

RISK ASSESSMENT

HRB® - Hollow Rock Bolt



RSC EKUSASA MINING

WE REINFORCE THE MINES®

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INTRODUCTION

RSC Ekusasa Mining is a well-established company owned by The Barnes Group. RSC Ekusasa Mining has a Level 4 BEE status and a 100% BEE Procurement Recognition which is accredited through SANAS. Black Woman Ownership of 51% and fronting listed as Low.

RSC EKUSASA Mining is ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018 accredited and has a certified Integrated Management System in place

RSC Ekusasa Mining has been involved in various ground control and underground roof support projects throughout the world. RSC Ekusasa Mining often works with other companies in order to provide cost effective solutions to our customer needs. The range of critical / safety products and services supplied, includes a wide range of lateral and reinforcing roof support systems. The group's services extend from initial manufacture to the ultimate supply of high quality, roof support tendons.

RSC Ekusasa Mining adheres strictly to the standards of the ISO 9001: 2015 and the SANS 1408: 2002 requirements for "Mechanical Components of tendon-based rock support systems". These roof support tendons are delivered to the mine on purchase and these articles are used and installed by the mine's employees and or contractors employed by the mine.

The Mine Health and Safety Act (Act 29 of 1996) section 21 however states the following:

"21.1 Any person who-

(a) designs, manufactures, repairs, imports or supplies any article for use at a mine must ensure, as far as reasonably practicable

(i) that the article is safe and without risk to health and safety when used properly; and

(ii) that it complies with all the requirements in terms of this Act;

(b) erects or installs any article for use at a mine must ensure, as far as reasonably practicable, that nothing about the manner in which it is erected or installed makes it unsafe or creates a risk to health and safety when used properly; or

(c) Designs, manufactures, erect or installs any article for use at a mine must ensure, as far as reasonably practicable, that ergonomic principles are considered and implemented during design, manufacture, erection or installation.

21.2 Any person who bears a duty in terms of sub-section (1) is relieved of that duty to the extent that is reasonable in the circumstances, if –

(a) that person designs, manufactures, repairs, imports or supplies an article for or to another person; and

(b) That other person provides a written undertaking to take specified steps sufficient to ensure, as far as reasonably practicable, that the article will be safe and without risk to health and safety when used properly and that it complies with all prescribed requirements.”

Because of these legal requirements RSC Ekusasa Mining embarked on a full risk assessment to ensure as far as reasonably practical, that all potential health, safety and financial hazards are identified, relevant risks measured, and control measures taken to ensure the articles are safe and without risk to the user. Furthermore, the risk assessment serves as proof of RSC Ekusasa Mining’s due diligence towards the mine, its employees, and assets and contributes in ensuring a healthy and safe work environment as far as reasonably practicable.

EXECUTIVE SUMMARY

Introduction - The risk assessment on the support articles considered activities such as loading, offloading, transport, storage, installation, maintenance, and inspections which are typical activities the user performs whenever using the articles being supplied. These activities are normally performed on surface and mainly underground. The risk assessment was therefore structured in such a manner that all potential health, safety, financial hazards and other relevant risks could be identified, as far as reasonably practical covering any of the activities when using the articles being supplied. The format of the risk assessment was laid out such, that the user can use the information as specified steps, whenever performing any of the activities using the articles.

Mentioned activities were broken down into specific task steps, as the supplier foresees the user using the articles, then all potential hazards were identified, related risks measured and recommendations made to guide the user of the most effective means in handling the articles when performing such activities.

Risks were measured using a risk index, which considers the three factors influencing the degree of risk such as consequence; exposure and probability (Refer to APPENDIX 1 for an example of the Risk Index used on page 13). The reason for risk measurement is to prioritize the hazards identified looking at the significant risks it poses, and then deciding whether the risks should be eliminated, controlled, minimized or are the risks perhaps tolerable as is.

RESULT

In summary the highest risks pertaining to each activity is listed below:

- Loading - Over loading of truck
- Transport - Traffic and public roads
- Off-loading - Unsafe off-loading with forklift and truck standing on uneven
- Surface for off-loading
- Ensure sharp ends not protruding from stored stack
- Loading - Handling articles manually
- Transport - Using defective loco for transport
- Off-loading - Bundle strapping loose
- Ensure sharp ends not protruding from stored stack

Resin Grouted HRB® Installed Manually

SCOPE OF WORK

Objective – To conduct a suitable and sufficient risk assessment that will, as far as reasonably practical, identify all potential health, safety and financial hazards the articles could pose to the user and measure the level of risk of each hazard identified in order to recommend controls to mitigate or control the relevant risks.

