NATE

THE COMMUNICATIONS INFRASTRUCTURE CONTRACTORS ASSOCIATION

NATE Safety Equipment Manufacturers Committee

2025 NATE SEMC ROPE GRAB

TESTING REPORT

Acknowledgment

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- 3M
- Alro Steel
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Introduction

Rescue planning is a required component of any fall protection plan in the telecommunications industry. Rescue hierarchy has historically been to utilize a companion rescue (otherwise known as a "pick-off") as the primary method to rescue. This type of rescue involves a synthetic rope vertical lifeline paired with a fall arrester, commonly referred to as a "rope grab." Rope grabs are engineered to travel along the lifeline as a single person ascends or descends and to arrest a fall in accordance with their rated capacity.

In real world scenarios, these devices are sometimes utilized as a backup fall arrest system during companion rescue operations. This places both individuals on a single vertical lifeline and raises serious safety questions: How do rope grabs perform when subjected to loads beyond their designed intent? What risks do rescuers and victims face when equipment is used outside of its intended parameters? And how should training, standards, and product innovation adapt to these realities?

Currently, no published regulation standard exists in the United States that addresses the use of rope grabs for multi-user rescue scenarios. The lack of regulatory and standards guidance has often resulted in inconsistent training and field practices and prevented manufacturers and training providers from receiving meaningful feedback, especially regarding how their products are being implemented for applications outside of their intended parameters and product certifications. To address this gap, the Safety Equipment Manufacturers Committee (SEMC) designed and executed a series of controlled tests simulating both single-person and two-person rescue events. The results collected during the SEMC-controlled testing event do not represent alliance or validation to any certification body or equipment manufacturer.

We cannot rely on standards or equipment testing to prevent every form of misuse. The test findings detailed in this white paper provide a clearer understanding of both the hazards and limitations of a rope grab used in a rescue scenario. Factors such as rope type, rope condition, rope size, environmental influences, and overall system setup can affect how these systems operate, particularly when transitioning from single to two-person applications. By identifying patterns of misuse, educating end-users, and sharing data with manufacturers, training providers, and standards bodies, the SEMC aims to guide safer practices and support the development of future equipment specifically designed for the realities of telecom rescue.

A three-day comprehensive testing event and analysis was conducted at the University of Dayton Research Institute (UDRI). The event encompassed three scenarios and over 44 individual tests using new equipment. These were conducted outdoors on a tower structure using a non-intrusive foundation frame and sandpit catch bed. The test weights utilized were two 310 lb. rigid torsos with integral sternal and dorsal attachment points that did not require a full body harness. All rope grabs tested conformed with Z359.15 maximum capacity of 310 pounds. Testing was conducted to align with this rated capacity to ensure compliance and performance under expected load conditions. All tests were performed with the maximum free fall distance, based on the manufacturer specified lanyard.

The SEMC collaborated with industry stakeholders to identify six of the most commonly used rope grabs applicable to the defined testing scenarios. Detailed specifications for each tested rope grab are provided in the appendix of this document.

