

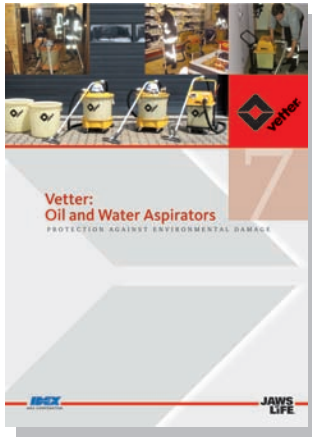
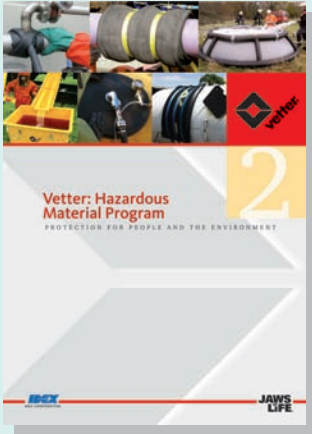


# Vetter: Rescue Products

SAFETY, NO ALTERNATIVE



Edition 01/2007



**Other Vetter product catalogues being prepared:**

Vetter: Industry

Vetter: Mobile Inspection Service

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Lifting Bags  
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## Super-Mini Lifting Bags 8.0 bar (116 psi)

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Super-Mini Lifting Bags  
8.0 bar (116 psi)

## Mini Lifting Bags 8.0 bar (116 psi)

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Mini Lifting Bags  
8.0 bar (116 psi)

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- Rescue Path
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Rescue Path  
0.5 bar (7.25 psi) NG

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- Safety Cushions
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Safety Cushions  
SP 16 / SP 25

## Resistance charts and material charts

Resistance charts  
and material charts

## Vetter Lifting Bags 1.0 bar (14.5 psi) prEN 13731



Due to their smooth power and their extremely high adaptability to every type of unevenness, Vetter lifting bags enable careful recovery of vehicles which have rolled over.

Lifting and elevation of thin-walled components as well as the rescue of trapped persons are within the versatile application field of the lifting bags. For over 40 years they have been reliable aids to fire and rescue services.

Due to the application of special tape lapping on the inside, bulging of the highly resistive rubber polyamide structure, produced for the bottom and top plates, is avoided thus achieving increased lateral stability at the same time.

The cavities on the top and bottom plates increase slip resistance on soft, marshy or snowy ground.

With correct treatment, which includes carrying out the specified inspections and storage according to DIN 7716, lifting bags will have an extremely long life cycle.



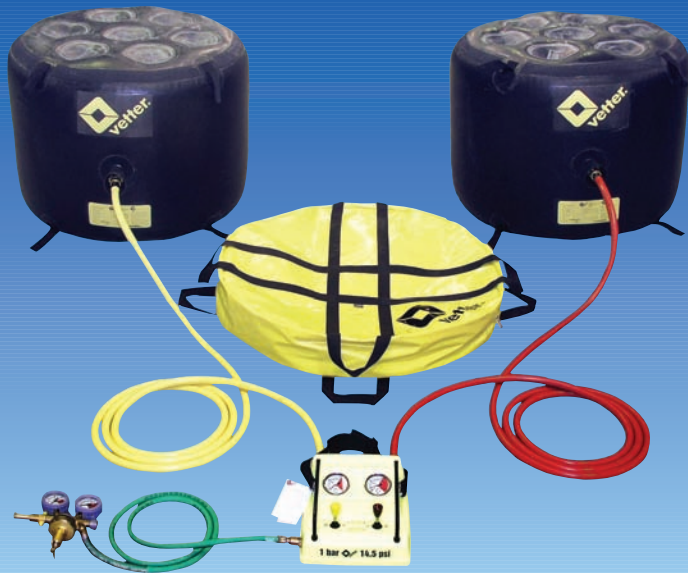
The tape lapping inside the bag

### Advantages

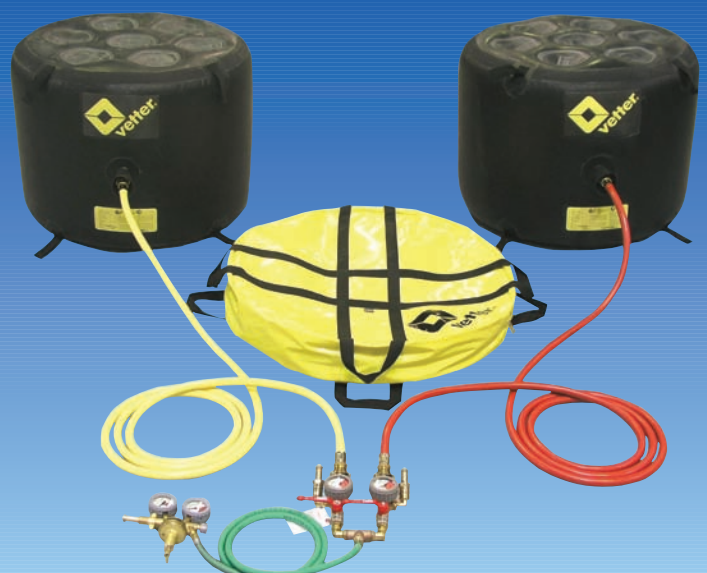
- Low pressure point loading of maximum 1000 g/cm<sup>2</sup>
- Constant lifting power over the complete lift
- High degree of flexibility, they grip a load around the edges, then lift and press simultaneously
- Can be easily repaired when damaged
- Operating pressure of 0.1 bar to 1.0 bar, regulated by a controller (1.45 psi to 14.5 psi)
- Side walls made of high quality aramide
- Life cycle with average use and correct storage: 15 - 20 years
- Patented vulcanized valve connections optimize air supply even in difficult applications.

### Safety

- Quality management according to DIN ISO 9001:2000
- Continuous product monitoring by the German testing authorities (TÜV Rheinland)
- Bursting pressure is 3 to 4 times the operating pressure
- The testing pressure is 1.5 times the operating pressure
- Tear strengths according to DIN 53354 and ongoing tear strengths according to DIN 53363
- Rubber gripping properties according to DIN 53357
- Piercing strength according to DIN 53373, 6 mm objects, 110 mm tin can, 2740 N



Set up variation: deadman controller



Set up variation: fitting controller

As a standard the lifting bag sets are supplied in two variations, one with a deadman controller and the other one with a fitting controller. The control lever of the deadman controller automatically springs back to the zero position when released. The air supply from the fitting controller is manually regulated by a ball valve. Using the accessories shown on the page “System accessories 1.0 bar (14.5 psi)” it is possible to compile an individual set.

Sets Lifting Bags 1.0 bar (14.5 psi), consisting of:

Art.-No.	Description	Art.-No. 3110000800 Set Type 1/23	Art.-No. 3110001500 Set Type 1/13	Art.-No. 3110001900 Set Type 1/9	Art.-No. 3110002200 Set Type 1/6	Art.-No. 3110003300 Set Type 1/23	Art.-No. 3110003400 Set Type 1/13	Art.-No. 3110003500 Set Type 1/9	Art.-No. 3110003600 Set Type 1/6
3110000900	Lifting Bag, Type 1/23, 1.0 bar (14.5 psi)	2				2			
3110001600	Lifting Bag, Type 1/13, 1.0 bar (14.5 psi)		2				2		
3110002000	Lifting Bag, Type 1/9, 1.0 bar (14.5 psi)			2				2	
3110002300	Lifting Bag, Type 1/6, 1.0 bar (14.5 psi)				2				2
3110000100	Valise for Lifting Bag 1/23	1				1			
3110000200	Valise for Lifting Bag 1/13		1				1		
3110000300	Valise for Lifting Bag 1/9			1				1	
3110000400	Valise for Lifting Bag 1/6				1				1
0100000501	Inflation hose 1.0 bar, 5 m, yellow (14.5 psi, 16.4 ft.)	1	1	1	1	1	1	1	1
0100001301	Inflation hose 1.0 bar, 5 m, red (14.5 psi, 16.4 ft.)	1	1	1	1	1	1	1	1
0100001801	Dual fitting controller, 1.0 bar (14.5 psi)	1	1	1	1				
0100001100	Dual deadman controller, 1.0 bar (14.5 psi)					1	1	1	1
1600000200	Pressure regulator, 200/300 bar (3,000/4,500 psi)*	1	1	1	1	1	1	1	1
0100001000	Set repair material 0.5/1.0 bar (7.25/14.5 psi)	1	1	1	1	1	1	1	1
9987000600	Operating instruction Lifting Bags	1	1	1	1	1	1	1	1

