CONFINED SPACE SAFETY AND RESCUE TRAINING COURSES

EMERGENCY RESPONDERS AND RESCUE TEAMS

About Rescue 3 Europe

Rescue 3 Europe develops state of the art technical rescue courses, providing internationally recognised accreditation for organisations and individuals operating in high risk environments.

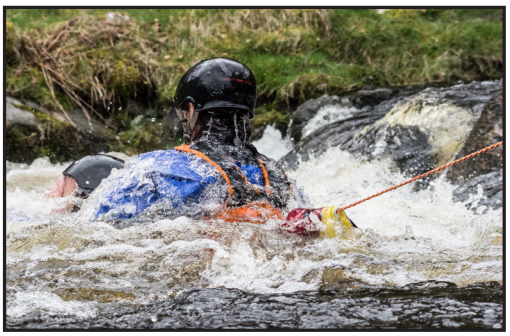
As an international accrediting body, Rescue 3 provide up to date best practice guidance that is constantly evolving in line with new research and testing. All changes and developments of Rescue 3 courses go through a process of peer review and oversight by a steering committee made up of industry experts from all over the world.

Rescue 3 training providers deliver courses worldwide, in multiple disciplines, including: rope, water, boat, ice and confined space rescue. Our large suite of courses have been adopted by mountain rescue teams, wind turbine operators, fire and rescue services, ambulance teams, utilities providers, and military personnel.

Within each discipline, Rescue 3 accredited courses cover every level of operations, whether this is at an awareness level, avoiding risks and applying simple safe systems of work; or at more advanced levels where practitioners must acquire high levels of personal skills and understanding to access and navigate difficult environments.

For over four decades Rescue 3 has provided the standard for technical rescue training, offering guidance and support for maintaining best practice.

Rescue3 EUROPE



The course learning outcomes are provided as pre- and post-course reference for people involved in the delivery of Rescue 3 courses (eg Rescue 3 training providers, instructors and students). They are not to be used for any other purpose without the express written permission of Rescue 3 Europe.

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EMERGENCY RESPONDERS AND RESCUE TEAMS

Confined Space Rescue Operator (CSRO) 5
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Confined Space Rescue Operator (CSRO)

Course overview and target audience

The Confined Space Rescue Operator (CSRO) course introduces the knowledge and skills required by personnel to operate safely and effectively during confined space rescues and be an active part of a confined space rescue team working under the supervision of Confined Space Rescue Technicians. Topics that are covered include: hazards of confined spaces, gas detection, legislation and guidelines on the area of confined spaces, knowledge of knots, loads and forces, building anchors, using pulley systems, use of tripod, self-climbing and rappelling, lowering and hoisting of rescuer and victim, standard configurations, stretchers used for confined space, situation analysis and incident management around incidents in confined spaces.

Contact hours	**Prerequisites**
30 hours (5 days)	Minimum age: 18
Qualification valid for	**Accredited by**
3 years	Rescue 3 Europe

Taught by

- Confined Space Rescue Operator Instructor (CSROI)
- Confined Space Rescue Technician Instructor (CSRTI)
- Confined Space Rescue Specialist Instructor (CSRSI)

Assessment

The assessed elements of this course are:

- Foundation knowledge
- Use of a 4-gas pump meter
- Use of SCBA for rescue
- Rigging of a tripod and raising/lowering system

Confined Space Rescue Operator (CSRO) skill sheet contents

Theory
1. Rescue 3 philosophy
2. Confined space definitions and categories
3. Legislation and standards
4. Confined space hazards and risk assessment
5. Personal safety
6. Air monitoring
7. Lock-out, tag-out, try-out
8. Introduction to respiratory protection systems
9. Safe systems of work, permits to work and rescue plans
10. Last-minute risk analysis and system safety check
11. On-scene safety briefing and site control
12. Size-up, pre-planning and ICS
13. Personal and team equipment
14. Equipment care and maintenance
15. Entry procedures/entrant/safety attendant/entry supervisor
16. Communications and verbal commands
17. Medical considerations

Practical
18. Use of a 4-gas pump meter
19. Confined space ventilation
20. Introduction to technical gear and entry systems
21. Knots
22. Anchor systems
23. Belay systems and operations
24. Use of different types of fall arrest equipment
25. Reach type rescue with a telescopic pole
26. Standard tripod configurations and mechanical hoisting
27. Work restraint
28. Placing edge/rope protection
29. Loads and forces
30. Tensioning systems and mechanical advantage
31. Personal descending
32. Litter management - low angle
33. Low angle litter management in an industrial setting
34. Horizontal confined space entry and rescue
35. Vertical confined space entry and rescue
36. Rope-based raising and lowering systems
37. Confined space rescue harnesses and stretchers
38. Casualty care and packing
39. Team-based raising and lowering systems
40. Mirrored team-based raising and lowering systems
41. Offsets - taglines
42. Practical use of SCBA for work and rescue
43. Scenarios

Confined Space Rescue Operator (CSRO) learning outcomes and key teaching points

	Skill sheet element		Learning outcome	Key teaching points
1	Rescue 3 philosophy	1.1	Recall the steps required in order to develop judgment	Training, practice, experience, judgment
		1.2	Explain the order of priorities at a confined space rescue scene	Self > team > victim
2	Confined space definitions and categories	2.1	Recall the definition of a confined space	Practically or totally closed, not for continuous work, possibility of a dangerous atmosphere, restricted entry or exit
3	Legislation and standards	3.1	Recognize the different training courses within the Rescue 3 scheme	Confined space rescue courses. Rope rescue courses. Water rescue courses. Boat rescue courses. Industry level courses
		3.2	Recall the remit and role of an individual trained to this level	Remit and role for someone at this level
		3.3	State how the Rescue 3 scheme fits within national and international standards	Introduce the Rescue 3 Standard as a truly international standard. Intro to NFPA Standards How we meet and exceed these standards Applicable local standards
		3.4	State how the Rescue 3 scheme fits within agency policy and agency standard operating guidelines	Describe how Rescue 3 can be used to fit in to agency policy and agency standard operating guidelines
4	Confined space hazards and risk assessments	4.1	Perform a generic or site specific risk assessment	• Identify the hazards • Decide who might be harmed and how • Evaluate the risks and decide on precaution • Record your findings and implement them • Review your assessment and update if necessary

	Skill sheet element		Learning outcome	Key teaching points
5	Personal Safety	5.1	Be aware of personal safety considerations when working near or in confined spaces at all times	Safe person concept. Do not enter confined space if work can be done without entry. Risks of confined space specific hazards, and other generic workplace hazards, eg slips, trips and falls. Electricity, other workers and machinery. Number of confined space fatalities who were would- be rescuers
6	Air monitoring	6.1	Recall the constituent gas levels in a normal atmosphere	Oxygen 20.9%. Nitrogen 78%. Argon 0.9%. Other gases in very small quantities including carbon dioxide
		6.2	Understand risk and possible causations of low and high oxygen levels	Low O2 can cause asphyxiation. High O2 can increase risk of fire/explosion
		6.3	Understand the risks associated with flammable and explosive atmospheres	Flammable range. Lower explosive limit. Upper explosive limit. Tetrahedron of combustion
		6.4	Recall how potential flammable and explosive atmospheres can be measured, including the use of correction factors	LEL sensor calibrated to known gas. Reading is based on test gas used and needs to be corrected to actual gas if known. Reasons for alarms setting normally set to 10%/20% of LEL
		6.5	Have an awareness of both short- and long-term hazards associated with the presence of toxic gases and vapours, how these are measured and exposure controlled	Toxic gases generally measured in ppm. Conversion of ppm to % volume. Workplace exposure limits set by legislation (eg EH40). STEL and LTEL are both time-weighted averages (TWA)
		6.6	Have an understanding of high, low, STEL and WEL alarm levels on a gas meter	Workplace exposure limits set by legislation (eg EH40). STEL and LTEL are both time weighted averages (TWA)
		6.7	Have an understanding of vapour density and how it affects air monitoring practice in confined spaces	Air = 1. <1 gas will rise. >1 gas will sink. Need to measure at multiple levels

	Skill sheet element		Learning outcome	Key teaching points
7	Lock-out, tag-out, try-out	7.1	Recall appropriate use of lock-out, tag-out, try-out procedures	Lock-out, tag-out, try-out (LOTOTO) procedures and installation. Specific plan per company. Why and how to do. Type of equipment
		7.2	Check the placement of lock-out, tag-out, try-out for a given confined space	Responsible person, checklist, work permit, physically check and test
		7.3	Place lock-out, tag-out, try-out for a given confined space, if used by agency	Add tag/lock and test
8	Introduction to respiratory protection systems	8.1	Recall various respiratory protection systems	Understanding of dusts masks, filter masks, SCBA, SAR, escape sets
		8.2	Recall the limitations of various respiratory protection systems	The need of oxygen for various masks, time limitations in use, bulkiness
9	Safe systems of work, permits to work, and rescue plans	9.1	Recall the rescue plan is a vital part of a SSW	Rescue plan should accompany a PTW
		9.2	Recall correct use of a safe system of work	Job risk analysis Check procedures Work permits and control measures Responsible person
		9.3	Recall correct use of permits-to-work	Signed work permits according to individual responsibilities
10	Last-minute risk analysis and system safety check	10.1	Identify the components of a system safety check	Redundancy Hands-free test (aka whistle test) Safety factor check Integrity of anchors Carabiner alignment Rope leg alignment Anchor leg angle
		10.2	Perform a system safety check	Redundancy Hands-free test (aka whistle test) Safety factor check Integrity of anchors Carabiner alignment Rope leg alignment Anchor leg angle

	Skill sheet element		Learning outcome	Key teaching points
11	On-scene safety briefing and site control	11.1	Based on hazard recognition, apply appropriate control measures to protect personnel and bystanders	Site zoning Chain of command Team roles
		11.2	Install and mark site zones	Methods of marking site zones
		11.3	Identify issues and hazards of bystanders in the cold zone	Crowd control Moral pressure Bystander safety
		11.4	Identify how and when to contact the emergency services in the event of an incident	Emergency service contact details: US & Canada: 911 Australia: 000 or 112 New Zealand: 111 Europe-wide emergency number: 112 Check emergency number for countries not listed Rescue capability of relevant bodies Phone access Mobile signal Radios
		11.5	Identify the role and responsibilities of an incident commander (IC)	Operational management of the rescue (on scene). Responsibilities include: Establishment of radio call signs Scene safety Pre-operational brief Role-call Establishment of commands Control of the operation

