Geopro

S.A.

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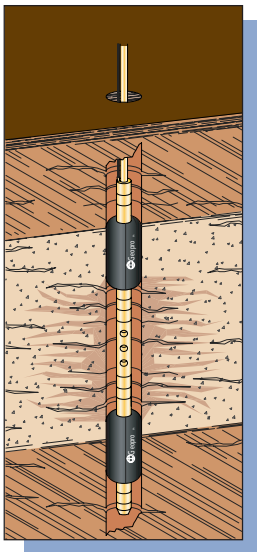
BIMBAR INFLATABLE PACKERS

PRODUCTS, SYSTEMS AND SERVICE



Geopro is an independent company specializing in the design and manufacture of inflatable packers made of BIMBAR dilatable hose.
The staff mainly composed of engineers, geologists and technicians has as its main concern technical improvement and constant product innovation. With such a policy, Geopro has positioned itself among the leaders in the inflatable packers industry.

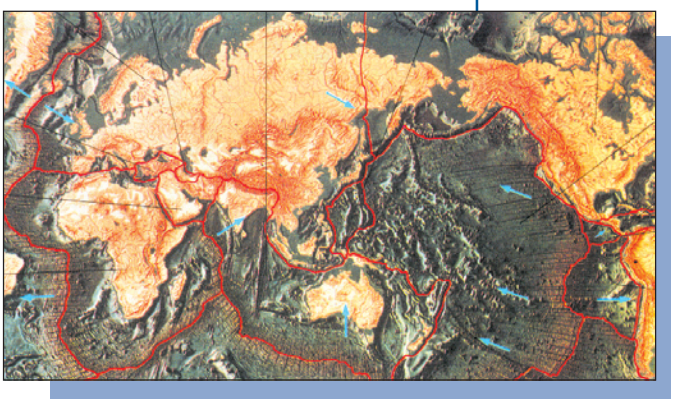
A dynamic team, our driving force

Activity

Thanks to its extended BIMBAR packers range, Geopro can rapidly respond to any particular customer's request. Bridges, dam construction, tunnels excavation are projects which all require the injection of cement under pressure. The packer is an important and reliable element in this procedure. Our BIMBAR inflatable packers can effectively isolate a borehole section and apply cement grouting under pressures of several dozens of bar.

The packer, our know-how

Network



Today, Geopro has extended its geographical coverage to over 65 countries, strengthening its international commercial network of agents and customers.
Our high-quality manufacturing process and products are trusted in countries such as Japan, Thailand, Canada and the United States of America.

An international network, our commercial force

Edition 12/2005

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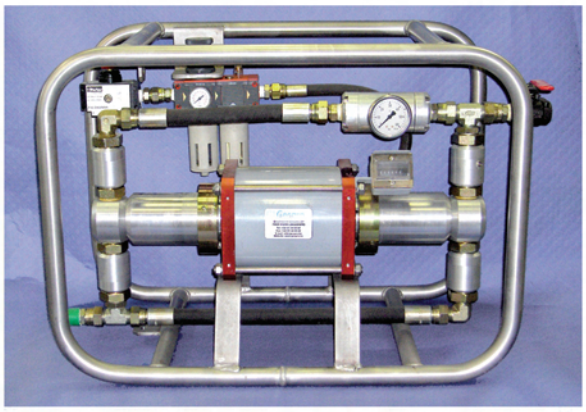

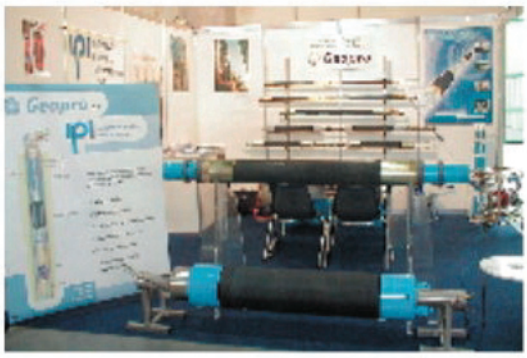

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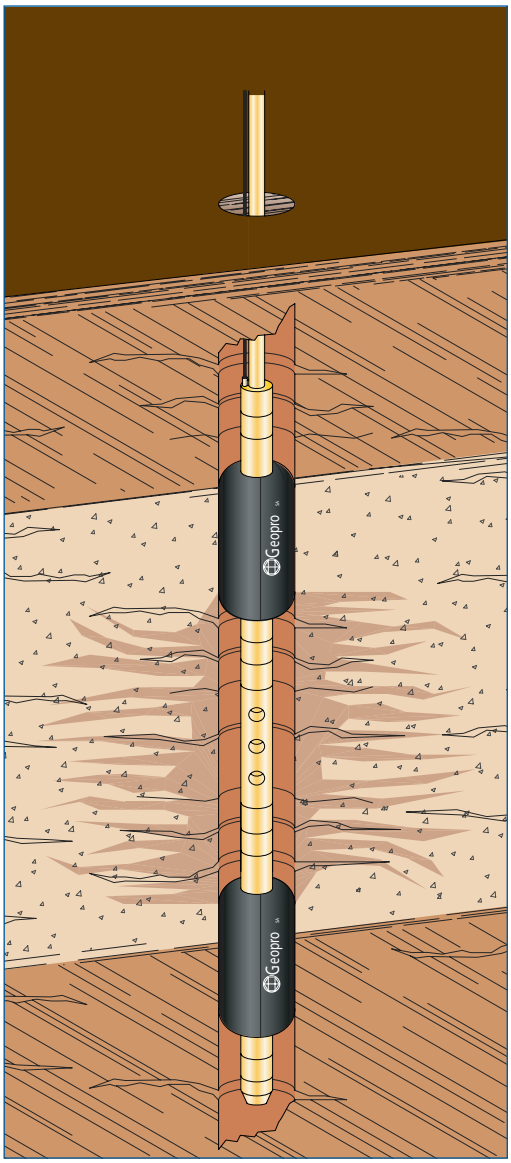
Inflatable packers BIMBAR : introduction



Geopro manufactures and supplies worldwide a complete range of inflatable packers available in nine different diameters from ø 28 mm to 170mm. All our packers' inflatable elements of BIMBAR* technology, are reinforced with two layers of steel cables embedded in natural rubber.

The deflated packer is lowered into the drilled bore-hole. The packer is then inflated with neutral gas or liquid injected through an inflation line. A bore-hole section is thus isolated and hydrological tests or cement grouting works can be conducted in this area.

Thanks to their modular design, all Geopro packers offer reliable and easy operation. Inflatable elements can be replaced in the field and single packers are easily adapted into double packers.

Some typical applications are:

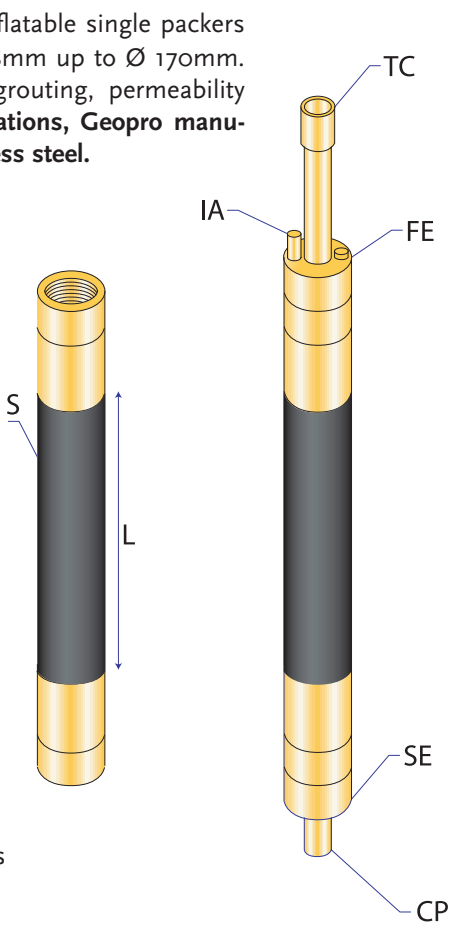
- "tube à manchettes" grouting,
- rock grouting,
- permeability testing,
- bore-hole fluid sampling,
- bore-hole wall impression testing,
- hydraulic fracture testing,
- industrial piping hydro-testing,
- water wells repair,
- aquifers monitoring.

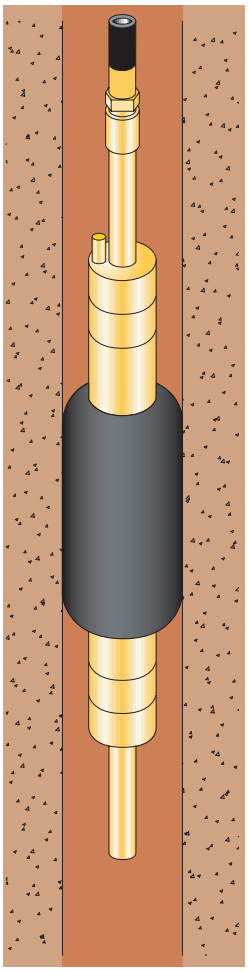
In addition to Geopro standard packers range, our technical staff are continually researching and developing new packers and related systems, always working in close cooperation with our customers to meet their specific needs.

* BIMBAR is a registred mark of Trelleborg Industries SA.

Inflatable single packers BIMBAR (28 – 170 mm)

Geopro manufactures a complete range of inflatable single packers available in nine different diameters from Ø 28mm up to Ø 170mm. These packers are mainly used for cement grouting, permeability testing... **For monitoring and hydrology applications, Geopro manufactures also these packers fully made of stainless steel.**





The basic components of the packers are :

- **The upper fixed end (FE)** equipped with one or two inflation inlets with one adapter.
- **The center pipe (CP)**, made of stainless steel
- **The dilatable element (S)**, mounted with steel fittings on both sides
- **The sliding end (SE)**, equipped, up to Ø 102mm, with a scraper ring.

All Geopro packers are supplied with **inflation adapter IA (quick coupling type).** Cutting ring coupling are also available on request.

The length (L) of the dilatable element depends on the application requirements.
Standard lengths are :

- **L : 300mm** for Ø 28,30 and 42mm packers.
- **L : 500mm and 1000mm** for Ø 28,30, 42, 56, 72, 85 and 102mm packers.
- **L : 1000mm** for Ø130 and 170mm packers.

Other lengths are also available on request. These single packers can be easily transformed into ZI double packer

Main specifications and dimensions of single and double packers

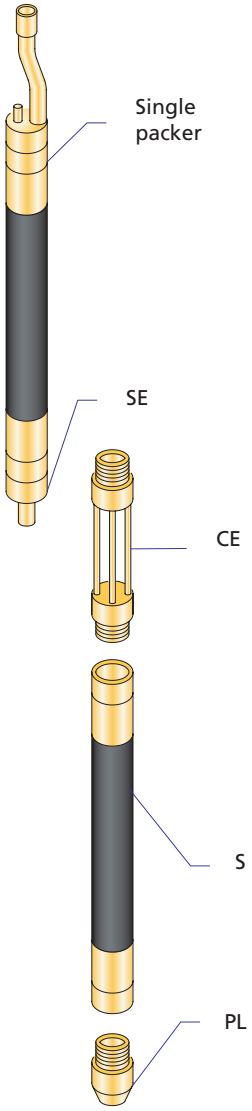
Nominal diameter (mm)	Connection upper "TC"	Central tube "CP" Inner diameter (mm)	Expansion max. Diameter (mm)	Bore-hole max. diameter (mm)	Inflation Inlet(s)
28	3/8" BSP *	8	55	50	1X 1/8" BSP
30	3/8" BSP	8	55	50	1X 1/8" BSP
42	1/2" BSP	17	98	90	2X 1/8" BSP
56	3/4" BSP	20	125	110	2X 1/8" BSP
72	1" 1/4 BSP	35	160	150	2X 1/8" BSP
85	1" 1/4 BSP	35	185	170	2X 1/8" BSP
102	2" BSP	53	200	190	2X 1/8" BSP
130	3" BSP	83	270	240	2X 1/4" BSP
170	3" BSP	83	350	330	2X 1/4" BSP

* Optional 1/4" connection available on request

All dimensions and characteristics are indicative only and may be modified without prior notice.

ZI double inflatable Packers BIMBAR (28-170mm)

Ø 28, Ø 30, Ø 42



Each single packer from Ø 28mm to Ø 170mm can easily be transformed into a double packer assembly by adding a specific element : the central element CE. Just unscrew the sliding end from the single packer and replace it with the CE element. Complete the installation by screwing a standard inflatable element S (sleeve) and a plug PL on the lower part of the packer.

