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Homeland Security

**United States
Coast Guard**

Container Climbing (CC)
Tactics, Techniques, and Procedures (TTP)

**Force Readiness Command
(FORCECOM)**

**CGTTP 3-95.14A
September 2014**

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COAST GUARD TACTICS, TECHNIQUES, AND PROCEDURES (TTP) 3-95.14A

Subj: CONTAINER CLIMBING (CC) TTP

Ref:
(a) Tactical Law Enforcement Team (TACLET) Program Manual, COMDTINST M3510.8 (series)
(b) Rescue and Survival Systems Manual, COMDTINST M10470.10 (series)
(c) Pre-Mission Inspection (PMI) and Pre-Mission Check (PMC) Tactics, Techniques, and Procedures (TTP), CGTTP 3-95.2 (series)
(d) Hook and Climb (H&C) Tactics, Techniques, and Procedures (TTP), CGTTP 3-95.1 (series)
(e) National Container Inspection Program (NCIP) Tactics, Techniques, and Procedures (TTP), CGTTP 3-72.3 (series)

1. PURPOSE. To provide Coast Guard deployable specialized forces (DSF) and training systems (TRASYS) personnel with Coast Guard tactics, techniques, and procedures (CGTTP) on the planning and execution of container climbing (CC).

2. ACTION. This CGTTP publication applies to Coast Guard DSF and TRASYS personnel authorized to conduct CC training or operations. Internet release authorized.

3. DIRECTIVES/TTP AFFECTED. This publication supersedes Container Climbing TTP, CGTTP 3-95.14.

4. DISCUSSION. This publication provides TTP for CC. Per reference (a), performing CC to inspect containers is a required skill for all DSF personnel supporting law enforcement and national defense missions. This CC TTP instructs and enables container climbing team members (CCTMs) to inspect individual containers for contraband, human smuggling, and embargo violations. It also discusses specific CC safety regulations and maintenance components.

5. MAJOR CHANGES. This TTP publication uses Adobe Acrobat stamps to indicate revisions. For each revision listed below, there is a stamp in the left margin next to the section with a revision in the PDF file. To display the location of all stamps in the PDF file, select “Comments/Show Comments List.” Click anywhere in a comment row to move between revisions, or use the scroll bar to scroll through the revisions.

This revision includes the following changes:

a. General: Rearranged some chapter and section content to improve flow.

b. Chapter 1: Introduction. Revised for clarity (1-1).

c. Chapter 2: Roles. Omitted the term “responsibilities” (2-1, 2-2, 2-3).

d. Chapter 2: Roles, Section A: Team Roles. Expanded to more clearly identify the key roles of each member of the team. Added container climbing instructor (CCI) as a training environment role (2-2, 2-3).

e. Chapter 3: Principles, Section A: Operational Principles. Condensed the explanation of procedure words (prowords) (3-2).

f. Chapter 3: Principles, Section A: Operational Principles. Spelled out that only static rope is to be used for CC evolutions (3-3).

g. Chapter 3: Principles, Section A: Operational Principles. Clarified the function of the rappel anchor (3-4) and added anchor failure procedures (3-7).

h. Chapter 3: Principles, Section B: Risk Management. Renamed to reflect future policy changes and included a note on the anticipation of new risk management models (3-8).

i. Chapter 3: Principles, Section B: Risk Management. Added environmental considerations to factor into risk assessments (3-9).

j. Chapter 4: Equipment, Section A: Tools and Equipment. Improved explanation of software tools and equipment (4-2).

k. Chapter 4: Equipment, Section A: Tools and Equipment. Added treble hook and common tip interface (CTI) to the list of required gear (4-3, 4-8).

l. Chapter 4: Equipment, Section A: Tools and Equipment. Added cheater bar as an optional tool for accessing containers (4-15).

m. Chapter 5: Climbing, Rappelling, and Inspecting Containers, Section B: Hooking the Container. Improved language on establishing a “good hook” (5-4).

n. Chapter 5: Climbing, Rappelling, and Inspecting Containers, Section D: Rappel Anchoring System. Renamed section and some headings for clarity (5-13, 5-14).

o. Chapter 5: Climbing, Rappelling, and Inspecting Containers, Section E: Rappelling. Added procedures for moving laterally while on rappel (5-22).

p. Chapter 5: Climbing, Rappelling, and Inspecting Containers, Section F: Accessing a Container. Added reference (e) for ventilating containers (5-25).

q. Appendix A: Glossary and Acronyms. Added additional terms.

6. DISCLAIMER. This guidance is not a substitute for applicable legal requirements, nor is itself a rule. It provides guidance for Coast Guard personnel and does not impose legally-binding requirements on any party outside the Coast Guard.

7. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS. While developing this publication, Integrated Process Team (IPT) members examined environmental considerations under the National Environmental Policy Act (NEPA) and determined they are not applicable.

8. DISTRIBUTION. FORCECOM TTP Division posts an electronic version of this TTP publication to the CGTTP Library on CGPortal. In CGPortal, navigate to the CGTTP Library by selecting References, Tactics, Techniques, and Procedures (TTP), and then TTP Library. FORCECOM TTP Division does not provide paper distribution of this publication.

9. RECORDS MANAGEMENT CONSIDERATIONS. Integrated Process Team (IPT) members thoroughly reviewed this publication during the TTP coordinated approval process and determined there are no further records scheduling requirements per Federal Records Act, 44 U.S.C. Chapter 31 § 3101 et seq., NARA requirements, and Information and Life Cycle Management Manual, COMDTINST M5212.12 (series). This publication does not have any significant or substantial change to existing records management requirements.

10. FORMS/REPORTS. None.

11. REQUEST FOR CHANGES. Submit recommendations for TTP improvements or corrections via email to FORCECOM-PI@uscg.mil or through the TTP Request form on CGPortal. In CGPortal, navigate to the TTP Request form by selecting References, Tactics, Techniques, and Procedures (TTP), and then TTP Request.

    Info COMCOGARD FORCECOM NORFOLK VA//FC-P// on message traffic containing lessons learned applicable to this TTP publication.

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Chapter 1: Introduction

Revision

Introduction

This tactics, techniques, and procedures (TTP) publication gives actionable, step-by-step container climbing (CC) procedures in direct support of policy and doctrine. It also defines the use of notes, cautions, and warnings in TTP publications.

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Introduction	1-2
B	Notes, Cautions, and Warnings	1-3

Section A: Introduction

A.1. Overview

Reference (a), Tactical Law Enforcement Team (TACLET) Program Manual, COMDTINST M3510.8 (series), requires all deployable specialized forces (DSF) personnel to maintain CC skills for conducting container inspections.

This TTP publication instructs and enables container climbing team members (CCTMs) to inspect individual containers for contraband, human smuggling, and embargo violations. It also discusses specific CC safety regulations and maintenance components.

Section B: Notes, Cautions, and Warnings

B.1. Overview The following definitions apply to notes, cautions, and warnings found in this TTP publication.

NOTE: **An emphasized statement, procedure, or technique.**

CAUTION: **A procedure, technique, or action that, if not followed, carries the risk of equipment damage.**

WARNING: ***A procedure, technique, or action that, if not followed, carries the risk of injury or loss of life.***

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Revision

Chapter 2: Roles

Introduction

This chapter discusses specific CC roles and procedures to use in both training and operational environments.

In This Chapter

This chapter contains the following section:

Revision

Section	Title	Page
A	Team Roles	2-2

Revision

Section A: Team Roles

A.1. Team Composition

A minimum of four CCTMs can conduct CC in the following roles: pole tender, ladder tender, lead climber/rigger, and belay man. A team leader supervises the evolution and, if needed, can serve in any of the aforementioned roles.

In a training environment, additional team personnel include an officer in charge of training (OINCT), a safety officer (SO), a container climbing instructor (CCI), and one or more medical response personnel.

A.1.a. Officer in Charge of Training (OINCT) *(Training Only)*

A current or previously certified CCTM who is aware of the latest program policies and/or changes. During training evolutions involving initial personnel qualification, the OINCT does not participate in the actual climbing of containers.

A.1.b. Safety Officer (SO) *(Training Only)*

Maintains full awareness of all decisions, operations, and actions that might affect safe completion of CC training. Ensures CCTMs follow all inspection safety procedures, performs risk assessments for each container to be inspected, and acts as a safety observer when opening container doors. Positions himself or herself in a location that maximizes situational awareness of the CC evolution. Continually assesses the dynamic conditions found during training, recognizing hazards and clearly communicating instructions to mitigate them.

Revision

A.1.c. Container Climbing Instructor (CCI) *(Training Only)*

Instructs and guides teams on proper CC techniques, and provides recommendations to the unit commanding officer on members' suitability to be certified as CCTMs.

NOTE: **Only a current CCI can sign CC PQS.**

A.1.d. Medical Response Personnel *(Training Only)*

Provides quick, initial care for injuries during training. A corpsman, emergency medical technician (EMT), or a combat life support (CLS) person with a current cardiopulmonary resuscitation (CPR) certification can fill this role.

A.1.e. Boarding Officer (BO)	In charge of the boarding. Ensures clear, concise communication between team members. Also oversees team safety.
A.1.f. Team Leader (TL)	Identifies containers to be inspected, and ensures the safe conduct of all inspections (to include assignment of a rescue climber). Ensures all required paperwork is complete and accurate, reporting any discrepancies to operational control (OPCON).
A.1.g. Pole Tender (PT)	Hooks the ladder on a safe hook point by either dynamically raising the pole (similar to raising the pole during hook and climb evolutions) or conducting deliberate vertical pole raising in tight quarters on deck between containers.
A.1.h. Ladder Tender (LT)	Pays out a sufficient amount of ladder, ensuring it does not get caught up on anything. Keeps ladder taut during climbing.
A.1.i. Lead Climber (LC)/Rigger	First one up the ladder to reach the hook point. Asks for slack from the belay man to get on top of the container. Once on top of the container, secures the hook and ladder to the container with a prepared sling of tubular nylon (or similar material, such as a pre-sewn runner of comparable strength).
A.1.j. Second Climber (SC)	Second one up the ladder after the LC secures the hook and ladder to the container with a prepared sling of tubular nylon. Assists LC as needed, and is capable of conducting a buddy rescue (if required).
A.1.k. Belay Man	Ensures the climber has the right amount of rope by paying out or pulling in excess rope to prevent the climber from falling.

Revision

NOTE: **Ensure there are always two climbers present during CC evolutions so a buddy rescue is available, if needed. See Appendix D: Emergency Procedures for buddy rescue methods.**

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Chapter 3: Principles

Revision

Revision **Introduction**

This chapter discusses CC fundamentals, managing climbing risks, and understanding fall factor.

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Fundamentals	3-2
B	Risk Management (RM)	3-8
C	Fall Factor	3-12

Section A: Fundamentals

Revision

A.1. Communication	It is essential all CCTMs understand basic CC commands and procedure words (prowords).
A.1.a. “Up Pole”	Verbal command from team leader to pole tender to raise the pole to the hook position.
A.1.b. “Good Hook”	Alerts the team the hook is in place in the container’s corner cast, and is stable for climbing.
A.1.c. “No Hook”	Alerts the team the hook is <u>not</u> in place in the container’s corner cast, and is <u>not</u> safe for climbing. The hook must be reset by properly placing it into the corner cast.
A.1.d. “Slack”	Alerts the belay man a CCTM on rope requires more slack in the rope.
A.1.e. “Rope”	Alerts the team to impending rope release from an elevated position, and for the CCTMs to be aware above their level.
A.1.f. “Falling”	Alerts the belay man a CCTM on rope is falling, requiring the belay man to pull tension on the rope to arrest the fall.
A.1.g. “On Rope”	Alerts the belay man a CCTM is connected to the rope.
A.1.h. “On Rappel”	Alerts the belay man a CCTM is about to rappel.
A.1.i. “On Belay”	Reply from the belay man to the rappeller acknowledging the belay man is ready for the CCTM to commence the rappel.
A.1.j. “Off Rappel”	Notifies belay man a CCTM is off the rope.
A.1.k. “Off Belay”	Notifies all CCTMs the belay man is not tending the belay.

