



WHITFIELD MINERALS PTY LTD
*Supplier of Quality Aquacrete
Products*

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QUALITY PRODUCTS

AQUACRETE

2PSI FLEXIBLE SAIL STOPPING



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DESCRIPTION

The Flexible Sail Stopping is an alternative ventilation structure that offers an air tight seal that can maintain ventilation control in adverse conditions. The simple installation technique utilises minimal material handling required from mines and can easily be removed and re-used in similar size cut throughs

MAJOR BENEFITS OF FLEXIBLE SAIL STOPPING

- Quick and easy to install.
- Mine installation or Supervision and installation can be supplied.
- Offers flexibility to combat convergence.
- Impermeable FRAS rated barrier.
- Over pressure design rated to 2 PSI.
- Logistics Effectiveness – less requirement of transport pods.
- Complete kits or fabric only can be supplied.
- Able to incorporate man doors.

STORAGE

The Flexible Sail stopping should be stored undercover in dry conditions.

HEALTH AND SAFETY

- Material Safety Data Sheet is available upon request.
- Recommended Safe Working Procedures are available upon request.

TENSILE FORCE IN A MEMBRANE

DESIGN CONSIDERATIONS:

ASSUMED DATA

1. Calculations are based on Tensile/Tearing strengths of Fabric as supplied by manufacturer
2. Anchorage to roof, floor and ribs will adequately distribute loads
3. Fabric properties as per manufacturer accredited tests

Heading Dimensions

Seam Height, $a = 3$ Metres

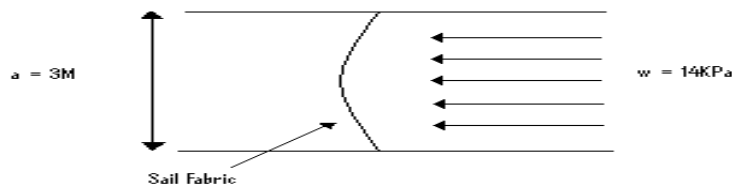
Seam Width $b = 5$ Metres

Maximum Elongation $= 52\%$

$$\text{Arc length} = \pi \times \text{radius} \times \text{arc angle} / 180^\circ = 0.017453 \times r \times \text{arc angle}$$

$$1.62H = 0.017453 \times r \times \text{arc angle}$$

$$r = 1.5M, \text{ arc angle} = 180^\circ$$



The methodology used to determine tensile load in a strip of the fabric assumes that the fabric acts as a “Catenary” when anchored at its edges and loaded by ventilation pressure.

Using catenary method, it is possible to calculate the reinforcement force

$$\begin{aligned} \text{Loading} &= 14\text{KPa} \\ \text{Tension} &= 0.5w a \sqrt{1 + a^2 / 16r^2} \\ &= 0.5 \times 14 \times 3 \sqrt{1 + 3^2 / 16 \times 1.5^2} \\ &= 23.50\text{KN/M} \end{aligned}$$

Assuming that the load is applied instantaneously, and the wide strip tensile strength is an accurate indication of the available strength, the FOS would be:

$$\begin{aligned} \text{FOS Rupture} &= \text{Wide strip tensile strength} / \text{Tension required} \\ &= 27.6 / 23.5 \\ &= 1.18 \end{aligned}$$

From load extension data for Flexible Sail Stopping fabric

$$\begin{aligned} \text{Strain, } \epsilon &= 23.5 / 27.6 \times 59\% \\ &= 50.234\% \text{ elongation} \end{aligned}$$

Please note: More detailed information is available upon request.

FLEXIBLE SAIL STOPPING ANCHORAGE SYSTEM



FEATURE

This plastic strapping support has been selected as the preferred anchorage system to pin the Sail fabric to the roadway aperture. Straps can be supplied in various lengths. The straps will be installed end to end to cover the perimeter.

SECTION PROPERTIES

Profile Width	200mm
Circle Diameter	12mm
Circle Thickness	3mm
Web Thickness	4mm
Moment Inertia	241,462mm ⁴
Section Modulus	7,629mm ³
Polar Moment Inertia	7,218,015mm ⁴
Volume	0.0013m ³ /m
Mass	1.27kg/m

RESIN PROPERTIES

Density	0.95g/cc
Tensile Yield Strength	26 Mpa
Flexural Modulus	1206 Mpa

CENTRAL POINT LOAD CAPACITY

Support Centres	mm	1,000	500
Loading	kg	100	200
Deflection	mm	66	18

SCREWBOLTS

The 120mm x 10mm screwbolts are a threaded bolt that will cut its own thread into stone & coal after a 10mm hole has been drilled to the correct depth with a hand held air Rotary drill. Screwbolts can be used in competent roof to eliminate the use of hand held Roof bolters.

DESCRIPTION

- Screwbolt: 120mm x 10mm
- Embedment depth: 100mm
- Drill Diameter: 10mm
- Safe Working Tensile Load: 4.7Kn
- Safe Working Shear Load: 10.1 Kn

Note: Screwbolts should only be used when the geology perimeter is of sound nature & not loose & crumbly. If the geology perimeter is loose & crumbly roof/rib bolts should be used.

ALLTHREAD ROD

The M20mm Allthread Rod can be used in the ribs & floor after a 24mm hole has been drilled to the correct depth with a hand held rib boarer. The Allthread rod is then anchored using chemical anchors.

Description

- Allthread Bolt: M20mm
- Embedment Depth: Up to 3 metres
- Drill Diameter: 24mm
- Safe Working Tensile Load: 84 Kn
- Safe Working Sear Load: 46.4 Kn



SEALANT

The outside perimeter of the Flexible Stopping can be sealed by spraying or hand scriming with Aquacrete product.

DOORS

The Flexible Stopping can accommodate man doors. There are 2 options available:

1. 1800 x 900mm or 900 x 900mm 2psi rated metal doors.
2. 900 x 900mm Velcro doors.

LEAKAGE AND RESISTANCE

A trial installation of a Flexible Sail Stopping™ was carried out in a NSW colliery to quantify an actual leakage and resistance rate to determine this structures suitability as a 2PSI rated Stopping. The test involved opening a pressure relief aperture in a set of double doors creating the potential for pit air to short circuit to return. The following tables refer

Table 1

4/03/03		0.95				
		0.9				
		0.85				
	Av Vel.	0.9	m/s	Area	0.95	0.95
					0.90	m ²
				Quantity	0.81	m ³ /s
	P=RQ ²	P	668	Pa		
		Q	0.81	m/s		
	R=P/Q ²	R	1018.137	Gaules		

Table 1 data reflects a relatively high leakage rate. It is to be noted that no sealant material was in place and the door frame was loosely fitted

Table 2

4/03/03		0.24				
		0.28				
		0.28				
	Av Vel.	0.27	m/s	Area	0.95	0.95
					0.90	m ²
				Quantity	0.24	m ³ /s
	P=RQ ²	P	662	Pa		
		Q	0.24	m ³ /s		
	R=P/Q ²	R	11493.06	Gaules		

Table 2 data shows better leakage and resistance rate with the application of Aquacrete sealant. It is to be noted that the door was loosely fitted when this data was recorded and the scrim was applied by hand. Actual installation will involve shot blasting Aquacrete OPR2 to create an even better seal.

DEPARTMENT OF MINERALS AND RESOURCES COMPLIANCE

The Department of Minerals and Resources Compliance for Aquacrete 2psi Flexible Sail Stopping is available by contacting our New South Wales office.