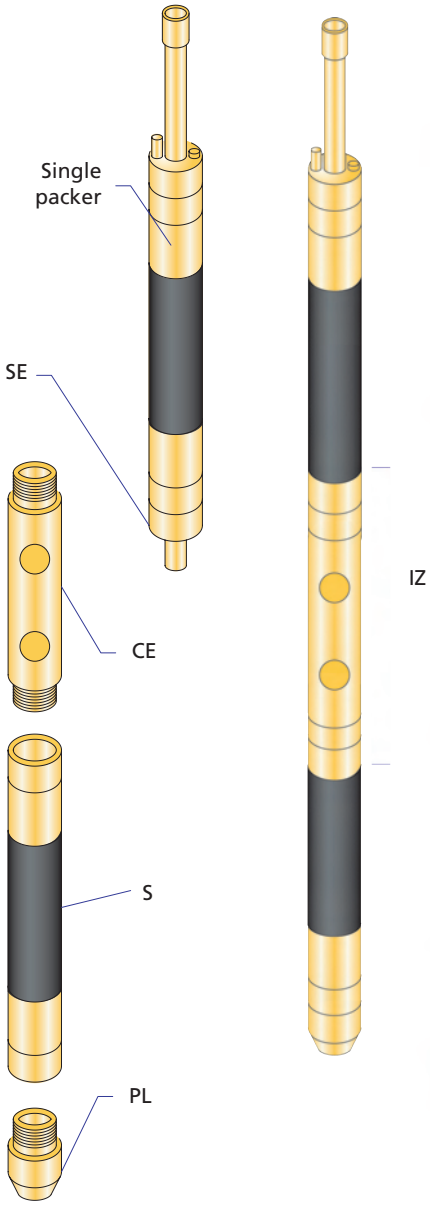
The perforated CE central element from Ø 56mm to Ø 170mm consists of a compact and perforated tube, with a diameter identical to the whole packer assembly. This design makes the double packer ZI extremely robust and the external flush O.D. is particularly well adapted to micropiles grouting and water pressure tests.

With Ø 28,30 and 42mm packers, the narrow space between the two packer elements does not allow to use the same tubular design.

Here, the CE element consists of 4 pipes, two of which are used for inflation of the lower packer.

A special characteristic of these packers is that the injection zone (IZ) length remains constant after inflation.

Ø 56 à Ø 170



Diam. / IZ	Ø 28	Ø 30	Ø 42	Ø 56	Ø 72	Ø 85	Ø 102	Ø 130	Ø 170
340 mm									
350 mm									
500 mm									
1000 mm									

Standard Consult us Not recommended

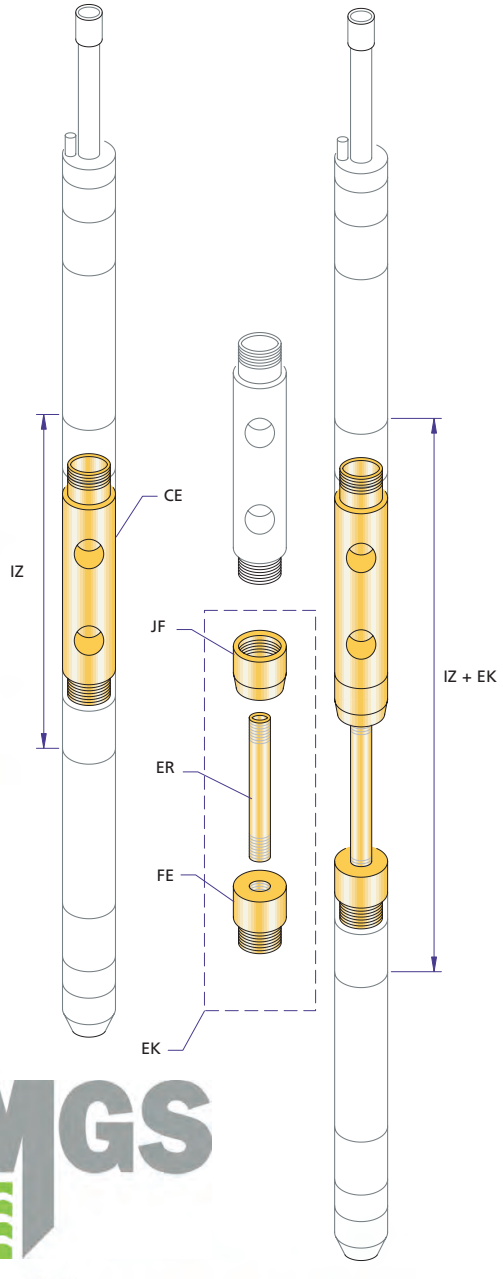
"Tubes à manchettes" applications – Use recommendations.

Packer ↓	"tube à manchettes" Diameter		
	1" 1/4	1" 1/2	2"
Packer ø 28 mm	YES	YES	NO
Packer ø 30 mm	NO	YES	NO
Packer ø 42 mm	NO	NO	YES

The ZI double packers Ø 28, 30 and 42 mm are specially designed for "tubes à manchettes '' grouting use ; the injection zone length (IZ) remains constant regardless of the diameter of the "tube à manchettes".

The bottom element of the packer is flexible making it easy to introduce into and retrieve from the "tube à manchettes".

The choice of which packer to use depends on the "tube à manchettes" inner diameter. Please refer to the selection chart shown on the left.



EK Extension Kit (42-170mm)

For the double packers Ø 42 to Ø 170mm, some applications may require a longer injection zone than the standard one determined by the CE central element length.

In this case, an **EK extension kit** is available to facilitate extension between the two inflatable elements.

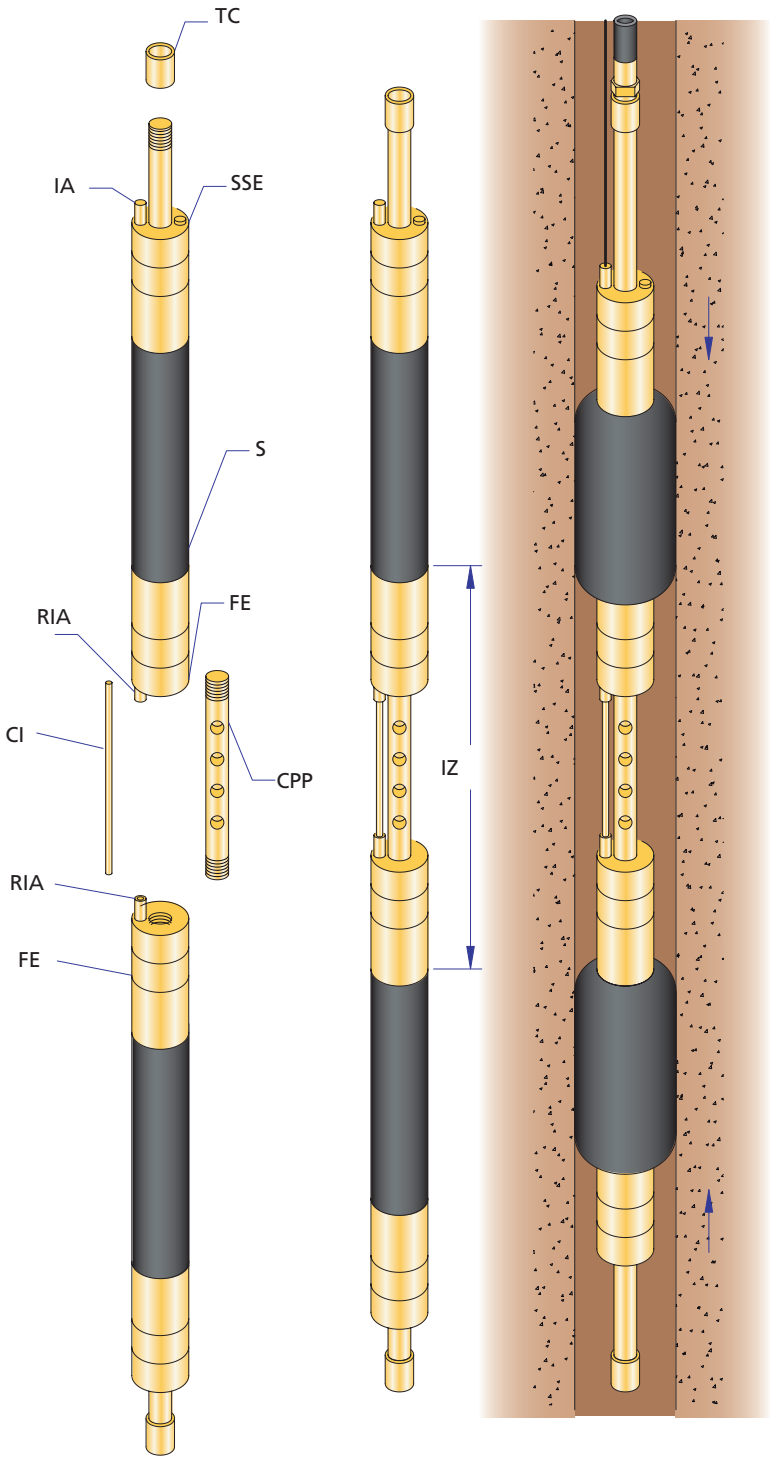
The 3 elements of the EK kit are:

- **The JF junction end**
- **The ER extension pipe**
- **The FE fixed end**

These elements are easily screwed together to form a complete assembly.

Thanks to their modular design, ***Geopro*** packers can be adapted in a flexible and **economical way** to suit the various demands of each job, wherever the worksite.

"TZ" BIMBAR Double packers (56-170 mm)



For some hydrological applications at low or medium pressure, ***Geopro*** proposes a specific double packer, the "TZ" which is available from 56 up to 170 mm diameters.

In this configuration, the two packers fixed ends are put into the test zone "IZ".

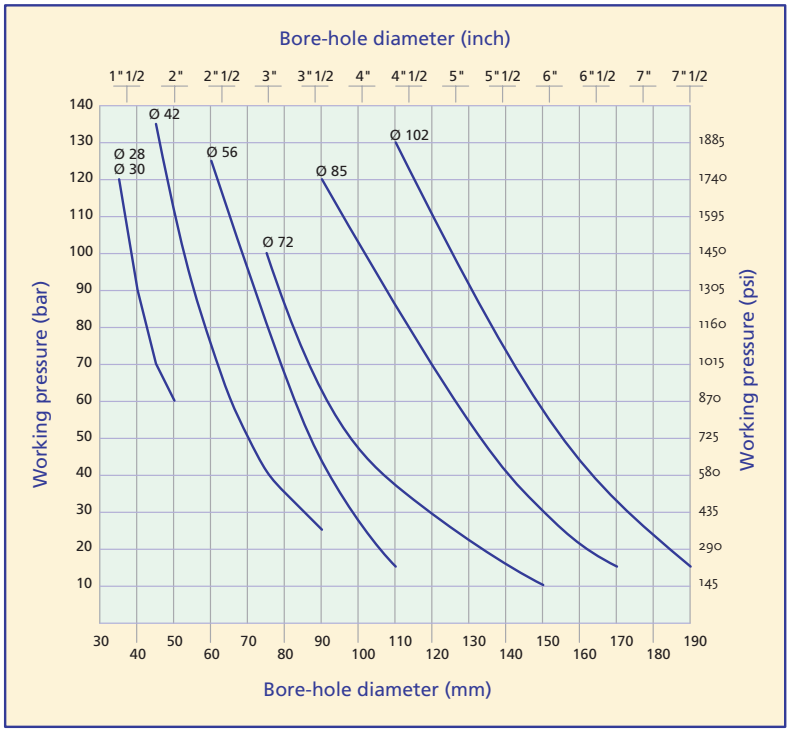
In this way, after inflation, the "IZ" length stays constant

Basic components
of a double packer "TZ" are :

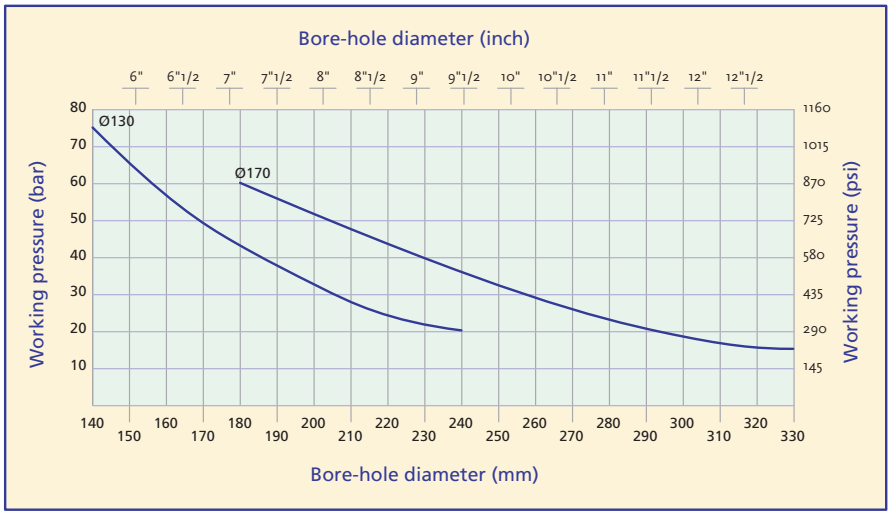
- Two standard packers, one of which is mounted on top with the specific sliding end SSE which has two inflation ports.
- In the center, an extensible perforated tube CPP closed at the bottom. These tubes CPP are standard pipes with BSP threads.
- An inflation line CI into the test zone with reinforced inflation hose mounted with swaged couplings.
- Others configurations (for the positioning of the sliding and fixed ends) are available on request.

