

**alvatec**

*high-tech getters*  
for innovative vacuum solutions

# *alvatec* **TUBE GETTER®**

*High Sorption Capacity*  
*Low Activation Temperature*

## *Applications:*

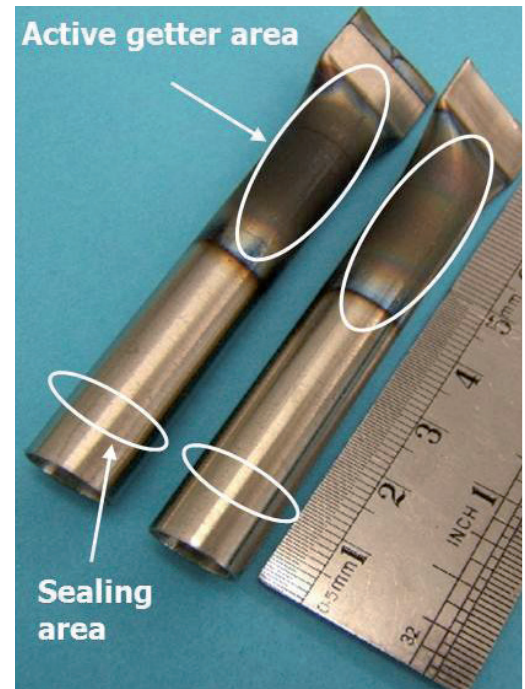
- VACUUM-INSULATED PIPE SYSTEMS  
(*Steam pipes, Solar receivers*)
- CRYOGENIC DEWARs
- MOBILE LH2 TANK SYSTEMS
- LIQUID GAS STORAGE SYSTEMS
- CRYO-COOLED CCD CAMERAS
- VACUUM PROTECTION IN UHV SYSTEMS
- INFRARED DETECTOR DEWARs

## 1. Technology

Current „Non evaporable getters“ (NEGs), based on the principle of metallic surface sorption of gas molecules, are mostly porous alloys or powder mixtures of Zr, Ti, Al, V and Fe. They are important tools for improving the performance of many vacuum systems. But the main sorption parameters of the current NEGs, like pumping speed and sorption capacity, have reached their limits, and thus, the continuous development of vacuum technologies has created new challenges for the field of getter materials. Sorption capacity of other sorbents like molecular sieves or charcoal is temperature-dependent and they need cryogenic temperatures for a high performance. The functionality of these cryo-sorbents are limited by the fact that the sorption capacity for H<sub>2</sub> is extremely weak. Chemically active metals are the basis of a new generation of high capacity NEGs. These active materials enable a new generation of NEGs to reach faster pumping speeds, sticking rates and sorption capacities.

The pumping speed and sorption capacity of our ATG® according to ASTM standard F 798-97 (2002):

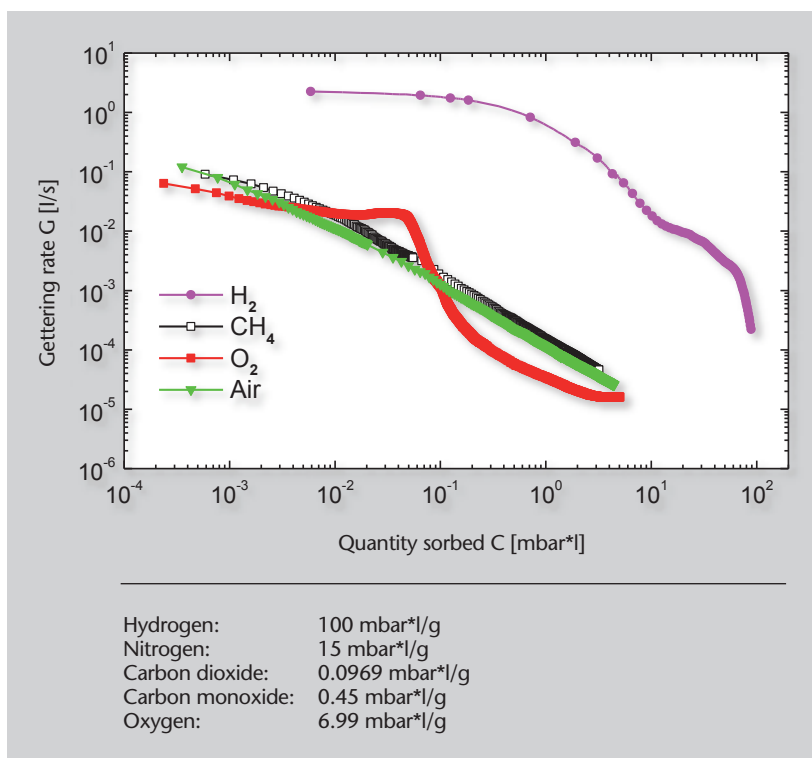
The test itself was carried out at room temperature and a pressure at 10<sup>-6</sup> mbar. With the ATG® gettering solution we have greatly exceeded the current limit of sorption capacity at room temperature. It is an excellent solution for sealed-off vacuum devices which require vacuum levels to be maintained in the range lower than 10<sup>-5</sup> mbar over extended periods of time.