Aim – To provide the user with sufficient information – specified steps - that can/should be used to train and guide employees to enable them to use the articles properly.

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RESIN GROUTED HRB® INSTALLED MANUALLY

Activity	Potential Hazard	Recommendation/Controls
Ensure immediate area is Safe.	Area not barred, not inspected by competent person, gasses/fumes, falls of ground, water, loose material on ground, steep areas, slip and fall, bystanders, electrical equipment, sockets/misfires, geological features, moving conveyance, tip areas, no PPE, poor ventilation, poor visibility.	The user to ensure a competent person establishes a safe working area, and clearly marks any geological features and takes the necessary precautions before any work commences, to reduce the possibility of any injury, property damage or financial loss.
Install temporary support.	No temporary support used, incorrect temporary support use.	Install temporary support. No attempt to be made to install any form of support unless temporary support is adequately installed and over inspected by a competent person before any work commences, to reduce the possibility of injury, property damage or any financial loss.
Ensure required equipment is available for task to be performed.	Using sub-standard equipment, using defective grout pumps, using defective support articles, inadequate PPE, using equipment unsafely, employees not trained on use of equipment.	The user to ensure that only skilled and properly trained employees are used to install support with equipment fit for the task to be performed to reduce the possibility of any injury, property damage and financial loss. It is important for the user to involve the supplier on specific training requirements for employees as far as the use of the articles are concerned so that the supplier could issue the user with relevant safe working Procedures. The user to ensure the employees is issued with the required PPE to ensure the safe performance of the task.
Drill required length of Hole.	Holes drilled too short; Holes not drilled to required direction to strata, inadequate spacing between holes, holes drilled too long, correct length of drill steel not available.	The user to ensure that a competent person indicates the position of holes to be drilled as per required mine standard, and the correct length of drill steel is available for the task. A competent person to conduct regular planned task observations on the drilled holes for correct direction and length. Employees to be trained on the consequences of incorrectly drilled holes to prevent the possibility of injury, property damage and financial loss.
Ensure required diameter of hole.	Hole diameter to big or small, correct size drill bits not available, incorrect drill bits available.	The user to follow the supplier's recommendations on hole diameter. User to have a go, no go measuring gauge available. Employees to be trained in the correct use and importance of measuring gauge. No installation to take place unless the hole is of specified diameter to

		prevent possible injury, property damage and financial loss.
Measure the drilled hole by pushing the HRB® into hole until bearing plate is against hanging wall or side wall and then remove the bolt.	Falling/slipping HRB®	The user to ensure the employee use HRB® with extreme caution to prevent the HRB® from slipping and falling, which may damage the HRB® and ultimately result in sub-standard installations. It is recommended that a measuring stick be available at all times to eliminate this practice.
If length is correct insert required quantity of resin capsules into hole.	Not ensuring the correct quantity of capsules, using the incorrect diameter of capsules, using expired capsules, and incorrect order of setting times on capsules.	Refer to installation procedure as supplied by the resin supplier.
Insert HRB® into hole and push by hand as far as possible. If additional length is required join to another HRB® with a coupler.	Slipping and falling HRB®	The user to ensure employees is properly trained with the involvement of the supplier on the correct technique for pushing in the HRB® and fitting Coupler.
Attach spinning adaptor to jackhammer and push bolt to back of hole with jackhammer rotating for the recommended spinning time after the HRB® bearing plate has reach the hanging or side wall.	Slip and fall, unsafe use of equipment, not spinning for required period.	The user to train employees with the involvement of the supplier in the correct method of turning the HRB® and securing it in the hole for further tensioning and the purpose of the torque indicator. The employees should use the required PPE supplied.
Stop machine rotation and hold intact for required holding time specified by resin used to allow for sufficient setting of resin.	Not allowing for complete setting time before removing machine.	Refer to resin supplier installation procedure or recommendations.
Remove temporary support to ensure completion of installation	Unsafe removal of temporary support, removing temporary support prematurely, slip and fall.	The user to ensure employees is equipped with remote release equipment and support not to be removed until the bolt is properly tensioned.

