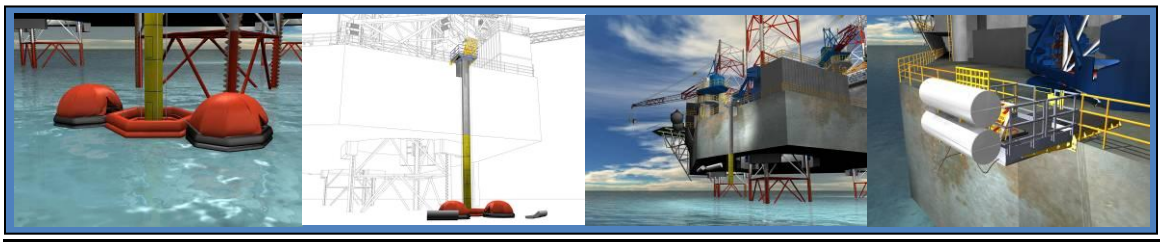

INTEGRATED ESCAPE CHUTE (AND LIFE RAFT) SYSTEM (IECS) Variable Height Application

Operations & Maintenance Manual General

Risk Safety Systems US Inc.

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1.0 Introduction

The Integrated Escape Chute System (IECS) is a method for personnel who are required to utilise Life Rafts to leave an installation to move from the deck level down to Life Rafts at sea level via a protected, enclosed system.

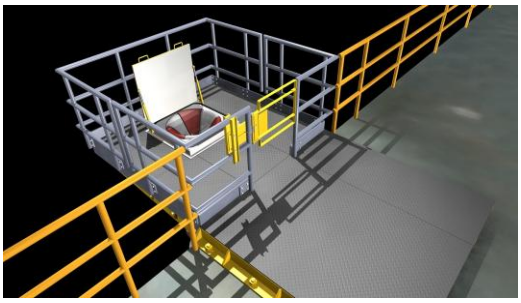
The IECS integrates the Life Rafts with a reliable method of descent to sea that offers protection from heat flux, flame impingement and smoke/gas.

Personnel descend through the chute to a debarkation raft at the bottom of the chute column to which the Life Rafts are connected by their painter lines.

The system enables a large volume of personnel to evacuate from a topsides location into Life Rafts without exposure to flame/heat or smoke and without entering the water. Transit time varies but each person will spend approx 15/25 seconds transiting from topsides to the debarkation raft.

The IECS is a low cost, low maintenance, low weight, modular unit; skid mounted and easily integrated into any existing or new build facilities; needing only an unobstructed drop to sea level and 7’ GAP created in the deck edge rails.

