GLOBAL WIND ORGANISATION

TRAINING STANDARD

Advanced Rescue Training (ART)

(Onshore/Offshore)

Version 1

October 2018

1 LIST OF ABBREVIATIONS 5

2 TERMS AND DEFINITIONS 6

3 CHANGE LOG 7

4 SCOPE 8

5 GENERAL REQUIREMENT TO GWO ADVANCED RESCUE TRAINING 9
5.1 Overview 9
5.2 Target group 9
5.3 Aims and objectives 9
5.4 Conformity with other Training 9
5.5 Legal requirements 10
5.6 Duration of ART Modules 10
5.7 Guidance on delivering lesson elements 11
5.8 Validity period 11
5.9 Delegate prerequisites for the ART 12
5.10 Physical demands 12

6 GENERAL RESOURCES REQUIRED TO DELIVER ART MODULES 12
6.1 Training Staff 12
6.2 Facilities and Equipment 13
6.3 Theory training facilities 13
6.4 Practical training facilities 13
6.5 Wind turbine environment explained 16
6.6 Training Equipment 17

7 UNDERSTANDING GWO LEARNING OBJECTIVES 19
7.1 Taxonomy 19

8 ADMINISTRATION AND CERTIFICATION OF ART MODULES 21
8.1 Administrative arrangements 21
8.2 Delegate performance assessment 21
8.3 Requirement to upload training record in WINDA 21

9 HUB RESCUE 23
9.1 Aims and objectives of the Hub Rescue Module 23
9.2 Competencies of the Hub Rescue Module 24
9.3 Duration of the Hub rescue Module 24
9.4 Hub Rescue Trainer/Delegate Ratio 25
9.5 Equipment for Hub Rescue Module 25
9.6 Hub Rescue Module Time Table 25
9.7 Detailed description of the Hub Rescue Module 27
Lesson 1 - Introduction 27
Lesson 2 - Emergency response plan in your own organization 28
Lesson 3 - Control measures to prevent injury during training 31
Lesson 4 - Cervical collar 31
Lesson 5 - Packaging the injured person 33
Lesson 6 - Lowering/raising rescue system 34
Lesson 7 - Hub rescue exercise 1+2 (from blade) 34
Lesson 8 - Hub rescue exercise 3+4 (from spinner) 37
Lesson 9 - Outside evacuation of injured person 38
Lesson 10 - Evaluation 41

10 NACELLE, TOWER & BASEMENT RESCUE 43
10.1 Aims and objectives of Nacelle, Tower & Basement Module 43

10.2 Competencies of the Nacelle, Tower & Basement Module 44
10.3 Duration of the Nacelle, Tower & Basement Module 45
10.4 Nacelle, Tower & Basement Trainer/Delegate Ratio 45
10.5 Equipment for Nacelle, Tower & Basement Module 45
10.6 Nacelle, Tower & Basement Module Time Table 45
10.7 Detailed description of the Nacelle, Tower & Basement Module 47
Lesson 1 - Introduction 47
Lesson 2 - Emergency response plan in your own organization 49
Lesson 3 - Control measures to prevent injury during training (day 1 + 2) 51
Lesson 4 - Cervical collar 51
Lesson 5 - Packaging the injured person 53
Lesson 6 - Lowering/raising rescue system 54
Lesson 7 - Evacuation of an injured person from the nacelle to the base of the tower 56
Lesson 8 - Rescue from enclosed space 60
Lesson 9 - Rescue from crawl space 63
Lesson 10 - Rescue up 66
Lesson 11 - Evaluation 71

11 SINGLE RESCUER: HUB, SPINNER & INSIDE BLADE RESCUE (SR:HSIBR) 73
11.1 Aims and objectives of the Single Rescuer HSIBR Module 73
11.2 Competencies of the Single Rescuer HSIBR Module 73
11.3 Delegate prerequisites for the Single Rescuer HSIBR Module 73
11.4 Duration of the Single Rescuer HSIBR Module 73
11.6 Equipment for the Single Rescuer HSIBR Module 74
11.7 Time Table of the Single Rescuer HSIBR Module 74
11.8 Detailed description of the Single Rescuer HSIBR Module 76
Lesson 1 - Introduction 76
Lesson 2 - Single rescuer rescue strategy 77
Lesson 3 - Control measures to prevent injury during training 79
Lesson 4 - Hub rescue exercise 1+2 (from blade) 79
Lesson 5 - Hub rescue exercise 3+4 (from spinner) 82
Lesson 6 - Evaluation 83

12 SINGLE RESCUER: NACELLE, TOWER & BASEMENT RESCUE (SR:NTBR) 85
12.1 Aims and objectives of the Single Rescuer NTBR Module 85
12.2 Competencies of the Single Rescuer NTBR Module 85
12.3 Delegate prerequisites for the Single Rescuer NTBR Module 85
12.4 Duration of the Single Rescuer NTBR Module 85
12.5 Trainer/Delegate Ratio of the Single Rescuer NTBR Module 86
12.6 Equipment for the Single Rescuer NTBR Module 86
12.7 Time Table of the Single Rescuer NTBR Module 86
12.8 Detailed description of the Single Rescuer HSIBR Module 88
Lesson 1 - Introduction 88
Lesson 2 - Single rescuer rescue strategy 89
Lesson 3 - Control measures to prevent injury during training 91
Lesson 4 - Evacuation of an injured person from the nacelle to the base of the tower 91
Lesson 5 - Rescue From enclosed space 94
Lesson 6 - Rescue from crawl space 97
Lesson 7 - Rescue up 99
Lesson 8 - Evaluation 103

13 COMBINED GWO ADVANCED RESCUE TRAINING 105
13.1 Duration of the Combined GWO ART Module 105
13.2 Trainer/Delegate Ratio of the Combined GWO ART Module 105
13.3 Requirement to upload training record in WINDA 105
13.4 Time Table of the Combined GWO ART Module 106

ANNEX 1 - DELEGATE ASSESSEMENT FORM 109

ANNEX 2 - MEDICAL SELF-ASSESSMENT FORM 114

ANNEX 3 - EQUIPMENT LISTS 115

1. Hub Rescue 116
2. Nacelle Tower & BAsement 119
3. Single Rescuer HSIBR Module 123
4. Single rescuer NTBR module 127

ANNEX 4 - GUIDELINE FOR WARM-UP EXERCISES 131

ANNEX 5 - ART GUIDELINE: RECOMMENDATIONS FOR IMPLEMENTATION 132

1. Introduction 132
2. Purpose 132
3. Sufficiently Trained Personnel 133
4. Advanced Rescue Equipment 133

1 List of Abbreviations

ANSI	American National Standards Institute
AS/NZS	Australia and New Zealand Standard
ART	Advanced Rescue Training
BST	Basic Safety Training
CSA	Canadian Standards Association
EMT	Emergency Medical Treatment
GWO	Global Wind Organisation
HSIBR	Hub, Spinner and Inside Blade Rescue
LOTO	Lock Out Tag Out
NTBR	Nacelle, Tower and Basement Rescue
PPE	Personal Protective Equipment
SAR	Search and Rescue
SRL	Self-Retractable Lifeline
WTG	Wind Turbine Generator

2 TERMS AND DEFINITIONS

Clear / precise communication	a. Technician A is giving information to technician B b. Technician B repeats the information c. A confirms that the repetition is correct d. If repetition was not correct the technician starts at "a" again.
Flexitime	The time that must be utilized in the course, either theory or practical elements, where training provider sees the most valuable for the Delegates.
IP	Injured person, or ill person – i.e. the affected person requiring first aid treatment and rescue/evacuation
PPE	Includes Personal Fall Protection Equipment
Rescue device setups: • Passive (rescue device in stationary mode setup) • Active (rescue device in mobile mode setup)	• Rescue device in standard mode setup, i.e. the rescue device rigged in the WTG • Rescue device in inverted/reverse mode setup, i.e. the rescue device attached to the injured person (and the rescue device rope's loaded end is rigged in the WTG)
Single rescuer Advanced Rescue operation	When an Advanced Rescue operation is performed by one rescue personnel only. Relevant for personnel working in two-person teams, where Advanced Rescue preparedness is required.
Zip line	Areal ropeway for injured person transportation. Setup horizontally with a rescue device (Milan) rigged between two structural and/or certified anchor points

3 CHANGE LOG

Amendment Date		Approved by & date	
Version		Description of changes	

Amendment Date	**2018**	Approved by & date	
Version	**1**	Description of changes	
- First edition			

4 SCOPE

The Global Wind Organisation (GWO) is an association of Wind Turbine owners and manufacturers with the aim of supporting an injury-free work environment in the wind industry. An objective of GWO is to develop common industry training and best practice Standards for health and safety as a vital and necessary way forward to reduce risks for personnel in the wind industry working on site and to reducing environmental risks across Europe and the globe.

This Standard has been developed in response to the demand for recognizable advanced rescue training in the industry, and has been prepared in co-operation between the members of GWO based on risk assessments and factual incident and accident statistics pertaining to the installation, service and maintenance of wind turbine generators and wind power plants.

This Standard describes the requirements for advanced rescue training courses that are recommended by the members of GWO. The full standard covers four modules:

1) Hub, Spinner and Inside Blade Rescue (HSIBR)
2) Nacelle, Tower and Basement Rescue (NTBR)
3) Single Rescuer: Hub, Spinner and Inside Blade Rescue (SR:HSIBR)
4) Single Rescuer: Nacelle, Tower and Basement Rescue (SR:NTBR)

The members of the Global Wind Organisation (GWO) recognize trained persons as competent within Advanced Rescue in the wind industry and accept the trained person as possessing the required knowledge to conduct rescue operations, in a WTG, using standard wind turbine industry rescue and fall protection. Training is verified through the GWO database WINDA.

Where national legislation sets higher requirements for the specific training, the Training Provider shall incorporate these requirements into the training program.

Additional training may be required for company or country specific reasons.

This standard has been developed by the GWO Training Committee. Disputes and potential non-conformities should be brought to the attention of the GWO Audit and Compliance Committee.

The standard has been approved by the GWO Steering Committee.

5 General Requirement to GWO Advanced Rescue Training

Upon completion of the Global Wind Organisation (GWO) Advanced Rescue training (ART) Delegates will possess the theoretical and practical knowledge required to access and rescue an injured person from the Hub and the Nacelle, Tower and Basement section. These training modules can be delivered independently of one another or as stand-alone training.

5.1 Overview

The GWO Advance Rescue Training is divided into the following four Modules:

1) Hub, Spinner and Inside Blade Rescue (HSIBR)
2) Nacelle, Tower and Basement Rescue (NTBR)
3) Single Rescuer: Hub, Spinner and Inside Blade Rescue (SR:HSIBR)
4) Single Rescuer: Nacelle, Tower and Basement Rescue (SR:NTBR)

5.2 Target group

Personnel who will be working in the wind industry or related fields and will have their duties in a wind turbine environment.

Personnel that may need or is selected by their employer to perform advanced rescue or lead an advanced rescue operation, where training according to one or more modules of the GWO Advanced Rescue Training may mitigate the identified risks.

5.3 Aims and objectives

The ART modules shall enable Delegates to perform entry-type injured person rescue operations, in a WTG, using industry standard rescue equipment, rescue methods and techniques, exceeding those of GWO Working at Height.

5.4 Conformity with other Training

The GWO ART standard sets out minimum requirements.

The modules, learning objectives, lessons and elements may be delivered in the order that fits best for the specific training situation. Provided the minimum requirements of the ART are met the Training Provider may choose to incorporate delivery of other similar certified training.

5.5 Legal requirements

The Training Provider shall identify whether national legislation sets additional requirements for Advanced Rescue Training, or prohibits delivery of certain elements. If so, the Training Provider shall incorporate these identified requirements in the training.

5.6 Duration of ART Modules

The total contact time for completing the stand-alone modules in this basic safety training standard is estimated to be ***29 hours***. This is based on the time estimates given in the module timetables and summarised in table 5-6 below.

The training provider must not exceed the times per day given in table 5-7 below.

The training provider must ensure that sufficient time is allowed for delegates with prior experience to share their experiences related to the modules of the basic training standard in a way that is constructive for the entire class.

Module	Duration
Hub, Spinner and Inside Blade Rescue (HSIBR)	7 hours
Nacelle, Tower and Basement Rescue (NTBR)	14 hours
Single Rescuer: Hub, Spinner and Inside Blade Rescue (SR:HSIBR)	4 hours
Single Rescuer: Nacelle, Tower and Basement Rescue (SR:NTBR)	4 hours

*Table **5**-6 - Duration of the ART Modules (Excluding meals & Breaks)*

	Maximum duration per day
Contact time	8 hours
Total training day	10 hours

Table 5-7 - Maximum durations for training days

Note: Contact time includes delivery of course lesson contents, practical exercises and activities directly related to these**.**

The total training day includes contact time, meals and breaks and travel between training sites (where applicable).

Within the module timetables, approximate duration of each of the lessons are given. The training provider may choose to deliver elements of the training according to other timetables, as long as the total duration is not reduced, and practical elements are not reduced in length. Theoretical elements may be delivered during the practical exercises when feasible.

5.7 Guidance on delivering lesson elements

Within the module timetables, approximate duration of each of the lessons are given. The training provider may choose to deliver elements of the training according to other timetables, as long as the total duration is not reduced, and the duration of practical elements is not reduced in length. Theoretical elements may be delivered during the practical exercises when feasible.

Individual exercises can be combined and integrated to create a more challenging scenarios, e.g. connecting the crawl space exercise to the descent exercise into one scenario.

During the exercises the Instructor is free to introduce new elements or change the circumstances of the exercise, to challenge the delegates and to provide a more dynamic scenario. For example, removing equipment, or marking anchor points as defect.

5.8 Validity period

The advanced rescue training modules are valid for the period stated in the table below. Certificates and training records shall be renewed before the end of a given validity period. A certificate or training record can be renewed up to two months prior to expiry and maintain the original certification date by uploading the previous certificate's valid until date in WINDA.

If a certificate or training record is renewed outside of two months of expiry, it must carry the new date of certification.

A Delegate is only allowed to attend a refresher course in the specific Training Module prior to the date of expiry on the current certificate or training records.

If a certificate or training record is expired, the Delegate must attend the full advanced rescue training module(s) to obtain a new training record.

The validity period is automatically calculated in WINDA by entering the course completion date.

Course/Modules	Certificate Validity
Hub, Spinner and Inside Blade Rescue (HSIBR)	24 Months
Nacelle, Tower and Basement Rescue (NTBR)	24 Months
Single Rescuer: Hub, Spinner and Inside Blade Rescue (SR:HSIBR)	No Expiry
Single Rescuer: Nacelle, Tower and Basement Rescue (SR:NTBR)	No Expiry

Table 5-8 - Validity period of GWO ART Modules

5.9 Delegate prerequisites for the

All personnel participating in advanced rescue training shall be medically fit and capable of fully participating.

Training providers shall have a procedure that requires Delegates to sign a statement stating that they are medically fit to participate in the safety training and that they do not suffer from any medical illness or are under influence of any narcotic substance or alcohol. The Annex 2: Medical Self-Assessment Form shall be used if no other equivalent procedure is in place.

Delegates' signatures testifying to their medical fitness shall be collected prior to the start of the advanced rescue training course.

Valid GWO BST module Working at Heights, GWO First aid and GWO Manual Handling certificates are prerequisites for participation. Furthermore, Delegates shall have created a personal Delegate profile in WINDA and provide their own WINDA ID prior to completing the training.

5.10 Physical demands

Modules are expected to be physically demanding.

If there is any doubt regarding the medical fitness of any Delegate, the Training Provider shall stop training the Delegate and seek a physician's advice.

Note: Practical exercises shall be designed and delivered solely to meet this Standard and shall not place any physical or mental demands on the Delegates other than those required to meet this Standard.

6 General Resources required to deliver Modules

The Training Provider shall ensure that Staff, facilities and equipment are in place to support the training of Delegates.

6.1 Training Staff

The Instructor shall possess appropriate qualifications and experience to ensure that all training and supportive activities are carried out in accordance with current legislation and current CRITERIA FOR TRAINING PROVIDERS OFFERING GWO TRAINING.

The Instructor must be:

1) Trained in instructional/ lecture techniques and/ or have documented instructional/ teaching experience
2) Qualified GWO WAH instructor
3) Trained in GWO BST/BSTR First Aid and GWO BST/BSTR Manual Handling

4) Included in an on-going training program, which includes visits to onshore and/ or offshore WTGs (tower, nacelle, hub) prior to instructing Modules, to enable them to maintain and update skills related to the Modules they instruct. The Instructor shall physically visit the tower, nacelle and hub of WTGs
5) Able to apply knowledge and practical skills in alternative rescue methods, techniques and rigging setups compared to those executed by the Delegates during the practical exercises of the ART Modules
6) Able to analyse and justify the ART rescue equipment used, uses and limitations of this equipment included.

A person with First Aid qualifications shall be present during all practical training.

All Staff shall possess the appropriate competencies to conduct/ assist the elements of training they have been assigned to.

6.2 Facilities and Equipment

The full range of facilities and equipment relevant to the modules delivered shall be available during the training. The following facilities criteria shall be adhered to. Turbine manufacturer specifics may limit the application of the training requiring additional methods, techniques and equipment.

6.3 Theory training facilities

Facilities shall be designed to enable each Delegate to see, hear and fully participate in the taught subject matter.

6.4 Practical training facilities

All facilities shall be maintained and where appropriate, inspected and tested in accordance with current national legislation and manufacturers' recommendations.

Risk assessments shall be conducted and documented for all training facilities. The Training Provider shall hold the required permits to operate the facilities.

The learning process is facilitated by identical or comparable elements comparing the training environment and the delegates' working environment. Identical or comparable elements enhances the application of what is learned. The practical training facilities and the training environment are therefore expected to incorporate as many identical or comparable elements to a real wind turbine working environment as possible.

The objective is that the practical training facility should enable each Delegate to individually and/or as part of a team, see, hear and practice the taught subject matter in such a way, that it resembles the working practices in a real wind turbine environment.

The following training facility items will be required for the ART training:

1) Mock-up with enclosed space to simulate the hub, with a height differentiated crawl way. Figure 6-41 provides dimensions to the GWO recommended Hub mock up. The training provider can deviate from the recommended hub measures to facilitate a specific turbine design
2) A mock up to simulate access between hub and blade with a max. 60 cm diameter access hatch, which can be reduced to a 50 cm, to simulate a pitch cylinder partly blocking the hatch
3) Mock-up for the "Rescue up" exercises, to simulate basement/tower rescue with anchor point at min. 6.75 m.
4) Mock-up to simulate under the gearbox with a max. 60 cm diameter access crawl way into the crawl space, a height between 60 and 30 cm and minimum 200 cm length (Basement/Tower/Nacelle module)
5) Mock-up to simulate the nacelle. Figure 6-42 provides dimensions to the GWO recommended Nacelle mock up. The training provider can deviate from the recommended nacelle measures to facilitate a specific turbine design. The nacelle mock-up must be filled with sufficient simulated assets, to create a realistic nacelle. The maximum available contiguous floor space must be less than 3m2, excluding walkways of less than 60 cm width. The sides of the nacelle should be designed in such a way as to prevent direct visual contact from within the nacelle to the teams outside of the nacelle
6) Structural and certified anchor points (both modules).

It is recommended to connect the various mock ups to recreate a realistic sequence. For example, connecting the nacelle mock-up with the hub mock up. Rather than connecting a blade mock up with the nacelle mock up. This would provide a more realistic scenario. However, if there are practical reasons to separate the individual mock ups, then this is allowed. For example, to allow different teams to train at the same time.

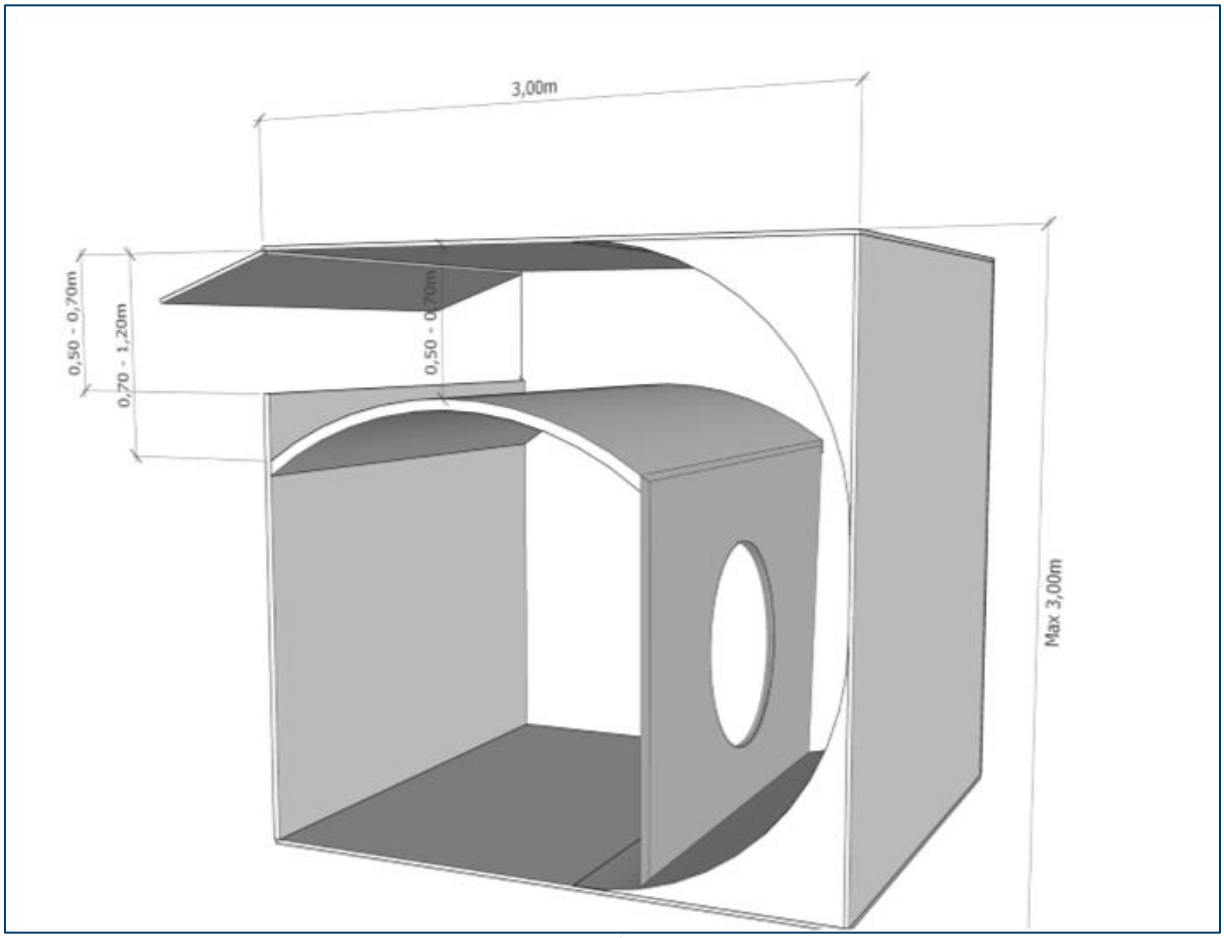

Figure 6-41 - Recommended dimensions for the Hub Mock-up

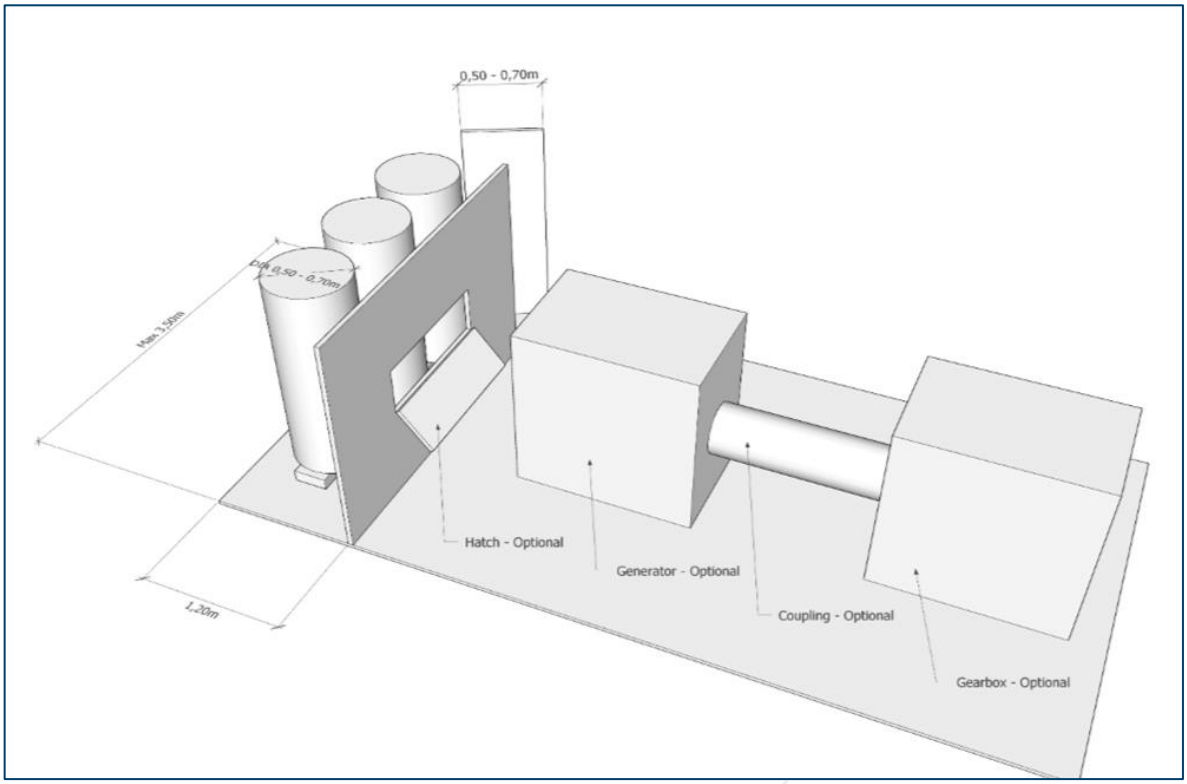

Figure 6-42 - Recommended dimensions for the Nacelle Mock-up

6.5 Wind turbine environment explained

What is a wind turbine training environment?