	Skill sheet element		Learning outcome	Key teaching points
	On-scene safety briefing and site control (continued)	11.6	Operate as a safety officer	Oversee the safety of the rigging phase while not being directly involved. Calling 'stop!' at a relevant juncture during safety critical phases. Attention to detail at a macro scale Rope alignment Point of edge transition Technique selected) and at a micro scale (carabiner alignment Gates done up Snugness of safety line
		11.7	Operate as a technical rescue team leader in a small 2-3 person team	Considerations for size of team
		11.8	For a given task, appoint different roles (including safety officer) for the personnel and casualty present	Consider multiple roles per person in small teams
		11.9	Perform an on-site safety brief based on risk assessments	Use of GSMEAC/SMEACQ
		11.10	Identify basic rescue options and their limitations	Use of GSMEAC/SMEACQ KISS Priorities LAST
		11.11	List rescue options	Use of GSMEAC/SMEACQ
		11.12	Select and brief an appropriate plan of action for a given incident	Use of GSMEAC/SMEACQ

	Skill sheet element		Learning outcome	Key teaching points
12	Size-up, pre-planning and ICS	12.1	List the four components of a generic pre-plan	Management Personnel Training Equipment
		12.2	Identify sources of information useful for generic and task-/ location-specific pre-planning	Weather forecasts Mapping Other relevant agencies Location of rescue and first aid equipment Post-rescue documentation
		12.3	Identify sources of information useful for generic and task-/location-specific pre-planning	Site-specific risk assessment General risk assessment Access or egress to site Topography Response plan
		12.4	Describe key information that should be included within a pre-plan	Site-specific risk assessment General risk assessment Access or egress to site Topography Response plan
		12.5	Demonstrate use of size-up models	CHALET and METHANE
		12.6	Explain the phases of a successful rescue	Locate. Access. Stabilise. Transport

	Skill sheet element		Learning outcome	Key teaching points
13	Personal and team equipment	13.1	Identify personal protective equipment(PPE) for performing rescues in confined spaces	Coveralls Helmet etc. Work restraint Fall arrest harnesses Gas detector Independent breathing protection systems Escape hoods etc
		13.2	Recall national and international standards for PPE	CE EN standards Applicable local standards
		13.3	Select appropriate PPE for performing rescues in confined spaces,perform pre-use checks, donning and buddy checks	CE EN standards PPE inspection Buddy checks
		13.4	Identify technical equipment used for performing rescues in confined spaces	Anchors Mobile anchor points Fall protection Hardware Slings Communication Ventilation Gas detection Ladders Winches/pulley systems Multi-pods Rescue stretchers Extrication harnesses Spine boards/spine splints Wrist loops Casualty helmet and casualty escape sets Self contained breathing apparatus and airline systems Ropes
		13.5	Recall national and international standards for technical and team equipment	EN standards Applicable local standards
		13.6	Recall post-use care and inspection procedures for technical and team equipment	Equipment inspection Storage and care
14	Equipment care and maintenance	14.1	Recall post-use care and inspection procedures for personal equipment	Decontamination PPE inspection Storage and care

	Skill sheet element		Learning outcome	Key teaching points
15	Entry procedures/ entrant/safety attendant/entry supervisor	15.1	Recall the various roles within the confined space entry procedure and their responsibilities	Responsibilities of Entry supervisor Safety attendant Entrant including communication Paperwork Work method statement Location during entry
16	Communications and verbal commands	16.1	Use whistle signals in confined space operations	1= stop/ok 2 = up 3= down Repeated signals = emergency
		16.2	Use verbal commands in confined space operations	Speak slowly Short messages Repeat message Confirmation
		16.3	Identify correct use of mobile radios in confined space operations	Speak slowly Short messages Repeat message Confirmation
		16.4	Use hand signals in confined space operations	Up Down Stop Get together Watch
		16.5	Use rope pulling signals in confined space operations	1 = stop/ok 2 = up 3 = down Repeated signals = emergency
		16.6	Compare merits and limitations of communication methods in confined space operations	Radio interference Line of sight Darkness VOX systems Cable management ATEX requirements

	Skill sheet element		Learning outcome	Key teaching points
17	Medical considerations	17.1	Identify signs/ symptoms and treatment for common medical issues found in confined spaces	Electrocution Amputation Overheating Hypothermia Bleeding Bumps and bruises Spinal injuries Intoxication. Follow first aid procedures including self-safety first due to cross contamination Treat first what kills first Do no further harm Golden hour
		17.2	Identify individuals at risk for common medical issues found in confined spaces and control measures to minimize these	Individuals at risk Casualty Rescuers Bystanders. Control measures: PPE Training Site zoning
18	Use of a 4 gas pump meter	18.1	Recall how a 4-gas pump meter is used to monitor the air in a confined space, and procedures in the event of an alarm	Device for measuring a confined space from the outside Calibration date Start up procedures Fresh air calibration Bump testing Alarm rates Hose selection and leak testing Correction factors Data interpretation
		18.2	Use a 4-gas pump meter to monitor the air in a confined space	Measuring at minimum three levels: • top • middle • bottom. Minimum time of measuring per level Floating ball with long hose on a pumped device

	Skill sheet element		Learning outcome	Key teaching points
19	Confined space ventilation	19.1	Recall when a confined space would be ventilated	Measuring before entry Size and volume variations
		19.2	Recall ventilation methods	Overpressure Underpressure
		19.3	Use appropriate ventilation equipment to ventilate a confined space	Manhole entry device Blower/exhauster ATEX vs. non-ATEX
20	Introduction to technical gear and entry systems	20.1	Recall national and international standards for technical and team equipment	EN standards Applicable local standards
		20.2	Recall post-use care and inspection procedures for technical and team equipment	Equipment inspection Storage and care
21	Knots	21.1	Identify, tie and check appropriate knots for performing rescues in confined spaces, relative to the remit of someone trained to this level	CSRO: Overhand knot, overhand on a bight, multiple strand overhand knot on a bight (BFK), figure of eight, figure of eight on a bight, figure of eight follow-through, alpine butterfly, water knot, double overhand stopper knot, square knot. Optional: barrel knot. Loops as big as necessary and as small as possible, well-dressed knots - neat and tidy, end 10x diameter, awareness of strength reduction
		21.2	Recall factors affecting knot choice for performing rescues in confined spaces	Ability to release under load. Ease of tying. Appropriate for task

	Skill sheet element		Learning outcome	Key teaching points
22	Anchor systems	22.1	Identify use of anchor systems when performing rescues in confined spaces, relative to the remit of someone trained to this level	112kN = 1 person load 20kN is 2 person load >30kN is unquestionably sound/bombproof In line with direction of load
		22.2	Identify, install and check appropriate anchor attachments for performing rescues in confined spaces, relative to the remit of someone trained to this level	Basket hitch with sling, basket hitch with steel cable, extended basket hitch with a carabiner, basket hitch with delta maillon, basket hitch with extra round turn. Sharp edges, angles of slings, carabiner loading, equipment hazards, construction strength and quality, position of loading
		22.3	Select an appropriate single anchor point	Relative to the load Unquestionably sound anchor (aka bombproof anchor)
		22.4	Identify, install and check load-sharing anchor systems, relative to the remit of someone trained to this level	Difference between load sharing and load distributing anchors, shifting of loads, backup, prevention of shock load, centring attachment point between anchors
		22.5	Identify agency use or non-use of artificial anchor points	Agency policy. Agency standard operating procedures
		22.6	Identify, install and check temporary artificial anchor points	Artificial door traverse anchors. Artificial beam clamp anchors
23	Belay systems and operations	23.1	Identify appropriate belay systems for a WCE	12kN = 1 person load 20kN is 2 person load >30kN is unquestionably sound/bombproof In line with direction of load
		23.2	Operate belay systems	12kN = 1 person load 20kN is 2 person load >30kN is unquestionably sound/bombproof In line with direction of load

	Skill sheet element		Learning outcome	Key teaching points
24	Use of different types of fall arrest equipment	24.1	Identify when fall arrest equipment is used, its merits and limitations	Where work restraint isn't appropriate (eg when climbing a structure), and where there is a likelihood of a fall
		24.2	Use a fall arrest device using horizontal attachments	Use of scaffold hooks with shock absorbing lanyard
		24.3	Use a fall arrest device using vertical attachments	Use of scaffold hooks with shock absorbing lanyard
25	Reach type rescue with a telescopic pole	25.1	Identify when a casualty would be connected to a line using a telescopic pole, its merits and limitations	Casualties not able to assist within reach of a telescopic pole Advantage = safety for rescuers More easy to learn for co-worker rescue You don't need to be fit to rescue
		25.2	Connect a casualty to a line, using a telescopic pole	Backup of stick prevents dropping Prevention of dropping objects
26	Standard tripod configurations and mechanical hoisting	26.1	Recall the appropriate direction of loading a conventional tripod	Loading in the centre of the tripod Awareness of resultant forces Forces outside the legs of the tripod is toppling over
		26.2	Recall the advantages of mechanical hoisting from the tripod	Retrieval function necessary for adequate response Retrieval function installed on the legs works best
27	Work restraint	27.1	Identify when work restraint equipment is used, its merits and limitations	Prevents an operative from reaching an edge
		27.2	Select, install and check appropriate horizontal work restraint equipment	Consider peninsulas. Anchor/ edge alignment. Suitability of anchor
28	Placing edge/rope protection	28.1	Select, install and check appropriate rope protection	Prevents an operative from reaching an edge

