



**Grouting equipment for  
professional sealing**

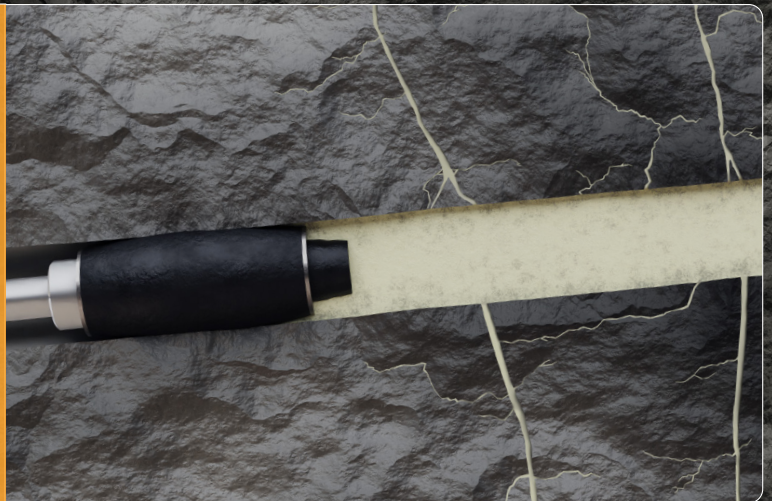




## About injection

Grouting involves filling a crack or cavity in the bedrock with some type of sealing material.

Grouting is done to prevent water flows and drainage of groundwater. Common applications are, for example, in the construction of tunnels and caverns.





# Injection prevents drainage of groundwater

In order to prevent water leakage during the construction and usage of tunnels and rock caverns, pre-injection and, if necessary, post-injection is carried out. Long holes are drilled in a circle around the tunnel profile, after which a mixture of cement and water, under high pressure, is forced through the drillholes and into the natural cracks in the rock. When the cement hardens, the rock around the future tunnel seals. GMA has the necessary equipment.

In order to pump cement paste through the drillholes into the rock fractures, the holes must be plugged so that a high pressure can be built up. Sealing is done using packers that are placed in the drillholes and expanded to form a seal.

Packers are usually applied to an injection pipe to tighten it up and allow cement mixture to be pumped in.

## GMA HAS WHAT IT TAKES

GMA has long experience in injection systems. We develop, produce and market a wide range of packers and injection-pipes along with the necessary accessories.

The starting point is a strong and well-thought-out basic program, with great variation in terms of size and design. We also create special solutions based on unique customer requirements. For us, special is standard!



### COMPRESSIBLE PACKERS

Disposable packers, reusable packers, plugs and open disposable packers.



### INJECTION PIPES

Manual and mechanical injection pipes for low and high pressure packers.



### INFLATABLE PACKERS

Inflatable packers in reusable or single use versions in a variety of dimensions.



### SPECIAL/ACCESSORIES

Special packers and pipe-designs and all necessary accessories.

## Compressible packers

Compressible packers expand because they are axially compressed. When the rubber in the packer expands the packer's diameter increases.

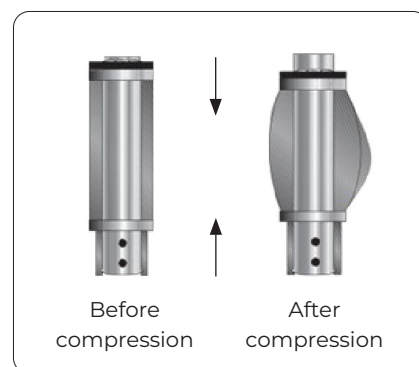
Compressible packers are available in several types and designs.

Our program includes *single-use packers (disposable packers)*, packers that are left in the drillholes after the injection is completed and these packers are equipped with different types of check valves and lock washers. The single use packers are also available in an open model.

The range also includes *reusable packers* - packers that are removed from the drillhole after injection and which do not have a check valve and lock washer.

The choice of packer is based on the injection pressure for which the packer is intended. GMA provides *low or high pressure packers* where the difference lies in the lock washers used (what pressure the packer can withstand without the injection pipe being connected).

The GMA program also includes compressible packers for special purposes, such as high pressure packers with additional mechanical locking, and/or high flow rates.