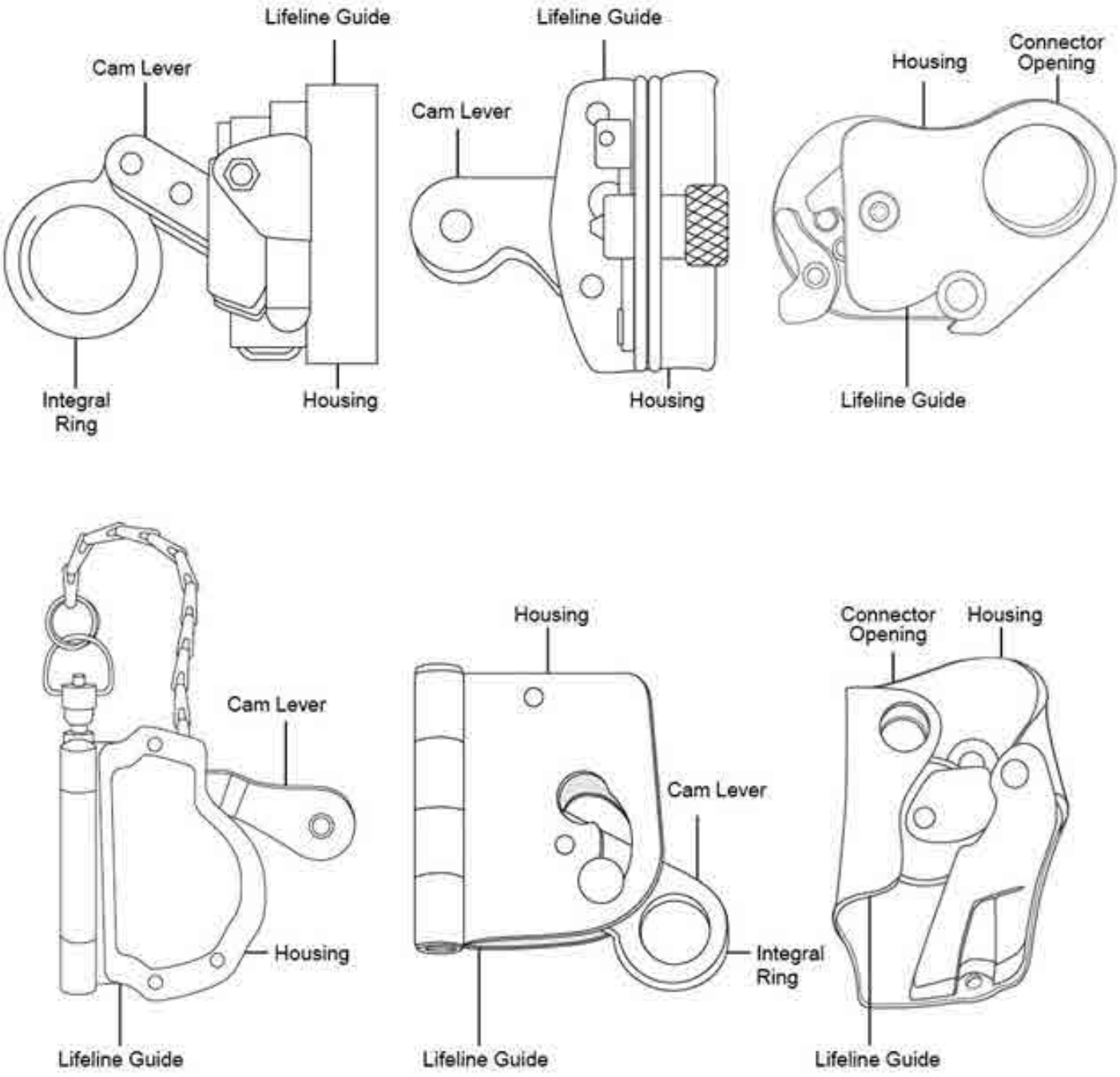
The testing protocols outlined in this document were not conducted under American National Standard Institute (ANSI) requirements and therefore should not be construed as ANSI testing. The tests performed were not intended to conform to the current ANSI/ASSP Z359.15 Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems testing protocol, but rather to better emulate how the rope grabs are being utilized in the telecommunications industry.

Pre-Inspection Process

Each rope grab was inspected to confirm there was no pre-existing damage or concerns with functionality. As part of this pre-inspection process, measurements were taken to establish deployment distances during post-test inspection. All rope grabs were photographed during this inspection.

Rope Grab #	Manufacturer	Pre-Inspection Rope Grab + Lanyard Measurement
PZ	Petzl	18”
KG	Kong	22”
MS	MSA	26”
MO	MIO	35.25”
GD	Guardian	36.5”
3M	3M	40.75”

Anatomy of Rope Grab



ANSI/ASSP Z359.15-2024 Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems

Post-Inspection Process

We used this reference image to standardize the assessment of the rope condition after each drop test. The chart provided clear examples of potential damage, including cuts, burns, soft zones, core issues, and sheath slippage. This standardized approach guided with consistent and accurate evaluations across all inspections. For more detailed inspection processes, follow the manufacturer's instructions for your specific product.