Working pressures

Maximum working pressures for Ø 28 to Ø 102 versus borehole diameter



Maximum working pressures for Ø 130 to Ø 170 versus borehole diameter



Example of selection :

For permeability testing in a Ø 3'' bore-hole (76mm), three packers' diameters are theoretically suitable : Ø 42mm, Ø 56mm or Ø 72m. The maximum respective working pressures in a Ø 76mm bore-hole are given by the above graph :

- 40 bar (580 psi) for the Ø 42mm packer
- 80 bar (1160 psi) for the Ø 56mm packer
- 100 bar (1450 psi) for the Ø 72mm packer

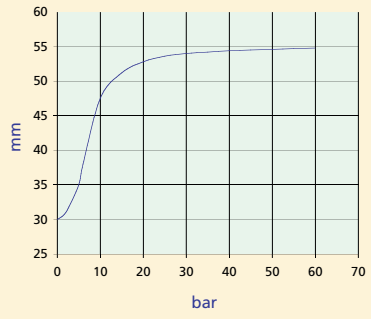
The packer diameter is chosen according to the maximum working pressure needed for each application.

Do not use the packer at the limits of its expansion . Always allow a reasonable distance between the at-rest packer diameter and the bore-hole. For instance, a Ø 72mm packer should not be used in a 76mm bore-hole.

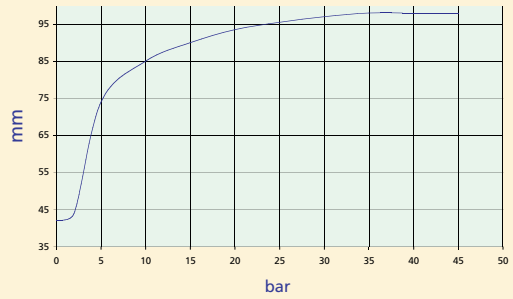
Expansion curves

These curves are indicative only and vary slightly depending on the manufacturing batch

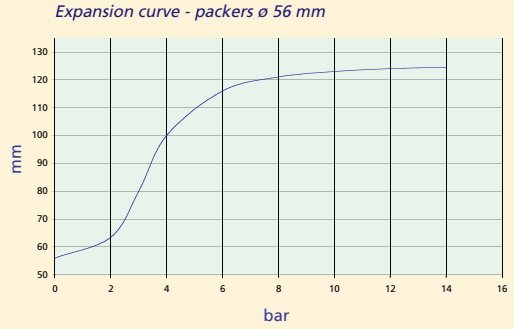
Expansion curve - packers ø 28 and ø 30 mm



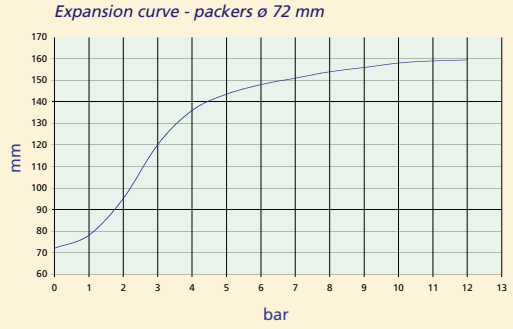
Expansion curve - packers ø 42 mm



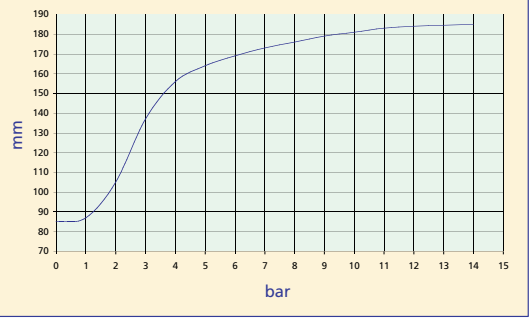
Expansion curve - packers ø 56 mm



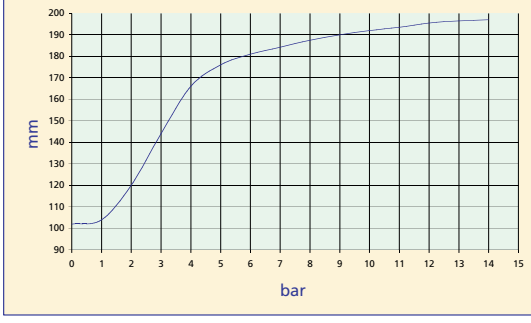
Expansion curve - packers ø 72 mm



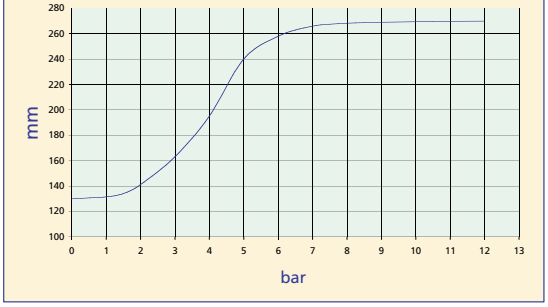
Expansion curve - packers ø 85 mm



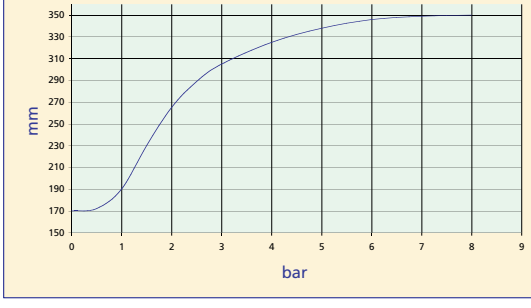
Expansion curve - packers ø 102 mm



Expansion curve - packers ø 130 mm



Expansion curve - packers ø 170 mm



(1 bar = 14.5 psi)

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Recommendations – Safety – Guarantee

Inflation

As an inflation fluid, and whenever it is possible, water will always be preferred to neutral gas (nitrogen). **Other fluids (oxygen, oil ,...) are prohibited**. Water provides a greater safety margin since it does not produce the explosive effect of compressed gas. Moreover, when the packer is inflated with gas for long periods of time, gas pockets may form on the outer cover of the packer. This is a natural phenomenon caused by the diffusion of gas through the micro-pores of the natural rubber.

When inflating with water in vertical bore-holes, the hydrostatic pressure of the water column inside the inflation line should also be taken into account. (10m of water = 1bar or 14.5psi).

This phenomenon can sometimes complicate the deflation of the packer. Never inflate the packer in open air.

Working pressure – injection

Working inflation pressure must always be greater than to injection pressure especially when using neutral gas as for inflation fluid.

This is to ensure a good seal in the bore and anchor the packer so that it won't be pumped out of place. Cement slurry or water column weight is also important to consider.

Deflation

Do not move the packer before complete deflation. A few minutes are needed when water has been used to inflate the packer. **Carefully clean the packer with water** after each use, especially when the application requires the use of cement and/or bentonite. For deep and dry vertical bore-holes applications, we recommend using an additional deflation line with the Geopro deflation device.

Example

A grouting job with injection of cement slurry requiring the use of a single packer Ø 56mm in a 3" bore-hole at 50-meter depth (grout S.G. = 1.5).

Inflation pressure 30 bar at pressure gauge, grouting pressure 10 bar at pump injection gauge.

Effective packer inflation pressure : 30+(50/10) = 35 bar.

Effective grouting pressure at packer level:
10 + (50/10) x 1.5 = 17.5bar.

Pressures ratio: 35/17.5 = 2. Correct use.

Test

Each inflatable element is tested with water in a test bench. After the assembling, the tightness of each complete packer is also assured. A test certificate is supplied with each order.

Storage

Packers should be stored away from light. Since natural rubber is very sensitive to UV rays, packers should not be exposed to sunlight.

Temperature

The extremes of temperature not to be exceeded are –45 °C and +65 °C.

Diameters of use

Never use a packer at its limit of maximum expansion (see page 6)

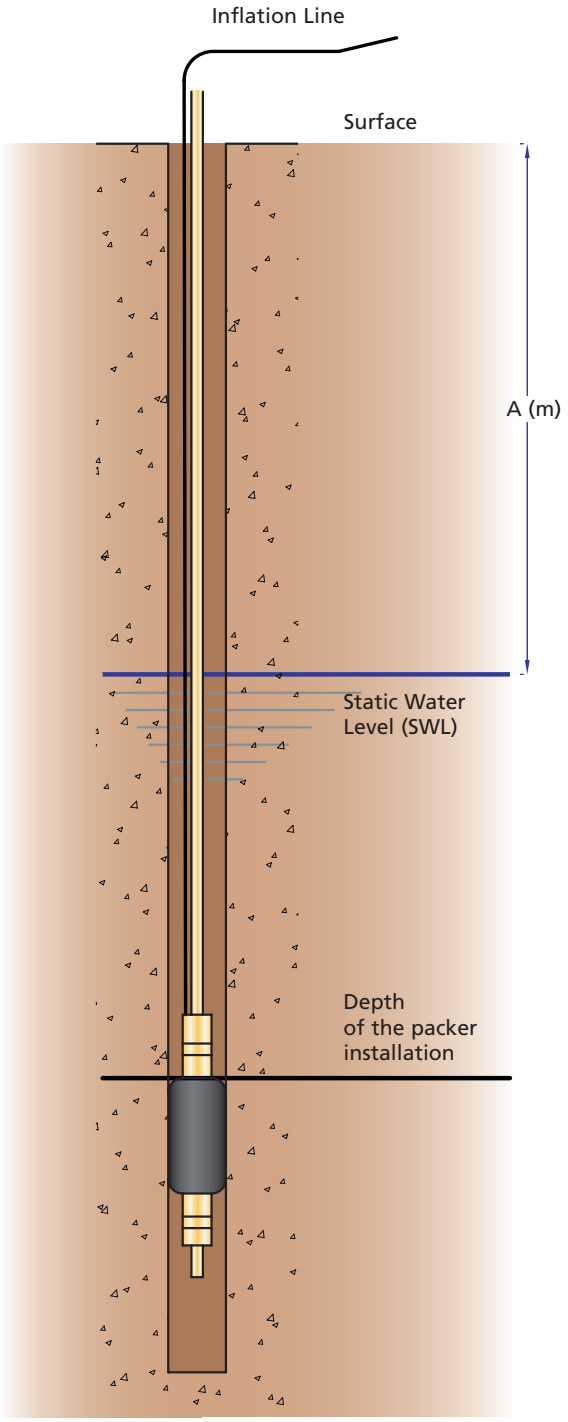
Safety and guarantee

Our packers are guaranteed free from any defect in material and workmanship. Our guarantee is limited to the repair or replacement of any defective product or parts thereof. This guarantee is void if the products are used in other circumstances than those described in our technical sheets. The decision of our technical department is final .

Please contact us for additional information.

Considering the nature of equipment working under pressure, users should be aware of the dangers and take the necessary precautions relating to the safety of their employees. Our responsibility ends with our guarantee of good manufacture for the material designed and made according to engineering rules and techniques available at the time of manufacture.

Inflating and deflating the packer



Different parameters determine the use of inflatable packers.

These must be clearly identified in order to define the most suitable procedure for the planned application in each case.

One of these parameters is the diameter of the bore-hole : the greater the diameter of the bore-hole, the smaller the maximum operating pressure for the same packer.

Another parameter is the depth of use and the water level in the bore-hole.

As well as this, it is advisable to check the static water level (SWL) before and after placing the packer into the bore-hole.

The choice of inflating fluid (water or gas) depends mainly on the difference between the depth of use and the hydrostatic level in the bore-hole (SWL).

1) When inflating with gas, the pressure applied from the surface (pressure gauge) must correspond to the desired inflation pressure, to which shall be added the pressure from the water-column (one bar per 10 metres of water-column) on the packer.

For example, an packer is placed 100 m below the water level (SWL) and must be effectively inflated to 20 bar. In this case, gauge pressure must be 30 bar: 100 metres of water-column is approximately 10 bar plus the 20 bar of pressure for inflating the packer.

2) Water inflation. In this case, the pressure to be applied from the surface (pressure gauge) must correspond to the desired inflation pressure, which will be decreased by the pressure from the height of the water (A) contained in the inflation hose between the surface and the static water level (SWL).

Using the same example for a height A of 50 metres , the pressure read on the surface pressure gauge must be 15 bar, i.e. 20 bar less 5 bar (50 metres).

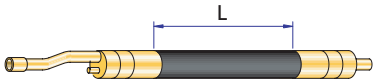
Water inflation also has several other advantages such as its low cost, availability and ease of transport.

N.B.
Sometimes the pressure resulting from the height of the water A in the inflation hose is sufficiently high to make it impossible to deflate the packer (see expansion curves). ***Geopro*** has a deflation device which makes it possible to use water as the inflation fluid in most applications (see page 21).

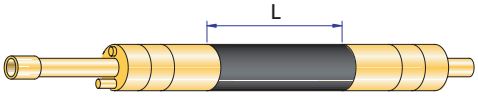
Single, double packers and dilatable element
Order references

dilatable element S
Ø 28 to 170 mm

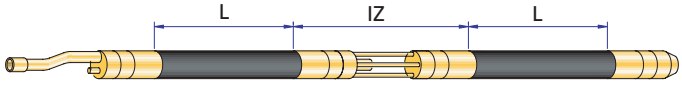
single packers SP
Ø 28 to 42 mm



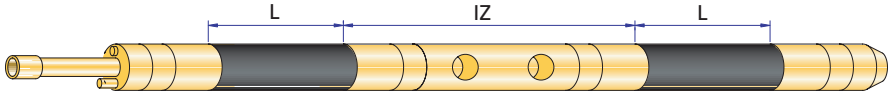
single packers SP
Ø 56 to 170 mm



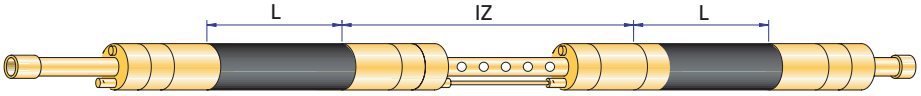
double packers DP type ZI
Ø 28 to 42 mm



double packers DP type ZI
Ø 56 to 170 mm



double packers DP type TZ
Ø 56 to 170 mm



How to order ?