### Compressible packers



Disposable packers – GX/GX Mini  
Part.no 80008XX



Disposable packers – C/C Mini  
Part.no 80007XX



Reusable packers – GU  
Part.no 80005XX



Open disposable packer  
C Open/C Mini Open  
Part.no 80007XX-Open

XX = Drill hole size (mm)



Disposable plug  
GX Plug  
Part.no 80008XX-Plug

#### LOW PRESSURE / HIGH PRESSURE



LOW PRESSURE  
Injection pressure  
< 65 Bar



HIGH PRESSURE  
Injection pressure  
> 65 Bar



## Compressible packers

Other dimensions available on request

Drill hole Ø <i>mm</i>	Injection pipe <i>Inch</i>	Sealing aperture <i>mm</i>	Single use <i>GMA model code</i>	Single use High pressure <i>GMA model code</i>	Reusable <i>GMA model code</i>
28	3/8"	27,5-30	GX-mini <sup>2</sup>		GU
30	3/8"	29,5-32	GX-mini <sup>2</sup> + C-mini <sup>3</sup>		GU
32	3/8"	31,5-34	GX-mini <sup>2</sup> + C-mini <sup>3</sup>		GU
34	3/8"	33,5-36	GX-mini <sup>2</sup> + C-mini <sup>3</sup>		GU
36	3/8"	35,5-38	GX-mini <sup>2</sup> + C-mini <sup>3</sup>		GU
38	1/2"	37-40	C <sup>2+3</sup>		GU
41	1/2"	40-44	C <sup>2+3</sup>		GU
45	1/2"	44-47	GX <sup>2</sup> + C <sup>3</sup>		GU
48	1/2"	47-50	GX <sup>2</sup> + C <sup>3</sup>	GXHD + C-HD <sup>3</sup> / CS <sup>3</sup>	GU
51	1/2"	50-53	GX <sup>2</sup> + C <sup>3</sup>	GXHD + C-HD <sup>3</sup> / CS <sup>3</sup>	GU
54	1/2" <sup>1</sup>	53-56	GX <sup>2</sup> + C <sup>3</sup>	GXHD + C-HD <sup>3</sup> / CS <sup>3</sup>	GU
57	1/2" <sup>1</sup>	56-59	GX <sup>2</sup> + C <sup>3</sup>	GXHD + C-HD <sup>3</sup> / CS <sup>3</sup>	GU
60	1/2" <sup>1</sup>	59-62	GX <sup>2</sup> + C <sup>3</sup>	GXHD + C-HD <sup>3</sup> / CS <sup>3</sup>	GU
63	1/2" <sup>1</sup>	62-65	GX <sup>2</sup> + C <sup>3</sup>	GXHD + C-HD <sup>3</sup> / CS <sup>3</sup>	GU
66	1/2" <sup>1</sup>	65-69	GX <sup>2</sup> + C <sup>3</sup>	GXHD + C-HD <sup>3</sup> / CS <sup>3</sup>	GU
70	1/2" <sup>1</sup>	69-75	GX <sup>2</sup> + C <sup>3</sup>		GU
75	1/2" <sup>1</sup>	74-79	GX <sup>2</sup> + C <sup>3</sup>		GU
80	1/2" <sup>1</sup>	79-84	GX <sup>2</sup> + C <sup>3</sup>		GU
85	1/2" <sup>1</sup>	84-89	GX <sup>2</sup> + C <sup>3</sup>		GU
90	1/2" <sup>1</sup>	89-94	GX <sup>2</sup> + C <sup>3</sup>		GU
95	1/2" <sup>1</sup>	94-99	GX <sup>2</sup> + C <sup>3</sup>		GU
100	1/2" <sup>1</sup>	99-104	GX <sup>2</sup> + C <sup>3</sup>		GU
105	1/2" <sup>1</sup>	104-109	GX <sup>2</sup> + C <sup>3</sup>		GU
110	1/2" <sup>1</sup>	109-114	GX <sup>2</sup> + C <sup>3</sup>		GU
115	1/2" <sup>1</sup>	114-119	GX <sup>2</sup> + C <sup>3</sup>		GU
120	1/2" <sup>1</sup>	119-124	GX <sup>2</sup> + C <sup>3</sup>		GU
125	1/2" <sup>1</sup>	124-129	GX <sup>2</sup> + C <sup>3</sup>		GU
130	1/2" <sup>1</sup>	129-135	GX <sup>2</sup> + C <sup>3</sup>		GU

