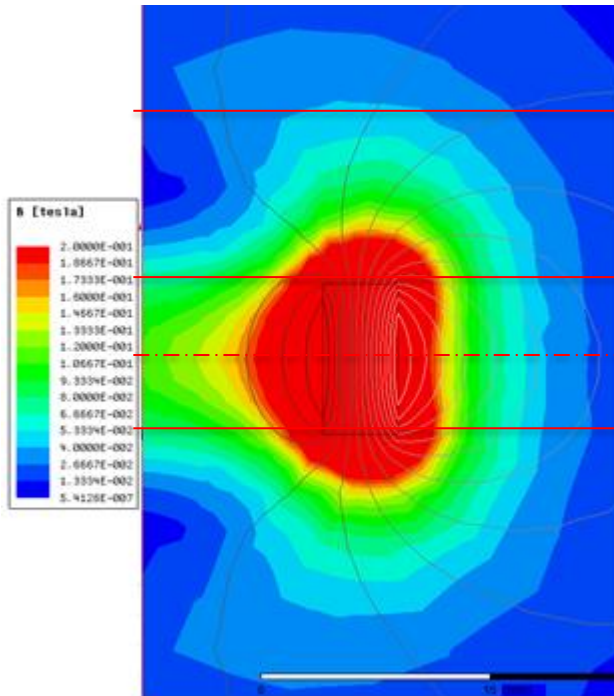
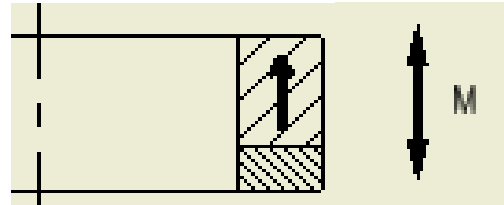
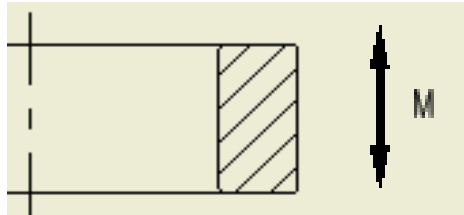
The Hybrid family



Available in 5 heights:

5, 6, 7, 8 and 9 mm.

Shown: Epoxy coated magnets
(AdBlue resistant)

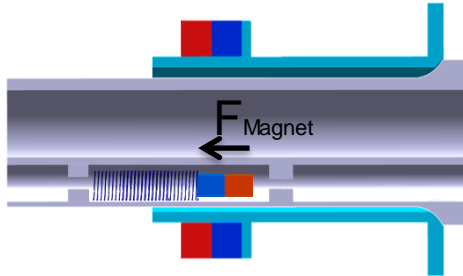
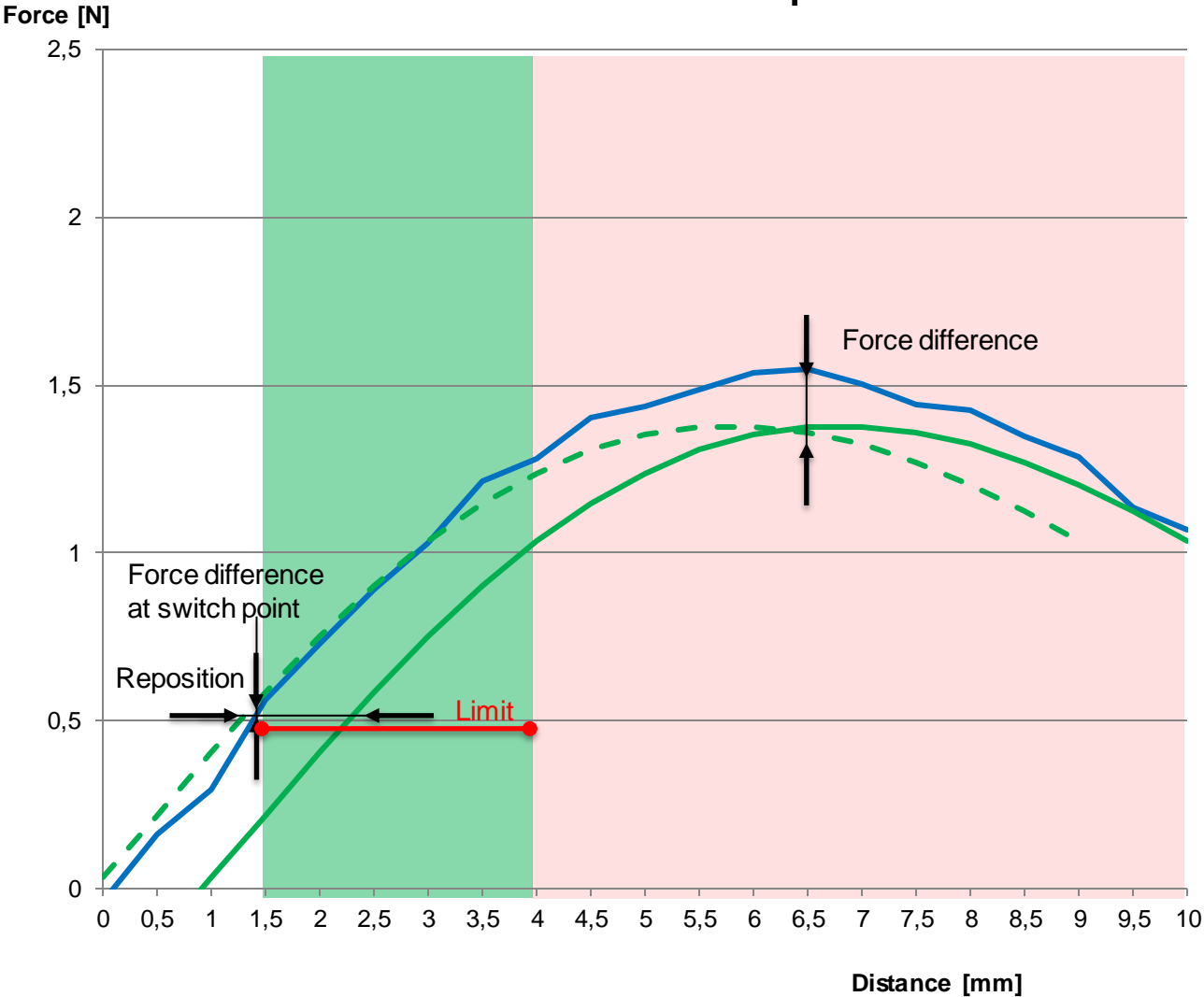