To apply what you have learned, e.g. during a course, is a learning process of its own.

This process is facilitated by identical elements comparing the training environment and the delegates' working environment. Thus, identical elements enhance the application of what you have learned - The more identical elements, the merrier.

As training provider your goal should be to achieve training facilities and a training environment with as many identical elements to a real wind turbine working environment possible.

In addition, "train as you work", i.e. executing training end-to-end the way delegates should perform in practice, enhances real work behaviour.

So how do you "train as you work" and design a training environment with a high degree of identical elements?

Depending on the delegate's job and tasks in the wind industry, many technicians work in the wind turbine tower and nacelle – during pre-assembly, erection, commissioning and troubleshooting, or service of the wind turbine.

For access up/down the tower, the tower is in general fitted with ladder sections provided with a vertical fall protection system, and tower section platforms with ladder hatches fitted with certified anchor points for attachment of personal fall protection

equipment. The wind turbine may hold a basement section fitted as mentioned, and primarily holding electrical cabinets.

In the geared type WTG, access in the nacelle is in general limited to narrow pathways along the left or right side of the main shaft and generator etc. These pathways are often "fitted" with mechanical components and the like, as well as steps and small ladder sections due to variations in floor level, as part of the WTG design – increasing the risk of trips and falls. Access between nacelle and hub is possible through low and often very narrow passageways.

To "train as you work" training should be executed by doing real work tasks end-to-end under the actual working procedures, and/or realistic emergency situation (fire, first aid, evacuation or injured person rescue) end-to-end scenarios, in a wind turbine environment.

6.6 Training Equipment

The equipment required for training as listed in Annex 3 must be available and must fulfil national legal requirements as listed in table A3-4 in annex 3 where applicable.

A generic approach to teaching safety equipment is applied to this Module aiming to avoid potential product specific additional training on completion of this Module, which may be required by the Delegate's organisation e.g. prior to site or work.

The generic approach is achieved by teaching a variety of safety equipment products within each safety equipment category (e.g. guided type fall arresters), enabling the Delegate to conduct pre-use inspection and to use other safety equipment products compared to those taught during this Module – based on the manufacturer's user manual but without additional formal training.

Where reasonably practicable the training provider shall eliminate the risk of a fall from height. Where it is not possible to eliminate the risk of a fall then the fall factor experienced by any person shall be kept as low as is reasonably practicable.

GWO recommends a maximum fall factor of 0.5. To calculate this the following formula has been used,

$$Fall\ Factor\ (FF) = \frac{Distance\ Fallen}{Length\ of\ lanyard},$$

using the maximum allowed lanyard of length 2.00 m and a fall of 1.00 m,

$$Factor\ (FF) = \frac{1.00\ m}{2.00\ m},$$

$$Factor\ (FF) = 0.5.$$

During the evacuation exercises in this module the anchor points used for the attachment of fixed length fall arrest lanyards must be high enough above the ground, or structure below them, so that in the event that a person experiences a fall the shock absorber in their fall arrest lanyard can fully deploy and prevent them from contacting the ground (or structure directly below the anchor point).

During the evacuation exercise the delegates must be able to experience a minimum amount of descent using an evacuation or rescue device to ensure that they gain the experience of the speed of descent using these devices. This can be achieved by having the delegate descend from a minimum height using a rescue or evacuation device.

To ensure that for all fall protection equipment that may be used that there will be enough clearance below the anchor point, and to ensure that the delegates can experience a descent of sufficient duration for meaningful learning transfer, the GWO recommends that the anchor point is a minimum of 6.75 m above the ground or structure directly below the anchor point. The recommended 6.75 m clearance under the anchor point is explained in detail in annex 3.

If a training provider deviates from the recommended anchor point height of 6.75 m to a lower height, then the following additional control measures must be in place,

a. The training provider shall document a risk assessment for the lower height, this shall include calculations for the equipment to be used during the evacuation exercises, the calculations shall;
    1. use the value for shock absorber elongation that is provided by the equipment manufacturer, and,
    2. demonstrate that the equipment will prevent the person from coming into contact with the ground or structure directly below the anchor point, and,
    3. use a formula provided by the equipment manufacturer or national legislation that is for the purpose of calculating anchor point clearance height or, where no such formula exists, use the formula in annex 3 section 4, and,
b. the potential fall factor shall not exceed 0.5, and,
c. delegates must experience a descent from a platform that is a minimum of 4.5 m above the ground.

7 UNDERSTANDING GWO LEARNING OBJECTIVES

The described learning objectives (expected learning outcome) are the foundation of the course contents and what the delegate performance assessment must be based upon.

Traditionally learning objectives are prepared within three different domains of learning – knowledge, skills and attitude. A learning objective describes the expected learning outcome on completion of a module or a course, within one or more learning domains.

If a learning objective is related to more than one domain of learning, e.g. to knowledge *and* skills, one learning objective per learning domain is often prepared – to enable a better understanding of the learning objective.

The GWO Training Provider may apply teaching methods (didactics) that are appropriate to the course participants prior training, education and cultural backgrounds, but should always aim to provide course participants ample possibility to perform hands-on demonstrations and learning reflection.

7.1 Taxonomy

To formulate a measurable learning objective, taxonomy is used to describe the *level* of expected learning outcome within a learning domain.

As an example, belonging to the learning domain of knowledge, to have a delegate *name* or ***recognize*** something, as oppose to have him ***explain*** it in his own words, or even *apply* or ***demonstrate*** what he has learned – describes different performance levels, i.e. different taxonomy levels.

Different taxonomies are associated with different learning domains, for instance:

Knowledge: such as Bloom's "cognitive taxonomy"

- Intellectual knowledge, mental skills and procedures

Skills: such as Simpson's "psychomotor taxonomy"

- Physical skills, cognitive controlled and observable

Attitude: such as Krathwohl's "affective taxonomy"

- Attitude and feelings to the learning

Selecting a suitable taxonomy level, an ***action verb*** expresses the expected behaviour of the delegate, thus describing the taxonomy level of a learning objective.

Action verbs are usually highlighted in bold in this standard. The table below presents the three learning domains with taxonomy level 1-3, provided with associated *action verbs* applicable in the learning objective wording, defining the taxonomy level. In the GWO training standard, the learning objectives are in general described as level 2 or 3.

	Knowledge	Skills	Attitude
3	**Application / Applying** To use in a new situation. Solving problems by applying acquired knowledge, facts, techniques and rules in a different way. Applying a procedure to a familiar or unfamiliar task. Using a manual to calculate and operate. **Action verbs** Apply, Change, Choose, Compute, Modify, Operate, Practice, Prepare, Schedule, Solve, Write.	**Guided response** Follows instructions to build a model. Using a tool after observing an expert demonstrate how to use it. Be able to demonstrate an activity to other learners. Can complete the steps involved in the procedure as directed. **Action verbs** Accomplish, Achieve, Calibrate, Complete, Control, Demonstrate, Perform, Refine, Show.	**Value** Demonstrates belief in the company described process. Shows the ability to solve problems. Informs management on matters that one feels strongly about. Decide worth and relevance of ideas and tasks. **Action verbs** Argue, Challenge, Confront, Complete, Debate, Criticize, Justify, Join, Propose.
2	**Comprehension / Understanding** Construct a meaning from instructional messages, including oral, written and graphic communication. Demonstrating basic understanding of facts and ideas. Explain in your own words the steps of performing a complex task. **Action verbs** Classify, Distinguish, Estimate, Explain, Express, Give, Illustrate, Indicate, Locate, Predict, Summarize, Translate.	**Set** Awareness or knowledge of the ability needed to use the skill. Carry out tasks from verbal or written instructions. Showing eagerness to assemble components to complete a task. Knows and acts upon a sequence of steps in a process. **Action verbs** Access, Build, Complete, Conduct, Execute, Implement, Operate, Perform, Recreate.	**Respond** Completing work assignments with highly respect to the agreement. Participating in team problem solving activities. Questions new ideas and concepts in order to fully understand them. Participate actively and respectful in discussions. Showing enthusiasm. **Action verbs** Assist, Contribute, Discuss, Present, Question, Report, Respond, Tell, Write.
1	**Knowledge / Remembering** Memory of facts, terminology, rules, sequences, procedures, etc. Locating knowledge in long-term memory and retrieving relevant knowledge from long-term memory. **Action verbs** Arrange, Define, Describe, Find, Identify, List, Name, Outline, Recognize, Relate, Recall, Retrieve.	**Perception** Watch instructor and repeat action, process or activity. Recognizing sounds or pictures that indicate certain functionalities. Estimate the event of a certain function and be prepared for it. **Action verbs** Attempt, Copy, Duplicate, Follow, Organize, Repeat, Sketch, Replicate, Reproduce.	**Receive** Listening to discussions of controversial issues with an open mind. Respecting the rights of others. Listen to others and remember their opinions. Be positive and creative to what is being taught. **Action verbs** Ask, Be open to, Concentrate, Discuss, Focus, Follow, Listen, Reply, Take part.

Table 1-1 - Taxonomy used by GWO

Note: Higher taxonomy levels exist.

8 ADMINISTRATION AND CERTIFICATION OF MODULES

8.1 Administrative arrangements

Appropriate for the enrolment and certification of Delegates and all aspects of the delivery of training shall be in accordance with this Standard.

8.2 Delegate performance assessment

Delegates will be assessed by means of direct observation and supplementary oral questions where appropriate (formative evaluation).

Throughout the entire course the instructor will enforce the Delegate Assessment Form (see annex 2) and adhere to it, accordingly, with a high focus on evaluating the Delegate's practical skills.

The Trainer keeps a Delegate Assessment Form (or adaptation) for each Delegate until the completion / evaluation of the Module.

The Delegate Assessment Form (or adaption) is a final evaluation tool for the instructors to assess Delegates during practical elements. It allows measurement of the number of violations in regard to safety, competency, or attitude.

It shall be used as a progressive evaluation tool to discuss the performance of a Delegate in guiding them to success and it also serves as supporting documentation if a Delegate passes or fails the Module. If a Delegate fails to meet the demands of the module, they shall attend a new Module.

Training Provider may adapt the Delegate Assessment Form to other media. Training Providers shall have a documented procedure in place for dealing with Delegates not meeting the stated learning outcomes.

8.3 Requirement to upload training record in WINDA

Training Providers are responsible for uploading a record of training to WINDA, the GWO online database of training records. This must be done as soon as possible and no later than 10 working days after completion of the training program.

Each record shall contain the following:

1) Delegate's WINDA ID
2) Course code (As shown in table 8-3)
3) Course completion date

Module	Course Code
Hub, Spinner and Inside Blade Rescue	ART-H
Nacelle, Tower and Basement Rescue	ART-N
Single Rescuer: Hub, Spinner and Inside Blade Rescue	SART-H
Single Rescuer: Nacelle, Tower and Basement Rescue	SART-N

Table 8-3 - Course codes for ART modules

The Training Provider shall in accordance with the criteria for Training Provider maintain own records of Delegates.

Upon request from GWO or any of the members of GWO, the Training Provider shall be able to verify the training and competence records of any specific personnel either attending a course and/or performing training of a course by name and nationality.

Training providers may issue other additional proof of training, e.g. as paper certificate or plastic cards. If the training provider chooses to do so, it is recommended (not a requirement) to include the delegate WINDA id.

9 HUB RESCUE

9.1 Aims and objectives of the Hub Rescue Module

The aim of this module is to enable the Delegates to perform rescue operations, in a WTG hub, spinner and inside the blade by using industry standard rescue equipment, methods and techniques, exceeding those of GWO Working at Height.

The Hub Rescue module shall ensure that Delegates are able to;

1) Assess and determine rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) for various rescue scenarios, in a WTG hub, spinner and inside a blade
2) Assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower
3) Explain and demonstrate the identification and suitable selection of certified and structural anchor points, relevant for various rescue scenarios, in a WTG hub, spinner and inside a blade
4) Explain and apply the concept of lifting angle, angle factor and deviation
5) Explain and control common risks of hazardous energies and common hazards of enclosed space areas in a WTG, when performing rescue operations
6) Apply rescue methods and techniques in performing descending and ascending rescue operations, from a WTG hub, spinner and inside a blade using a rescue stretcher and spineboard, manually operated lowering/raising rescue system for limited distance rescue (rescue device, pulley system or similar), and other rescue equipment relevant to the Delegates
7) Fit a harness and other PPE (e.g. helmet, safety glasses) onto an injured person, in an enclosed space in a WTG
8) Package an injured person on a rescue stretcher and spineboard in a vertical or horizontal configuration to enable safe transportation, by doing regular checks, using rescue equipment such as cervical collar and avoiding head down configuration of the unconscious injured person
9) Manually transport an injured person on a rescue stretcher or spineboard - in a balanced way, in a WTG
10) Change directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa) when suspended
11) Perform rescue operations, in a WTG hub, spinner and inside a blade, using safe and suitable (certified or structural) anchor points, lifting angles, deviation, and edge protection for the rescue equipment
12) Perform rescue operations, in a WTG hub, spinner and inside a blade, using an injured person personal fall protection equipment backup system, when

required (i.e. when the manually operated lowering/raising rescue system is not certified for person lifting)

13) Perform rescue operations, in a WTG hub, spinner and inside a blade using personal flashlight (e.g. helmet light), if required due to poor lighting conditions
14) Perform rescue operations, in a WTG hub, spinner and inside a blade, as the informal rescue team coordinator performing scene assessment and hazard identification, assessing and determining the rescue strategy and exercising clear communication
15) Perform clear and precise communication in a stressful rescue operation, both with members of the rescue team as a team coordinator and as a team member
16) Apply clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew) including coordinating the handover of an injured person

Delegates show signs of;

17) Acknowledging the benefits of having a coordinator in a rescue team, and the responsibility that comes with it
18) Taking part in discussing what advanced rescue preparations, and emergency, communication and command procedures, apply in their own organization
19) Committing themselves to avoid incidents from where they may be exposed to a rescue operation
20) Committing themselves to act out this value by demonstrating a pro-active approach and role model behaviour.

9.2 Competencies of the Hub Rescue Module

1) Perform descending rescue operations from a WTG hub, spinner and from inside a blade, to a primary assembly area (ground or transition piece) or a secondary assembly area (vessel), using industry standard rescue equipment
2) Rescue operations performed on the outside of the blades are not included
3) Perform these rescue operations in teams acting as the rescue team coordinator.

9.3 Duration of the Hub rescue Module

The total contact time for completing this hub rescue module is estimated to be 7 hours. This is based on the time estimate given in the module timetable.

The training provider must not exceed the times per day given in table 9-2 below.

The training provider must ensure that sufficient time is allowed for delegates with prior experience to share their experiences related to the module in a way that is constructive for the entire class.

	Maximum duration per day
Contact time	8 hours
Total training day	10 hours

Table 9-3 - Maximum durations for training day

Note: Contact time includes delivery of course lesson contents, practical exercises and activities directly related to these**.**

The total training day includes contact time, meals and breaks and travel between training sites (where applicable).

9.4 Hub Rescue Trainer/Delegate Ratio

The ratio shown for theory sessions indicates the maximum number of Delegates that can attend the course.

The ratio shown for practical sessions indicates the maximum number of Delegates to be supervised by one instructor during each activity.

Module	Session	Trainer – Delegate Ratio
Hub Rescue Module	Theory	1:12
	Practical	1:4

Table 9-4 - GWO ART Instructor to delegate ratios

9.5 Equipment for Hub Rescue Module

The equipment required for training as listed in Annex 3 must be available and must fulfil national legal requirements as listed in table A3-1 in annex 3 where applicable.

9.6 Hub Rescue Module Time Table

The order in which the elements of this training Module are delivered may vary.

Within the module timetables, approximate duration of each of the lessons are given. The training provider may choose to deliver elements of the training according to other timetables, as long as the total duration is not reduced, and the practical elements are not reduced in length. Theoretical elements may be delivered during the practical exercises when feasible.

Note: The stated 'FLEXITIME' of the Timetable must be utilized for theoretical and/or practical course contents, where the Training Provider finds it provides most value to the Delegates.

Lesson		Element		Approx. Duration
1	Introduction	1.1	Safety Instructions and Emergency Procedures	
		1.2	Facilities	
		1.3	Instructor & Delegate Presentation	
		1.4	Overall Aim & Objectives and Agenda	
		1.5	Motivation	
		1.6	On-Going Assessment	
			TOTAL	**30 min.**
2	Emergency Response Plan in Your Own Organization	2.1	Emergency Response Plan in Your Own Organization	10 min.
		2.2	Evacuation Strategy	20 min.
			TOTAL	**30 min.**
3	Control measures to prevent injury during training	3.1	Preparations for today's training, incl. - Inspection/don PPE - Control measures to prevent injury during training - Warm-up	
			TOTAL	**20 min.**
4	Cervical Collar	4.1	Utilization of cervical collar	
			TOTAL	**25 min.**
5	Packaging the injured person	5.1	Packaging the injured person	
			TOTAL	**50 min.**
6	Lowering/Raising Rescue System	6.1	Lowering/Raising Rescue System	
		6.2	Rigging setup options - combining rescue equipment and PPE lanyards	
			TOTAL	**25 min.**
7	Hub Rescue Exercise 1+2 (From Blade)	7.1	Hub Rescue Exercise 1+2 (From Blade)	
			TOTAL	**90 min.**
8	Hub Rescue Exercise 3+4 (From Spinner)	8.1	Hub Rescue Exercise 3+4 (From Spinner)	
			TOTAL	**90 min.**
9	Outside Evacuation of injured person	9.1	Outside Evacuation of injured person – Practical Exercise	
			TOTAL	**45 min.**
10	Evaluation	10.1	Reflection Session	
		10.2	Formative Evaluation	
			TOTAL	**15 min.**
			GRAND TOTAL	**420 min.**

Table 9-6 - GWO Hub rescue Module Timetable

9.7 Detailed description of the Hub Rescue Module

Additionally, the Instructor shall ensure that one rescue scenario training exercise during the entire module is conducted during (simulated) poor lighting conditions.

The learning outcomes specified for the Hub Rescue Module are:

Note: The administrative part of the registration should be carried out before the course commences.

Lesson 1 - INTRODUCTION

30 min.

The aim of this lesson is to introduce the Delegates to the course, each other, the facilities and what is expected of them during the course.

To successfully complete this lesson of the Module, Delegates must be able to:

1) Explain the safety rules and emergency procedures of the training facilities
2) Locate emergency exits and equipment, and relevant training facilities
3) Recognize who the instructor and other Delegates are
4) Describe the main aim and main learning objectives
5) Explain the on-going assessment according to delegates assessment form
6) State own expectations for the course.

ELEMENT 1.1 - SAFETY INSTRUCTIONS AND EMERGENCY PROCEDURES

The Instructor shall explain:

1.1.1 Safety instructions according to internal procedures

1.1.2 Emergency procedures and emergency exits in the areas where the Delegates can be expected to be located during the course

ELEMENT 1.2 - FACILITIES

The Instructor shall give:

1.2.1 A general description of the on-site facilities (Administration, dining area, restrooms, etc.)

ELEMENT 1.3 - INSTRUCTOR & DELEGATE PRESENTATION

The Instructor shall:

1.3.1 Ensure that all Delegates are registered with a personal Delegate profile in WINDA and have provided their WINDA ID prior to completing the training course.

1.3.2 Give a short introduction, including their backgrounds as instructors

Delegates shall:

1.3.3 Give a short introduction, including their job function, onshore/offshore experience, time of employment in the wind industry, and expected primary geographic work location, etc.

1.3.4 Present his/her own expectations for the course

ELEMENT 1.4 - OVERALL AIM & OBJECTIVES AND AGENDA

The Instructor shall explain:

1.4.1 The overall aim & objectives and agenda of this ART Module, highlighting the rescue team coordinator functionality

ELEMENT 1.5 - MOTIVATION

The Instructor shall explain:

1.5.1 Why advanced rescue preparedness and skills are relevant

1.5.2 The importance of personal involvement in the course

1.5.3 How the Delegates will be challenged, and why

ELEMENT 1.6 - ON-GOING ASSESSMENT

The Instructor shall explain:

1.6.1 The reasons for the on-going assessment

1.6.2 The GWO Delegate Assessment Form and its use

1.6.3 What is expected of the Delegates

Lesson 2 - EMERGENCY RESPONSE PLAN IN YOUR OWN ORGANIZATION

30 min.

The aim of this lesson is to raise awareness on emergency response planning and evacuation strategy. This is to inspire the Delegates on what information to search for

concerning what specific rescue preparations and rescue procedures apply in their own organisation.

To successfully complete this lesson of the Module, Delegates must:

1) Take part in discussing what specific hub/blade/spinner rescue preparations, and emergency, communication and command procedures, apply in their own organization
2) Recognize the limitations of the rescue preparations available, when deciding on the rescue strategy
3) Explain what to consider when deciding on evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower.

ELEMENT 2.1 - EMERGENCY RESPONSE PLAN IN YOUR OWN ORGANIZATION

The Instructor and Delegates shall discuss:

2.1.1 What specific hub/blade/spinner rescue preparations and emergency and communication procedures apply in their own organization, e.g. concerning:

2.1.2 Number of rescue personnel available (on site) for a rescue operation and availability of additional rescue personnel

2.1.3 Rescue training level depending on your work location in the WTG and number of personnel (e.g. working in the hub, or in the tower)

2.1.4 Communication procedures of operation, e.g. communication to backup/rescue team, Emergency Medical Treatment (EMT) i.e. ambulance and fire service, Site Lead, service vessel, helicopter Search And Rescue (SAR), and the means of communication - radio or phone (cell, IP or satellite phone)

2.1.5 Command procedures of operation, e.g. site lead command or command in rescue team

2.1.6 National and/or local requirements (e.g. confined space regulations and procedures)

2.1.7 Estimated time for professional emergency response providers to arrive

2.1.8 What to be aware of (during this training) concerning what specific elements in their own WTG type/WTG environment might differ from the training scenario environment (to visualize and enhance learning transfer), e.g.

2.1.9 Turbine design (e.g. layout, pathways, access ways, components, obstacles, hatches, Heli pad)

2.1.10 Anchor points (certified/structural/location)

2.1.11 Rescue equipment (type/quantity/location)

2.1.12 Emergency light (system/equipment)

ELEMENT 2.2 - EVACUATION STRATEGY

The Instructor shall:

2.2.1 Explain how to assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower - by considering the medical condition of the injured person, time constraints, transition piece size and configuration, nacelle position to the wind, evacuation hatch location, and interfering wind speeds, wind directions, temperatures and wind chill factor

2.2.2 Explain how to mitigate transition piece size and configuration, nacelle position to the wind, evacuation hatch location and interfering wind speeds and wind directions, bringing down an injured person by an outside evacuation;

d. From a hub/nacelle to a transition piece - by means of a passive rescue device setup, and tagline if beneficial

e. From a transition piece to a vessel - by means of an active or passive rescue device setup, and tagline if beneficial

2.2.3 Explain the challenges, methods and techniques of evacuating an injured person from a transition piece to a vessel - highlighting pros and cons on passive or active rescue device setup, communication with vessel crew, and procedures and techniques on how to put down the injured person cautiously on a vessel moving up/down in the swell

2.2.4 Demonstrate proper use of a specific rescue device

2.2.5 Demonstrate how to attach and rig the rescue device in passive setup and how to secure the rope

2.2.6 Explain the requirements, applications and limitations of the device

2.2.7 Explain the common additional rope's length compared to the specific WTG height

2.2.8 Explain/demonstrate the above mentioned based on the manufacturer's specifications

2.2.9 Explain pros and cons of utilizing a rescue stretcher type with lifting bridles versus a rescue stretcher/spineboard type without lifting bridles versus no rescue stretcher/spineboard, for an outside evacuation

2.2.10 Explain and demonstrate how to attach and rig the rescue device in a passive and active setup, respectively, and how to utilize a fall restraint lanyard onto the setup to balance the injured person in a perfect horizontal configuration, if required and possible

2.2.11 Explain how to load the injured person out of the WTG preferably feet first attending to avoid neck/head injury of the injured person due to hatchway opening contact, or load the injured person out of the WTG head first if this risk cannot be mitigated

2.2.12 Explain how to cautiously manipulate and balance/let go of the injured person out of the WTG when suspended by utilizing a tagline, at the same time aiming to

avoid head down configuration of the unconscious injured person - preventing stomach content release

Lesson 3 - CONTROL MEASURES TO PREVENT INJURY DURING TRAINING

20 min.