1: 1" packer pipe on request    2: Closed model, plug/blindpacker, available, item nr: 80008mm-plug

3: Open model available with C-check-valve, item nr: 80007mm-Open

## Injection pipes

GMA offers manual injection pipes for mounting with a handle, mechanical injection pipes for mounting with a wrench or nutrunner and injection pipes for inflatable packers (not in picture).

Injection pipes for compressible packers are selected based on whether the pipes will be used for *high pressure packers* or *low pressure packers*. GMA supplies injection pipes in standard lengths from 0.6m to 6m. Other lengths on request.



### Manual injection pipe

GMA Models	Inner tube <i>Inch</i>	Opening <i>mm</i>
80020XX-3/8"	3/8"	12,6
80020xx	1/2"	14,8
80020xx-1"	1"	27,3

XX = Length pipe in dm



### Mechanical, low pressure

GMA Model	Inner tube <i>Inch</i>	Opening <i>mm</i>
80010xx	1/2"	14,8



### Mechanical, high pressure

GMA Model	Inner tube <i>Inch</i>	Opening <i>mm</i>
80010xxHD	1/2"	14,8



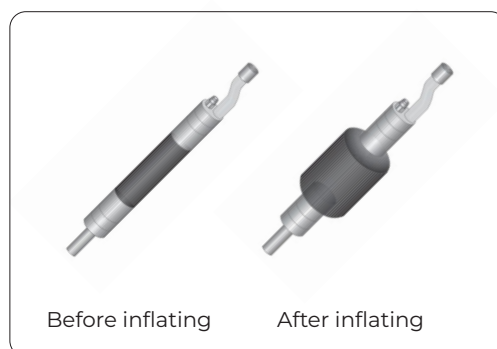
## Inflatable packers

Inflatable packers expand by pushing liquid into the reinforced rubber hose causing the diameter of the packer to increase. Inflatable packers comprise two main groups, *reusable* and *single use* packers.

Inflatable packers have a larger work span compared to compressible ones in terms of hole size but have limitations in terms of maximum injection pressure. The type of reinforcement in the rubber hose - textile or steel - also affects the wear resistance and working range of the packer in terms of diameter and injection pressure.

In general, it is important to choose a packer size as close to the drillhole's diameter as possible but which can be installed without problems.

It is also noteworthy that most inflatable packers, both single use and reusable, can be delivered in aluminum.



### Reusable inflatable packer

The *reusable packer* is expanded by pumping liquid through its own connection to the packer which will expand the packer.

The same liquid can, after completion of the injection be released from the packer so the packer returns to its original size and it can be moved or removed in the drillhole.



Other dimensions available on request

GMA model	Sealing aperture mm	Max inflation pressure <sup>2</sup> bar	Center tube Ø (outside thread) mm	Grout connection
853-35-50-500 <sup>1</sup>	35-50	90-60	10 x 1	G 1/2"
853-40-55-600 <sup>1</sup>	40-55	70-50	16 x 2,5	G 1/2"
853-45-80-600 <sup>1</sup>	45-80	100-50	16 x 2,5	G 1/2"
853-54-100-600 <sup>1</sup>	54-100	120-40	20 x 2,5	G 1/2"
853-60-120-600 <sup>1</sup>	60-120	100-30	20 x 2,5	G 1/2"
853-83-150-600 <sup>1</sup>	83-150	70-20	30 x 3	G 1"
853-105-200-800 <sup>1</sup>	105-200	80-20	30 x 3	G 1"
853-150-220-800 <sup>1</sup>	150-220	60-15	40 x 3	G 1"