A.2. Belaying

In its simplest form, a belay is nothing more than a rope running from a climber to another person (the belayer) who is ready to stop the climber's fall. Three principles make the belay system work:

- A method of applying a stopping force to the rope.
- A stance with an anchor strong enough to resist the pull from a fall.
- A skilled belayer.

Typical climbing situations have one end of the rope fixed to the climber's harness using a figure eight loop knot. The rope then passes through climbing protection (e.g., carabiner); for CC, it is the carabiner attached to the hook in the container's corner cast.

The rope runs through the protection (carabiner) to a second person called the belayer. The belayer wears a harness with an attached belay device, through which he or she threads the rope. Altering the rope's position varies the amount of friction on the rope. In one position, the rope runs freely through the belay device. In another, the belayer can easily hold the rope without moving because the friction on the rope is so great. This is called "locking off" the rope.

If the climber climbs three feet higher than the last piece of protection (carabiner) and then falls, the climber falls the three feet to the carabiner and another three feet below that. Falling any farther pulls rope upwards through the protection from the belayer below. Since the belayer generally keeps the rope locked off, this arrests the climber's fall and leaves the climber suspended, but safe, somewhere below the protection.

It is important for the climber to limit the amount of rope above his or her protection. Once on top of the container, the climber remains low on the container to limit the danger of falling.

Revision

Only use static rope for CC evolutions. Do not use dynamic rope, which is widely accepted as the industry standard for non-military applications.

The climber is said to be "on belay" when using one of these belaying methods. Belaying is a critical part of the climbing system. A correct belaying method lets the belayer hold the climber's full weight with relatively little force, and easily arrests even a long fall. By using a mixture of belaying angle and hand-grip on the rope, the belayer can gently lower a climber to a safe point where climbing can resume.

NOTE: **Whenever possible, use chafing gear to prevent excessive equipment wear.**

A.3. Rappelling

Rappelling depends entirely on the strength of the anchors securing the rope, the rope itself, and proper technique. Unlike the belay system, which is called upon only if a fall occurs, the rappel system absorbs all forces exerted by each rappel. Consequently, there is no room for error in setting up or using the rappel system.

A rappel system has four basic elements: an anchor, a rope, a rappel method for applying friction to the rope, and the person rappelling. Failure of any rappel system element could be catastrophic. Even when you are cold, tired, hungry, and racing to beat darkness, check and double check to ensure every element is in place, functioning properly, and connected together to make an integrated system. Teams must thoroughly understand the integrated rappelling system and practice it properly during every rappel to ensure a safe descent.

Revision

- Rappel anchor: The anchor is the first and most important element of the rappel system. It is the point on the container to which the rest of the system attaches.
  - Use a two-point anchor system (or distributing anchor system) to share the load and create "bomb-proof anchors" during rope evolutions. This anchor system also creates a stable central anchor point that prevents the working rope from shifting past a corner of the container and injuring operators.
  - Do not allow the angle between the two legs on a two-point anchor system (or distributing anchor system) to exceed 90º during rappel evolutions. This ensures both legs of the anchor system have adequate strength. Use long legs on the anchor system to minimize the angle between legs. Using long legs also reduces the amount of tubular webbing needed to connect them to the main working rope. This, in turn, minimizes the length of fall if one anchor fails.
  - See Chapter 5, Section D: Rappel Anchoring System of this publication to set up the anchor on a container.
- Rope: The rope, discussed in Chapter 4: Equipment of this publication, is the second element of the rappel system.
- Rappel method: The third element of the system is the method used to apply friction to the rope to control your rate of descent, while at the same time remaining firmly attached to the rope.
  - The mechanical rappel system is the only approved system for CC. In this system, the rope passes through a friction device attached to the climber's seat harness. For CC, the preferred rappelling device is a device with a hands-free or self-locking mode. These devices have a cam that locks off the rope and allows the rappeller to work

suspended hands-free, without requiring complex tie off procedures.

- Rappeller: The rappeller is the final and most variable element in the rappel system. Use proper techniques to attach into the rappel system and to descend safely. Individual circumstances, such as fatigue level, anxiety, poor weather, impending darkness, and level of skill and training, potentially affect the safety of the rappel.

  - Use the four elements of the rappel system (anchor, rope, rappel method, and rappeller) as a mental checklist to prepare for each rappel.

  - Start by ensuring your anchor is solid and dependable; ensure all carabiners are closed and locked, the knots are dressed and secure, and your anchor is of a good angle and equalized.

  - Inspect your rope for any cuts, fraying, or other possible damage from climbing or previous rappels. Then check to ensure proper connection of the rope to the anchor (e.g., not tangled or knotted), and verify it will not load dangerously over a sharp edge. Finally, make certain the chafing gear is in place.

  - Verify your rope's threading through the rappelling device is correct per the manufacturer's instructions. Ensure the hands-free or self-locking cam is working properly. Is the locking carabiner attached to your harness and the device properly rigged and locked?

  - Think through the entire process: going over the side, the descent, and finally, the finish. Put your gloves on. Look for and secure anything that could get caught in the system (e.g., long hair, loose clothing, pack straps, helmet chinstraps, etc.). Be mentally prepared for a safe rappel and anticipate any challenges that might occur during the rappel.

  - Just before descending, shout out, ***"<Your last name> on rappel,"*** to signal your belayer you are ready to rappel.

- Since the anchor is on the same plane as the edge, use the undercut edge method (see Figure 3-1 below). Reach down over the edge until the crook of your elbow is even with the edge of the container. Grasp the rope; this is the point where your rappel device will lock out. While kneeling on the top of the container before going over the edge, verify correct threading of your rope through the rappelling device per the manufacturer's instructions and ensure the hands-free or self-locking cam is working properly.

- Lay on your side and approach the edge. Extend your legs and ease over the edge until the self-locking cam engages. Adjust into an "L" position (your legs forming the "L's" horizontal extension), set your break hand, and slowly lower yourself. You are now rappelling.

Figure 3-1: Undercut edge method

Revision

A.3.a. Anchor Failure

Anchor system design ensures that if one anchor leg fails, the other leg provides enough strength to support the suspended operator. The figure 8 equalizing anchor (shown in Figure 5-14) binds down on itself, and the total length of fall depends on two factors:

- The angle between the two anchor legs. The narrower the angle, the better.
- The length of the figure 8 equalizing anchor used to attach the anchors to the working rope.

If one leg of the anchor system fails and a shock-load occurs, immediately regain any loss of stability or control, continue in a controlled descent to the deck, and come off rappel. The belay man assists to minimize shock-load and control the descent. Once off rappel, assess whether you need medical care. Then remove all equipment involved with the shock-load and separate for destruction upon completion of an investigation.

NOTE: **There have been no documented cases of this anchor system failing during CC evolutions.**

For a complete description of the anchoring system, including rigging procedures for CC, see Chapter 5, Section D: Rappel Anchoring System of this publication.

Revision

Section B: Risk Management (RM)

B.1. Overview

All Coast Guard missions require management of risk. Coast Guard operations are inherently complex, dynamic and dangerous, and involve accepting some level of risk. The most common cause of mission failure, task degradation, or mishaps is poorly executing RM during mission analysis and planning.

However, we can identify and control hazards. See Table 3-1: Sample risk management assessment worksheet and Table 3-2: Risk assessment matrix below.

Revision

NOTE: **The Coast Guard plans to implement new RM models in the near future, at which point it is anticipated that Table 3-1 and Table 3-2 below will become obsolete.**

B.1.a. Risk Factors

The following risk factors are the most important for determining the risk level of a climbing evolution.

Calculating fall distance. Calculating fall distance depends upon various factors including the type of fall-arrest equipment used, human factors, the container's physical height, and object clearance for the entire surrounding area. Consider the following factors when determining fall distances:

- Condition of the container.
- Location of the anchor point.
- Length of the safety lanyard (e.g., 6 feet).
- Height of climber.
- Stretch of harness/connector lengths (e.g., hook/carabiners).
- Impact forces.
  - A full-body harness helps absorb impact forces through its elasticity and design, concentrating the majority of forces on parts of the body that can best tolerate the impacts (e.g., the buttocks). In a fall, the harness allows a climber to be suspended for a much greater time (e.g., 20 to 25 minutes with minimal discomfort) than a belt does, and without the threat of further serious injury. Beyond this period, the climber suffers increasing discomfort.

Revision

B.1.b. Environmental Considerations

Environmental factors to consider in managing risk during a container climb include:

- Winds.
- Seas.
- Visibility.
- Day/night time operations.
- Temperature (hypothermia).
  - For additional information and guidance on hypothermia, see reference (b), Rescue and Survival Systems Manual, COMDTINST M10470.10 (series).
- Humidity, precipitation, or rain.

Other considerations include:

- Assigning additional duties and responsibilities.
- Additional equipment needs.
- Emergency procedures (e.g., accidental exposure).
- Hazards of commodities in the targeted containers.

Enclosure 2 to MSRTINST 16601.8 (May 2008): RISK ASSESSMENT WORKSHEET								
Activity or Exercise Name: Container Climbing REF: FORCECOM Container Climbing TTP Field Test				**Organization:** FORCECOM/MSRT	**Date**: March 19-21 2013 MSRT	**Prepared By**: MSRT		**Page 1/4**
Hazards	**Mishap-Prob**	**Effect**	**Risk Level**	**Controls Implemented**	**Implemented By**	**Residual -Probab**	**Residual -Effect**	**Residual Risk Level**
Falls from 10 ft and greater	Seldom	Critical	Moderate	- Situational awareness of all climbers -All climbers will be using a self breaking belay system with a secondary belay man -Hook, ladder ,and safety ropes will be secured via safety runner prior to climbing -Fall pads will be in place below all climbers	Lead instructor and safety observer	Seldom	Negligible	Low
Equipment Failure	Seldom	Critical	Moderate	- PMIs and PMCs will be completed prior to all evolutions - Secondary belay men will be used - Safety runners will be in place prior to climbing	Lead instructors and safety observers	Unlikely	Critical	Low
Equipment falling from climbers	Occasional	Negligible	Low	- PMIs and PMCs will be completed prior to all evolutions	Squad Leaders	Seldom	Negligible	Low
Muscle fatigue and soreness	Seldom	Critical	Moderate	- All climbers will be monitored prior to climbing - All climbers fitness will be addressed each day during GAR.	Lead instructors	Unlikely	Critical	Low

OVERALL RISK LEVEL AFTER CONTROLS ARE IMPLEMENTED: (based on most serious remaining residual risk level)				RISK ACCEPTANCE (Approval Authority Signature Block): **(Low–Mod = O3 Approval; High = O4 Approval; Ext. High = O6 Approval)**
EXTREMELY HIGH	**HIGH**	**MODERATE**	**LOW**	
		X		

Table 3-1: Sample risk management assessment worksheet

RISK ASSESSMENT MATRIX						
SEVERITY		PROBABILITY				
		Frequent	**Likely**	**Occasional**	**Seldom**	**Unlikely**
	Catastrophic	Extremely High	Extremely High	High	High	Moderate
	Critical	Extremely High	High	High	Moderate	Low
	Marginal	High	Moderate	Moderate	Low	Low
	Negligible	Moderate	Low	Low	Low	Low

Table 3-2: Risk assessment matrix

Section C: Fall Factor

WARNING: ***Rappellers must be aware of fall factor when attaching safety runners to containers.***

C.1. Calculating Fall Factor

Ideal fall factor (IFF) is the term for measuring or describing falls involving shock forces. To determine fall factor, divide the length of fall by the length of rope in actual use.

