



## Technical Bulletin: Cable Grabs

### Association for Challenge Course Technology

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The intent of this bulletin is to educate challenge course designers of the potential risks associated with delayed lock-on in some cable grab systems and to provide information so that challenge course designers can critically evaluate the effectiveness of their systems.

This technical bulletin is for those designing or using cable grabs as part of a personal fall arrest system on a challenge course. This technical bulletin specifically applies to cam/lever type cable grabs which have been designed for use in ladder safety systems employing rigid rails or wire rope. In addition, it is specifically meant to address those circumstances where the cable grab is connected directly to the front of the climber's harness (sternum or waist) with a connector or connector/shock absorber combination.

Information contained in this bulletin is NOT meant to apply to cable or rope grabs which are designed for use in fall arrest systems which connect to the dorsal "D" of a full body harness. This bulletin does not apply to rope grabs that are used with textile ropes.

#### **Background**

The use of cable grabs in the challenge course industry became widespread in the last decade. Cam/lever type cable grabs employ a spring-loaded lever camming upon the cable to arrest a fall. The cable grab moves when the spring bias is overcome by upward tension. During a fall, the spring-loaded lever locks and the cable grab becomes a fixed anchor point. The climber decelerates a short distance, comes to a complete stop, and remains suspended in mid-air.

A slip by one or both feet is unlikely to result in a fall if one or both hands retain a firm grip. When both hands lose their grip, however, the climber falls away from the tree or pole which adds horizontal force to the vertical force generated by gravity (Clark, 1985). This horizontal force must disperse before the downward force of the fall can engage the cam of the cable grab onto the vertical cable. The larger the horizontal component of the fall, the longer it may take for the fall arrester to engage (Arndt & Weaver, 2008; Riches, 2004). It is also possible that the cable grab may not engage at all and the climber will fall to the bottom of the

vertical cable. This appears to have happened in a challenge course incident that occurred 27 July 2008. As a result of this specific incident North Safety has recommended that North FP571/10 cable grabs should only be used with their Rungmaster™ ladder system.

### **Technical Information**

The fall arrest industry has become aware of delayed lock-on in cam activated vertical fall arresters (Arndt & Weaver, 2008; Second, 2007). Safety warnings were issued in Europe on 1 June 2004 (HSE, 2004), in the United States on 13 December 2006 (GIDEP, 2006; Second, 2007) and in Canada on 31 July 2008 (Sulowski, 2008) as a result of test results and accident reports. These advisories and other communications indicate that some cam/lever type cable grabs used with a front connection may not function as intended in the event of a backward fall.

There are also a number of factors that may increase the potential for delayed lock-on in cam/lever type cable grabs addressed in the scope of this bulletin. Deviating from the parameters upon which a manufacturer has designed and tested a particular cable grab system may lead to such an occurrence. Manufacturers' recommendations regarding connector length, connector location, cable tension, cable angle, and harness compatibility need to be carefully considered in light of their potential contribution to delayed lock-on. While addressing these factors may reduce the risk of delayed lock-on, testing and accident investigations (Arndt & Weaver, 2008; Riches, 2004) indicate that the potential for delayed lock-on may still exist.

Delayed lock on is a phenomena that is often hidden, as current standards pertaining to cable grabs require an unobstructed vertical drop test using only a solid mass rather than an articulated manikin (ANSI A14.3, ANSI Z359.1, CSA Z259.2.1, and EN 353-1, 353-2). This test approach may not adequately simulate actual use conditions in the field. While standard-setting bodies are in the process of developing fall back tests (ANSI A14.3-2008; Doughty, 2008), current standards do not require manufacturers to perform tests that adequately simulate the kinds of backward falls which may lead to delayed lock-on (Arndt & Weaver, 2008; Riches, 2004; Sulowski, 2008). Correspondence from members of both the ANSI Z359.1 and the ANSI A14.3 committees indicate that there is an awareness of this issue, but agreement has not yet been reached about a suitable test method and subsequent change to the standards. The American Ladder Institute has indicated that they are aware that "outward (backward) fall risk potential is critical" and that they "will continue to monitor this issue and provide an addendum to the standard once a test method becomes available" (ANSI A14.3-2008, p. 10).

Delayed lock-on is a low frequency but potentially severe event. Readers should be aware that tests and research have been limited in scope and have primarily focused on fall arrest systems using rigid rails rather than wire rope. Because

cable grabs used on wire rope utilize the same mechanical cam principle, researchers (Riches, 2004) and industry advisories (Sulowski, 2008) have indicated that the potential for delayed lock-on may apply to this entire class of arrest devices rather than a single product. It is also important to acknowledge that not all cable grabs may be subject to the risks of delayed lock-on. Specific design considerations and testing approaches by some manufacturers may mitigate this risk in particular brands of grabs.

## Summary and Recommendations

1. Challenge course designers should consult with the cable grab manufacturer and a *Qualified Person* to evaluate the potential for failure due to delayed lock-on in their systems. The compatibility of cable grabs with various harness types, installation approaches in trees or on poles, and connectors must be carefully established.
2. For organizations that use cam/lever type cable grabs with a frontal attachment, we recommend that you review your training procedures to ensure that the device is being used correctly as required by the manufacturer and regulations in your specific jurisdiction.

## References

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