1: Effective inflation length

2: Depending on Ø, decrease with increased Ø

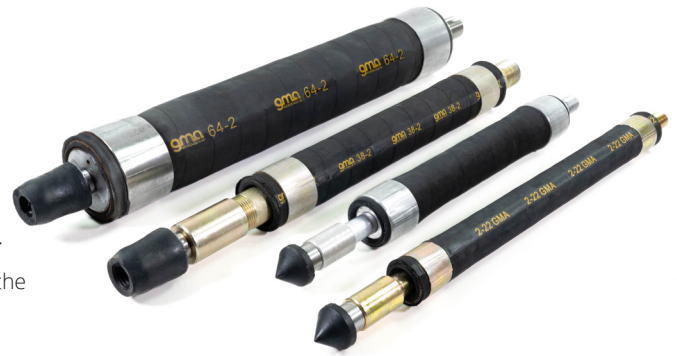


## Single use inflatable packer

The *single use packer* is expanded by pumping liquid into the packer via the injection pipe. An internal pop-off valve and an internal membrane control the size increase of the packer.

When the packer has reached the desired size and pressure the pop-off valve opens and the internal membrane closes.

Injection can then be carried out and the packer remains in the drillhole after injection.



Other dimensions available on request

GMA model	Sealing aperture mm	Max inflation pressure <sup>2</sup> bar	Center tube Ø (outside thread) mm	Grout connection
855-40-80-300 <sup>1</sup>	40-80	120-40	20x4	M20x1,5
855-45-80-300 <sup>1</sup> -Alu*	45-80	80-30	25x5	G1/2" inside
855-55-90-270 <sup>1</sup>	55-90	70-50	34x5	G 1"
855-55-90-270 <sup>1</sup> -Alu*	55-90	80-50	20x3	M20x1,5
855-85-130-400LP <sup>1</sup>	85-130	70-30	30x3	M30x2
855-85-130-400HP <sup>1</sup>	85-130	100-50	30x3	M30x2

1: Effective inflation length

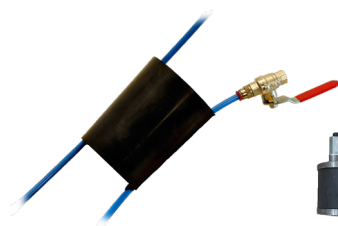
2: Depending on Ø, decrease with increased Ø

\*Aluminum version drillable

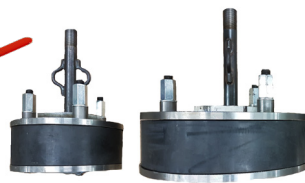
## At GMA, special is standard

Special packers, plugs, mechanical constructions, GMA designs and manufactures what you need. One-off products, small series or continuous production, all according to the customer's demands.

### Examples of special packers



Spiling packer



Plug



SDA Packer Tool



Hyd. packer

### Examples of accessories



Chemical mixer



HP Quick coupling



Y-connection



Grouting hose



# Rocky problems - solid solutions

Finding simple solutions to difficult problems, perhaps that's what our business is all about. GMA develops, manufactures and markets new, innovative solutions to complex problems. Solutions that simplify and improve your work environment as well as economy with the least possible environmental impact.

The collaboration often takes place in close dialog with you as a customer. We listen carefully to your ideas and develop products that will meet your requirements. Development and production take place under the same roof which makes us fast and flexible both for serial deliveries and for finding solutions to complex problems.

Knowledge and solid experience have given GMA a leading position as a supplier of technology and products for tunneling, rock excavation and mining with projects both in Scandinavia and the rest of the world.

We produce complete solutions for *injection* and *rock reinforcement*.



## RELATED PRODUCTS

### Strong in rock reinforcement

In addition to our injection program, we offer a well thought-out range of proprietary products for rock reinforcement.

Thorbolt, GMA's patented solution for efficient installation of rock reinforcement in leaking drillholes. Thorbolt is supplied in a variety of lengths, dimensions and variants adapted for rebars or rock bolts with R-threads.

GMA offers both our own dynamic rock bolt called GE bolt as well as production according to our customers' demands and requirements.

GMA today has one of Europe's most modern and flexible factories for producing rock bolts and has manufactured more than 3 million rock bolts for customers all around the world.

Varying lengths, anchor designs, bolt dimensions and threads can be provided. With its own production of dome plates in a variety of models as well as a large program of nuts, spherical washers and wedges, GMA becomes a complete rock bolt supplier.

Thorbolt®



Dynamic rock bolt



GE bolt



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