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TECHNICAL WHITEPAPER

SHARP-EDGE RISK IN FALL ARREST

Understanding SRL Capability and Compliance



Working at height remains one of the most significant risk categories across construction, maintenance, infrastructure, and industrial environments. A particular challenge within these environments is exposure to sharp edges, where a worker may fall over an edge and the lifeline interacts directly with the structure during the fall event.

Traditional fall arrest systems are more commonly designed for overhead anchorage, where the lifeline remains vertical and the device can respond quickly to acceleration during a fall. However, many real-world work environments — such as roofing, bridge construction, steel erection and deck installation — do not always provide an overhead anchorage point. In these situations, fall arrest equipment may need to be connected at foot level or used horizontally, significantly altering the dynamics of a fall event.

Understanding these risks is critical when selecting the right fall protection equipment.

DEFINING THE SHARP-EDGE HAZARD

A sharp edge is any edge or surface over which a worker could fall and where the lifeline may make contact with the unprotected, exposed edge of the structure — potentially damaging the lifeline during a fall arrest event. Examples include:

- The unprotected edge of a roof or deck
- The edge of structural steel bars or beams
- The edge of structural concrete slabs

During a fall, the lifeline may bend over this edge while under significant load. The forces generated during fall arrest can result in abrasion, deformation or cutting of the lifeline if the device is not designed for these conditions.

Under the methodology defined in EN 360:2023, testing is undertaken using a steel edge with a radius of 0.5mm to ensure clean, consistent, repeatable conditions and to represent a “worst-case” cutting/abrasion edge.

Another risk associated with work near an edge is the potential for an increased fall distance. When the anchor point is located at or near foot level, the self-retracting lifeline (SRL) may travel further before the braking mechanism engages — increasing the fall factor, fall clearance requirements and potential arrest forces.

These factors highlight why specialised sharp-edge SRLs are required for such environments.

RISK AND REGULATORY LANDSCAPE

Falls from height remain one of the leading causes of workplace fatality in Australia, and recent national data shows the trend moving in the wrong direction. Safe Work Australia reporting shows falls from height accounted for 13–15% of worker fatalities across 2023–2024, with a 71% year-on-year increase in fatalities recorded between 2022 and 2023 (from 17 to 29 deaths). In Asia fatalities from work at height are 32% to 46% of fatalities most especially in the construction segments.

Fall-from-height worker deaths occur within construction, and falls from ladders and off roofs account for roughly half of all falls-related hospitalisations in the industry.

The injury burden behind these fatality figures is substantial, thousands of non-fatal injuries also occur across Asia, and it varies from country to country but it is significant.

Regulatory settings are also shifting toward exactly the lower-height, foot-level scenarios that sharp-edge SRLs are designed to address.

Compliance gaps on the ground reinforce why engineered controls matter. Across Asia, it was found that more than 50% 1,500 sites with roof work underway had no fall protection in place at all — underscoring that equipment capability alone cannot close the safety gap without correct system design, training and enforcement.

These trends sit alongside the compliance framework already in place. Across Asia there are regulations in most SE Asian nations but contractor, worker and government compliance efforts are quite inadequate.

ENGINEERING FOR SHARP-EDGE ENVIRONMENTS

The Brute and Micron Sharp Edge ranges of self-retracting lifelines have been developed to address these conditions. These devices are engineered for horizontal and sharp-edge use, enabling safer operation where traditional overhead anchorage is not available.

Key engineering characteristics of the range include:

Reinforced Lifeline Design

Units are available with 4.8mm galvanised steel wire rope or reinforced webbing, providing improved resistance to abrasion and edge interaction during a fall event.

Integrated Energy Absorption

Energy absorbers are incorporated within the system to help manage the higher forces generated during horizontal fall arrest scenarios.

Durable Housing

The units are protected by high-impact polymer casings, designed to protect internal components in demanding work environments.

Roll Cage

Enhances performance and protects the SRL while operating at floor level.

Swivel Anchorage and Connection Hardware

Swivel anchorage eyes and snap hooks are used to reduce twisting and ensure consistent operation during use.

Impact Indicators

Integrated fall indicators allow users and inspectors to identify if the equipment has been subjected to a fall event.

Operational Capacity

Devices in the range support a working load capacity of up to 140kg, with a minimum breaking strength of 12kN for wire rope and 15kN for the webbing lifeline assembly.

Environmental Durability

Operational temperature ranges between -30°C and $+50^{\circ}\text{C}$, allowing use in a variety of industrial environments.

PRODUCT RANGE AND CONFIGURATIONS

The Brute and Micron Sharp Edge series is available in multiple configurations to suit different work environments and fall clearance constraints.

Standard Sharp Edge configurations include:

Model Type	Lifeline Type	Typical Length Options
Wire Rope SRL	Galvanised steel cable	3.5m, 7m, 10m, 15m, 20m
Webbing SRL	Reinforced polyester webbing	2m, 3.5m, 7m
Micron Series Webbing	Dyneema webbing	2m

Being designed to attach to foot-level anchor points, the 2m Micron range is also ideal for use in applications such as EWP baskets — providing greater freedom of movement while maintaining effective control and capture in the event of a fall.

All devices incorporate compact retractable housings, connection hardware and anchorage karabiners designed to integrate with standard fall protection systems.

COMPLIANCE AND STANDARDS

Equipment in the Brute and Micron Sharp Edge range is tested and certified to internationally recognised standards, including:

- EN 360:2023, by contrast, contains the actual test protocol: devices are loaded horizontally over a 0.5 mm reference edge through locking, dynamic performance (1.5 m drops, perpendicular and laterally offset, capped at 6 kN), dynamic strength (2 m drops), and static strength (3–4.5 kN held 3 minutes) — giving edge-rated SRLs a genuine tested basis for leading/sharp-edge use rather than relying on the older smooth-radius test
- AS/NZS 1891.3:2020 doesn't set its own sharp-edge test method — it's a short referencing standard that accepts Type 2 (retractable) devices certified to EN 360 or ANSI/ASSP Z359.14, so edge performance depends entirely on whether that underlying certificate specifically covers edge use (a plain EN 360 base certification doesn't automatically extend to it).

Inspection and maintenance requirements are defined by KStrong, with guidance provided under AS/NZS and EN standards.

SYSTEM DESIGN CONSIDERATIONS

While specialised sharp-edge certified SRLs provide enhanced protection, safe system design remains essential. User instruction manuals emphasise several key requirements for safe use:

- Anchoring at foot level, but not below foot level
- Maintaining a minimum setback distance from the edge
- Ensuring adequate fall clearance and rescue planning
- Using the equipment in accordance with manufacturer instructions

For example, a recommended minimum setback distance of approximately 600mm from the edge may be required to reduce the likelihood of lifeline damage during a fall.

These considerations highlight that equipment capability must always be supported by correct system design and worker training.

SUPPORTING SAFER WORK AT HEIGHT

Operations in potential sharp-edge work environments introduce complex hazards that require careful consideration when designing fall protection systems. By combining engineered fall arrest devices, appropriate anchorage design and trained workers, organisations can significantly reduce exposure to fall hazards.

Specialised equipment such as sharp-edge approved self-retracting lifelines provides an important engineering control in environments where horizontal use and edge exposure cannot be avoided.

However, the effectiveness of any fall protection system ultimately depends on:

- Proper hazard identification
- Correct equipment selection
- Compliance with relevant standards
- Competent installation and use

Understanding the interaction between equipment, structure and worker movement remains fundamental to improving safety outcomes when operators are exposed to sharp-edge work environments.





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