Because we use static rope for climbing and rappelling in CC, energy absorption is important to consider. To what degree is energy absorption necessary? Climbing and rappelling places various amounts of force on the rope. However, nylon rope's natural elasticity and construction handles these forces well. Energy absorption ability becomes an important feature when the system sustains a sudden shock force, such as when a climber falls from the top of the container onto a slacked rope.

Military research on the opening impact of a parachute on the human body concluded that 12 KiloNewton (kN) (approximately 2700 pounds) was the maximum force a body could withstand without injury. Organ displacement begins to occur above 12 kN. This information formed the basis for design criteria of ropes and all other related equipment.

NOTE: **1 KiloNewton (kN) = 224.81 pounds-force (lbf)**

Short falls generate some of the most significant forces. It's possible to have a fall factor greater than 2 if the belayer begins reeling in the rope when the climber announces he or she is falling. High impact falls push the limits of climber-related gear, such as harnesses, carabiners, anchors, and slings. Most climbing rigs and low-stretch (static) ropes can sustain less-than-factor-one falls. For that reason, always maintain a fall factor less than 1.0.

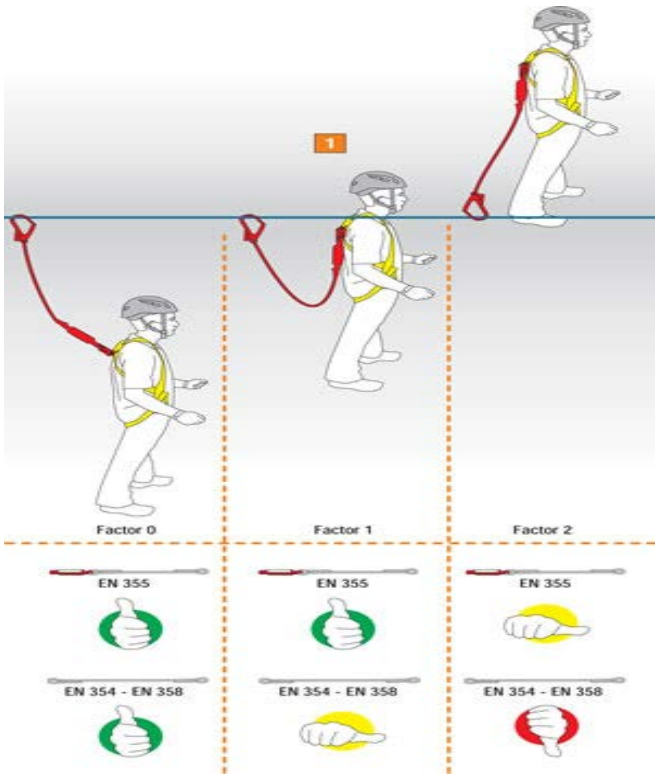

Figure 3-2: Fall factor (1)

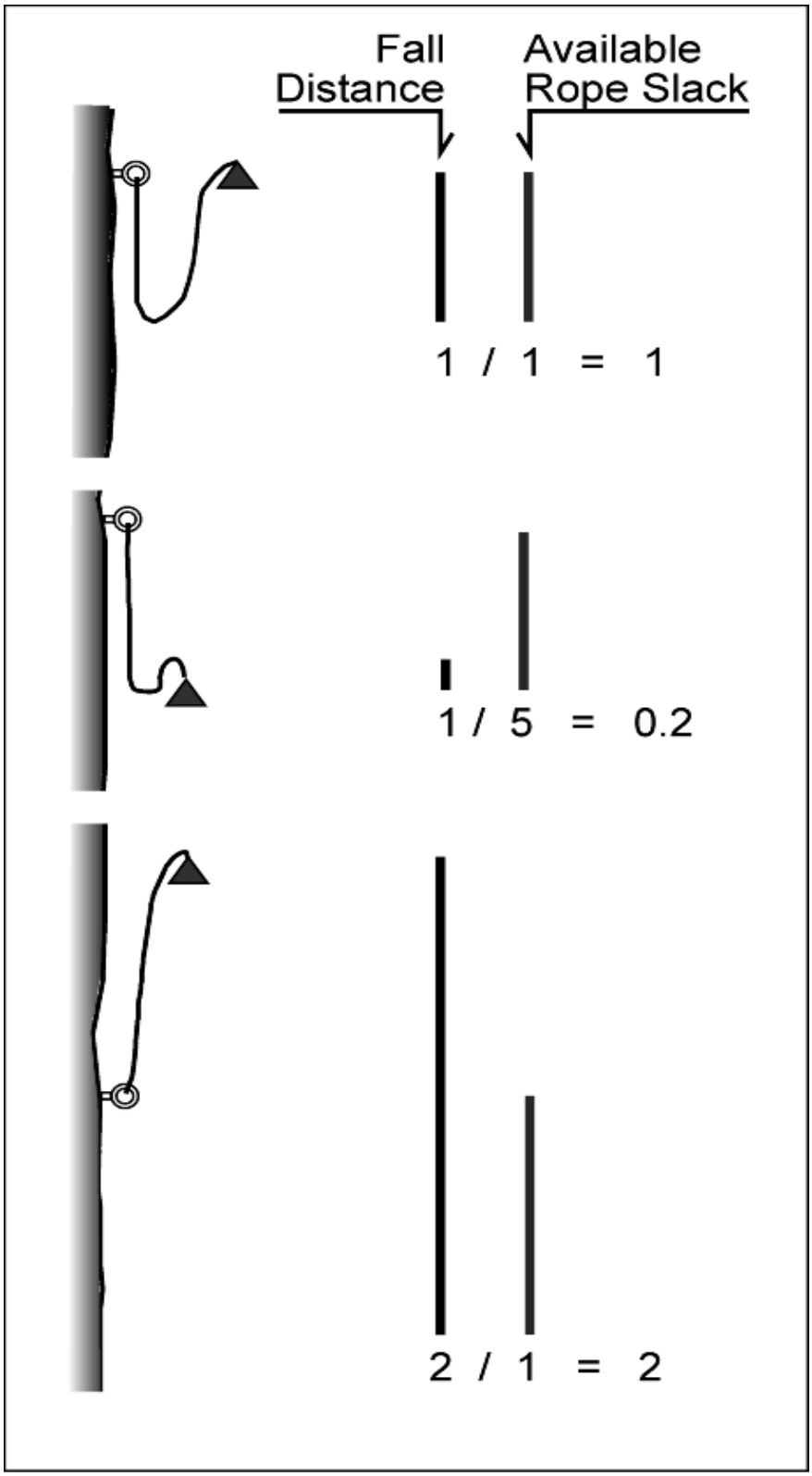

Figure 3-3: Fall factor (2)

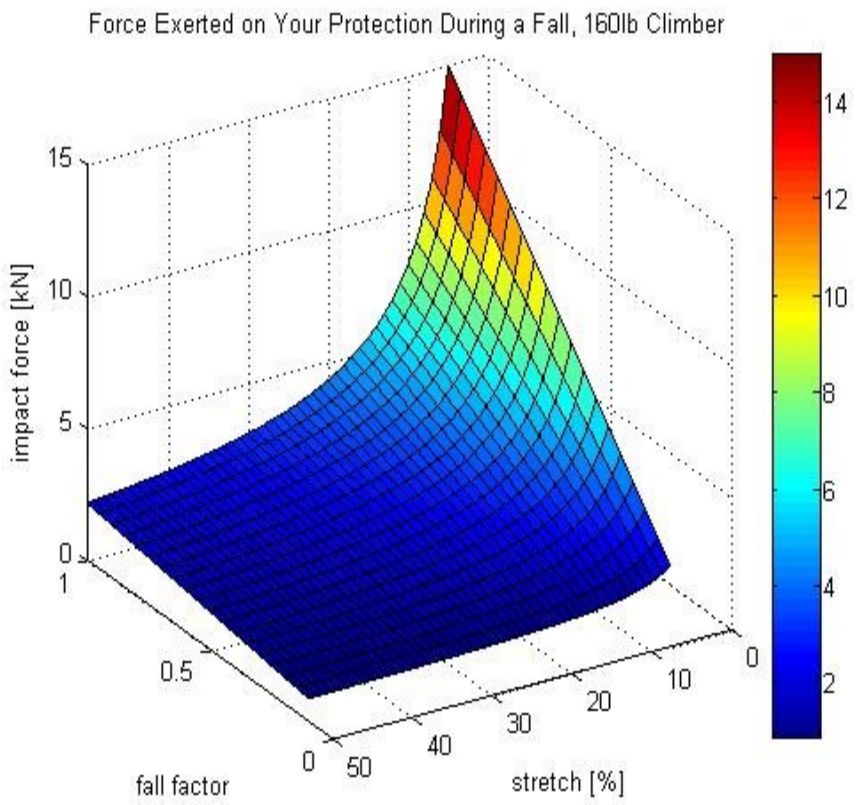

Figure 3-4: Impact force during fall

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Revision

Chapter 4: Equipment

Introduction

This chapter discusses CC equipment, specifications, standards, and maintenance. All equipment used in CC evolutions must be approved through, and authorized on, the uniform allowance list (UAL).

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Tools and Equipment	4-2
B	Equipment Standards	4-17

Section A: Tools and Equipment

A.1. Standards

The American National Standards Institute (ANSI) uses a consensus standards development process to develop National Fire Protection Association (NFPA) codes, standards, and recommended practices. Many safety professionals consider NFPA standards a benchmark for safety. Most equipment associated with high angle work, either rescue or fall protection, uses NFPA as the standard for gear rating.

There are three major groups of equipment rated by NFPA:

- Hardware: Includes connection hook, carabiners, descent control devices, etc.
- Revision Software: Includes webbing, rope, and material consisting of soft materials (e.g., anchor straps, pick-off straps, and rigging slings) suitable for climbing and rappelling.
- Rope: There are two categories of rope:
  - Escape rope: Single purpose, one-time use, emergency self-escape rope; not classified as life safety rope.
  - Life safety rope: Rope dedicated solely to supporting people during operations, firefighting, training evolutions, rescue, or other emergency operations.

NOTE: **NFPA has established standards for manufacturers of Life Safety Rope and System Components (NFPA Standards 1983). Although NFPA 1983 is a "manufacturing" standard and not a "use" standard, many professionals use this as a guide for equipment use.**

NOTE: **Ensure you are using the most recent edition of the standard. Routinely verify this by checking: http://www.nfpa.org.**

NFPA breaks equipment and life safety rope into two classifications:

- Technical use: System components or manufactured systems designed for light-use loads (300 pounds and under) and escape.
- General use: System components or manufactured systems designed for general use loads (600 pounds), light loads, and escape.

Required gear:

- Rope.
- Harness.
- Carabiners.
- Descending device.
- Webbing.
- Treble hook.
- Common tip interface (CTI).
- Telescopic pole.
- Caving ladder.

Revision

Revision

NOTE: **Remove all gear after use and inspect per reference (c), Pre-Mission Inspection (PMI) and Pre-Mission Check (PMC) Tactics, Techniques, and Procedures (TTP), CGTTP 3-95.2 (series).**

A.2. Rope Construction

Constructed of 100 percent nylon continuous filament block-creel, kern mantle construction.

- Kern = core = 85 percent strength.
- Mantle = sheath = 15 percent strength.