Diameter (mm)	S or SP or DP	Dilatable element length	Type ZI or TZ	IZ injection zone length
___	___	____	___	____

Examples

- Single packer Ø 56 L 1000 — 5 6 | S P | 1 0 0 0
- Double packer ZI Ø 42 L 300 — 4 2 | D P | 3 0 0 | Z I | 5 0 0
  Test zone or Injecting zone length : 500 mm

Geopro is constanly improving its products and therefore reserves the right to change design, materials, specifications without notice.

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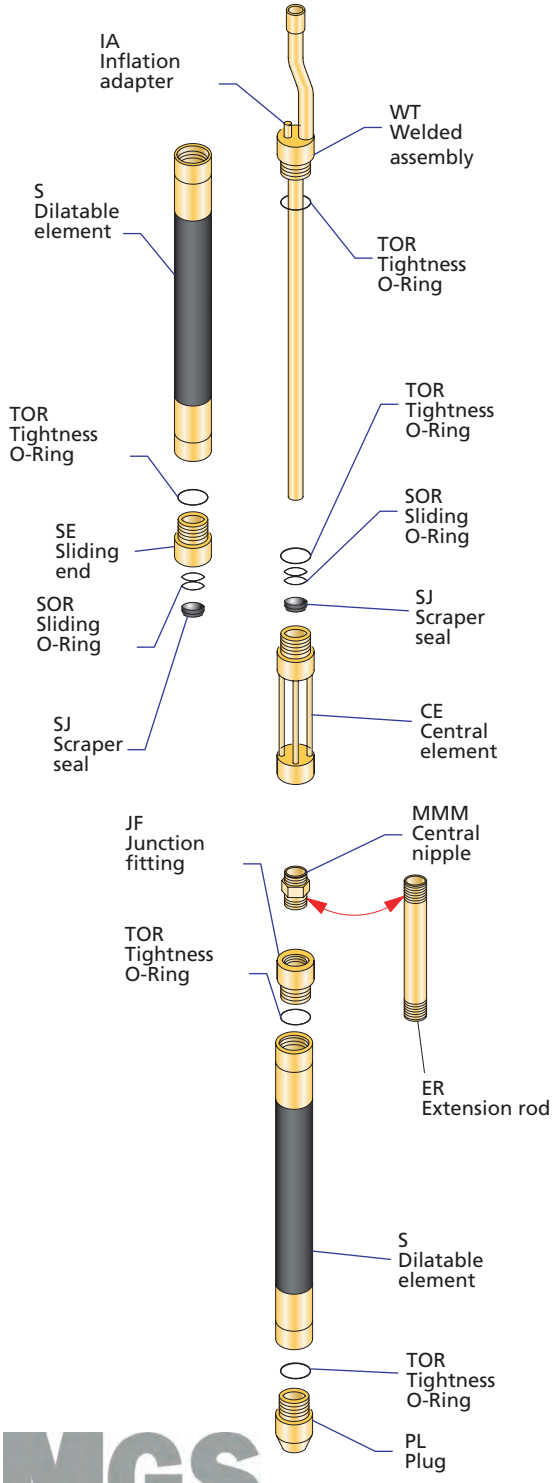
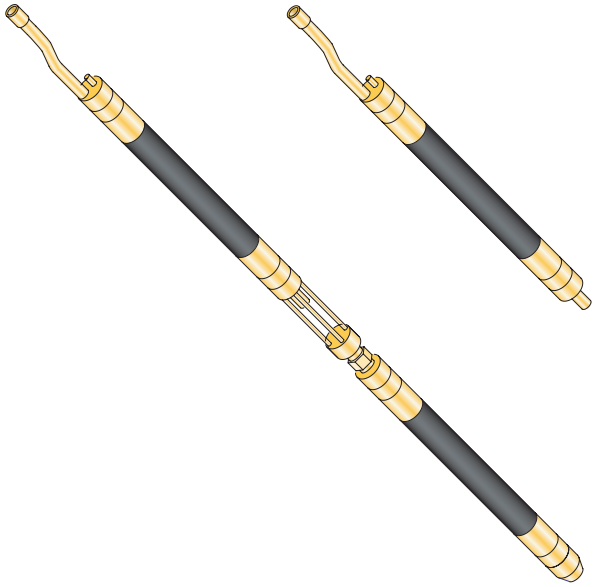
Packers spare parts ø 28 and ø 30 mm





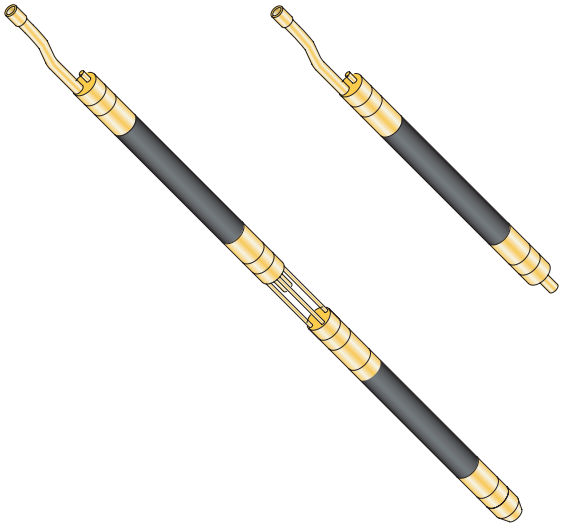
Packer parts
Order references

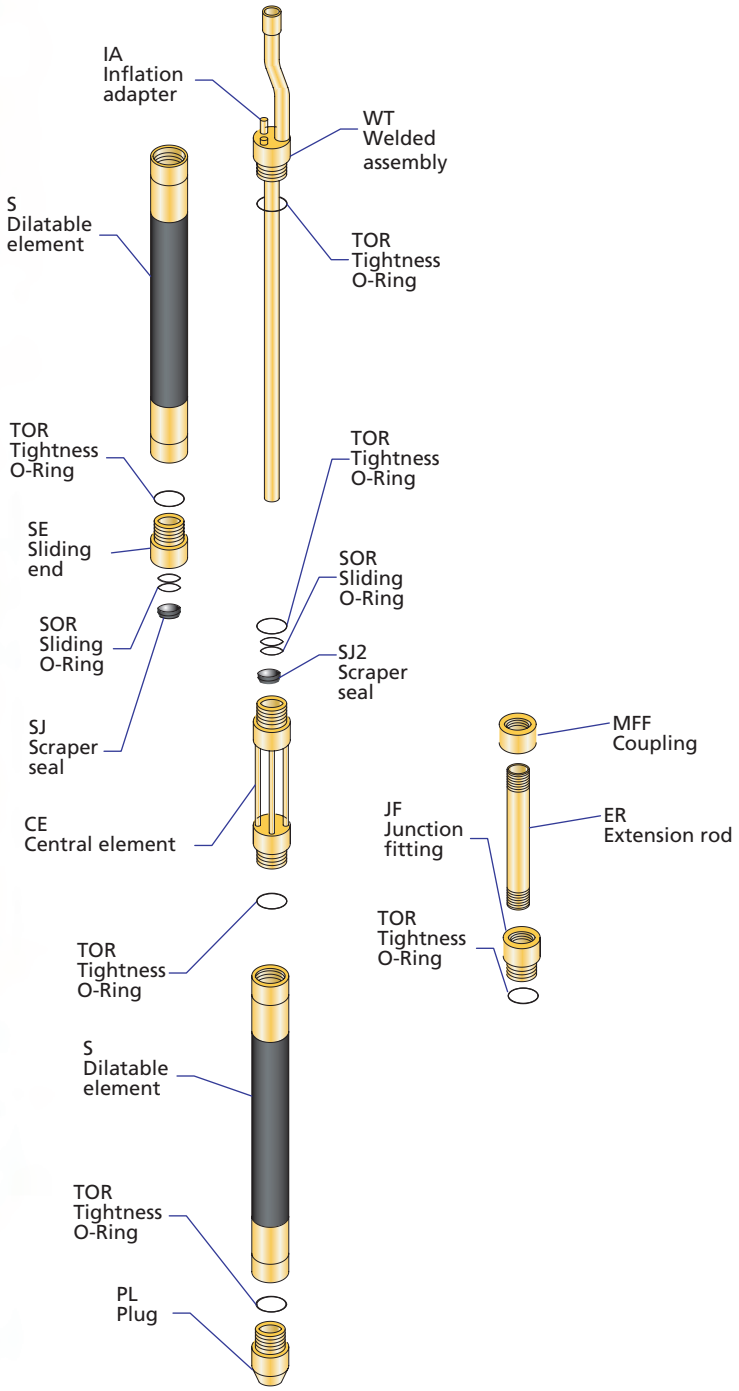
Dilatable element	Ø 28	Ø 30
L 300	28 S 300	30 S 300
L500	28 S 500	30 S 500
L1000	28 S 1000	30 S 1000
Special length	28 S “length”	30 S “length”

Parts	Ø 28	Ø 30
WT L 300	28 WT 300	30 WT 300
WT L 500	28 WT 500	30 WT 500
WT L 1000	28 WT 1000	30 WT 1000
WT special length	28 WT “length”	30 WT “length”
SE	28 SE	30 SE
CE (for IZ 340 mm)	28 CE 340	30 CE 340
JF	28 JF	30 JF
PL	28 PL	30 PL
MMM	MMM 28	MMM 30
ER (for IZ 500 mm)	28 ER 500	30 ER 500
ER (for IZ 1000 mm)	28 ER 1000	30 ER 1000
ER (tube)	Tube 3/8” Sch.40	Tube 3/8” Sch.40
TOR	28 TOR (Ø 20,35 x 1,78)	30 TOR (Ø 20,35 x 1,78)
SOR	28 SOR (Ø 10,82 x 1,78)	30 SOR (Ø 10,82 x 1,78)
SJ	28 SJ	30 SJ
IA	IA 18 “quick coupling”	IA 18 “quick coupling”

Geopro

Packer spare parts ø 42 mm



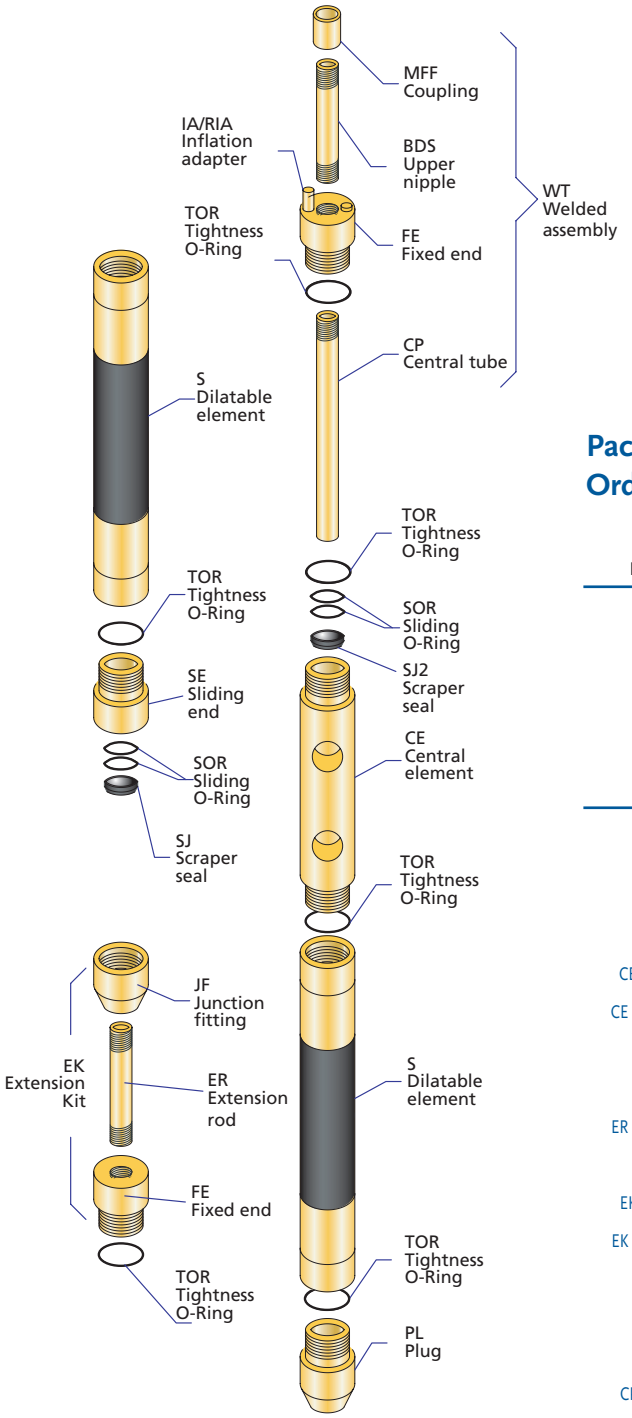


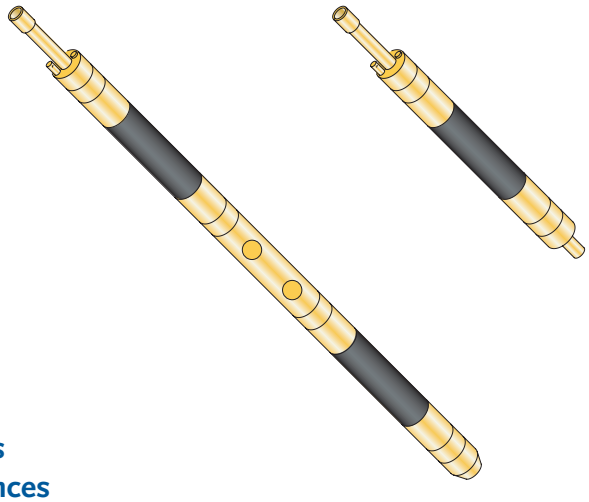
Packers parts
Order references

Dilatable element	Ø 42
L 300	42 S 300
L500	42 S 500
L1000	42 S 1000
Special length	42 S “length”