The Instructor shall:

3.1.1 Explain further control measures relevant for the specific training facilities and training to avoid injury during training, e.g.

f. Ensure Delegates are properly qualified to use the PPE available, e.g. recap and/or provide the necessary instructions on user inspection and use of available gliders, lanyards etc. during the training e.g. if the equipment is unfamiliar to the Delegates. Flexitime is spent to meet this requirement

g. Ensure relevant Lock Out Tag Out (LOTO) actions of the relevant training facilities have been conducted, and communicate the LOTO status to the Delegates prior to commencing practical exercises

h. Lead a warm-up session of the major muscle groups of the body and ankles, wrists and back

Delegates shall:

3.1.2 Perform a user inspection of their Personal Fall Protection Equipment

3.1.3 Take part in the warm-up of the major muscle groups of the body and ankles, wrists and back

Lesson 4 - CERVICAL COLLAR

25 min.

Note: In teams of two; 2 exercises pr. Delegate - 1 sitting, 1 lying down; live injured person recommended

The aim of this lesson is to enable the Delegates to utilize a cervical collar to ensure safe transportation of an injured person during a rescue operation.

To successfully complete this lesson of the Module, Delegates must be able to:

1) Prepare and fit a cervical collar onto an unconscious injured person
2) Check correct application of cervical collar on fitting onto the injured person

3) Ensure open airways ("A") and breathing ("B") of the injured person on fitting completion
4) Fit helmet and safety glasses on an unconscious injured person wearing a cervical collar
5) Demonstrate the above-mentioned skills on an injured person sitting and on an injured person lying down.

ELEMENT 4.1 - UTILIZATION OF CERVICAL COLLAR

The Instructor shall explain and demonstrate on an injured person how to, unassisted:

4.1.1 Prepare and fit cervical collar

4.1.2 Fit injured person PPE, i.e. helmet and safety glasses

4.1.3 Ensure correct application by doing product specific checks of the cervical collar

4.1.4 Ensure open airways ("A") and breathing ("B") of the injured person on fitting completion

4.1.5 Each Delegate shall practice how to:

4.1.6 Prepare, fit and check cervical collar and fit helmet and safety glasses on an injured person sitting and on an injured person lying down

4.1.7 Ensure open airways ("A") and breathing ("B") of the injured person on fitting completion

Lesson 5 - PACKAGING THE INJURED PERSON

50 min.

Note: In teams of two; 1 exercise per Delegate, live injured person recommended

The aim of this lesson is to enable the Delegates to fit a harness onto the injured person and package him onto a rescue stretcher or a spineboard, to enable safe transportation of the injured person.

To successfully complete this lesson of the Module, Delegates must be able to, unassisted:

1) Fit helmet and safety glasses on an unconscious injured person wearing a cervical collar
2) Fit a harness onto an unconscious injured person
3) Package an unconscious injured person on a rescue stretcher and on a spineboard.

ELEMENT 5.1 - PACKAGING THE INJURED PERSON

The Instructor shall explain how to:

5.1.1 Fit a harness onto an unconscious injured person, highlighting the importance of loosening the injured person's shoulder straps prior to fitting (to easily fit the harness correctly onto the injured person)

5.1.2 Package an unconscious injured person on a rescue stretcher and on a spineboard, adhering to the manufacturer's specifications

5.1.3 Each Delegate shall practice how to:

5.1.4 Prepare, fit and check cervical collar and fit PPE helmet and safety glasses on an unconscious injured person

5.1.5 Ensure open airways ("A") and breathing ("B") of the injured person on fitting completion and during the packaging of the injured person

5.1.6 Fit a harness onto an unconscious injured person

5.1.7 Package an unconscious injured person on a rescue stretcher and on a spineboard, adhering to the manufacturer's specifications

Lesson 6 - LOWERING/RAISING RESCUE SYSTEM

25 min.

The aim of this lesson is to introduce the Delegates to a lowering/raising rescue system for limited distance rescue purpose (rescue device, pulley system or similar), rigging setup options included.

To successfully complete this lesson of the Module, Delegates must be able to:

1) Explain the proper utilization of a specific lowering/raising rescue system
2) Explain how to attach, rig and secure the system.
3) Explain requirements, applications and limitations of the system
4) Explain the system's maximum raising distance possible
5) Explain rigging setup options i.e. ways to combine rescue equipment and PPE lanyards.

ELEMENT 6.1 - LOWERING/RAISING RESCUE SYSTEM

The Instructor shall explain and demonstrate:

6.1.1 Proper utilization of a specific lowering/raising rescue system

6.1.2 How to attach and rig the system and how to secure the rope

6.1.3 The requirements, applications and limitations of the system

6.1.4 The system's maximum raising distance possible

6.1.5 The principles of lifting angle, angle factor, deviation and edge protection

6.1.6 The above mentioned based on the manufacturer's specifications

6.1.7 How to use the rescue equipment to prepare and rig a zip line (areal ropeway) in a nacelle and transport for horizontal transportation

6.1.8 Examples of ways to combine rescue equipment and PPE lanyards to achieve an efficient rigging setup with the equipment available, and a minimum of re-rigging during the rescue operation.

Lesson 7 - HUB RESCUE EXERCISE 1+2 (FROM BLADE)

80 min.

Note: In teams of two incl. a team coordinator; 1 exercise per team; live injured person recommended

There are several locations on the turbine were occasionally work needs to take place with reduced horizontal and vertical space. Such as in a hub, spinner or blade.

The aim of this lesson is to enable the Delegates to perform injured person rescue operations, in a WTG blade and out of the hub.

To successfully complete this lesson of the Module, Delegates must be able to:

1) Explain common hazards/risks and control measures/risk mitigation in a WTG
2) Apply rescue methods and techniques in performing lowering/raising rescue operations, in a WTG blade
3) Perform rescue operations in a WTG blade using personal flashlight (e.g. helmet light), if required due to poor lighting conditions
4) Prepare, fit and check cervical collar and fit PPE helmet and safety glasses on the unconscious injured person
5) Fit a harness or improvised harness by the use of a rescue sling around the injured person's chest, and other PPE (e.g. helmet, safety glasses) onto an injured person, in an enclosed space in a WTG
6) Assess and determine the suitable attachment point on the injured person and/or spineboard/rescue stretcher, i.e. harness front or back attachment point and in the top or bottom of the spineboard/rescue stretcher
7) Perform the rescue operation from the incident scene fully aware of where the injured person is stuck and how to slowly lower/raise the injured person and carefully manipulate him out, constantly evaluating the rescue efforts
8) Package the unconscious injured person on a rescue stretcher or on a spineboard in a vertical configuration, adhering to the manufacturer's manual specifications
9) Package an injured person to enable safe transportation, by doing regular checks, using rescue equipment such as cervical collar and avoiding head down configuration of the unconscious injured person
10) Utilize safe and suitable (certified or structural) anchor points
11) Adhere to safe lifting angles of the rescue equipment
12) Explain the strain to the rescue equipment and anchor points, depending on the lifting angle
13) Apply deviation and edge protection to the lowering/raising rescue system rigging
14) Utilize a manually operated lowering/raising rescue system for limited distance rescue in a safe and proper manner as taught previously, adhering to the manufacturer's manual specifications
15) Perform the rescue operation using an injured person personal fall protection equipment backup system, if required (i.e. if the manually operated lowering/raising rescue system is not certified for person lifting)
16) Balance an injured person from a horizontal to a vertical configuration (and vice versa)

17) Act as the informal rescue team coordinator performing scene assessment and hazard identification, assessing and determining the rescue strategy

18) Perform clear and precise communication in a stressful rescue operation, both with members of the rescue team as a team coordinator and as a team member

19) Acknowledging the benefits of having a coordinator in a rescue team, and the responsibility that comes with it.

ELEMENT 7.1 - HUB RESCUE EXERCISE 1+2 (FROM BLADE)

The Instructor shall:

7.1.1 Highlight specific control measures to avoid injury during training relevant to this specific exercise scenario, according to section 1.6 Control measures to avoid injury during training

7.1.2 Introduce the specific exercise, including (to the extent needed):

a. Point out a team coordinator for the exercise, and introduce the tasks and responsibilities related to this function

b. Different rescue strategies, methods and techniques in order to optimize the rescue set up.

c. Highlight the considerations to determine where in the WTG to package the injured person on a rescue stretcher/spineboard

d. To guide and support the Delegates with exploring different rigging options of attaching the lowering/raising rescue system to the injured person or rescue stretcher/spineboard (i.e. harness front or back attachment point, or attachment point at the foot of the rescue stretcher/spineboard)

e. Highlight what injured person configuration to apply (i.e. horizontal or vertical configuration)

f. Highlight how to organize the rescue team to the specific rescue operation scenario (who does what)

7.1.3 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the Delegates) on completion of the rescue exercise efforts with a focus on:

a. Positive feedback

b. Improvement proposals and alternative solutions

c. Delegates' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualize and enhance learning transfer)

d. Delegate's risk mitigation during the exercise

Delegates shall demonstrate and on request explain, in a team, how to:

7.1.4 Identify and control the specific hazards/risks in the WTG during the rescue operation, e.g. Hazardous energies (mechanical, electrical, hydraulic, pneumatic, magnetic, pressurized substances - i.e. LOTO); Enclosed space areas (hazardous materials, low levels of oxygen); Poor lighting conditions; Dropped objects; Poor manual handling; Temperature/Working conditions (dehydration, heat stroke, exhaustion); Injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context); Slips and trips

7.1.5 Assess and determine the most optimum rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) for a rescue scenario in a WTG blade

7.1.6 Prepare the injured person for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard)

7.1.7 Rig and operate the lowering/raising rescue system in a proper manner aiming to achieve a safe and efficient rigging setup, including the utilization of an injured person personal fall protection equipment backup system, if required

7.1.8 Apply rescue methods, techniques and clear communication in performing safe lowering/raising rescue operations from inside a WTG blade

7.1.9 Perform regular checks of the injured person during the entire rescue operation

7.1.10 Perform a rescue operation, from a WTG blade, through the hub and e.g. out of the hub or into the nacelle

7.1.11 Perform the rescue effort as a team member or team coordinator

Lesson 8 - HUB RESCUE EXERCISE 3+4 (FROM SPINNER)

100 min.

Note: In teams of two incl. a team coordinator; 1 exercise per team; dummy recommended

The aim, learning objectives and elements mentioned in the lesson above (lesson 5) applies to this lesson as well - but from inside the spinner.

Additionally, to successfully complete this lesson of the Module, Delegates must be able to:

1) Transport the injured person to the escape hatch by means of a zip line (areal ropeway), to control the handling of injured person more efficiently and reduce manual handling.

ELEMENT 8.1 - HUB RESCUE EXERCISE 3+4 (FROM SPINNER)

The Instructor shall conduct the elements mentioned in the lesson elements above (lesson 5) which applies to this element as well - but related to the spinner

Additionally, the Instructor shall:

8.1.1 Highlight the relevant differences in rescue strategy of this specific exercise scenario, compared to the blade rescue strategy (anchor points, rigging of the lowering/raising rescue system, deviation, techniques, etc.)

8.1.2 Explain the concept of zip line (areal ropeway) in a nacelle, how to rig it and adhering hazards and risks.

ELEMENT 8.2 - HUB RESCUE EXERCISE 3+4 (FROM SPINNER)

Delegates shall demonstrate and on request explain, in a team, how to conduct the elements mentioned in the lesson elements above (lesson 5) which applies to this element as well - but related to the spinner

Additionally, Delegates shall demonstrate how to:

8.2.1 Rig a zip line (areal ropeway) in a nacelle and transport the injured person to the escape hatch

8.2.2 Perform rescue operations using personal flash light (e.g. helmet light), if required due to poor lighting conditions.

Lesson 9 - OUTSIDE EVACUATION OF INJURED PERSON

45 min.

Note: In teams of two; 1 exercise per team either passive rescue device setup with tagline or active rescue device setup; dummy recommended

The aim of this lesson is to enable the Delegates to evacuate an injured person in a safe and secure manner from the hub or nacelle, outside the tower, to a primary assembly area (ground or transition piece) and from transition piece to a secondary assembly area (vessel)

To successfully complete this lesson of the Module, Delegates must be able to:

1) Assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower
2) Explain how to mitigate interfering winds bringing down an injured person onto the transition piece during an outside evacuation by means of a passive rescue device setup, with tagline (to control the final descent of the injured person onto the transition piece)
3) Prepare the injured person for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard)
4) Manually transport an injured person on a rescue stretcher or spineboard - in a balanced way, in a WTG

5) Utilize safe and suitable (certified or structural) anchor points
6) Adhere to safe lifting angles of the rescue equipment
7) Apply deviation and edge protection to the evacuation device rigging
8) Utilize a rescue device in a passive setup (i.e. the rescue device fixed in the WTG) and attach the rescue device descending rope to the injured person harness and if possible to the rescue stretcher/spineboard, according to the injured person configuration (horizontal or vertical)
9) Utilize a rescue device in an active setup (i.e. the rescue device attached onto the injured person) but fix the rescue device carabiner to an extended connection to the injured person harness to avoid head injury and if possible connect it to the rescue stretcher/spineboard, according to the injured person configuration (horizontal or vertical)
10) Rig a fall restraint lanyard between the foot of the rescue stretcher/spineboard and the rescue device attachment carabiner on the injured person to balance the injured person in a perfect horizontal configuration, if required and possible
11) Ensure open airways ("A") and breathing ("B") of the injured person prior to evacuation
12) Load the injured person out of the WTG preferably feet first attending to avoid neck/head injury of the injured person due to hatchway opening contact, or load the injured person out of the WTG head first if this risk cannot be mitigated
13) Cautiously manipulate and balance/let go of the injured person out of the WTG when suspended by utilizing a tagline, at the same time aiming to avoid head down configuration of the unconscious injured person - preventing stomach content release
14) Perform clear and precise communication in a stressful rescue operation, both with members of the rescue team as a team coordinator and as a team member
15) Apply clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew) including coordinating the handover of an injured person
16) Perform an outside evacuation with the injured person in a horizontal configuration - from a WTG hub or nacelle to a primary assembly area (ground or transition piece) by means of a passive rescue device setup; or from a transition piece to a secondary assembly area (vessel) by means of an active or passive rescue device setup.

ELEMENT 9.1 - OUTSIDE EVACUATION OF INJURED PERSON - PRACTICAL EXERCISE

The Instructor shall:

9.1.1 Highlight specific control measures relevant to this specific exercise scenario, e.g. when to open evacuation hatch and/or provide fall restraint or fall arrest in (training) situations where fall from height is a risk - according to local legal requirements

9.1.2 Introduce the specific exercise, including:

a. Injured person configuration to apply (i.e. horizontal or vertical configuration)

b. Organise the rescue team to the specific evacuation scenario

c. What the Delegate must focus on during this exercise

9.1.3 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the Delegates) on completion of the rescue exercise efforts with a focus on:

a. Positive feedback

b. Improvement proposals and alternative solutions

c. Delegates' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualize and enhance learning transfer)

d. Delegate's risk mitigation during the exercise

Delegates shall demonstrate and on request explain, in a team, how to:

9.1.4 Identify and control the specific hazards/risks of the WTG during the evacuation

9.1.5 Assess and determine evacuation strategy (relevant evacuation route, method, technique, certified equipment and required personnel) for an evacuation scenario from a WTG hub or nacelle outside the tower

9.1.6 Prepare the injured person for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard)

9.1.7 Manually transport an injured person on a rescue stretcher or spineboard - in a balanced way - or by means of a zip line (areal ropeway) when relevant

9.1.8 Attach the rescue device to the injured person in a safe and proper manner.

9.1.9 Utilize tagline(s) during one exercise, when performing outside evacuation

9.1.10 Balance an injured person from a horizontal to a vertical position (and vice versa), in order to move the injured person downwards through hatches, or similar. Select and utilize Certified and structural anchor points

9.1.11 Apply the theory of Lifting angle, angle factor, deviation and edge protection

9.1.12 Rig and operate the lowering/raising rescue system in a proper manner aiming to achieve a safe and efficient rigging setup, including the utilization of an injured

person personal fall protection equipment backup system. Apply rescue methods, techniques and clear and precise communication in performing safe ascending/descending rescue operations from a WTG

9.1.13 Perform regular checks of the injured person during the entire rescue operation

9.1.14 Perform the rescue effort as a team member or team coordinator

9.1.15 Perform an outside evacuation with the injured person in a horizontal configuration, and the rescue device in a;

a. Passive setup, from a WTG hub or nacelle to a primary assembly area (ground or transition piece), or an

b. Active setup, from a transition piece to a secondary assembly area (vessel)

Lesson 10 - EVALUATION

15 min.

The aim of this lesson is to enable the Delegates to reflect on and process their learning outcome and key takeaways from the module, aiming to achieve a high learning transfer from the module to his/her way of work. Additionally, the aim is to give the Delegates the opportunity to conduct an open-minded written and oral formative evaluation of the training.

To successfully complete this lesson of the Module, Delegates must:

1) Show commitment to avoid incidents requiring a rescue operation
2) Show commitment to act out this value by demonstrating a pro-active approach and role model behaviour
3) Participate in the formative evaluation of the module in a constructive manner

ELEMENT 10.1 - REFLECTION SESSION

The Instructor shall:

10.1.1 Give the Delegates final feedback on the formal Delegate performance assessment and inform them whether they have passed (failed Delegates must be informed individually prior to the reflection session)

10.1.2 Help the Delegate to do a summative self-evaluation, i.e. mentally overview and assort what is learned, identify key takeaways and bridge the gap between what is learned during the module and applying it in his/her way of work. This can be achieved e.g. by an individual reflection session, question session and/or class discussion

10.1.3 Re-present the overall aims and objectives of the course for the Delegates' comparison on their learning outcome and meeting of their previously stated expectations of the course

10.1.4 Give an overall feedback and feed forward on the Delegates' learning outcome

10.1.5 Encourage the Delegates to examine and grow awareness of what specific elements in their own WTG type/WTG environment differ from the training scenario environment (to visualize and enhance learning transfer) and to discuss with colleagues advanced rescue methods and techniques under the local specific conditions identified after course completion

10.1.6 Motivate the Delegates to avoid incidents requiring rescue efforts during daily work and demonstrating a pro-active approach and role model behavior

Delegates shall:

10.1.7 Conduct an online or written formative evaluation of the module, as a minimum.

The Instructor shall:

10.1.8 Respond on relevant elements of any oral feedback from the Delegates.

10 NACELLE, TOWER & BASEMENT RESCUE

10.1 Aims and objectives of Nacelle, Tower & Basement Module

The aim of this module is to enable the delegate to perform injured person rescue operations in a WTG nacelle, tower and basement, by using industry standard rescue equipment, methods and techniques, exceeding those of GWO work at height.

The Nacelle, Tower and Basement Rescue module shall ensure that Delegates are able to;

1) Assess and determine rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) for various rescue scenarios, from the nacelle, tower or basement of a WTG
2) Assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower
3) Explain and demonstrate the identification and suitable selection of certified and structural anchor points, relevant for various rescue scenarios
4) Explain and apply the concept of lifting angle, angle factor and deviation
5) Explain national and local requirements and/or procedures for helicopter rescue in an WTG, including preparing the injured person, preparing the WTG, the Heli-pad safe zones and safe behaviour included
6) Explain and control common risks of hazardous energies and common hazards of enclosed space areas, when performing rescue operations
7) Apply rescue methods and techniques in performing descending and ascending rescue operations, from a WTG nacelle, tower and basement, using a rescue stretcher and spineboard, manually and power-driven lowering/raising rescue system (rescue device, pulley system or similar)
8) Fit a harness and other PPE (e.g. helmet, safety glasses) onto an injured person, in an enclosed space
9) Package an injured person on a rescue stretcher and spineboard in a vertical or horizontal configuration to enable safe transportation, by doing regular checks, using rescue equipment such as cervical collar and avoiding head down configuration of the unconscious injured person.
10) Manually transport an injured person on a rescue stretcher or spineboard - in a balanced way
11) Change directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa) when suspended
12) Perform rescue operations, in the nacelle, tower and basement, using safe and suitable (certified or structural) anchor points, lifting angles, deviation, and edge protection for the rescue equipment

13) Perform rescue operations using the casualties personal fall protection on the injured person - as fall protection backup, when required
14) Perform rescue operations in a WTG nacelle, tower and basement using personal flashlight (e.g. helmet light), if required due to poor lighting conditions
15) Act as the informal rescue team coordinator performing scene assessment and hazard identification, assessing and determining the rescue strategy and exercising clear communication
16) Perform clear and precise communication in a stressful rescue operation, both with members of the rescue team as a team coordinator and as a team member
17) Apply clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew) including coordinating the handover of an injured person
18) Transport an injured person horizontally over the length of the turbine, with the use of industry rescue equipment (zip line)
19) Transport an injured person to a higher platform, using rescue up techniques and equipment (both manual and power-driven) in a controlled and secure manner

Delegates will show signs of:

20) Acknowledging the benefits of having a coordinator in a rescue team, and the responsibility that comes with it
21) Taking part in discussing which advanced rescue preparations, and emergency and communication procedures, apply in their own organization
22) Committing themselves to avoid incidents from where they may be exposed to a rescue operation
23) Committing themselves to act out this value by demonstrating a pro-active approach and role model behaviour.

10.2 Competencies of the Nacelle, Tower & Basement Module

1) Perform descending and ascending rescue operations from an enclosed space in a WTG nacelle, tower and basement, to a primary assembly area (ground or transition piece) or a secondary assembly area (vessel), using industry standard rescue equipment

Note: Rescue scenarios where the injured person is located on the outside of the nacelle and on the outside of the tower are not included

2) Perform these rescue operations in teams acting as the rescue team coordinator
3) Prepare an injured person for helicopter rescue from a WTG.

10.3 Duration of the Nacelle, Tower & Basement Module

The total contact time for completing this module is estimated to be 14 hours. This is based on the time estimate given in the module timetable.

The training provider must not exceed the times per day given in table 10-3 below.

The training provider must ensure that sufficient time is allowed for delegates with prior experience to share their experiences related to the module in a way that is constructive for the entire class.

	Maximum duration per day
Contact time	8 hours
Total training day	10 hours

Table 10-3 - Maximum durations for training day

Note: Contact time includes delivery of course lesson contents, practical exercises and activities directly related to these**.**

The total training day includes contact time, meals and breaks and travel between training sites (where applicable).

10.4 Nacelle, Tower & Basement Trainer/Delegate Ratio

The ratio shown for theory sessions indicates the maximum number of Delegates that can attend the course

The ratio shown for practical sessions indicates the maximum number of Delegates to be supervised by one instructor during each activity.

Module	Session	Trainer – Delegate Ratio
Nacelle, Tower and Basement Module	Theory	1:12
	Practical	1:4

Table 10-4 - GWO NTB instructor to delegate ratio

10.5 Equipment for Nacelle, Tower & Basement Module

The equipment required for training as listed in Annex 3 must be available and must fulfil national legal requirements as listed in table A3-2 in annex 3 where applicable.

10.6 Nacelle, Tower & Basement Module Time Table

The order in which the elements of this training Module are delivered may vary.

Within the module timetables, approximate duration of each of the lessons are given. The training provider may choose to deliver elements of the training according to other

timetables, as long as the total duration is not reduced, and total duration of practical elements is not reduced in length. Theoretical elements may be delivered during the practical exercises when feasible.