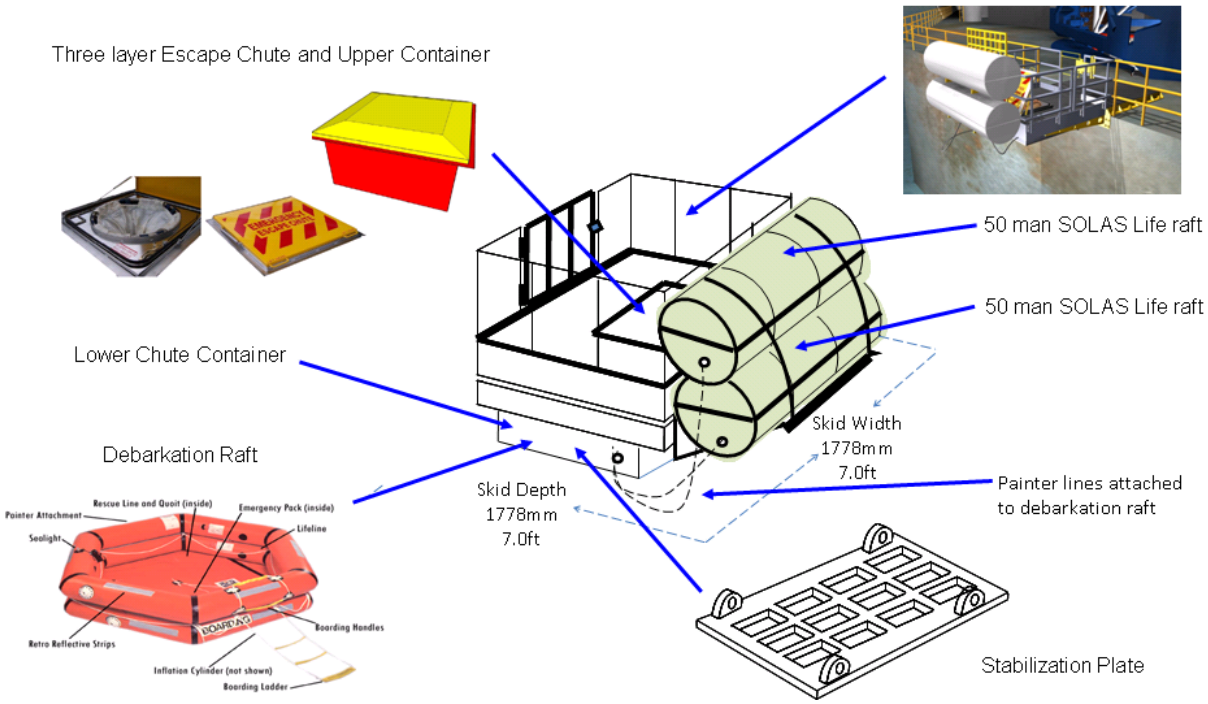
For applications where no clear drop to sea level is available the system can be supplied with a purpose built cantilever that can be bolted to the existing structure with no hot work required.



2.0 Primary System Components

Primary system components comprise:

- Purpose built 7ft x 7ft steel box section skid with checker plate deck, safety hand rails, access gate and instructions on use.
- Life Raft mounting & deployment assembly located at the front of the skid system may be configured for 2 x 25 or 50 man Life Rafts.
- Upper Chute Container with hydraulically dampened lid containing for access to chute system.
- Lower Chute Container fixed to underside of skid frame containing Kevlar main structural support cables, 3 layer chute interface with netted Kevlar variable height application chute, debarkation raft, 350lb stabilization plate, lower hinged trap door to deploy the system.