RESIN GROUTED HOLLOW BOLT INSTALLED MANUALLY – RISK RATING

No	Activity	Potential Hazard	Consequences	C	E	P	Risk Result	Recommendation/Controls
1	Ensure immediate area is safe.	Area not barred, not inspected by competent person, gasses/fumes, falls of ground, water, loose material on ground, steep areas, slip and fall, bystanders, electrical equipment, sockets/misfires, geological Features, moving conveyance, tip areas, no PPE, poor ventilation, poor visibility.	Personal injury, time loss, production loss, financial loss, property damage, fire, explosion.	40	10	1	400	The user to ensure a competent person establishes a safe working area, and clearly mark any geological features and take the necessary precautions before any work commences, to reduce the possibility of any injury, property damage or financial loss.
2.	Install temporary Support.	temporary support used; incorrect temporary support used.	Falls of ground, possible injury, time loss, production loss, financial loss, damage to property.	40	6	1	240	No attempt to be made to install any form of support unless temporary support is adequately installed and over inspected by a competent person before any work commences, to reduce the possibility of injury, property damage or any financial loss.
3	Ensure required equipment is	Using substandard equipment, using	Personal injury, time loss, production loss, property	40	6	1	240	The user to ensure that only skilled and properly trained employees are used to

	available for task to be performed.	defective support articles, adequate PPE, using equipment unsafely, employees not trained on use of equipment.	damage, substandard.					install support with equipment fit for the task to be performed to reduce the possibility of any injury, property damage and financial loss. It is important for the user to involve the supplier on specific training requirements for employees as far as the use of the articles are concerned so that the supplier could issue the user with relevant safe working procedures. The user to ensure the employees is issued with the required PPE to ensure the safe performance of the installation, financial loss task.
4	Drill required length of hole.	Holes drilled too short, Holes not drilled to required direction to strata, inadequate spacing between holes, holes drilled too long, correct length of drill steel not available.	Substandard installation, possible injury, time loss, financial loss, property damage, falls of ground.	40	10	1	400	The user to ensure that a competent person indicates the position of holes to be drilled as per required mine standard, and the correct length of drill steel is available for the task. A competent person to conduct regular planned task observations on the drilled holes for correct direction and length. Employees to be trained on the consequences of incorrectly drilled holes to prevent the possibility of injury, property damage and financial loss.
5	Ensure required diameter of hole	Hole diameter to big or small, correct size drill bits not available, incorrect drill bits available.	HRB® bolts not fitting in hole, bolts falling out of hole, substandard installation, lost time, possible injury, property damage, production loss, financial loss, falls of ground.	40	10	1	400	The user to follow the supplier's recommendations on hole diameter. User to have a go no go measuring gauge available. Employees to be trained in the correct use and importance of the measuring gauge. No installation to take place unless the hole is of specified diameter to prevent possible injury, property damage and financial loss.
6	Measure the drilled hole by pushing the HRB® into hole until	Falling/slipping HRB®.	Personal injury, damage to property, defective article, substandard installation, production loss, financial loss.	15	2	,5	15	The user to ensure the employee use HRB® with extreme caution to prevent the HRB® from slipping and falling, which may damage the HRB® and ultimately result in sub-

	bearing plate is against hanging wall or side wall and then removed bolt.							standard installations. It is recommended that a measuring stick be available at all times to eliminate this practice.
7	If length is correct insert required quantity of resin capsules into hole.	Not ensuring the correct quantity of capsules, using the incorrect diameter of capsules, using expired capsules, incorrect order of setting times on capsules.	Substandard installation, injury, production loss, financial loss, time loss, property damage.	35	10	1	350	Refer to installation procedure as supplied by the resin supplier.
8	Insert HRB® into hole and push by hand as far as possible. If additional length is required join to another HRB® with a coupler.	Slipping and falling roof bolt.	Personal injury.	7	6	1	42	The user to ensure employees is properly trained with the involvement of the supplier on the correct technique for pushing in the HRB® and fitting Coupler.
9	Attach spinning adaptor to jackhammer and push bolt to back of hole with jackhammer rotating for the recommended spinning time after the HRB® bearing plate has reach the hanging or side wall.	Slip and fall, unsafe use of equipment, not spinning for required period.	Substandard installation, injury, production loss, financial loss, time loss, property damage.	15	3	3	135	The user to train employees with the involvement of the supplier in the correct method of turning the HRB® and securing it in the hole for further tensioning. The employees should use the required PPE supplied.