Note: The stated 'FLEXITIME' of the Timetable must be utilized for theoretical and/or practical course

Lesson		Element		Approx. Duration
1	Introduction	1.1	Safety Instructions and Emergency Procedures Facilities Instructor & Delegate Presentation Overall Aim & Objectives and Agenda Motivation On-Going Assessment	
			TOTAL	**30 min.**
2	Emergency Response Plan in Your Own Organization	2.1	Emergency Response Plan in Your Own Organization	
		2.2	Evacuation Strategy	
			TOTAL	**30 min.**
3	Control measures to prevent injury during training (Day 1 + 2)	3.1	Preparations for today's training, incl. - Inspection/don PPE - Control measures to prevent injury during training - Warm-up	
			TOTAL	**35 min.**
4	Cervical Collar	4.1	Utilization of Cervical Collar	
			TOTAL	**25 min.**
5	Packaging the Injured person	5.1	Packaging the Injured person	
			TOTAL	**50 min.**
6	Lowering/Raising Rescue System	6.1 6.2	Lowering/Raising Rescue System Rigging setup options - combining rescue equipment and PPE lanyards	
			TOTAL	**25 min.**
7	Evacuation of an injured person from the Nacelle to the Base of the Tower	7.1	Practical exercise Evacuation inside and outside of tower	
			TOTAL	**120 min.**
8	Rescue from Enclosed Space	8.1	Enclosed Space Rescue - Exercises	
			TOTAL	**110 min.**
9	Rescue from Crawl Space		Rescue from Crawl Space - Exercises	
			TOTAL	**200 min.**
10	Rescue Up	10.1	Rescue Up - Introduction	

		10.2	Rescue Up, Inside and Outside of the Tower - Practical Exercises	
			TOTAL	**90 min.**
11	Evaluation	11.1 11.2	Reflection Session Formative Evaluation	
			TOTAL	**20 min.**
			SUB TOTAL	**735 min.**
			FLEXITIME	105 min.
			GRAND TOTAL	**840 min.**

Table 10-6 - GWO Nacelle, Tower & Basement module timetable

10.7 Detailed description of the Nacelle, Tower & Basement Module

The learning outcomes specified for the Nacelle, Tower & Basement Module are:

Note: The administrative part of the registration should be carried out before the course commences.

Lesson 1 - INTRODUCTION

30 min.

The aim of this lesson is to introduce the Delegates to the course, each other, the facilities and what is expected of them during the course.

To successfully complete this lesson of the Module, Delegates must be able to:

1) Explain the safety rules and emergency procedures of the training facilities
2) Locate emergency exits and equipment, and relevant training facilities
3) Recognize who the instructor and other Delegates are
4) Describe the main aim and main learning objectives
5) Explain the on-going assessment according to delegates assessment form.
6) State own expectations for the course

ELEMENT 1.1 - SAFETY INSTRUCTIONS AND EMERGENCY PROCEDURES

The Instructor shall explain:

1.1.1 Safety instructions according to internal procedures

1.1.2 Emergency procedures and emergency exits in the areas where the Delegates will be located during the course.

ELEMENT 1.2 - FACILITIES

The Instructor shall give:

1.2.1 A general description of the on-site facilities (Administration, dining area, restrooms, etc.)

ELEMENT 1.3 - INSTRUCTOR & DELEGATE PRESENTATION

The Instructor shall:

1.3.1 Ensure that all Delegates are registered with a personal Delegate profile in WINDA and have provided their WINDA ID prior to completing the training course.

1.3.2 Give a short introduction, including their backgrounds as instructors

Delegates shall:

1.3.3 Give a short introduction, including their job function, onshore/offshore experience, time of employment in the wind industry, and expected primary geographic work location, etc.

1.3.4 Present his/her own expectations for the course.

ELEMENT 1.4 - OVERALL AIM & OBJECTIVES AND AGENDA

The Instructor shall explain:

1.4.1 The overall aim & objectives and agenda of this ART Module, highlighting the rescue team coordinator functionality.

ELEMENT 1.5 - MOTIVATION

The Instructor shall explain:

1.5.1 Why advanced rescue preparedness and skills are relevant

1.5.2 The importance of personal involvement in the course

1.5.3 How the Delegates will be challenged, and why

ELEMENT 1.6 - ON-GOING ASSESSMENT

The Instructor shall explain:

1.6.1 The reasons for the on-going assessment

1.6.2 The GWO Delegate assessment form and its use

1.6.3 What is expected of the Delegates

Lesson 2 - EMERGENCY RESPONSE PLAN IN YOUR OWN ORGANIZATION

30 min.

The aim of this lesson is to raise awareness on emergency response planning and evacuation strategy. This is to inspire the Delegates on what information to search for concerning what specific rescue preparations and rescue procedures apply in their own organisation.

To successfully complete this lesson of the Module, Delegates must:

1) Take part in discussing what specific rescue preparations, and emergency, communication and command procedures, apply in their own organization
2) Recognize the limitations of the rescue preparations available, when deciding on the rescue strategy
3) Explain what to consider when deciding on evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower.

ELEMENT 2.1 - EMERGENCY RESPONSE PLAN IN YOUR OWN ORGANIZATION

The Instructor and Delegate's shall discuss:

2.1.1 What specific nacelle/tower/basement rescue preparations and emergency and communication procedures apply in their own organization, e.g. concerning:

2.1.2 Number of rescue personnel available (on site) for a rescue operation and availability of additional rescue personnel

2.1.3 Rescue training level depending on your work location in the WTG and number of personnel (e.g. working in the hub, or in the tower)

2.1.4 Communication procedures of operation, e.g. communication to backup/rescue team, Emergency Medical Treatment (EMT) i.e. ambulance and fire service, Site Lead, service vessel, helicopter Search And Rescue (SAR), and the means of communication - radio or phone (cell, IP or satellite phone)

2.1.5 Command procedures of operation, e.g. site lead command or command in rescue team

2.1.6 National and/or local requirements (e.g. confined space regulations and procedures)

2.1.7 Estimated time for professional emergency response providers to arrive

2.1.8 What to be aware of (during this training) concerning what specific elements in their own WTG type/WTG environment might differ from the training scenario environment (to visualize and enhance learning transfer), e.g.

2.1.9 Turbine design (e.g. layout, pathways, access ways, components, obstacles, hatches, Heli pad)

2.1.10 Anchor points (certified/structural/location)

2.1.11 Rescue equipment (type/quantity/location)

2.1.12 Emergency light (system/equipment)

ELEMENT 2.2 - EVACUATION STRATEGY

The Instructor shall:

2.2.1 Explain how to assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower - by considering the medical condition of the injured person, time constraints, transition piece size and configuration, nacelle position to the wind, evacuation hatch location, and interfering wind speeds, wind directions, temperatures and wind chill factor

2.2.2 Explain how to mitigate transition piece size and configuration, nacelle position to the wind, evacuation hatch location and interfering wind speeds and wind directions, bringing down an injured person by an outside evacuation;

a. From a nacelle to a transition piece - by means of a passive rescue device setup, and tagline if beneficial

b. From a transition piece to a vessel - by means of an active or passive rescue device setup, and tagline if beneficial

2.2.3 Explain the challenges, methods and techniques of evacuating an injured person from a transition piece to a vessel - highlighting pros and cons on passive or active rescue device setup, communication with vessel crew, and procedures and techniques on how to put down the injured person cautiously on a vessel moving up/down in the swell

2.2.4 Demonstrate proper use of a specific rescue device

2.2.5 Demonstrate how to attach and rig the rescue device in passive setup and how to secure the rope

2.2.6 Explain the requirements, applications and limitations of the device

2.2.7 Explain the common additional rope's length compared to the specific WTG height

2.2.8 Explain/demonstrate the above mentioned based on the manufacturer's specifications

2.2.9 Explain pros and cons of utilizing a rescue stretcher type with lifting bridles versus a rescue stretcher/spineboard type without lifting bridles versus no rescue stretcher/spineboard, for an outside evacuation

2.2.10 Explain and demonstrate how to attach and rig the rescue device in a passive and active setup, respectively, and how to utilize a fall restraint lanyard onto the setup to balance the injured person in a perfect horizontal configuration, if required and possible

2.2.11 Explain how to load the injured person out of the WTG preferably feet first attending to avoid neck/head injury of the injured person due to hatchway

opening contact, or load the injured person out of the WTG head first if this risk cannot be mitigated

2.2.12 Explain how to cautiously manipulate and balance/let go of the injured person out of the WTG when suspended by utilizing a tagline, at the same time aiming to avoid head down configuration of the unconscious injured person - preventing stomach content release

Lesson 3 - CONTROL MEASURES TO PREVENT INJURY DURING TRAINING (DAY 1 + 2)

35 min.

The Instructor shall:

3.1.1 Explain further control measures relevant for the specific training facilities and training to avoid injury during training, e.g.

3.1.2 Ensure relevant Lock Out Tag Out (LOTO) actions of the relevant training facilities have been conducted, and communicate the LOTO status to the Delegates prior to commencing practical exercises

3.1.3 Lead a warm-up session of the major muscle groups of the body and ankles, wrists and back, ref: annex 3: Guideline for Warm-up exercises

Delegates shall:

3.1.4 Perform a user inspection of their Personal Fall Protection Equipment

3.1.5 Take part in the warm-up of the major muscle groups of the body and ankles, wrists and back.

Lesson 4 - CERVICAL COLLAR

25 min.

Note: Exercises in teams of two; 2 exercises per Delegate - 1 sitting, 1 lying down; live injured person recommended

The aim of this lesson is to enable the Delegates to utilize a cervical collar to ensure open airways and breathing of an injured person during a rescue operation.

To successfully complete this lesson of the Module, Delegates must be able to:

1) Prepare and fit a cervical collar onto an unconscious injured person
2) Check the correct application of the cervical collar on the injured person

3) Ensure open airways ("A") and breathing ("B") of the injured person on fitting completion
4) Fit helmet and safety glasses on an unconscious injured person wearing a cervical collar
5) Demonstrate the above-mentioned skills on an injured person sitting and on an injured person lying down

ELEMENT 4.1 - UTILIZATION OF CERVICAL COLLAR

The Instructor shall explain and demonstrate on an injured person how to, unassisted:

4.1.1 Prepare and fit cervical collar

4.1.2 Fit injured person PPE, i.e. helmet and safety glasses

4.1.3 Ensure correct application by doing product specific checks of the cervical collar

4.1.4 Ensure open airways ("A") and breathing ("B") of the injured person on fitting completion

Each Delegate shall practice how to:

4.1.5 Prepare, fit and check cervical collar and fit helmet and safety glasses on an injured person sitting and on an injured person lying down

4.1.6 Ensure open airways ("A") and breathing ("B") of the injured person on fitting completion

Lesson 5 - PACKAGING THE INJURED PERSON

50 min.

Note: Exercises in teams of two; 1 exercise per Delegate; live injured person recommended

The aim of this lesson is to enable the Delegates to fit a harness onto the injured person and package him onto a rescue stretcher and on a spineboard, to enable safe transportation of the injured person.

To successfully complete this lesson of the Module, Delegates must be able to, unassisted:

1) Fit helmet and safety glasses on an unconscious injured person wearing a cervical collar
2) Fit a harness onto an unconscious injured person
3) Package an unconscious injured person on a rescue stretcher and on a spineboard

ELEMENT 5.1 - PACKAGING THE INJURED PERSON

The Instructor shall explain how to:

5.1.1 Fit a harness onto an unconscious injured person, highlighting the importance of loosening the injured person's shoulder straps prior to fitting (to easily fit the harness correctly onto the injured person)

5.1.2 Package an unconscious injured person on a rescue stretcher and on a spineboard, adhering to the manufacturer's specifications

Each Delegate shall practice how to:

5.1.3 Prepare, fit and check cervical collar and fit PPE helmet and safety glasses on an unconscious injured person

5.1.4 Ensure open airways ("A") and breathing ("B") of the injured person on fitting completion and during the packaging of the injured person

5.1.5 Fit a harness onto an unconscious injured person

5.1.6 Package an unconscious injured person on a rescue stretcher and on a spineboard, adhering to the manufacturer's specifications.

Lesson 6 - LOWERING/RAISING RESCUE SYSTEM

25 min.

The aim of this lesson is to introduce the Delegates to a lowering/raising rescue system for limited distance rescue purpose (rescue device, pulley system or similar), rigging setup options included.

To successfully complete this lesson of the Module, Delegates must be able to:

1) Explain the proper utilization of a specific lowering/raising rescue system
2) Explain how to attach, rig and secure the system
3) Explain requirements, applications and limitations of the system
4) Explain the system's maximum raising distance possible
5) Explain rigging setup options i.e. ways to combine rescue equipment and PPE lanyards.

ELEMENT 6.1 - LOWERING/RAISING RESCUE SYSTEM

The Instructor shall explain and demonstrate:

6.1.1 Proper utilization of a specific lowering/raising rescue system

6.1.2 How to attach and rig the system and how to secure the rope

6.1.3 The requirements, applications and limitations of the system

6.1.4 The system's maximum raising distance possible

6.1.5 The principles of lifting angle, angle factor, deviation and edge protection

6.1.6 The above mentioned based on the manufacturer's specifications

6.1.7 How to use the rescue equipment to prepare and rig a zip line (areal ropeway) in a nacelle and transport for horizontal transportation

6.1.8 Examples of ways to combine rescue equipment and PPE lanyards to achieve an efficient rigging setup with the equipment available, and a minimum of re-rigging during the rescue operation

ELEMENT 6.2 - EVACUATION STRATEGY

20 min.

The Instructor shall:

6.2.1 Explain how to assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower - by considering the emotional state and medical status of the injured person, time constraints, transition piece size and configuration, nacelle position to the wind, evacuation hatch location, and interfering wind speeds, wind directions, temperatures and wind chill factor

6.2.2 Explain how to mitigate transition piece size and configuration, nacelle position to the wind, evacuation hatch location and interfering wind speeds and wind directions, bringing down an injured person by an outside evacuation;

a. From a hub/nacelle to a transition piece - by means of a passive rescue device setup, and tagline if beneficial

b. From a transition piece to a vessel - by means of an active or passive rescue device setup, and tagline if beneficial

6.2.3 Explain the challenges, methods and techniques of evacuating an injured person from a transition piece to a vessel - highlighting pros and cons on passive or active rescue device setup, communication with vessel crew, and procedures and techniques on how to put down the injured person cautiously on a vessel moving up/down in the swell

6.2.4 Demonstrate proper use of a specific rescue device

6.2.5 Demonstrate how to attach and rig the rescue device in passive setup and how to secure the rope

6.2.6 Explain the requirements, applications and limitations of the device

6.2.7 Explain the common additional rope's length compared to the specific WTG height

6.2.8 Explain/demonstrate the above mentioned based on the manufacturer's specifications

6.2.9 Explain pros and cons of utilizing a rescue stretcher type with lifting bridles versus a rescue stretcher/spineboard type without lifting bridles versus no rescue stretcher/spineboard, for an outside evacuation

6.2.10 Explain and demonstrate how to attach and rig the rescue device in a passive and active setup, respectively, and how to utilize a fall restraint lanyard onto the setup to balance the injured person in a perfect horizontal configuration, if required and possible

6.2.11 Explain how to load the injured person out of the WTG preferably feet first attending to avoid neck/head injury of the injured person due to hatchway opening contact, or load the injured person out of the WTG head first if this risk cannot be mitigated

6.2.12 Explain how to cautiously manipulate and balance/let go of the injured person out of the WTG when suspended by utilizing a tagline, at the same time aiming to avoid head down configuration of the unconscious injured person - preventing stomach content release.

Lesson 7 - EVACUATION OF AN INJURED PERSON FROM THE NACELLE TO THE BASE OF THE TOWER

120 min.

Note: Dummy recommended; exercises in teams incl. a team coordinator:

Note: In teams of two-four, 1 inside evacuation exercise per Delegate from nacelle to primary assembly area (ground/transition piece), and rescue device in active setup.

Note: In teams of two, 1 outside evacuation exercise per team - from nacelle to primary assembly area (ground/transition piece), and rescue device in passive setup with tagline.

Note: Each exercise includes: Rescue strategy planning, rescue efforts and Instructor-Led evaluation.

The aim of this lesson is to enable the Delegates to evacuate an injured person in a safe and secure manner from the hub or nacelle, inside and outside the tower, to a primary assembly area (ground or transition piece) and from transition piece to a secondary assembly area (vessel)

To successfully complete this lesson of this Module, delegates must be able to:

1) Assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower
2) Explain and demonstrate the identification and suitable selection of certified and structural anchor points, relevant for various rescue scenarios, relevant for various rescue scenarios
3) Explain and apply the concept of lifting angle, angle factor and deviation.
4) Explain and control common risks of hazardous energies and common hazards of enclosed space areas in a WTG, when performing rescue operations

5) Apply rescue methods and techniques in performing descending rescue operations, from a WTG to a primary assembly area (ground or transition piece) and a secondary assembly area (vessel), using a rescue stretcher and spineboard, lowering/raising rescue system (rescue device, pulley system or similar)
6) Fit a harness or improvised harness by the use of a rescue sling around the injured person's chest, and other relevant PPE (e.g. helmet, safety glasses) onto an injured person, in an enclosed space
7) Package an injured person on a rescue stretcher and spineboard in a vertical or horizontal configuration to enable safe transportation, by doing regular checks, using rescue equipment such as cervical collar and avoiding head down configuration of the unconscious injured person.
8) Manually transport an injured person on a rescue stretcher and on a spineboard - in a balanced way
9) Change directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa), when suspended
10) Perform rescue operations, in the nacelle, tower and basement, using safe and suitable (certified or structural) anchor points, lifting angles, deviation, and edge protection for the rescue equipment
11) Perform rescue operations, using the casualties personal fall protection on the injured person - as fall protection backup, if required
12) Perform evacuation of an injured person from the nacelle to the base of the tower using personal flashlight (e.g. helmet light), if required due to poor lighting conditions
13) Act as the informal rescue team coordinator performing scene assessment and hazard identification, assessing and determining the rescue strategy
14) Perform clear and precise communication in a stressful rescue operation, both with members of the rescue team as a team coordinator and as a team member
15) Apply clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew) including coordinating the handover of an injured person
16) Acknowledging the benefits of having a coordinator in a rescue team, and the responsibility that comes with it
17) Taking part in discussing which advanced rescue preparations, and emergency and communication procedures, apply in their own organisation.

ELEMENT 7.1 - PRACTICAL EXERCISE EVACUATION INSIDE AND OUTSIDE OF TOWER

The Instructor shall:

7.1.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario, according to section 2.6 Control measures to avoid injury during training

7.1.2 Introduce the specific exercise, including (to the extent needed):

a. Point out a team coordinator for the exercise, and introduce the tasks and responsibilities related to this function

b. Introduce relevant rescue strategy, method and technique

c. Highlight the considerations to determine where in the WTG to package the injured person on a rescue stretcher/spineboard

d. Highlight what injured person configuration to apply (i.e. horizontal or vertical configuration)

e. Highlight where to attach the lowering/raising rescue system to the injured person or rescue stretcher/spineboard (i.e. harness front or back attachment point,

f. Highlight how to organize the rescue team to the specific rescue operation scenario (who does what)

g. What specific elements/course contents the instructor's assessment will include

7.1.3 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the Delegates) on completion of the rescue exercise efforts with a focus on:

a. Positive feedback

b. Improvement proposals and alternative solutions

c. Delegates' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualize and enhance learning transfer)

d. Delegate's risk mitigation during the exercise.

7.1.4 The Instructor shall guide and support the Delegates with applying:

a. Manually operated lowering and raising systems.

b. Fall protection backup of injured person, if required

Delegates shall demonstrate and on request explain, in a team, how to:

7.1.5 Identify and control the specific hazards/risks in the WTG during the rescue operation, e.g. Hazardous energies (mechanical, electrical, hydraulic, pneumatic, magnetic, pressurized substances - i.e. LOTO); Enclosed space areas (hazardous materials, low levels of oxygen); Poor lighting conditions; Dropped objects; Poor

manual handling; Temperature/Working conditions (dehydration, heat stroke, exhaustion); Injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context); Slips and trips

7.1.6 Assess and determine evacuation strategy (relevant rescue method, route technique, certified equipment, and required personnel) for a rescue scenario in a WTG

7.1.7 Prepare the injured person (live injured person preferred) for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard)

7.1.8 Manually transport an injured person (dummy) on a rescue stretcher or spineboard - in a balanced way - or by means of a zip line (areal ropeway) when relevant

7.1.9 Attach the rescue device to the injured person (dummy) in a safe and proper manner

7.1.10 Utilize tagline(s) during one exercise, when performing outside evacution

7.1.11 Balance an injured person (dummy) from a horizontal to a vertical position (and vice versa), in order to move the injured person downwards through hatches, or similar.

7.1.12 Select and utilize Certified and structural anchor points

7.1.13 Apply the theory of Lifting angle, angle factor, deviation and edge protection

7.1.14 Rig and operate the lowering/raising rescue system in a proper manner aiming to achieve a safe and efficient rigging setup, including the utilization of an injured person personal fall protection equipment backup system

7.1.15 Apply rescue methods, techniques and clear and precise communication in performing safe ascending/descending rescue operations from a WTG

7.1.16 Perform regular checks of the injured person during the entire rescue operation

7.1.17 Perform the rescue effort as a team member or team coordinator

7.1.18 Perform an evacuation (dummy), with the rescue device in a passive setup for evacuation outside of the tower, from the WTG nacelle to a primary assembly area (ground or transition piece)

7.1.19 Perform an evacuation (dummy), with the rescue device in an active setup for evacuation inside the tower, from the WTG nacelle to a primary assembly area (ground or transition piece), i.e. the rescuer controlling the descent located below the injured person, carrying the rope bag with him

7.1.20 Perform an evacuation (dummy), with the rescue device in an active setup, from a transition piece to a secondary assembly area (vessel)

Lesson 8 - RESCUE FROM ENCLOSED SPACE

110 min.

Note: Dummy recommended; exercises in teams of two incl. a team coordinator; 2 exercises per team.

Note: Each exercise includes: Rescue strategy planning, rescue efforts and Instructor-Led evaluation.

There are several locations on the turbine were occasionally work needs to take place with reduced horizontal and vertical space. Such as in the basement/transition piece, yaw section, transformer room or between canopy and generator of a Direct Drive WTG.

The aim of this lesson is for the delegates to be able to apply various techniques to evacuate an injured person from an area with restricted manoeuvrability, filled with sufficient simulated assets, to a location were first aid can be administered.

To successfully complete this lesson of the Module, delegates must be able to:

1) Apply the techniques to successfully rescue the injured person from the enclosed space, in a controlled manner
2) Assess and determine rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) in an enclosed space scenario
3) Explain and demonstrate the identification and suitable selection of certified and structural anchor points, for relevant enclosed space scenarios
4) Explain and apply the concept of lifting angle, angle factor and deviation
5) Explain and control common risks of hazardous energies and common hazards of enclosed space areas in a WTG, when performing rescue operations
6) Apply rescue methods and techniques in performing descending and ascending rescue operations, from a WTG, using a rescue stretcher and spineboard, lowering/raising rescue system (rescue device, pulley system or similar)
7) Fit a harness or improvised harness by the use of a rescue sling around the injured person's chest, and other PPE (e.g. helmet, safety glasses) onto an injured person, in an enclosed space
8) Assess and determine the suitable attachment point on the injured person and/or spineboard/rescue stretcher, i.e. harness front or back attachment point and in the top or bottom of the spineboard/rescue stretcher
9) Perform the rescue operation from the incident scene fully aware of where the injured person is stuck and how to slowly lower/raise the injured person and carefully manipulate him out, constantly evaluating the rescue efforts
10) Package an injured person on a rescue stretcher and spineboard in a vertical or horizontal configuration to enable safe transportation, by doing regular checks,

using rescue equipment such as cervical collar and avoiding head down configuration of the unconscious injured person.

11) Manually transport an injured person on a rescue stretcher or spineboard - in a balanced way
12) Change directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa), in a WTG, when suspended
13) Perform rescue operations, in the nacelle, tower and basement, using safe and suitable (certified or structural) anchor points, lifting angles, deviation, and edge protection for the rescue equipment
14) Perform rescue operations, in a WTG, using the casualties personal fall protection on the injured person - as fall protection backup, if required.
15) Perform rescue operations in a WTG enclosed space using personal flashlight (e.g. helmet light), if required due to poor lighting conditions
16) Act as the informal rescue team coordinator performing scene assessment and hazard identification, assessing and determining the rescue strategy
17) Perform clear and precise communication in a stressful rescue operation, both with members of the rescue team as a team coordinator and as a team member
18) Apply clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew) including coordinating the handover of an injured person
19) Transporting an injured person horizontally over the length of the turbine, with the use of industry rescue equipment (zip line)
20) Acknowledging the benefits of having a coordinator in a rescue team, and the responsibility that comes with it.