The magnetic field of a standard (ISO defined) magnet

The magnetic field of a Hybrid magnet

Both fields are almost equal but the magnet is much smaller. There are no losses at the lower side of the magnet.

Force comparison



- Standard Magnet
- 1. Bimetal (Nd+St) repositioned
- 1. Bimetal (Nd+St)

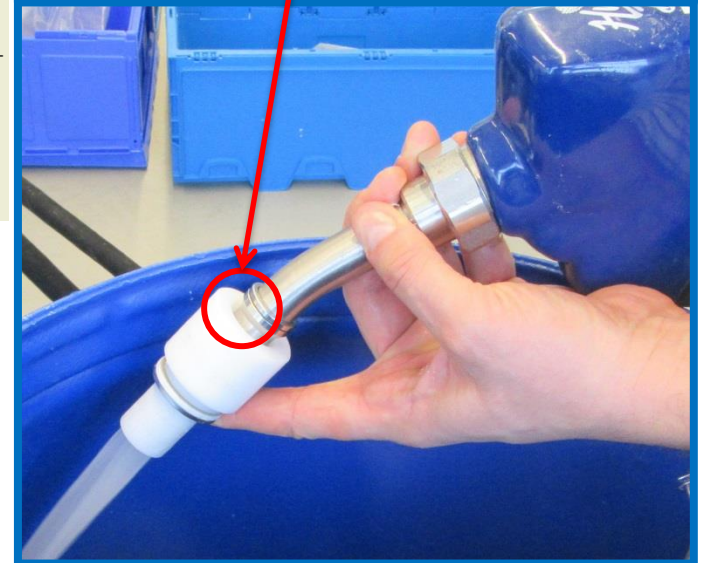
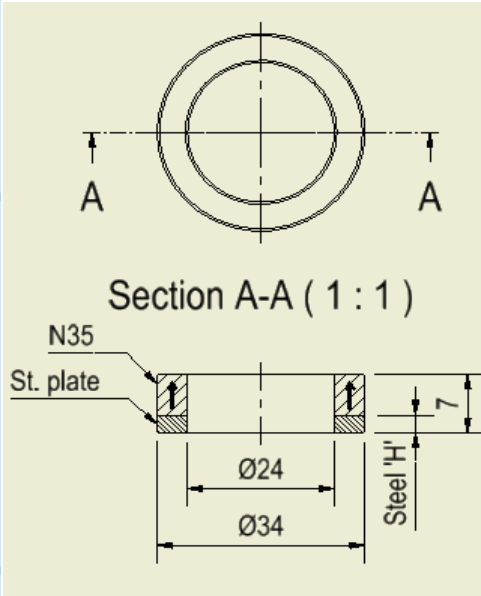
Elaflex



Piusi



Husky



The Hybrid Family



“Naked magnet” (NiCuNiEpoxy coated)
Outside diameter = 34 mm
Inside diameter = 24 mm
Heights from 5 to 9 mm

HDPE or POM overmoulded
Standard dimensions available
Tailored dimensions possible

The Advantages of the Hybrid Magnet

- 1- Cost advantage
 - Minus 45% compared to the current magnet
- 2- Weight advantage
 - Minus 30% compared to the current magnet
 - Minus 46% compared to ferrite
- 3- Fully compatible with ISO 22241-4
- 4- Stability at all conditions (temperature, opposite magnetic fields, vibrations)
- 5- Interaction with all available nozzles (worldwide) at all conditions.