Part	Ø 42
WT L 300	42 WT 300
WT L 500	42 WT 500
WT L 1000	42 WT 1000
WT special length	42 WT “length”
SE	42 SE
CE 350	42 CE 350
CE 500	42 CE 500
JF	42 JF
PL	42 PL
MFF	MFF 42
ER (for ZI 1000)	42 ER 1000
ER (tube)	Tube 1” Sch.40
TOR	42 TOR (Ø 20,35 x 1,78)
SOR	42 SOR (Ø 10,82 x 1,78)
SJ	42 SJ
IA	IA 18 “quick coupling”
RIA	RIA 18 “screw fitting”

Packers spare parts ø 56 to ø 102 mm



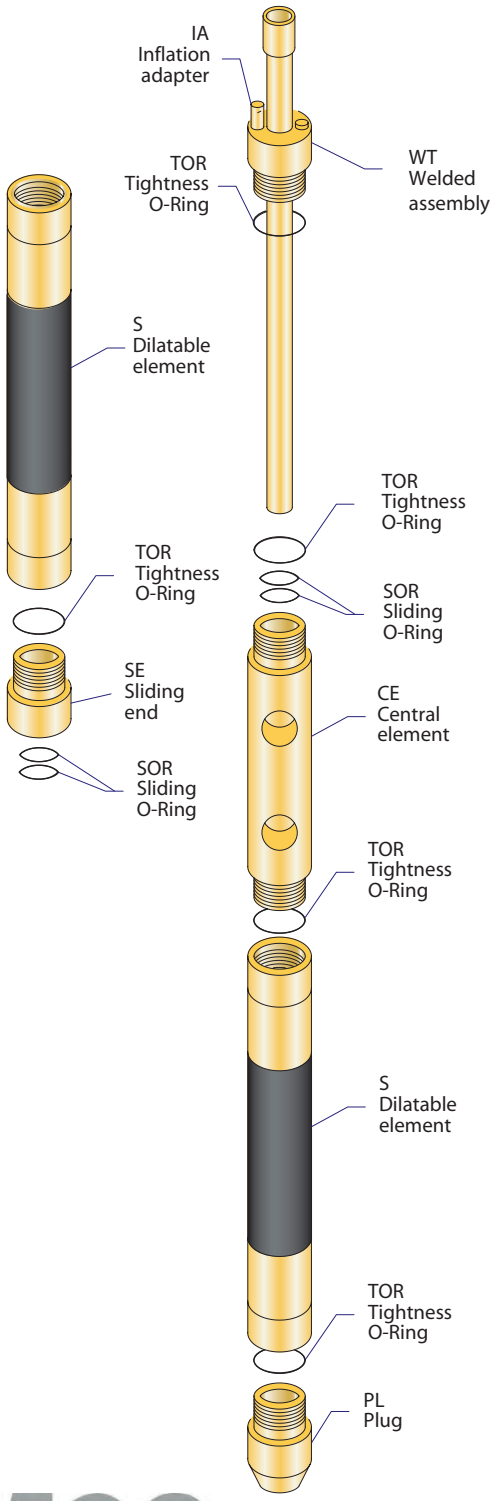


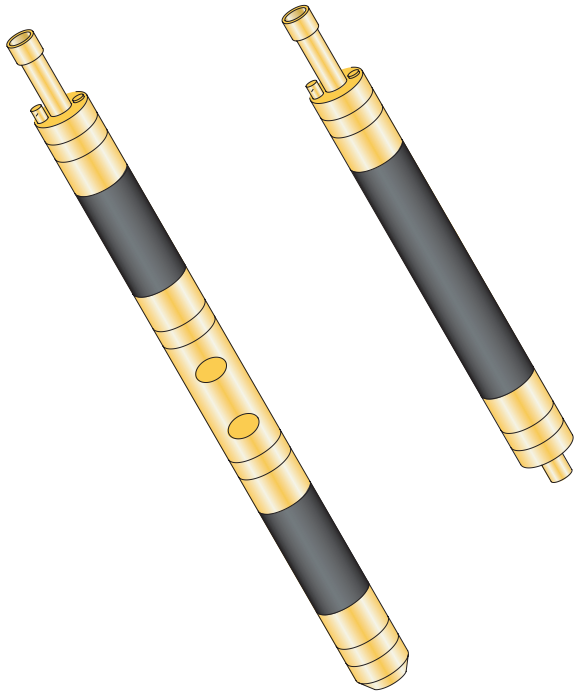
Packers parts
Order references

Dilatable element	Ø 56	Ø 72	Ø 85	Ø 102
L500	56 S 500	72 S 500	85 S 500	102 S 500
L1000	56 S 1000	72 S 1000	85 S 1000	102 S 1000
Special length	56 S "Length"	72 S "Length"	85 S "Length"	102 S "Length"

Part	Ø 56	Ø 72	Ø 85	Ø 102
WTL500	56 WT 500	72 WT 500	85 WT 500	102 WT 500
WTL1000	56 WT 1000	72 WT 1000	85 WT 1000	102 WT 1000
WT Spec. length	56 WT "Length"	72 WT "Length"	85 WT "Length"	102 WT "Length"
SE	56 SE	72 SE	85 SE	102 SE
CE (for IZ 500 mm)	56 CE 500	72 CE 500	85 CE 500	102 CE 500
CE (for IZ 1000 mm)	56 CE 1000	72 CE 1000	85 CE 1000	102 CE 1000
JF	56 JF	72 JF	85 JF	102 JF
PL	56 PL	72 PL	85 PL	102 PL
ER (for IZ 1000 mm)	56 ER 1000	72 ER 1000	85 ER 1000	102 ER1 000
ER(TUBE)	Tube 3/4" Sch.40	Tube 1"1/4 Sch.40	Tube 1"1/4 Sch.40	Tube 2" Sch.40
EK (for IZ 500 mm)	56 EK 500	72 EK 500	85 EK 500	102 EK 500
EK (for IZ 1000 mm)	56 EK 1000	72 EK 1000	85 EK 1000	102 EK 1000
MFF	MFF34	MFF114	MFF114	MFF2
BDS	BD34	BD114	BD114	BD2
FE	56 FE	72 FE	85 FE	102 FE
CP(for SP 500 mm)	56 CP 500	72 CP 500	85 CP 500	102 CP 500
CP(for SP 1000 mm)	56 CP 1000	72 CP 1000	85 CP 1000	102 CP 1000
CP Spec. length	56 CP "Length"	72 CP "Length"	85 CP "Length"	102 CP "Length"
TOR	56 TOR (Ø40,94x2,62)	72 TOR (Ø56,82x2,62)	85 TOR (Ø72,69x2,62)	30 TOR (Ø82,22x2,62)
SOR	56 SOR (Ø26,65x2,62)	72 SOR (Ø40,94x2,62)	72 SOR (Ø40,94x2,62)	102 TOR (Ø59,92x3,53)
SJ	56 SJ	72 SJ	85 SJ	102 SJ
SJ 2	56 SJ 2	72 SJ 2	85 SJ 2	102 SJ 2
IA	IA 18 "quick coupling"	IA 18 "quick coupling"	IA 18 "quick coupling"	IA 18 "quick coupling"

Packers spare parts ø 130 and ø 170 mm





Packers parts
Order references

Dilatable element	Ø 130	Ø 170
L1000	130 S 1000	170 S 1000
Special length	Consult us	Consult us

Part	Ø130	Ø170
WTL 1000	130 WT 1000	170 WT 1000
WT Spec. length	Consult us	Consult us
SE	130 SE	170 SE
CE (IZ 1000)	130 CE 1000	170 CE 1000
CE (IZ Special)	Consult us	Consult us
PL	130 PL	170 PL
TOR	130 TOR (Ø104,14x5,33)	170 TOR Ø139,07x6,99)
SOR	130 SOR (Ø88,27x5,33)	170 SOR Ø88,27x5,33)
IA	IA 14 “quick coupling“	IA 14 “quick coupling“

Hand pump, inflation and injection hoses

Inflation hand pump

Max. output pressure: 100 bar (1450 PSI)
Tank: 6 litres
Plunger: ø 10 mm
Order Numer: VHP 100

Weight: 9,5 kg
Supplied with pressure gauge
0-100 bar and drain valve

Inflation hoses

Low pressure inflation hose Nylon 3/6

Material: polyamide 12
Inner diameter: 3 mm
Order Numer: IH36

Max. working pressure: 45 bar (at 20° C)
Outer diameter: 6 mm

High pressure reinforced inflation hose

Tube: polyamide 12
Braiding: polyester fiber
Cover: polyamide co-polymer micro-perforated
Bending radius: 40 mm
Order Numer: RIH48

Inner diameter: 4 mm
Outer diameter: 8 mm
Max. working pressure: 215 bar
Weight: 4,9 kg / 100 m

Injection hoses

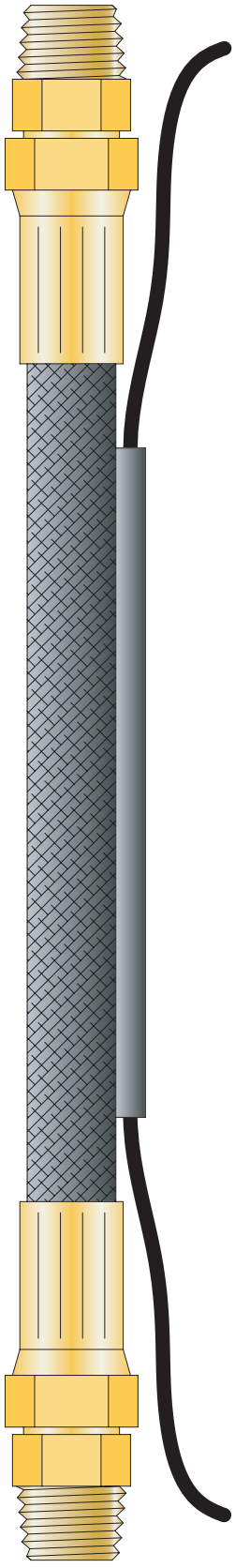
Our injection hoses are made of synthetic rubber reinforced with one steel layer. They are supplied with swaged "JIC" coupling and BSP adapters.

Standard lengths: 25 et 50 m

Dimensions and specifications

Inner diam.	Outer diam.	Max. W.P.	Weight	Order Numer
3/8" - 9.5	17.4	155	0.32	**GH9**
1/2" - 12.7	20.6	140	0.42	**GH12**
3/4" - 19.0	27.7	86	0.65	**GH19**
1" - 25.4	35.6	70	0.99	**GH25**

Thermowelded twin hose



The twin hose is used for injecting grouting or any other strengthening product through a packer. One of the pipes is for inflation, the other for grouting.

The grouting hose is available in 2 sizes: 1/2" and 3/4" . The inflation hose is in both cases, a Rilsan 3 x 6 mm hose.

The injection hose has marks spaced 333 mm apart, allowing the user to precisely position the packer when 'tube à manchettes' grouting.

An extra length of the inflation hose allows it to be easily connected to the packer's end and to the inflation pump.

The twin hose is available in standard lengths of 25 and 50 metres.