ELEMENT 8.1 - RESCUE FROM ENCLOSED SPACE - EXERCISES

The Instructor shall:

8.1.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario, according to section 2.6 Control measures to avoid injury during training

8.1.2 Introduce the specific exercise, including (to the extent needed):

a. Point out a team coordinator for the exercise, and introduce the tasks and responsibilities related to this function
b. Different rescue strategies, methods and techniques in order to optimize the rescue set up, e.g. refresh how to rig a zip line (areal ropeway) and/or methods/techniques to evacuate from transition piece to secondary assembly area (vessel)

c. To highlight the considerations to determine where in the WTG to package the injured person on a rescue stretcher/spineboard

d. To guide and support the Delegates with exploring different rigging options of attaching the lowering/raising rescue system to the injured person or rescue stretcher/spineboard (i.e. harness front or back attachment point, or attachment point at the foot of the rescue stretcher/spineboard

e. To highlight what injured person configuration to apply (i.e. horizontal or vertical configuration)

f. To highlight how to organize the rescue team to the specific rescue operation scenario (who does what)

g. What specific elements/course contents the instructor's assessment will include

8.1.3 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the Delegates) on completion of the rescue exercise efforts with a focus on:

a. Positive feedback

b. Improvement proposals and alternative solutions

c. Delegates' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualize and enhance learning transfer)

d. Delegate's risk mitigation during the exercise.

8.1.4 The Instructor shall guide and support the Delegates with applying:

a. Manually operated lowering and raising systems.

b. Fall protection backup of injured person, if required

Delegates shall demonstrate and on request explain, in a team, how to:

8.1.5 Identify and control the specific hazards/risks in the WTG during the rescue operation, e.g. Hazardous energies (mechanical, electrical, hydraulic, pneumatic, magnetic, pressurized substances - i.e. LOTO); Enclosed space areas (hazardous materials, low levels of oxygen); Poor lighting conditions; Dropped objects; Poor manual handling; Temperature/Working conditions (dehydration, heat stroke, exhaustion); Injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context); Slips and trips

8.1.6 Assess and determine the most optimum rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) for a rescue scenario in a WTG

8.1.7 Prepare the injured person for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard)

8.1.8 Balance an injured person from a horizontal to a vertical position (and vice versa), in order to move the injured person downwards through hatches, or similar

8.1.9 Apply proper manual handling techniques when transporting the injured person in a balanced and secure way

8.1.10 Select and utilize Certified and structural anchor points

8.1.11 Apply the theory of Lifting angle, angle factor, deviation and edge protection

8.1.12 Rig and operate the lowering/raising rescue system in a proper manner aiming to achieve a safe and efficient rigging setup, including the utilization of an injured person personal fall protection equipment backup system, if required

8.1.13 Apply rescue methods, techniques and precise and clear communication in performing safe lowering/raising rescue operations from a WTG

8.1.14 Perform regular checks of the injured person during the entire rescue operation

8.1.15 Perform the rescue effort as a team member or team coordinator

8.1.16 Show acknowledgement of the added value of having a team coordinator

8.1.17 Conduct a rescue operation in poor lighting conditions

8.1.18 Transport the injured person to the escape hatch by means of a zip line (areal ropeway), to control the handling of injured person more efficiently and reduce manual handling.

Lesson 9 - RESCUE FROM CRAWL SPACE

200 min.

Note: Live injured person recommended; exercises in teams of two-four incl. a team coordinator; min. 6 exercises in total.

Note: Each exercise includes: Rescue strategy planning, rescue efforts and Instructor-Led evaluation

There are several locations on the turbine were occasionally work needs to take place with strongly reduced vertical space, such as in a transformer room, behind a generator or underneath a gearbox, main bearing or under the floor.

The aim of this lesson is to enable the delegates to rescue an injured person from a crawl space to a location were first aid can be administered.

To successfully complete this lesson of the Module, Delegates must be able to:

1) apply the techniques to successfully rescue the injured person from the crawl space, in a controlled manner

2) Assess and determine rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) in a crawl space scenario
3) Explain and demonstrate the identification and suitable selection of certified and structural anchor points, for relevant crawl space scenarios
4) Explain and apply the concept of lifting angle, angle factor and deviation
5) Explain and control common risks of hazardous energies and common hazards of crawl space areas in a WTG, when performing rescue operations
6) Apply rescue methods and techniques in performing a rescue operation, from a crawl space, covering efforts with and without rescue equipment to ensure the most optimum result
7) Fit a harness or improvised harness by the use of a rescue sling around the injured person's chest, and other PPE (e.g. helmet, safety glasses) onto an injured person, in a crawl space
8) Assess and determine the suitable attachment point on the injured person and/or spineboard/rescue stretcher, i.e. harness front or back attachment point and in the top or bottom of the spineboard/rescue stretcher
9) Perform the rescue operation from the incident scene fully aware of where the injured person is stuck and how to slowly lower/raise the injured person and carefully manipulate him out, constantly evaluating the rescue efforts
10) Perform rescue operations using safe and suitable (certified or structural) anchor points, lifting angles, deviation, and edge protection for the rescue equipment.
11) Perform rescue operations, using the casualties personal fall protection on the injured person - as fall protection backup, if required
12) Prepare the injured person for safe transportation, by doing regular checks, using rescue equipment such as cervical collar and avoiding head down configuration of the unconscious injured person.
13) Act as the informal rescue team coordinator performing scene assessment and hazard identification, assessing and determining the rescue strategy
14) Perform clear and precise communication in a stressful rescue operation, both with members of the rescue team as a team coordinator and as a team member
15) Apply clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew) including coordinating the handover of an injured person
16) Acknowledging the benefits of having a coordinator in a rescue team, and the responsibility that comes with it.

ELEMENT 9.1 - RESCUE FROM CRAWL SPACE - EXERCISES

The Instructor shall:

9.1.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario, according to section 2.6 Control measures to avoid injury during training

9.1.2 Introduce the specific exercise, including (to the extent needed):

a. Point out a team coordinator for the exercise, and introduce the tasks and responsibilities related to this function. Different rescue strategies, methods and techniques in order to optimise the rescue setup

b. To highlight the considerations to determine where in the WTG to package the injured person on a rescue stretcher/spineboard

c. To guide and support the Delegates with exploring different rigging options of attaching the lowering/raising rescue system to the injured person or rescue stretcher/spineboard (i.e. harness front or back attachment point, or attachment point at the foot of the rescue stretcher/spineboard

d. To highlight how to organize the rescue team to the specific rescue operation scenario (who does what)

e. What specific elements/course contents the instructor's assessment will include

9.1.3 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the Delegates) on completion of the rescue exercise efforts with a focus on:

a. Positive feedback

b. Improvement proposals and alternative solutions

c. Delegates' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualize and enhance learning transfer)

d. Delegate's risk mitigation during the exercise

9.1.4 The Instructor shall guide and support the Delegates with applying:

a. Manually operated lowering and raising systems.

b. Fall protection backup of injured person, if required

Delegates shall demonstrate and on request explain, in a team, how to:

9.1.5 Identify and control the specific hazards/risks in the WTG during the rescue operation, e.g. Hazardous energies (mechanical, electrical, hydraulic, pneumatic, magnetic, pressurized substances - i.e. LOTO); Enclosed space areas (hazardous materials, low levels of oxygen); Poor lighting conditions; Dropped objects; Poor manual handling; Temperature/Working conditions (dehydration, heat stroke,

exhaustion); Injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context); Slips and trips

9.1.6 Prepare the injured person for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard)

9.1.7 Apply proper manual handling techniques when transporting the injured person in a balanced and secure way

9.1.8 Select and utilize certified and structural anchor points

9.1.9 Apply the theory of Lifting angle, angle factor, deviation and edge protection.

9.1.10 Rig and operate a manually operated rescue system to horizontally transport the injured person and how to mitigate the challenges of a horizontal rescue enabling a safe rescue operation

9.1.11 Apply rescue methods, techniques and precise and clear communication in performing safe lowering/raising rescue operations from a WTG

9.1.12 Perform regular checks of the injured person during the entire rescue operation

9.1.13 Perform the rescue effort as a team member or team coordinator

9.1.14 Show acknowledgement of the added value of having a team coordinator

9.1.15 Conduct a rescue operation in poor lighting conditions

Lesson 10 - RESCUE UP

90 min.

Note: Dummy recommended; exercises in teams of two incl. a team coordinator; min. 3 exercises per team:

- 1 outside rescue up exercises per team; preparing the injured person, rescue up from transition piece outside tower to nacelle/Heli platform, and rescue device in passive setup
- 1 inside rescue up exercise per Delegate; preparing the injured person, rescue up from either basement to primary assembly area (ground/transition piece) or from transition piece inside tower to nacelle/Heli platform, and rescue device in active setup

Note: Each exercise includes: Rescue strategy planning, rescue efforts and Instructor-Led evaluation

Helicopter transport becomes increasingly important for the offshore wind industry. Without the dependency on helicopters for emergency transport, the evacuation route will always be towards the base of the tower. However, emergency evacuation by helicopter transport from a hoisting platform, requires the rescue team to bring the

injured person up to the helicopter hoisting platform, rather than to the base of the tower.

The lesson is also relevant for structures with a considerable basement structure and transition piece. Standard evacuation equipment and techniques might not always be suitable for excessive distances rescue up from inside these locations.

The aim is to enable the Delegates to bring their injured person from a lower platform to the higher platform, outside and inside the tower, by the use of a power-driven lowering/raising rescue system.

To successfully complete this lesson the Delegates shall be able to:

1) Assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower, including a high awareness on the risk of the injured person getting stuck in the WTG (e.g. under a tower-tower sections)
2) Explain and demonstrate the identification and suitable selection of certified and structural anchor points, relevant for various rescue scenarios, relevant for various rescue scenarios
3) Explain and demonstrate the proper utilization of a specific power-driven lowering/raising rescue system, incl. how to properly attach, rig and secure the system, and requirements, applications, limitations, means of tethering and the maximum raising distance possible for the system and associated battery power source
4) Explain and apply the concept of lifting angle, angle factor and deviation
5) Explain national and local requirements and/or procedures for helicopter rescue in an onshore/offshore WTG, preparing the injured person, preparing the WTG, the helicopter hoisting platform, safe zones and safe behaviour included
6) Explain and control common risks of hazardous energies and common hazards of enclosed space areas in a WTG, when performing rescue operations
7) Apply rescue methods and techniques in performing rescue up operations in a WTG from basement to primary assembly area (ground/transition piece), from transition piece inside tower to nacelle/Heli platform and from transition piece outside tower to nacelle/Heli platform, using a rescue stretcher and/or spineboard, raising rescue system (power driven rescue system)
8) Change directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa), when suspended
9) Perform rescue operations, using the casualties personal fall protection on the injured person - as fall protection backup, if required
10) Act as the informal rescue team coordinator performing scene assessment and hazard identification, assessing and determining the rescue strategy

11) Perform clear and precise communication in a stressful rescue operation, both with members of the rescue team as a team coordinator and as a team member
12) Apply clear communication and guidance to other emergency responders (e.g. helicopter crew or ambulance crew) including coordinating the handover of an injured person
13) Acknowledging the benefits of having a coordinator in a rescue team, and the responsibility that comes with it
14) Utilize a rescue device in a passive setup (i.e. the rescue device fixed in the WTG) during a rescue up operation outside of the tower
15) Utilize a rescue device in an active setup (i.e. the rescue device attached onto the injured person) during an inside rescue up operation inside of the tower/basement.

ELEMENT 10.1 - RESCUE UP - INTRODUCTION

The Instructor shall:

10.1.1 Explain the necessity and relevance of this module

10.1.2 Demonstrate the method of rigging and operating the power-driven devices including relevant technical specifications, requirements, applications, limitations, means of tethering preventing drop and the maximum raising distance possible for the specific complete power-driven lowering/raising rescue system and associated battery power source (fully charged)

10.1.3 Discuss with the delegates elements to consider when determining the rescue strategy, attending to a clear and preferred evacuation route for the injured person outside or inside the tower. Including;

a. exposure of the injured person to weather,
b. the potentially dangerous effect of wind pushing the injured person against the tower,
c. emotional state of the injured person
d. the medical status of the injured person
e. time constraints
f. nacelle configuration and position to the wind
g. evacuation hatch location
h. obstructions within the evacuation route

10.1.4 Discuss with the Delegates requirements and procedures for helicopter rescue

10.1.5 Highlight the specific limitations of lifting distances of rescue devices, designed for lowering an injured person.

ELEMENT 10.2 - RESCUE UP, INSIDE AND OUTSIDE OF THE TOWER- PRACTICAL EXCERCISES.

The Instructor shall:

10.2.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario, according to section 2.6 Control measures to avoid injury during training

10.2.2 Introduce the specific exercise, including (to the extent needed):

a. Point out a team coordinator for the exercise, and introduce the tasks and responsibilities related to this function

b. Introduce relevant rescue strategy, method and technique, including active or passive recue device setup

c. Highlight what injured person configuration to apply (i.e. horizontal or vertical configuration)

d. Highlight how to organize the rescue team to the specific rescue operation scenario (who does what)

e. What specific elements/course contents the instructor's assessment will include

10.2.3 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the Delegates) on completion of the rescue exercise efforts with a focus on:

a. Positive feedback

b. Improvement proposals and alternative solutions

c. Delegates' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualize and enhance learning transfer)

d. Delegate's risk mitigation during the exercise.

10.2.4 The Instructor shall guide and support the Delegates with applying:

a. Power-driven raising rescue systems

b. Fall protection backup of injured person

Delegates shall demonstrate and on request explain, in a team, how to:

10.2.5 Identify and control the specific hazards/risks in the WTG during the rescue up operation, e.g. Hazardous energies (mechanical, electrical, hydraulic, pneumatic, magnetic, pressurized substances - i.e. LOTO); Enclosed space areas (hazardous materials, low levels of oxygen); Poor lighting conditions; Dropped objects; Poor manual handling; Temperature/Working conditions (dehydration, heat stroke, exhaustion); Injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context); Slips and trips

10.2.6 Assess and determine the most optimum rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) for a rescue up scenario

10.2.7 Prepare the injured person (live injured person preferred) for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard, respectively)

10.2.8 Balance an injured person (dummy) from a horizontal to a vertical position (and vice versa), in order to move the injured person downwards through hatches, or similar

10.2.9 Select and utilize Certified and structural anchor points

10.2.10 Apply the theory of Lifting angle, angle factor, deviation and edge protection.

10.2.11 Rig and operate the rescue up system in a proper manner aiming to achieve a safe and efficient rigging setup, including the utilization of an injured person personal fall protection equipment backup system, if required

10.2.12 Apply rescue methods, techniques and clear and precise communication in performing safe rescue up operations

10.2.13 Perform regular checks of the injured person during the entire rescue operation

10.2.14 Perform the rescue effort as a team member or team coordinator.

10.2.15 Perform a rescue up (dummy), with the rescue device in a passive setup for rescue up outside of the tower

10.2.16 Perform a rescue up (dummy), with the rescue device in an active setup for rescue up inside of the tower/basement

Lesson 11 - EVALUATION

20 min.

The aim of this lesson is to enable the Delegates to reflect on and process their learning outcome and key takeaways from the module, aiming to achieve a high learning transfer from the module to his/her way of work. Additionally, the aim is to give the Delegates the opportunity to conduct an open-minded written and oral formative evaluation of the training.

To successfully complete this lesson of the Module, Delegates must:

1) Show commitment to avoid incidents requiring a rescue operation
2) Show commitment to act out this value by demonstrating a pro-active approach and role model behaviour
3) Participate in the formative evaluation of the module in a constructive manner

ELEMENT 11.1 - REFLECTION SESSION

The Instructor shall:

11.1.1 Give the Delegates final feedback on the formal Delegate performance assessment and inform them whether they have passed (failed Delegates must be informed individually prior to the reflection session)

11.1.2 Help the Delegate to do a summative self-evaluation, i.e. mentally overview and assort what is learned, identify key takeaways and bridge the gap between what is learned during the module and applying it in his/her way of work. This can be achieved e.g. by an individual reflection session, question session and/or class discussion

11.1.3 Re-present the overall aims and objectives of the course for the Delegates' comparison on their learning outcome and meeting of their previously stated expectations of the course

11.1.4 Give an overall feedback and feed forward on the Delegates' learning outcome

11.1.5 Encourage the Delegates to examine and grow awareness of what specific elements in their own WTG type/WTG environment differ from the training scenario environment (to visualize and enhance learning transfer) and to discuss with colleagues advanced rescue methods and techniques under the local specific conditions identified after course completion

11.1.6 Motivate the Delegates to avoid incidents requiring rescue efforts during daily work and demonstrating a pro-active approach and role model behavior.

ELEMENT 11.2 - FORMATIVE EVALUATION

Delegates shall:

11.2.1 Conduct an online or written formative evaluation of the module, as a minimum.

The Instructor shall:

11.2.2 Respond on relevant elements of any oral feedback from the Delegates.

11 SINGLE RESCUER: HUB, SPINNER & INSIDE BLADE RESCUE (SR:HSIBR)

11.1 Aims and objectives of the Single Rescuer HSIBR Module

The aim of this module is to enable the Delegates to perform Single Rescuer Advanced Rescue operations, in a WTG hub, spinner and inside the blade by using industry standard rescue equipment, methods and techniques, exceeding those of GWO Working at Height.

Based on the Delegates HSIBR Module qualifications, the Single Rescuer HSIBR Module shall ensure that Delegates are able to;

1) Assess and determine single rescuer rescue strategy (relevant rescue method, technique, certified equipment and how to organize the rescue efforts and incident scene) for various rescue scenarios, in a WTG hub, spinner and inside a blade
2) Apply rescue methods and techniques in performing descending and ascending single rescuer rescue operations, from a WTG hub, spinner and inside a blade using a rescue stretcher and spineboard, manually operated lowering/raising rescue system for limited distance rescue (rescue device, pulley system or similar), and other rescue equipment relevant to the Delegate.

11.2 Competencies of the Single Rescuer HSIBR Module

1) Perform Single Rescuer descending rescue operations from a WTG hub, spinner and from inside a blade, to a primary assembly area (ground or transition piece) or a secondary assembly area (vessel), using industry standard rescue equipment

Note: Single Rescuer rescue operations performed on the outside of the blades are not included.

11.3 Delegate prerequisites for the Single Rescuer HSIBR Module

The Single Rescuer HSIBR module is an add on to the Hub module, hence it is a prerequisite to have a valid HSIBR certificate. Valid GWO Working at Heights, GWO First Aid, and GWO Manual Handling certificates are prerequisites for participation as well.

11.4 Duration of the Single Rescuer HSIBR Module

The total contact time for completing this module is estimated to be 4 hours and 35 minutes. This is based on the time estimate given in the module timetable.

The training provider must not exceed the times per day given in table 11-4 below.

The training provider must ensure that sufficient time is allowed for delegates with prior experience to share their experiences related to the module in a way that is constructive for the entire class.

	Maximum duration per day
Contact time	8 hours
Total training day	10 hours

Table 11-4 - Maximum durations for training day

Note: Contact time includes delivery of course lesson contents, practical exercises and activities directly related to these**.**

The total training day includes contact time, meals and breaks and travel between training sites (where applicable).

11.5 Trainer/Delegate Ratio of the Single Rescuer HSIBR Module

The ratio shown for theory sessions indicates the maximum number of Delegates that can attend the course

The ratio shown for practical sessions indicates the maximum number of Delegates to be supervised by one instructor during each activity.

Module	Session	Instructor to delegate ratio
Single Rescuer HSIBR Module	Theory	1:12
	Practical	1:4

Table 11-5 - GWO Single rescuer HSIBR module instructor to delegate ratio

11.6 Equipment for the Single Rescuer HSIBR Module

The equipment required for training as listed in Annex 3 must be available and must fulfil national legal requirements as listed in table A3-3 in annex 3 where applicable.

11.7 Time Table of the Single Rescuer HSIBR Module

The order in which the elements of this training Module are delivered may vary.

Within the module timetables, approximate duration of each of the lessons are given. The training provider may choose to deliver elements of the training according to other timetables, as long as the total duration is not reduced, and total duration of practical elements is not reduced in length. Theoretical elements may be delivered during the practical exercises when feasible.

Lesson		Element		Approx, Duration
1	Introduction	1.1	Safety Instructions and Emergency Procedures Facilities Instructor & Delegate Presentation Overall Aim & Objectives and Agenda Motivation On-Going Assessment	
			TOTAL	**30 min.**
2	Singular rescuer rescue strategy	2.1	Organisational strategy, in your own organisation, singular rescuer	10 min.
		2.1	Evacuation strategy, singular rescuer	20 min.
			TOTAL	**30 min.**
3	Control measures to prevent injury during training	3.1	Preparations for today's training, incl. - Inspection/don PPE - Control measures to prevent injury during training - Warm-up	
			TOTAL	**20 min.**
4	Hub Rescue Exercise 1+2 (From Blade)	4.1	Hub Rescue Exercise 1+2 (From Blade)	
			TOTAL	**90 min.**
5	Hub Rescue Exercise 3+4 (From Spinner)	5.1	Hub Rescue Exercise 3+4 (From Spinner)	
			TOTAL	**90 min.**
6	Evaluation	6.1	Reflection Session	
		6.2	Formative Evaluation	
			TOTAL	**15 min.**
			GRAND TOTAL	**275 min.**

Table 11-7 - GWO SR HSIBR Module timetable

11.8 Detailed description of the Single Rescuer HSIBR Module

Lesson 1 - INTRODUCTION

30 min.

The aim of this lesson is to introduce the Delegates to the course, each other, the facilities and what is expected of them during the course.

To successfully complete this lesson of the Module, Delegates must be able to:

1) Explain the safety rules and emergency procedures of the training facilities
2) Locate emergency exits and equipment, and relevant training facilities
3) Recognize who the instructor and other Delegates are
4) Describe the main aim and main learning objectives
5) Explain the on-going assessment according to delegates assessment form
6) State own expectations for the course.

ELEMENT 1.1 - SAFETY INSTRUCTIONS AND EMERGENCY PROCEDURES

The Instructor shall explain:

1.1.1 Safety instructions according to internal procedures

1.1.2 Emergency procedures and emergency exits in the areas where the Delegates can be expected to be located during the course

ELEMENT 1.2 - FACILITIES

The Instructor shall give:

1.2.1 A general description of the on-site facilities (Administration, dining area, restrooms, etc.)

ELEMENT 1.3 - INSTRUCTOR & DELEGATE PRESENTATION

The Instructor shall:

1.3.1 Ensure that all Delegates are registered with a personal Delegate profile in WINDA and have provided their WINDA ID prior to completing the training course.

1.3.2 Give a short introduction, including their backgrounds as instructors

Delegates shall:

1.3.3 Give a short introduction, including their job function, onshore/offshore experience, time of employment in the wind industry, and expected primary geographic work location, etc.

1.3.4 Present his/her own expectations for the course

ELEMENT 1.4 - OVERALL AIM & OBJECTIVES AND AGENDA

The Instructor shall explain:

1.4.1 The overall aim & objectives and agenda of this ART Module

ELEMENT 1.5 - MOTIVATION

The Instructor shall explain:

1.5.1 Why advanced rescue preparedness and skills are relevant

1.5.2 The importance of personal involvement in the course

1.5.3 How the Delegates will be challenged, and why

ELEMENT 1.6 - ON-GOING ASSESSMENT

The Instructor shall explain:

1.6.1 The reasons for the on-going assessment

1.6.2 The GWO Delegate Assessment Form and its use

1.6.3 What is expected of the Delegates

Lesson 2 - SINGLE RESCUER RESCUE STRATEGY

30 min.

The aim of this lesson is to raise awareness on the impact strategic choices have during a singular rescue. Both on organisational level and on the practical evacuation.

To successfully complete this lesson of the Module, Delegates must:

1) Explain focal areas of single rescuer Advanced Rescue operations most likely to have greater consequence compared to Advanced Rescue operations performed in teams
2) Take part in discussing what specific rescue preparations, and emergency, communication and command procedures, apply in their own organization.
3) Recognize the limitations of the rescue preparations available, when deciding on the single rescuer rescue strategy, attending to a clear and preferred evacuation route for the injured person outside or inside the tower.