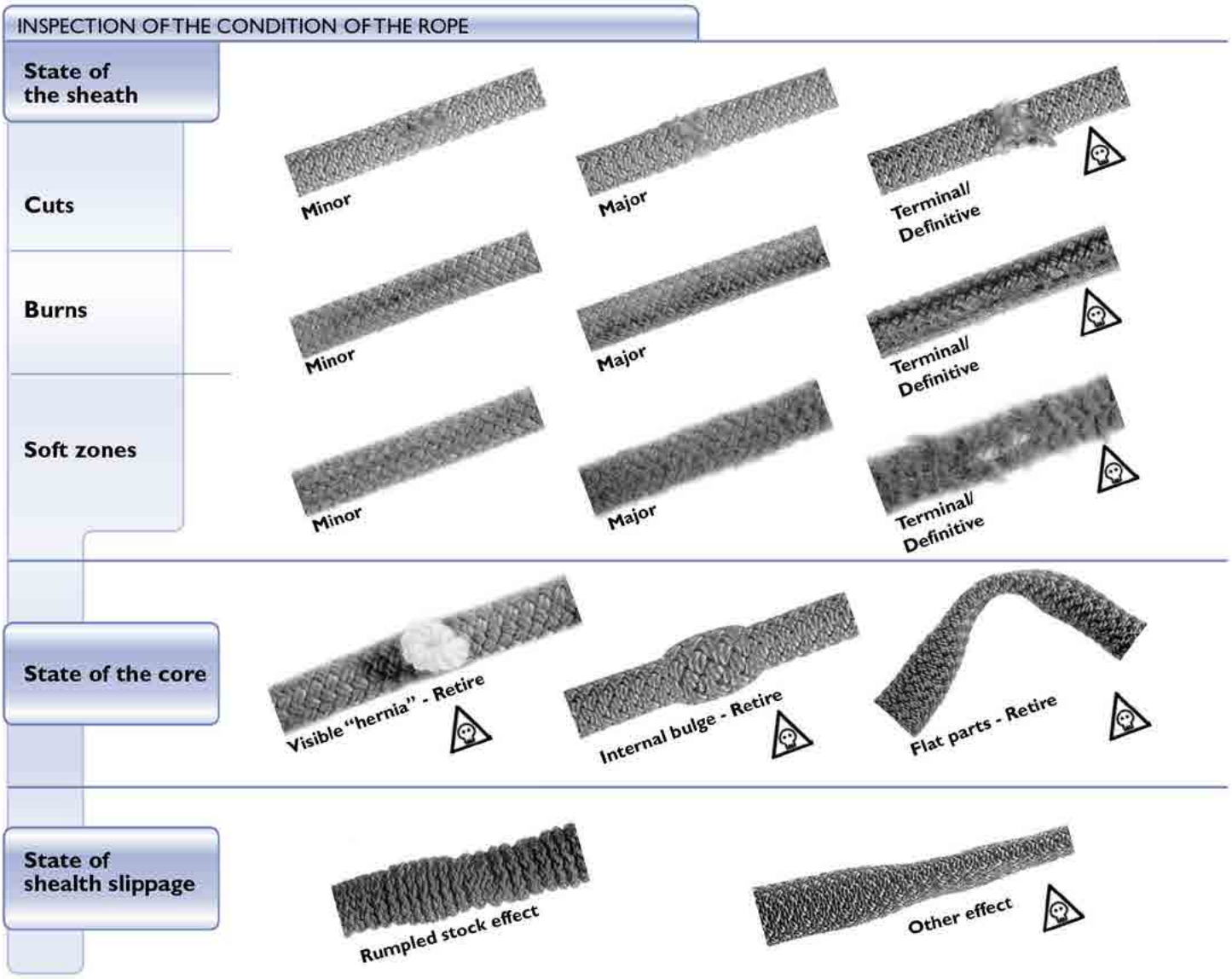


IMAGE COURTESY OF BEAL

Source: https://bit.ly/WMRBlog_Rope

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Baseline

Test 1

Purpose

To conduct dynamic performance testing of the rope grab under ideal and environmentally controlled conditions. The test scenario simulates a single climber experiencing a fall while connected to the rope grab.

Test Setup

A 310 lb. drop test was performed on the rope grab using a load cell. The test utilized the manufacturer's specified rope size and type, which was installed on the structure in accordance with the manufacturer's specifications.

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Baseline

Test 1

ROPE GRAB #	PZ-1	KG-1	MS-1	MO-1	GD-1	3M-1
Rope Size & Type	Petzl 11mm Kernmantle	Kong 11mm Kernmantle	MSA 5/8" 3 Strand	PMI 12.5mm Kernmantle	Elk River 5/8" 3 Strand	3M 5/8" 3 Strand
Total fall distance (ft.)	5.63	6.16	7.62	11.31	7.76	9.37
Maximum Arresting Force (lbf.)	1182	1070	1572	1778	1482	1661
Locking Mechanism - Damaged						
Locking Mechanism - Does Not Function						
Attachment Point - Damaged						
Attachment Point - Does Not Function						
Housing - Damaged						
Housing - Does Not Function						
Component - Attachment Point - Damaged						
Component - Lanyard - Damaged						X
Component - Deployed Energy Absorber - Damaged	X	X	X	X	X	X
Rope Condition - Cuts/Abrasion	Minor	Minor	Minor	Major	Minor	Major
Rope Condition - Core Damage		Minor		Minor		
Rope Condition - Sheath Damage				Major		