\* Pressure regulator US-Version: 1600005301  
Pressure regulator FR-Version: 1600004700



Lifting bag under a light aircraft

Rescue of injured people

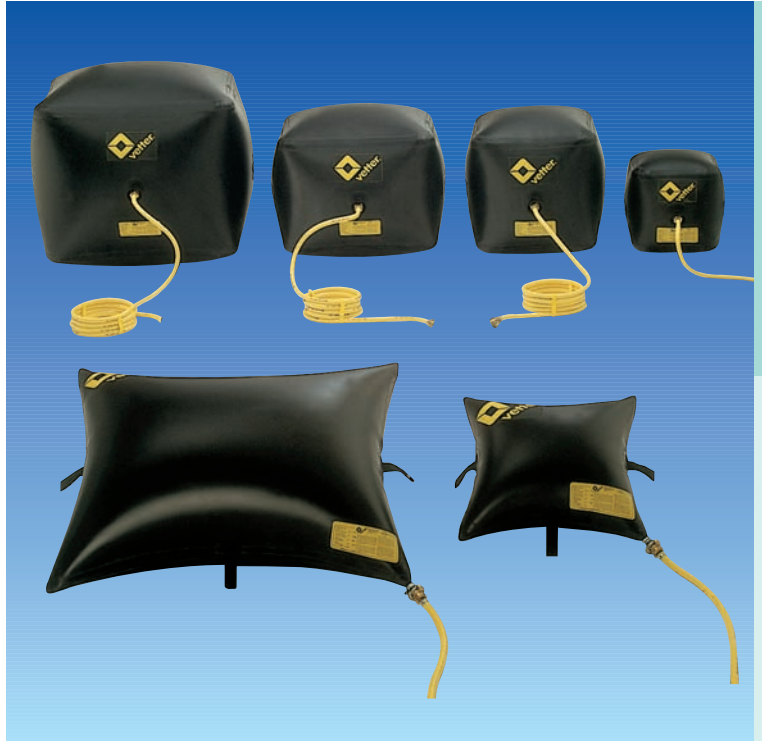
### Technical Data Lifting Bags 1.0 bar (14.5 psi)

	Unit	Set 1/23	Lifting Bag 1/23	Set 1/13	Lifting Bag 1/13	Set 1/9	Lifting Bag 1/9	Set 1/6	Lifting Bag 1/6
Art.-No. for set with fitting controller		3110000800	3110000900	3110001500	3110001600	3110001900	3110002000	3110002200	3110002300
Art.-No. for set with deadman controller		3110003300		3110003400		3110003500		3110003600	
Lifting power	to US tons	22.60 24.90	11.30 12.45	13.00 14.30	6.50 7.15	9.00 9.90	4.50 4.95	6.00 6.60	3.00 3.30
Lifting height max.	cm inch	110 43	110 43	62 24	62 24	60 24	60 24	45 18	45 18
Insertion height (uninflated)	cm inch		3 1.2		3 1.2		3 1.2		3 1.2
Diameter	cm inch		120 47		91 36		76 30		61 24
Working pressure	bar psi	1.0 14.5	1.0 14.5	1.0 14.5	1.0 14.5	1.0 14.5	1.0 14.5	1.0 14.5	1.0 14.5
Test pressure	bar psi	1.5 21.75	1.5 21.75	1.5 21.75	1.5 21.75	1.5 21.75	1.5 21.75	1.5 21.75	1.5 21.75
Air requirement at 1.0 bar (14.5 psi)	l cu. ft.	4,972 175	2,486 88	1,612 57	806 28	1,088 38	544 19	524 19	262 9
Nominal content	l cu. ft.	2,486 88	1,243 44	806 28	403 14	544 19	272 9.6	262 9	131 4.6
Inflation time, approx.	sec.	382	191	124	62	84	42	40	20
Packaged size	cm inch	125 x 20 49 x 8		95 x 20 37 x 8		80 x 20 31.5 x 8		65 x 20 25.6 x 8	
Weight for set with fitting controller	kg lbs	57.5 127	21 46	39.7 87	12 26	31.7 70	9 20	24.7 54	7 15
Weight for set with deadman controller	kg lbs	58 128	21 46	40 88	12 26	32 71	9 20	25 55	7 15

Technical changes reserved!

Vetter pressure bags, including the rescue set 1.0 bar (14.5 psi) prEN 13731, are used where large heights and exceptional adaptability is required but still maintaining constant “smooth power”.

For example, lifting and erecting overturned vehicles, especially thin-walled body parts of cars, buses, lorries and trains. However lifting bags are also the quick and safe solution in emergency situations such as supports in pits or in the rescue of trapped people and animals.



Lifting Bags  
1.0 bar (14.5 psi)

The rescue set shown here with a total lift power of 12.1 tons (13.3 US tons) offers an economical alternative to the lifting bag set 1/13 with deadman controller (refer to Pages 2-4). The main difference is in the simpler construction.



## Advantages

- Variable pressure up to 1.0 bar (14.5 psi)
- Better stability due to the square shape
- Cut-proof top and bottom plates
- Side walls made of tear-proof aramide
- Repairable

## Safety

- High safety factor 1:4
- Integrated safety valve – in addition to the safety valve in the controller (with the rescue set)
- Design test ZU 247/3
- Piercing strength according to DIN 53373, 6 mm objects, 110 mm tin can, 275 kg

Set, consisting of:

Art.-No.	Description	Art.-No. 3110003200 Rescue Set
3110002900	Lifting Bag, Type LH 1/30 S, 1.0 bar (14.5 psi)	2
3110000700	Valise 110 x 72 x 30 cm (43 x 28 x 12 inch)	1
0100000501	Inflation hose 1.0 bar, 5 m, yellow (14.5 psi, 16.4 ft.)	1
0100001301	Inflation hose 1.0 bar, 5 m, red (14.5 psi, 16.4 ft.)	1
0100001100	Dual deadman controller, 1.0 bar (14.5 psi)	1
1600000200	Pressure regulator 200/300 bar (3,000/4,500 psi)*	1
0100001000	Set repair material 0.5/1.0 bar (7.25/14.5 psi)	1
9987000600	Operating instruction Lifting Bags	1

\* Pressure regulator US-Version: 1600005301  
Pressure regulator FR-Version: 1600004700

### Technical Data Pressure Bags 1.0 bar (14.5 psi)

Art.-No.	Unit	LH 1/10	LH 1/30	LH 1/10 S	LH 1/20 S	LH 1/30 S	LH 1/50 S	Rescue Set
		3110002500	3110002600	3110002700	3110002800	3110002900	3110003100	3110003200
Lifting power	to	2.08	6.18	2.16	4.46	6.05	7.11	12.1
	US tons	2.29	6.81	2.38	4.92	6.67	7.84	13.3
Lifting height max.	cm	21	43	37	65	65	75	65
	inch	8	17	15	26	26	30	26
Insertion height (uninflated)	cm	2	2	4	4	4	4	
	inch	0.8	0.8	1.6	1.6	1.6	1.6	
Size	cm	65 x 32	65 x 95	50 x 45	70 x 65	90 x 71	90 x 80	
	inch	26 x 13	26 x 37	20 x 18	28 x 26	35 x 28	35 x 32	
Working pressure	bar	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	psi	14.5	14.5	14.5	14.5	14.5	14.5	14.5
Test pressure	bar	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	psi	21.75	21.75	21.75	21.75	21.75	21.75	21.75
Air requirement at 1.0 bar (14.5 psi)	l	52	228	248	760	1,082	1,434	2,164
	cu. ft.	1.84	8.05	8.75	26.83	38.19	50.62	76.39
Nominal content	l	26	114	124	380	541	717	1,082
	cu. ft.	0.92	4.02	4.38	13.41	19.10	25.31	38.19
Packaged size (L x W x H)	cm							110 x 72 x 30
	inch							43 x 28 x 12
Inflation time, approx.	sec.	4	18	19	58	83	110	164
Weight, approx.	kg	2.5	6.0	3.1	5.5	7.0	11.0	25
	lbs	5.5	13.2	6.8	12.1	15.4	24.3	55.1

Technical changes reserved!



# For your safety. Vetter accessories for system 1.0 bar (14.5 psi)

## Inflation hose 1.0 bar (14.5 psi) and Shut-off unit



Art.-No. 010000501  
Inflation hose 1.0 bar,  
5 m, yellow  
(14.5 psi, 16.4 ft.)



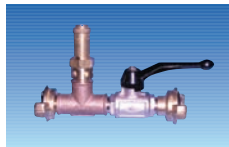
Art.-No. 0100001301  
Inflation hose 1.0 bar,  
5 m, red  
(14.5 psi, 16.4 ft.)