ELEMENT 2.1 - ORGANISATIONAL STRATEGY, IN YOUR OWN ORGANISATION, SINGLE RESCUER

The Instructor and Delegates shall discuss:

2.1.1 What specific rescue preparations and emergency and communication procedures apply in their own organization, e.g. concerning:

2.1.2 Number of rescue personnel available (on site) and the required response time for additional (advanced rescue) back up

2.1.3 Rescue training level depending on your work location in the WTG and number of personnel (e.g. working in the hub, or in the tower)

2.1.4 Communication procedures of operation, e.g. communication to backup/rescue team, Emergency Medical Treatment (EMT) i.e. ambulance and fire service, Site Lead, service vessel, helicopter Search And Rescue (SAR), and the means of communication - radio or phone (cell, IP or satellite phone)

2.1.5 National and/or local requirements (e.g. confined space regulations and procedures)

2.1.6 Estimated time for professional emergency response providers to arrive

2.1.7 What to be aware of (during this training) concerning what specific elements in their own WTG type/WTG environment might differ from the training scenario environment (to visualize and enhance learning transfer)

2.1.8 Turbine design (e.g. layout, pathways, access ways, components, obstacles, hatches, Heli pad).

ELEMENT 2.2 - EVACUATION STRATEGY, SINGLE RESCUER

Delegates must be able to:

2.2.1 Recognize the consequences of performing a rescue operation as a singleton rescuer, as compared to a team operation, as elaborated below

2.2.2 Recognize the importance of end-to-end rescue strategy planning and how to organize the entire setup and operation i.e. what to do, when and how

2.2.3 Explain that PPE lanyards available are limited to two of each type (fall restraint and fall arrest)

2.2.4 What equipment to rig/utilize/layout where, to achieve a correct setup the first time

2.2.5 Evaluate where you should be located and how you can move from one side of the IP to the other (if relevant), e.g. by removing hatch between hub and nacelle

2.2.6 Explain how to assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route and the limitations related to the singular rescue

2.2.7 Establish means of escape

2.2.8 Establish means of communication with incident/site command in own organization

2.2.9 Be aware that a singleton rescue operation could take more time, then a team rescue operation and the effect this could have on the medical condition of the IP.

2.2.10 Be aware of limitations in own capacity, e.g. due to mental stress or physical stress like exhaustion/fatigue and dehydration – and how to cope with this. This includes acknowledging when you are not able to successfully complete the rescue operation, and what to do in this situation

2.2.11 Reduce manual handling to a minimum due to the risk of injury and/or exhaustion/fatigue

Lesson 3 - CONTROL MEASURES TO PREVENT INJURY DURING TRAINING

20 min.

The Instructor shall:

3.1.1 Explain further control measures relevant for the specific training facilities and training to avoid injury during training, e.g.

3.1.2 Ensure relevant Lock Out Tag Out (LOTO) actions of the relevant training facilities have been conducted, and communicate the LOTO status to the Delegates prior to commencing practical exercises

3.1.3 Lead a warm-up session of the major muscle groups of the body and ankles, wrists and back, ref: annex 3: Guideline for Warm-up exercises.

Delegates shall:

3.1.4 Perform a user inspection of their Personal Fall Protection Equipment

3.1.5 Take part in the warm-up of the major muscle groups of the body and ankles, wrists and back.

Lesson 4 - HUB RESCUE EXERCISE 1+2 (FROM BLADE)

90 min.

Note: One delegate per exercise; dummy recommended

There are several locations on the turbine were occasionally work needs to take place with reduced horizontal and vertical space. Such as in a hub, spinner or blade.

The aim of this lesson is to enable the Delegates to successfully perform injured person rescue operations, in a WTG blade and out of the hub, as a single rescuer.

To successfully complete this lesson of the Module, Delegates must be able to:

1) Acknowledge the value and explain the importance of end-to-end rescue strategy planning prior to single rescuer Advanced Rescue operations and explain the potential consequences in lack of planning
2) Demonstrate what equipment to rig/utilize/layout where, aiming to achieve a correct and efficient setup the first time and minimizing re-rigging during the rescue operation
3) Ensure rigging setup can be operated as intended, by one person
4) Demonstrate where he should be located during the rescue operation and how he can move from one side of the IP to the other (if relevant)
5) Establish means of escape
6) Demonstrate means of communication with (simulated) incident/site command in own organization
7) Acknowledge limitations in own capacity – and how to cope with this and what to do in this type of situation
8) Reduce manual handling to a minimum
9) Perform the rescue operation using an injured person personal fall protection equipment backup system, if required (i.e. if the manually operated lowering/raising rescue system is not certified for person lifting)
10) Perform scene assessment and hazard identification, assessing and determining the rescue strategy
11) Apply clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew), including coordinating the handover of an injured person.

ELEMENT 4.1 - HUB RESCUE EXERCISE 1+2 (FROM BLADE)

The Instructor shall:

4.1.1 Highlight specific control measures to avoid injury during training relevant to this specific exercise scenario, according to the section on Control measures to avoid injury during training

4.1.2 Introduce the specific exercise, including (to the extent needed):

4.1.3 Point out a single rescuer for the exercise, and introduce the task

4.1.4 Highlight that single rescuer is expected to apply the principals, methods and techniques from hub rescue operations in a team, and incorporate the mentioned single rescuer focal areas in his efforts

4.1.5 Guide and support the Delegates with exploring different rigging options of attaching the lowering/raising rescue system to the injured person or rescue stretcher/spineboard (i.e. harness front or back attachment point, or attachment point at the foot of the rescue stretcher/spineboard)

4.1.6 Highlight what injured person configuration to apply (i.e. horizontal or vertical configuration)

4.1.7 Highlight the considerations to determine where in the WTG to package the injured person on a rescue stretcher/spineboard

4.1.8 What specific elements/course contents the instructor's assessment will include

4.1.9 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the Delegates) on completion of the rescue exercise efforts with a focus on:

a. Positive feedback
b. Improvement proposals and alternative solutions
c. Delegates' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualize and enhance learning transfer)
d. The importance of planning
e. Delegate's risk mitigation during the exercise.
f. The Instructor shall guide and support the Delegates with applying fall protection backup of injured person, if required

Delegates shall demonstrate and on request explain, how to:

4.1.10 Identify and control the specific hazards/risks in the WTG during the rescue operation, e.g. Hazardous energies (mechanical, electrical, hydraulic, pneumatic, magnetic, pressurized substances - i.e. LOTO); Enclosed space areas (hazardous materials, low levels of oxygen); Poor lighting conditions; Dropped objects; Poor manual handling; Temperature/Working conditions (dehydration, heat stroke,

exhaustion); Injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context); Slips and trips

4.1.11 Assess and determine the most optimum rescue strategy (relevant rescue method, technique, certified equipment) for a rescue scenario in a WTG blade

4.1.12 Prepare the injured person for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard)

4.1.13 Rig and operate the lowering/raising rescue system in a proper manner aiming to achieve a safe and efficient rigging setup, including the utilization of an injured person personal fall protection equipment backup system, if required

4.1.14 Apply rescue methods, techniques and clear communication in performing safe lowering/raising rescue operations from inside a WTG blade

4.1.15 Perform regular checks of the injured person during the entire rescue operation

4.1.16 Perform a rescue operation, from a WTG blade, through the hub and e.g. out of the hub or into the nacelle.

Lesson 5 - HUB RESCUE EXERCISE 3+4 (FROM SPINNER)

90 min.

Note: One delegate per exercise; dummy recommended

The aim, learning objectives and elements mentioned in the lesson above applies to this lesson as well - but from inside the spinner.

Additionally, to successfully complete this lesson of the Module, Delegates must be able to:

5.1.1 Transport the injured person to the escape hatch by means of a zip line (areal ropeway), to control the handling of injured person more efficiently and reduce manual handling

ELEMENT 5.1 - HUB RESCUE EXERCISE 3+4 (FROM SPINNER)

The Instructor shall conduct the elements mentioned in the lesson elements above which applies to this element as well - but related to the spinner

Additionally, The Instructor shall:

5.1.1 Highlight the relevant differences in rescue strategy of this specific exercise scenario, compared to the blade rescue strategy (anchor points, rigging of the lowering/raising rescue system, deviation, techniques, etc.)

5.1.2 Explain the concept of zip line (areal ropeway) in a nacelle, how to rig it and adhering hazards and risks

ELEMENT 5.2 - HUB RESCUE EXERCISE 3+4 (FROM SPINNER)

Delegates shall demonstrate and on request explain, how to conduct the elements mentioned in the lesson elements above (lesson 5) which applies to this element as well - but related to the spinner

Additionally, Delegates shall demonstrate how to:

5.2.1 Rig a zip line (areal ropeway) in a nacelle and transport the injured person to the escape hatch

5.2.2 Perform rescue operations using personal flash light (e.g. helmet light), if required due to poor lighting conditions.

Lesson 6 - EVALUATION

15 min.

The aim of this lesson is to enable the Delegates to reflect on and process their learning outcome and key takeaways from the module, aiming to achieve a high learning transfer from the module to his/her way of work. Additionally, the aim is to give the Delegates the opportunity to conduct an open-minded written and oral formative evaluation of the training.

To successfully complete this lesson of the Module, Delegates must:

1) Show commitment to avoid incidents requiring a rescue operation
2) Show commitment to act out this value by demonstrating a pro-active approach and role model behaviour
3) Participate in the formative evaluation of the module in a constructive manner.

ELEMENT 6.1 - REFLECTION SESSION

The Instructor shall:

6.1.1 Give the Delegates final feedback on the formal Delegate performance assessment and inform them whether they have passed (failed Delegates must be informed individually prior to the reflection session)

6.1.2 Help the Delegate to do a summative self-evaluation, i.e. mentally overview and assort what is learned, identify key takeaways and bridge the gap between what is learned during the module and applying it in his/her way of work. This can be achieved e.g. by an individual reflection session, question session and/or class discussion

6.1.3 Re-present the overall aims and objectives of the course for the Delegates' comparison on their learning outcome and meeting of their previously stated expectations of the course

6.1.4 Give an overall feedback and feed forward on the Delegates' learning outcome

6.1.5 Encourage the Delegates to examine and grow awareness of what specific elements in their own WTG type/WTG environment differ from the training scenario environment (to visualize and enhance learning transfer) and to discuss with colleagues advanced rescue methods and techniques under the local specific conditions identified after course completion

6.1.6 Motivate the Delegates to avoid incidents requiring rescue efforts during daily work and demonstrating a pro-active approach and role model behaviour.

ELEMENT 6.2 - FORMATIVE EVALUATION

Delegates shall:

6.2.1 Conduct an online or written formative evaluation of the module, as a minimum.

The Instructor shall:

6.2.2 Respond on relevant elements of any oral feedback from the Delegates.

12 SINGLE RESCUER: NACELLE, TOWER & BASEMENT RESCUE (SR:NTBR)

12.1 Aims and objectives of the Single Rescuer NTBR Module

The aim of this module is to enable the Delegates to perform Single Rescuer Advanced Rescue operations, in a WTG nacelle, tower and basement, by using industry standard rescue equipment, methods and techniques, exceeding those of GWO Working at Height.

Based on the Delegates NTBR Module qualifications, the Single Rescuer NTBR Module shall ensure that Delegates are able to;

1) Assess and determine single rescuer rescue strategy (relevant rescue method, technique, certified equipment and how to organize the rescue efforts and incident scene) for various rescue scenarios, in a WTG nacelle, tower and basement
2) Apply rescue methods and techniques in performing descending and ascending single rescuer rescue operations, from a WTG nacelle, tower and basement using a rescue stretcher and spineboard, manually operated and power-driven lowering/raising rescue system (rescue device and pulley system or similar), and other rescue equipment relevant to the Delegate.

12.2 Competencies of the Single Rescuer NTBR Module

Perform Single Rescuer descending and ascending rescue operations from an enclosed space in a WTG nacelle, tower and basement, to a primary assembly area (ground, transition piece, or helicopter hoisting platform) or a secondary assembly area (vessel), using industry standard rescue equipment

1) Rescue scenarios where the injured person is located on the outside of the nacelle and on the outside of the tower are not included.

12.3 Delegate prerequisites for the Single Rescuer NTBR Module

The Single Rescuer NTBR module is an add on to the NTBR module, hence it is a prerequisite to have a valid NTBR certificate. Valid GWO Working at Heights, GWO First Aid, and GWO Manual Handling certificates are prerequisites for participation as well.

12.4 Duration of the Single Rescuer NTBR Module

The total contact time for completing this module is estimated to be 4 hours and 35 minutes. This is based on the time estimate given in the module timetable.

The training provider must not exceed the times per day given in table 12-4 below.

The training provider must ensure that sufficient time is allowed for delegates with prior experience to share their experiences related to the module in a way that is constructive for the entire class.

	Maximum duration per day
Contact time	8 hours
Total training day	10 hours

Table 12-4 - Maximum durations for training day

Note: Contact time includes delivery of course lesson contents, practical exercises and activities directly related to these**.**

The total training day includes contact time, meals and breaks and travel between training sites (where applicable).

12.5 Trainer/Delegate Ratio of the Single Rescuer NTBR Module

The ratio shown for theory sessions indicates the maximum number of Delegates that can attend the course.

The ratio shown for practical sessions indicates the maximum number of Delegates to be supervised by one instructor during each activity.

Module	Session	Instructor to delegate ratio
Single Rescuer HSIBR	Theory	1:12
	Practical	1:4

Table 12-5 - GWO SR HSIBR Module instructor to delgate ratio

12.6 Equipment for the Single Rescuer NTBR Module

The equipment required for training as listed in Annex 3 must be available and must fulfil national legal requirements as listed in table A3-4 in annex 3 where applicable.

12.7 Time Table of the Single Rescuer NTBR Module

The order in which the elements of this training Module are delivered may vary.

Within the module timetables, approximate duration of each of the lessons are given. The training provider may choose to deliver elements of the training according to other timetables, as long as the total duration is not reduced, and the duration of practical elements is not reduced in length. Theoretical elements may be delivered during the practical exercises when feasible.

Lesson		Element		Approx. Duration
1	Introduction	1.1	Safety Instructions and Emergency Procedures	
		1.2	Facilities	
		1.3	Instructor & Delegate Presentation	
		1.4	Overall Aim & Objectives and Agenda	
		1.5	Motivation	
		1.6	On-Going Assessment	
			TOTAL	**30 min.**
2	Emergency Response Plan in Your Own Organization	2.1	Emergency Response Plan in Your Own Organization	
		2.2	Evacuation Strategy	
			TOTAL	**30 min.**
3	Control measures to prevent injury during training	3.1	Preparations for today's training, incl. - Inspection/don PPE - Control measures to prevent injury during training - Warm-up	
			TOTAL	**20 min.**
4	Evacuation of an injured person from the Nacelle to the Base of the Tower	4.1	Practical exercise Evacuation inside of tower	
			TOTAL	**40 min.**
5	Rescue from Enclosed Space	5.1	Enclosed Space Rescue - Exercises	
			TOTAL	**50 min.**
6	Rescue from Crawl Space	6.1	Rescue from Crawl Space - Exercises	
			TOTAL	**50 min.**
7	Rescue Up	7.1	Rescue Up - Introduction	
		7.2	Rescue Up, Inside and Outside of the Tower - Practical Exercises	
			TOTAL	**40 min.**
8	Evaluation	8.1	Reflection Session	
		8.2	Formative Evaluation	
			TOTAL	**15 min.**
			GRAND TOTAL	**275 min.**

Table 12-7 - GWO SR NTBR Module timetable

12.8 Detailed description of the Single Rescuer HSIBR Module

Lesson 1 - INTRODUCTION

30 min.

The aim of this lesson is to introduce the Delegates to the course, each other, the facilities and what is expected of them during the course.

To successfully complete this lesson of the Module, Delegates must be able to:

1) Explain the safety rules and emergency procedures of the training facilities
2) Locate emergency exits and equipment, and relevant training facilities
3) Recognize who the instructor and other Delegates are
4) Describe the main aim and main learning objectives
5) Explain the on-going assessment according to delegates assessment form
6) State own expectations for the course

ELEMENT 1.1 - SAFETY INSTRUCTIONS AND EMERGENCY PROCEDURES

The Instructor shall explain:

1.1.1 Safety instructions according to internal procedures

1.1.2 Emergency procedures and emergency exits in the areas where the Delegates can be expected to be located during the course

ELEMENT 1.2 - FACILITIES

The Instructor shall give:

1.2.1 A general description of the on-site facilities (Administration, dining area, restrooms, etc.)

ELEMENT 1.3 - INSTRUCTOR & DELEGATE PRESENTATION

The Instructor shall:

1.3.1 Ensure that all Delegates are registered with a personal Delegate profile in WINDA and have provided their WINDA ID prior to completing the training course.

1.3.2 Give a short introduction, including their backgrounds as instructors

Delegates shall:

1.3.3 Give a short introduction, including their job function, onshore/offshore experience, time of employment in the wind industry, and expected primary geographic work location, etc.

1.3.4 Present his/her own expectations for the course

ELEMENT 1.4 - OVERALL AIM & OBJECTIVES AND AGENDA

The Instructor shall explain:

1.4.1 The overall aim & objectives and agenda of this ART Module, highlighting the rescue team coordinator functionality

ELEMENT 1.5 - MOTIVATION

The Instructor shall explain:

1.5.1 Why advanced rescue preparedness and skills are relevant

1.5.2 The importance of personal involvement in the course

1.5.3 How the Delegates will be challenged, and why

ELEMENT 1.6 - ON-GOING ASSESSMENT

The Instructor shall explain:

1.6.1 The reasons for the on-going assessment

1.6.2 The GWO Delegate Assessment Form and its use

1.6.3 What is expected of the Delegates

Lesson 2 - SINGLE RESCUER RESCUE STRATEGY

30 min.

The aim of this lesson is to raise awareness on the impact strategic choices have during a singular rescue. Both on organisational level and on the practical evacuation.

To successfully complete this lesson of the Module, Delegates must:

1) Explain focal areas of single rescuer Advanced Rescue operations most likely to have greater consequence compared to Advanced Rescue operations performed in teams
2) Take part in discussing what specific rescue preparations, and emergency, communication and command procedures, apply in their own organization in order to support the singleton Rescue operation.

3) Recognize the limitations of the rescue preparations available, when deciding on the single rescuer rescue strategy, attending to a clear and preferred evacuation route for the injured person outside or inside the tower.

ELEMENT 2.1 - ORGANISATIONAL STRATEGY, IN YOUR OWN ORGANISATION, SINGULAR RESCUER

The Instructor and Delegates shall discuss:

2.1.1 What specific rescue preparations and emergency and communication procedures apply in their own organization, e.g. concerning:

2.1.2 Number of rescue personnel available (on site) and the required response time for additional (advanced rescue) back up.

2.1.3 Rescue training level depending on your work location in the WTG and number of personnel (e.g. working in the nacelle, or in the tower)

2.1.4 Communication procedures of operation, e.g. communication to backup rescue team, Emergency Medical Treatment (EMT) i.e. ambulance and fire service, Site Lead, service vessel, helicopter Search And Rescue (SAR), and the means of communication - radio or phone (cell, IP or satellite phone)

2.1.5 National and/or local requirements (e.g. confined space regulations and procedures)

2.1.6 Estimated time for professional emergency response providers to arrive

2.1.7 What to be aware of (during this training) concerning what specific elements in their own WTG type/WTG environment might differ from the training scenario environment (to visualize and enhance learning transfer)

2.1.8 Turbine design (e.g. layout, pathways, access ways, components, obstacles, hatches, Heli pad).

ELEMENT 2.2 - EVACUATION STRATEGY, SINGULAR RESCUER

Delegates must be able to:

2.2.1 Recognize the consequences of performing a rescue operation as a singleton rescuer, as compared to a team operation, as elaborated below.

2.2.2 recognize the importance of end-to-end rescue strategy planning and how to organize the entire setup and operation i.e. what to do, when and how

2.2.3 Explain that PPE lanyards available are limited to two of each type (fall restraint and fall arrest)

2.2.4 What equipment to rig/utilize/layout where, to achieve a correct setup the first time

2.2.5 Evaluate where you should be located and how you can move from one side of the IP to the other (if relevant), e.g. by removing hatch between hub and nacelle

2.2.6 Explain how to assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route (e.g. removing hatches within the rescue route), where you should be located during the rescue operation, in relation to moving past the injured person and the limitations related to the singular rescue.

2.2.7 Establish means of communication with incident/site command in own organization

2.2.8 Be aware that a singleton rescue operation could take more time, then a team rescue operation and the effect this could have on the medical condition of the IP.

2.2.9 Be aware of limitations in own capacity, e.g. due to mental stress or physical stress like exhaustion/fatigue and dehydration – and how to cope with this. This includes acknowledging when you are not able to successfully complete the rescue operation, and what to do in this situation

2.2.10 Reduce manual handling to a minimum due to the risk of injury and/or exhaustion/fatigue

Lesson 3 - CONTROL MEASURES TO PREVENT INJURY DURING TRAINING

20 min.

The Instructor shall:

3.1.1 Explain further control measures relevant for the specific training facilities and training to avoid injury during training, e.g.

3.1.2 Ensure relevant Lock Out Tag Out (LOTO) actions of the relevant training facilities have been conducted, and communicate the LOTO status to the Delegates prior to commencing practical exercises

3.1.3 Lead a warm-up session of the major muscle groups of the body and ankles, wrists and back, ref: annex 3: Guideline for Warm-up exercises

Delegates shall:

3.1.4 Perform a user inspection of their Personal Fall Protection Equipment

3.1.5 Take part in the warm-up of the major muscle groups of the body and ankles, wrists and back.

Lesson 4 - EVACUATION OF AN INJURED PERSON FROM THE NACELLE TO THE BASE OF THE TOWER

40 min.

Note: 1 exercise for one delegate; Dummy recommended;.

Note: Exercise includes: Rescue strategy planning, rescue efforts and Instructor-Led evaluation.

The aim of this lesson is to enable the Delegates to evacuate an injured person in a safe and secure manner from the nacelle, inside or outside the tower, to a primary assembly area (ground or transition piece) and from transition piece to a secondary assembly area (vessel), as a singleton rescuer.

To successfully complete this lesson of this Module, delegates must be able to:

4.1.1 Assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower

4.1.2 Apply rescue methods and techniques in performing descending rescue operations, from a WTG to a primary assembly area (ground or transition piece) and a secondary assembly area (vessel), using a rescue stretcher and spineboard, lowering/raising rescue system (rescue device, pulley system or similar), as a single rescuer.

4.1.3 Package an injured person on a rescue stretcher and spineboard in a vertical or horizontal configuration to enable safe transportation, by doing regular checks, using rescue equipment such as cervical collar and avoiding head down configuration of the unconscious injured person

4.1.4 Manually transport an injured person on a rescue stretcher and on a spineboard - in a balanced way

4.1.5 Change directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa), when suspended

4.1.6 Perform rescue operations, in the nacelle, tower and basement, using safe and suitable (certified or structural) anchor points, lifting angles, deviation, and edge protection for the rescue equipment

4.1.7 Perform rescue operations, using the casualties personal fall protection on the injured person - as fall protection backup, if required

4.1.8 Perform evacuation of an injured person from the nacelle to the base of the tower using personal flashlight (e.g. helmet light), if required due to poor lighting conditions

4.1.9 Perform scene assessment and hazard identification, assessing and determining the rescue strategy

4.1.10 Apply clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew) including coordinating the handover of an injured person.

ELEMENT 4.2 - PRACTICAL EXERCISE EVACUATION INSIDE OF TOWER

The Instructor shall:

4.2.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario, according to section 2.6 Control measures to avoid injury during training

4.2.2 Introduce the specific exercise, including (to the extent needed):

4.2.3 Introduce relevant rescue strategy, method and technique

4.2.4 Highlight the considerations to determine where in the WTG to package the injured person on a rescue stretcher/spineboard

4.2.5 Highlight what injured person configuration to apply (i.e. horizontal or vertical configuration)

4.2.6 Highlight where to attach the lowering/raising rescue system to the injured person or rescue stretcher/spineboard (i.e. harness front or back attachment point,

4.2.7 What specific elements/course contents the instructor's assessment will include

4.2.8 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the Delegates) on completion of the rescue exercise efforts with a focus on:

a. Positive feedback
b. Improvement proposals and alternative solutions
c. Delegates' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualize and enhance learning transfer)
d. Delegate's risk mitigation during the exercise.
e. The Instructor shall guide and support the Delegates with applying:
f. Fall protection backup of injured person, if required.

Delegate shall demonstrate and on request explain, how to:

4.2.9 Identify and control the specific hazards/risks in the WTG during the rescue operation, e.g. Hazardous energies (mechanical, electrical, hydraulic, pneumatic, magnetic, pressurized substances - i.e. LOTO); Enclosed space areas (hazardous materials, low levels of oxygen); Poor lighting conditions; Dropped objects; Poor manual handling; Temperature/Working conditions (dehydration, heat stroke, exhaustion); Injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context); Slips and trips

4.2.10 Assess and determine evacuation strategy (relevant rescue method, route technique, certified equipment) for a singleton rescue scenario in a WTG

4.2.11 Prepare the injured person (live injured person preferred) for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard)

4.2.12 Manually transport an injured person (dummy) on a rescue stretcher or spineboard - in a balanced way - or by means of a zip line (areal ropeway) when relevant

4.2.13 Attach the rescue device to the injured person (dummy) in a safe and proper manner

4.2.14 Balance an injured person (dummy) from a horizontal to a vertical position (and vice versa), in order to move the injured person downwards through hatches, or similar.

