Technical Data Sheet

SPLIT SET MINING SYSTEMS
UNDERGROUND ROOF SUPPORT PRODUCTS

MINOVA

LOKSET® TOOSPEEDIE®

HARD ROCK MINING – WEST COAST
TWO SPEED RESIN, ANCHORING MEDIUM

DESCRIPTION

The LOKSET® TOOSPEEDIE® is a two-speed resin capsule that consists of a reinforced, thixotropic polyester resin mastic in one compartment and an organic peroxide catalyst separated by a physical barrier in the other. The rotation of the bolt during installation ruptures the capsule, shreds the skin and mixes the two components causing a chemical reaction and transforming the resin mastic into a solid anchor.

The capsule is available in either 40:50 or 50:50 ratio of fast: slow speeds.

APPLICATION AND USES

The Lokset Toospeedie resin capsule is used primarily as an anchoring medium for rockbolts and long tendons. They provide roof and sidewall support in mines and tunnels. They can be used with both hydraulic and pneumatic roof bolters.

Other uses include:

- Marine fixings above or below water
- Ground anchors in rock
- Fixtures to building structures
- Pipe and cable support fixings
- Crane and rail track fixing
- Anchoring bolts for machinery

ADVANTAGES

Selection of appropriate capsule enables a wide variety of applications:

- Rapid insertion, easy and quick to use
- Higher compressive strength, strong, rapid and consistent anchorage
- Reduced handling and wastage
- Protects bolt from corrosion, can be used in wet or underwater conditions
- Unaffected by vibration
- No expansion stresses, can be used in weak strata

Figure 1 - Toospeedie® Resin Capsule

- Full encapsulation with pretensioning when using combination Toospeedie capsules
- A unique design of capsule configuration enabling extremely effective mixing of resin mastic and catalyst compartments
- Guarantees both fast and slow set capsules are installed
- Both speeds compatible giving reduced back pressure and easier penetration
- No plastic or cardboard joiners required
- Acts as a reinforcement that clamps the individual strata layers together into a single high strength beam

TECHNICAL DATA

Typical insertion properties at 25°C:

Speed Ratio	Speed	Spin Time[1]	Hold Time[2]
50:50	XFast/Medium	11	12-19
50:50	Super Fast/Slow	11	10-60
50:50	XFast/Slow	12	12-60
50:50	Fast/Slow	14	12-60
50:50	Medium/Slow	16	19-60
40:60	XFast/Slow	12	12-60
40:60	Fast/Slow	14	15-60
40:60	Medium/Slow	16	19-60

[1] *Approximate spin time in seconds*
[2] *Minimum hold time in seconds*

The hold time is the minimum time allowed after completion of the spin time before bolt tensioning is attempted. In many cases the hold time will be greater than that listed.

The times listed are an indication only, they may vary with temperature, mining conditions, equipment, hole: bolt annulus, age and storage conditions of resin capsules.

Each mine site should be evaluated to determine optimum installation parameters.

Temperature / Mastic Gel Time

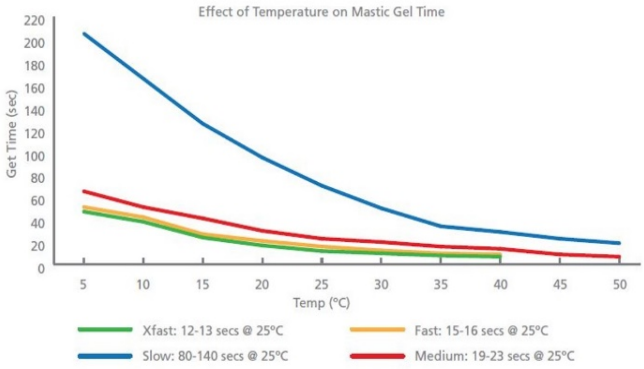

Figure 2 - Effect of Temperature on Mastic Gel Time

Compressive Strength

Tested in accordance with [1]BS 7861:Part 1:1996. Tested on 40 mm cubes with slow set resin.

[1] Strata reinforcement support system components used in coal mines: Part 1, specification for rock bolting.

Typical results:

Age (hours)	Uniaxial compressive Strength (MPa)
24	>60

Youngs Modulus

Tested on 2:1 aspect ratio cylinder with slow set resin.

Typical results:

Age (hours)	Young Modulus (GPa)
24	>6.5

Push Out Test

Measured on 22mm bolt, 50mm encapsulation in 28mm I.D. threaded cylinder, with slow set resin.

Typical results:

Age (hours)	Push out Force (kN)
24	>72

Punched Shear Strength

This test (according to BS 2782 Part 3) provides excellent correlation with mine pull out tests (without the variances) and is directly related to the strength of the resin. With fast setting resins the test can be performed in a very short time after the resin mixture has gelled (15 seconds).