	Skill sheet element		Learning outcome	Key teaching points
29	Loads and forces	29.1	Differentiate between mass and force	Force = mass x acceleration
		29.2	Identify SI base units and derived units used in confined space rescue	Meter (length) Second (time) Kilogram (mass) Newton (force) Meter per second per second (acceleration)
		29.3	Describe the differences between static and dynamic forces	Static = non-moving, eg being held in space. Dynamic = moving, eg an uncontrolled event
		29.4	Recall the permissible maximum arrest force (MAF)	15kN, as defined by BCCTR
		29.5	Recall the parameters of a worst case event (WCE)	As defined by BCCTR: attendant and stretcher falling 1m with 3m of rope in service. Fall factor of 0.33
		29.6	Apply the worst case event and maximum arrest force to minimum breaking strength of equipment and system design	Awareness of equipment strength rating
		29.7	Recall the use of leverage in confined space rescue systems, its merits and limitations	Pulleys as levers Considerations for class of lever using pulley systems
		29.8	Recall the difference between ideal, theoretical and actual mechanical advantage	Ideal - velocity ratio. Doesn't account for frictional loss, heat loss, rope stretch, slippage. Theoretical - takes frictional loss into consideration, as far as is possible. Actual - the mechanical advantage in the real world, involving frictional loss, heat loss, rope stretch and slippage

	Skill sheet element		Learning outcome	Key teaching points
30	Tensioning systems and mechanical advantage	30.1	Identify the need for mechanical advantage systems within confined space rescue	Adding extra power without extra people
		30.2	Identify the hazards and control measures associated with mechanical advantage systems	Over-tightening the system when it is fixed Shock-loading with external systems
		30.3	Identify the different categories of mechanical advantage systems, their merits and limitations	Internal and external systems Simple, compound and complex systems
		30.4	Build and check a variety of mechanical advantage systems, relative to the remit of someone trained to this level	CSRO: 1:1 change of direction, 2:1 simple, 3:1 simple, 4:1 simple, 4:1 block and tackle, 5:1 simple, 4:1 compound
31	Personal descending	31.1	Identify hazards and control measures associated with personal descending	Redundancy, edge management. Control measures: PPE, training
		31.2	Demonstrate personal descending using two rope (main and safety) system	With auto-locking descender, and auto-locking backup device. Use of external belay to replace auto-locking backup device
32	Litter management - low angle	32.1	Identify hazards and control measures associated with low angle litter management	Angle of slope, terrain, restricted movement (eg in stairwell), consequences of failure, manual handling, anchor failure. Control measures: judgement (as a result of training, practice and experience), scene size-up, appropriate PPE for rescuers and casualty, training
		32.2	Participate in a variety of low angle litter management techniques	Eg staircase, road embankment, river bank. Variety of team configurations
33	Low angle litter management in an industrial setting	33.1	Transport a casualty in a litter in an industrial setting	Horizontal transport through narrow gangways Diagonal transport over stairs with a belay line Passing over the stretcher"
34	Horizontal confined space entry and rescue	34.1	Select, install and check appropriate ways of entering a horizontal confined space	Use of attached rope Line of sight Backup when not attached to a safety system

	Skill sheet element		Learning outcome	Key teaching points
35	Vertical confined space entry and rescue	35.1	Select, install and check appropriate ways of entering vertical confined space	Use of attached rope/cable Line of sight Backup when not attached to a safety system
36	Rope-based raising and lowering systems	36.1	Identify when fixed high directionals would be used, their merits and limitations	Abrupt edge transitions, especially with stretchers. Merits: Negates manual handling hazards Eases transition of stretcher Reduces fall factor. Limitations: Remote working Space Selection of appropriate high directional
		36.2	Install and check a fixed high directional	Resultant vector Compressive loading of in-situ anchors Consequences of failure. Discussion about raising the safety line into the apex of the change of direction vs. Running it on the floor
		36.3	Demonstrate an edge transition with the use of a high directional	With a stretcher
37	Confined space rescue harnesses and stretchers	37.1	Identify various confined space rescue harnesses, extraction devices and stretchers	Wristlets Vertical harness/stretcher bridles Specpak LSP Halfback Cocoon type stretchers vs. basket model stretchers Narrow openings Foldable packs Drawing possibilities with/ without back protection

	Skill sheet element		Learning outcome	Key teaching points
38	Casualty care and packing	38.1	Identify patient needs, hazards and control measures associated with casualty care and packing	General: Environmental protection Stabilization Impact protection Considerations for vertical transport Terrain considerations. Horizontal: Stretcher Vacuum mattress Casualty bag Head guard (or helmet and eye protection if not available) Medical gases Foot loops Knee support. Vertical: As horizontal, plus foot loop security Consideration of injury and ability to load-bear Confined space considerations
		38.2	Pack a casualty for horizontal transport	Stretcher Vacuum mattress Casualty bag Head guard (or helmet and eye protection if not available) Medical gases Foot loops Knee support

	Skill sheet element		Learning outcome	Key teaching points
39	Team-based raising and lowering systems	39.1	Explain the importance of working with twin lines	Redundancy, vulnerability of tensioned ropes
		39.2	Identify when team rope-based raising and lowering systems would be used, their merits and limitations	Rescue operations (as opposed to emergency situations without access to confined space rescue team). Task distribution, greater inherent safety, greater capability
		39.3	Identify the importance of using an auto-locking lowering device with team rope-based raising and lowering systems	Local legislative requirements, best practice
		39.4	Rig and check team rope-based raising and lowering systems	Rope alignment, anchor selection, focal point positioning, consideration of hazards, selection of mechanical advantage
		39.5	Identify considerations for a change of direction mainline raising and lowering system	Lack of space, force increase at change of direction, implications for safety factors
		39.6	Convert a lowering system to a raising system whilst unloaded	Consideration of the amount of mechanical advantage required, edge friction, working space
		39.7	Convert a lowering system to a raising system whilst loaded	Parity of raising system with lowering system, changeover without loss of height, maintenance of redundancy

	Skill sheet element		Learning outcome	Key teaching points
	Team-based raising and lowering systems (continued)	39.8	Identify the advantages of a dual capable two tension rope system (DCTTRS) over 'designated main, designated belay'	Linked to BCCTR research. Based upon risk, hand tight safety during edge transition but consideration of secondary edges, plumb line and other hazards when considering switching to mirrored system. Merits: pre-loaded safety line, reducing elongation in the event of a mainline failure. During raising, MA on both lines enhances flexibility and efficiency. Limitations: judgement-based, slightly more complex to rig, extra command and control considerations
		39.9	Rig, check and use a dual capable two tension rope system (DCTTRS)	Perform a changeover from hand-tight to load-sharing on the safety line
40	Mirrored team-based raising and lowering systems	40.1	Identify when mirrored systems are used, their merits and limitations	When mirrored systems are used: Based upon risk Hand tight safety during edge transition but consideration of secondary edges Plumb line and other hazards when considering switching to mirrored system. Merits: Pre-loaded safety line Reducing elongation in the event of a mainline failure. During raising MA on both lines enhances flexibility and efficiency. Limitations: Judgement-based Slightly more complex to rig Extra command and control considerations
		40.2	Rig, check and use a mirrored system	Perform a changeover from hand-tight to load-sharing on the safety line

	Skill sheet element		Learning outcome	Key teaching points
41	Offsets - tagline	41.1	Identify when tagline off sets would be used, their merits and limitations	To pull the package 1-1.5m away from the wall or obstacles and when impact risk can be reduced to a minimum. Can be used with and without attendant
		41.2	Install, check and use a tagline off set	Attachment on stretcher rail/ handles. Place tagline people far away to have a small tagline/ mainline angle (forces). Pull as far away as needed but minimize impact values in case of rope loss (1-1.5m away from the wall). Communication considerations. Preference for two taglines instead of just one
42	Practical use of SCBA for work and rescue	42.1	Identify when self-contained breathing apparatus is used, its hazards and control measures	Dangerous atmosphere which cannot be corrected. Breathing crisis (CO_2 build-up in lungs) Leaking mask Not enough pressure Medical fitness Time restraints Overheating Communication problems
		42.2	Use self-contained breathing apparatus in a confined space	Assemble SCBA device according to manufacturer instructions and protocols User test of system before entry Practice entry in confined space
43	Scenarios	43.1	Complete confined space rescue scenarios, relative to the remit of someone trained to this level	Perform one or more realistic scenarios which reflect the content of the course in a more or less realistic situation. Although the chosen solution might not always be perfect, the goal is to bring it all together. The instructor can do a time out for feedback or stop the scenario for safety reasons but will not be teaching all sessions again

Confined Space Rescue Technician (CSRT)

Course overview and target audience

The Confined Space Rescue Technician (CSRT) course covers concepts and techniques to enable small teams to undertake technical confined space rescues. Both individual and team skills are extensively addressed. Topics that are thoroughly covered are hazard, gas detection, legislation, international guidelines, key learning, extensive loads and forces, building anchors, using pulley systems, use of tripod for entry and evacuation, self-climbing and rappelling, lowering and hoisting of rescuer and victim, use of stretchers and various stretcher configurations in confined spaces, moving and evacuations from manholes, victim care, building horizontal span, situation analysis, incident management and various scenarios.

