

SWP-GS-0002

SANDVIK MD/MDX BOLT PULL TESTING SAFE WORKING PROCEDURE

Applicable parts – MD & MDX rock bolts

Prepared by – B. Darlington

Revised by – B. Darlington

Date – 09/05/2012


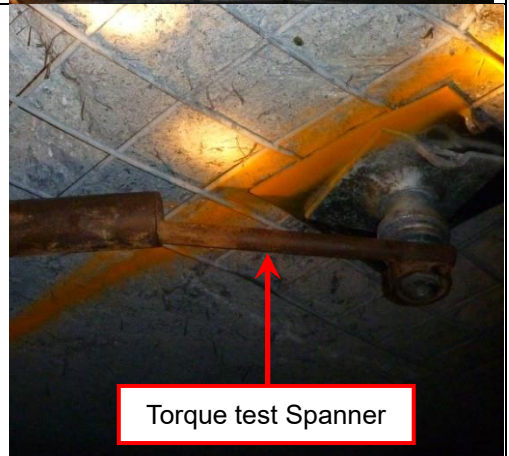

Date – 13/02/2024

Resources	<ul style="list-style-type: none"> • 1 or 2 person(s) • IT or EWP. 	Materials	<ul style="list-style-type: none"> • Sandvik Rock bolt pull test kit <ul style="list-style-type: none"> ○ Box 1 - 39kg ○ Box 2 - 19kg
PPE	<ul style="list-style-type: none"> • Gloves. • Hearing protection. • Steel cap boots. • Safety glasses. • Hard hat. • Fall protection when working in EWP. • Underground mine site minimum PPE. • 	Environment Controls	<ul style="list-style-type: none"> • Underground mine site safe working procedures.
		Training required	<ul style="list-style-type: none"> • Competent in use of the Sandvik Pull test equipment, and familiar with SWP-GS-0003. • Approved Working at Heights certification

References	<ul style="list-style-type: none"> • SSP Sandvik Standard Procedure 002 – PPE. (In lieu of mine site PPE procedures) • SSP Sandvik Standard Procedure 006 – Manual Task. (In lieu of mine site Manual handling procedures). • Enerpac operation manuals for hydraulic equipment. • SWP-GS-0003 – Pull test Hydraulic equipment (Enerpac)
-------------------	---



General handling of MD & MDX Rockbolt product				
	Steps	Potential Hazard & Consequences.	Control Measures	Visual
a)	Conduct Take 5/JSA or equivalent safety procedure of the work area before starting the task.	<ul style="list-style-type: none"> Poor rock conditions. Slip, Trip and fall. EWP fall hazard. EWP crush/pinch injury EWP emergency evac 	<ul style="list-style-type: none"> Never work under unsupported ground. Ensure work areas are free from obstacle and tripping hazards. Never work in IT EWP unless competent. Always keep all body parts within EWP during any movement of EWP or work basket. Prior to entering EWP, ensure emergency EWP evacuation plan is in place. Follow site specific procedures/requirements for EWP tramming distance 	
b)	Pull testing of MD Rock bolts should be performed with correct PPE and lifting techniques.	<ul style="list-style-type: none"> Heavy material, which can cause back /hand injuries. Strains /sprains. Crush/pinch injuries. 	<ul style="list-style-type: none"> Ensure gloves are worn during pull test. Follow SSP 002 PPE Procedures. Follow SSP 006 Manual handling procedures. 	
c)	Assess all equipment for quality or damage	<ul style="list-style-type: none"> Hydraulic (Enerpac) components/hoses could have a leak. Mechanical damage to other components. 	<ul style="list-style-type: none"> Visual check on all hydraulic and mechanical components for any damage. When working with hydraulic equipment, never come into contact/handle or disconnect hoses and fitting when under pressure, and always follow Enerpac safety requirements. 	




d)	Assess suitability of bolt for pull test.	<ul style="list-style-type: none"> • Void behind rock plate, could result in crushing rock plate or breaking mesh. • Excessive bolt installation angle may cause premature failure of bolt. 	<ul style="list-style-type: none"> • Only perform pull tests on bolts that are firmly against rock, and where the installation angle allows correct connection to the pull cylinder. 	
e)	<p>If required, perform Torque test on rock bolt with torque test spanner (tighten by hand with spanner minimum length 600mm). Determines if the bolt was correctly installed. Poorly installed bolts (loose bar/nut not tight) may still be pull tested (see step i).</p>	<ul style="list-style-type: none"> • Strains /sprains. • Crush/pinch injuries. • Tool slip/Failure. • 	<ul style="list-style-type: none"> • Wear correct PPE. • Ensure spanner is secured correctly to the blind nut, and the extension rod is sufficiently engaged with the spanner. • Use correct manual handling techniques when applying test torque to the bolt. • Correct ergonomic body position before muscle force is applied. 	
f)	When testing MD Bolts, attached the pull test claws (with pull rod) to the pull test collar.	<ul style="list-style-type: none"> • Strains /sprains. • Crush/pinch injuries. • 	<ul style="list-style-type: none"> • Wear correct PPE. • Use correct lifting techniques especially if working overhead or far from the body. 	