ATG with indium sealing



Nanostructured Ba layers ensure huge sorption surface

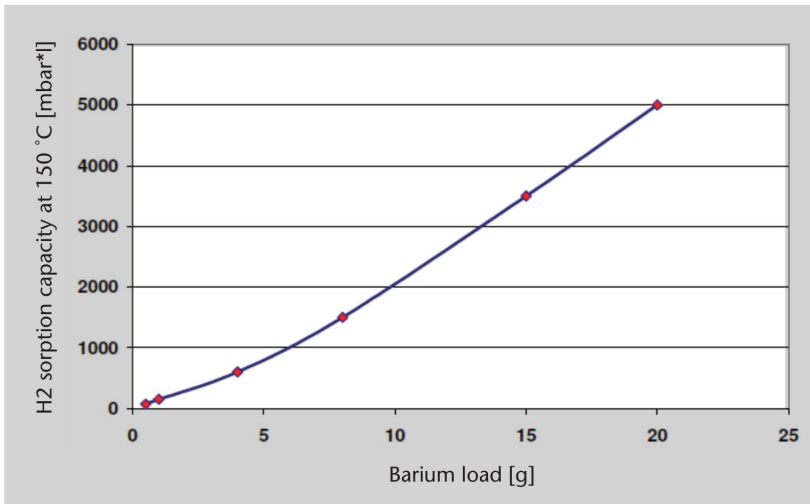


Gettering rate G [l/s] versus quantity sorbed C [mbar\*l] for the ATG®

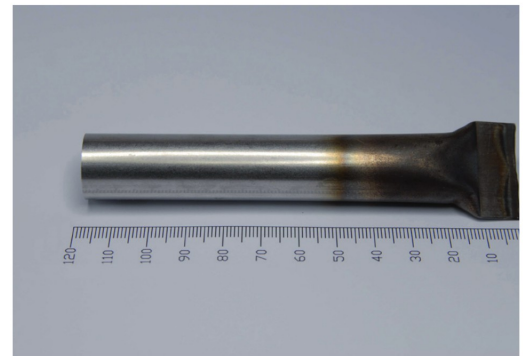


## 2. Design and scalability

The design of the Tubegetter is flexible and the sorption capacity can be adjusted by the Barium amount.



ATG 12\_80



ATG 12\_120

## 3. Configuration Table

The following table gives an overview of our standard getter types. Nevertheless the design of our Tubegetters is very flexible. Tubegetters with other capacities or a customized design are available on request.

PRODUCT CODE	diameter [mm]	length [mm]	particle mesh / swagelock adapted	capacity H2 [mbar*l]
ATG-8-75-003-01	8 mm	75±5 mm	no/no	100
ATG-12-85-004-01	12 mm	85±5mm	no/no	200
ATG-12-95-005-01	12 mm	95±5mm	no/no	300
ATG-8-90-006-01	8 mm	90±5mm	yes/no	100
ATG-12-100-007-01	12 mm	100±5mm	yes/no	200
ATG-12-110-008-01	12 mm	110±5mm	yes/no	300
ATG-8-95-009-01	8 mm	95±5mm	no/yes	100
ATG-12-105-010-01	12 mm	105±5mm	no/yes	200
ATG-12-115-011-01	12 mm	115±5mm	no/yes	300
ATG-8-110-012-01	8 mm	110v5mm	yes/yes	100
ATG-12-120-013-01	12 mm	120±5mm	yes/yes	200
ATG-12-130-014-01	12 mm	130±5mm	yes/yes	300
ATG-16-120-015-01	16 mm	120±5mm	yes/no	500
ATG-18-120-002-01	18 mm	120±5mm	no/no	1000

## 4. Handling and mounting

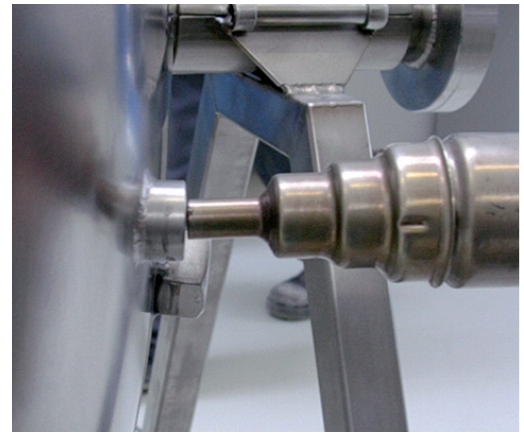
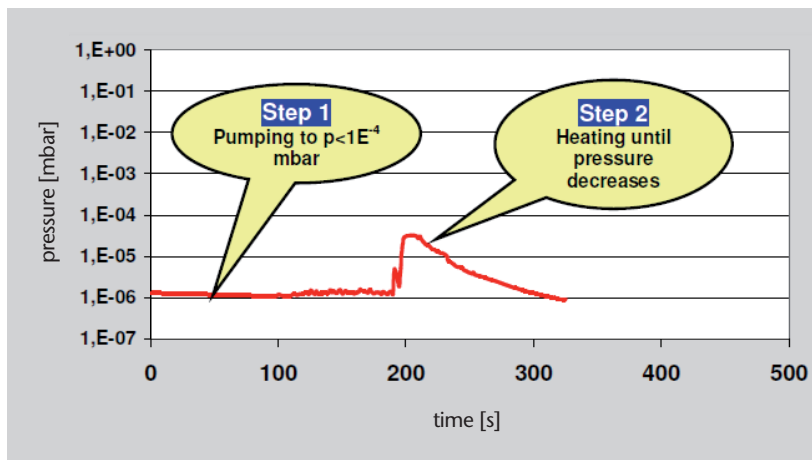
The ATG® can be safely handled and mounted in ambient air conditions. All of our ATGs® are vacuum baked-out, so we recommend touching them only with latex gloves. Cotton gloves should be avoided. The indium sealing must not be damaged either mechanically or thermally before the usage of the ATG®.