NOTE: **Some manufacturers have different ratios for rope configuration.**

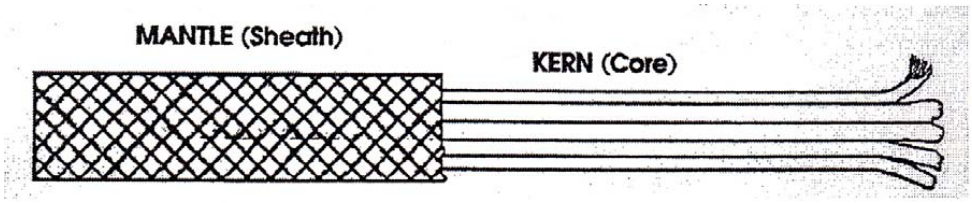

Figure 4-1: Kern mantle rope construction

Kern mantle rope comes in two types:

- Static: Minimum stretch (less than 6 percent stretch); good control for suspended load and rescue; <u>not</u> good for shock absorption.
- Dynamic: Stretches to absorb shock (10 percent or greater stretch); used if anticipating long falls (e.g., mountain climbing).

Strengths:

- Constructed of nylon, which has a high tensile strength (for CC, 11 millimeter (mm) rope strength is approximately 9200 pounds).
- Excellent abrasion resistance.
- Won't dry-rot like natural fiber ropes.
- Resistant to heat and cold: melts at 480-500ºF and withstands cold to well below 0ºF.
- Resists most common chemicals. Clean with mild soap and water, as per manufacturer's instructions.
- Low spin under load.

Limitations:

- 10-15 percent strength loss when wet.
- Easily damaged by certain chemicals (e.g., bleaches, hydrocarbons, acids).
- Core fibers cannot be inspected.

Rope requirements:

- Life safety rope for general use (600 pounds design load).
- Static kern mantle.
- 11 mm diameter.
- Minimum length 150 feet.

CAUTION: **Moving nylon on static nylon (nylon-on-nylon) can result in rope failure.**

A.3. Life Safety Harnesses

NFPA standards requirement for two persons (general use):

- Class II: Waist/seat harness rated to at least 600 pounds (general use).
- Class III: Full body harness rated to at least 600 pounds (general use).
- Load-bearing attachments: Rated to at least 2473 pounds (11 kN).
- Your harness: Class II with dual anchor points each rated to 5000 pounds (21 kN).

NOTE: **1 KiloNewton (kN) = 224.81 pounds-force (lbf)**

Figure 4-2: Life safety/climbing harness

Climbing harness:

- Class II = 600 pounds design load.
- If harness has steel D-rings, verify they have a 5000 pound rating.
- 2-inch flat webbing rated at 9500 pounds.
- Total tensile strength is 5000 pounds.
- D-rings and backup loops <u>are</u> load-bearing attachment points.

WARNING: ***Never use utility loops for load-bearing. They are for carrying equipment only!***

A.4. Carabiners

The two types of carabiners used for CC are aluminum and steel:

- Only use aluminum carabiners for attaching the self-locking descending device to your harness. Avoid using steel carabiners on aluminum descending devices, or vice versa. Steel carabiners can mar aluminum, causing unnecessary wear and tear, as well as galvanization of two dissimilar metals, particularly when wet.
- Use steel carabiners for rigging/anchoring systems and buddy rescues.

Per manufacturer's recommendations:

- Aluminum carabiners used by climbers (single-person use) must have a minimum strength of 23 kN = 5175 pounds.
- Steel carabiners used to rig the anchor system or conduct a buddy rescue must have a minimum strength of 40kn = 9000 pounds.

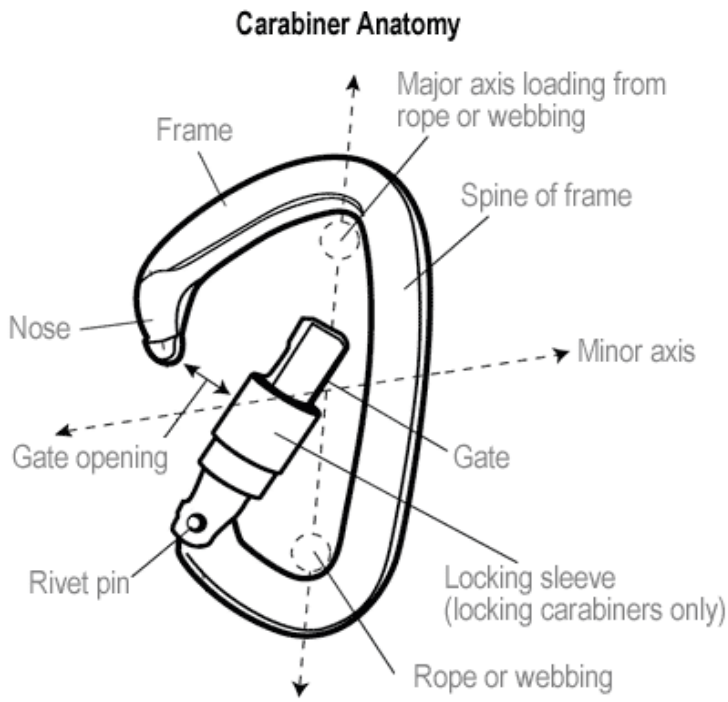

Figure 4-3: Carabiner anatomy

A.5. Descending/ Rappelling Devices

Descending/rappelling devices apply friction to the rope to control your rate of descent while you remain firmly attached to the rope. There are two methods for applying this friction.

- Non-mechanical system. In non-mechanical systems, wrapping the rope around your body provides the necessary friction. This is an effective system when the rappel is not directly vertical.

WARNING: ***Because CC deals with suspended loads requiring work, do not use non-mechanical systems for CC.***

- Mechanical rappel system. In this system, the rope passes through a friction device attached to your seat harness. For CC, the preferred rappelling device has a hands-free or self-locking mode. These devices have a cam that locks off the rope, allowing you to work suspended hands-free without having to do complex tie-off procedures.

Figure 4-4: Hands-free locking device

A.6. Webbing

Webbing (sometimes called flat tape) is essentially flat rope. Its most common use is for slings and harnesses. Available in many sizes, webbing comes in two forms: flat and tubular. Both types appear flat but, if examined from the end, tubular webbing is hollow. Typically, tubular webbing's flexibility makes it the most commonly used. Manufacturers use a variety of fabrics for webbing. Nylon is preferred for climbing applications.

Tubular webbing is constructed in two different ways:

- Spiral structure (shuttle loom), which is very strong.
- Chain structure, which is weaker, more apt to abrasion on the edges, and subject to unraveling.

The preferred spiral webbing structure is military specification (mil spec) webbing.

Webbing withstands abrasion well, but remains vulnerable. It is not a kern mantle construction, so the outside surface, which is subject to abrasion's weakening effects, is also responsible for the load. Examine the fibers in the weave and retire if severely abraded or broken at any place along the webbing. **If in doubt, throw it <u>out</u>**.

See manufacturer's care requirements.

Revision

A.7. Treble Hook

The treble hook is a stainless steel or titanium tri-hook for smaller hook points such as narrow gunnels, rails, supported knife edges on vessels, and corner casts on shipboard cargo containers. Conduct pre- and post-use checks, and quarterly preventive maintenance. After use, remove any chafing gear used on the hook and inspect per reference (c), Pre-Mission Inspection (PMI) and Pre-Mission Check (PMC) Tactics, Techniques, and Procedures (TTP), CGTTP 3-95.2 (series).

Revision

Figure 4-5: Treble hook with chafing gear

Revision

A.8. CTI Spline Shaft and Insert

The CTI spline shaft is an anodized aluminum shaft attached to the treble hook. It is designed to be inserted into the CTI spline insert attached to the end of the extension pole. The CTI spline shaft separates from the CTI spline insert with little resistance.

Revision

CTI spline shaft

CTI spline insert

Figure 4-6: Common tip interface (CTI)

A.9. Telescopic Pole with CTI

Use the telescopic pole to extend the caving ladder and lift the attached hook to the hook point. The pole can be round or triangular and must have locking segments to prevent its collapse during use. The CTI is ball/ detent, not magnetic. Conduct pre- and post-use checks, and quarterly preventive maintenance. Any excessive wear, damage, or abnormalities make the equipment non-operational.

- Telescoping fiberglass or carbon fiber pole, minimum of 25- to 30-foot length.
- Do not use first section (fluorescent green).

Figure 4-7: Telescopic pole with CTI

A.10. Caving Ladder

The caving ladder is a lightweight, flexible ladder system for climbing shipping containers. The ladder weight limits are per manufacturer's specifications. Conduct pre- and post-use checks, and quarterly preventive maintenance per the manufacturer's guidance. If damaged, place the equipment out of service and replace.

- Caving ladder, minimum of 30 feet.
- Wire cable with metal rungs.
- Rung minimum breaking strength (MBS): 2 kN.
- Acceptable slippage at 4 kN.
- For more information on caving ladder uses and specifications, see reference (d), Hook and Climb (H&C) Tactics, Techniques, and Procedures (TTP), CGTTP 3-95.1 (series).

CAUTION: **Remove any non-skid on the caving ladder's rungs which could cover cracks in the rungs.**

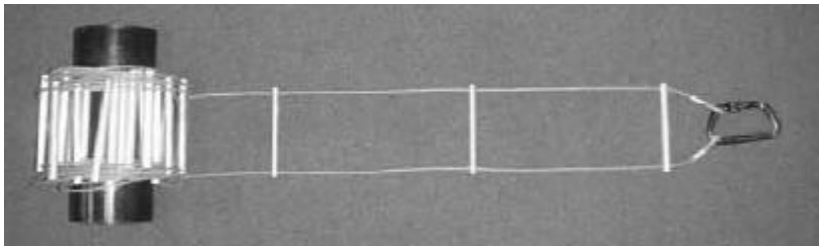

Figure 4-8: Caving ladder

A.11. Bottom Bag Equipment

The bottom bag contains the following items:

- One 11 mm rope, 150-foot length.
- Two red 1-inch nylon webbing, 8- to 10-foot length.
- One yellow 1-inch nylon webbing, 10-foot length.
- Six steel locking carabiners: two for the hook setup, two for the safety straps (one for the hook point to secure the ladder, and one for the bottom corner cast anchor strap), and two for buddy rescues.
- Four self-locking descending devices.
- Two Rescue 8 descending devices.
- Four aluminum locking carabiners: one for each self-locking descending device.

Figure 4-9: Bottom bag equipment

A.12. Top Bag Equipment

The top bag contains the following items:

- One 11 mm rope, 150-foot length.
- Two rope chafing gear.
- Two black 1-inch nylon webbing, 20- to 30-foot length.
- One yellow 1-inch nylon webbing, 10-foot length.
- One red 1-inch nylon webbing, 10-foot length (for door strap, consider sewn webbing or knot tying).
- Six steel carabiners: four for the anchor system, one for the door strap, and one for the bag handle.

Figure 4-10: Top bag equipment

A.13. Equipment Maintenance

See manufacturer's care requirements.

A.14. Knot Tying

Tying rope into knots creates sharp bends that can weaken the rope. The outside fibers expand and the inside fibers compress. This means only the outside fibers carry the rope's tension. Only half of the rope's thickness might be working, which could reduce the rope's tensile strength by half.

Good quality knots spread the sharp bends over a larger surface area; they only weaken the rope to a minimal degree, and the rope retains much of its inherent strength.

While a variety of knots can be used in rappelling, it is wise to only use a few basic ones. Keeping the rappelling site as simple as possible helps the evolution run more smoothly, and increases site safety.