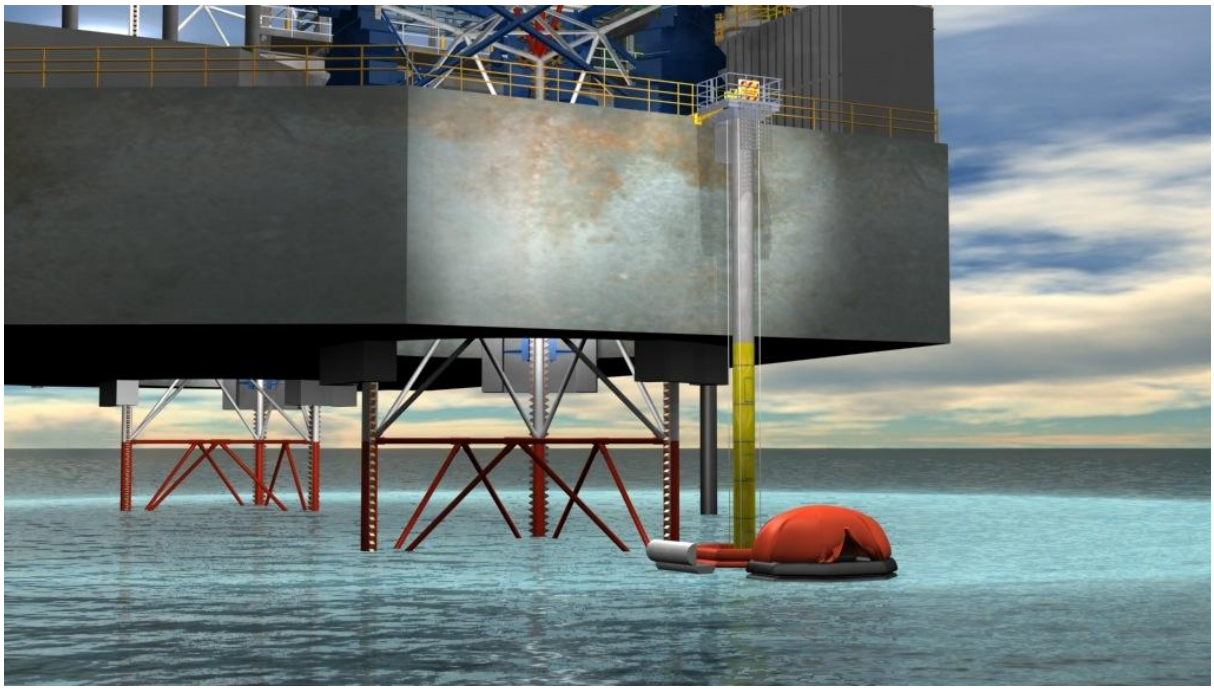
3.0 System Options for Configuration

The system can be configured and supplied for either a fixed height application or variable height applications.

Fixed height IECS utilizes a Single chute configuration suitable for fixed height applications such as **TLP, Spar, Fixed single Jacket, Multi Jacket Facilities** and any other facility design where the gap between the skid at deck level and mean sea level does not vary.

The Variable height IECS utilizes a dual chute configuration allowing for variable height applications such as **FPSO, FSO, Drilling rigs, MODU, Shuttle Tankers** or any application where the gap between the deck skid location and mean sea level could be variable.

The illustration below shows a variable height application system with both closed and open Kevlar chutes.



4.0 Operating the IECS – Prerequisites for Use

	**NOTE:** Safety awareness is vital when using any type of evacuation system; the same applies with the IECS. At all times follow instructions and ensure you are fully trained prior to access to the facility where the system is installed. If in doubt ASK! If you need more training ASK!

- **All personnel** must undergo a minimum of **Two** hours training combination classroom and practical using the training chute prior to access to the facility where the IECS is installed.

- **All personnel** will be assessed on there capability by the trainer identifying any persons who have a fear of heights, vertigo or any other height related phobias. Fully document each person's condition or phobia and earmark for extended training.

- **The IECS is a vertical descent device** and as such all users **must** be fully familiarized with this type of evacuation procedure before accessing the facility on which it is utilized.

- **During evacuation be aware of your surroundings** and any hazards that may be present, stay calm at all times and try not to panic. Ensure you have read the operational manual and fully understand the Facility muster and evacuation procedures. Follow directions of designated personnel (see next slide).

- **Familiarize yourself with all written instructions** that are provided with IECS system and located in front of the skid and attached to the hand rails.

5.0 Operating the IECS Roles & Responsibilities

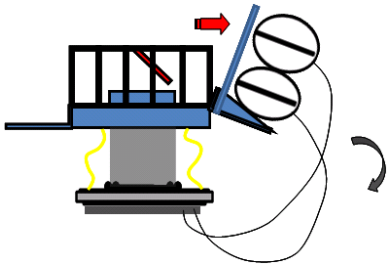
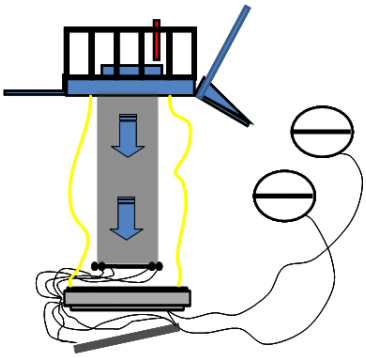
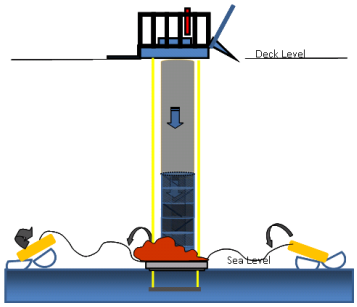
	**In an emergency where personnel are required to evacuate using the IECS** the following procedure should be followed: Assemble at the IECS muster station. Persons **designated** Topsides Chute Access Supervisor (TCAS), Debarkation Raft Supervisor (DRS), Life Raft 1 & 2 Access Supervisors (LRAS) commence duties:

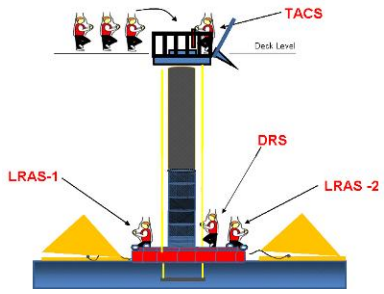
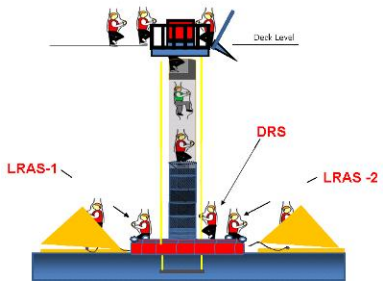
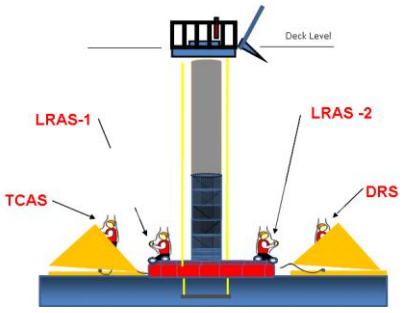
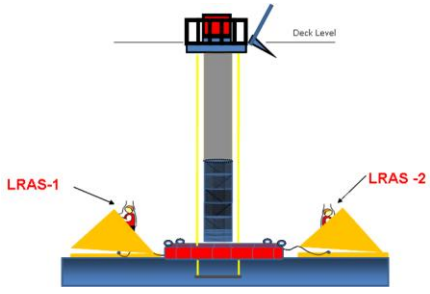
	**Topsides Chute Access Supervisor (TCAS) -** The individual assigned this task will be responsible for entering the IECS skid, removing life raft safety latches and deploying the system. Once the system is deployed he will remain at the topsides supervising the personnel as they traverse the chute. He will be the last individual into the chute.
	**Debarkation Raft Supervisor (DRS) -** The (DRS) will be the first person into the chute. On exiting at the debarkation raft he will supervise the remaining personnel as they traverse the chute to the debarkation raft. He will communicate directly with the TCAS via hand held radios to supervise personnel descent.
	**Life Raft Access Supervisor 1 & 2 (LRAS) -** The LRAS with be the second and third personnel to descend to the debarkation raft. Once at sea level they will pull in the QTY 2 x 50 Man Life Rafts and take station at the edge of the Debarkation Raft (attach the Life Raft painter lines to the last ring of the netted chute using the carabineer that is attached to the rafts painter line). Their function is to supervise the personnel transit into the Life Rafts. They will be the last to enter each Life Raft after evacuation is complete.

6.0 Preparation for IECS Deployment

TCAS (Topsides Chute Access Supervisor)	
1.	Open access gate and secure in open position using Stainless Steel chain and Carabiner.
2.	Step onto the skid, lift chute access lid and remove knife. Close Chute container lid.
3.	Cut safety restraint cord that provides secondary restraint when not in use for the lower chute container. (Note the chute will not deploy if this restraint cord is not cut prior to system deployment).
4.	Unlatch weather fast safety restraint strap that hold both 50 man life rafts secure.
5.	Remove circlip from large pin and remove from life raft deployment assembly (note life rafts will not deploy if this pin is not removed prior to system deployment.
6.	Remove the system deployment lever and walk to the back of the skid, stand directly in front of the main chute container facing the deployment mechanism. Turn vigorously in a clockwise direction after 10-15 seconds the system will deploy releasing the lower trap door and life raft cradle simultaneously. You will feel a slight vibration as the life rafts throws forward and the lower chute container trap door swings open. This is normal.
7.	Check chute system has deployed correctly (chute is fully extended and debarkation raft has fully inflated).
8.	Ensure Life Rafts are deployed and connected to the lower escape chute ring. Evacuation process can now commence.