Art.-No. 0100000701  
Inflation hose 1.0 bar,  
10 m, yellow  
(14.5 psi, 32 ft.)



Art.-No. 0100001401  
Inflation hose 1.0 bar,  
10 m, red  
(14.5 psi, 32 ft.)



Art.-No. 0100000300  
Shut-off unit 1.0 bar  
(14.5 psi)

## Controllers 1.0 bar (14.5 psi)



Art.-No. 0100001501  
Single fitting controller,  
1.0 bar (14.5 psi)



Art.-No. 0100001801  
Dual fitting controller,  
1.0 bar (14.5 psi)

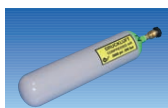


Art.-No. 0100001100  
Dual deadman controller,  
1.0 bar (14.5 psi)

## Please choose your additional accessories according to the air source

Compressed air cylinder	Compressor	Brake line of a truck	Tyre inflation system	Tyre	Commercial hand or foot pump	Fixed compressed air installation
<p>Art.-No. 1600000200 Pressure regulator 200/300 bar (3,000/4,500 psi)</p>	<p>Art.-No. 1600013401 Air-supply hose 10 m, green (32 ft.)</p>					<p>Art.-No. 1600013601 Air-supply hose 10 m, green (32 ft.) with shut-off unit</p>
or alternative						

US-Version: 1600005301  
FR-Version: 1600004700



**Compressed air cylinders**  
Art.-No. 1600011600  
Safety and carrier rack for compressed air cylinder 6 l/300 bar (0.2 cu.ft./4,500 psi)  
Art.-No. 1600019900  
9 l/300 bar (0.3 cu.ft./4,500 psi)  
Art.-No. 1600010500  
10 l/200 bar (0.35 cu.ft./3,000 psi)



Art.-No. 1600011600  
Safety and carrier rack for compressed air cylinder 6 l/300 bar (0.2 cu.ft./4,500 psi)  
**Two cylinder rack**



Art.-No. 1600011600  
Safety and carrier rack for compressed air cylinder 6 l/300 bar (0.2 cu.ft./4,500 psi) (you have to use this article two times for the four cylinder rack)  
Art.-No. 1600011800  
Trolley for safety and carrier rack  
**Four cylinder rack**

Supplied without cylinders.



Art.-No. 1600012000  
Construction-site compressor adaptor



Art.-No. 1600008200  
Adaptor for portable compressor



Art.-No. 1600007500  
Truck brake connector, 2 way



Art.-No. 1600012600  
Sealing-off cap



Art.-No. 1600007800  
Tyre inflation system adaptor



Art.-No. 1600012900  
Tyre valve connector



Art.-No. 1600008000  
Truck tyre valve



Art.-No. 1600008200  
Compressed-air mains connector



Art.-No. 1600014500  
Pressure regulator max. 20 bar (290 psi)

If the outgoing pressure of the fixed compressed air installation is higher than the permitted filling pressure of the controller, you have to replace the compressed-air mains connector with this pressure regulator.



Art.-No. 1600012500  
Set universal connectors

## Vetter Super-Mini Lifting Bags 8.0 bar (116 psi)

Vetter Super-Mini Lifting Bags release their power in narrow spaces. Their advantages can be seen when used in spaces just about big enough to fit a hand. The main advantage for all sizes is the low height of only 2.5 cm (1 inch).

The compact equipment design, contained in a handy transport case, fits into the limited space of a fire service truck or rescue vehicle.

The bags have a multi-layer construction made of aramide. Two standard set combinations are available: one version carries out inflation with a foot pump and the other version inflates the bags with a compressed air bottle.

Each accessory for the Mini Lifting Bag 8.0 bar (116 psi) is available, refer to “System accessories 8.0 bar (116 psi)”.



### Advantages

- Extremely small
- Quick application
- Inflation time: 1.4 seconds at the most (with compressed air bottle)
- Equipment ready for operation in a handy transport case

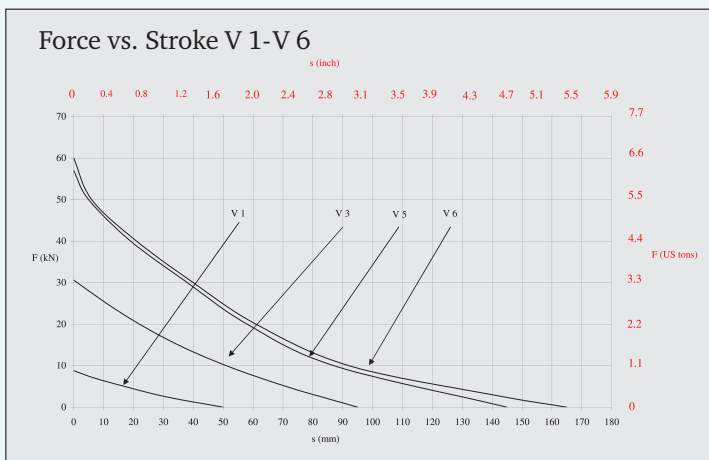
### Safety

- Field proven series compressed air bottle with the inspection seal from the German Testing Authorities (TÜV)
- Inflation fitting or foot air pump with integrated safety valve and manometer
- Brief operating instructions on the bag



Sets Super-Mini Lifting Bags 8.0 bar (116 psi) consisting of:

Art.-No.	Description	Art.-No. 1314010100 Set "compressed-air inflation"	Art.-No. 1314009200 Set "foot pump"
1314009300	Super-Mini Lifting Bag, Type V 1	1	1
1314009500	Super-Mini Lifting Bag, Type V 3	1	1
1314009600	Super-Mini Lifting Bag, Type V 6	1	1
080000901	Inflation hose 8.0 bar, 5 m, yellow (116 psi, 16.4 ft.)	1	1
0800009601	Dual inflation distributor with 2 hoses, each 1 m (3.5 ft.), yellow	1	
0800009800	Inflation and safety device for compressed-air	1	
1600010100	Compressed-air cylinder 1 l/200 bar (0.035 cu. ft./3,000 psi)	1	
0800009900	Foot pump with safety valve 8.0 bar (116 psi)		1
0800010800	Transport case Super-Mini Lifting Bags "compressed-air inflation"	1	
0800009700	Transport case Super-Mini Lifting Bags "foot pump"		1



In order to use the maximum lift power the complete effective area, i.e. the total area minus the edge areas, must be under the load to be lifted and the bag must be pressurized to the maximum permissible operating pressure.

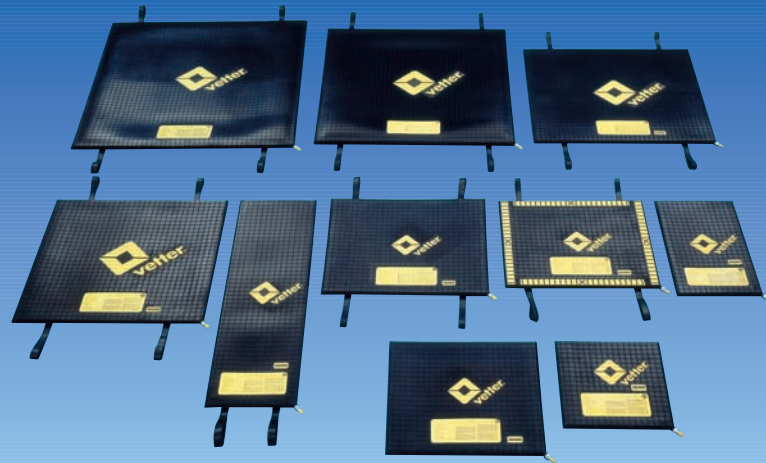
Technical Data Super-Mini Lifting Bags 8.0 bar (116 psi)



Art.-No.	Unit	Set with foot pump 1314009200	Set for compressed-air inflation 1314010100	V1 1314009300	V3 1314009500	V5 1314018200	V6 1314009600
Lifting power	to US tons			1.0 1.1	3.29 3.63	5.70 6.29	6.36 7.01
Lifting height max.	cm inch			7.5 3.0	12.0 4.7	14.5 5.7	16.5 6.5
Insertion height (uninflated)	cm inch			2.5 1.0	2.5 1.0	2.5 1.0	2.5 1.0
Size	cm inch			14.0 x 13.0 5.5 x 5.1	25.5 x 20.0 10.0 x 7.9	28.0 x 28.0 11.0 x 11.0	29.5 x 29.5 11.6 x 11.6
Working pressure	bar psi	8 116	8 116	8 116	8 116	8 116	8 116
Test pressure	bar psi	12 174	12 174	12 174	12 174	12 174	12 174
Bursting pressure	bar psi			56.3 816.4	49.9 723.6	41.0 594.5	38.7 561.2
Air requirement at 8.0 bar (116 psi)	l cu. ft.	58.1 2.1	58.1 2.1	2.7 0.1	15.8 0.6	28.4 1.0	39.6 1.4
Nominal content	l cu. ft.	6.45 0.23	6.45 0.23	0.30 0.01	1.75 0.06	3.16 0.11	4.40 0.16
Inflation time, approx.	sec.			0.50	1.00	1.30	1.40
Size transport case (L x W x H)	cm inch	60 x 40 x 13.5 24 x 16 x 5	60 x 40 x 13.5 24 x 16 x 5				
Weight, approx.	kg lbs	9.80 21.60	10.80 23.80	0.44 0.97	1.10 2.43	1.70 3.75	1.95 4.30

Technical changes reserved!