Important knot characteristics:

- Is it strong? Does it bend the rope sharply? Is it easy to untie after loading?
- Is it secure? Will it stay tied while being loaded, unloaded, or otherwise jostled about?
- Is it symmetrical? Symmetry allows for easy inspection and correction.

A.14.a. Figure 8 Knot (On a Bight/ Follow Through)

Strength: 75 to 80 percent of rope strength. The primary knot for securing the end of a rope to another object. Use for tying into the end of a rope or securing the rope to an anchor. It is strong, symmetrical, secure, and easy to untie once loaded. Even when tied improperly, the knot retains all but 8 percent of its full strength.

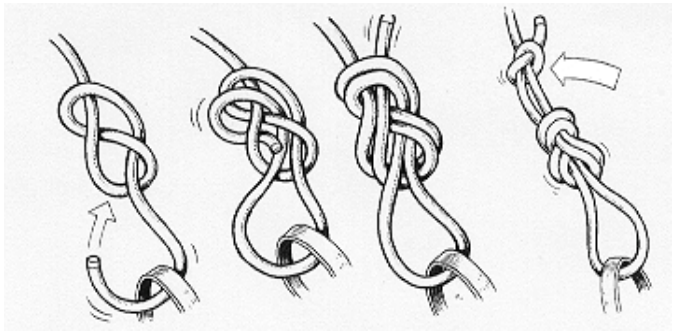

Figure 4-11: Figure 8 knot

A.14.b. Water Knot (Ring Bend, Overhand Follow Through, or Flat Knot)

Strength: 60 to 70 percent of rope strength. Used primarily when tying webbing, as it stays symmetrical in webbing when other knots won't. It is important to tighten the knot and leave no less than 2-inch of excess at the ends.

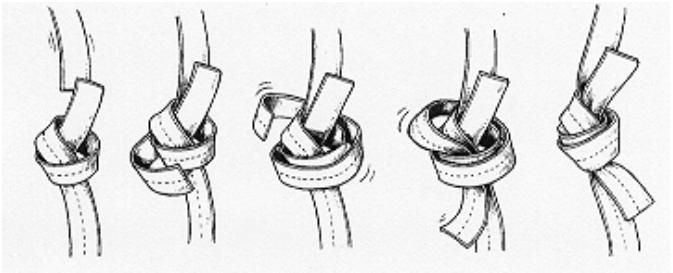

Figure 4-12: Water knot

A.14.c. Girth Hitch

Strength: No discernible loss of strength. This hitch is good for joining two tied or sewn loops. It is also good for fastening tied or sewn loops around an anchor.

Figure 4-13: Girth hitch

A.15. Hook Setup

- Place two separate, locked carabiners on the treble hook.
  - Ensure gates are opposite each other.
  - Ensure one carabiner supports the ladder.
  - Use the second carabiner to support the rope, and thread the 11 mm rope through it.

Revision

- Mount the rigged hook on the telescoping pole using the CTI.

Figure 4-14: Hook setup

Revision

A.16. Cheater Bar

A cheater bar is an optional tool used to free container door handles that are difficult to open because of weather or damage during shipping. The application of this tool is based on the following equation:

Torque = Radius x Force

In this equation, the torque required to open the door equals the radius of the arm used to open the container, multiplied by the force you apply to the end of the cheater bar

When you use a cheater bar on a container door, the bar's length makes it easier for you to generate the required torque to open the door. The greater the length of the cheater bar, the greater the torque provided with the same amount of applied force.

You can reduce the length of cheater bars to make them easier to handle during rope evolutions. Understand, however, that a shorter cheater bar provides less mechanical advantage.

Revision

Figure 4-15: Using a cheater bar to access a container (1)

Revision

Figure 4-16: Using a cheater bar to access a container (2)

Section B: Equipment Standards

B.1. Personal Climbing Equipment

Incorrectly worn personal climbing equipment is a significant contributor to injuries while climbing. Ensure proper fit and wear using manufacturer's recommendations.

At a minimum, all inspection team members must use the following safety equipment during CC evolutions:

- Helmets approved through the unit UAL and meeting NFPA or ANSI climbing safety standards for permissive operating environments. Ballistic rating is required for non-permissive environments.
  - Worn at all times when aloft or within 15 feet of the base of climb.
- NFPA/ANSI approved eye protection.
- Gloves.
- Climbing harness.
  - NFPA standards requirement for 2 persons (general use):
    - Class II: Waist harness rated to at least 600 pounds (2.67 kN).
    - Class III: Full body harness rated to at least 600 pounds (2.67 kN).
    - Load-Bearing Attachments: Rated to at least 2473 pounds (11 kN).
    - Your harness: Class II with dual anchor points each rated to 5000 pounds (21 kN).

NOTE: **1 KiloNewton (kN) = 224.81 pounds-force (lbf)**

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Chapter 5:
Climbing, Rappelling, and Inspecting Containers

Introduction

This chapter discusses techniques, procedures, and equipment required to safely climb, set anchor points, rappel, and inspect containerized cargo on suspect vessels. Rappelling is a combination of gross and fine motor skills that together develop a muscle memory skill set. Practice rappelling skill sets continually, as these skills deteriorate and can be lost.

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Equipment Checks	5-2
B	Hooking the Container	5-4
C	Climbing	5-7
D	Rappel Anchoring System	5-13
E	Rappelling	5-18
F	Inspecting Containers	5-13
G	Last Person Drill	5-27

Revision

Section A: Equipment Checks

A.1. Equipment Checks

A PMI is a full inspection of all equipment:

- To conduct a PMI, lay out all equipment on a flat surface and use the checklist in reference (c), Pre-Mission Inspection (PMI) and Pre-Mission Check (PMC) Tactics, Techniques, and Procedures (TTP), CGTTP 3-95.2 (series).
- Conduct a quarterly PMI (or as necessary) to verify assigned equipment is functional and serviceable before training or operations.
- Plan to deploy with spare equipment, parts, batteries, etc. to account for possible damage during transit or operations.

A PMC is an inspection of all relevant equipment and gear conducted immediately prior to training or operational evolutions. The PMC is a systematic top-to-bottom, front-and-back, side-to-side inspection to ensure fit, function, applicability, and carriage of equipment prior to use:

- Ensure equipment has no visible cracks or tears.
- Ensure there are no sharp edges.
- Conduct all required preventive maintenance system (PMS) checks.
- Protect equipment from hot surfaces.
- Avoid dropping equipment from higher than shoulder height.

Revision

A.1.a. Individual Climbers

- Check harness seams for stitching.
- Inspect climbing rope before and after use:
  - Brush free of dirt consistently.
  - Wash and hang dry.
  - Log appropriately.
- Inspect all carabiners before and after use:
  - Ensure carabiners are serviceable and functional, without cracks or corrosion; complete preventive maintenance per manufacturer's instructions.

NOTE: **No smoking while in climbing gear.**

A.1.b. Inspect Caving Ladder	• Ensure components are serviceable and functional, without cracks or corrosion; cables not frayed; float secured; complete preventive maintenance per manufacturer's instructions. • Log appropriately.
A.1.c. Inspect Treble Hooks	• Ensure components are serviceable and functional, without cracks or corrosion; CTI spline shaft and insert serviceable; complete preventive maintenance per manufacturer's instructions.
A.1.d. Inspect Extension Pole	• Ensure components are serviceable and functional, without cracks or corrosion; locking segments functional; CTI serviceable; complete preventive maintenance per manufacturer's instructions.

Section B: Hooking the Container

NOTE: **Before commencing a climb, ensure all climbers have the proper personal protective equipment (PPE) per reference (d), Hook and Climb (H&C) Tactics, Techniques, and Procedures (TTP), CGTTP 3-95.1 (series).**

WARNING: ***Approach all containers with caution as they might contain undeclared hazardous materials or hazardous materials in quantities that do not require placards.***

Revision

B.1. "Good Hook"/ "No Hook"

The team leader gives the command ***"Up Pole."*** As pre-briefed, all designated personnel assist in raising the pole/hook/ladder. The pole tender guides the pole/hook/ladder to the hook point, and places the hook in the corner cast fitting of the top container. Ensure proper placement in the corner cast before the first climber ascends.

Figure 5-1: "Good hook" example

Figure 5-2: "No hook" example

Figure 5-3: "Good hook" example (top view)

Once the hook is set, the ladder tender pulls slack and keeps the hook/ladder secure. The ladder tender keeps the ladder taut and clear of obstructions during climbing. The team leader announces, ***"Good hook."*** The lead climber then commences climb. The pole tender releases pole from hook, retracts pole, and secures it.

Section C: Climbing

C.1. Climbing

1. Rig the belay system at the base of the container (see Figure 5-4 below).
2. Use a 10- to 12-foot length of 1-inch tubular nylon with a water knot and secure it to the corner cast on the bottom container with a girth hitch (immediately below the corner cast hook).

Figure 5-4: Rigging the belay system

Figure 5-5: Belay device

3. Run the 11 mm rope through a hands-free locking device so rope from the corner cast hook runs into the bottom of the hands-free locking device. Close the face plate.

Figure 5-6: Threading belay device

4. Use a carabiner to connect the locking device on the rope to the 1-inch tubular nylon webbing secured to the bottom container. Ensure the strain is on the carabiner's major axis. Engage the lock hand tight, then back off ¼ of a turn.

Figure 5-7: Connecting the locking device to the belayer and anchor strap

5. One climber ties in by placing the carabiner at the end of the rope to a load-bearing connection on his or her harness or D-ring. The climber then closes and locks the carabiner, turning it hand tight, then back ¼ turn.
6. Two climbers check all gear from top-down before going on rope (e.g., helmet and strap, gloves, shirt, harness and securing devices, hands-free locking device, carabiner, pockets, and boots).

NOTE: **While on deck, every climber tests the belay system and integrity of his or her anchoring system.**

7. A second climber belays.
8. The climber calls out, ***"<Your name here> on climb"*** and awaits the response ***"<Name> on belay."*** Although ***"on climb"*** is not a standard command, it lets the belay man know you are actually climbing and not rappelling.
9. Using proper techniques, the climber climbs the caving ladder by putting boots in the corner of the container's face and hands on either the ladder's back side or the container's outside edge. Use legs (e.g., major muscles) to climb.

10. Lead climber: Approach the top of the ladder with caution, and ask for slack from the belayer to climb above the hook point and get on top of the container.

WARNING: ***This is the most dangerous part of the climbing evolution.***

11. Once on top of the container, lay down to keep a low center of gravity and, with a safety runner, hard-point yourself to the corner cast.
12. Reposition ladder (if needed) and secure it with a safety runner and locking carabiner.

Figure 5-8: Installing safety runner (step one)

Figure 5-9: Installing safety runner (step two)

Figure 5-10: Installing safety runner (step three)

WARNING:

Any time climbers are working near the edge, they should hard-point themselves to the container for safety. When personnel working atop the container stack have to disconnect from a hard-point to work, they must be mindful of the edge and always keep situational awareness.

13. Follow-on climber(s) then ascend the caving ladder to the top of the container while a fellow climber belays.

Revision

14. Rigging the rappel anchoring system can occur at the same time climbers ascend the container. The last climber is belayed by another CCTM at the base of the container.

15. If the anchor has not yet been established by the time the last climber safely makes it to the top, the last climber disconnects the carabiner attached to the climbing rope and uses this rope to retrieve the top bag. He or she then attaches this rope to the hook point with a carabiner for future use.

Revision

Section D: Rappel Anchoring System

D.1. Overview

Determining what constitutes a good anchor takes knowledge and experience that only comes with time. On most large buildings, this involves attaching the rope or rigging sling to a major structural component like a steel I beam or a load-bearing column. On containers, use the corner casts linking stacked containers together as anchor points. These corner casts are designed for lifting the container and, therefore, far exceed the requirements of a good anchor point.