10	Stop machine rotation and hold intact for required holding time specified by resin used to allow for sufficient setting of resin.	Not allowing for complete setting time before Removing machine.	Substandard installation, injury, production loss, financial loss, time loss, property damage.	15	3	.5	22.5	Refer to resin supplier installation procedure or recommendations.
11	Tension of HRB® to required tension.	Not enough tensioning of HRB®.	Substandard installation, injury, production loss, financial loss, time loss, property damage.	15	10	.5	75	User to ensure bolts are properly tensioned by using the available torque on the Machine if not use a t-spanner and turning nut until bearing plate is firm against hang/side wall. Visual inspection can be conducted and if any loose bearing plates are observed tensioning is required.
12	Remove temporary support to ensure completion of installation.	Unsafe removal of temporary support, removing temporary support prematurely, slip and fall.	Falls of ground, personal injury, loss time, financial loss	15	3	3	135	The user to ensure employees is equipped with remote release equipment and support not to be removed until the bolt is properly tensioned.

CONCLUSION

This risk assessment is not absolute and should always be seen as a live document, because risk assessment in any form is a process and not a once-off activity. Part of this process is that the user receiving the risk assessment from the supplier should scrutinize it, make recommendation or relevant comments and contribute to the assessment to make it more suitable and sufficient and thus more applicable for the proper use of the articles.

Should any recommendations be made from the user, or the supplier should add or remove anything as far as the design of the article is concerned, such recommendations or changes should be incorporated into this risk assessment, thus, and the risk assessment should be revised for its adequacy. Most importantly is that the user should take the recommended specified steps made by the supplier, evaluate them for practical implementation, and incorporate the information into the organizations specific training material, and train employees accordingly. This must be done to ensure the employees responsible for using the articles are familiar with potential hazards and risks they or any other employee might be exposed to. Only then one can ensure as far as reasonably practical the articles will be used properly. If any significant problems or health and safety issues are identified by the user, and the user would like to bring it under the attention of the supplier, the supplier can be contacted at the following numbers:

Office : 011- 824 8660

Fax : 011- 824 0146

E-Mail: info@rscekusasa.co.za

RISK MEASUREMENT INDEX

CONSEQUENCES (Worst case scenario if hazard should realize)

Index	Value	Result
Catastrophic (many fatalities or damage over R100,000,000)	100	
Disaster (a few fatalities or damage over R10,000,000)	40	
Very Serious (one fatality or damage over R1,000,000)	15	
Serious (serious injury or damage over R 100,000)	7	
Important (temporary disability or damage over R10,000)	3	
Of Concern (minor injury or damage over R1,000)	1	

EXPOSURE (How often hazardous event occurs or is present)

Index	Value	Result
Continuous (many times daily)	10	
Frequent (once daily)	6	
Occasionally (once per week to monthly)	3	
Unusual (once / month to once / year)	2	
Rare (yearly)	1	
Very rarely (not known to have occurred but remotely possible)	0.5	

PROBABILITY (Chance of loss / harm during the exposure period)

Current controls / safeguards in place to be objectively assessed for sufficiency.

Index	Value	Result
Is the most likely and expected result if event occurs	10	
Quite possible (50/50 chance)	6	
Unusual but possible	3	
Only remotely possible (has happened somewhere)	1	
Conceivable but very unlikely (hasn't happened yet)	0.5	
Practically impossible (one in a million)	0.1	

RISK RESULT = CONSEQUENCE x EXPOSURE x

PROBABILITY RISK CLASSIFICATION (Appendix 1)

Classification	Action
More than 400 - Very High Risk	Immediate correction with high level input
200 to 400 - High Risk	Immediate correction required
70 to 200 - Substantial Risk	Correction needed
20 to 70 - Possible Risk	Attention indicated
Less than 20	Risk perhaps tolerable as is

RISK REDUCTION

% Reduction	DESCRIPTION	VALUE
10%	Small	6
20%	Small	4
50%	Effective	3
75%	Very Effective	2
100%	Eliminated	1

Risk Assessors	Occupation
F Cronje	Technical Manager
M Spangenberg	Operations Manager
G Jordaan	SHEQ Manager
J Sebelele	Safety Officer