



Seismic Drills – Safe Guarding of Rotating Parts; a Guide to Compliance in British Columbia

CAGC INFORMATION ALERT

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The following information is not a definitive guide to government legislation and does not release users of this document from their responsibilities under applicable legislation.

Safeguarding is the first line of defense when ensuring the safety of workers who are operating powered machinery and/or equipment – especially when those workers are exposed to the hazard of rotating parts. The term “safeguard” is an umbrella term for measures that give workers effective protection from harmful contact with hazardous moving/rotating parts or other harmful conditions.

Safeguards include barrier guards, safety devices, shields, awareness barriers, warning signs etc. , that are used separately or in combination; alternatives to barrier guards can include interlocked movable barrier guards, two-hand controls, and electronic presence-sensing devices etc.

When mitigating the hazard a rotating stem presents, there is a hierarchy of controls employers should take into consideration:

 Most Effective	1. Elimination or Substitution	<ul style="list-style-type: none">• Eliminate human interaction in the process• Eliminate pinch points (increase clearance)• Automated material handling
	2. Engineering Controls (Safeguarding technology)	<ul style="list-style-type: none">• Mechanical hard stops• Barriers• Interlocks• Presence-sensing devices• Two-hand controls
	3. Awareness Means	<ul style="list-style-type: none">• Lights, beacons, and strobes• Computer warnings• Signs• Restricted space painted on floor• Beepers• Horns• Labels
	4. Training and Procedures (Administrative Controls)	<ul style="list-style-type: none">• Safe job procedures• Safety equipment inspections• Training• Lockout
	Least Effective	5. Personal Protective Equipment (PPE)

INFORMATION ALERT – SAFE GUARDING OF ROTATING PARTS

The main concern coming out of WorkSafeBC, in relation to hazard exposure, is the rotation, connection and removal of the drill stem during seismic drilling operations. To be in compliance with BC legislation, employers are required to ensure their workers are not coming into contact with a stem while it is rotating. This can be achieved by the implementation of safeguards on seismic drills or, alternatively, two-handed controls (pull down and rotary, positioned far enough apart that they cannot be operated with one hand) **and** neutralized controls (i.e. when released they automatically return to the neutral position). Other engineering controls that can also be considered to mitigate this hazard are:

- A work procedure for torque control (i.e. idling down) when engaging the Kelly pin for coupling/decoupling using mechanical means;
- Slips for holding the bottom drill stem in place when coupling/decoupling if using mechanical means to rotate on or off the Kelly pin;

Two-handed controls must be:

- Protected against unintended or accidental operation;
- Separated or otherwise designed to require both hands to activate controls, meaning no hand-and-elbow or one-handed operation (300–400 mm (12–18.7 in) symmetrical in front of the body);
- Designed so that both hands must be released before another cycle can be initiated. The design should also prevent the operator from tying down one of the controls by using tape, rubber band, wedge etc.;
- Located a safe distance from the nearest hazard so that the operator cannot reach it with a hand or other body part before the rotation has stopped. This safe distance is calculated using a “Hand Speed Constant” of 1,600 mm per second, considered the speed of a person reaching into a machines point of operation to retrieve an object or correct a fault;
- Subject to CSA Z432-04 Safeguarding of Machinery Table 4: Recommended Ergonomics Control Parameters:

Dimension	Dual Palm Buttons
Surface	Mushroom / Dome-shaped
Diameter	50 - 60mm (1.976 - 2.36 in)
Horizontal Location	< 250mm (10 in) in front of operator
Vertical Location	0.90 – 1.15m (35 - 45 in) above standing surface
Control Separation	300 - 400mm (12 - 18.7 in) symmetrical in front of the body
Force	4 – 16 N (0.90 – 3.60 lbf)

Note: Two-handed controls alone may not provide sufficient safeguarding. Additional safeguards may be required to protect workers other than the operator (i.e. no go zones when drill stem is rotating).