The key to successful anchoring is redundancy. A redundant anchor never relies on one piece of equipment. Every piece of load-bearing equipment has another separate piece backing it up. Once the system is set, look at it: the system should remain intact if any single piece fails. This does not apply to the rope, harness, rappel device, or locking carabiner, which are not part of the anchoring system.

D.2. Equalizing

Another principle of the anchor is equalization. Equalization is having your two anchoring systems (main and backup) under the same amount of tension once loaded. Most methods for equalizing the load on multiple anchors use runners. CC is no exception: the anchor teams establish a self-equalizing anchor on top of the container.

Revision

D.3. Angles

As explained above, an anchor must be redundant and must have at least two separate equalized systems in it. The angle formed when these two different systems go from anchor point to the rappel rope is critical: the lesser the angle, the better. If the two systems are close together and equalized, and there is no angle between them, they will each carry 50 percent of the load. However, as the distance between the two systems increases, the angle increases. This increase in angle, due to the laws of physics, increases the load held by each anchor.

Based on a 1000 pound load:

Angle in degrees	Weight on each leg
0°	500 foot-pounds
30°	517 foot-pounds
45°	540 foot-pounds
60°	577 foot-pounds
120°	1000 foot-pounds
150°	1932 foot-pounds

Table 5-1: Angles, degrees, and weights

As seen in Table 5-1, widening the angle in the anchor system significantly increases the load on each system in the anchor. An anchor with a large angle can shift significantly if one of the two systems fails. That shift might have a shock-loading effect, and could cause the remaining system to slide over the edge of the container. If that edge is the least bit sharp, it can damage or cut the remaining system. Anchor system angle is critical to the anchor's strength. A best practice is to set the maximum angle at less than 90º.

Revision

D.4. Rigging Procedures

1. Tie a water knot in each of two black 20-foot lengths of 1-inch tubular nylon webbing, and one 10-foot length of 1-inch nylon webbing, creating runners. Ensure the water knots are facing up so they are easier to inspect.

Figure 5-11: Satisfactory angles anchoring system setup (also known as a "Sliding X")

Revision

2. Secure a 20-foot runner to each rear corner cast fitting on the top of container using a girth hitch (see Figure 5-12 below).

Figure 5-12: Girth hitch on corner cast fitting

3. Connect the 10-foot runner between the two 20-foot runners using two steel carabiners.
4. Put a 180º twist in one strand of the 10-foot runner, making a loop.

Figure 5-13: 10 foot runner with loop in one strand

5. To complete the anchoring system, attach a third steel carabiner to the loop created by the twist and the other strand of the 10-foot runner. Verify all water knots are still facing up so they are easier to inspect.

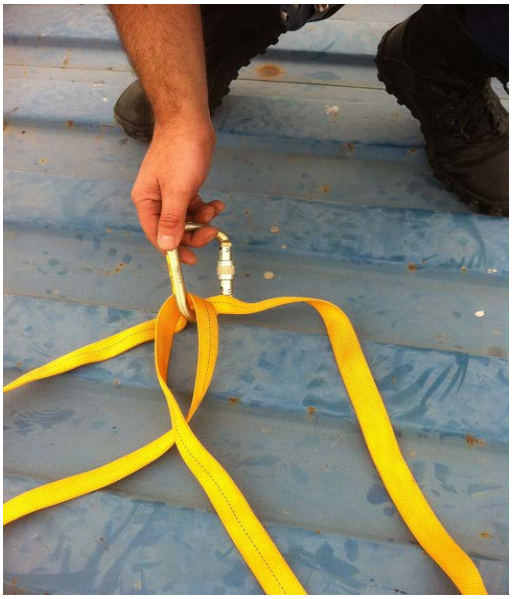

Figure 5-14: Carabiner in center of figure 8 equalizing the anchor

Revision

Figure 5-15: Completed self-equalizing rappel anchoring system

Revision

6. Take the 11 mm static kern mantle climbing rope out of your rigging top bag and tie a figure eight knot in the center of your rope. Attach the loop formed by the rope's figure 8 knot to the anchoring system (attachment point indicated by the arrow in Figure 5-15 above).

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7. You now have two coils of rope: one for climbing and one for rescuing. If using two climbers to inspect containers, ensure both have a Rescue 8 and a steel carabiner to effect a buddy rescue, if needed. Or, have a third coil of rope rigged on the top container with a rescue climber standing by (see Figure 5-16 below). When lowering the ropes, alert all CCTMs by calling out, ***"Rope."***

8. Thoroughly inspect the anchor system. Ensure all carabiners are closed, locked hand tight, and backed off ¼ turn. Also ensure all knots are dressed and have sufficient tail to prevent slipping off. When the anchor looks set, squat down in the middle of the container, grab the black rope and lean back. This transfers your weight to the rope to verify it holds and the anchor equalizes when the load shifts.

Figure 5-16: Anchoring system with two climbing/rappelling ropes and one rescue rope

NOTE: **If using the caving ladder to re-ascend between stack inspections, leave the rope used for climbing the caving ladder in place. If ascending by climbing the front of the stack while on belay, you can remove the rope on the caving ladder and use it as an additional inspection or rescue rope.**

Section E: Rappelling

E.1. Procedures One CCTM on the ground assumes the belaying position for each rappeller.

NOTE: **While rappelling, continually inspect the rappel anchoring system to ensure it is functioning properly.**

1. The first CCTM to rappel approaches the edge of the container with a low center of gravity (on his or her belly) to lessen the chances of falling. The rappeller reaches down and grasps the rope approximately 18 inches (roughly the distance from elbow to fingertips) from the edge.

Figure 5-17: Grasping the rope to thread the device

2. Thread the 11 mm rope into a hands-free locking device. Ensure the rope heading toward the anchor goes in the bottom of the hands-free locking device and the rope heading over the edge comes out the top of the hands-free locking device. With another team member, verify the self-locking cam is operating correctly and the rope is threaded properly. Announce ***"On rope."***

Figure 5-18: Threading and testing the belay device

3. If possible, have two other CCTMs perform a head-to-toe safety check (e.g., helmet and strap, gloves, shirt, harness and securing devices, hands-free locking device, carabiner, pockets, boots).
4. Rappeller calls out: ***"<Your name here> on rappel,"*** and awaits the answer ***"<Name> on belay."***
5. Ensure edge protection is in place.
6. The rappeller then gradually lowers himself or herself over the side using the undercut edge method until the rope is under tension and the belay device locks.

Figure 5-19: CCTM on rappel

7. Use your left hand to move the belay device handle, and your right hand to hold the 11 mm static kern mantle black rope (knuckles in the small of the back, thumb facing the sky). You can hold the belay device with the left thumb on the device and palm facing the container or the opposite direction with the palm facing away from the container.

Figure 5-20: Operating the belay device, palm facing container

Figure 5-21: Operating the belay device, palm facing away from container

8. Keep your legs parallel to the deck, with the bottom of your feet flat against the container door. To control your descent, hold the locking device lever in your left hand and grip the rope in your right hand.

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E.1.a. Moving Laterally While on Rappel

Climbers can move laterally while on rappel to access other containers, maneuver over to an adjacent container, or effect a buddy rescue.

When moving laterally, side step in the direction you want to go while keeping your legs parallel to the deck and the bottom of your feet flat against the container. The farther you move laterally, the more difficult it is to maintain your footing, so ensure you have a good grip with your feet to avoid slipping.

The belay man maintains situational awareness and moves with the rappeller. If the rappeller slips, he or she eventually swings back to the center point where the working line attaches to the anchor legs. If this happens, the belay man applies tension to the rope until the rappeller is able to regain brake and footing.

Section F: Accessing a Container

F.1. Inspecting a Container

1. Align your waist with the container's door handle. Place an 8- to 10-foot length of 1-inch tubular nylon webbing (with water knot in it) behind the locking rod and secure with a carabiner. This serves as the door strap.
2. Ensure the edge protection and rappel ropes do not obstruct the container door. Ensure there is only 6 to 7 inches of slack in the door strap. Lower or hoist bolt cutters to the inspection team if they cannot unlock the container. Unlock container or cut lock, and note this on the ship's manifest.

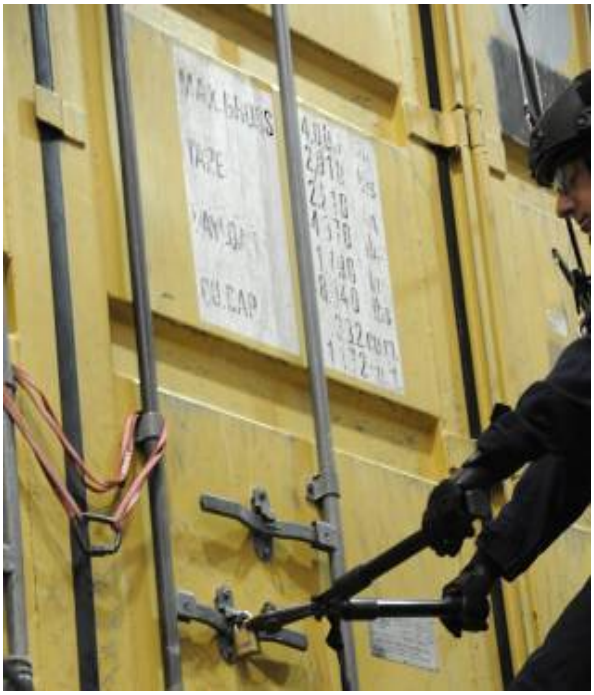

Figure 5-22: Cutting lock to open container door

WARNING: ***Be aware the cargo inside the container might have shifted at some point during transit. Although the door strap is intended to prevent the door from opening, the door could still spring ajar and cause injury.***

3. Before opening the container door, position both of your feet on the door you are opening. This prevents the door from hitting your shins if there has been a load shift.

4. Grasp the locking rod bar handles and rotate to open the right hand door. Rappellers/belayers should stay clear when opening the door, as objects might fall from the container. Assess the tailgate for shifted cargo. If cargo has shifted and poses a safety threat, notify the vessel's master or designated representative.

NOTE: **If unable to reclose the doors, secure with straps and notify the vessel's master. Do not inspect containers above or below.**

NOTE: **The personal multi-gas meter activates when the atmosphere inside the container is hazardous, usually due to either a sudden drop in oxygen level or the presence of carbon monoxide. The alarm should cease after properly ventilating the container. If the gas meter continues to alarm, consider de-vanning the stack to avoid exposure. Also consider the possibility of a malfunctioning gas alarm.**

5. If cargo did not shift, open both doors 180º and ventilate the container for at least 15 minutes before entering. For fumigated containers, or those containing poison inhalation hazards, ventilate for a minimum of 30 minutes. If concerned about the container's atmosphere, reassess risk versus gain. If necessary, secure doors open to maintain positive control and prevent the doors from swinging.