Contact hours	**Prerequisites**
30 hours (5 days)	Confined Space Rescue Operator (CSRO) Minimum age: 18
Qualification valid for	**Accredited by**
3 years	Rescue 3 Europe

Taught by

- Confined Space Rescue Technician Instructor (CSRTI)
- Confined Space Rescue Specialist Instructor (CSRSI)

Assessment

The assessed elements of this course are:

- Foundation knowledge
- Knots and anchors
- Ascending and descending
- Mechanical advantage
- Use of SAR for rescue
- Offsets

Confined Space Rescue Technician (CSRT) skill sheet contents

Theory
1. Rescue 3 philosophy
2. Confined space hazards and risk assessment
3. Use of detector tubes
4. Supplied air systems
5. Hardwire communication systems
6. Rescue systems analysis
7. Safe systems of work and permits to work
Practical
8. Use of PID meters
9. On-scene safety briefing and site control
10. Knots
11. Anchor systems
12. Belay systems and operations
13. Use of different types of fall arrest equipment
14. Loads and forces
15. Tensioning systems and mechanical advantage
16. Personal ascending and descending
17. Litter attending - low angle
18. Litter attending - high angle
19. Vertical/horizontal litter transitions
20. Horizontal confined space entry and rescue
21. Vertical confined space entry and rescue
22. Rope-based raising and lowering systems over an edge with artificial high directional
23. Individual pick-off rescues
24. Team-based pick-off and team-based casualty evacuations
25. Use of SAR for rescue
26. Confined space rescue harnesses and stretchers
27. Mirrored team-based raising and lowering systems
28. Offsets - deflection
29. Offsets - guiding line
30. Offsets - tracking line
31. Scenarios

Confined Space Rescue Technician (CSRT) learning outcomes and key teaching points

	Skill sheet element		Learning outcome	Key teaching points
1	Rescue 3 philosophy	1.1	Recall the steps required in order to develop judgment.	Training, practice, experience, judgment
		1.2	Explain the order of priorities at a confined space rescue scene	Self > team > victim
2	Confined space hazards and risk assessment	2.1	Perform a generic or site-specific risk assessment	• Identify the hazards • Decide who might be harmed and how • Evaluate the risks and decide on precaution • Record your findings and implement them • Review your assessment and update if necessary
3	Use of detector tubes	3.1	Use glass tubes to monitor the air in a confined space	• Additional PPE • Expiration date • Humidity • Sampling time • Colour change • Cross contamination
4	Supplied air systems	4.1	Identify when supplied air systems/ airline systems are used, their hazards and control measures	• Longer air supply • Hose management • Hose flushing • Use in very constricted areas/manholes • Escape bottles and escape signal
		4.2	Use supplied air systems/ airline systems in a confined space	Practise in various setups
5	Hardwire communication systems	5.1	Use hardwire communication in confined space operations	• Speak slowly • Short messages • Repeat message • Confirmation
6	Rescue systems analysis	6.1	Recall the direction and amount of forces playing a role in a rescue system	• Direction of forces • Force multipliers • Shock-loading
		6.2	Perform a systems analysis	Calculate static system safety factors of a given system

	Skill sheet element		Learning outcome	Key teaching points
7	Safe systems of work and permits to work	7.1	Recall correct use of a safe system of work	Job risk analysis Check procedures Work permits and control measures Responsible person
		7.2	Recall correct use of permits-to-work	Signed work permits according to individual responsibilities
8	Use of PID meters	8.1	Use a PID meter to monitor the air in a confined space	• Ionization potential • Lamp voltage • PID is non-selective • Correction factors and calibration gases • See above

	Skill sheet element		Learning outcome	Key teaching points
9	On-scene safety briefing and site control	9.1	Operate as a safety officer	Oversee the safety of the rigging phase while not being directly involved. Calling 'stop!' at a relevant juncture during safety critical phases. Attention to detail at a macro scale. Rope alignment. Point of edge transition. Technique selected and, at a micro scale, carabiner alignment Gates done up Snugness of safety line
		9.2	Provide information for use in an incident management system	Rescue planning
		9.3	Operate as a technical rescue team leader in a team of 4 or more people	Considerations for size of team
		9.4	For a given task, appoint different roles (including safety officer) for the personnel and casualty present	Consider multiple roles per person in small teams
		9.5	For a given task, place appropriate markings for rigging the main line, safety line, artificial high directional, change of direction	Alignment of various markings
		9.6	Perform an on-site safety brief based on risk assessments	Use of GSMEAC/SMEACQ
		9.7	Identify basic rescue options and their limitations	• Use of GSMEAC/SMEACQ • KISS • Priorities • LAST
		9.8	List rescue options	Use of GSMEAC/SMEACQ
		9.9	Select and brief an appropriate plan of action for a given incident	Use of GSMEAC/SMEACQ

	Skill sheet element		Learning outcome	Key teaching points
10	Knots	10.1	Identify, tie and check appropriate knots for performing rescues in confined spaces, relative to the remit of someone trained to this level	CSRT: Figure of nine on a bight, figure of ten on a bight, Mickey, single fisherman's knot, double fisherman's knot, Italian hitch (Münter hitch), clove hitch, bowline, bowline with Yosemite tie-off , bowline with double overhand stopper knot, double longtail bowline, longtail interlocking bowlines, square knot. Optional: constrictor knot. Loops as big as necessary and as small as possible, well-dressed knots - neat and tidy, end 10x diameter, awareness of strength reduction
		10.2	Recall factors affecting knot choice for performing rescues in confined spaces	Ability to release under load. Ease of tying. Appropriate for task

	Skill sheet element		Learning outcome	Key teaching points
11	Anchor systems	11.1	Identify use of anchor systems when performing rescues in confined spaces, relative to the remit of someone trained to this level	112kN = 1 person load 20kN is 2 person load >30kN is unquestionably sound/bombproof In line with direction of load
		11.2	Identify, install and check appropriate anchor attachments for performing rescues in confined spaces, relative to the remit of someone trained to this level	CSRT: Wrap 2 pull 1, wrap 4 pull 3, pretensioned back ties, pretensioned front ties. Sharp edges, angles of slings, carabiner loading, equipment hazards, construction strength and quality, position of loading
		11.3	Select an appropriate single anchor point	• Relative to the load • Unquestionably sound anchor (aka bombproof anchor)
		11.4	Identify, install and check load-sharing anchor systems, relative to the remit of someone trained to this level	CSRT: Load-sharing Y anchor with a Mickey, load-sharing V anchor with sling and 3 anchor points, load-sharing V anchor with ropes and 3 anchor points, interlocking V anchor, floating anchor systems. Difference between load sharing and load distributing anchors, shifting of loads, backup, prevention of shock load, centring attachment point between anchors
		11.5	Identify, install and check load-distributing anchor systems, relative to the remit of someone trained to this level	• Load-distributing V anchor with sling and 2 anchor points • Load-distributing V anchor with ropes and 2 anchor points • Load-distributing V anchor with sling and 3 anchor points • Load-distributing V anchor with ropes and 3 anchor points
		11.6	Identify agency use or non-use of artificial anchor points	• Agency policy • Agency standard operating procedures
		11.7	Identify, install and check temporary artificial anchor points	• Artificial door traverse anchors. • Artificial beam clamp anchors

	Skill sheet element		Learning outcome	Key teaching points
12	Belay systems and operations	12.1	Identify appropriate belay systems for a WCE	12kN = 1 person load 20kN is 2 person load >30kN is unquestionably sound/bombproof In line with direction of load
		12.2	Operate belay systems	12kN = 1 person load 20kN is 2 person load >30kN is unquestionably sound/bombproof In line with direction of load
13	Use of different types of fall arrest equipment	13.1	Identify when combined work positioning and fall arrest equipment is used, its merits and limitations	Work positioning utilized during resting on long ascent
		13.2	Demonstrate resting during an ascent with a combined work positioning and fall arrest configuration	Load is taken by work positioning configuration, not fall arrest
14	Loads and forces	14.1	Calculate the effect of a change of direction on system force	• Vector analysis • Relate to system safety factors
		14.2	Recall appropriate system safety factors	• 2kN static rescue load • 20kN is 10 x factor. This accommodates 15kN WCE
		14.3	Recall the use of leverage in confined space rescue systems, its merits and limitations	Pulleys as levers Considerations for class of lever using pulley systems
		14.4	Calculate the ideal mechanical advantage of a system	T-method
		14.5	Calculate the theoretical mechanical advantage of a system	Consideration of pulley efficiency, both bushed and roller bearing

	Skill sheet element		Learning outcome	Key teaching points
15	Tensioning systems and mechanical advantage	15.1	Identify the need for mechanical advantage systems within confined space rescue	Adding extra power without extra people
		15.2	Identify the hazards and control measures associated with mechanical advantage systems	• Over-tightening the system when it is fixed • Shock-loading with external systems
		15.3	Identify the different categories of mechanical advantage systems, their merits and limitations	• Internal and external systems • Simple, compound and complex systems
		15.4	Build and check a variety of mechanical advantage systems, relative to the remit of someone trained to this level	CSRT: 6:1 compound, 9:1 compound, 12:1 compound, 15:1 compound, 5:1 complex (2x), 7:1 complex, 11:1 complex, 15:1 complex
16	Personal ascending and descending	16.1	Demonstrate personal ascending in a variety of twin line systems	CSRT: With auto-locking descender, handled ascender and auto-locking backup device
		16.2	Demonstrate personal descending in a variety of twin line systems	With auto-locking descender device and auto-locking backup device
17	Litter management - low angle	17.1	Participate in a variety of low angle litter management techniques	Eg staircase, road embankment, river bank. Variety of team configurations
18	Litter attending - high angle	18.1	Identify hazards and control measures associated with high angle litter attending	• Edge transition. • Control measures: » training » PPE » safety line management » edge protection » communication
		18.2	Participate in a variety of high angle litter attending techniques, relative to the remit of someone trained to this level	• Team-based high angle litter attending, including rescuer, medic, rigger etc. • Desirable for as many people as possible to act as rescuer
19	Vertical/horizontal litter transitions	19.1	Select, install and check various possibilities to differ between a horizontal/ vertical litter/ extraction harness while under load	• Raise head end • Raise foot end • Use of jiggers • Short bridles for maximum space under tripods • etc

	Skill sheet element		Learning outcome	Key teaching points
20	Horizontal confined space entry and rescue	20.1	Select, install and check appropriate ways of entering a horizontal confined space	Use of attached rope Line of sight Backup when not attached to a safety system
21	Vertical confined space entry and rescue	21.1	Select, install and check appropriate ways of entering vertical confined space	Use of attached rope/cable Line of sight Backup when not attached to a safety system
22	Rope-based raising and lowering systems over an edge with artificial high directional	22.1	Identify when artificial high directionals would be used, their merits and limitations	• Abrupt edge transitions, especially with stretchers. • Merits: » Negates manual handling hazards » Eases transition of stretcher » Reduces fall factor. • Limitations: » Remote working » Space
		22.2	Install and check conventional and articulating artificial high directionals	• Resultant vector, guying, hobbling, consequences of collapse. • Discussion about raising the safety line into the apex of the high directional vs. running it on the floor
		22.3	Install and check a lazy leg A-frame	• Resultant vector, guying, hobbling, consequences of collapse. • Discussion about raising the safety line into the apex of the high directional vs. running it on the floor
		22.4	Demonstrate an edge transition with the use of a high directional	With a stretcher
23	Individual pick-off rescues	23.1	Perform an individual pick off rescue	• Taking over the load with jiggers • External systems • Bodyweight • Suitable backup