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Two Person Rescue

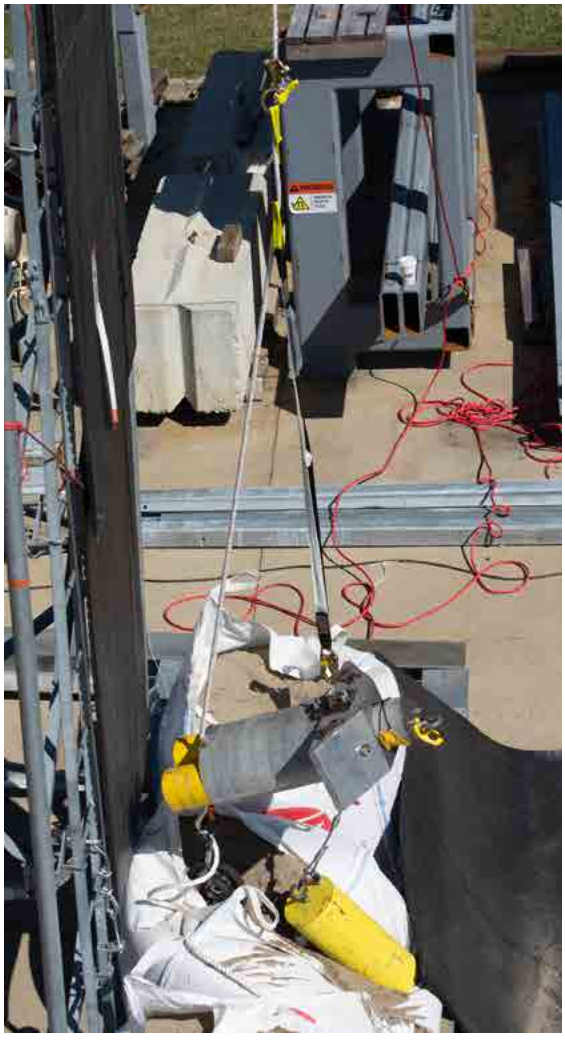
Test 2

Purpose

To conduct dynamic performance testing of the rope grab under ideal and environmentally controlled conditions. The test scenario simulates two climbers simultaneously experiencing a fall while connected to the rope grab.

Test Setup

A 620 lb. drop test was performed on the rope grab using a load cell. The test utilized the manufacturer's specified rope size and type, which was installed on the structure in accordance with the manufacturer's specifications.



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Two Person Rescue

Test 2

ROPE GRAB #	PZ-2	KG-2	MS-2	MO-2	GD-2	3M-2
Rope Size & Type	Petzl 11mm Kernmantle	Kong 11mm Kernmantle	MSA 5/8" 3 Strand	PMI 12.5mm Kernmantle	Elk River 5/8" 3 Strand	3M 5/8" 3 Strand
Total fall distance (ft.)	*	*	7.62	11.31	*	9.37
Maximum Arresting Force (lbf.)	*	*	3029	1776	*	2288
Locking Mechanism - Damaged	X	X				
Locking Mechanism - Does Not Function	X	X				
Attachment Point - Damaged		X				
Attachment Point - Does Not Function		X				
Housing - Damaged	X					
Housing - Does Not Function	X					
Component - Attachment Point - Damaged		X				
Component - Lanyard - Damaged					X	
Component - Deployed Energy Absorber - Damaged	X	X	X	X	X	X
Rope Condition - Cuts/Abrasion	Major	Terminal	Major	Major	Major	Major
Rope Condition - Core Damage	Major	Terminal		Major		
Rope Condition - Sheath Damage	Major	Terminal		Major		

** Caught by sand*

Compatibility

Test 3

Purpose

To conduct dynamic performance testing of the rope grab under ideal and environmentally controlled conditions. The test scenario simulates a single climber experiencing a fall while connected to the rope grab. This is a compatibility test for rope grabs using various rope types.

Test Setup

A 310 lb. drop test was performed on the rope grab using a load cell. The test utilized a rope size and type that is different than what the manufacturer specifies.

