



## Non-Evaporable Getter (NEG) Pumps at GAMMA VACUUM

# NEG pumps benefits

Non-evaporable getter (NEG) pumps operate with a non evaporable, compact getter material with a porous structure. Reactive gas molecules like nitrogen or oxygen adsorb on the surface of the getter material while hydrogen diffuses rapidly into it. Noble gases or methane are not pumped by NEG materials.

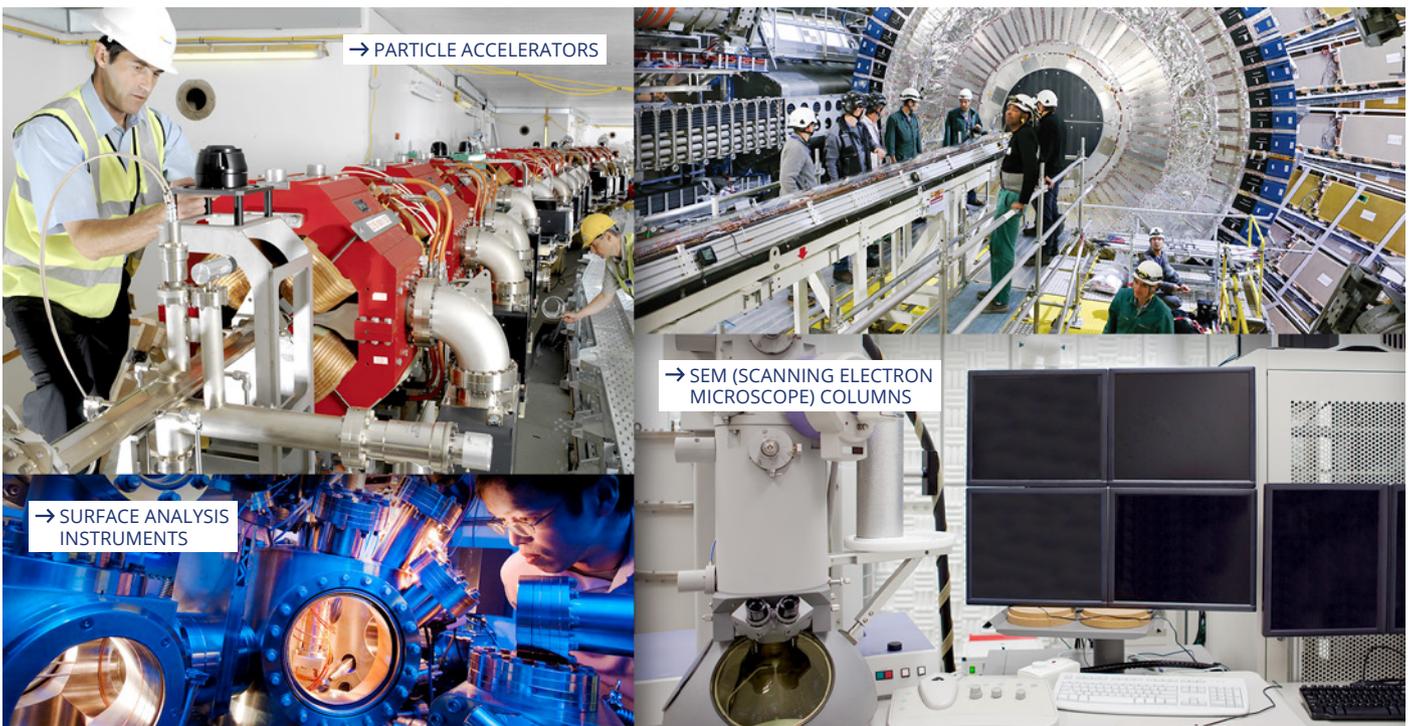
NEG pumps contain an electrical heater which is used for heating up the getter material after first installation or after saturation within the respective application. The heating step removes the reactive gas compounds from the surface and expels hydrogen from inside the getter material.

Between heating steps, the pump operates at room temperature without consumption of electrical energy. In UHV, hydrogen plays the dominant role and NEG pumps have a particularly high pumping speed for that.

Another great advantage is the absence of vibrations. Moreover, the getter materials consist of zirconium alloys which allow for hydrocarbon-free operation.



# NEG pumps applications



# Pressed NEG Discs vs. Sintered NEG Discs

GAMMA VACUUM offers two types of NEG pumps in the pumping speed range from 50 l/s up to 400 l/s: The NP series is based on pressed discs while the NS series uses sintered discs.

GAMMA's pressed NEG discs are made by cold-pressing getter alloy powder. The getter powder is obtained by grinding and milling the alloy blocks.

For the sintered discs, getter alloy powders are mixed with an appropriate evaporator granule. The mixture is then pressed into tablets and sintered subsequently. The granule will soon evaporate, leaving behind a network of holes and improving the accessibility of the reactive gas molecules to the getter material. Thus, the density of the sintered discs is much smaller while the porosity is larger. The porosity is the ratio of volume occupied by the holes to the total disc volume.