Technical details

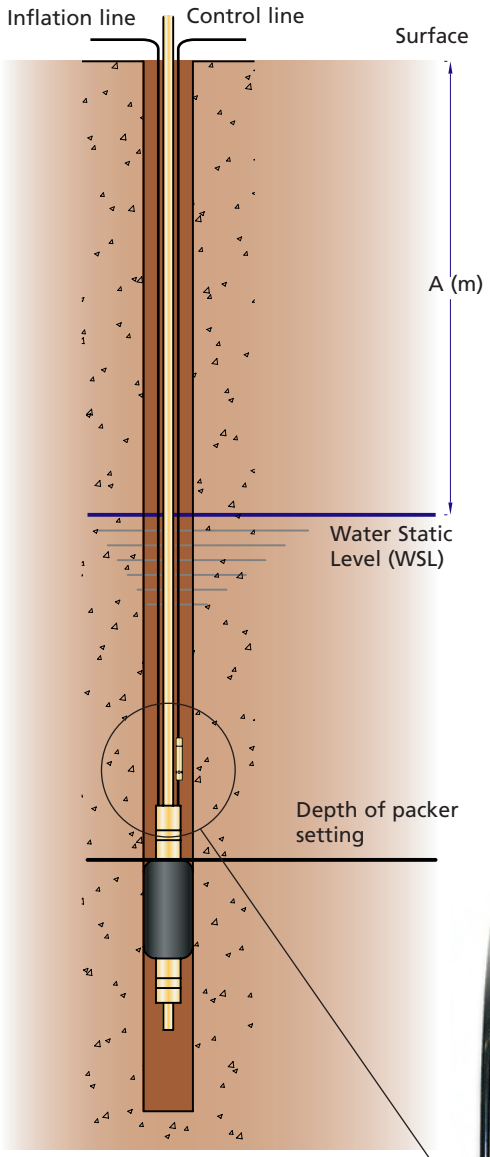
Inflation hose	
Operating pressure	75 bar
External diameter	6 mm
Internal diameter	3 mm
Material	Polyamide 12
Protection sleeve	Polyurethane

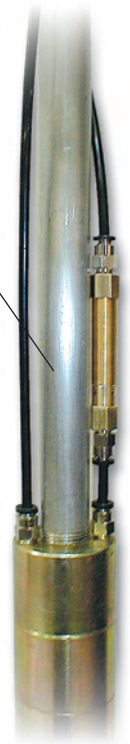
Grouting hose		
Nominal diameter	1/2"	3/4"
Operating pressure	200 bar	150 bar
Bursting pressure	825 bar	620 bar
External diameter	19,4 mm	27 mm
Internal diameter	12,7 mm	19 mm
Bend radius	85 mm	155 mm
Traction resistance	1600 Kg	2400 Kg

Order References

Nominal diameter	1/2"	3/4"
Length 25 m.	TGH 12-25	TGH 19-25
Length 50 m.	TGH 12-50	TGH 19-50

Packer Deflation System





In a dry bore-hole or a bore-hole with very little water, the deflation of a packer inflated with water soon becomes problematic as the depth increases. The absence or insufficiency of a hydrostatic pressure on the packer does not allow it to deflate and it remains blocked in the bore-hole. Most often, the only option is to inflate it with compressed air or nitrogen, thus removing the benefit of the incompressibility of water. Under these conditions, the inflatable packers are prone to deformations and variations in volume, which can sometimes be significant.

For example, cement grouting using a single-cylinder pump with an alternating movement causes, with each piston stroke, a deformation and a shifting of the dilated membranes. This leads to the elements becoming prematurely worn.

Furthermore, the supply and transportation of gas bottles (nitrogen, compressed air) is often an additional problem which is difficult to resolve on remote sites.

Aware of this problem, Geopro is offering deflation system without the restriction of installation depth. Simple and economical, this system is mounted on the upper part of the packer and controlled from the surface with a compressed air-line.

Operating method for deflating:

Open the purge valve on the inflation line: the pressure gauge returns to zero.

Activate the deflation system by injecting the necessary pressure of compressed air using the control line.

The packer is quickly emptied.

Deflation device

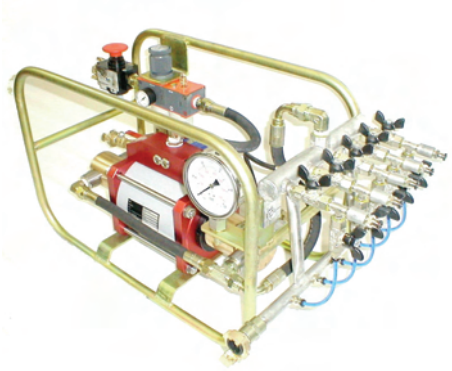
Order Reference: **DG 8015**

Dimensions: length 80mm x diameter 15mm

Weight: 100 grams

Connections: internal screw thread 1/8 BSP.

P160 PUMP for packers inflation with water



Double effect P160 pump

Geopro supplies a large range of air driven pumps. Six pump ratios are available from ratio 10 for output pressure of 70 bar /1025 psi up to ratio 115 for a maximum output pressure of 800 bar/11400 psi. The output pressure is related to the pump ratio multiplied by the air inlet pressure. Our pump ratio 10 is specially well adapted to the inflation of our inflatable packers. Other ratios with working pressure up to 3650 bar/52200psi are available on request.

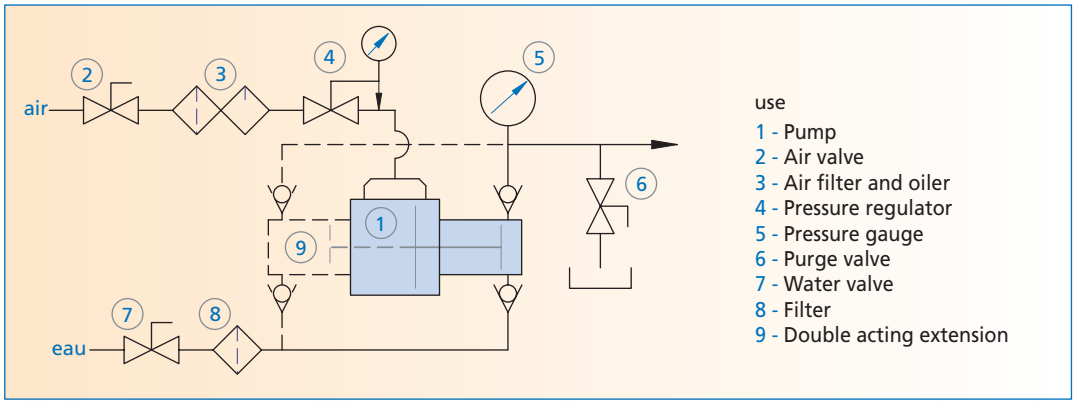
Single acting P 160 pump

In order to give the best support and service to our customers, these pumps are supplied bare or fully equipped, mounted or not on skids as per your requirements.They are also available in single or double acting configuration. Numerous other applications of these pumps include hydrostatic pressure testing of pipes or sewers, feeding of hydraulic systems, water infusion into coal seams...

Set of spare seals and parts are available as well as kits to change the ration of the pump.

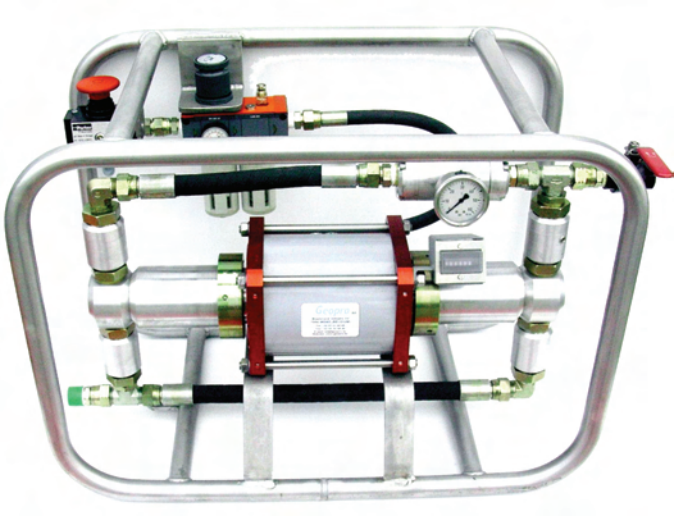
Pump type	Ratio	Max. pressure (bar/psi)	Single acting		Double acting	
			flow max. (l/min.)	Volume per cycle (cc)	flow max. (l/min.)	Volume per cycle (cc)
P160-10	10	70/1025	26.3	98	50	196
P160-20	20	145/2100	13.2	48	25	96
P160-30	30	200/2850	9.5	35.3	18	70.6
P160-40	40	285/4100	6.4	24.5	12.2	49
P160-65	65	450/6400	4.2	15.7	8	31.4
P160-115	115	800/11400	2.4	8.8	4.5	17.6

Principle sketch / components



use
1 - Pump
2 - Air valve
3 - Air filter and oiler
4 - Pressure regulator
5 - Pressure gauge
6 - Purge valve
7 - Water valve
8 - Filter
9 - Double acting extension

PGP 35-5 Portable Grout Pump



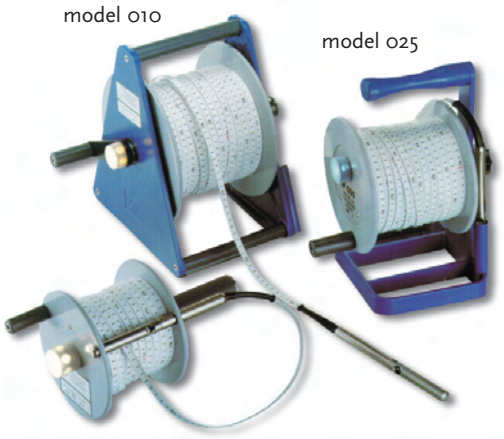
The PGP35-5 grout pump, double acting motor air-driven, allows the grouting under pressure of different fluids like water, cement slurry or bentonite. It operates on the simple but efficient principle of an automatic reciprocating differential area piston. A relatively large air-operated piston is connected to a smaller high-pressure piston to convert compressed air flow into fluid flow at high pressure. The standard ratio of 5 multiplies by the air inlet pressure gives an output pressure up to 500 psi (35 bar)*.
Its reduced weight and size make it very suitable for narrow space worksite avoiding heavy equipment.

* The option PGP70-10 pump is available under request : 1000psi (70 bar) , 6 gallons (35 litres) per minute.

Main specifications

Grout pressure	0-35 bar (0-500psi) *
Inlet air pressure	0-7 bar (0-100 psi)
Flow rate	0-45 l/min (12 gallons)
Air cylinder diameter	160 mm
Fluid cylinder diameter	70 mm
Suitable fluids	water, bentonite mud, cement slurry
Valves	ball type
Dimensions	700 x 500 x 400 mm
Pump skid assembly weight	38 kg (84 lbs)
Air inlet thread	1/2'' BSP
Fluid inlet thread	3/4'' BSP
Fluid outlet thread	3/4'' BSP
Air consumption	1,5 m³/min (16 cfm)
Pumped volume per cycle	0,4 litre (0.11 gallon)

Hydrogeological Measuring Equipment



• Electric contact meter for water level measurement

Measuring tape: Bifilar stripline made of white polyethylene. Conductor made of highly rust resistant and acid proof flexible steel wire. Meters printed in red, centimeters and decimeters figures printed in black.

Sonde: Made of stainless steel, brass-nickel plated, Ø 15mm, length 175mm. Special design of sonde: Ø 10mm, length 140mm. Acoustic signal optional.

Batteries: 4 baby cells at 1.5V each. Alkaline manganese.

Working temperature range: -30°C to +75°C.

Model 010 for manual operation, sturdy construction and low price. Drum disk made of cold and shock resisting synthetic material. The handle contains also the batteries.
Measuring ranges: 15m, 20m, 25m, 30m, 50m.
For longer tape lengths, a stable frame is used.
Measuring ranges: 80m, 100m, 150m, 200m, 250m, 300m, and 500m.

Model 025 for best suited for permanent use. To relieve the operator, the rack can be placed onto the sounding pipe.
Measuring range: 25m, 30m, 50m, 60m.

• Electric contact meter model 150 with temperature measurement

This reliable electronic instrument is a contact meter for water level and temperature measurements. It is equipped with an easily readable digit LCD display. A push-button switch shows battery capacity and operating condition.

Measuring tape: bifilar stripline made of white polyethylene. Conductor made of highly rust resistant and acid proof flexible steel wire. Meters printed in red, centimeters and decimeters figures printed in black.

Sound: Made of stainless steel, brass-nickel plated, Ø15mm, length about 180mm. Acoustic signal optional.

Batteries: 4 baby cells at 1.5V each. Alkaline manganese.

Working temperature range: -25°C to +50°C.

Temperature range: -15°C to +80°C

Accuracy: +/-0.1°C

Measuring ranges: 25m, 30m, 50m. 75m, 100m, 150m, 200m, 250m, 300m and 500m.

• Sounding apparatus model 150

For sounding the bottom of drill holes, determination of the drilling progress and sounding the level of gravel pack layers.

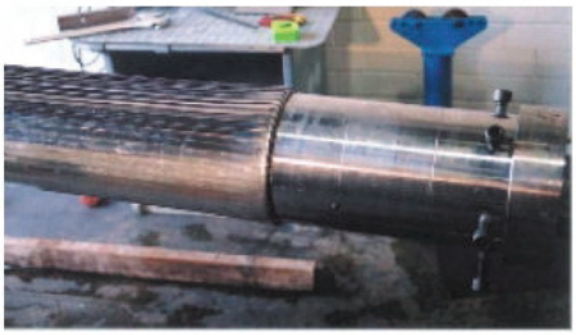
Construction: stable triangle framework, large crank handle, fixing device for sounding weight.