The ATG® can be mounted either inside the vacuum chamber or at the outside connected by e.g. swage lock connection. In either way a proper heat transfer for the activation process must be provided.

## 5. Activation and getting process

The activation process is easy and comprises two steps which can be easily monitored by measuring the total pressure.

1. Pumping down to a pressure lower than  $1E^{-4}$  mbar.
2. Heating the sealing area to ca.  $200^{\circ}\text{C}$  ( $392^{\circ}\text{F}$ ) until the pressure decreases.



ATG® – Mounting possibilities

## 6. Degassing

There is no special degassing necessary. However, the ATG® sealing withstands a bake-out procedure of max 120°C. On request the melting temperature of the sealing can be increased.

## 7. Working temperature of ATG®

The working temperature of the ATG® starts from the cryo-range up to 500°C at 10<sup>-4</sup> mbar. In the region below -200°C the reaction speed and the gas movement is very low, therefore the pumping speed is also weak, but there is no limitation of the total capacity.

## 8. Packaging, Labeling and Storage

ATG®s are shipped in labelled cans under argon atmosphere. After the first opening of the can we strongly recommend to store the ATG®s in dry and cool atmosphere, preferably under nitrogen or argon. Provided that storage conditions are as described above, the shelf life of our sources can be several years.

## 9. Environmental issues

After usage, the ATG® can be easily neutralized with sulfuric acid. The resulting barium sulfate is non-toxic and can easily be disposed. Please also see local and national regulations for proper disposal of alkali and alkali earth metals as well as for proper disposal of other alloying agents (e.g. In). Further information is provided in our material safety data sheets (MSDS).

## 10. Frequently asked questions

### **Are ATGs® RoHs-compliant?**

*Yes, all ATG® types do not contain any Cd, Hg, Pb or Cr(VI)*

### **How does the ATG® work?**

*Barium nano-layers bind residual gases chemically to solid Barium compounds.*

### **Do I have to evaporate alkali metal to activate the getter?**

*No, the Ba in the ATG® is pre-evaporated. It works as a NEG.*

### **What is the working temperature of ATG®? Are there any limits?**

*The ATG® works in a broad temperature range. There are no limits in the cryo-range. The vapour pressure of Ba limits the usage in UHV/XHV conditions to a temperature of 400°C~500°C.*

### **Does the ATG® also work in UHV/XHV conditions?**

*Yes, due to enormous H<sub>2</sub> sorption capacity the ATG® is predestined to work in UHV/XHV conditions by gettering the H<sub>2</sub> back-flow.*

### **Does the ATG® absorb noble gasses?**

*No, there is no reaction with any noble gas.*

### **How is the activation process of ATG®?**

*The ATG is thermally activated.  $T > 160^{\circ}\text{C}$  must be applied to the Indium sealing area for a few minutes at  $p < 1\text{E}^{-4}$  mbar.*

### **How can I be sure that the getter is activated?**

*This can be easily monitored by the total pressure. The pressure increases during the heating process and instantly decreases when the Indium sealing is melted and the getter is active.*

### **Does the indium sealing flow out when the ATG® is activated?**

*No, the indium sealing melts and remains in the tube.*

### **Does the ATG® need to be degassed?**

*The ATG® does not need to be degassed. However, a maximum bake-out temperature of 120°C is possible.*

### **Can ATG®s be regenerated after usage?**

*No, an already used ATG® can not be regenerated.*

### **Once activated, can the ATG® be exposed to air?**

*No, it should not be exposed to air otherwise the ATG® is saturated very quickly.*

### **Do you provide alternative geometrical designs of ATG®?**

*Yes, we provide various diameters, lengths and capacities. Please contact us.*

### **How do I store the getter? What is the shelf time of ATG®?**

*The ATG® can be stored under ambient air conditions, but as it is a vacuum component, we recommend storing it under dry, inert gas atmosphere (N<sub>2</sub>, Ar). The shelf time can be several years at recommended storage conditions.*



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