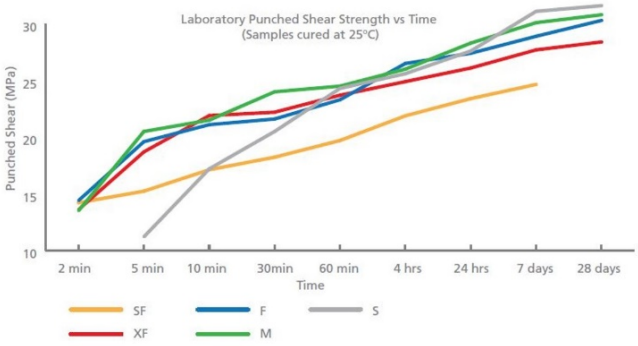

Figure 3 - Punched Shear Strength vs Time

APPLICATION METHOD

It is essential that good bolting procedures are followed and the instructions on the box are observed.

As a guide the following steps must be taken:

1) Drill hole to correct diameter ensuring water/air flush is used. The hole should be clean and free from dust and other loose particles. In Coal mining 27-28mm hole diameters are normally preferred with 22mm core diameter roof bolts or cables. Do not exceed the manufacturers recommended diameter.

2) Drill hole to correct length for bolt. The ideal hole length should be at least 100mm shorter than the bolt, dependent on the bolt/cable being used. Do not deviate from the manufacturers recommended length of hole in relation to the bolt.

3) Select the correct resin capsule(s) that has been specified for the job

4) Check that the use by date on the box label has not expired.

5) Follow the below insertion steps:

Step 1	*Insert one Toospeedie capsule in the correct way:* *Yellow end first : Fast* *: SuperFast / Slow* *: XFast / Medium* *: Fast / Slow* *: XFast / Slow* *Red end first : Medium* *: Medium / Slow*
Step 2	*Push the capsule until the first capsule touches the top of the hole using the bolt (or other insertion device if available).* *Ensure the capsule reaches the top of the hole. Do not insert the Toospeedie capsule upside down* *Should insertion problems occur then the problem must be investigated.*

6) Connect the bolt to the spinning dolly/spanner.

7) The bolt is pushed and spun at maximum rpm at a constant feed rate through the entire length of the capsule(s), when the top of the hole is reached a further 2 - 4 seconds spinning will suffice to ensure complete mixing.

   Total spin time through the capsule and at the top of the hole should not exceed the "approximate spin time" on the box label. It is essential the bolt is pushed and spun to the top of the hole before mixing is completed.
   Note: Penetration time through the capsule to the back of the hole should be greater than 8 seconds

8) Do not over mix the resin. If mixing continues beyond the recommended spin time and into the gel time, the solidifying chemical may be ground up and destroyed.

9) The bolt is then held stationary and after the hold time has elapsed the bolt may be tensioned as required.

   The hold time is the minimum time allowed after completion of the spin time before bolt tensioning can be attempted. In many cases the hold time will be greater than that listed.

10) The following items must also be checked where hand-held (air operated) equipment is utilised:

- Clean and dry supply of compressed air
- Air supply from roof bolter to miner should not be more than 100 metres of 2" hose
- Air pressure must be between 85 - 100 psi (586 - 690 KPa) when bolter(s) are operating
- Water pressure should be between 80-90 psi (550 - 620 KPa) and hoses flushed out prior to connection

SAFETY INSTRUCTIONS AND LIMITATIONS

The annular gap between bolt and hole diameter should be at a minimum. It is recommended the annular gap be between 4 - 6mm e.g.

Bolt Diameter	22mm
Hole Diameter	27mm
Annular Gap	5mm

Where larger annular gaps are encountered (e.g. in Hardrock mines) the bolt must possess larger deforms or a mixing device such as mixing wire or Paddles. Follow the installation guidelines. Larger hole diameters/annular gaps may result in extended cure times, less efficient mixing, finger gloving of the bolt into the resin capsule, a reduction in load transfer (strength), a reduction in encapsulation length.

In all cases it is strongly recommended that short encapsulation pull tests be performed to verify that required load strengths are achieved.

Extended tensioning times may be due to:

- Low temperatures
- Broken ground
- Large hole diameters
- Insufficient spinning
- High nut break out loads
- High machine torque load levels
- Excessive thrust/feed on the installation rig
- Intermixing of slower setting resin into faster setting resin capsules.

The resin appearing to be "too quick" with the bolt not reaching the top of the hole may be due to:

- High temperatures
- Smaller diameter holes
- Hole closure
- Angled holes
- Misaligned holes/rigs
- Low feed pressure
- Premature nut break out
- Old/out of date resin

All bolting parameters will vary depending on several factors such as:

- Strata condition/type
- Temperature
- Hole:bolt annulus
- Age of resin capsule
- Equipment
- Installation method

Volume

It is essential the correct length of capsule is selected to fill the volume left in the hole after allowing for the volume of the bolt.