In general, less particles are emitted from sintered NEG discs. Their smaller density leads to a smaller sorption capacity but larger pumping speed with respect to the pressed discs. Our studies revealed that an iron skeleton is firmly holding the getter particles tight, so that the emission of getter particles into the vacuum chamber is strongly suppressed.



## Properties of NEG types

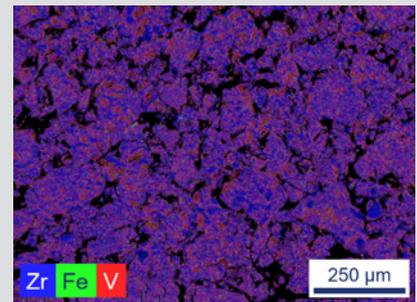
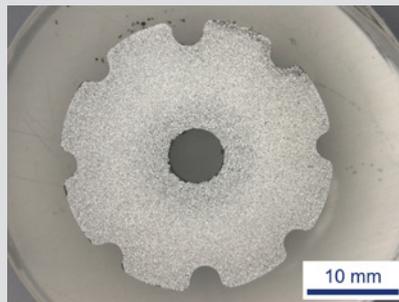
The use of either pressed or sintered discs will depend on the requirements of your specific application. Both types, use a Zirconium-Vanadium-Iron alloy with a slightly different composition. All Gamma NEG pumps are attached to a DN 40 CF (2.75" CF) flange.

The engraving on the flanges marks the pump series: NS (sintered) or NP (pressed).



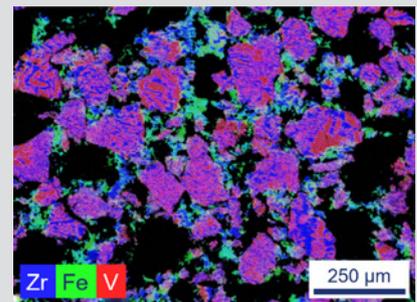
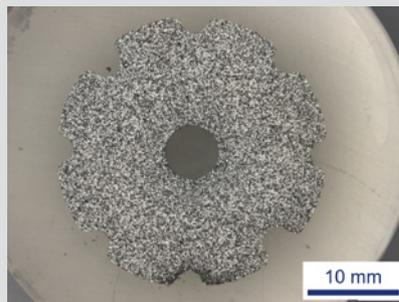
### Pressed disc

weight 4.5 g - Porosity 18%



### Sintered disc

weight 2.8 g - Porosity 50%



The properties of our NEG discs were investigated in detail with the help of the Fraunhofer IFAM in Bremen, Germany

# NEG PUMPS specifications

		50NP	100NP	200NP	300NP	400NP 410NP	50NS	100NS	200NS	300NS	400NS 410NS
Pumping Speed (l/s)*	H <sub>2</sub>	55	106	208	312	418	60	120	230	360	470
	CO	27	51	94	125	156	20	36	66	88	110
	N <sub>2</sub>	9	17	32	43	54	16	30	54	72	90
Sorption Capacity (torr-l)	H <sub>2</sub>	630	1170	2160	2880	3600	390	730	1300	1800	2200
	CO	0.1	0.2	0.4	0.6	0.8	0.05	0.09	0.16	0.21	0.26
	N <sub>2</sub>	0.03	0.07	0.14	0.20	0.27	0.02	0.04	0.08	0.10	0.13
Getter Mass (g)		31.5	58.5	108	144	180	20	36	67	90	110
Total Mass (kg)		0.48	0.54	0.75	0.80	0.85	0.47	0.52	0.71	0.75	0.78

\*Pumping speeds reference initial speed values at 25° C in exposed configuration

# NEG PUMPS ordering information

	Part number	Description
Pressed	50NP	NEG Pump, 50 l/s, Pressed Discs
	100NP	NEG Pump, 100 l/s, Pressed Discs
	200NP	NEG Pump, 200 l/s, Pressed Discs
	300NP	NEG Pump, 300 l/s, Pressed Discs
	400NP	NEG Pump, 400 l/s, Pressed Discs
	410NP	NEG Pump, 400 l/s, Pressed Discs, 4 Pins
Sintered	50NS	NEG Pump, 50 l/s, Sintered Discs
	100NS	NEG Pump, 100 l/s, Sintered Discs
	200NS	NEG Pump, 200 l/s, Sintered Discs
	300NS	NEG Pump, 300 l/s, Sintered Discs
	400NS	NEG Pump, 400 l/s, Sintered Discs
	410NS	NEG Pump, 400 l/s, Sintered Discs, 4 Pins

## Variances of Feedthroughs

The pumps 400NP and 400NS are equipped with a 3-pin feedthrough - just like 50NP, 100NP, 200NP, 300NP as well as 50NS, 100NS, 200NS, 300NS.

The pumps 410NP/410NS provide the same pumping properties like 400NP/400NS, but are equipped with an alternative 4-pin feedthrough.



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Read all safety instructions in the manual before usage.