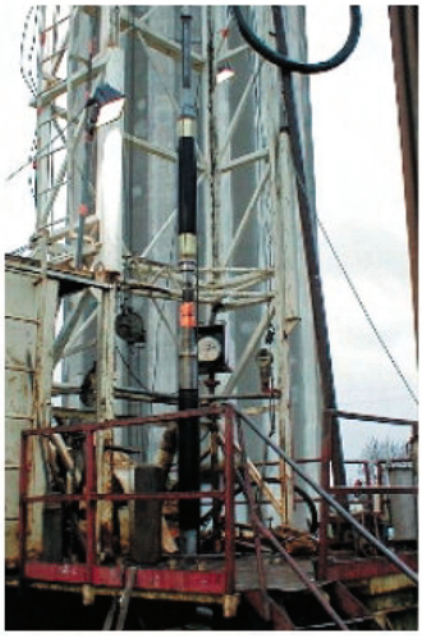
Measuring wire: Galvanized highly rust resistant steel wire Ø 12mm, depth imprinted on brass body each 1m or 5m.

Sounding weight: Stainless Ø 34mm, 130mm long up to 200m range and 165mm long from 200m up to 700m.

Measuring ranges: 50m, 100m, 150m, 200m, 250m, 300m, 500m and 700m.

Packers for specific applications







Introduction

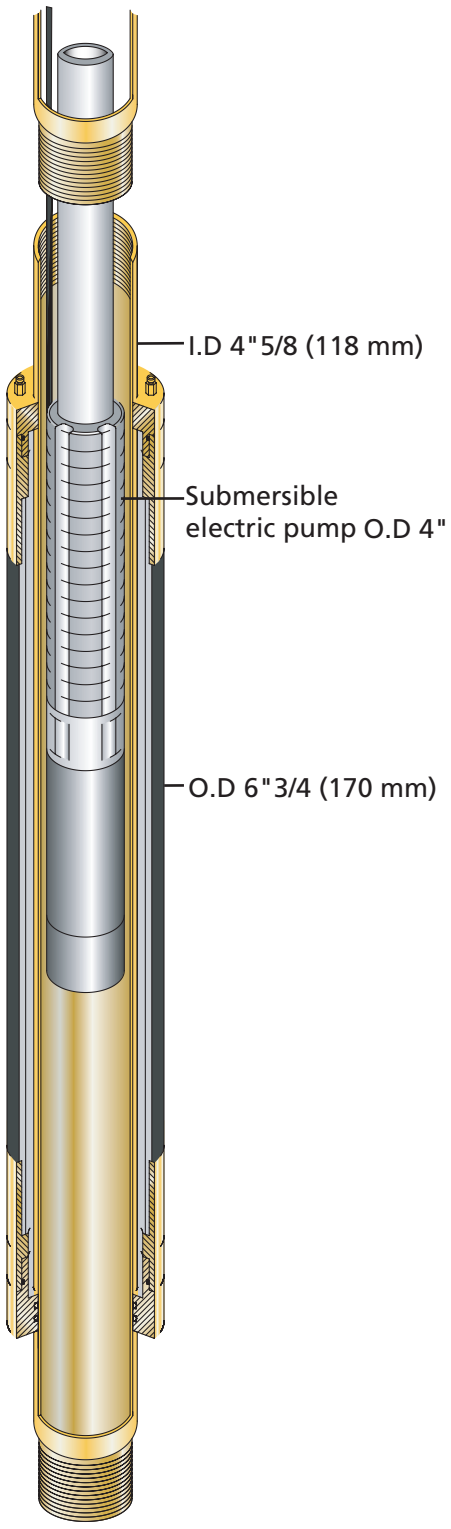
Geopro designs and manufactures customized inflatable packers for geotechnical and hydrologic applications.

You will find some examples in the following pages.

We remain at your disposal to adapt our inflatable packers to your specific requirements.

- Testing system for water wells from ø 8''1/4 to ø 12''1/2
- Packer ø 273mm (10''3/4)
- Inflatable packer for wireline core barrels
- Wireline Packer
- Plug Packer from ø 56 to ø 170 mm
- Print packer
- Pumpacker for water sampling
- Hydrofracturation packers

Testing system for water wells from ø 8” 1/2 to 12” 1/4



This new equipment basically integrates our standard largest inflatable packers 6" 3/4 onto a casing tube string of 4" 5/8 inner diameter. This key specification allows a 4" electric submersible pump to passing through the constant bore of the packer and casing tube string.

The most common application among many others is pump-out testing of aquifers in isolation to check water quality and yield. Geopro supplies the whole system ready for field operation in deep water wells.

The main components of the testing system are:

- Geopro inflatable packer ø 170mm (6" 3/4), bore 4"5/8 (118mm) single or double.
- Casing tube element 128x118mm, N80 steel grade, pin x box threads, available in 0.5, 1, 1.5, 3m lengths.
- Casing attachment: shoe, lifting head, and clamp.
- Hand pump model HP100 for packer inflation with water.
- Reinforced hose 8x3 for inflation.
- Geopro deflation device.

MGS

Geopro

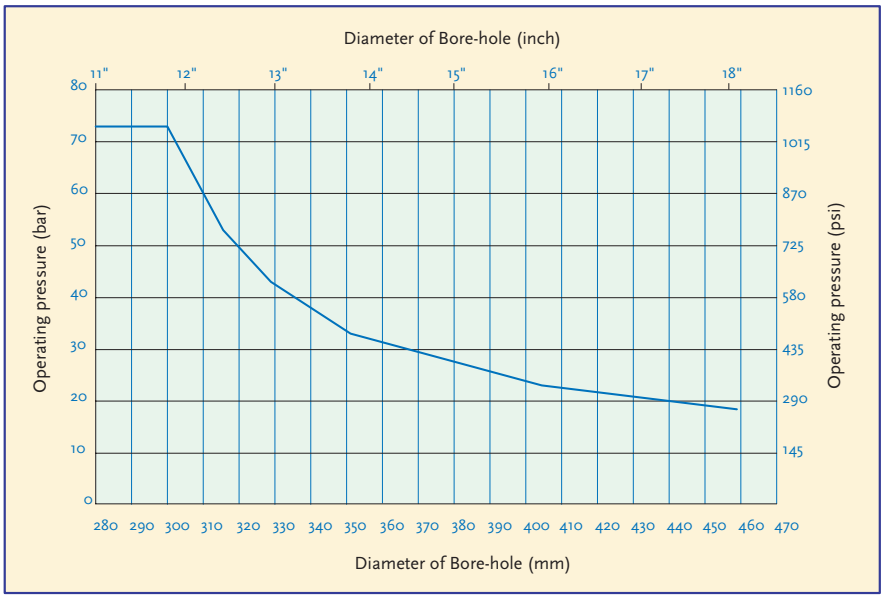
Large diameter inflatable packer : Ø 273mm (10”3/4)

Complementary to the Bimbar standard packers range (Ø28 to Ø170mm) Geopro is offering to the users a packer of 275 mm (10 ’’3/4) diameter.

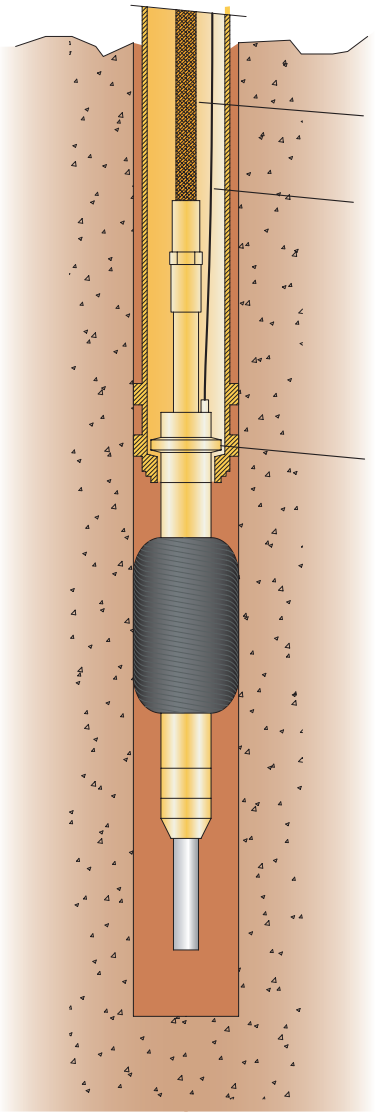
This packer is designed for large diameter wells up to 450mm (18’’). It is available in single or double configuration with an external inflation line in the straddle part.

The central pipe in the standard version has an inner bore of 102mm (4’’) and a top connection of NPT 4’’.

Upon request other central tube can be supplied up to 6’’ diameter with API, DCDMA or BSP thread connection.



Inflatable packers for wire-line core barrels



This system is an easy way of positioning a Geopro inflatable packer below the wire-line core bit in open hole for conducting permeability testing.

This packer assembly incorporates a positioning ring which rests on the drilling bit inner shoulder. This positioning ring end can be fitted, on request, with a pressure transducer for read out of the ''in situ'' pressure especially useful for permeability tests.

This simple and economical device saves time for the rig operator and is available for all makes of core barrels.

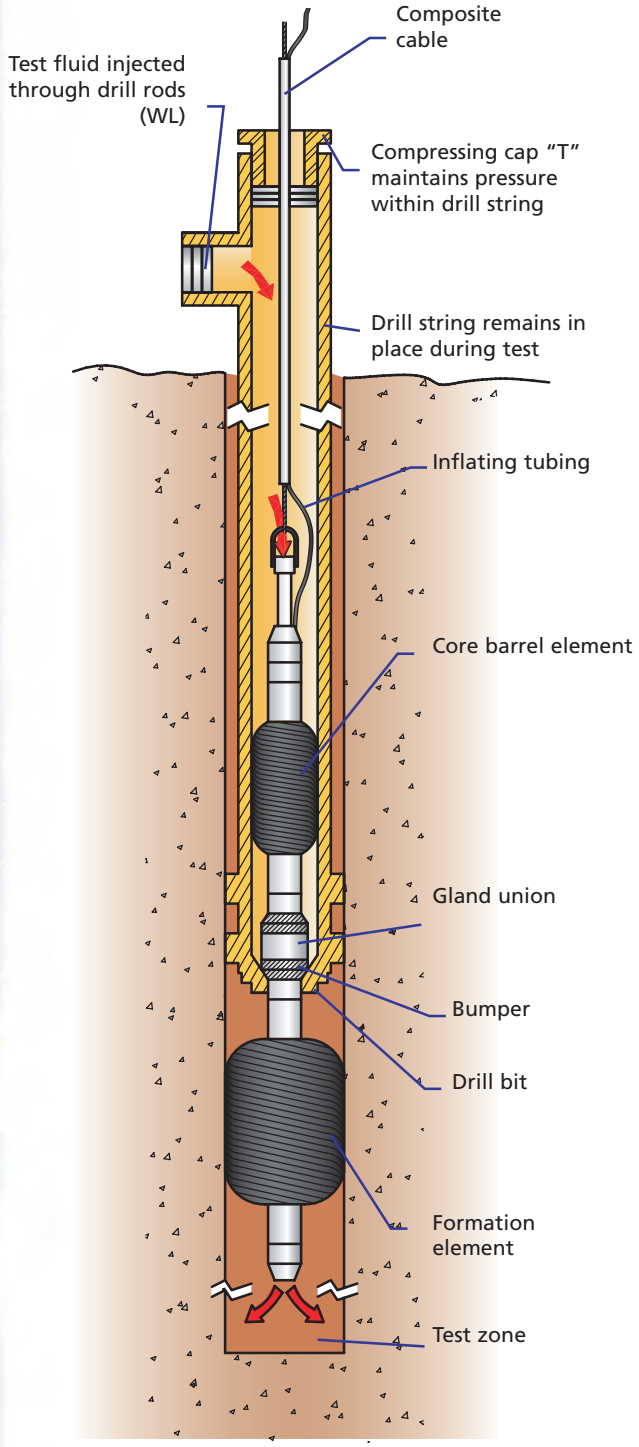
Different options are available:

- pressure intake at top of packer.*.
- double packer attachment and extension zone test kits.

* pressure intake option

Wire-line corebarrels nominal ø	Bore-hole ø (mm)	Core bit ID ø (mm)	Packer nominal ø (mm)	Recom. Max. working pressure (bar)
N	75.6	47.6	42	40
H	96.3	63.5	56	35
P	122.3	85	72	30
S	146.3	102	98	50

Wireline Packer System



The Wireline Packer System is a time-saving method for conducting permeability testing during core drilling.

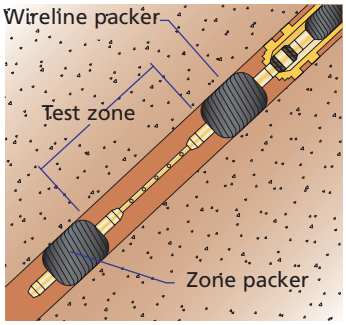
The test is carried out with the drill string in place, reducing the time required to test in open or unstable formations. Available for all makes of wireline core barrels (N, H and P), Wireline packers are easily repaired in the field in just minutes.

The wireline packers incorporate a bumper that rests inside the throat of the drill bit.

This positions both packers and protects the drill bit. A compression cap "T" on the Seal Tee Assembly prevents pressure loss around the composite cable during testing. The composite cable itself is composed of a high pressure nylon tube for inflation and a cable to lower and retrieve the wireline packer.