Installation of MD & MDX Rockbolt

	Steps	Potential Hazard& Consequences	Control Measures/procedures	Visual
a)	Slide the holding ring onto the claws attached to the bolt.	<ul style="list-style-type: none"> • Strains /sprains. • Crush/pinch injuries. 	<ul style="list-style-type: none"> • Wear correct PPE. • Use correct lifting techniques especially if working overhead or far from the body. 	
b)	If pull testing MDX bolts (or the bar only for MD bolt), install the adapter and Pull-bar onto the bolt.	<ul style="list-style-type: none"> • Strains /sprains. • Crush/pinch injuries. 	<ul style="list-style-type: none"> • Wear correct PPE. • Use correct lifting techniques especially if working overhead or far from the body. 	
c)	Slide pull test Shroud onto the pull test claws and rod; ensure the flat on the shroud base is aligned with the rock plate hook point.	<ul style="list-style-type: none"> • Strains /sprains. • Crush/pinch injuries. • Falling parts. 	<ul style="list-style-type: none"> • Wear correct PPE. • Use correct lifting techniques especially if working overhead or far from the body. • Ensure no parts fall from the assembly. 	





	Steps	Potential Hazard& Consequences	Control Measures/procedures	Visual
d)	<p>Slide the hydraulic cylinder onto the pull test rod, while supporting the shroud by hand.</p> <p>DO NOT LIFT THE CYLINDER BY HOSE – ONLY USE THE HANDLE.</p>	<ul style="list-style-type: none"> • Strains /sprains. • Crush/pinch injuries. • Falling parts. 	<ul style="list-style-type: none"> • Wear correct PPE. • Use correct lifting techniques especially if working overhead or far from the body. • Ensure no parts fall from the assembly. 	
e)	<p>Attached the nut (and spacer if required) to the end of the pull rod, while supporting the shroud and cylinder by hand.</p>	<ul style="list-style-type: none"> • Strains /sprains. • Crush/pinch injuries. • Falling parts. 	<ul style="list-style-type: none"> • Wear correct PPE. • Use correct lifting techniques especially if working overhead or far from the body. • Ensure no parts fall from the assembly. 	
f)	<p>Install fall arrest equipment.</p>	<ul style="list-style-type: none"> • Falling components if Rock bolt fails catastrophically. 	<ul style="list-style-type: none"> • Fall arrest equipment secured to fixed point. 	



	Steps	Potential Hazard& Consequences	Control Measures/procedures	Visual
g)	<p>Using the Hydraulic pump (electric or manual), apply the pull load (until a maximum load is reached or the bolt starts to slip).</p> <p>For destructive testing of MD bolts, the test must be stopped at 280 kN AND MUST NOT EXCEED MAX CYLINDER STROKE* to prevent overloading the hydraulic equipment.</p> <p>For testing past maximum cylinder extension, release hydraulic pressure and re-tighten Nut.</p> <p>When destructive testing MDX bolts, the load must not exceed 190 kN AND MUST NOT EXCEED MAX CYLINDER STROKE*, which is the yield point of the bar.</p> <p>NEVER CONTACT OR HANDLE HYDRAULIC EQUIPMENT WHEN UNDER PRESSURE.</p>	<ul style="list-style-type: none"> Noise. Strains /sprains. Crush/pinch injuries. Falling parts/projectiles. Projectiles due to broken bolt. Incorrectly installed bolts (loose bar) may break at relatively low loads as loads are applied only to the tube. Hydraulic needle pin leaks/injections. 	<ul style="list-style-type: none"> Wear correct PPE. Use correct lifting techniques especially if working overhead or far from the body. Ensure no parts fall from the assembly and that no rock falls from behind the rock plate. Remain out of the “line of fire” of the bolt being tested. Care must be taken when loading incorrectly installed bolts (not tight or loose bar). Fit protective sleeving on high pressure hoses. Wear double eye protection. * RCH302 maximum cylinder stroke 60 mm * RACH304 maximum cylinder stroke 100 mm. 	 <p>Routine testing of MD/MDX bolts will be stopped at a load of either 15 t or as agreed between the mine and Sandvik.</p>
<p>Remain out of the “line of fire” of the bolt being tested, to prevent any injury if bar breaks.</p>				



	Steps	Potential Hazard& Consequences	Control Measures/procedures	Visual
h)	Release the hydraulic pressure and remove all pull test parts from the rock bolt.	<ul style="list-style-type: none"> • Strains /sprains. • Crush/pinch injuries. • Falling parts/rock. • Mechanical stored energy. 	<ul style="list-style-type: none"> • Wear correct PPE. • Use correct lifting techniques especially if working overhead or far from the body. • Ensure no parts fall from the assembly. • Remain away from the rock face, as rock may have been loosened during the pull test procedure. 	
i)	Spray the bolt and plate with paint and mark the test load and test date (If requested by specific mine site).	<ul style="list-style-type: none"> • Paint fumes 	<ul style="list-style-type: none"> • Ensure ventilation is adequate and avoid inhaling paint fumes where possible. 	



DOCUMENT HISTORY

The document status is detailed below (e.g. Concept, Final, Release)

Date	Version	Change(s)	Author
09/05/2012	0	Document released	B. Darlington
18/01/2013	1	Item g) updated with image, procedure update to cover destructive testing and list hydraulic safety requirements.	B. Darlington
12/04/2017	2	Update template, Pg. 1 training details, and reference to MDX bolt	B. Darlington
19/02/2021	3	Update Step 1 to add reference to EWP emergency evacuation consideration	B. Darlington
23/02/2021	4	Step j) updated with max stroke for both cylinder types.	B. Darlington
18/03/2022	5	Update Step 1 to add reference to EWP tramming	S. Weaver
13/02/2024	6	Template updated	B. Darlington