	Skill sheet element		Learning outcome	Key teaching points
24	Team-based pick-off and team-based casualty evacuations	24.1	Identify when a team-based pick-off would be performed, its merits and limitations	When a casualty is in extremis
		24.2	Participate in a team-based pick-off	• Twin line system • Twin line system with pre-installed jigger • Twin line raising
25	Use of SAR for rescue	25.1	Identify when supplied air systems/ airline systems are used and their advantages during longer rescue operations, their hazards and control measures	• Longer air supply • Hose management • Hose flushing • Use in very constricted areas/manholes • Escape bottles and escape signal
		25.2	Use supplied air systems/ airline systems in a confined space during a given confined space rescue scenario	Practice in various setups
26	Confined space rescue harnesses and stretchers	26.1	Identify various confined space rescue harnesses, extraction devices and stretchers	Wristlets Vertical harness/stretcher bridles Specpak LSP Halfback Cocoon type stretchers vs. basket model stretchers Narrow openings Foldable packs Drawing possibilities with/ without back protection

	Skill sheet element		Learning outcome	Key teaching points
27	Mirrored team-based raising and lowering systems	27.1	Identify when vertically oriented stretcher abrupt edge transitions without a high directional would be performed, their merits and limitations	Cage ladders, fences, no appropriate high directional available, lack of space due to piping, equipment and machinery. Differences in configurations for horizontal, vertical, with/without attendant, and configuration when over the edge
		27.2	Install and check systems for performing vertically oriented stretcher abrupt edge transitions without high directionals	Safety check etc. Speed etc
		27.3	Perform a vertically oriented stretcher abrupt edge transition without a high directional	Pike and pivot, lengthening the handholds of the stretcher to lower a stretcher over the edge
		27.4	Identify the advantages of a dual capable two tension rope system (DCTTRS) over 'designated main, designated belay'	Linked to BCCTR research. Based upon risk, hand tight safety during edge transition but consideration of secondary edges, plumb line and other hazards when considering switching to mirrored system. Merits: pre-loaded safety line, reducing elongation in the event of a mainline failure. During raising, MA on both lines enhances flexibility and efficiency. Limitations: judgement-based, slightly more complex to rig, extra command and control considerations
		27.5	Rig, check and use a dual capable two tension rope system (DCTTRS)	Perform a changeover from hand-tight to load-sharing on the safety line

	Skill sheet element		Learning outcome	Key teaching points
28	Offsets - deflection	28.1	Identify when deflected off sets would be used, their merits and limitations	To pull the package away from the wall to lower/raise a package between objects. If the impact causes a concern when the deflected off set line fails the off set should be a two rope system. Depending on the off set angle the forces will increase up to 1.5 times the static force of the load
		28.2	Install, check and use a deflected off set without an artificial high directional	Normal high angle rope system clipped on a normal high angle normal rope system. Deviation point is normally in mid air
29	Offsets - guiding line	29.1	Identify when guiding line off sets would be used, their merits and limitations	Guiding line - eg loose scree, managed by appropriate clearance of the package above the hazard with minimal consequence of guiding line failure
		29.2	Install, check and use guiding line off sets	Appropriate selection and application of technique, force multiplication, redundancy
30	Offsets- tracking line	30.1	Identify when tracking line off sets would be used, their merits and limitations	Track line - eg rescue near loose materials, change of direction anchor experiences force multiplier (safety factor consideration), easy to rig, adjust the landing site of package
31	Scenarios	31.1	Complete confined space rescue scenarios, relative to the remit of someone trained to this level	Perform one or more realistic scenarios which reflect the content of the course in a more or less realistic situation. Although the chosen solution might not always be perfect, the goal is to bring it all together. The instructor can do a time out for feedback or stop the scenario for safety reasons but will not be teaching all sessions again

Confined Space Rescue Specialist (CSRS)

Course overview and target audience

The Confined Space Rescue Specialist (CSRS) course is for confined space rescue team members who already have completed a comprehensive basic training and want to continue to specialise. This training continues where the CSRT course finishes.

Contact hours	**Prerequisites**
30 hours (5 day)	Confined Space Rescue Operator (CSRO) Confined Space Rescue Technician (CSRT) Minimum age: 18
Qualification valid for	**Accredited by**
3 years	Rescue 3 Europe

Taught by

- Confined Space Rescue Specialist Instructor (CSRSI)

Assessment

The assessed elements of this course are:

- Foundation knowledge
- Knots and anchors
- Ascending and descending
- Tensioning systems and mechanical advantage
- Use of SCBA for rescue
- Offsets
- Team briefing

Confined Space Rescue Specialist (CSRS) skill sheet contents

Practical
1. On-scene safety briefing and site control
2. Knots
3. Anchor systems
4. Tensioning systems and mechanical advantage
5. Knot passing
6. Personal ascending and descending
7. Climbing over a 90 degree edge
8. Litter management - low angle
9. Litter attending - high angle
10. Vertical/horizontal litter transitions
11. Rope-based raising and lowering systems
12. Mirrored team-based raising and lowering systems
13. Offsets - deflection
14. Offsets - skateblock
15. Offsets - two rope
16. Highline rope system - Kootenay highline
17. Night/poor visibility operations
18. Scenarios

Confined Space Rescue Specialist (CSRS) learning outcomes and key teaching points

	Skill sheet element		Learning outcome	Key teaching points
1	On-scene safety briefing and site control	1.1	Operate as a technical rescue team leader in a team of 6 or more people	Considerations for size of team
		1.2	For a given task, appoint different roles (including safety officer) for the personnel and casualty present	Consider multiple roles per person in small teams
		1.3	For a given task, place appropriate markings for rigging the main line, safety line, artificial high directional, change of direction	Alignment of various markings
		1.4	Perform an on-site safety brief based on risk assessments	Use of GSMEAC/SMEACQ
		1.5	Identify basic rescue options and their limitations	• Use of GSMEAC/SMEACQ • KISS • Priorities • LAST
		1.6	List rescue options	Use of GSMEAC/SMEACQ
		1.7	Select and brief an appropriate plan of action for a given incident	Use of GSMEAC/SMEACQ
2	Knots	2.1	Identify, tie and check appropriate knots for performing rescues in confined spaces, relative to the remit of someone trained to this level	CSRS: Single sheet bend, double sheet bend, double sheet bend with Yosemite tie-off . Loops as big as necessary and as small as possible, well-dressed knots - neat and tidy, end 10x diameter, awareness of strength reduction

	Skill sheet element		Learning outcome	Key teaching points
3	Anchor systems	3.1	Identify, install and check passive and active camming devices	• Nuts • Cams • Placing • Testing and loading • Urban environment and natural environment considerations • As required by agency
		3.2	Install and check mechanical bolts by drilling	• Urban environment • Local regulations regarding use/non-use in wilderness settings • Expansion bolts, difference with resin bolts
4	Tensioning systems and mechanical advantage	4.1	Build and check a variety of mechanical advantage systems, relative to the remit of someone trained to this level	CSRS: 6:1 compound, 9:1 compound, 12:1 compound, 15:1 compound, 5:1 complex (2x), 7:1 complex, 11:1 complex, 15:1 complex
5	Knot passing	5.1	Identify situations when knot passing might be needed	• Lengthening the ropes • Damaged ropes
		5.2	Perform a knot pass through the system	• Taking over forces with an external system • Mirror change of directions
6	Personal ascending and descending	6.1	Demonstrate personal ascending in a variety of twin line systems	CSRS: With chest and handled ascender and auto-locking backup device
		6.2	Demonstrate personal descending in a variety of twin line systems	With auto-locking descender device and auto-locking backup device
7	Climbing over a 90 degree edge	7.1	Identify when a 90 degree edge would be encountered, its hazards and control measures	Tops of buildings, structures. Sharp edge - rope protection
		7.2	Climb over a 90 degree edge	Perform a 90 degree edge transition as an individual
		7.3	Lowering over a 90 degree edge	Perform a 90 degree edge transition as an individual
8	Litter management - low angle	8.1	Participate in a variety of low angle litter management techniques	Eg staircase, road embankment, river bank. Variety of team configurations

	Skill sheet element		Learning outcome	Key teaching points
9	Litter attending - high angle	9.1	Participate in a variety of high angle litter attending techniques, relative to the remit of someone trained to this level	• Team-based high angle litter attending, including rescuer, medic, rigger etc. • Desirable for as many people as possible to act as rescuer
10	Vertical/horizontal litter transitions	10.1	Select, install and check various possibilities to differ between a horizontal/ vertical litter/ extraction harness while under load	• Raise head end • Raise foot end • Use of jiggers • Short bridles for maximum space under tripods • etc
11	Rope-based raising and lowering systems	11.1	Install and check a sideways A-frame	• Resultant vector, guying, hobbling, consequences of collapse. • Discussion about raising the safety line into the apex of the high directional vs. running it on the floor
		11.2	Demonstrate an edge transition with the use of a high directional	With a stretcher

	Skill sheet element		Learning outcome	Key teaching points
12	Mirrored team-based raising and lowering systems	12.1	Identify when vertically oriented stretcher abrupt edge transitions without a high directional would be performed, their merits and limitations	Cage ladders, fences, no appropriate high directional available, lack of space due to piping, equipment and machinery. Differences in configurations for horizontal, vertical, with/without attendant, and configuration when over the edge
		12.2	Install and check systems for performing vertically oriented stretcher abrupt edge transitions without high directionals	Safety check etc. Speed etc
		12.3	Perform a vertically oriented stretcher abrupt edge transition without a high directional	Pike and pivot, lengthening the handholds of the stretcher to lower a stretcher over the edge.
		12.4	Identify the advantages of a dual capable two tension rope system (DCTTRS) over 'designated main, designated belay'.	Linked to BCCTR research. Based upon risk, hand tight safety during edge transition but consideration of secondary edges, plumb line and other hazards when considering switching to mirrored system. Merits: pre-loaded safety line, reducing elongation in the event of a mainline failure. During raising, MA on both lines enhances flexibility and efficiency. Limitations: judgement-based, slightly more complex to rig, extra command and control considerations
		12.5	Rig, check and use a dual capable two tension rope system (DCTTRS)	Perform a changeover from hand-tight to load-sharing on the safety line
13	Offsets - deflection	13.1	Install, check and use a deflected offset with an artificial high directional	Normal high angle rope system clipped on a normal high angle normal rope system. Deviation point is normally in mid air

