



PACKSETTER HAND PUMP

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Introduction

This document has been compiled as a risk assessment for the Packsetter Hand pump designed and manufactured by ELBROC. This assessment preempts any potential application and trials that will be conducted underground.

The aim of this assessment is to identify the potential hazards associated with the use of the Packsetter Hand pump in underground stoping operations and to list control measures to eliminate or reduce that potential.

1. Product Description

The Packsetter Hand pump comprises a tank and frame assembly, a mixer assembly, two air chamber assemblies, a pump assembly and hose assembly.

2. Design Criteria

The Packsetter Hand pump is designed to mix the correct volume of water and grout in the tank and then pump the water and grout mix into a packsetter bag which is placed between the pack and hangingwall. As the bag is filled, it acts as blocking between the hangingwall and the pack, as well as pre-stressing the pack to provide active support.

3. Risk Assessment Team

The team that compiled this provisional assessment consisted of:

T Clements	Operations Manager
F Malan	Director
O vd Merwe	Site Manager

4. Objectives

In order to effectively identify the hazards associated with this product, a process as set out below facilitates a logical approach to formulating the risk indices.

1. Utilize a task procedure for installing packsetter bags and grout to pre-stress packs using packsetter hand pump to identify probable hazards.
2. Apply a risk rating for each hazard.
3. List preventative measures.

All the above are tabulated in Appendix 1.

5. Hazard Classification

The following definitions are appropriate to this risk assessment and will be referred to in this document:

HAZARD	- something that has potential to cause harm.
RISK	- the likelihood that harm from a particular hazard will occur.
SEVERITY	- extent of the risk associated with the harm that a person might suffer as well as the number of persons likely to be harmed.
PROBABILITY	- the chance that a person or persons will be harmed during the exposure period.
CONSEQUENCE	- the degree of harm; the potential severity of injuries.

*The matrix below has been adopted from the **Anglogold policy and procedure (QSP 111 Issue 1 – dated 1999-02-15)** and appropriately incorporated into the risk rating of this product.*

Allocating a value for the **consequence** and **probability** from the index **column** and **row** does the process of attaching the risk.

		Probability					
		Expected result	Quite possible	Unusual but possible	Remotely possible	Very unlikely	Practically impossible
Consequence	<i>Index</i>	1	2	3	4	5	6
Catastrophic	1	48	47	45	42	38	33
Disaster (few fatalities)	2	46	44	41	37	32	27
Very serious (single fatal)	3	43	40	36	31	26	21
Serious (serious injury)	4	39	35	30	25	20	15
Important (temporary disability)	5	34	29	24	19	14	10
Of concern (minor injury)	6	28	23	18	13	9	6
No incident	7	22	17	12	8	5	3
Near miss	8	16	11	7	4	2	1

FACTOR

INDEX

Consequences	
1. Catastrophic (many fatalities)	1
2. Disaster (a few fatalities).	2
3. Very serious (one fatality).	3
4. Serious (serious injury).	4
5. Important (temporary disability).	5
6. Of concern (minor injury).	6
7. No incident	7
8. Near miss	8
Probability	
1. Is the most likely and expected result if event occurs.	1
2. Quite possible (50/50).	2
3. Unusual but possible.	3
4. Only remotely possible (has happened somewhere).	4
5. Conceivable but very unlikely (hasn't happened yet).	5
6. Practically impossible (one in a million).	6

6. Conclusion

Primary hazards associated with the direct use of these products within the designed specifications and controls will be minimized if the correct installation and transport procedures are applied.

This provisional risk assessment is restricted to the application of these products for underground permanent stope support only.

APPENDIX 1

PAKSETTER HAND PUMP

PROCESS	ACTIVITY	HAZARD	CONS	PROB	RISK	PREVENTATIVE MEASURES
Installation	Making work and support area safe	Falls of ground resulting in injuries to persons	3	2	40	Employ mine standard / procedure for barring down the hangingwall and creating a stable footwall
	Determining and installing the pack in accordance to the mine standard	Decrease in areal coverage - increased area of possible instability (FOGs)	4	3	30	Demarcation of installation pattern
	Pack to be positioned at right angles to the dip of the strata	Uneven load distribution- uneven load distribution on pack and increased risk of being dislodged by blasting or the scraper operations	2	3	41	Installation of pack to mine standard
	Bag placed in middle of pack	Creates a shear plane in the middle of the pack and a very good chance that under rock burst condition, blasting operations and cleaning operations the pack could come out	2	3	41	Place bag on top of pack or as close as possible to the hangingwall
	Placing of bag	Valve facing the wrong direction causing bag not to be pre-stressed to correct pressure, could cause pack to be blasted out	2	3	41	To ensure that bag is placed with valve facing up dip and towards foot wall
Pumping	Incorrect water to grout ratio	More water than grout cause bag to deflate when punctured during blast and could cause pack to come out	2	3	41	Ensure that the correct water to grout ratio is used

PAKSETTER HAND PUMP

PROCESS	ACTIVITY	HAZARD	CONS	PROB	RISK	PREVENTATIVE MEASURES
	Pumping of grout	Specified pressure will not be reached in bag and could cause pack to come out during blast	2	3	41	Ensure that the pump operator pump until the correct pressure is achieved as indicated when the pump stops stroking.
		Bag not filled after pumping and not properly pressurized could cause pack to come out during blast	2	3	41	Ensure that the bag is filled with grout mix and where necessary a second mix must be pumped into bag with out delay

TRAINING FOR PACKSETTER AIR PUMP OPERATORS

Before using the Air pump:

1. Before using the hand pump, the following are required:
 - Two bags of grout for a complete mix.
 - A 25 mm hose connected to a clean water supply.
2. The following pre-start checks must be carried out before operating hand pump:
 - Inspect the hand pump for signs of damage or missing parts.
 - Rotate the mixer handle to ensure that the mixer shaft turns smoothly.
 - Inspect the delivery hose for cracks or other damage, and check that the grooves at the delivery end of the hose are not damaged.
3. The following pre-start tasks are necessary:
 - Remove the filter plug and clean, if necessary.
 - Flush the inside of the mixer tank to remove fines from the previous mix.
 - Replace the filter plug and fill the mixer tank with water.
 - Depress the pump handle several times until water is forced out of the delivery hose. This ensures that the pump is free of blockages.
 - Kink the delivery hose and operate the pump handle against the kinked hose to check for:
 - A worn piston (water escapes through the breather holes in the outlet manifold)
 - Leaks at hose connections
 - Pressure-tightness on the pump (the indicator clevis should release at 400 kPa).

Using the Air pump

WARNING

1. The Hand pump operates at high pressure. Safety goggles must be worn at all times when using the Hand pump.

Fill the mixer tank with water to the lower indicator pin on mixer paddle, with the mixer paddle in its top position.

NOTE

Because the grout and water mixture sets in a short time, it is important to fill the mixer tank as quickly as possible. Therefore a 25 mm hoses recommended.

2. Two persons are needed to mix the grout in the mixer tank. The mixer handle must be turned smoothly by one person as the second person slowly pours the two bags of grout into the mixer tank.

NOTE

To ensure that the grout is mixed correctly, the mixer tank must first be filled with water and the two bags of grout must be completely used for the mixture. Any attempt to make half a tank of mixture will lead to clogging of the tank.

3. Turning the mixer handle slowly, mix the grout and water for approximately two minutes, regularly changing the direction of rotation on the mixer handle.
4. Operate the pump to force the mixture through the delivery hose back into the tank to extract any air contained in the mixture and to ensure that the grout and water are completely mixed.
5. When the mixture is properly mixed, connect the delivery hose to the packsetter bag and commence pumping.

Cleaning the Hand pump

CAUTION

To prevent the pump from becoming permanently clogged, it must be cleaned after procedures are completed.

1. After pumping is complete, remove the filter and flush out any material left in the mixer tank. Turn the filter anticlockwise and pull to remove the filter.
2. Wash the filter, ensuring that all material is removed.
3. Using the outer (woven) part of a clean packsetter bag, clean and rinse the inside of the inlet manifold.
4. Using the outer (woven) part of a clean packsetter bag, clean and rinse the inside of the mixer tank.
5. Install the filter plug and fill the mixer tank with clean water.
6. Operate the pump to flush the water out of the mixer tank; this procedure will also clean the pump and the delivery hose.
7. Using the outer (woven) part of a clean packsetter bag, clean and rinse the outer surface of the pump and mixer tank.
8. Remove and coil the delivery hose and store the hose inside the mixer tank.
9. Stow the Hand pump in a safe area, which must be clean and dry.

Checking and adjusting the pressure setting

Check the pressure setting as follows:

- Connect a pressure indicator, with a range of 0 to 1000 kPa, to the outlet side of the pump, by removing the straight fitting and replace with the pressure indicator.
- Kink the delivery hose downstream of the pressure gauge and depress the pump handle SLOWLY until the indicator clevis is extended.
- Note the pressure, which should be approximately 400 kPa, on the pressure indicator.

If the pressure setting is incorrect, adjust the pressure setting as follow:

- Loosen the lock nut on each of the indicator grub screws.
- To increase the pressure setting, turn each grub screw an identical number of turns in a clockwise direction; to decrease the pressure, turn each grub screws an identical number of turns in an anticlockwise direction.
- Do not tighten the lock nuts at this stage.
- SLOWLY depress the pump handle until the indicator clevis is extended and note the pressure on the pressure gauge.
- Adjust the grub screws clockwise if the pressure setting is still too low or clockwise if the pressure setting is still to high.
- Repeat the procedure until the indicator clevis is extended at the correct pressure (400 kPa).
- When the pressure setting is correct, tighten the two lock nuts.

Fault finding

Fault	Possible Cause	Corrective action
Pump not operating smoothly	1. Piston seized	1. Free piston
	2. Inlet valve/s blocked	2. Clear valves
	3. Outlet valve/s blocked	3. Clear valves
	4. Delivery hose blocked	4. Clear hose
Little or no water delivered from pump	1. Piston worn	1. Renew piston
	2. Inlet or outlet valve/s partially blocked	2. Clear valves
	3. Delivery hose partially blocked	3. Clear hose
Pump can be depressed against resistance	1. Piston worn	1. Renew piston
	2. Joints leaking	2. Tighten joints
Unable to reach pressure to activate indicator clevis	1. Pressure setting too high	1. Adjust pressure setting
	2. Piston worn	2. Renew piston
	3. Joints or seals leaking	3. Renew seals and tighten joints
	4. Punctured hose	4. Renew hose
Indicator clevis extended below 400 kPa	1. Pressure setting too low	1. Adjust pressure setting

Dismantling the pump assembly

- Loosen the wing nut and remove the stirrup clamp.
- Carefully detach the outlet manifold, taking care not to lose the balls from each of the outlet check valves.
- Remove the two balls and store in a safe place.
- Loosen the two tension bolts and swing the tension bolts clear of the pump top.
- Carefully detach the pump top and lift the handle to raise the cylinder.
- Detach the cylinder by pulling it downwards and away from the piston.
- Remove the pump base.