**It should be noted that some manufacturers state that their rope grabs should only be utilized with specific ropes.*

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Compatibility

Test 3

ROPE GRAB #	PZ-3	KG-3	MS-3	MO-3	GD-3	3M-3
Rope Size & Type	Kong 11mm Kernmantle	PMI 12.5mm Kernmantle	3M 5/8" 3 Strand	Petzl 11mm Kernmantle	MSA 5/8" 3 Strand	Elk River 5/8" 3 Strand
Total fall distance (ft.)	5.45	6.28	7.47	13.46	11.02	9.29
Maximum Arresting Force (lbf.)	996	1079	1507	1140	1623	1892
Locking Mechanism - Damaged						
Locking Mechanism - Does Not Function						
Attachment Point - Damaged						
Attachment Point - Does Not Function						
Housing - Damaged						
Housing - Does Not Function						
Component - Attachment Point - Damaged						
Component - Lanyard - Damaged						
Component - Deployed Energy Absorber - Damaged	X	X	X	X	X	X
Rope Condition - Cuts/Abrasion			Minor	Major	Minor	Major
Rope Condition - Core Damage		Minor				
Rope Condition - Sheath Damage				Major		

** Caught by sand*

Compatibility Rescue I

Test 4A

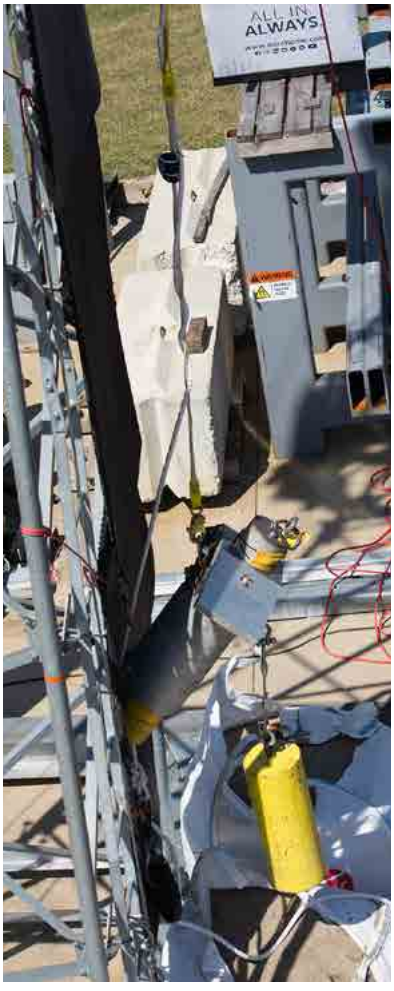
Purpose

To conduct dynamic performance testing of the rope grab under ideal and environmentally controlled conditions. The test scenario simulates two climbers simultaneously experiencing a fall while connected to the rope grab. This is a compatibility test for rope grabs using various rope types.

Test Setup

A 620 lb. drop test was performed on the rope grab using a load cell. The test utilized a rope size and type that is different than what the manufacturer specifies.

**It should be noted that some manufacturers state that their rope grabs should only be utilized with specific ropes.*



Test 4A

ROPE GRAB #	PZ-4A	KG-4A	MS-4A	MO-4A	GD-4A	3M-4A
Rope Size & Type	Kong 11mm Kernmantle	PMI 12.5mm Kernmantle	3M 5/8" 3 Strand	Petzl 11mm Kernmantle	MSA 5/8" 3 Strand	Elk River 5/8" 3 Strand
Rope grab travel distance (in.)	2.75	23.5	1.875	*	*	71.75
Deployment distance of energy absorber (in.)	102	88.75	74.5	*	*	80
Total fall distance (ft.)	10.22	11.18	10.69	*	*	16.05
Maximum Arresting Force (lbf.)	1471	2136	2698	*	*	1984
Locking Mechanism - Damaged	X					
Locking Mechanism - Does Not Function	X					
Attachment Point - Damaged	X					
Attachment Point - Does Not Function						
Housing - Damaged						X
Housing - Does Not Function						
Component - Attachment Point - Damaged						
Component - Lanyard - Damaged						
Component - Deployed Energy Absorber - Damaged	X	X	X	X	X	X
Rope Condition - Cuts/Abrasion	Minor	Major	Major	Major	Major	Major
Rope Condition - Core Damage		Major				
Rope Condition - Sheath Damage		Terminal		Major		

** Caught by sand*

Compatibility Rescue II

Test 4B

Purpose

To conduct dynamic performance testing of the rope grab under ideal and environmentally controlled conditions. The test scenario simulates two climbers simultaneously experiencing a fall while connected to the rope grab. This is a compatibility test for rope grabs using various rope types.