7.0 Evacuating Using the IECS

	**STEP 1 -** TCAS enters the skid, releases Life Raft retaining strap, cuts lower chute restraint cord with cutting knife which is stowed under the lid of the main chute container, removes large retaining pin from life raft deployment assembly. Extends system deployment lever and deploys system using deployment handle.
	**STEP 2 -** Chute falls to sea with Debarkation Raft and Stabilizer plate attached to bottom, deploying both life rafts with it.
	**STEP 3 -** As the debarkation raft descends it starts to inflate, attached to the chute bottom by the anchor cables running through the raft to the stabilizer plate suspended in the water column below the debarkation raft. On impacting the water the two SOLAS life rafts float awaiting inflation by the LRAS; they are connected to the bottom ring of the netted chute via their painter lines.

	**STEP 4 –** TACS, DRS & LRAS take stations. Personnel begin the decent into the debarkation raft ready to transfer to the two SOLAS life rafts. **Note:** in all cases evacuees must enter the chute front facing, the chute container is marked with two directional arrows and a notice stating **(Enter Chute This Way).**
	**STEP 5 –** Crew traverse into the debarkation raft and transfer to the two SOLAS life rafts.
	**STEP 6 –** TCAS & DRS enter Life Raft.
	**STEP 7 –** LRAS-1 & LRAS - 2 enter Life Raft & Separate Life Raft from bottom ring of netted chute. Life rafts may then be moved away from the facility.

8.0 Maintenance & Servicing Requirements IECS

The IECS requires very little day to day maintenance when compared to other evacuation systems. In order to enhance reliability and availability on demand the system has been designed with simplicity of components and operation as a major focus. However, the following maintenance & inspection functions are recommended.

8.1 Monthly (By Owner/operator)

General visual inspection. Enter skid & perform walk around. Check for obvious faults. Revert to quarterly schedule to address any issues. For any issues found outside the qtly recommended inspection and cannot be rectified by the owner/operator. Refer to RSS contact details below and call for assistance.

8.2 Quarterly (By Owner/operator)

- **Main IECS Skid Access Gate:**
  Check hinges and restraint assemblies. Apply lithium grease as required.

- **Main IECS Skid**
  Visual inspection of the main skid, check for missing components (knife, deployment handle etc.) If components are missing replace as soon as practicable.

- **IECS Deployment Mechanism**
  Inspect deployment mechanism; apply lithium grease by inserting a greasing gun into the upper grease nipple. Keep charged with grease at all times to protect the gears of the deployment mechanism.

  Apply grease to the deployment control rod that travels from the life raft support plate retainer to the floor mounted retaining plate which is situated at skid deck level. The lower section of the rod that travels through the skid to the lower chute container will be pr-greased by RSS and requires no maintenance by the owner/operator.

- **Upper Escape Chute Container:**
  Lift lid and inspect the chute container. Apply lithium grease to the rear lid hinges as necessary. Check the dampened hydraulic arms for signs of wear. Make a visual inspection of the top of the chute checking the main

stainless steel securing ring for signs of pitting or marking. Check the chute material straps are in good order and are not weathered.

- **Life Raft Support Cradle and Retaining Strap:**
  Make a visual inspection of the main life raft support strap checking for wear. Check the ratcheting mechanism and apply lithium grease as necessary. This is necessary to keep the tension mechanism on the strap free and ready for use. Only remove this strap if the system is to be deployed.

  Make a visual inspection of the secondary locking pin and circlip ensuring that these are greased on a regular basis. Also apply grease to the main deployment arm bracket that holds the control arm in place. Apply lithium grease as necessary.