	Skill sheet element		Learning outcome	Key teaching points
14	Offsets - skateblock	14.1	Identify when skateblock off sets would be used, their merits and limitations	Skateblock - eg tower rescue, high implication of anchor failure, prevention of impact on tower/clearance from tower
		14.2	Install, check and use skateblock off sets	Appropriate selection and application of technique, force multiplication, redundancy
15	Offsets - two rope	15.1	Identify when two rope off sets would be used, their merits and limitations	Two normal high angle rope systems connected to each other with the end of the lines to transport a package on either system. Keep angles smaller than 120 degrees at the yoke and make sure the yoke consists of equipment which can handle three-way loading. Also make sure each connection is backed up in case of an equipment failure at the yoke
		15.2	Install, check and use a two rope off set	Normal high angle rope system connected to a normal high angle normal rope system with the end of both sets of lines

	Skill sheet element		Learning outcome	Key teaching points
16	Highline rope system - Kootenay highline	16.1	Identify when a Kootenay highline would be used, its merits and limitations	Transportation system from A to B although can be used in a drooping variation. Versions: horizontal (0-10 degrees), diagonal (10-45 degrees), steep (>45 degrees), One line trackline is sufficient, since tagline functions as a backup, although extra tracklines reduce loss of height. Extra top tagline with diagonal and steep highlines. Separate anchors for all lines (>30KN). Taglines are connected to the pulley and not the package. Personnel- and equipment intensive. More complex communications and influence of loads and forces. The use of Kootenay pulleys is preferred due to strength and multiple attachment points. Use of a single transportation pulley versus a double transportation pulley depends on external influences like available height, equipment and the wind which potentially causes the package to spin around on bigger heights. Tagline attachment can be with or without shock absorbing prussiks (which reduces the shock load with an average 0,5kN, but increases the drop distance in case of a trackline failure). Tension rules: without load 2:1 with pulley systems and 3:1 with friction device in the pulley system. When load is not in midspan go up to 6:1/9:1 and when in midspan go up to 12:1/15:1
		16.2	Install, check and use a Kootenay highline	Communications, alignment, line transfer methods, working in multiple teams, logistics, space at the edge, use of high directionals behind the edge

	Skill sheet element		Learning outcome	Key teaching points
17	Night/poor visibility operations	17.1	Identify hazards associated with night/poor visibility operations, and apply suitable control measures	Darkness, higher risk of injury to lack of sight. Communications with visual signals is more complicated. Consider smart use of lighting without blinding people and use chemical light sticks to mark and signal
		17.2	Perform a risk assessment and operate at night/in poor visibility	Job risk analysis, preventive measures. Standard operating procedures, use of colour coding with lights/chemical sticks. Use red lighting to maintain nightview
18	Scenarios	18.1	Complete confined space rescue scenarios, relative to the remit of someone trained to this level	Perform one or more realistic scenarios which reflect the content of the course in a more or less realistic situation. Although the chosen solution might not always be perfect, the goal is to bring it all together. The instructor can do a time out for feedback or stop the scenario for safety reasons but will not be teaching all sessions again

Confined Space Operations for HART (CSOHART)

Course overview and target audience

The CSOHART course is designed for Hazardous Area Response Teams (HART) undertaking operations in confined spaces. It meets the requirements of the UK's National Ambulance Resilience Unit (NARU) TIS NH 06: Confined Space Operations.

Contact hours	**Prerequisites**
21.5 hours (3.5 days)	None
Qualification valid for	**Accredited by**
3 years	Rescue 3 Europe

Taught by

- Confined Space Operations for HART Instructor (CSOHARTI)

Assessment

The assessed elements of this course are:

- Foundation knowledge
- Use of multi-gas diffuse and pump meters
- Tripod setup and winch operations
- Casualty packaging and stretcher rigging
- Entry to confined space wearing EDBA

Confined Space Operations for HART (CSOHART) skill sheet contents

Theory
1. Rescue 3 introduction and philosophy
2. Confined space definitions, hazards and categories
3. Legislation and standards
4. Personal safety
5. Safe systems of work for confined space entry
6. Isolation - lock-out, tag-out, try-out
7. Introduction to air monitoring
8. Rescue plans, incident size-up and incident management
9. PPE and team equipment
10. Entry procedures
11. Communications and verbal commands
12. Loads and forces
13. Medical considerations
14. Considerations for safe operations in trenches
15. Considerations for use of SAR (airlines)
16. Clinical considerations for confined space operations
17. Confined space ventilation considerations
Practical
18. Respiratory protective equipment (RPE) - escape sets, Savox and EDBA
19. Use of multi gas diffuse and pump meters
20. Knots and terminations
21. Anchor systems
22. Dynamic risk assessment and safety checks
23. On-scene safety briefing and site control
24. Standard tripod and winch operations
25. Work restraint
26. Vertical confined space entry
27. Emergency procedures
28. Entry supervision
29. Raising/lowering systems, and mechanical advantage
30. Confined space rescue harnesses and stretchers
31. Casualty care and packing
32. Rescue of casualty from a low/medium risk confined space
33. EDBA periodic, pre use and post use set checks and care
34. EDBA entry control
35. Entry to confined space wearing EDBA
36. Rescue from a high risk confined space wearing EDBA

Confined Space Operations for HART (CSOHART) learning outcomes and key teaching points

	Skill sheet element		Learning outcome	Key teaching points
1	Rescue 3 introduction and philosophy	1.1	Be aware of Rescue 3 as the accrediting body for this course	Rescue 3 International, Rescue 3 Europe, Rescue 3 training providers
		1.2	Recognise the different training courses within the Rescue 3 scheme	Rescue 3 confined space courses (including low, low and medium, and high risk). Other Rescue 3 courses eg rope courses
		1.3	Recall the remit and role of an individual trained to Rescue 3 CSOHART	The CSOHART course is designed for Hazardous Area Response Teams (HART) undertaking operations in confined spaces. It meets the requirement of the UK's National Ambulance Resilience Unit (NARU) TIS NH 06: Confined Space Operations
		1.4	Recall the steps required in order to develop judgement	Training. Practice. Experience. Judgement
		1.5	Explain the order of priorities when undertaking rescues from confined spaces	Self > team > victim
2	Confined space definitions, hazards and categories	2.1	Recall the definition of a confined space	Common characteristics of a confined space. Definitions such as UK confined space regulations definition, NFPA definition
		2.2	Identify common hazards associated with confined spaces, and how confined spaces can be categorised according to risk	Risk of fire, explosion. Atmospheric hazards - low/ high oxygen, toxic gases. Free-flowing solids, water and fluids etc. Fall from height/ into depth. Classification as low, medium or high risk confined spaces

	Skill sheet element		Learning outcome	Key teaching points
3	Legislation and standards	3.1	Be aware of applicable legislation and its requirements for working confined spaces, in the jurisdiction where training and/or work is taking place	National regulations, such as UK Confined Space Regulations 1997, Ireland The Safety, Health and Welfare at Work (Confined Spaces) Regulations 2001, Netherlands Arbowet and Arbobesluit
		3.2	Be aware of the existence of sector- specific national and international standards for working in confined spaces	Eg NFPA 350 (2019), UK Water Industry
		3.3	Be aware that the Rescue 3 training scheme aligns with national and international standards and legislation	Course content written to reflect international best practice
4	Personal safety	4.1	Be aware of personal safety considerations when working near or in confined spaces at all times	Safe person concept. Do not enter confined space if work can be done without entry. Risks of confined space specific hazards, and other generic workplace hazards, eg slips, trips and falls. Electricity, other workers and machinery. Number of confined space fatalities who were would- be rescuers

	Skill sheet element		Learning outcome	Key teaching points
5	Safe systems of work for confined space entry	5.1	Recall the common components of a safe system of work	Hazard assessment, risk assessment, method statement, rescue plan, dynamic risk assessment, site briefing, review
		5.2	Identify the elements of an effective generic and site-specific risk assessment	Identify the hazards, decide who might be harmed and how, evaluate the risks and decide on precaution, record your findings and implement them, review your assessment and update if necessary
		5.3	Identify hazards and control measures associated with confined spaces	Hazards include: risk of fire/ explosion. Atmospheric hazards - low/high oxygen, toxic gases. Free flowing solids, water and fluids etc. Fall from height/into depth. Control measures include: air monitoring, safe access/ egress systems, safe work at height procedures, appropriate training, PPE
		5.4	Understand the benefits of a method statement, its use, and common elements contained within it	Method statement describes in a logical sequence exactly how a job is to be carried out in a safe manner and without risks to health. It includes all the risks identified in the risk assessment and the measures needed to control those risks
		5.5	Understand the structure, use and potential benefits of a permit to work system	Permit to work is part of a safe system of work, and not a replacement for it. Common information needed on a permit to work. Role of person issuing and accepting the permit to work. Permit to work duration and closure
		5.6	Understand that a rescue plan is a vital part of a safe system of work	Rescue plan needs to be suitable for potential events. Rescue plan must be matched by capability to perform the rescue. Rescue plan should not be reliant on calling emergency services