4.2.15 Select and utilize Certified and structural anchor points

4.2.16 Apply the theory of Lifting angle, angle factor, deviation and edge protection

4.2.17 Rig and operate the lowering/raising rescue system in a proper manner aiming to achieve a safe and efficient rigging setup, including the utilization of an injured person personal fall protection equipment backup system

4.2.18 Apply rescue methods, techniques and clear and precise communication in performing safe ascending/descending rescue operations from a WTG

4.2.19 Perform regular checks of the injured person during the entire rescue operation

4.2.20 Perform an inside evacuation, with the rescue device in an active setup, from the nacelle to a primary assembly area (ground or transition piece). Thus the rescuer controlling the descent should be located below the injured person.

Lesson 5 - RESCUE FROM ENCLOSED SPACE

50 min.

Note: 1 exercise for one delegate; dummy recommended.

Note: Exercise includes: Rescue strategy planning, rescue efforts and Instructor-Led evaluation.

There are several locations in the nacelle were occasionally work needs to take place with reduced horizontal and vertical space. Such as the, yaw section, transformer room or between canopy and generator of a Direct Drive WTG.

The aim of this lesson is for the delegates to be able to apply various techniques to evacuate an injured person from an area with restricted manoeuvrability, filled with sufficient simulated assets, to a location were first aid can be administered.

To successfully complete this lesson of the Module, delegates must be able to:

1) Apply the techniques to successfully rescue the injured person from the enclosed space, in a controlled manner

2) Assess and determine rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) in an enclosed space scenario
3) Apply rescue methods and techniques in performing descending and ascending rescue operations, from a WTG, using a rescue stretcher and spineboard, lowering/raising rescue system (rescue device, pulley system or similar)
4) Fit a harness or improvised harness by the use of a rescue sling around the injured person's chest, and other PPE (e.g. helmet, safety glasses) onto an injured person, in an enclosed space
5) Assess and determine the suitable attachment point on the injured person and/or spineboard/rescue stretcher, i.e. harness front or back attachment point and in the top or bottom of the spineboard/rescue stretcher
6) Perform the rescue operation from the incident scene fully aware of where the injured person is stuck and how to slowly lower/raise the injured person and carefully manipulate him out, constantly evaluating the rescue efforts
7) Package an injured person on a rescue stretcher and spineboard in a vertical or horizontal configuration to enable safe transportation, by doing regular checks, using rescue equipment such as cervical collar and avoiding head down configuration of the unconscious injured person
8) Manually transport an injured person on a rescue stretcher or spineboard - in a balanced way
9) Change directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa), in a WTG, when suspended
10) Perform rescue operations, in the nacelle, tower and basement, using safe and suitable (certified or structural) anchor points, lifting angles, deviation, and edge protection for the rescue equipment
11) Perform rescue operations, in a WTG, using the casualties personal fall protection on the injured person - as fall protection backup, if required
12) Perform rescue operations in a WTG enclosed space using personal flashlight (e.g. helmet light), if required due to poor lighting conditions
13) Perform scene assessment and hazard identification, assessing and determining the rescue strategy
14) Apply clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew), including coordinating the handover of an injured person
15) Transporting an injured person horizontally over the length of the turbine, with the use of industry rescue equipment (zip line)

ELEMENT 5.1 - RESCUE FROM ENCLOSED SPACE - EXERCISES

The Instructor shall:

5.1.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario, according to section 2.6 Control measures to avoid injury during training

5.1.2 Introduce the specific exercise, including (to the extent needed):

5.1.3 Different rescue strategies, methods and techniques in order to optimize the rescue set up, e.g. refresh how to rig a zip line (areal ropeway) and/or methods/techniques to evacuate from transition piece to secondary assembly area (vessel)

5.1.4 To highlight the considerations to determine where in the WTG to package the injured person on a rescue stretcher/spineboard

5.1.5 To guide and support the Delegates with exploring different rigging options of attaching the lowering/raising rescue system to the injured person or rescue stretcher/spineboard (i.e. harness front or back attachment point, or attachment point at the foot of the rescue stretcher/spineboard

5.1.6 To highlight what injured person configuration to apply (i.e. horizontal or vertical configuration)

5.1.7 What specific elements/course contents the instructor's assessment will include

5.1.8 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the Delegates) on completion of the rescue exercise efforts with a focus on:

a. Positive feedback
b. Improvement proposals and alternative solutions
c. Delegates' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualize and enhance learning transfer)
d. Delegate's risk mitigation during the exercise
e. The Instructor shall guide and support the Delegates with applying:
f. Manually operated lowering and raising systems.
g. Fall protection backup of injured person, if required

Delegates shall demonstrate and on request explain, how to:

5.1.9 Identify and control the specific hazards/risks in the WTG during the rescue operation, e.g. Hazardous energies (mechanical, electrical, hydraulic, pneumatic, magnetic, pressurized substances - i.e. LOTO); Enclosed space areas (hazardous materials, low levels of oxygen); Poor lighting conditions; Dropped objects; Poor manual handling; Temperature/Working conditions (dehydration, heat stroke, exhaustion); Injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context); Slips and trips

5.1.10 Assess and determine the most optimum rescue strategy (relevant rescue method, technique, certified equipment) for a singleton rescue scenario in a WTG

5.1.11 Prepare the injured person for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard)

5.1.12 Balance an injured person from a horizontal to a vertical position (and vice versa), in order to move the injured person downwards through hatches, or similar

5.1.13 Apply proper manual handling techniques when transporting the injured person in a balanced and secure way

5.1.14 Select and utilize Certified and structural anchor points

5.1.15 Apply the theory of Lifting angle, angle factor, deviation and edge protection

5.1.16 Rig and operate the lowering/raising rescue system in a proper manner aiming to achieve a safe and efficient rigging setup, including the utilization of an injured person personal fall protection equipment backup system, if required

5.1.17 Apply rescue methods, techniques and precise and clear communication in performing safe lowering/raising rescue operations from a WTG

5.1.18 Perform regular checks of the injured person during the entire rescue operation

5.1.19 Conduct a rescue operation in poor lighting conditions

5.1.20 Transport the injured person to the escape hatch by means of a zip line (areal ropeway), to control the handling of injured person more efficiently and reduce manual handling.

Lesson 6 - RESCUE FROM CRAWL SPACE

50 min.

Note: 1 exercise for one delegate; dummy recommended;

Note: Exercise includes: Rescue strategy planning, rescue efforts and Instructor-Led evaluation

There are several locations on the turbine were occasionally work needs to take place with strongly reduced vertical space, such as in a transformer room, behind a generator or underneath a gearbox, main bearing or under the floor.

The aim of this lesson is to enable the delegates to rescue an injured person from a crawl space to a location were first aid can be administered, as a single rescuer.

To successfully complete this lesson of the Module, Delegates must be able to:

1) Apply the techniques to successfully rescue the injured person from the crawl space, in a controlled manner
2) Assess and determine rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) in a crawl space scenario

3) Apply rescue methods and techniques in performing a rescue operation, from a crawl space, covering efforts with and without rescue equipment to ensure the most optimum result
4) Fit a harness or improvised harness by the use of a rescue sling around the injured person's chest, and other PPE (e.g. helmet, safety glasses) onto an injured person, in a crawl space
5) Assess and determine the suitable attachment point on the injured person and/or spineboard/rescue stretcher, i.e. harness front or back attachment point and in the top or bottom of the spineboard/rescue stretcher
6) Perform the rescue operation from the incident scene fully aware of where the injured person is stuck and how to slowly lower/raise the injured person and carefully manipulate him out, constantly evaluating the rescue efforts
7) Perform rescue operations using safe and suitable (certified or structural) anchor points, lifting angles, deviation, and edge protection for the rescue equipment.
8) Perform rescue operations, using the casualties personal fall protection on the injured person - as fall protection backup, if required
9) Prepare the injured person for safe transportation, by doing regular checks, using rescue equipment such as cervical collar and avoiding head down configuration of the unconscious injured person
10) Perform scene assessment and hazard identification, assessing and determining the rescue strategy
11) Apply clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew) including coordinating the handover of an injured person.

ELEMENT 6.1 - RESCUE FROM CRAWL SPACE - EXERCISES

The Instructor shall:

6.1.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario, according to section 2.6 Control measures to avoid injury during training

6.1.2 Introduce the specific exercise, including (to the extent needed):

6.1.3 Different rescue strategies, methods and techniques in order to optimize the rescue set up

6.1.4 To highlight the considerations to determine where in the WTG to package the injured person on a rescue stretcher/spineboard

6.1.5 To guide and support the Delegates with exploring different rigging options of attaching the lowering/raising rescue system to the injured person or rescue stretcher/spineboard (i.e. harness front or back attachment point, or attachment point at the foot of the rescue stretcher/spineboard

6.1.6 What specific elements/course contents the instructor's assessment will include

6.1.7 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the Delegates) on completion of the rescue exercise efforts with a focus on:

a. Positive feedback
b. Improvement proposals and alternative solutions
c. Delegates' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualize and enhance learning transfer)
d. Delegate's risk mitigation during the exercise
e. The Instructor shall guide and support the Delegates with applying:
f. Manually operated lowering and raising systems
g. Fall protection backup of injured person, if required

Delegates shall demonstrate and on request explain, how to:

6.1.8 Identify and control the specific hazards/risks in the WTG during the rescue operation, e.g. Hazardous energies (mechanical, electrical, hydraulic, pneumatic, magnetic, pressurized substances - i.e. LOTO); Enclosed space areas (hazardous materials, low levels of oxygen); Poor lighting conditions; Dropped objects; Poor manual handling; Temperature/Working conditions (dehydration, heat stroke, exhaustion); Injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context); Slips and trips

6.1.9 Prepare the injured person for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard)

6.1.10 Apply proper manual handling techniques when transporting the injured person in a balanced and secure way

6.1.11 Select and utilize certified and structural anchor points

6.1.12 Apply the theory of Lifting angle, angle factor, deviation and edge protection

6.1.13 Rig and operate a manually operated rescue system to horizontally transport the injured person and how to mitigate the challenges of a horizontal rescue enabling a safe rescue operation

6.1.14 Apply rescue methods, techniques and precise and clear communication in performing safe lowering/raising rescue operations from a WTG

6.1.15 Perform regular checks of the injured person during the entire rescue operation

6.1.16 Conduct the rescue operation in poor lighting conditions

Lesson 7 - RESCUE UP

40 min.

Note: 1 inside rescue up exercise for one delegate; dummy recommended.

Note: Preparing the injured person, rescue up from either basement to primary assembly area (ground/transition piece) or from transition piece inside tower to nacelle/Heli platform, and rescue device in active setup

Note: Exercise includes: Rescue strategy planning, rescue efforts and Instructor-Led evaluation

Using power-driven devices can be an important mitigating measure to avoid over exhaustion when performing single rescue operations.

Helicopter transport becomes increasingly important for the offshore wind industry. Without the dependency on helicopters for emergency transport, the evacuation route will always be towards the base of the tower. However, emergency evacuation by helicopter transport from a hoisting platform, requires the rescue team to bring the injured person up to the helicopter hoisting platform, rather than to the base of the tower.

The lesson is also relevant for structures with a considerable basement structure and transition piece. Standard evacuation equipment and techniques might not always be suitable for excessive distances rescue up from inside these locations.

The aim is to enable the Delegates to bring their injured person from a lower platform to the higher platform, outside and inside the tower, by the use of a power-driven lowering/raising rescue system.

To successfully complete this lesson the Delegates shall be able to:

1) Assess and determine evacuation strategy during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower, including a high awareness on the risk of the injured person getting stuck in the WTG (e.g. under a tower-tower sections)
2) Explain and demonstrate the identification and suitable selection of certified and structural anchor points, relevant for various rescue scenarios
3) Explain and demonstrate the proper utilization of a specific power-driven lowering/raising rescue system, incl. how to properly attach, rig and secure the system, and requirements, applications, limitations, means of tethering and the maximum raising distance possible for the system and associated battery power source
4) Explain national and local requirements and/or procedures for helicopter rescue in an onshore/offshore WTG, preparing the injured person, preparing the WTG, the helicopter hoisting platform, safe zones and safe behaviour included
5) Explain and control common risks of hazardous energies and common hazards of enclosed space areas in a WTG, when performing rescue operations, as a singleton rescuer

6) Apply rescue methods and techniques in performing rescue up operations in a WTG from basement to primary assembly area (ground/transition piece), from transition piece inside tower to nacelle/Heli platform and from transition piece outside tower to nacelle/Heli platform, using a rescue stretcher and/or spineboard, raising rescue system (power driven rescue system)
7) Change directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa), when suspended
8) Perform rescue operations, using the casualties personal fall protection on the injured person - as fall protection backup, if required
9) Perform scene assessment and hazard identification, assessing and determining the rescue strategy
10) Apply clear communication and guidance to other emergency responders (e.g. helicopter crew or ambulance crew) including coordinating the handover of an injured person
11) Utilize a rescue device in an active setup (i.e. the rescue device attached onto the injured person) during an inside rescue up operation inside of the tower/basement.

ELEMENT 7.1 - RESCUE UP - INTRODUCTION

The Instructor shall:

7.1.1 Explain the necessity and relevance of this module

7.1.2 Demonstrate the method of rigging and operating the power-driven devices including relevant technical specifications, requirements, applications, limitations, means of tethering preventing drop and the maximum raising distance possible for the specific complete power-driven lowering/raising rescue system and ensuring sufficient battery power (fully charged)

7.1.3 Discuss with the delegates elements to consider when determining the rescue strategy, attending to a clear and preferred evacuation route for the injured person outside or inside the tower. Including;

a. exposure of the injured person to weather,
b. the potentially dangerous effect of wind pushing the injured person against the tower,
c. emotional state of the injured person
d. the medical status of the injured person
e. time constraints
f. nacelle configuration and position to the wind
g. evacuation hatch location
h. obstructions within the evacuation route

7.1.4 Discuss with the Delegates the requirements and procedures for helicopter rescue

7.1.5 Highlight the specific limitations of lifting distances of rescue devices, designed for lowering an injured person.

ELEMENT 7.2 - RESCUE UP, INSIDE OF THE TOWER- PRACTICAL EXCERCISE.

The Instructor shall:

7.2.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario, according to the section on Control measures to avoid injury during training

7.2.2 Introduce the specific exercise, including (to the extent needed):

7.2.3 Introduce relevant rescue strategy, method and technique, including active or passive recue device setup

7.2.4 Highlight what injured person configuration to apply (i.e. horizontal or vertical configuration)

7.2.5 Highlight how to organize the rescue team to the specific rescue operation scenario (who does what)

7.2.6 What specific elements/course contents the instructor's assessment will include

7.2.7 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the Delegates) on completion of the rescue exercise efforts with a focus on:

a. Positive feedback
b. Improvement proposals and alternative solutions
c. Delegates' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualize and enhance learning transfer)
d. Delegate's risk mitigation during the exercise.

7.2.8 The Instructor shall guide and support the Delegates with applying:

a. Power-driven raising rescue systems
b. Fall protection backup of injured person.

Delegates shall demonstrate and on request explain, how to:

7.2.9 Identify and control the specific hazards/risks in the WTG during the rescue up operation, e.g. Hazardous energies (mechanical, electrical, hydraulic, pneumatic, magnetic, pressurized substances - i.e. LOTO); Enclosed space areas (hazardous materials, low levels of oxygen); Poor lighting conditions; Dropped objects; Poor manual handling; Temperature/Working conditions (dehydration, heat stroke, exhaustion); Injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context); Slips and trips

7.2.10 Assess and determine the most optimum rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) for a rescue up scenario

7.2.11 Prepare the injured person for safe transportation (i.e. fit cervical collar, harness and other PPE, and package him on a rescue stretcher or spineboard, respectively)

7.2.12 Balance an injured person from a horizontal to a vertical position (and vice versa), in order to move the injured person downwards through hatches, or similar

7.2.13 Select and utilize Certified and structural anchor points

7.2.14 Apply the theory of Lifting angle, angle factor, deviation and edge protection.

7.2.15 Rig and operate the rescue up system in a proper manner aiming to achieve a safe and efficient rigging setup, including the utilization of an injured person personal fall protection equipment backup system, if required

7.2.16 Apply clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew), including coordinating the handover of an injured person

7.2.17 Perform regular checks of the injured person during the entire rescue operation

7.2.18 Perform a rescue up, with the rescue device in an active setup for rescue up inside of the tower.

Lesson 8 - EVALUATION

15 min.

The aim of this lesson is to enable the Delegates to reflect on and process their learning outcome and key takeaways from the module, aiming to achieve a high learning transfer from the module to his/her way of work. Additionally, the aim is to give the Delegates the opportunity to conduct an open-minded written and oral formative evaluation of the training.

To successfully complete this lesson of the Module, Delegates must:

1) Show commitment to avoid incidents requiring a rescue operation
2) Show commitment to act out this value by demonstrating a pro-active approach and role model behaviour
3) Participate in the formative evaluation of the module in a constructive manner.

ELEMENT 8.1 - REFLECTION SESSION

The Instructor shall:

8.1.1 Give the Delegates final feedback on the formal Delegate performance assessment and inform them whether they have passed (failed Delegates must be informed individually prior to the reflection session)

8.1.2 Help the Delegate to do a summative self-evaluation, i.e. mentally overview and assort what is learned, identify key takeaways and bridge the gap between what is learned during the module and applying it in his/her way of work. This can be achieved e.g. by an individual reflection session, question session and/or class discussion

8.1.3 Re-present the overall aims and objectives of the course for the Delegates' comparison on their learning outcome and meeting of their previously stated expectations of the course

8.1.4 Give an overall feedback and feed forward on the Delegates' learning outcome

8.1.5 Encourage the Delegates to examine and grow awareness of what specific elements in their own WTG type/WTG environment differ from the training scenario environment (to visualize and enhance learning transfer) and to discuss with colleagues advanced rescue methods and techniques under the local specific conditions identified after course completion

8.1.6 Motivate the Delegates to avoid incidents requiring rescue efforts during daily work and demonstrating a pro-active approach and role model behavior.

ELEMENT 8.2 - FORMATIVE EVALUATION

Delegates shall:

8.2.1 Conduct an online or written formative evaluation of the module, as a minimum.

The Instructor shall:

8.2.2 Respond on relevant elements of any oral feedback from the Delegates.

13 COMBINED GWO ADVANCED RESCUE TRAINING

The combined GWO ART consist of all four ART modules: Hub, Spinner and Inside Blade Rescue, Nacelle, Tower and Basement Rescue, Single Rescuer: Hub, Spinner and Inside Blade and Single Rescuer: Nacelle, Tower and Basement.

13.1 Duration of the Combined GWO ART Module

The total contact time for completing the combined ART module is estimated to be 24 hours. This is based on the time estimate given in the module timetable.

The training provider must not exceed the times per day given in table 9-2 below.

The training provider must ensure that sufficient time is allowed for delegates with prior experience to share their experiences related to the module in a way that is constructive for the entire class.

	Maximum duration per day
Contact time	8 hours
Total training day	10 hours

Table 13-1 - Maximum durations for training day

Note: Contact time includes delivery of course lesson contents, practical exercises and activities directly related to these**.**

The total training day includes contact time, meals and breaks and travel between training sites (where applicable).

13.2 Trainer/Delegate Ratio of the Combined GWO ART Module

The ratio shown for theory sessions indicates the maximum number of Delegates that can attend the course.

The ratio shown for practical sessions indicates the maximum number of Delegates to be supervised by one instructor during each activity.

Module	Session	Instructor to delegate ratio
Combined GWO ART module	Theory	1:12
	Practical	1:4

Table 13-2 - Combined GWO ART Instructor to delegate rat

13.3 Requirement to upload training record in WINDA

Training Providers are responsible for uploading a record of training to WINDA, the GWO online database of training records. This must be done as soon as possible and no later

than 10 working days after completion of the training program. For the combined GWO ART the below four training records must be uploaded separately.

Module	Course Code
Hub, Spinner and Inside Blade Rescue	ART-H
Nacelle, Tower and Basement Rescue	ART-N
Single Rescuer: Hub, Spinner and Inside Blade Rescue	SART-H
Single Rescuer: Nacelle, Tower and Basement Rescue	SART-N

Table 13-3 - GWO ART course codes

13.4 Time Table of the Combined GWO ART Module

The order in which the elements of this training Module are delivered may vary.

Within the module timetables, approximate duration of each of the lessons are given. The training provider may choose to deliver elements of the training according to other timetables, as long as the total duration is not reduced, and duration of practical elements is not reduced in length. Theoretical elements may be delivered during the practical exercises when feasible.

Note: The stated 'FLEXITIME' of the Time Table must be utilized for theoretical and/or practical course contents, where the Training Provider finds it provides most value to the Delegates.

Lesson		**Element**		**Approx. Duration**
1	Introduction (Ref. modules 1+2: lesson 1)	1.1	Safety Instructions and Emergency Procedures	
		1.2	Facilities	
		1.3	Instructor & Delegate Presentation	
		1.4	Overall Aim & Objectives and Agenda	
		1.5	Motivation	
		1.6	On-Going Assessment	
			TOTAL	**30 min.**
2	Emergency Response Plan in Your Own Organization (Ref. modules 1+2: lesson 2)	2.1	Emergency Response Plan in Your Own Organization	
		2.1	Evacuation Strategy	
			TOTAL	**30 min.**
3	Control measures to prevent injury during training (day 1+2+3) (Ref. modules 1+2: lesson 3)	3.1	Preparations for the days training, incl. - Inspection/don PPE - Control measures to prevent injury during training - Warm-up	
			TOTAL	**50 min.**

4	Cervical Collar (Ref. modules 1+2: lesson 4)	4.1	Utilization of Cervical Collar	
			TOTAL	**25 min.**
5	Packaging the Injured person (Ref. modules 1+2: lesson 5)	5.1	Packaging the Injured person	
			TOTAL	**50 min.**
6	Lowering/Raising Rescue System (Ref. modules 1+2: lesson 6)	6.1 6.2	Lowering/Raising Rescue System Rigging setup options – combining rescue equipment and PPE lanyards	
			TOTAL	**25 min.**
7	Hub Rescue Exercise 1+2 (From Blade) (Ref. module 1: lesson 7)	7.1	Hub Rescue Exercise 1+2 (From Blade)	
			TOTAL	**90 min.**
8	Hub Rescue Exercise 3+4 (From Spinner) (Ref. module 1: lesson 8)	8.1	Hub Rescue Exercise 3+4 (From Spinner)	
			TOTAL	**90 min.**
9	Evacuation of an Injured person from the Nacelle to the Base of the Tower (Ref. module 2: lesson 7)	9.1	Practical exercise Evacuation inside and outside of tower	
			TOTAL	**120 min.**
10	Rescue from Enclosed Space (Ref. module 2: lesson 8)	10.1	Rescue from Enclosed Space - Exercises	
			TOTAL	**110 min.**
11	Rescue from Crawl Space (Ref. module 2: lesson 9)	11.1	Rescue from Crawl Space - Exercises	
			TOTAL	**200 min.**
12	Rescue Up (Ref. module 2: lesson 10)	12.1 12.2	Rescue Up - Introduction Rescue Up, Inside and Outside of the Tower - Practical Exercises	
			TOTAL	**90 min.**
13	Single Rescuer (Ref. module 3+4: lesson 7)	13.1 13.2	Single Rescuer - Introduction Single Rescuer - Practical Exercises; - Single Rescuer HSIBR Module Hub Rescue Exercise 1 (From Blade) - Single Rescuer NTBR Module Rescue from crawl space - Single Rescuer NTBR Module Evacuation of an Injured person from the Nacelle to the Base inside of the Tower - Single Rescue NTBR Module Rescue Up, Inside and Outside of the Tower	
			TOTAL	**200 min.**
14	Evaluation	14.1	Reflection Session	

		14.2	Formative Evaluation	
			TOTAL	**20 min.**
			SUB TOTAL	**1130 min.**
			FLEXITIME	**100 min.**
			GRAND TOTAL	**1230 min.**

Table 13-4 - Combined GWO ART Module timetable

ANNEX 1 - DELEGATE ASSESSEMENT FORM

Delegate full name as in passport:	
Delegate WINDA ID:	
Course module:	
Date of completion:	

Scenario Organisation	Violation of Assessment Measures			0-2 passed/ 3 failed	Instructor Remarks
Aware of personal and group safety at all times					
Organises and utilises correct equipment for given scenario					
Organises individuals and groups as required					
Scenario Management					
Establishes and					

intains control of the exercises scenario at all times					
Fully partici					

passinthe exercise scenario					
Follows instructions when required					

Demonstrates correct and safe Manual Handling in exercises scenar					

i o						
Knowledge and Understanding						
Applies subject knowledge correctly in given scenario						
Demonstrates understanding of subject						

Total Marks	0-9 Pass 10-27 Fail	PASS: ☐	FAIL: ☐
Instructor Name (in CAPITAL letters)			
Instructor Signature			
Training provider			

ANNEX 2 - MEDICAL SELF-ASSESSMENT FORM

Your personal health is your own responsibility. Your Training Provider shall not be held responsible for any illness whatsoever during or after the training. I hereby confirm that I have read and understood the listed risks and potentially life-threatening medical conditions and that I am physically and medically fit to participate in GWO Training.