## Vetter Mini Lifting Bags 8.0 bar (116 psi)



The distinguishing feature of Vetter Mini Lifting Bags 8.0 bar (116 psi) is the noiseless, jolt-free, and smooth lifting of the heaviest loads. They lift, push, press, prise and split, even on sloping surfaces. The surface profile improves grip on slippery ground such as grass, sand etc.

They are produced in two versions. Both versions have a multi-layer construction which covers each side of the bag. This is either steelcord or aramide reinforcement.

The advantage of aramide reinforcement over steelcord reinforcement is its low weight (refer to the technical data).

On the other hand, steelcord reinforcement has a greater pragmatical value.

Both versions have antistatic and self-extinguishing characteristics and are therefore permitted for the mining industry.

Inflation of the Mini Lifting Bags is normally carried out with compressed air (option water).

The accessories required for inflation can be seen on the page "System accessories 8.0 bar (116 psi)" and can be individually compiled.

In every case, an inflation hose and a controller, or a combination of both, belong to the inflation installation. The controllers are equipped with a manometer and a safety valve and therefore avoid unintentional over-inflation of the Mini Lifting Bags.

The remaining accessories can be selected from the lower part, depending on the type of air source required or which exists.

### Advantages

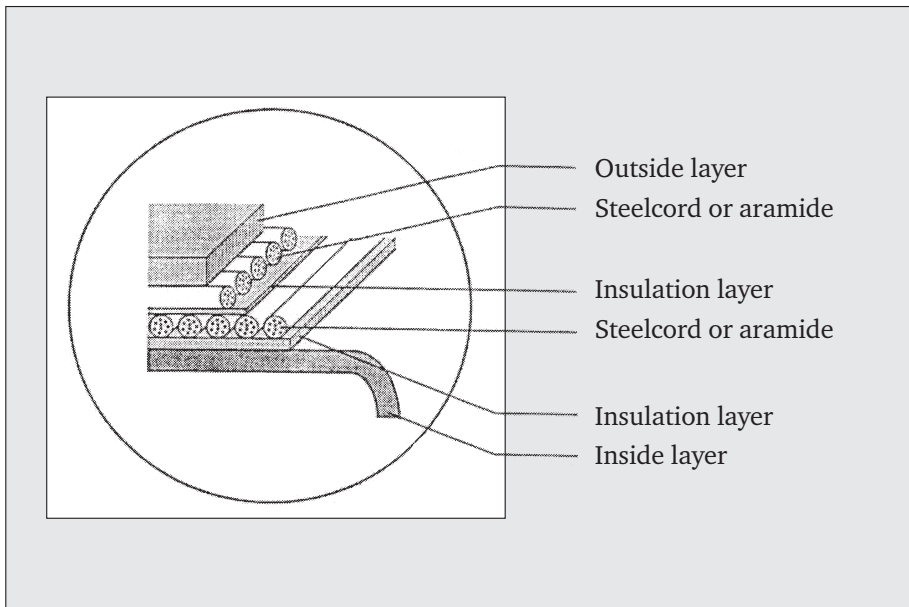
- Insertion height 2.5 cm (1 inch)
- Technical data is vulcanized in yellow lettering on the bag
- Three controller versions are available
- Very high lifting power
- A life cycle of 15 – 20 years with average use and correct storage
- Quickly operational (5 seconds for the Mini Lifting Bag type V 10)

### Safety

- Inspected by the German Testing Authorities (TÜV Rheinland)
- GS label
- Continuous production monitoring by specialists from the German Testing Authorities (TÜV Rheinland)
- For example: artificial aging with 1250 hours, 2500 hours and 5000 hours at 80°C with the V 31 and then a burst pressure of 34 bar

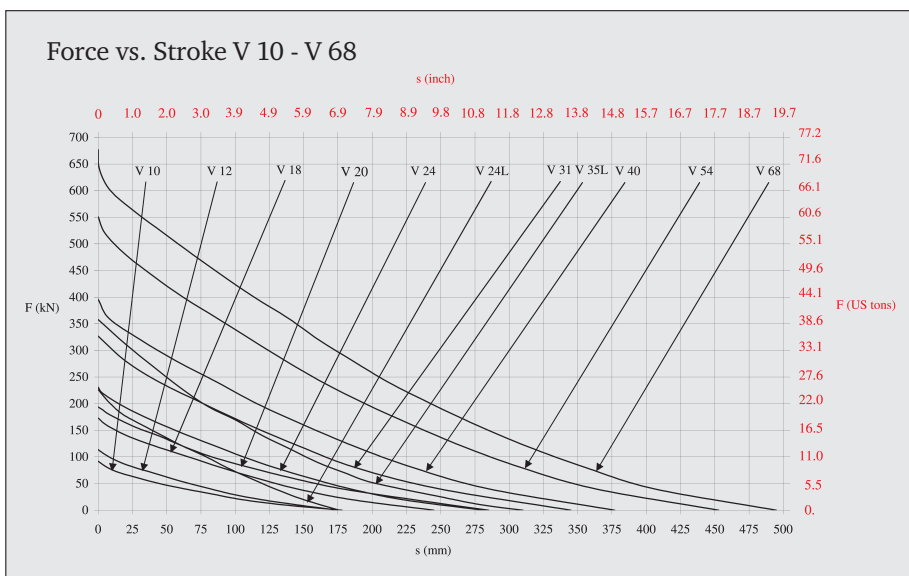
Load testing:

- a) with 17 kN by 11 steel bolts (16 mm diameter), point loading 3.85 N/mm<sup>2</sup>. Result: only slight indentation on the outside surface.
- b) a ball, 70 cm (155 kg), dropped from a height of 7 m. Result: no damage, only a pressure increase of 2.5 bar.
- c) impulse loading by falling object 17 kN, bolt 16 mm, 50 mm long, height of drop up to 4 m. Result: no damage.
- d) dynamic duration loading with a 16 ton machine, energy 1280 Nm, 0.4 m/sec, over 60,000 load changes.
- e) impact tests with pointed object having 50 N, round shaped and nail shaped tips, drop height 7 m. Result: no leaks.



Due to our extensive tests, experience and high quality standards, we guarantee the Mini Lifting Bag 8.0 bar (116 psi) for 36 months with respect to material and production defects.

Mini Lifting Bags  
8.0 bar (116 psi)



Selection of the Mini Lifting Bag is dependent on the weight of the load to be lifted as well as the height.

This means that the Mini Lifting Bag develops the greatest lift power at the beginning of the lift and the greatest possible lift height in the unloaded state. The result is that the lift height becomes shorter with increased load. This can be seen in the “Force vs. Stroke diagram”.

These diagrams can be obtained for each individual bag on request.