	Skill sheet element		Learning outcome	Key teaching points
6	Isolation - lock-out, tag-out, try-out	6.1	Recall appropriate use of lock-out, tag-out, try-out procedures	Lock-out, tag-out, try-out (LOTOTO) procedures and installation. Specific plan per company. Why and how to do. Type of equipment
7	Introduction to air monitoring	7.1	Recall the constituent gas levels in a normal atmosphere	Oxygen 20.9%. Nitrogen 78%. Argon 0.9%. Other gases in very small quantities including carbon dioxide
		7.2	Understand risk and possible causations of low and high oxygen levels	Low O2 can cause asphyxiation. High O2 can increase risk of fire/ explosion
		7.3	Understand the risks associated with flammable and explosive atmospheres	Flammable range. Lower explosive limit. Upper explosive limit. Tetrahedron of combustion
		7.4	Recall how potential flammable and explosive atmospheres can be measured, including the use of correction factors	LEL sensor calibrated to known gas. Reading is based on test gas used and needs to be corrected to actual gas if known. Reasons for alarms setting normally set to 10%/20% of LEL
		7.5	Have an awareness of both short- and long- term hazards associated with the presence of toxic gases and vapours, how these are measured and exposure controlled	Toxic gases generally measured in ppm. Conversion of ppm to % volume. Workplace exposure limits set by legislation (eg EH40). STEL and LTEL are both time- weighted averages (TWA)
		7.6	Have an understanding of high, low, STEL and WEL alarm levels on a gas meter	Workplace exposure limits set by legislation (eg EH40). STEL and LTEL are both time-weighted averages (TWA)
		7.7	Have an understanding of vapour density and how it affects air monitoring practice in confined spaces	Air = 1. <1 gas will rise. >1 gas will sink. Need to measure at multiple levels

	Skill sheet element		Learning outcome	Key teaching points
8	Rescue plans, incident size-up and incident management	8.1	Explain the importance of rescue plans	Need to provide a suitable rescue solution. Requirements for rescue are determined by confined space risk and complexity, and work being undertaken. Co-worker rescue/standby rescue team considerations
		8.2	Explain the phases of a successful rescue	Locate. Access. Stabilise. Transport
		8.3	Identify possible rescue options	Non-entry and entry required. Casualty raise in harness or stretcher. Best locations for casualty packaging and stretcher orientation
		8.4	Select and implement an appropriate plan of action for a given incident	Casualty care considerations. Team roles and actions

	Skill sheet element		Learning outcome	Key teaching points
9	PPE and team equipment	9.1	Identify personal protective equipment (PPE) for working in confined spaces	Harness (fall arrest/work positioning), helmet, work restraint lanyards and connectors, coveralls, gloves, eye and ear protection. Harness should be worn by all confined space entrants, including horizontal confined spaces
		9.2	Have an awareness of applicable national and international standards for PPE	EN standards, applicable national standards
		9.3	Use appropriate PPE for working in confined spaces, perform pre-use checks, donning and buddy checks	Pre-use checks vs periodic examinations required by legislation. Correct equipment, compatible, condition, age, records and traceability, fastened correctly, PPE fit, anchors, ground clearance, site
		9.4	Identify team equipment used for working in confined spaces	Gas meters, tripods, ladders, winches/pulley systems, fall arrest blocks, communication equipment, ventilation equipment, tools for work within confined space
		9.5	Recall pre-use and post-use care and inspection procedures for team equipment	Pre-use function checks. Post-use checks, cleaning, storage and care. Periodic equipment inspections
10	Entry procedures	10.1	Have a working knowledge of the various team roles (and their responsibilities) to undertake a confined space entry into a low or medium risk confined space	Entry supervisor, entry assistants, entrant(s) (including intermediate entrant), air monitoring person

	Skill sheet element		Learning outcome	Key teaching points
11	Communications and verbal commands	11.1	Use verbal commands in confined space operations	Speak slowly. Short messages. Repeat message. Confirmation
		11.2	Identify correct use of mobile radios in confined space operations	Speak slowly. Short messages. Repeat message. Confirmation
		11.3	Use rope pulling signals in confined space operations	1= stop/ok 2 = up 3= down Repeated signals = emergency
		11.4	Compare merits and limitations of communication methods in confined space operations	Radio interference Line of sight Darkness ATEX considerations
12	Loads and forces	12.1	Differentiate between mass and force	Force = mass x acceleration
		12.2	Identify SI base units and derived units used in confined space rescue	Metre (length), second (time), kilogram (mass), Newton (force), metre per second per second (acceleration)
		12.3	Describe the differences between static and dynamic forces	Static = non-moving, eg being held in space. Dynamic = moving, eg in an uncontrolled event
		12.4	Recall the maximum arrest force applicable by legislation	Eg 6kN within the European Union and 8kN within North America
		12.5	Describe the potential consequences of a rescue load becoming stuck during a raise	Once load is stuck, we are tensioning the rope/wire and additional input on the haul can cause failure
13	Medical considerations	13.1	Identify signs/symptoms and treatment for common medical issues found in confined spaces	Electrocution, amputation, overheating, hypothermia, bleeding, bumps and bruises, spinal injuries, intoxication. DR CABC - danger, response, catastrophic haemorrhage, airway, breathing, circulation
		13.2	Identify individuals at risk for common medical issues found in confined spaces and control measures to minimise these	Individuals at risk: workers, entrants, casualty, rescuers, bystanders. Control measures: safe systems of work and rescue, PPE, training, site zoning and exclusions

	Skill sheet element		Learning outcome	Key teaching points
14	Considerations for safe operations in trenches	14.1	Define a trench	Narrow excavation. Deeper than it is wide. By definition, a confined space
		14.2	Explain the legislation applicable when operating in a trench	Local legislation applicable to the country you're working in. Eg, The Construction (Design and Management) 2015, in the UK
		14.3	Describe the common hazards associated with trench operations	Confined space hazards. Risk of collapse of excavation. Flooding of trench due to weather conditions
		14.4	Describe control measures that can be implemented to deal with common hazards associated with trench operations	Shuttering, boarding, propping, of excavation to prevent collapse. Use of ground pads. Water pumps. Ventilation. Confined space training and PPE
		14.5	Explain how Partner Agency control measures may affect patient care in a trench	USAR teams control measures impact space for clinical care and extraction
		14.6	Explain the different causes of trench collapse	Soil type. Water table. Poor construction
		14.7	Explain the different types of trench collapse	Layered soil failure. Soft zone failure. Sloughing/air drying. Soft pockets. Wedge failure. Rotational failure
		14.8	Explain the term "specific gravity" and its relation	Specific gravity is the density of an object divided by the density of water
		14.9	Label the key features of a trench using common terminology	Walls, lip, bedding (material placed around eg a pipe prior to backfilling), bottom (base, floor), spoil pile, toe (leading edge of spoil pile), surcharge load (any weight on top of the surface of the soil which would add extra stress to the walls of the trench)
		14.10	Identify the zones to be applied to trench operations	Exclusion zone, safe zone, control zone, operational zone. Egress point(s)
		14.11	Demonstrate a safe approach to a (simulated) trench	Use of ground pads and bridging

	Skill sheet element		Learning outcome	Key teaching points
	Considerations for safe operations in trenches *(Continued)*	14.12	Demonstrate safe operation on an appropriate system in or around a (simulated) trench	Use of control measures to prevent collapse, to access casualty
		14.13	Discuss safe care of a patient in a trench	Appropriate control measures to prevent collapse. Safe working in confined space. Access and egress points. Protection from elements (weather)
		14.14	Discuss safe packaging and extrication of a patient in a trench	Available equipment eg stretchers. Rope system/ ladder/other. What medical care is necessary pre-extraction? Access to casualty during extraction. Extraction point at site of incident or other egress point?
15	Consideration for use of SAR (airlines)	15.1	Identify when supplied air systems/airline systems are used, their hazards and control measures	If a longer air supply is needed than BA. Need for hose management and hose flushing. Can be used in very restricted areas/manholes. Need for escape bottles and escape signal in case of failure of main system
16	Clinical considerations for confined space operations	16.1	Explain the hazards associated with patient care in a confined space, and methods to mitigate these	Restricted space. Hazardous gases. Need for supplied air. Ventilation. In-situ clinical care before extraction, vs extraction before clinical care, based upon patient needs and present hazards
		16.2	Discuss clinical considerations when packaging and extricating patients from confined spaces	Type of injury. Conscious or unconscious. Type of stretcher available/ room available. Vertical or horizontal extraction, and appropriate packaging. Ability to monitor and administer clinical care to patient whilst packaged for extraction in a confined space

	Skill sheet element		Learning outcome	Key teaching points
17	Confined space ventilation considerations	17.1	Recall when and why a confined space would be ventilated	Before entry to achieve normal atmosphere. After air monitoring finds a non-standard atmosphere. To remove dust etc created by work in the confined space. Confined space ventilation undertaken by partner agencies of HART operatives
		17.2	Recall the different types of ventilation systems and their advantages/ disadvantages	Natural ventilation, forced air (overpressure), forced extraction (underpressure)
18	Respiratory protective equipment (RPE) - escape sets, Savox and EDBA	18.1	Identify when personal escape sets and self-contained breathing apparatus (SCBA) are used, types available and their benefits and limitations	Potential risk of atmospheric hazard. Time limitations. Of both escape sets and SCBA. Differences between demand valve masks and constant flow hoods on escape sets. Escape sets to provide air to allow entrants to escape from confined space, but may be taken in by rescuers to provide air for casualties. Size limitations of wearing SCBA. No reserve on SCBA - whistle. Basic duration calculations for SCBA use. Medical considerations and screening for SCBA users
		18.2	Perform a pre-use check of a personal escape set	Check gauge. Check service date. Check trigger clip is connected
		18.3	Use a personal escape set in a confined space	Perform an emergency exercise to don escape set and exit confined space