Test Setup

A 620 lb. drop test was performed on the rope grab using a load cell. The test utilized a rope size and type that is different than what the manufacturer specifies.

**It should be noted that some manufacturers state that their rope grabs should only be utilized with specific ropes.*

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Compatibility Rescue II

Test 4B

ROPE GRAB #	MS-4B	GD-4B	3M-4B
Rope Size & Type	Westfall 5/8" Double Braid	Westfall 5/8" Double Braid	Westfall 5/8" Double Braid
Total fall distance (ft.)	9.41	*	15.70
Maximum Arresting Force (lbf.)	2957	*	1820
Locking Mechanism - Damaged			
Locking Mechanism - Does Not Function			
Attachment Point - Damaged			
Attachment Point - Does Not Function			
Housing - Damaged	X		X
Housing - Does Not Function			
Component - Attachment Point - Damaged			
Component - Lanyard - Damaged			
Component - Deployed Energy Absorber - Damaged	X	X	X
Rope Condition - Cuts/Abrasion	Terminal	Major	Minor
Rope Condition - Core Damage			
Rope Condition - Sheath Damage			

** Caught by sand*

Wet Lifeline

Test 5

Purpose

To conduct dynamic performance testing of the rope grab with a wet lifeline. The test scenario simulates A single climber experiencing a fall while connected to the rope grab.

Test Setup

A 310 lb. drop test was performed on the rope grab using a load cell. The test utilized the specified rope size and type, which was installed on the structure in accordance with the manufacturer's specifications, with the rope in a wet condition. Ropes were submerged overnight in potable water.

Wet Lifeline

Test 5

ROPE GRAB #	PZ-5	KG-5	MS-5	MO-5	GD-5	3M-5
Rope Size & Type	Petzl 11mm Kernmantle	Kong 11mm Kernmantle	MSA 5/8" 3 Strand	PMI 12.5mm Kernmantle	Elk River 5/8" 3 Strand	3M 5/8" 3 Strand
Total fall distance (ft.)	5.93	5.97	7.31	9.19	9.09	11.29
Maximum Arresting Force (lbf.)	1223	1143	1418	1677	1444	1184
Locking Mechanism - Damaged						
Locking Mechanism - Does Not Function						
Attachment Point - Damaged						
Attachment Point - Does Not Function						
Housing - Damaged						
Housing - Does Not Function						
Component - Attachment Point - Damaged						
Component - Lanyard - Damaged						
Component - Deployed Energy Absorber - Damaged	X	X	X	X	X	X
Rope Condition - Cuts/Abrasion		Minor	Minor	Minor	Minor	Minor
Rope Condition - Core Damage		Minor				
Rope Condition - Sheath Damage						

Wet Lifeline Rescue

Test 6

Purpose

To conduct dynamic performance testing of the rope grab with a wet lifeline. The test scenario simulates two climbers simultaneously experiencing a fall while connected to the rope grab.

Test Setup

A 620 lb. drop test was performed on the rope grab using a load cell. The test utilized the specified rope size and type, which was installed on the structure in accordance with the manufacturer's specifications, with the rope in a wet condition. Ropes were submerged overnight in potable water.

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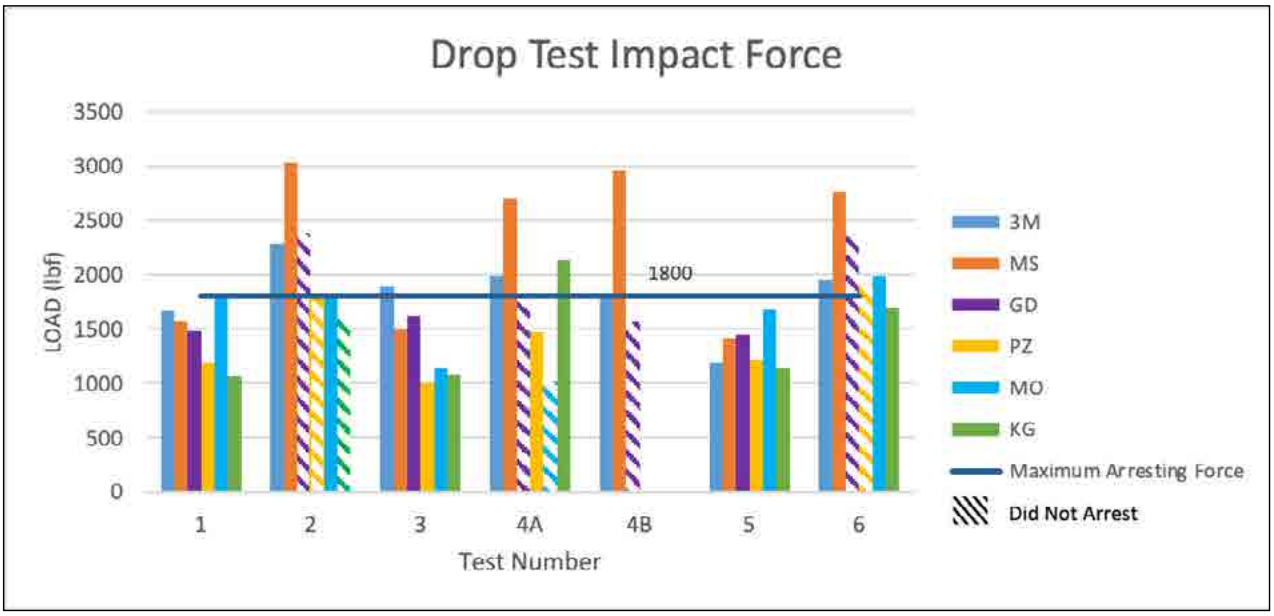
Wet Lifeline Rescue