It is good practice to use a capsule size which exceeds this volume by around 10% to allow for variations in hole diameter and length, bolt size and strata conditions.

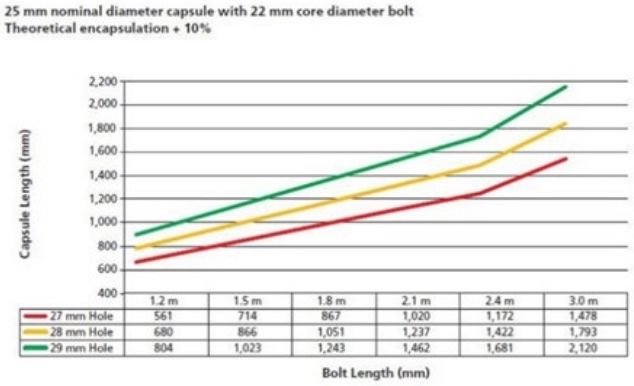

Figure 4 - 25mm nominal diameter capsule with 22mm core diameter bolt (Theoretical encapsulation + 10%)

PACKAGING AND TRANSPORTATION

Lokset Toospeedie resin capsules are available in lengths from 880 to 1,500mm, diameters 25mm "nominal" (actual 23.6mm), 26mm, and 30mm.

Resin capsules are packaged in water resistance cardboard cartons labelled with colour codes and supplied on wooden pallets. Capsules are packed according to their length and in quantities relative to the capsule size.

TOOSPEEDIE Product code

TS Toospeedie	50% fast set, 50% slow set
46 Toospeedie	40% fast set, 60% slow set
1200	Capsule length of 1200mm
25	Capsule length of 25mm
Standard Code	TS120025FS

TOOSPEEDIE Product Label

Label colour is dependent on resin speed and resin combination:

Resin Speed	Colour of Label
Super Fast	
Extra Fast	
Fast	
Medium	
Slow	

Example of Lokset Toospeedie 40/60 Fast Slow label.

Figure 5 - Capsule Label

X2 TOOSPEEDIE® Resin Capsules

X2 (two resin capsules joined) TOOSPEEDIE (two speed capsule) are available for use with the QUICK-CHEM™ or other installation systems.

Example: TS120026MSX2 (1200mm of Medium set connected to 1200mm of Slow set, giving a total capsule length of 2400mm) capsule folded in half for packaging.

Contact Minova Australia for further information such as availability if other sizes and special packaging for export.

STORAGE AND SHELF LIFE

Suggested shelf life for Lokset Toospeedie resin capsule is 4 months when stored between 20- 25°C. Extended shelf life can be expected when stored at lower temperatures of 0-5°C in cool rooms and is highly recommended. Stock rotation is strongly recommended. Storage at higher temperatures will severely reduce shelf life.

STORAGE CONDITIONS

Store in a cool, dry place away from direct sunlight. Do not double stack pallets. When using cool room storage, the resin capsules should be allowed time to attain ambient temperature before use otherwise SPIN and HOLD TIMES will be extended.

HEALTH AND SAFETY

For further information see the Lokset Safety data sheet on www.minovaglobal.com/apac

TECHNICAL SUPPORT

We provide technical advisory service by a team of specialists in the field. The service includes on site assistance and advice on evaluation trials and laboratory work.

Packed in water resistant cardboard cartons labelled with colour codes and supplied on wooden pallets.

QUALITY

The superior quality of the Lokset resin capsule is assured through a four-part quality control program:

1) Raw Material Testing
2) In-process quality control testing
3) Finished product acceptance testing
4) Quality system management to ISO 9001

Testing levels and specifications for each of the above programs have been established statistically, based on actual historical data to ensure the customer receives a uniform quality product which will perform dependably under field conditions

MANUFACTURER

Minova trading name of Orica Australia Pty Ltd
George Booth Drive
Kurri Kurri NSW 2327 AUSTRALIA

An ISO 9001: 2015 Quality Management Certificated Company

CUSTOMER SERVICE & SUPPORT

Product & Technical

Minova Australia
George Booth Drive
Kurri Kurri NSW 2327 AUSTRALIA

(1800 Minova) 1800 646 682
(1300 Minova) 1300 646 682
+61 2 4939 5159 (international)
Email: sales_au@minovaglobal.com

Sales & Logistics

Split Set Mining Systems
99-105 McDowell Street
Welshpool WA 6106 AUSTRALIA

Phone: +61 (0) 8 9458 1188
Email: mining@phoenixmetal.com.au
Customer Orders Email:
orders.desk@phoenixmetal.com.au