

Lokset Resin Cartridges

Polyester resin anchoring system

USES

Lokset resin cartridges enable bolts of various lengths to be anchored and grouted in one easy operation with no need for injection equipment. Applications include rock bolting in mines and tunnels, tie backs, rock reinforcement of highway cuts, dams and powerhouses, vibration resistant anchorages of equipment, anchorage of electrical transmission towers and integral ties between reinforced concrete and rock faces above or below water.

ADVANTAGES

- Accuracy** - All anchorages can be designed with reproducible strength characteristics.
- Speed** - Fast gelling resins enable rapid installation. Bolts can be installed and tensioned in minutes, giving immediate support in mining and tunnelling applications.
- Permanence** - The resins protect the encapsulated bolt from corrosion due to water, salt, mild alkalis and mild acids.
- Safety** - Millions of resin anchorages are used every year for critical jobs such as roof support in mines and tunnels.
- Vibration** - Lokset anchors are not affected by vibration and do not require retensioning after blasting.

DESCRIPTION

The Lokset polyester resin cartridge consists of a filled polyester mastic and a catalyst paste, contained in a heat sealed tube of polyester film. No reaction takes place until the rockbolt is rotated through the cartridge, mixing the components and initiating the curing action. Cartridges are available in various diameters and gel times.

INSTALLATION PROCEDURES

1. Drill the bolt hole using rotary-percussive equipment. Clean out with air or water (standing water in the hole does not affect the resin. The system permits bolt placement at any angle in rock or concrete, above or below water. For maximum anchorage strength the difference in diameter between the hole and the bolt should be kept to a minimum (ensuring better mixing of the resin and catalyst).

2. Insert resin cartridges. In uphole applications the cartridges may be tamped or plastic retainers used to hold the cartridges in place.

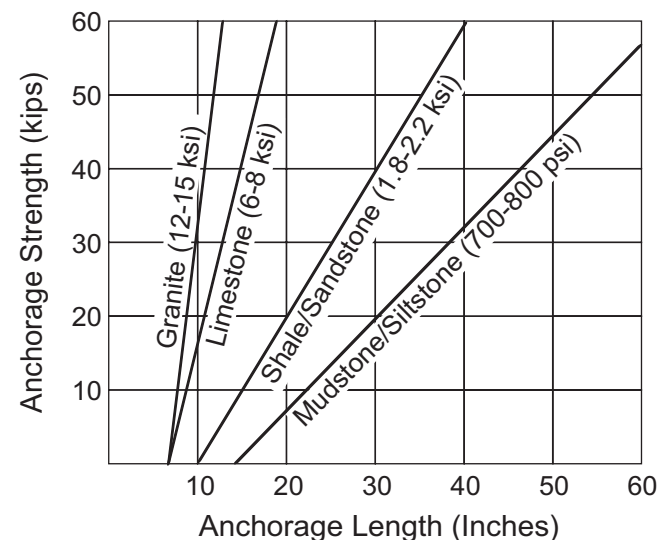
3. Insert the bar or bolt and immediately begin spinning the bolt (usually done with the same equipment used to drill the hole). A minimum rotational speed of 100 rpm is recommended. Under no circumstances should bolt be simply pushed through the resin cartridges without spinning as improper mixing can result, possibly resulting in anchorage failure. Spin for about 10 seconds (20 to 30 revolutions) after the bolt is completely inserted. Do not overspin.

4. If both fast and slow set cartridges are used, the bolt can be pretensioned after the fast resin sets but before the slow resin sets. This locks in the prestress load after the slow set resin sets.

PERFORMANCE DATA

Standard rebar, threadbar or deformed fibreglass rod can be used with the resin cartridges. Coil rod and all-thread rod will require modifications to insure complete mixing of the resin components during installation. Deformations on the bar are essential to mix the resin and catalyst.

In boreholes drilled by purely rotary means, or when underwater anchorage are considered, loadings will be reduced. Conduct anchorage tests to verify design assumptions. For underwater applications, the minimum recommended anchorage length is 24”.



GEL TIME AND TEMPERATURE

The gel time of a resin is the time required to change the resin from a viscous liquid to a gel. The process involves cross-linking of the unsaturated polyester resin. Important note - **working strengths are reached at 5 times the gel time.**

The resin gel and cure times are temperature sensitive. To insure proper behaviour the resin, bolts and rock temperatures must be monitored.

Lokset resin cartridges are available in 5 standard gel times (20W, 35, 50, 90 or 0204, and 1530). Fast set resins are colour coded black (20W, 35, 50 and 90). Slow set resins are colour coded brown (0204 and 1530).

	Fast Set			Slow Set	
	"20W"	"35"	"50"	"90" "0204"	"1530"
90°F/32°C	--	--	25sec	1.5min	10min
80°F/27°C	--	15sec	35sec	2min	15min
70°F/21°C	12sec	20sec	50sec	2.5min	20min
60°F/16°C	17sec	28sec	65sec	3.5min	30min
50°F/10°C	22sec	39sec	90sec	--	--
40°F/4°C	27sec	63sec	--	--	--

VISCOSITY

The cartridges are available in two different viscosities, regular viscosity (code "H") and medium viscosity (code "M"). "H" series is general purpose whereas "M" series resin is typically used with long bolts (to 60' length), with hand held equipment or with fibreglass bolts and dowels.

STORAGE

Store resin cartridges in a dry, cool, well ventilated area away from direct sunlight. High temperatures conditions can reduce the shelf life. Cartridges stored in extreme hot or cold conditions should be allowed to normalize to 50-70°F prior to use in order to provide the expected gel time.

SHELF LIFE

12 months for 23mm to 35mm diameter resin.
9 months for 40mm and 45mm diameter resin.

PACKAGING

Lokset resin cartridges are available in a variety of lengths from 12" (stock) to 54" (custom order) and are sold by case lot.

23mm x 12" resin	50/case
28mm x 12" resin	30/case
32mm x 12" resin	25/case
35mm x 12" resin	20/case
40mm x 12" resin	16/case
45mm x 12" resin	12/case

RESIN USAGE CHART

Hole Size	1"	1-1/4"	1-3/8"	1-1/2"		1-5/8"	1-3/4"	1-7/8"	2"		2-1/4"		
	25mm	32mm	35mm	38mm	41mm	45mm	48mm	51mm	57mm				
Resin Size	15/16" 23mm	1-1/8" 28mm	1-1/4" 32mm	1-1/4" 32mm	1-3/8" 35mm	1-1/4" 32mm	1-3/8" 35mm	1-9/16" 40mm	1-9/16" 40mm	1-9/16" 40mm	1-3/4" 45mm	1-9/16" 40mm	1-3/4" 45mm
Bolt Size													
#6 (19mm)	19.1"	12.4"											
#7 (22mm)		15.6"	14.4"		13.0"								
#8 (25mm)		22.0"	18.2"	12.9"	15.5"		11.8"	12.3"					
#10 (32mm)						15.0"	18.0"	16.9"	13.0"				13.1"
#11 (35mm)								21.6"	15.6"	12.0"			15.2"
#14 (41mm)										26.9"	12.6"	34.2"	16.0"

Chart indicates inches of bolt encapsulation per 12" (305mm) length of resin cartridge.
Chart calculations include 15% wastage and loss into cracks, joints, fissures, etc.
Blank spaces are non-recommended bolt and hole size combinations