Conducting a permeability test

- Remove inner tube assembly.
- Raise drill string off bottom, leaving desired test zone.
- Install seal tee assembly at top of drill string.
- Lower wireline packer assembly.
- Tighten compression cap.
- Connect composite cable to source of compressed fluid.
- Inflate wireline packer.
- Inject water through seal tee assembly wireline rods and packer into the test zone.
- Perform permeability test.
- Deflate wireline packer.
- Remove packer and seal tee assembly.
- Reinsert inner tube assembly.
- Lower drill string and resume drillling.

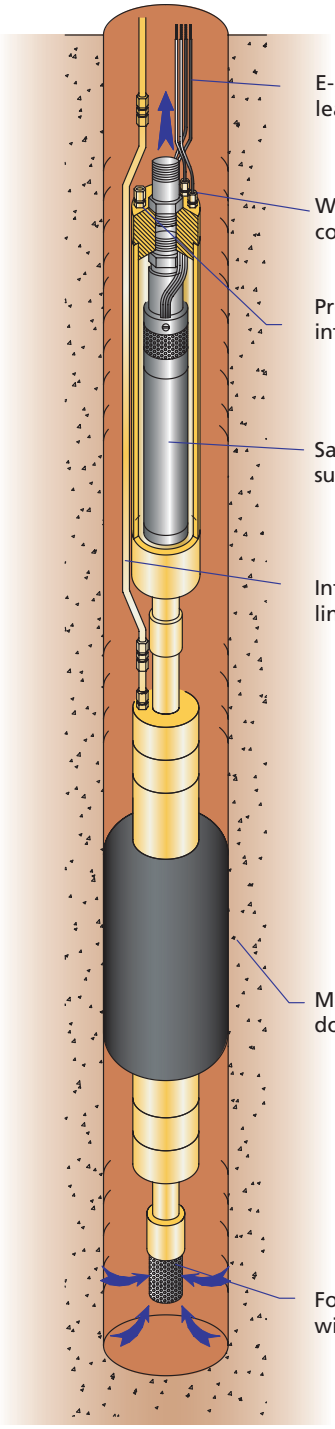


For testing specific zones, a zone packer can be easily attached to the lower end of the Wireline packer as shown at page 7.

Spécifications

Wireline core barrels diameter	N	H	P
Packer nominal diameter (mm)	42	56	72
Packer inner diameter (mm)	17	20	35

“Pumpacker” for water sampling



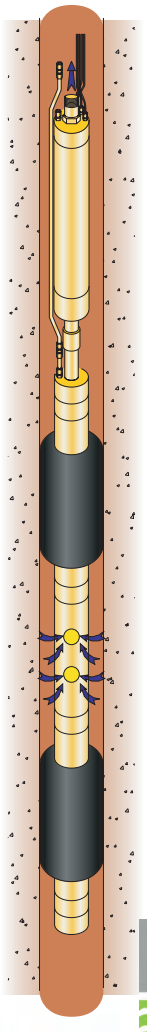
The ***Geopro*** "Pumpacker" system allows the connection of an electric submersible pump on a single or double packer.

Sampling is possible in borehole diameters:

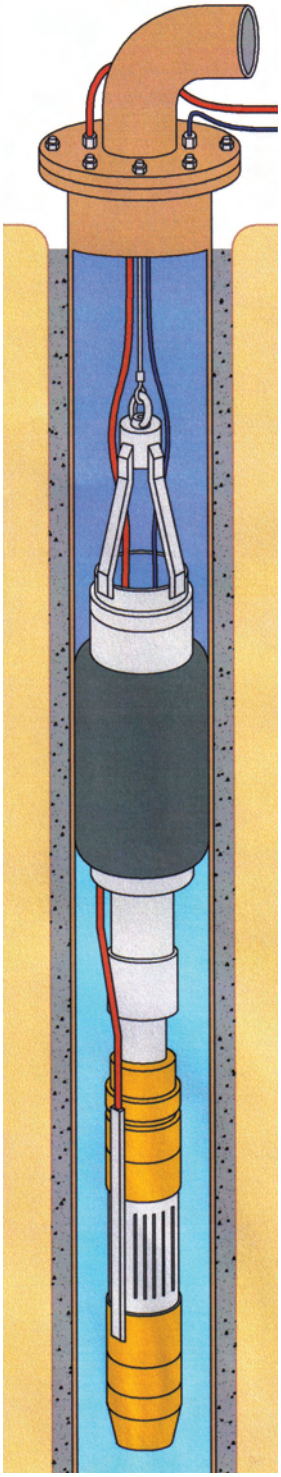
- up to 100mm with packer 56mm.
- up to 140mm with packer 72mm.
- up to 170mm with packer 85mm.

This system is fully modular and permits the use of standard Geopro packers single or double.

EK extension kit is available to increase the interval between the inflatable elements.



“RISERLESS”. A pumping assembly without riser pipe

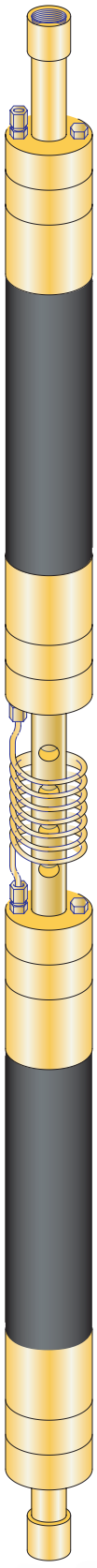


Casing corrosion and bacterial contamination are the most frequent problems occurring in water wells.
The use of a riserless system guarantees permanent water quality without extra cost during operation.

The assembly is composed of an inflatable packer connected to the submersible pump which is lowered with a cable or a pipe.
Once the packer is inflated, the casing is used as a production column. The part of the casing located between the packer and the surface is always pressurized by water eliminating the risk of external contamination.

- **Efficient protection against bacterial contamination**
- **Long term protection against casing corrosion**
- **Fast set up and maintenance**
- **Fully compatible with standard submersible pumps**

Hydrofracturation Packers



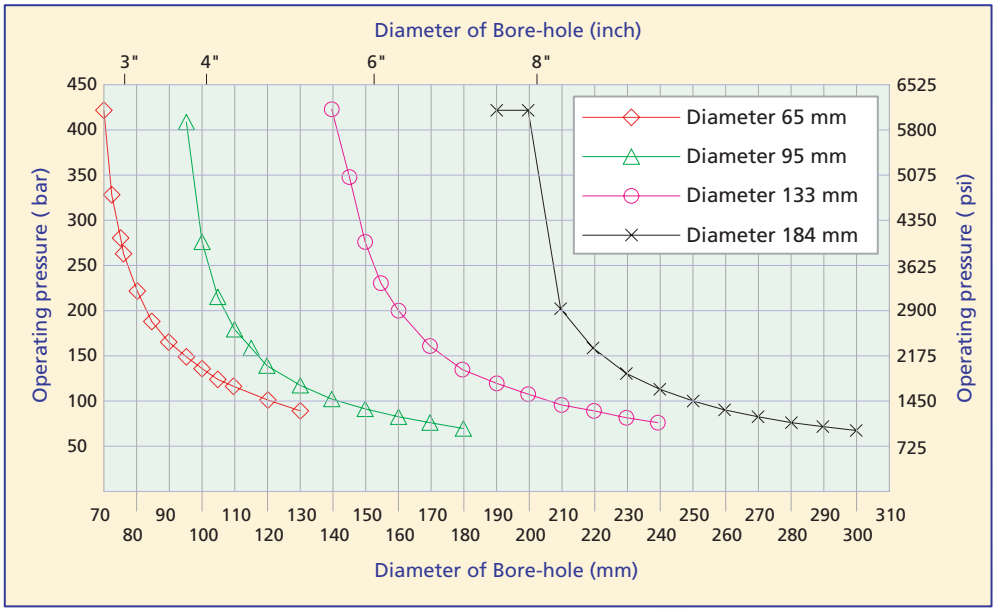
Geopro offers a range of high-pressure inflatable packers for hydraulic fracture testing, cementing or any other application which requires high pressure.

The standard range comprises four diameters from 65 mm up to 184 mm, designed for bore-holes of 3", 4", 6", and 8" and operating pressures up to 400 bar (5800 psi). They are available both as single packers and in double packers configuration.

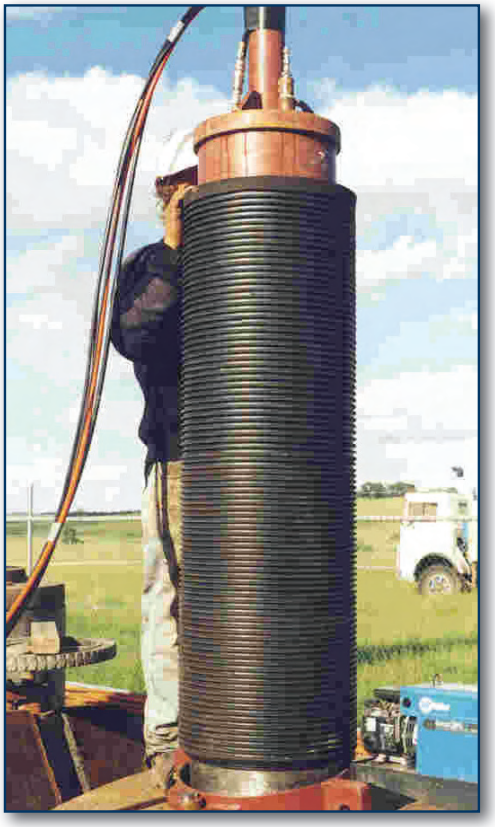
Connection to the central pipe is made by means of an NPT connector and the upper end is equipped with two UMCA type inflation adapters.

Nominal diameter	Maximum dilatation	Inner diameter of the pipe	Upper connection	Rubber length	Inflation inlets
65 mm	130 mm	14 mm	1/2" NPT	1000 mm	2 x 1/8" NPT
90 mm	180 mm	32.5 mm	1" 1/4 NPT	1000 mm	2 x 1/4" NPT
133 mm	240 mm	59 mm	2" 1/2 NPT	1200 mm	2 x 1/4" NPT
184 mm	300 mm	97 mm	4" NPT	1200 mm	2 x 1/4" NPT

Maximum operating pressures according to bore-hole diameter.



“SWAGE PACKER”. A repair systems for water wells



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Corrosion of the casing is a very common and frequent problem in water wells.

The “swage packer” method allows to carry out quickly and efficiently a local repair or a complete re-lining of water wells without compromising the existing production capacity of the well.

The method consists of using a high pressure inflatable packer to permanently deform a stainless steel tube, covered partially or completely with rubber, so that it seals against the existing casing.

Benefits include :

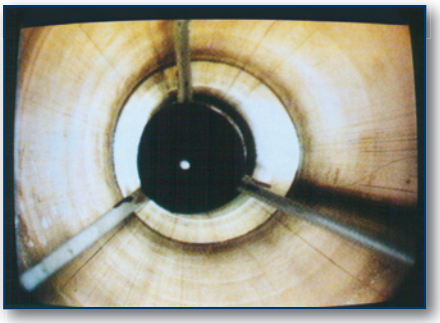
- **Fast repair with ligth equipment.**
- **Initial diameter of the well preserved**
- **Permanent mechanical seal**
- **Compatible with proven grouting techniques.**

Before Re-lining

Camera inspection of a corroded well.

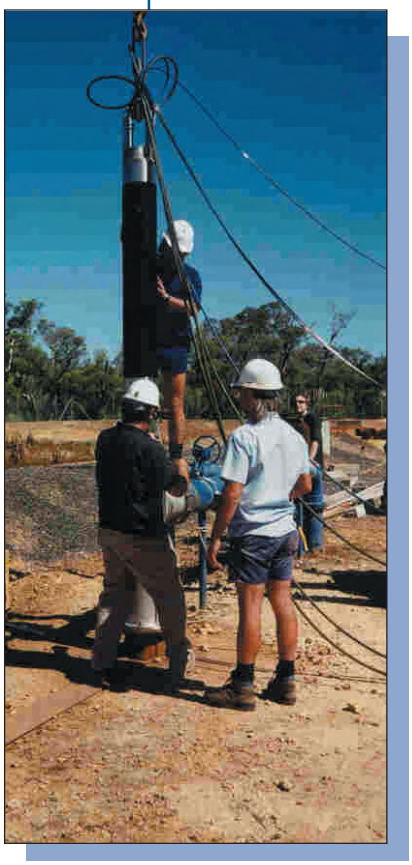
After Re-lining

Surface view of a relined well.



Camera inspection of a relined well.

Research & Development



Geopro also designs a wide range of specific products for different applications such as:

- Geotechnical engineering :
  permeability tests, aquifers samplings, ...
- Environment:
  Supervision and study of nuclear waste storage facilities,...
- Water: Reconditioning and maintenance of water wells,...

Research and development, our policy

Service

We are committed to giving a complete engineering and technical support to every customer. Geopro has created new partnerships with university departments and important industrial operators. We work closely with various companies to guarantee the success of advanced technologies developed for customers' projects.

Flexibility and customer service, our watchword

MGS

Field experience and
technical expertise are the basis
of our company.

We design, manufacture and supply
innovative equipment worldwide for:

- Consolidation and permeation grouting
- Ground water monitoring and testing
- Completion and maintenance
  of water wells

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