  Note: The front Life Raft cradle support arm is pre-packed with grease and has four grease nipples attached. The support pots are filled with sufficient grease for a period of 1 year and require no monthly maintenance. These will be inspected and maintained by RSS during the annual inspection.

- **Secondary Safety Deployment Device - Lower Chute Container:**
  The secondary safety device is located at the front of the IECS skid at floor level. It is the secondary safety device for the lower chute container trap door and ensures that if the main deployment arm fails, then the rope will keep the trap door closed until servicing can be arranged.

  The rope and knot should be slack at all times. If the rope tightens then the primary trap door closing device has opened and created tension on the rope. **Call RSS for technical support.**

- **General Visual Checks:**
  Make a visual check of the main Cantilever frame for signs of wear or corrosion; check the main skid assembly for signs of wear or corrosion.

  In all cases report any defects or irregularities to Safety (HSE) Manager, or complete the defect report and contact Risk Safety Systems:

  Please follow all operating and maintenance instructions carefully and report any defects to Risk Safety Systems.

8.3 RSS Service Contact Details

Risk Safety Systems US Inc.
21815 Katy Freeway, Unit C104-5 Mason Creek Business Park
Katy
Texas TX77450.

Tel:	001 – 281 – 646 – 8777
Fax:	001 – 281 – 646 – 8788
Toll Free:	1-866-447-8777
email:	sales@risksafetysystems.com
email:	service@risksafetysystems.com
	www.risksafetysystems.com

8.4 Annual Inspection (By RSS Service Agent)

- RSS service agent will inspect the system for defects, wear or other issues.
- Inspect deployment mechanism; test deployment mechanism with safety interlocks in place. Replace components as necessary
- Debarkation Raft - Check pressurized cylinder & deployment valve. Recharge if necessary, recertification is required annually for the 25 man debarkation rafts this will be provided by the Risk Safety Systems technician.
- 50 man life rafts to be removed from their cradle and inspected in line with manufacture recommendations re-certified and refitted to cradle.
- Upper chute retaining ring removed and internal inspection of lower chute container and all components carried out.
- Re-certification of system, replace any components as required. Issue re-certification certificate for 12 months.

8.5 Five Year Service (By RSS Service Agent)

Major inspection – system must be removed and moved to suitable location / lay down area on facility for inspection.

- Main Skid - Inspect for structural integrity, corrosion. Repaint / touch up as required.

- System Deployment Mechanism - General inspection of deployment mechanism and safety interlocks. Test for correct operation replace components as required.

- Life Raft Deployment Frame - Inspect for structural defects / corrosion repair / replace as necessary.

- Upper Chute Container - Remove from skid and check for corrosion or any structural defects. Inspect condition of chute retaining ring and chute connection straps.

- Lower Chute Container - Lower chute container unpacked. General inspection of container, hinges door and support brackets for corrosion or any structural defects. Replace as required.

- Chute & Components - Unpack chute and check for tears or fatigue. Inspect all stitching. Confirm stainless steel support rings are connected to main Kevlar chute. Inspect Kevlar / closed chute interface for structural integrity. Check Kevlar support cables for wear / fatigue. Replace any components as necessary. Repack system

- Main structural support Cables - Inspect and check for wear / fatigue (including webbing straps). Replace as required.

- Debarkation Raft - Unpack & inspect for wear or tears. Check pressurized cylinder confirm charged and armed. Inspect main cable interfaces with raft & confirm cables move freely through guides.

- Stabilization Plate - Check for corrosion or structural defects. Repair, touch up / repaint as necessary.

Repack system and re-install system. Re-certify for five year inspection.

Note: Life Rafts will be inspected annually in line with manufacturer requirements.