### Technical Data Mini Lifting Bags 8.0 bar (116 psi), steelcord



	Unit	V10	V12	V18	V20	V24	V24L	V31	V35L	V40	V54	V68
Art.-No.		131000600	1310001000	1310001100	1310002100	1310001200	1310001300	1310001400	1310008200	1310001500	1310001600	1310001700
Lifting power	to	9.60	12.00	17.70	19.40	24.00	24.00	31.40	35.8	39.60	54.40	67.70
	US tons	10.58	13.23	19.51	21.38	26.46	26.46	34.61	39.49	43.65	59.97	74.63
Lifting height max.	cm	20.3	20.0	27.0	28.0	30.6	20.1	37.0	31.0	40.2	47.8	52.0
	inch	8.0	7.9	10.6	11.0	12.0	7.9	14.6	12.2	15.8	18.8	20.5
Insertion height (uninflated)	cm	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.8	2.8
	inch	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1
Size	cm	37 x 37	32 x 52	47 x 52	48 x 58	52 x 62	31 x 102	65 x 69	43 x 115	78 x 69	86 x 86	95 x 95
	inch	15 x 15	13 x 20	19 x 20	19 x 23	20 x 24	12 x 40	26 x 27	17 x 45	31 x 27	34 x 34	37 x 37
Working pressure	bar	8	8	8	8	8	8	8	8	8	8	8
	psi	116	116	116	116	116	116	116	116	116	116	116
Test pressure	bar	16	16	16	16	16	16	16	16	16	16	16
	psi	232	232	232	232	232	232	232	232	232	232	232
Bursting pressure	bar	48.3	71.3	54.7	55.3	65.0	74.3	44.0	37.0	35.0	35.5	34.7
	psi	700	1,034	793	801	942	1,077	638	537	507	515	503
Air requirement at 8.0 bar (116 psi)	l	82.8	96.3	195.3	224.1	296.1	211.5	517.5	349.4	675.0	1,117.8	1,457.1
	cu. ft.	2.9	3.4	6.9	7.9	10.4	7.5	18.0	12.3	23.6	39.5	51.4
Nominal content	l	9.2	10.7	21.7	24.9	32.9	23.5	57.5	38.8	75.0	124.2	161.9
	cu. ft.	0.3	0.4	0.7	0.9	1.2	0.8	2.0	1.4	2.6	4.3	5.7
Inflation time, approx.	sec.	5	6	11	14	18	13	31	35	41	68	88
Weight, approx.	kg	4.3	5.1	7.5	8.7	9.8	9.7	13.6	15.8	16.3	27.3	33.8
	lbs	9.5	11.3	16.5	19.2	21.6	21.4	30.0	34.8	35.9	60.2	74.5

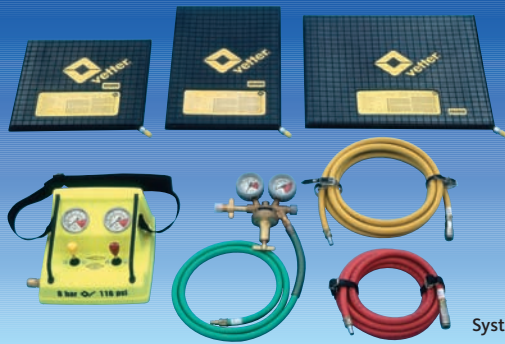
Technical changes reserved!

### Technical Data Mini Lifting Bags 8.0 bar (116 psi), aramide

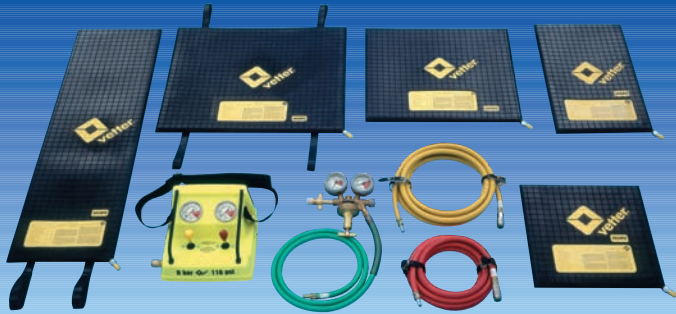


	Unit	V10	V12	V18	V20	V24	V24L	V31	V35L	V40	V54	V68
Art.-No.		1314002200	1314002400	1314002500	1314003400	1314002600	1314002700	1314002800	1314018300	1314002900	1314003000	1314003100
Lifting power	to	9.60	12.00	17.70	19.40	24.00	24.00	31.40	35.8	39.60	54.40	67.70
	US tons	10.58	13.23	19.51	21.38	26.46	26.46	34.61	39.49	43.65	59.97	74.63
Lifting height max.	cm	20.3	20.0	27.0	28.0	30.6	20.1	37.0	31.0	40.2	47.8	52.0
	inch	8.0	7.9	10.6	11.0	12.0	7.9	14.6	12.2	15.8	18.8	20.5
Insertion height (uninflated)	cm	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.8	2.8
	inch	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1
Size	cm	37 x 37	32 x 52	47 x 52	48 x 58	52 x 62	31 x 102	65 x 69	43 x 115	78 x 69	86 x 86	95 x 95
	inch	15 x 15	13 x 20	19 x 20	19 x 23	20 x 24	12 x 40	26 x 27	17 x 45	31 x 27	34 x 34	37 x 37
Working pressure	bar	8	8	8	8	8	8	8	8	8	8	8
	psi	116	116	116	116	116	116	116	116	116	116	116
Test pressure	bar	12	12	12	12	12	12	12	12	12	12	12
	psi	174	174	174	174	174	174	174	174	174	174	174
Bursting pressure	bar	73.0	73.0	62.5	53.1	55.5	73.0	38.0	37.0	38.0	36.0	32.5
	psi	1,058	1,058	906	770	805	1,058	551	537	551	522	471
Air requirement at 8 bar (116 psi)	l	82.8	96.3	195.3	224.1	296.1	211.5	517.5	349.4	675.0	1,117.8	1,457.1
	cu. ft.	2.9	3.4	6.9	7.9	10.4	7.5	18.0	12.3	23.6	39.5	51.4
Nominal content	l	9.2	10.7	21.7	24.9	32.9	23.5	57.5	38.8	75.0	124.2	161.9
	cu. ft.	0.3	0.4	0.7	0.9	1.2	0.8	2.0	1.4	2.6	4.3	5.7
Inflation time, approx.	sec.	5	6	11	14	18	13	31	35	41	68	88
Weight, approx.	kg	3.0	3.6	5.3	5.8	6.7	6.3	9.5	10.1	11.4	16.2	19.5
	lbs	6.6	7.9	11.7	12.8	14.8	13.9	21.0	22.3	25.1	35.7	43.0

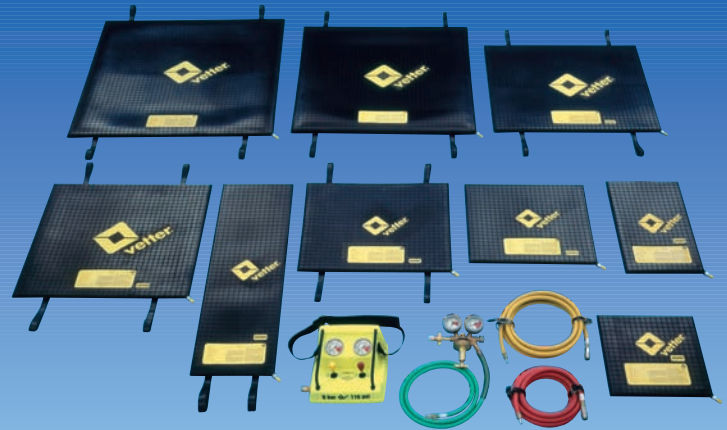
Technical changes reserved!



System 393



System 873



System 2804

Sets Mini Lifting Bags 8.0 bar (116 psi), steelcord, consisting of:

Art.-No.	Description	Art.-No. 1310004800 System 393 KN	Art.-No. 1310004900 System 873 KN	Art.-No. 1310005000 System 2804 KN
160000200	Pressure regulator 200/300 bar (3,000/4,500 psi)*	1	1	1
0800001600	Dual deadman controller 8.0 bar (116 psi)	1	1	1
0800000901	Inflation hose 8.0 bar, 5 m, yellow (116 psi, 16.4 ft.)	1	1	1
0800001301	Inflation hose 8.0 bar, 5 m, red (116 psi, 16.4 ft.)	1	1	1
1310000600	Mini Lifting Bag, Type V 10 Steelcord	1	1	1
1310001000	Mini Lifting Bag, Type V 12 Steelcord	1	1	1
1310001100	Mini Lifting Bag, Type V 18 Steelcord	1	1	1
1310001200	Mini Lifting Bag, Type V 24 Steelcord		1	1
1310001300	Mini Lifting Bag, Type V 24 L Steelcord		1	1
1310001400	Mini Lifting Bag, Type V 31 Steelcord			1
1310001500	Mini Lifting Bag, Type V 40 Steelcord			1
1310001600	Mini Lifting Bag, Type V 54 Steelcord			1
1310001700	Mini Lifting Bag, Type V 68 Steelcord			1

\* Pressure regulator US-Version: 1600005301

Pressure regulator FR-Version: 1600004700

Sets Mini Lifting Bags 8.0 bar (116 psi), aramide, consisting of:

Art.-No.	Description	Art.-No. 1314008200 System 393 KN	Art.-No. 1314008300 System 873 KN	Art.-No. 1314008400 System 2804 KN
160000200	Pressure regulator 200/300 bar (3,000/4,500 psi)*	1	1	1
0800001600	Dual deadman controller 8.0 bar (116 psi)	1	1	1
0800000901	Inflation hose 8.0 bar, 5 m, yellow (116 psi, 16.4 ft.)	1	1	1
0800001301	Inflation hose 8.0 bar, 5 m, red (116 psi, 16.4 ft.)	1	1	1
1314002200	Mini Lifting Bag, Type V 10 Aramide	1	1	1
1314002400	Mini Lifting Bag, Type V 12 Aramide	1	1	1
1314002500	Mini Lifting Bag, Type V 18 Aramide	1	1	1
1314002600	Mini Lifting Bag, Type V 24 Aramide		1	1
1314002700	Mini Lifting Bag, Type V 24 L Aramide		1	1
1314002800	Mini Lifting Bag, Type V 31 Aramide			1
1314002900	Mini Lifting Bag, Type V 40 Aramide			1
1314003000	Mini Lifting Bag, Type V 54 Aramide			1
1314003100	Mini Lifting Bag, Type V 68 Aramide			1

\* Pressure regulator US-Version: 1600005301

Pressure regulator FR-Version: 1600004700

# For your safety. Vetter accessories for system 8.0 bar (116 psi)

## Inflation hoses 8.0 bar (116 psi)



Inflation hoses 8.0 bar, 5 m (116 psi, 16.4 ft.)

Art.-No. 080000901 (yellow)  
 Art.-No. 0800001301 (red) Art.-No. 0800000601 (blue)  
 Art.-No. 0800000701 (grey) Art.-No. 0800000801 (green)

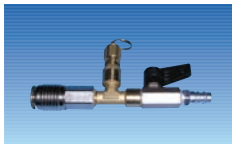


Inflation hoses 8.0 bar, 10 m (116 psi, 32 ft.)

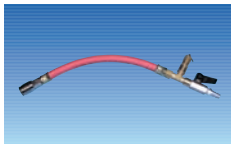
Art.-No. 0800007401 (yellow)  
 Art.-No. 0800007601 (red) Art.-No. 0800007801 (blue)  
 Art.-No. 0800007901 (grey) Art.-No. 0800007501 (green)



## Shut-off unit/Inline relief hoses



Art.-No. 0800005800  
 Shut-off unit  
 8.0 bar (116 psi)



Shut-off unit 8.0 bar,  
 0.3 m (116 psi, 1 ft.)  
 Art.-No. 0800007201 (red)  
 Art.-No. 0800007301  
 (yellow)

## Controllers 8.0 bar (116 psi)



Art.-No. 0800002001  
 Single fitting controller,  
 8.0 bar (116 psi)



Art.-No. 0800002401  
 Dual fitting controller  
 8.0 bar (116 psi)



Art.-No. 0800001600  
 Dual deadman controller  
 8.0 bar (116 psi)



Art.-No. 0800000401  
 Single deadman controller  
 8.0 bar (116 psi),  
 aluminium style



Art.-No. 0800000201  
 Dual deadman controller  
 8.0 bar (116 psi),  
 aluminium style

## Please choose your additional accessories according to the air source

### Compressed air cylinder



Art.-No. 1600000200  
 Pressure regulator  
 200/300 bar  
 (3,000/4,500 psi)

US-Version: 1600005501  
 FR-Version: 1600004700

### Compressor



Art.-No. 1600013401  
 Air-supply hose  
 10 m, green (32 ft.)

### Brake line of a truck

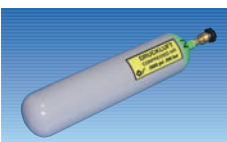
### Tyre inflation system

### Tyre



Art.-No. 1600013601  
 Air-supply hose  
 10 m, green (32 ft.)  
 with shut-off unit

or alternative



### Compressed air cylinders

Art.-No. 1600010100  
 1 l/200 bar  
 (0.04 cu.ft./3,000 psi)  
 Art.-No. 1600010800  
 6 l/300 bar  
 (0.2 cu.ft./4,500 psi)  
 Art.-No. 1600019900  
 9 l/300 bar  
 (0.3 cu.ft./4,500 psi)  
 Art.-No. 1600010500  
 10 l/200 bar  
 (0.35 cu.ft./3,000 psi)



Art.-No. 1600011600  
 Safety and carrier rack for  
 compressed air cylinder  
 6 l/300 bar  
 (0.2 cu.ft./4,500 psi)  
**Two cylinder rack**



Art.-No. 1600011600  
 Safety and carrier rack for  
 compressed air cylinder  
 6 l/300 bar  
 (0.2 cu.ft./4,500 psi)  
 (you have to use this  
 article two times for the  
 four cylinder rack)  
 Art.-No. 1600011800  
 Trolley for safety  
 and carrier rack  
**Four cylinder rack**

Supplied  
 without cylinders.



Art.-No. 1600012000  
 Construction-site  
 compressor adaptor



Art.-No. 1600008200  
 Adaptor for portable  
 compressor



Art.-No. 1600007500  
 Truck brake connector,  
 2 way



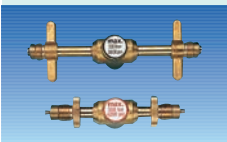
Art.-No. 1600012600  
 Sealing-off cap



Art.-No. 1600007800  
 Tyre inflation system  
 adaptor



Art.-No. 1600012900  
 Tyre valve connector



Art.-No. 1600009100  
 Dual connector  
 300 bar (4,500 psi)  
 Art.-No. 1600008400  
 Dual connector  
 200 bar (3,000 psi)



Art.-No. 1600012500  
 Set universal connectors



**8.0 bar (116 psi)**



**Shut-off unit 8.0 bar, 5 m (116 psi, 16.4 ft.)**  
 Art.-No. 0800008201 (yellow)  
 Art.-No. 0800008401 (red)  
 Art.-No. 0800008601 (grey)  
 Art.-No. 0800008801 (blue)  
 Art.-No. 0800009001 (green)



**Shut-off unit 8.0 bar, 10 m (116 psi, 32 ft.)**  
 Art.-No. 0800008301 (yellow)  
 Art.-No. 0800008501 (red)  
 Art.-No. 0800008701 (grey)  
 Art.-No. 0800008901 (blue)  
 Art.-No. 0800009101 (green)

**Inflation and safety hose 8.0 bar (116 psi)**

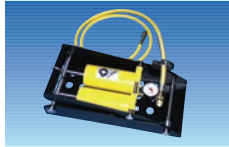


Art.-No. 0800008101  
 Inflation and safety hose 8.0 bar, 10 m, yellow (116 psi, 32 ft.)

**Foot pumps with safety-valve and pressure gauge**



Art.-No. 0800009900  
 Foot pump with safety-valve 8.0 bar (116 psi) and pressure gauge, 420 cm/stroke (25.6 cu.in.)



Art.-No. 0800012400  
 Foot pump with safety-valve 8.0 bar (116 psi) and pressure gauge, 800 cm/stroke (48.8 cu.in.)

**Complete Systems**



Art.-No. 0800002701  
 Swift Attack Gear SAG 8, consisting of: pressure regulator, 2 inflation hoses 8.0 bar (116 psi), dual deadman controller 8.0 bar (116 psi)  
 US-Version: 0800002801  
 FR-Version: 0800004001

Supplied without cylinders



Art.-No. 0800010301  
 Set of accessories 8.0 bar (116 psi) in transport case  
 US-Version: 0800012600

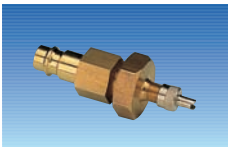
Commercial hand or foot pump

Fixed compressed air installation

Hand or foot pump



Art.-No. 1600008700  
 Hand pump, 520 ccm/stroke (31.7 cu.in.)  
 Art.-No. 1600009400  
 Foot pump, 420 ccm/stroke (25.6 cu.in.)



Art.-No. 1600008000  
 Truck tyre valve



Art.-No. 1600008200  
 Compressed-air mains connector



Art.-No. 1600014500  
 Pressure regulator max. 20 bar (290 psi)

If the outgoing pressure of the fixed compressed air installation is higher than the permitted filling pressure of the controller, you have to replace the compressed-air mains connector with this pressure regulator.