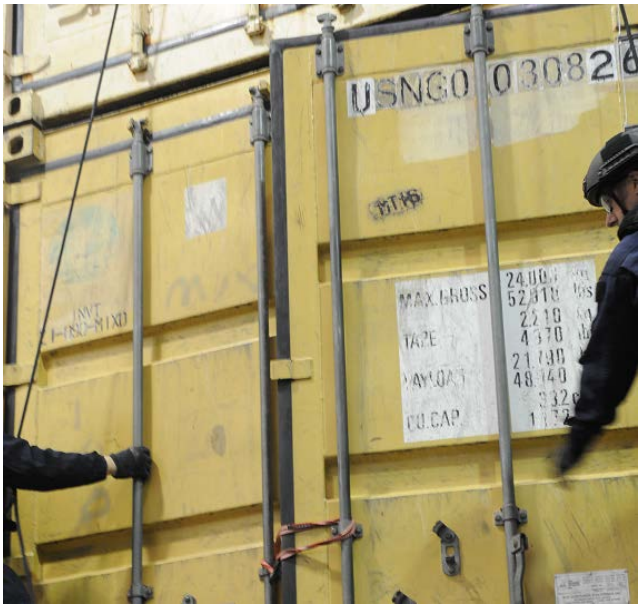

Figure 5-23: Opening container door

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6. After properly ventilating the container per reference (e), National Container Inspection Program (NCIP) Tactics, Techniques, and Procedures (TTP), CGTTP 3-72.3 (series) and determining it to be free of hazardous threats, inspect the inside of the container. Keep the number of inspecting personnel to a minimum. CCTM can come off the rope, if needed. If a CCTM comes off rope, he or she must announce to the belayer ***"<Your name here> off rope."***

WARNING: ***Use caution when examining cargo forward of the doors. Avoid climbing onto packages or dunnage.***

NOTE: **If you discover any leaking hazardous material, terminate the inspection and clear the area immediately. Leave the doors open, post a safety watch, and remain at a safe distance until further investigation.**

7. If coming back on rope, CCTM must announce ***"<Your name here> on rope"*** and perform a weight test to ensure the descending device is working properly before exiting the container.
8. Rappeller calls out, ***"<Your name here> on rappel,"*** and awaits the answer ***"<Name> on belay."***
9. Close the container doors. Remove the door strap (attached in step 1 above) and secure it in your cargo pocket. Either re-lock or use a seal to reseal the container, noting this action on ship's manifest. Proceed to the next container and repeat. Inspect containers in a systematic order. After finishing a stack, inspectors can either ascend the containers to reset the rappel anchoring system to the next stack or, if there is a CCTM on top who can reset the anchor, the inspection team can rappel to the deck.

Figure 5-24: Anti-pilferage seals

10. Continue rappelling until both feet are firmly on the ground and then squat to gain slack in the rope.
11. Remove the rope from the locking device and loudly call out, ***"<Your name here> off rappel."*** Wait for the belayer to confirm, ***"<Name> off belay."***
12. All remaining personnel except for the "last person aloft" repeat this process. See the next section for last person drill.

Section G: Last Person Drill

G.1. De-rigging

1. Break down the rappel anchoring system by removing all water knots, black 11 mm rope, and carabiners.
2. Secure all items in the top bag.
3. Keeping a low profile, lower the top bag to the team below using the primary rope originally used to climb the container.
4. Disconnect the hard-point securing the hook and ladder to the container. Then use the primary rope to lower the hook and ladder to the team below.
5. After that, route the primary rope through the corner fitting from the front of the container to the outboard side, then lower the bitter end to the ground. Ensure chafing gear covers and protects the rope as it passes through the corner fitting.

Figure 5-25: Routing the rope

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6. Using the 10- to 12-foot length of 1-inch tubular nylon with a water knot at the base of the container stack (previously used as a bottom anchor on initial climbing), attach the bitter end of the lowered rope to the bottom anchor carabiner with a figure 8 knot (see Figure 5-26 on the next page). Remove slack, creating an anchor for the last person's rappel.

Figure 5-26: Establish anchor

G.2. Last Person Drill

The last CCTM to rappel:

1. Reach down and grasp the rope approximately 18 inches (roughly the distance from elbow to fingertips) from the edge. Thread the 11 mm rope into a hands-free locking device. Ensure the rope heading toward the anchor goes in the bottom of the hands-free locking device and the rope heading over the edge comes out the top of the hands-free locking device. Ensure the self-locking cam is operating correctly, and the rope is threaded properly.
2. Call out, ***"<Your name here> on rappel,"*** and await the answer ***"<Name> on belay."***
3. Ensure edge protection is in place.

4. Gradually lower yourself over the edge using the undercut edge method until the rope has tension and the belay device locks.
5. Once down, tie three simple overhand knots in the bitter end and pull the 11 mm rope through the corner fitting from the belay (outboard) side, using the knots to pull the edge protection through.
6. Account for all equipment, re-inspect, and fill out rope inspection log.

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Appendix A: Glossary and Acronyms

Anchor or Anchoring System	The point on the container to which the climbing system is securely attached. There are two types used in container climbing (CC): belay anchors and rappel anchors.
ANSI	American National Standards Institute.
ATC	Air traffic controller (a type of belay device) (see below).
Belay	To protect a roped climber from falling by passing the rope through, or around, any type of friction-enhancing belay device (see below). Before the invention of belay devices, the belayer simply passed the rope around his or her hips or shoulders to create friction.
Belay device	A mechanical device that creates friction when belaying by putting bends in the rope. Many types of belay devices exist, including air traffic controller (ATC) devices, hands-free locking devices, Reverso, Sticht plate, eight, and tuber. Some belay devices can also function as descenders. A Munter hitch can sometimes replace a belay device.
BO	Boarding officer (see below).
Boarding Officer (BO)	In charge of the boarding. Ensures communication between team members is clear and concise. Also oversees team safety.
Carabiner	A metal loop with a spring-loaded snap-link (or gate). Carabiners come in various shapes and sizes for use in various capacities, such as belaying, rappelling, clipping into safety anchors, or securing ropes to points of protection.
Caving Ladder	A lightweight, flexible ladder system used to ascend to the top of a container or for hook and climb evolutions.
CC	Container climbing.
CCI	Container climbing instructor.

CCTM	Container climbing team member.
Chafing Gear	Material applied to a line or rope to prevent or reduce friction wear.
CLS	Combat life support.
Common Tip Interface (CTI)	Used with the telescopic pole to hook the corner casting of a container stack.
Container	A reusable freight container for storing and transporting goods or materials. Also known as a 20-foot equivalent unit (TEU).
CPR	Cardiopulmonary resuscitation.
CTI	Common tip interface (see above).
Descending Device	A device for controlling descent on a rope. Also called a rappel device or self-locking belay device. Many belay devices can function as descenders.
D-rings	A metal attachment point on a harness.
DSF	Deployable specialized forces.
Dynamic Rope	Rope intentionally designed to stretch at least 10 percent of its total length under load, thereby acting as a shock absorber during a fall.
EMT	Emergency medical technician.
“Falling”	Alerts the belay man a CCTM (see above) on rope is falling, requiring the belay man to pull tension on the rope to arrest the fall.
Figure 8	A type of anchor knot creating a single loop that jams (will not slip) under strain. It can be attached to other system components with a carabiner.
Girth Hitch	Used to anchor rope or webbing as a “choker.”
“Good Hook”	Alerts the team the hook is in place in the container’s corner cast, and is stable for climbing.

Hardware	Equipment that includes connection hook, carabiners, descent control devices, etc.
Harness	A sewn nylon webbing device worn around the waist and thighs designed to allow a person to safely hang suspended in the air.
Ideal Fall Factor (IFF)	Term for measuring or describing falls and shock forces. To determine fall factor, divide the length of fall by the length of rope in actual use.
IFF	Ideal fall factor (see above).
Kern	Core of a rope.
kN	KiloNewton (1 kN = 224.81 pounds).
Ladder Tender (LT)	The person in charge of the ladder. Pays out the ladder, and ensures it does not get caught up on anything. Keeps ladder taut during climbing.
Last Person Drill	When the last CCTM (see above) rappels down.
lbf	Pounds-force.
LC	Lead climber (see below).
Lead Climber (LC)	First one up the ladder to reach the hook point. Asks for slack from the belay man to get on top of the container. Once on top of the container, secures the hook and ladder to the container.
Locking Rod	Used to close shipping container doors.
LT	Ladder tender (see above).
Mantle	Sheath or outer layer of a rope.
MBS	Minimum breaking strength.
Mil spec	Military specification.
mm	Millimeter.

NFPA	National Fire Protection Association.
“No Hook”	Alerts the team the hook is not in place in the container’s corner cast, and is not safe for climbing. The hook must be reset by properly placing it into the corner cast.
“Off Belay”	Notifies all CCTMs (see above) the belay man is not tending the belay.
“Off Rappel”	Notifies belay man a CCTM (see above) is off the rope.
“On Belay”	Reply from the belay man to the rappeller acknowledging the belay man is ready for the CCTM (see above) to commence the rappel.
“On Rappel”	Alerts the belay man a CCTM (see above) is about to rappel.
“On Rope”	Alerts the belay man a CCTM (see above) is connected to the rope.
OPCON	Operational control.
PMC	Pre-mission check.
PMI	Pre-mission inspection.
PMS	Preventive maintenance system.
Pole Tender (PT)	Hooks the ladder on a safe hook point by either dynamically raising the pole (similar to raising the pole during hook and climb evolutions) or conducting deliberate vertical pole raising in tight quarters on deck between containers.
PPE	Personal protective equipment.
Procedure Word (Proword)	A standardized word (or group of words) authorized for use.
Proword	Procedure word (see above).
PT	Pole tender (see above).

Rappel Anchor	Main tension point for rappelling.
Rappel System	A combination of gear and equipment for rappelling.
Rappeller	Person who rappels.
Rescue 8	Type of descending device.
RM	Risk management.
"Rope"	Alerts the team to impending rope release from an elevated position, and for the CCTMs (see above) to be aware above their level.
Safety Officer (SO)	Person responsible for all aspects of safety during training.
SC	Second climber (see below).
Second Climber (SC)	Second climber up the ladder after the lead climber secures the hook and ladder to the container with a prepared tubular nylon sling. Assists lead climber as needed, and can serve as rescuer if a buddy rescue is needed.
"Slack"	Alerts the belay man a CCTM (see above) on rope requires more slack in the rope.
Sliding X	Crossing of webbing through a carabiner that allows movement within the anchor system.
SO	Safety officer (see above).
Software	Webbing, rope, and material consisting of soft materials suitable for climbing and rappelling.
Static Rope	Rope designed to stretch no more than 6 percent of the total length under load.
TACLET	Tactical law enforcement team.
Team Leader (TL)	Identifies containers to be inspected and ensures the team conducts all inspections safely (to include assignment of a rescue climber). Ensures all required paperwork is complete and accurate, reporting any discrepancies to operational control (OPCON).

Telescopic Pole	A device used to extend the caving ladder and lift the attached hook to the elevation of the corner casting of the top container.
TEU	Twenty-foot equivalent unit (see **Container** above).
TL	Team leader (see above).
TTP	Tactics, techniques, and procedures.
UAL	Uniform allowance list.
Undercut Edge Method	Kneeling down or laying down as low as possible while moving over the edge of a container to avoid falling during rappel evolutions.
"Up Pole"	Verbal command from team leader to pole tender to raise the pole to the hook position.
Water Knot	The water knot (also tape knot, ring bend, grass knot, or overhand follow-through) is a knot frequently used in climbing for joining two ends of webbing together, for instance when making a sling.
Webbing	A strong fabric woven as a flat strip or tube of varying width and fibers. Often used in place of rope. There are two basic constructions of webbing. Flat webbing is a solid weave (e.g., seatbelts and most backpack straps are common examples). Tubular webbing consists of a flattened tube; its most common use is climbing and industrial applications.

Appendix B: Gear Inspection

B.1. Rope Selection Considerations

- Only use static rope (without shock absorbers) for climbing or rappelling. Do not use dynamic rope.
- Always plan for "general use" (formerly two-person load) for rescue applications.
- Rescue rope must meet NFPA 1983 requirements.
- Size (diameter) the rope in comparison to other equipment in the climbing, rappelling, or rescue system.