9.0 Serial numbers Escape Chutes and Life Rafts

9.1 Examples 1.

1. Integrated Escape Chute
   Serial Number:
   Model Number:
   Tope section three layered integrated with lower netted chute section
   Inspection Annually

2. 25 man Debarkation Raft Serial Number: -
   (TYPE B) Pack IBA
   USCG No. 160.010/B101/0
   Painter Line adjusted to 15ft
   Stowage Height 36m 118ft
   Date Packed and inspected:
   Service Intervals Annual

3. 12/25 & 50 Man Life Rafts – Type Pack A
   Capacity 12/25/50 man
   Stowage Height 25m/30M
   Painter Length 30m
   C02 Bottle 26.0kg and 16.91
   C02 weight as Gas 22.33 and 10.77
   N2-kg 1.12 and 0.54
   Serial Number of Cylinder:
   E-module D Certification no:

10.0 Spares – Component List

Tables 10.1 thru 10.8 list all main components for IECS.
When ordering spares please quote item #.

10.1 Main Skid

Item #	Description	# Off
MS-001	Main Skid Frame	1
MS-002	Front Hand Rail Assembly	1
MS-002A	Front Hand Rail Assembly Bolts (Hold)	16
MS-003	Left Hand/Rear Rail Assembly	1
MS-003A	Left Hand/Rear Rail Assembly Bolts (Hlod)	16
MS-004A	Deck Plate Front	1
MS-004B	Deck Plate L/H	1
MS-004C	Deck Plate R/H	1
MS-004D	Deck Plate Rear	1
MS-004E	Deck Plate fitting bolts	hold
MS-0050P	Skid – Cantilever Mounting Brackets (Cantilever option)	4

10.2 System Deployment Mechanism

Item #	Description	# Off
DM-001	Lower Mounting Plate	1
DM-001A	Lower Mounting Plate Bolts (316 SS) ½' x 1 ¾" with SS flat washer)	2
DM-002	Deployment Gear – 'Bulldog' 190754TS static 8000lb, lift 5000lb	1
DM-003	Deployment Gear Handle	1
DM-004	Locking Pin with retaining Clip 7/8" Diameter x 5" Shaft	1

10.3 Life Raft Deployment System

Item #	Description	# Off
LD-001	12/25/50 Man Life Raft Support Frame CS	1
LD-002	Frame Retaining Mechanism with slide cut out 9 x 2"	2
LD-00A	Threaded draw pin 7/8" x 3 ¼" thread with Retaining Clip	1
LD-002B	1 ¾" x 7/8" ID Spacer	1
LD-002C	7/8" Locking Nut	1
LD-002D	2 ¼" flat washer with 7/8" ID	2
LD-003	Lower mounting Bracket (50 Man LR Frame)	1

LD-004	1 ¼" diameter steel hinge rod.	1

10.4 Upper Chute Container

Item #	Description	# Off
UC-001	Upper Chute Container	1
UC-002	Chute Container Lid	1
UC-002A	Stainless Steel Hydraulic Dampers	2
UC-002B	Chute Container Lid Hinge Assembly	1

10.5 Lower Chute Container

Item #	Description	# Off
LC-001	Lower Chute Container	1
LC-002	Lower Chute Container Trap Door Assembly (Inc Hinges)	1
LC-002A	Lower Chute Trap Door Mounting Bolts	16
LC-003	Lower Chute Container Front Mounting Frame	1
LC-003A	Front Mounting Frame to Main Skid Bolts 316 SS	2
LC-003B	Front Mounting Frame to Container Bolts 316 SS	4
LC-004	Lower Chute Container Rear Mounting Frame	1
LC-004A	Rear Mounting Frame to Main Skid Bolts 316BSS	2
LC-004B	Rear Mounting Frame to Container Bolts 316 SS	4
LC-005	Lower Chute Container Release Assembly	1

10.6 Chute & Components

Item #	Description	# Off
CC-001	Three Layer Enclosed Chute	1
CC-001A	Chute retention Ring (To Upper Container)	1
CC-002	Kevlar Chute Tube 40" Diameter	*
CC-002A	316 Stainless Steel Structural Hoops	*
CC-002B	316 SS 4000lb Kevlar support Cable Carabiner	*
CC-002C	4.9ft Kevlar Connector Cables with stitched loops	*
	Note: * Number dependent upon length of chute.	