# Vetter Rescue Path 0.5 bar (7.25 psi) NG **NEW**



Rescue paths from Vetter are transportable, pneumatic rescue paths. They enable rescue service personnel to react quickly and effectively in search, rescue and recovery operations on ice, water, moor land, marshy ground or other similar unstable ground. The paths are supplied in standard lengths of 6 m (19 ft.), 10 m (32 ft.) and 15 m (48 ft.). Other lengths and even other versions can also be supplied if required. The basic equipment includes the inflation connection, safety valve, deflation valve, securing lines and handles as well as stop rings. Corresponding packing sheets guarantee safe transport and correct storage.

Inflation of the path is made by an inflation hose which is directly connected to a compressed air bottle. The path can be deflated after operation using the vacuum adapter.

## Advantages

- Quickly operational
- Adjustable coupling devices
- The edges are surrounded with luminous strip enabling night operation
- Specially designed edge profile for pulling people easily onto the path

## Safety

- Low operating pressure of max. 0.5 bar (7.25 psi)
- A safety valve integrated into the path avoids over-inflation
- Tear-resistant material
- Anti-slip paths can be supplied on request (refer to picture section)

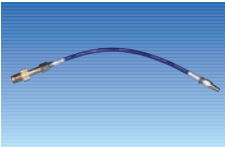
Technical Data Rescue Path NG

	Unit	6 m (19 ft.)	10 m (32 ft.)	15 m (48 ft.)
Art.-No.		1530003301	1530000601	1530000101
Art.-No. with anti-slip surface		1530008501	1530008601	1530008701
Size external (L x W x H)	cm	600 x 140 x 10	1,000 x 140 x 10	1,500 x 140 x 10
	inch	236 x 55 x 4	394 x 55 x 4	591 x 55 x 4
Working pressure	bar	0.50	0.50	0.50
	psi	7.25	7.25	7.25
Test pressure	bar	0.65	0.65	0.65
	psi	9.4	9.4	9.4
Air requirement at 0.5 bar (7.25 psi)	l	1,321	2,196	3,360
	cu. ft.	47	78	119
Nominal content	l	881	1,464	2,240
	cu. ft.	31	52	79
Inflation time, approx	sec.	18	30	45
Packaged size (L x W x H)	cm	165 x 35 x 25	165 x 45 x 30	165 x 60 x 45
	inch	65 x 14 x 10	65 x 18 x 12	65 x 24 x 18
Weight, approx.	kg	27	44	66
	lbs	60	97	146

Technical changes reserved!

# For your safety. Vetter accessories for rescue path NG

## Inflation hose for rescue path

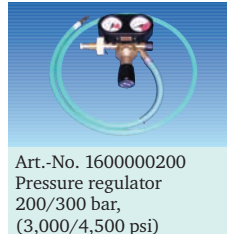


Art.-No. 1530003401  
Inflation hose for rescue path,  
500 mm (20 inch) for direct inflation  
by compressed air cylinder  
US-Version: 1530007600  
FR-Version: 1530007100

## Accessories for the deflation of the rescue path

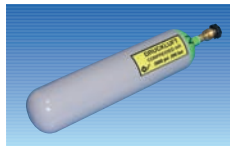


Art.-No. 1600016300  
Vacuum adaptor for rescue path  
and safety cushion



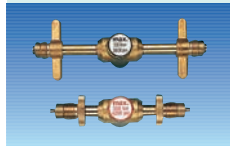
Art.-No. 1600000200  
Pressure regulator  
200/300 bar,  
(3,000/4,500 psi)

US-Version: 1600005301  
FR-Version: 1600004700



### Compressed air cylinders

Art.-No. 1600010800  
6 l/300 bar  
(0.2 cu.ft./4,500 psi)  
Art.-No. 1600019900  
9 l/300 bar  
(0.3 cu.ft./4,500 psi)  
Art.-No. 1600010500  
10 l/200 bar  
(0.35 cu.ft./3,000 psi)



Art.-No. 1600009100  
Dual connector  
300 bar (4,500 psi)  
Art.-No. 1600008400  
Dual connector  
200 bar (3,000 psi)



Art.-No. 1600011600  
Safety and carrier rack for  
compressed air cylinder  
6 l/300 bar  
(0.2 cu.ft./4,500 psi)  
**Two cylinder rack**

Supplied  
without cylinders.



Art.-No. 1600011600  
Safety and carrier rack for  
compressed air cylinder  
6 l/300 bar  
(0.2 cu.ft./4,500 psi)  
(you have to use this  
article two times for the  
four cylinder rack)  
Art.-No. 1600011800  
Trolley for safety  
and carrier rack  
**Four cylinder rack**

Supplied  
without cylinders.

Fotos: GMRS German Maritime Rescue Service,  
Rescue vessel "Bremen" Baltic Sea



## Vetter Safety Cushions SP 16 / SP 25



Safety Cushions are used for rescue work when ladders are not available or if they cannot be used due to lack of space.

The landing area and visual area, the blue circle, was designed according to psychological aspects. The colour and the shape helps to reduce the paralyzing fear which the person being rescued may have before jumping. This landing area was developed in cooperation with the experienced psychologist Professor Horst Schuh resulting in special advantages as well as being favourably assessed.

Safety Cushions are produced in two standard sizes and with two different landing areas and visual areas – the blue circle and the black cross.

The self-assembling support platform is made out of a layered structure that has been successfully field proven in other Vetter products. The outer covering is made of a special inflammable-resistive, anti-tear and anti-rotting material.

Not available in USA.

### Advantages

- Only two people are needed for assembly (four people for the SP 25)
- Outer covering is made of inflammable-resistive and anti-tear material
- SP 16 tested according to DIN 14151 T1 and T3, and designed for human rescue up to a maximum height of 16 m (51 ft.) (Test rep.: Fire Service Berlin - FG-1/06)
- SP 25 tested according to DIN and designed for human rescue up to a maximum height of 25 m (80 ft.)
- Safety valve replaceable

### Safety

- Safety valve integrated into the support frame
- 1.3 times the test pressure to operating pressure

Technical Data Safety Cushion

	Unit	SP 16	SP 25
Art.-No. (blue circle)		1530000800	1530010000
Art.-No. (black cross)		1530005000	1530005900
Size external (L x W x H)	cm inch	350 x 350 x 170 138 x 138 x 67	460 x 460 x 240 181 x 181 x 94
Working pressure	bar psi	0.30 4.35	0.50 7.25
Test pressure	bar psi	0.45 6.50	0.65 9.40
Air requirement at 0.3 bar/0.5 bar (4.35 psi/7.25 psi)	l cu. ft.	1,235 44	2,240 79
Nominal content	l cu. ft.	950 34	1,493 53
Inflation time, approx.	sec.	30	60
Packaged size (L x W x H)	cm inch	90 x 55 x 30 35 x 22 x 12	110 x 63 x 45 43 x 25 x 18
Weight incl. compressed air cylinder	kg lbs	55 121	94 207
Temperature range	°C °F	- 20 / + 50 - 4 / + 122	- 20 / + 50 - 4 / + 122

Technical changes reserved!

# For your safety. Vetter accessories for safety cushion

## Inflation hose for safety cushion



Art.-No. 1530004201  
Inflation hose for safety cushion  
for direct inflation  
by compressed air cylinder  
US-Version: 1530008100  
FR-Version: 1530006500

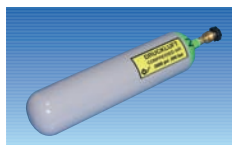
## Accessories for the deflation of the safety cushion



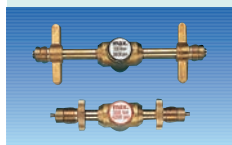
Art.-No. 1600016300  
Vacuum adaptor for rescue path  
and safety cushion



Art.-No. 1600000200  
Pressure regulator  
200/300 bar,  
(3,000/4,500 psi)  
US-Version: 1600005301  
FR-Version: 1600004700



**Compressed air cylinders**  
Art.-No. 1600010800  
6 l/300 bar  
(0.2 cu.ft./4,500 psi)  
Art.-No. 1600019900  
9 l/300 bar  
(0.3 cu.ft./4,500 psi)  
Art.-No. 1600010500  
10 l/200 bar  
(0.35 cu.ft./3,000 psi)



Art.-No. 1600009100  
Dual connector  
300 bar (4,500 psi)  
Art.-No. 1600008400  
Dual connector  
200 bar (3,000 psi)



Art.-No. 1600011600  
Safety and carrier rack  
for compressed air  
cylinder  
6 l/300 bar  
(0.2 cu.ft./4,500 psi)  
**Two cylinder rack**

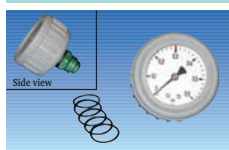
Supplied  
without cylinders.