B.2. Care and Maintenance

As with all rescue equipment, inspect rope before, during, and after each use per reference (c), Pre-Mission Inspection (PMI) and Pre-Mission Check (PMC) Tactics, Techniques, and Procedures (TTP), CGTTP 3-95.2 (series). The "authority having jurisdiction" designates an individual(s) as "rope/equipment inspector," as well as establishes a system to inspect, maintain, and add or remove items from service.

Follow manufacturer's recommendations for:

- Care.
- Use.
- Storage.
- Marking.
- Cleaning.
- Inspection.
- Retirement criteria.

Damage can occur from:

- Excessive exposure to direct sunlight (UV radiation).
- Certain chemicals – keep away from chemicals.
- Contact with other moving nylon equipment ("nylon-on-nylon").
- Exposure to dirt and grit.
- Exposure to high temperatures.

Common factors for retiring rope:

- Sheath penetration.
- Severe shock load.
- Overloading.
- Misuse.
- Chemical contamination.
- Unrecoverable soft/mushy or hard spots.
- Age.
- Degradation due to use or storage.
- Body substance contamination.
- Loss of confidence (e.g., questionable history).
- **When in doubt, throw it <u>out</u>!**

Grade	Definition	Appearance	Use
I	A new rappel rope, not older than 2 years with no more than 500 rappels on it.	Little or no wear.	High/low rappel towers of 100 feet or less, and combat-equipped rappels or helicopter rappels.
II	A rappel rope older than 2 years with 500 but less than 1000 rappels on it.	Shows slight external wear. Furry on outer sheath.	High/low rappel towers of 100 feet or less. No combat equipment stress exposure.
III	A rappel rope older than 5 years or with more than 1000 rappels.	Shows slight external wear. Furry on outer sheath.	Sling ropes and rappel seats.

Appendix C: Container Structural Considerations

C.1. Safety Assessment

Conduct an external assessment, including a complete walk around (if possible), of selected containers to ensure safety of Coast Guard personnel. Remain alert for indications of potential internal hazards (e.g., cargo leaks or severe container damage). If you discover any leaks, immediately terminate the inspection.

For CC, examine the following structurally sensitive container components for serious deficiencies: top rail, bottom rail, header, sill, corner posts, corner and intermediate fittings, understructure, and locking rods (see Figure C-1 below). Use Table C-1, Structural serviceability criteria to make immediate determination as to whether or not a container can be safely inspected.

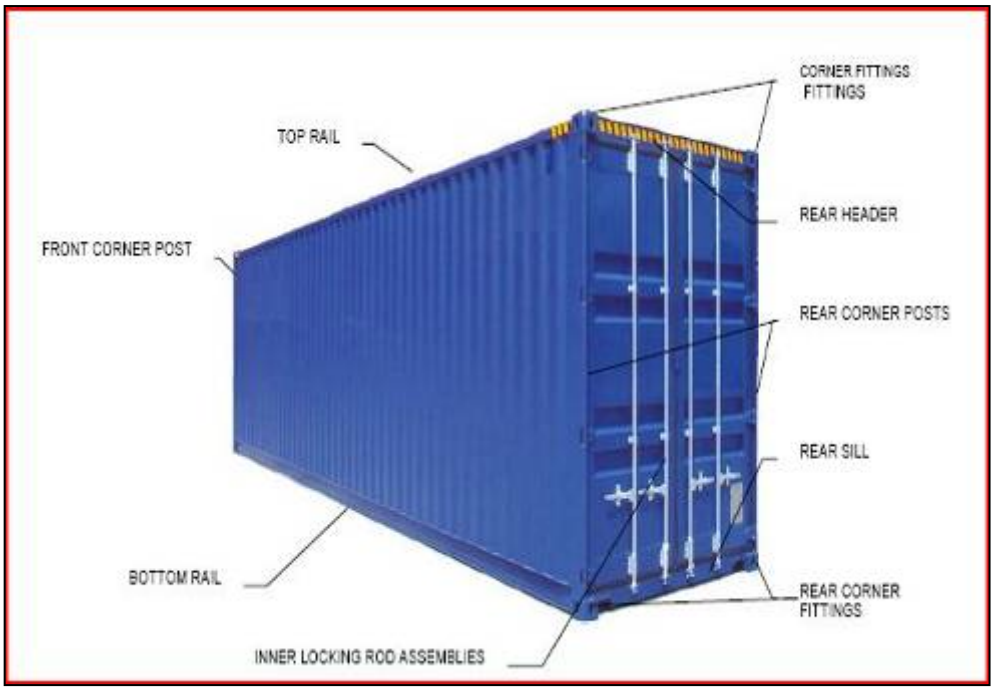

Figure C-1: Structurally sensitive components of a container

STRUCTURALLY SENSITIVE COMPONENT	SERIOUS STRUCTURAL DEFICIENCY
Top rail	No dents or bends > 60 mm (~2.4 inches). No cracks or tears > 45 mm (~1.75 inches) in length.
Bottom rail	No dents or bends > 100 mm (~4 inches). No cracks or tears > 75 mm (~3 inches) in length.
Header	No dents or bends > 80 mm (~3 inches). No cracks or tears > 80 mm (~3 inches) in length.

Sills	No dents or bends > 100 mm (~4 inches). No cracks or tears >100 mm (~4 inches) in length.
Corner posts	No dents or bends > 50 mm (~2 inches). No tears or cracks > 50 mm (~2 inches) in length.
Corner and intermediate fittings (castings)	No missing fittings. No cracks > 25 mm (~1 inch). No cracks at the weld of the adjoining components.

Understructure	Two or more adjacent cross members missing or detached from the bottom rails.
Locking rods	Inner locking rods must be functional.

Table C-1: Structural serviceability criteria

Appendix D: Emergency Procedures

D.1. Buddy Rescue

Buddy rescues become necessary when a climber is stranded due to injury or equipment malfunction and is unable to self-rescue. The two preferred methods of buddy rescue during CC are pick-off and rope-transfer techniques. These are necessary tools in the rescuer's "toolbox" and are quick, efficient, and effective ways to safely lower a stranded climber.

- Pick-off: A technique using a rope system to access and remove a victim suspended or stranded on an isolated perch. Victim access is typically made from above the victim using a lowering or rappelling system, and then transfering the victim to the rescue rope using a pick-off strap. Once done, the victim is lowered to safety.

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- Rope-transfer: Similar to the pick-off technique except it uses a mechanical advantage, rescue pulley system instead of a pick-off strap. The rope-transfer assembly allows the rescuer to safely transfer the load of the stranded climber to the rescue rope and lower both climbers on one rope. The rope-transfer assembly includes a built-in safety cam: as slack is taken out, the device automatically locks so the rescuer can release the rope to reposition or take up more slack.

D.2. Accessing the Victim

There are various strengths and limitations to buddy rescues when accessing the victim from above his or her position:

Strengths:

- Useful when limited personnel are available.
- Useful when line-of-sight between rappel site and victim is obstructed.
- Useful when communication with rescue team is limited.
- Provides greater descent control for rescuer (e.g., ability to stop at desired level).

Limitations:

- Exposes rescuer to a potentially panicked victim.
- Rescuer must "tie-off" to work on victim.
- Rescuer must control his or her descent while making adjustments for a two-person load.
- Rescuer must control descent while protecting the victim.

NOTE: **Avoid maneuvering too low (relative to the victim) during rescues. Being too low makes transferring the victim's load to the rescuer's system more difficult.**

D.3. Pick-Off Technique

The pick-off technique is commonly used when victims are:

- Trapped in an open container.
- Suspended.
- Unconscious.

Advantages:

- Efficient use of time, personnel, and equipment.
- Provides good maneuverability.
- Allows rescuer-to-victim contact.

Disadvantages:

- Not for use on victims with suspected spinal injuries.
- Difficult when victim is unconscious.
- Two-person load on main rope.
- Subjects both rescuer and victim to hazards, such as fire or hazardous materials.
- A combative victim can hinder the rescue.

D.3.a. Pick-Off Equipment

- Single safety-rope belay system designed for two-person load.
- Separate safety-rope belay for each person.
- Two steel carabiners: One to attach the pick-off strap to the victim and one to attach the Rescue 8 descending device to the rescuer, if rappelling.
- One pick-off strap.

D.3.b. Pick-Off Procedures

Rescuer pick-off procedures:

1. Position yourself in a safe location above the stranded climber and lock onto the container using a runner.
2. Release hands-free locking device and detach from harness.
3. Retrieve and attach the Rescue 8 onto your harness using a double wrap.
4. Place yourself in position for rescue. Lock off the Rescue 8.
5. Attach pick-off strap to your harness.
6. Attach other end of pick-off strap to victim.
7. Remove as much slack as possible from the pick-off strap. If able, the victim assists by climbing up enough to remove additional slack out of the pick-off strap and create enough slack in the victim's rope to disconnect from his or her rope.
8. Disconnect victim's hands-free locking device from his or her harness. If unable to disconnect, carefully cut the rope above the hands-free locking device. Be prepared for a load surge on your harness.
9. Position the victim between your legs.
10. Unlock the Rescue 8.
11. Slowly lower yourself and victim down to the deck. Use legs to keep yourself and victim clear of container while descending.

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NOTE: **A two-person load is acceptable only with equipment and techniques designed for such use.**

NOTE: **Avoid maneuvering too low (relative to the victim) during rescues. Being too low makes transferring the victim's load to the rescuer's system more difficult.**

D.4. Rope-Transfer Technique

The rope-transfer technique is commonly used when a victim is suspended due to an equipment malfunction, and is either relatively the same weight or heavier than the rescuer.

Advantages:

- Efficient use of time, personnel, and equipment.
- Provides good maneuverability.
- Allows rescuer-to-victim contact.
- Safer than methods that sever the victim's rope.
- Revision The rope-transfer assembly gives the rescuer mechanical advantage.

Disadvantages:

- Two-person load on main rope.
- Subjects both rescuer and victim to hazards, such as fire or hazardous materials.
- A combative victim can hinder the rescue.

WARNING: ***Use extreme caution when conducting a rope-transfer on an unconscious victim or a victim with suspected spinal injuries.***

D.4.a. Rope-Transfer Equipment

A safety-rope system is highly recommended for rope-transfer:

- Single safety-rope belay system designed for two-person load.
- Separate safety-rope belay for each person.

Rescuer's equipment consists of:

- Revision Two steel carabiners: One to attach the rope-transfer assembly to the victim, and one to attach the Rescue 8 descending device to the rescuer, if rappelling.
- Revision One rope-transfer assembly.

D.4.b. Rope-Transfer Procedures

Rescuer rope-transfer procedures:

1. If not already done, switch from hands-free locking device to Rescue 8.
2. Rappel (or be lowered) to a point several feet above the hung climber. Allow the rope-transfer assembly to dangle below you as a reference point for measuring distance to victim.
3. Descend only far enough to connect to victim's harness. It is critical you do not descend too low. With lowering system, the team can haul you up, if necessary.
4. If rappelling, lock-off the Rescue 8.
5. Attach safety-rope and rope-transfer assembly to victim's harness.
6. Re-check all connections and inform personnel operating the system, ***"Ready to load!"***
7. Wait for acknowledgment before loading the victim onto the system.
8. Carefully transfer victim's weight to your system by hauling with the rope-transfer assembly. Haul only enough to unload and disconnect the victim's rope. Use good hauling techniques to avoid injuring your back or shocking the system.
9. Unlock the rappel device (if applicable) and begin descent using your arms and legs to keep victim from obstructions.
10. To prevent pressure from the connecting utility strap, keep your legs at about a 45º angle from your torso rather than the usual 90º L-shape. If rappelling, a bottom belayer can assist in controlling your descent.
11. When safe, detach yourself from the victim. Provide definitive care, as needed.

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