10.7 Main Structural Support Cables & Stabilization Plate

Item #	Description	# Off
SC-001	Kevlar 15,000lb Main Structural Support Cables	4
SC-001A	316 SS 5000lb Kevlar support Cable eye bolt shackles	8
SC-001B	Carabiner Connectors Main Structural Cable to netted Chute at Debarkation Raft	4
SC001C	Carabiner Connectors Main Structural Cable to netted Chute at interface	4
SC-002	Steel Stabilization Plate with mounted eye pads.	1

10.8 Debarkation Raft

Item #	Description	# Off
DR-001	25 Man Debarkation Raft	1
DR-001A	30ft Painter Line as standard	1
DR-002	Carabiner shackle (connects painter to main Skid)	1
DR-003	PVC Floor Mounted Kevlar Cable Feed Guides	4

11.0 Example of IECS Weights and Dimensions

	Risk Safety Systems IECS	Weights	Height	Width	Length	Total Weight 1 System	Total Weight 4 Systems
	Total for 1 x System						
1	Main Skid Assembly including hand Rails	1380lb	48"	84"	84"		
1	Main Deck Chute Container	215lb	15"	41-1/2"	41-1/2"		
					Total	1595lb	6380lb
1	Life Raft Support Cradle	260b	6"	6"	47-1/2"		
1	Life Raft Support Cradle Mount Plate	88lb	66"	6"	66"		
1	Life Raft Support Arm Cantilver Break Arm	1lb	8"	1/2"	8"		
1	50 Man Raft 1.	921lb	36"	38"	76"		
1	50 Man Raft 2.	921lb	36"	38"	76"		
					Total	2191lb	8764lb
1	Lower Chute Container	350lb	39-3/4"	60-1/4"	79-3/4"		
1	Support Arm Front	26lb	38-3/4"	1-3/4"	44-1/2"		
1	Support Arm Back	24lb	36"	1-3/4"	44-1/2"		
1	Deployment Mechanism	25lb	25"	2-1/2"	2-1/2"		
1	Deployment bar and plate	18lb	60"	3/4"	60"		
1	Debarkation Raft	177lb	192"	192"	192"		
1	Stabaliztaion Plate	350lb	38"	2"	38"		
1	Kiz A Total Chute Weight	136lb	62.93"	40" max	62.93		
4	Qty 4 x Kevlar 15000lb Ropes	10lb	804"	7/16th	804"		
					Total	1116lb	4464lb
						4902lb	19608
4	Cantilvers frames	1980lb	168" = 14ft			1980lb	7920lb
						6882lb	31680lb

	Risk Safety Systems IECS	Weights	Height	Width	Length	Total Weight 1 System	Total Weight 4 Systems
	Total for 1 x System						
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1	Life Raft Support Cradle Mount Plate	88lb	66"	6"	66"		
1	Life Raft Support Arm Cantilver Break Arm	1lb	8"	1/2"	8"		
1	50 Man Raft 1.	721lb	36"	38"	76"		
1	50 Man Raft 2.	721lb	36"	38"	76"		
					Total	1791lb	7164lb
1	Lower Chute Container	350lb	39-3/4"	60-1/4"	79-3/4"		
1	Support Arm Front	26lb	38-3/4"	1-3/4"	44-1/2"		
1	Support Arm Back	24lb	36"	1-3/4"	44-1/2"		
1	Deployment Mechanism	25lb	25"	2-1/2"	2-1/2"		
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1	Kiz A Total Chute Weight	136lb	62.93"	40" max	62.93		
4	Qty 4 x Kevlar 15000lb Ropes	10lb	804"	7/16th	804"		
					Total	1116lb	4464lb
						4502lb	18008
4	Cantilvers frames	1980lb	168" = 14ft			1980lb	7920lb
						6482lb	25928lb