Test 6

ROPE GRAB #	PZ-6	KG-6	MS-6	MO-6	GD-6	3M-6
Rope Size & Type	Petzl 11mm Kernmantle	Kong 11mm Kernmantle	MSA 5/8" 3 Strand	PMI 12.5mm Kernmantle	Elk River 5/8" 3 Strand	3M 5/8" 3 Strand
Total fall distance (ft.)	*	16.63	8.89	14.49	*	14.67
Maximum Arresting Force (lbf.)	*	1695	2769	1985	*	1947
Locking Mechanism - Damaged	X					
Locking Mechanism - Does Not Function	X					
Attachment Point - Damaged						
Attachment Point - Does Not Function						
Housing - Damaged						X
Housing - Does Not Function						
Component - Attachment Point - Damaged						
Component - Lanyard - Damaged		X				
Component - Deployed Energy Absorber - Damaged	X	X	X	X	X	X
Rope Condition - Cuts/Abrasion	Terminal	Terminal	Minor	Minor	Major	Major
Rope Condition - Core Damage	Major	Terminal				
Rope Condition - Sheath Damage	Terminal	Terminal		Minor		

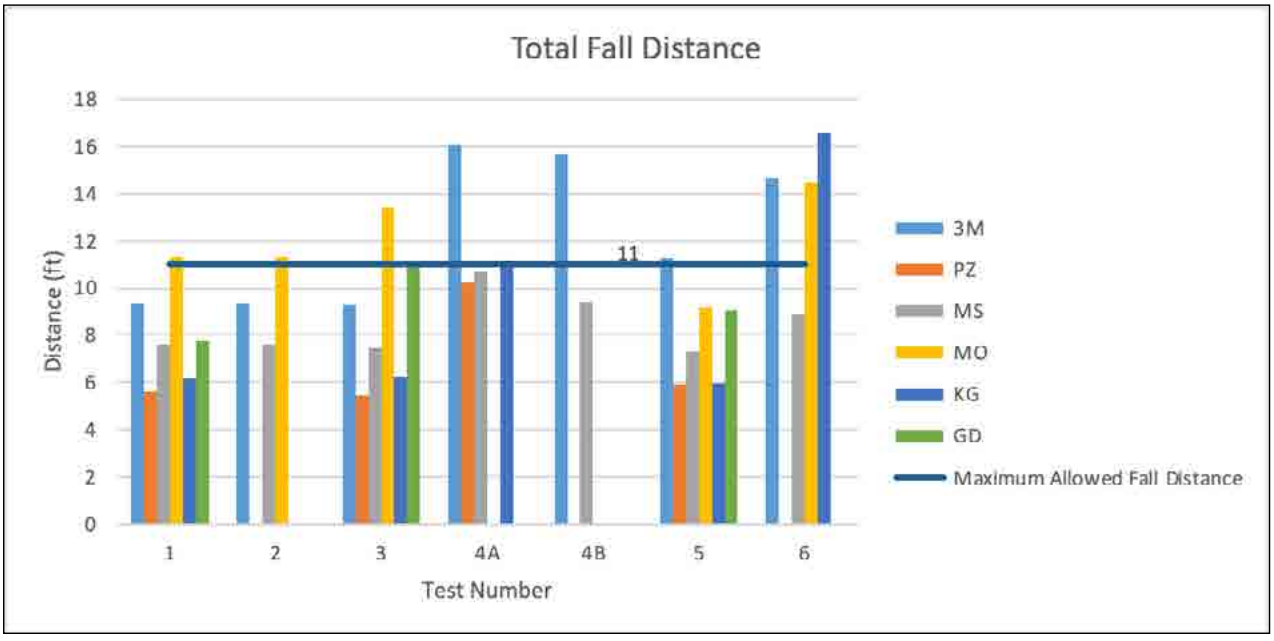
** Caught by sand*

Impact Forces



The SEMC test results shown above, which were completed outside of the ANSI/ASSP Z359 standard testing, indicate that several systems exceeded the 1,800 lb. maximum arresting force limit during companion rescue tests, with peak forces reaching above 3,000 lbs. These findings highlight the critical need for careful product selection, verification of compatibility, and ongoing manufacturer enhancements to ensure worker safety.

To better understand the applicable arresting force and deceleration distances sustained during a fall event, users should reference their specific equipment manufacturers user instructions. These instructions will provide detailed specifications and product certifications for your product.



Manufacturer Product Information

Report ID	Rope Grab Manufacturer	Rope Grab Tested *And additional items as listed	Manufacturer Specified Compatible Rope Tested
MS	MSA Safety	MSA Robe Grabs FP Pro Rope Grab with 3' Sure-Stop Lanyard, 36C Snap Hook – Model 415940	5/8 MSA LIFELINE, VERTICAL, POLY/PYP, 50 FT, CARA AL – Model 416049
PZ	Petzl America	Petzl ASAP Lock Kit with ASAP'SORBER Axess and Carabiner 40cm – Model K097AA00	Petzl RAY 11 mm Kernmantle Rope – 50' with sewn eye termination
MO	MIO Mechanical	MIO Mechanical Rope Grab 1/2" /with shock absorber (?RG-1200-3LS?)	12.5mm PMI EZ Bend Hudson Classic Professional Rope, minimum 50' with sewn eye termination
3M	3M	Rope Grab: 3M™ DBI-SALA® Lad-Saf™ Mobile Rope Grab – Model 5000335 Lanyard: 3M™ DBI-SALA® 3' Energy-Absorbing Lanyard – Model 1246536	3M™ DBI-SALA® 5/8" 100 ft. Rope Lifeline with 2 Snap Hooks – Model 1202823