	Skill sheet element		Learning outcome	Key teaching points
19	Use of multi gas diffuse and pump meters	19.1	Turn on multi gas diffuse and pump meters and perform a functional bump test	Fresh air startup. Check calibration dates. Use of appropriate gas for bump test to ensure all sensors alarm. Clear reading after bump start has been conducted
		19.2	Recall common meter functions that can be set up as required	Reading latching. Confidence beep. Alarm options (audio/ visual/vibrate)
		19.3	Use multi gas diffuse and pump meters to monitor the air in a confined space	Measuring at minimum three levels: top, middle, bottom, or every 5 metres. Minimum time of measuring per level. Actions if meter alarms. Use of a small rope for lowering. Considerations and benefits for using a pump meter and sampling hose
		19.4	Use a multi gas diffuse meter as a personal meter when entering a confined space	Consideration where to attach the meter. Take meter readings and communicate these to entry supervisor
20	Knots and terminations	20.1	Identify, tie and check appropriate knots for confined space entry and rescue, or connect to pre-sewn terminations	Required: use of sewn terminations. Additional content depending on agency use: overhand on a bight, figure of 8 on a bight, rethreaded figure of 8, clove hitch, reef knot, alpine butterfly, barrel knot
		20.2	Recall factors affecting knot choice for working in confined space	Ability to release under load. Ease of tying. Appropriate for task

	Skill sheet element		Learning outcome	Key teaching points
21	Anchor systems	21.1	Identify use of anchor systems when undertaking confined space entry/exit	Why we need anchors - work restraint, work positioning and fall arrest. Types of anchors - structural rated/tested, portable (tripod), improvised (railings, vehicles etc)
		21.2	Identify, install and check appropriate single point anchor attachments for working in confined spaces	Direct clip to rated anchor point with connector. Basket hitch with sling. Basket hitch with steel cable. Considerations: sharp edges, angles of slings, karabiner loading and alignment
22	Dynamic risk assessment and safety checks	22.1	Identify the elements of an effective dynamic risk assessment (aka last minute risk analysis)	Is written risk assessment and method statement relevant to conditions/site/ personnel? Are air monitor readings as expected? Weather considerations etc
		22.2	Perform a pre-entry dynamic risk assessment	Is written risk assessment and method statement relevant to conditions/site/ personnel? Are air monitor readings as expected? Weather considerations etc
		22.3	Identify the components of a safety check	Correct equipment, compatible, condition, age, records and traceability, fastened correctly, PPE fit, anchors, site
		22.4	Perform a pre-entry safety check	Correct equipment, compatible, condition, age, records and traceability, fastened correctly, PPE fit, suitable anchors. Required pre-use checks on equipment, eg retrievable fall arrest block

	Skill sheet element		Learning outcome	Key teaching points
23	On-scene safety briefing and site control	23.1	Based on hazard recognition, apply appropriate control measures to protect personnel and bystanders	Site zoning and exclusion. Team roles. Fall restraint, fall arrest. Safe access and entry systems
		23.2	Perform/observe a pre-entry briefing	Information on site/confined space. Task to be performed and job roles. Pre-entry gas monitoring readings. Confirm access/egress equipment has been set up and checked. Emergency procedures and rescue plan. Confirm all written documentation in place as required. Dynamic risk assessment/last minute risk analysis. Questions/team to confirm understanding
24	Standard tripod and winch operations	24.1	Recall the appropriate direction of loading a conventional tripod	Loading in the centre of the tripod. Awareness of resultant forces - when anchored anywhere on the tripod, the loaded rope/ cable is the resultant force. If the resultant force is outside the footprint of the tripod, it will cause the tripod to fall over
		24.2	Recall the hazards and advantages of mechanical hoisting from the tripod	Retrieval function necessary for emergency recovery. Retrieval function installed on the legs works best
		24.3	Set up, check and use a standard tripod for undertaking a confined space entry	Pre-use inspection. Requirements for whether the tripod requires hobbling. Considerations for setting working height of tripod. Attachment of access/ recovery system (retrievable fall arrest block, pre-rigged MA system, man-riding winch etc)

	Skill sheet element		Learning outcome	Key teaching points
25	Work restraint	25.1	Identify when work restraint equipment is used, its merits and limitations	Prevents an operative from reaching an edge
		25.2	Select, install and check appropriate work restraint equipment	Consider issues around open access hatches. Anchor/ edge alignment. Suitability of anchor. Attaching to restraint system in safe area and then approach edge
26	Vertical confined space entry	26.1	Enter and exit a vertical confined space with a ladder and a tripod mounted retrievable fall arrest block (self-retracting lifeline)	Pre-use checks on tripod and retrievable fall arrest block. Considerations for cable attachment to sternal or dorsal fall arrest points on harness
		26.2	Convert the fall arrest block from fall arrest to emergency retrievable function and back to fall arrest	Recovery from confined space on single wire/ rope only to be used in emergency situation
		26.3	Recover an entrant from a confined space using a retrievable fall arrest block	Backup safety system needs to be in place to raise a live load
		26.4	Enter and exit a vertical confined space using a tripod-mounted winch/ pre-rigged mechanical advantage system and retrievable fall arrest block (self-retracting lifeline)	Winch/pre-rigged mechanical advantage system as the primary system to raise/lower and retrievable fall arrest block as backup system

	Skill sheet element		Learning outcome	Key teaching points
27	Emergency procedures	27.1	Explain the "actions on" in the event of a gas monitor alarm actuating in a low, medium or high risk confined space	Alarm signal. Alarm causes. Muster point. Way of extraction. Closing the confined space for unintended visitors. Wind direction and emergency escape route
		27.2	Explain the criteria for deploying SavOx in a confined space	Air quality and air monitoring
		27.3	Demonstrate safe donning of SavOx	Follow manufacturer's instructions
		27.4	Demonstrate safe and effective evacuation from a confined space wearing SavOx	Use of SavOx whilst evacuating a confined space
		27.5	Demonstrate safely deploying as part of an emergency team to a (simulated) emergency in a confined space	Use of SavOx to access a casualty in a confined space
28	Entry supervision	28.1	Explain the role of an entry supervisor	Checking that everyone entering the confined space complies with the permit to work/operational guidelines (eg PPE). Logging number of personnel, entry and exit times, meter readings. Raising the alarm in event of emergency
		28.2	Explain the minimum activities that must be completed prior to entry into a confined space	Air monitoring. Checking personnel comply with permit to work/ operational guidelines. Logging personnel in and out of confined space
		28.3	Perform the duties of an entry control supervisor	Entry control supervisor duties, as identified above

	Skill sheet element		Learning outcome	Key teaching points
29	Raising/lowering systems, and mechanical advantage	29.1	Demonstrate use of winch or pre-rigged mechanical advantage system to raise/ lower	Tripod-mounted man-riding winch. Pre-rigged MA systems. Pre-use checks
		29.2	Demonstrate lowering of rescuers into a confined space and raising of casualty/rescuers from a confined space	Requirements for backup system. Rope/wire protection from edges. Attachments for working rope/wire and backup to harness/stretcher
		29.3	Demonstrate rigging and operation of component-based rope- based raising/ lowering system (if used by agency)	Twin rope system. Rigging and operation of rope control devices attached to tripod. Creation of mechanical systems using rope grabs, pulleys, karabiners (simple 3:1, simple 5:1, compound 6:1)
30	Confined space rescue harnesses and stretchers	30.1	Identify various confined space rescue stretchers	Cocoon type stretchers vs basket stretchers
		30.2	Demonstrate rigging of a rescue stretcher for a vertical raise	Rigging of vertical lift bridle. Considerations for secondary attachment point for casualty. Considerations for secondary attachment points for dealing with low anchor points
31	Casualty care and packing	31.1	Identify personnel at risk to suspension- induced syncope, and control measures to minimise this	Casualties tied in harnesses and stretchers in a vertical position, not able to move
		31.2	Demonstrate appropriate casualty care for suspected suspension-induced syncope	Moving legs. Fast rescue. Tell casualty to keep moving if possible. Use of relief straps
		31.3	Demonstrate appropriate casualty packing for a vertical raise in a cocoon-type stretcher	Key areas of support/padding: under heels, behind knees, between legs. Foot orientation. Helmet considerations. Safety glasses
32	Rescue of casualty from a low/ medium risk confined space	32.1	Act as part of a team undertaking casualty rescues from a simulated low/medium risk confined space	Team roles. Use of training mannikins, but ideally progressing to live loads by end of course

	Skill sheet element		Learning outcome	Key teaching points
33	EDBA periodic pre-use and post- use set checks and care	33.1	Recall when EDBA sets need to be checked	Periodic inspections (monthly, annual service, 5 year cylinder test). Daily checks before use. Pre-entry checks
		33.2	Perform daily and pre-entry set checks on EDBA set	Cylinder, harness and set visual inspection and date check. Cylinder pressure check (>80% full). Leak check - close cylinder and listen, <10 bar pressure drop in 1 minute. Fit mask and breathe using set - check for leaks with head movement, check over pressure at mask. Close cylinder and breathe down set to check whistle sounds at correct pressure. Follow manufacturer's specific guidance for set being used
		33.3	Perform post-use set check and cleaning	Check set for any damage. Detach cylinder for re-fill. Follow manufacturer's guidance on cleaning
34	EDBA entry control	34.1	Perform time and pressure calculations	Calculating time to whistle and duration calculation. Calculate turn around pressure. GUN - got/used/need
		34.2	Use a BA board to monitor entrants into a confined space wearing EDBA	Use of tallies. Overwriting on board. Communication with entrants to get pressure readings
35	Entry to a confined space wearing EDBA	35.1	Demonstrate safe access/egress and movement through a confined space in EDBA using a (simulated) partner agency system	Pre-use set checks. Entry and exit from a vertical confined space wearing ECBA. Movement through a confined space wearing ECBA. Communication to entry control to inform of pressure and gas monitor readings. Personal pressure gauge monitoring and turn around pressure calculations

	Skill sheet element		Learning outcome	Key teaching points
36	Rescue from a high risk confined space wearing EDBA	36.1	Act as part of a team undertaking casualty rescues from a simulated high risk confined space	Team roles. Use of training mannikins, but ideally progressing to live loads by end of course. All delegates must undertake entry wearing BA to perform a rescue
		36.2	Demonstrate safe, effective care of a (simulated) patient in a simulated high risk confined space while wearing EDBA	Entry into simulated high risk confined space, wearing EDBA
		36.3	Demonstrate safe and effective packaging and extrication of a (simulated) patient from a simulated high risk confined space while wearing EDBA	Extrication of simulated patient from a simulated high risk confined space, wearing EDBA

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