Art.-No. 1600011600  
Safety and carrier rack  
for compressed air  
cylinder  
6 l/300 bar  
(0.2 cu.ft./4,500 psi)  
(you have to use this  
article two times for the  
four cylinder rack)  
Art.-No. 1600011800  
Trolley for safety  
and carrier rack  
**Four cylinder rack**

Supplied  
without cylinders.

## Accessories for testing of the safety cushion



Art.-No. 1530002101  
Test gauge for safety cushion

Sets Safety Cushions, consisting of:

Art.-No.	Description	Art.-No. 1530000800 Set Sp. 16 "blue circle"	Art.-No. 1530005000 Set Sp. 16 "black cross"	Art.-No. 1530005900 Set Sp. 25 "black cross"	Art.-No. 1530010000 Set Sp. 25 "blue circle"
	Safety Cushion SP 16 (blue circle)	1			
	Safety Cushion SP 16 (black cross)		1		
	Safety Cushion SP 25 (black cross)			1	
	Safety Cushion SP 25 (blue circle)				1
1530004400	Packing foil for Safety Cushion SP 16	1	1		
1530005800	Packing foil for Safety Cushion SP 25			1	1
1530008800	Set repair material for Safety Cushion SP 16 and SP 25	1	1	1	1

# Vetter Resistance charts and material charts



Tears in the cover caused by external, mechanical effects

With resistance inspections (DIN 53476 and 53521) material durability is assessed with respect to changes in its mass and hardness. The resistance of a rubber mixture is, depending on diffusion, influenced by the material thickness used. Most of the stresses are caused by a combination of chemical-thermal effects and swelling.

An expanding material reacts to chemicals a lot quicker than when it is in the non-operative condition.

This means, the greater the expansion, the lower the chemical resistance. Therefore the resistance list can only be used as a rough guide.

The data is based on laboratory tests, experience and are influenced by such factors as temperature, intensity, length of exposure etc.

This list of resistance values was compiled under the above factors and rated with the following symbols:

- + resistant
- o conditionally resistant
- non-resistant
- nd no details

The data corresponds to our current know-how and are to be taken as guidelines.

We will gladly provide material samples to users wishing to conduct their own chemical resistance tests.

Temperature resistance limits

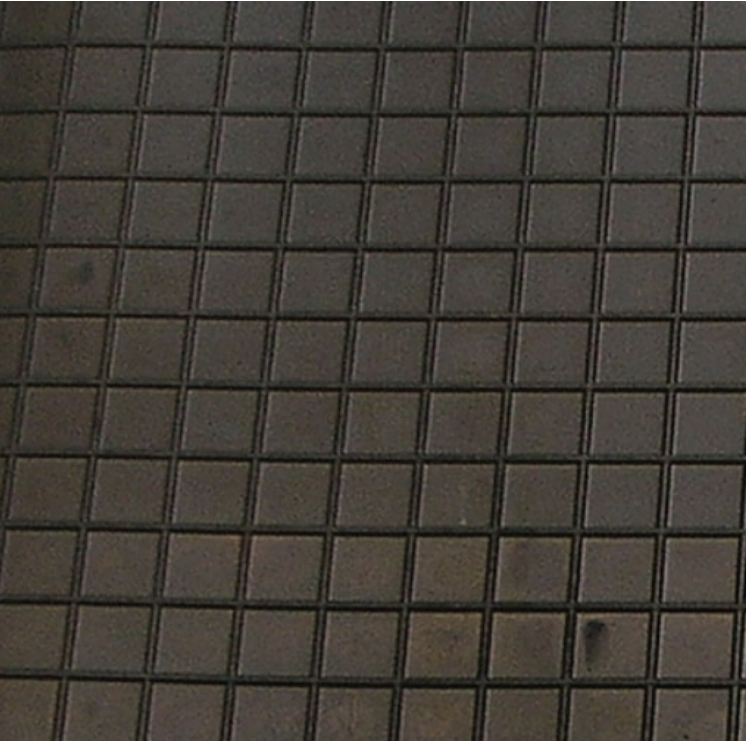
Products	Cold-resistance	Cold-flexible	Heat resistance long term	Heat resistance short term
Hot-vulcanised	- 40° C	- 20° C	+ 90° C	+ 115° C
Cold-vulcanised	- 40° C	- 20° C	+ 70° C	+ 85° C
NG	- 35° C	- 35° C	+ 80° C	+ 110° C
Rubber hoses	- 40° C	- 30° C	+ 90° C	
Packing bags	- 20° C		+ 50° C	
Pack sheets	- 20° C		+ 50° C	
Controller, fitting	- 20° C		+ 50° C	
Controller, plastic	- 20° C		+ 50° C	
Controller, aluminium	- 20° C		+ 50° C	

Technical changes reserved!

Material list

Product	Material	Support Material	Manufacture
Lifting bag 1.0 bar (14.5 psi)	CR	Aramide/Polyester	Cold-vulcanised
Packing bag for lifting bag	PVC	Polyester	-
Rescue set 1.0 bar (14.5 psi)	CR	Aramide/Polyester	Cold-vulcanised
Pressure bags 1.0 bar (14.5 psi)	CR	Aramide/Polyester	Cold-vulcanised
Packing bag for pressure bag	PVC	Polyester	-
Super-Mini Lifting Bags 8.0 bar (116 psi)	CR	Aramide	Hot-vulcanised
Mini Lifting Bags 8.0 bar (116 psi)	CR	Steelcord/Aramide	Hot-vulcanised
Rescue Path 0.5 bar (7.25 psi) NG	NG	Polyester	Cold-vulcanised
Packing sheet for path	PVC	Polyester	-
Safety cushion support frame	CR	Polyamid	Cold-vulcanised
Safety cushion sheet	PVC	Polyester	-
Packing sheet for Safety Cushion	PVC	Polyester	-
Inflation hoses and air supply hoses	EPDM	Polyester	-

Technical changes reserved!



Surface condition when new

Porous surface caused by subjection to chemicals

Resistance charts

Agent	CR	PVC	EPDM	NG
Aceton	o	-	-	-
Acetylene	+	o	-	-
Alum, watery	+	+	-	o
Aluminium chloride	+	o	+	+
Anilene	-	-	nd	o
ASTM-oil 1	o	nd	-	+
Petrol	o	-	nd	o
Benzene	-	-	-	o
Boric acid	+	+	+	+
Bromine (moist)	-	-	-	-
Butyric acid	-	o	nd	o
Chlorine gas (moist)	-	-	nd	-
Chlorine (wet)	o	nd	o	-
Diesel fuel	o	o	-	+
Iron chloride	+	+	+	+
Petroleum	o	o	-	+
Acetic acid	o	o	o	o
Fatty acid	+	nd	-	o
Formaldehyde	+	nd	+	-
Glukose	+	+	+	+
Heating oil	+	+	-	+
Potassium chloride	+	o	+	+
Calcium chloride	+	o	+	+

Agent	CR	PVC	EPDM	NG
Calcium nitrate	+	nd	+	+
Carbon dioxide	+	+	+	+
Carbon monooxide	+	-	+	+
Copper sulphate	+	o	+	+
Adhesive	+	nd	+	o
Methyl chloride	-	o	o	o
Sea water	+	o	nd	+
Mineral oil	+	+	-	+
Sodium carbonate	+	-	-	+
Ozone	+	nd	+	+
Paraffin	+	nd	-	+
Perchloric acid	o	nd	+	-
Phenol (watery)	-	-	+	-
Phosphoric acid (concentrated)	-	+	-	-
Mercury	+	o	+	+
Nitric acid (fuming)	-	+	-	-
Sulphur dioxide (dry)	-	o	nd	o
Sulphur acid (50%)	+	o	-	-
Nitrogen	+	nd	+	+
Carbon tetrachloride	-	o	-	-
Animal fat	+	nd	+	+
Toluene	-	-	-	-

Technical changes reserved!

Impressum

© Copyright: Vetter GmbH  
 A Unit of IDEX Corporation  
 Printed in Germany  
 03/2007  
 9988003702



Vetter GmbH  
A Unit Of IDEX Corporation  
Blatzheimer Str. 10-12  
D-53909 Zülpich  
Fon +49 (0) 22 52/30 08-50  
Fax +49 (0) 22 52/30 08-70  
Fon Exp. +49 (0) 22 52/30 08-60  
Fax Exp. +49 (0) 22 52/30 08-71  
[www.vetter.de](http://www.vetter.de)  
[info@vetter.de](mailto:info@vetter.de)