KG	KONG USA	Rope Grab: Back-Up ANSI – Ovalone Twist lock & Lanyard – Model 8021NO400KK Back-Up Energy Absorber: Energy Absorber 20" Shock Absorbing Lanyard – Model 9VP000013KK	Back-Up Lifeline 30' 11mm lifeline w/ Swivel Snap Hook – Model 9VP000014KK
GD	Guardian	Guardian Rope Grab w/ Attached 3' Shock Absorbing Lanyard – Model 01503	Elk River 49811 CP + Lifeline Snap Hooks Each End – Model 49811.M

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Recommendations and User Warnings

1. The use of rope grabs shall never exceed the user capacities that the manufacturer has identified in their instructions and product labeling. Certain manufacturers limit the use of their equipment to specific applications. Even though the SEMC compatibility testing may indicate acceptable results in isolated conditions, always follow manufacturer instructions.
2. Adverse environmental conditions, including temperature, moisture, and contamination, can cause inconsistent operation of the equipment. Caution should be exercised when adverse conditions are present.
3. The SEMC test results highlight the need for manufacturer guidance and more consistent training when rope grabs are used in two-person companion rescue situations.
4. Select equipment that will allow users to minimize their potential free fall distance to the extent job site conditions will allow.
5. Users should be trained to minimize their potential free fall to the extent possible when using vertical lifelines with rope grabs. This can be aided by engaging or locking the rope grab at its highest position when performing a stationary work task. This may help to reduce overall fall arrest distances.
6. The companion rescue scenario should be implemented only after all other rescue options have been evaluated to avoid placing two people on a single vertical lifeline.

This document is provided as informational guidance on the use of equipment in real-world applications. Field operations should be carried out by competent individuals in accordance with manufacturer guidelines and employer requirements. End users are responsible for confirming that the intended use is permitted under applicable contract provisions and complies with the ANSI/ASSP A10.48 standard, as well as the equipment manufacturers instructional guidance, federal, state, and local regulations.

For additional information and previous testing reports, please reference previous testing event documents by visiting bit.ly/NATE_SEMC_Docs.