I hereby confirm that there is no factor that will inhibit or affect my participation in GWO Training. I agree to follow all instructions from the appointed Instructor for the duration of the GWO Training. Should there be any doubt regarding my medical fitness, the training provider will stop the training and seek a physician's advice.

Name as in passport	
Delegate WINDA ID	
Course module	
Signature and date	

The following conditions could pose a risk, when you participate in GWO training
• Asthma or other respiratory disorders • Epilepsy, blackouts or other fits • Angina or other heart complaints • Vertigo or inner ear problems (difficulty with balance) • Claustrophobia/Acrophobia (fear of enclosed area/height) • Blood pressure disorder • Diabetes • Pacemaker or implanted defibrillator • Arthritis, osteoarthritis or other muscular/ skeletal disorders affecting mobility • Known allergies (E.g. bee, wasps or spider stings / bites) • Recent surgery • Any other medical condition or medication dependency that could affect climbing or physical impact of climbing

ANNEX 3 - EQUIPMENT LISTS

The following pages contain the lists of equipment required for delivering each of the modules contained within this training standard. Any equipment used by the training provider and delegates during the delivery of training under this standard must satisfy or exceed the requirements of the equipment standards for the time being in force in the country where the training is taking place.

Where training takes place in a country where there are no equipment standards for the equipment being used, then the equipment used by the training provider and the delegates during the delivery of training under this standard shall satisfy or exceed the requirements of the European (EN) standards.

Note: All equipment shall be maintained and where appropriate, inspected and tested in accordance with current national standards/legislation and manufacturers' recommendations.

1. HUB RESCUE

The following equipment is required during the entire duration of this Nacelle, Tower & Basement Training to meet the needs of the Nacelle, Tower & Basement Training Module:

1) Rescue stretcher
2) Spineboard
3) Cervical collar for rescue purpose
4) Manually operated lowering/raising rescue systems for limited distance rescue
    a. Rescue device, and
    b. Pulley system, with rope grab
5) Pulleys
6) Edge protector for rope
7) Tag line
8) Flash light
9) Radios when applicable
10) Rescue dummy min. 50 kg/110 lbs. Dummy preferably with detachable parts for proper manual handling

GWO BST/BSTR Working at Heights related equipment:

1) Full body harness
2) Fall restraint lanyards
3) Fall arrest lanyards
4) Helmets and safety glasses
5) Vertical fall arrest system
6) Self-Retractable Lifeline (SRL)
7) Rescue slings
8) Karabiner with mandatory automatic locking system (minimum dobb./triple lock)
9) Anchor points (Certified and Structural)
    a. For the rescue and evacuation exercises, the rigid fall protection anchor points shall be a minimum of 6.75 meters (21’4”) above the ground floor.

Note: The minimum height of the anchor point is set to ensure that in the event of a fall there will be enough space below the anchor point to allow the shock absorber in a fixed length fall arrest lanyard to fully deploy. The height is based upon the following formula,

$$RD = LL + DD + HH + C,$$

Where,

RD	=	Required Fall Distance Clearance (minimum anchor point height)
LL	=	Length of Lanyard
DD	=	Deceleration Distance (fall distance)
HH	=	Height of Suspended Worker
C	=	Safety Factor

The value for HH is the length of the suspended worker *after* a fall and includes factors like the height of the person and harness stretch, to account for these variables this is set to 2.00 m.

Using the value for HH $(2.00\,m)$, the maximum allowed values for LL $(2.00\,m)$ & DD $(1.75\,m)$, and the minimum allowed value for C $(1.00\,m)$, we get,

$$RD = LL + DD + HH + C$$

and,

$$RD = 2.00\,m + 1.75\,m + 2.00\,m + 1.00\,m,$$

therefore,

$$RD = 6.75\,m.$$

Any equipment used during this GWO training module shall meet or exceed the minimum requirements of the national standards listed in table A3-4. When working in a country where there is no applicable national standard then the equipment shall meet or exceed the minimum requirements of the European standards.

	Country Specific Equipment Standards (North America & Europe)			
Equipment	**Europe**	**North America**	**Canada**	**United Kingdom**
Rescue stretcher				
Spineboard				
Cervical collar for rescue purpose				
Manually operated lowering/raising rescue systems for limited distance rescue				
Rescue device				
Pulley system				
Pulleys				
Edge protector for rope				
Tag line				
Flash light				
Radios				
Rescue dummy				
Full Body Harness	EN 361 Or EN 813	ANSI Z359.3 ANSI Z359.11 OSHA 1926.28		BS EN 361 Or BS EN 813
Work Restraint Lanyards	EN 358	ANSI Z359.1-2 OSHA 1910.28 OSHA 1910.29 1926 Subpart M		BS EN 358
Fixed length Fall arrest lanyards	EN 355	ANSI Z359.3 OSHA 1910.28 OSHA 1910.29 1926 Subpart E		BS EN 355
Helmets	EN 397+A1	OSHA 1910.1333 OSHA 1926.28		BS EN 397+A1
Vertical fall arrest systems	EN 353-1+A1 EN 353-2 EN 1891 EN 892			BS EN 353-1+A1 BS EN 353-2 BS EN 1891 BS EN 892
SRL	EN 360	ANSI Z359.1-2 OSHA 1910.28 OSHA 1910.29 1926 Subpart M		BS EN 360
Anchor Points	EN 795			BS EN 795
Slings	EN 566			BS EN 566
Karabiners	EN 362			BS EN 362
Evacuation / Rescue devices	EN 341 and EN 1496			BS EN 341 and BS EN 1496
Vertical aluminium ladders	EN 131-2 and EN 14122-4			BS EN 131-2 and BS EN 14122-4

Table A3-1a - Country specific equipment standards - Hub rescue (North America and Europe)

2. NACELLE TOWER & BASEMENT

The following equipment is required during the entire duration of this Nacelle, Tower & Basement Training to meet the needs of the Nacelle, Tower & Basement Training Module:

1) Rescue stretcher
2) Spineboard
3) Cervical collar for rescue purpose
4) Manually operated lowering/raising rescue systems for limited distance rescue:
    a. 4.1 Rescue device, and
    b. 4.2 Pulley system, with rope grab
5) Power-driven lowering/raising rescue system
6) Pulleys
7) Edge protector for rope
8) Tag line
9) Flash light (helmet light)
10) Radios when applicable
11) Rescue dummy min. 50 kg/110 lbs. Dummy preferably with detachable parts for proper manual handling

GWO BST/BSTR Working at Heights related equipment:

1) Full body harness
2) Fall restraint lanyards
3) Fall arrest lanyards
4) Helmets and safety glasses
5) Vertical fall arrest system
6) Self-Retractable Lifeline (SRL)
7) Rescue slings
8) Karabiner with mandatory automatic locking system (minimum dobb./triple lock).
9) Anchor points (Certified and Structural)
    a. For the rescue and evacuation exercises, the rigid fall protection anchor points shall be a minimum of 6.75 meters (21’4”) above the ground floor.

Note: The minimum height of the anchor point is set to ensure that in the event of a fall there will be enough space below the anchor point to allow the shock absorber in a fixed length fall arrest lanyard to fully deploy. The height is based upon the following formula,

$$RD = LL + DD + HH + C,$$

Where,

RD	=	Required Fall Distance Clearance (minimum anchor point height)
LL	=	Length of Lanyard
DD	=	Deceleration Distance (fall distance)
HH	=	Height of Suspended Worker
C	=	Safety Factor

The value for HH is the length of the suspended worker *after* a fall and includes factors like the height of the person and harness stretch, to account for these variables this is set to 2.00 m.

Using the value for $HH\ (2.00\ m)$, the maximum allowed values for $LL\ (2.00\ m)$ & $DD\ (1.75\ m)$, and the minimum allowed value for $C\ (1.00\ m)$, we get,

$$RD = LL + DD + HH + C$$

and,

$$RD = 2.00\ m + 1.75\ m + 2.00\ m + 1.00\ m,$$

therefore,

$$RD = 6.75\ m.$$

Any equipment used during this GWO training module shall meet or exceed the minimum requirements of the national standards listed in table A3-4. When working in a country where there is no applicable national standard then the equipment shall meet or exceed the minimum requirements of the European standards.

	Country Specific Equipment Standards (North America & Europe)			
Equipment	**Europe**	**North America**	**Canada**	**United Kingdom**
Rescue stretcher				
Spineboard				
Cervical collar for rescue purpose				
Manually operated lowering/raising rescue systems for limited distance rescue				
Rescue device				
Pulley system				
Power-driven lowering/raising rescue system				
Pulleys				
Edge protector for rope				
Tag line				
Flash light				
Radios				
Rescue dummy				
Full Body Harness	EN 361 Or EN 813	ANSI Z359.3 ANSI Z359.11 OSHA 1926.28		BS EN 361 Or BS EN 813
Work Restraint Lanyards	EN 358	ANSI Z359.1-2 OSHA 1910.28 OSHA 1910.29 1926 Subpart M		BS EN 358
Fixed length Fall arrest lanyards	EN 355	ANSI Z359.3 OSHA 1910.28 OSHA 1910.29 1926 Subpart E		BS EN 355
Helmets	EN 397+A1	OSHA 1910.1333 OSHA 1926.28		BS EN 397+A1
Vertical fall arrest systems	EN 353-1+A1 EN 353-2 EN 1891 EN 892			BS EN 353-1+A1 BS EN 353-2 BS EN 1891 BS EN 892
SRL	EN 360	ANSI Z359.1-2 OSHA 1910.28 OSHA 1910.29 1926 Subpart M		BS EN 360
Anchor Points	EN 795			BS EN 795
Slings	EN 566			BS EN 566
Karabiners	EN 362			BS EN 362
Evacuation / Rescue devices	EN 341 and EN 1496			BS EN 341 and BS EN 1496
Vertical aluminium ladders	EN 131-2 and EN 14122-4			BS EN 131-2 and BS EN 14122-4

Table A3-2a - Country specific equipment standards - Hub rescue (North America and Europe)

	Country Specific Equipment Standards (China & Australasia)			
Equipment	**China**	**Australia**	**New Zealand**	
Rescue stretcher				
Spineboard				
Cervical collar for rescue purpose				
Manually operated lowering/raising rescue systems for limited distance rescue				
Rescue device				
Pulley system				
Power-driven lowering/raising rescue system				
Pulleys				
Edge protector for rope				
Tag line				
Flash light				
Radios				
Rescue dummy				
Full Body Harness				
Work Restraint Lanyards				
Fixed length Fall arrest lanyards				
Helmets				
Vertical fall arrest systems				
SRL				
Anchor Points				
Slings				
Karabiners				
Evacuation / Rescue devices				
Vertical aluminium ladders				

Table A3-2b - Country specific equipment standards - Hub rescue (China & Australasia)

3. SINGLE RESCUER HSIBR MODULE

The following equipment is required during the entire duration of this Training to meet the needs of the Training Module:

1) Rescue stretcher
2) Spineboard
3) Cervical collar for rescue purpose
4) Manually operated lowering/raising rescue systems for limited distance rescue
    a. Rescue device, and
    b. Pulley system, with rope grab
5) Pulleys
6) Edge protector for rope
7) Tag line
8) Flash light
9) Radios when applicable
10) Rescue dummy min. 50 kg/110 lbs. Dummy preferably with detachable parts for proper manual handling

GWO BST/BSTR Working at Heights related equipment:

1) Full body harness
2) Fall restraint lanyards
3) Fall arrest lanyards
4) Helmets and safety glasses
5) Vertical fall arrest system
6) Self-Retractable Lifeline (SRL)
7) Rescue slings
8) Karabiner with mandatory automatic locking system (minimum dobb./triple lock).
9) Anchor points (Certified and Structural)
    a. For the rescue and evacuation exercises, the rigid fall protection anchor points shall be a minimum of 6.75 meters (21’4”) above the ground floor.

Note: The minimum height of the anchor point is set to ensure that in the event of a fall there will be enough space below the anchor point to allow the shock absorber in a fixed length fall arrest lanyard to fully deploy. The height is based upon the following formula,

$$RD = LL + DD + HH + C,$$

Where,

RD	=	Required Fall Distance Clearance (minimum anchor point height)
LL	=	Length of Lanyard
DD	=	Deceleration Distance (fall distance)
HH	=	Height of Suspended Worker
C	=	Safety Factor

The value for HH is the length of the suspended worker *after* a fall and includes factors like the height of the person and harness stretch, to account for these variables this is set to 2.00 m.

Using the value for $HH\ (2.00\ m)$, the maximum allowed values for $LL\ (2.00\ m)$ & $DD\ (1.75\ m)$, and the minimum allowed value for $C\ (1.00\ m)$, we get,

$$RD = LL + DD + HH + C$$

and,

$$RD = 2.00\ m + 1.75\ m + 2.00\ m + 1.00\ m,$$

therefore,

$$RD = 6.75\ m.$$

Any equipment used during this GWO training module shall meet or exceed the minimum requirements of the national standards listed in table A3-4. When working in a country where there is no applicable national standard then the equipment shall meet or exceed the minimum requirements of the European standards.

	Country Specific Equipment Standards (North America & Europe)			
Equipment	**Europe**	**North America**	**Canada**	**United Kingdom**
Rescue stretcher				
Spineboard				
Cervical collar for rescue purpose				
Manually operated lowering/raising rescue systems for limited distance rescue				
Rescue device				
Pulley system				
Pulleys				
Edge protector for rope				
Tag line				
Flash light				
Radios				
Rescue dummy				
Full Body Harness	EN 361 Or EN 813	ANSI Z359.3 ANSI Z359.11 OSHA 1926.28		BS EN 361 Or BS EN 813
Work Restraint Lanyards	EN 358	ANSI Z359.1-2 OSHA 1910.28 OSHA 1910.29 1926 Subpart M		BS EN 358
Fixed length Fall arrest lanyards	EN 355	ANSI Z359.3 OSHA 1910.28 OSHA 1910.29 1926 Subpart E		BS EN 355
Helmets	EN 397+A1	OSHA 1910.1333 OSHA 1926.28		BS EN 397+A1
Vertical fall arrest systems	EN 353-1+A1 EN 353-2 EN 1891 EN 892			BS EN 353-1+A1 BS EN 353-2 BS EN 1891 BS EN 892
SRL	EN 360	ANSI Z359.1-2 OSHA 1910.28 OSHA 1910.29 1926 Subpart M		BS EN 360
Anchor Points	EN 795			BS EN 795
Slings	EN 566			BS EN 566
Karabiners	EN 362			BS EN 362
Evacuation / Rescue devices	EN 341 and EN 1496			BS EN 341 and BS EN 1496
Vertical aluminium ladders	EN 131-2 and EN 14122-4			BS EN 131-2 and BS EN 14122-4

Table A3-3a - Country specific equipment standards - Hub rescue (North America and Europe)

	Country Specific Equipment Standards (China & Australasia)			
Equipment	**China**	**Australia**	**New Zealand**	**United Kingdom**
Rescue stretcher				
Spineboard				
Cervical collar for rescue purpose				
Manually operated lowering/raising rescue systems for limited distance rescue				
Rescue device				
Pulley system				
Pulleys				
Edge protector for rope				
Tag line				
Flash light				
Radios				
Rescue dummy				
Full Body Harness				
Work Restraint Lanyards				
Fixed length Fall arrest lanyards				
Helmets				
Vertical fall arrest systems				
SRL				
Anchor Points				
Slings				
Karabiners				
Evacuation / Rescue devices				
Vertical aluminium ladders				

Table A3-3b - Country specific equipment standards - Hub rescue (China & Australasia)

4. SINGLE RESCUER NTBR MODULE

The following equipment is required during the entire duration of this Nacelle, Tower & Basement Training to meet the needs of the Nacelle, Tower & Basement Training Module:

1) Rescue stretcher
2) Spineboard
3) Cervical collar for rescue purpose
4) Manually operated lowering/raising rescue systems for limited distance rescue:
    a. Rescue device, and
    b. Pulley system, with rope grab
5) Power-driven lowering/raising rescue system
6) Pulleys
7) Edge protector for rope
8) Tag line
9) Flash light (helmet light)
10) Radios when applicable
11) Rescue dummy min. 50 kg/110 lbs. Dummy preferably with detachable parts for proper manual handling

GWO BST/BSTR Working at Heights related equipment:

1) Full body harness
2) Fall restraint lanyards
3) Fall arrest lanyards
4) Helmets and safety glasses
5) Vertical fall arrest system
6) Self-Retractable Lifeline (SRL)
7) Rescue slings
8) Karabiner with mandatory automatic locking system (minimum dobb./triple lock)
9) Anchor points (Certified and Structural)
    a. For the rescue and evacuation exercises, the rigid fall protection anchor points shall be a minimum of 6.75 meters (21’4”) above the ground floor.

Note: The minimum height of the anchor point is set to ensure that in the event of a fall there will be enough space below the anchor point to allow the shock absorber in a fixed length fall arrest lanyard to fully deploy. The height is based upon the following formula,

$$RD = LL + DD + HH + C,$$

Where,

RD	=	Required Fall Distance Clearance (minimum anchor point height)
LL	=	Length of Lanyard
DD	=	Deceleration Distance (fall distance)
HH	=	Height of Suspended Worker
C	=	Safety Factor

The value for HH is the length of the suspended worker *after* a fall and includes factors like the height of the person and harness stretch, to account for these variables this is set to 2.00 m.

Using the value for $HH\ (2.00\ m)$, the maximum allowed values for $LL\ (2.00\ m)$ & $DD\ (1.75\ m)$, and the minimum allowed value for $C\ (1.00\ m)$, we get,

$$RD = LL + DD + HH + C$$

and,

$$RD = 2.00\ m + 1.75\ m + 2.00\ m + 1.00\ m,$$

therefore,

$$RD = 6.75\ m.$$

Any equipment used during this GWO training module shall meet or exceed the minimum requirements of the national standards listed in table A3-4. When working in a country where there is no applicable national standard then the equipment shall meet or exceed the minimum requirements of the European standards.

	Country Specific Equipment Standards (North America & Europe)			
Equipment	**Europe**	**North America**	**Canada**	**United Kingdom**
Rescue stretcher				
Spineboard				
Cervical collar for rescue purpose				
Manually operated lowering/raising rescue systems for limited distance rescue				
Rescue device				
Pulley system				
Power-driven lowering/raising rescue system				
Pulleys				
Edge protector for rope				
Tag line				
Flash light				
Radios				
Rescue dummy				
Full Body Harness	EN 361 Or EN 813	ANSI Z359.3 ANSI Z359.11 OSHA 1926.28		BS EN 361 Or BS EN 813
Work Restraint Lanyards	EN 358	ANSI Z359.1-2 OSHA 1910.28 OSHA 1910.29 1926 Subpart M		BS EN 358
Fixed length Fall arrest lanyards	EN 355	ANSI Z359.3 OSHA 1910.28 OSHA 1910.29 1926 Subpart E		BS EN 355
Helmets	EN 397+A1	OSHA 1910.1333 OSHA 1926.28		BS EN 397+A1
Vertical fall arrest systems	EN 353-1+A1 EN 353-2 EN 1891 EN 892			BS EN 353-1+A1 BS EN 353-2 BS EN 1891 BS EN 892
SRL	EN 360	ANSI Z359.1-2 OSHA 1910.28 OSHA 1910.29 1926 Subpart M		BS EN 360
Anchor Points	EN 795			BS EN 795
Slings	EN 566			BS EN 566
Karabiners	EN 362			BS EN 362
Evacuation / Rescue devices	EN 341 and EN 1496			BS EN 341 and BS EN 1496
Vertical aluminium ladders	EN 131-2 and EN 14122-4			BS EN 131-2 and BS EN 14122-4

Table A3-4a - Country specific equipment standards - Hub rescue (North America and Europe)

	Country Specific Equipment Standards (China & Australasia)			
Equipment	**China**	**Australia**	**New Zealand**	
Rescue stretcher				
Spineboard				
Cervical collar for rescue purpose				
Manually operated lowering/raising rescue systems for limited distance rescue				
Rescue device				
Pulley system				
Power-driven lowering/raising rescue system				
Pulleys				
Edge protector for rope				
Tag line				
Flash light				
Radios				
Rescue dummy				
Full Body Harness				
Work Restraint Lanyards				
Fixed length Fall arrest lanyards				
Helmets				
Vertical fall arrest systems				
SRL				
Anchor Points				
Slings				
Karabiners				
Evacuation / Rescue devices				
Vertical aluminium ladders				

Table A3-4b - Country specific equipment standards - Hub rescue (China & Australasia)

ANNEX 4 - GUIDELINE FOR WARM-UP EXERCISES

Body part/major muscle group	Exercise	Duration/repetitions
Head	**Head rotations:** • Rotate your head clockwise and counter clockwise	10 repetitions (five each way)
Shoulders	**Shoulders rotation:** • Place your legs at shoulder-width • Feet straight and toes facing forward • Keep your arms straight at your sides • Perform both shoulders rotation clockwise and counter clockwise	10 repetitions
Arms	**Arm swings and big arm circles:** • Stand up straight with your feet shoulder-width apart • Rotate your arms forward making big circles and then switch rotating backwards.	10 times (clockwise) 10 times (counter clockwise) 10 times (in opposite directions)
Wrists	**Wrist rotation:** • Perform wrists rotation in both directions	10 repetitions (for each wrist)
Torso	**Torso swings:** • Stand with your legs straight • Place your feet at shoulder-width • Bend your torso forward 90 degrees • Raise both arms straight to the outside	15 repetitions (to each side)
Hips	**Hip rotation:** • Place your hands on your hips and keep your head straight • Perform extensive hips rotation	10 repetitions (clockwise) 10 repetitions (counter clockwise)
Thighs	**Squats:** • Stand with your legs straight • Place your feet at shoulder-width • Push your hips back and slowly bend your knees. • Keep your back straight and your eyes looking forward. • Raise yourself back up when your knees reach a 90-degree angle	15 repetitions
Ankle	**Ankle rotation:** • Place your feet slightly apart • Perform rotation for each foot clockwise and counter clockwise	10 repetitions (for each foot)
Back	**Back stretch:** • Open legs slightly and place hands on the hips • Turn to the right and left • Incline the back to the right and left • Move Back forward and backward	

Table A2 - Suggested warm-up exercises

ANNEX 5 - ART GUIDELINE: RECOMMENDATIONS FOR IMPLEMENTATION

1. INTRODUCTION

Wind turbines are increasingly placed in remote areas far away from established medical facilities – both offshore and onshore. The time from placing the emergency/distress call until the professional emergency responders arrive at the location is also increasing. Working in remote areas requires the wind turbine personnel teams to have a high level of self-reliance in emergency situations especially when it can be questioned if professional help can be expected in the nacelle of modern wind turbines, due to increasing heights and their limited skills to climb the turbine and perform the rescue from the turbine.

2. PURPOSE

The GWO training provides the foundation for the development of the advanced rescue competencies. This document serves as a guideline for when GWO members should implement Advanced Rescue Training (ART) and special equipment for wind personnel working at sites. Whether Advanced Rescue is integrated into the emergency response plan of a company or site should be the result of a risk assessment.

By providing advanced rescue training, GWO is providing employers an effective tool to control the risks associated with rescue operations, as well as ensuring a more efficient rescue operation from a wind turbine successfully. The course elevates the level of rescuer self-reliance and enables rescuer to successfully transport the colleague who cannot self-evacuate, to an assembly point until professional emergency responders arrive at the location.

GWO Advanced Rescue Training supports the employer by mitigating numerous of common wind turbine emergency rescue related hazards, included but not limited to:

1) Injured person getting stuck due to structure interference
2) Use of improper anchor point for injured person transportation
3) Ropes, slings and similar breaking due to sharp edges
4) Improper rescue method and technique
5) Physical shock, mental stress, exhaustion, fatigue due time-consuming rescue
6) Challenging weather conditions for rescue: wind speed, extreme temperatures and alike
7) Due to limited space difficulties to put harness and other rescue equipment onto an injured person and prepare the injured person for safe transportation
8) Collision of injured person and vessel when delivering the injured person down to the vessel, due to vessel moving up and down

9) Burns from contact HV-cables or hyperthermia during rescue operation
10) Improper PPE of rescuer and/or placing improper PPE onto injured person
11) Improper means of communication during rescue operation
12) Improper positioning of turbine parts
13) Movable parts of the wind turbine not locked properly
14) Etc.

To implement GWO ART, the employer will need to have the following:

1) An integrated emergency response plan
2) Sufficiently trained personnel
3) Dedicated advanced rescue equipment

3. SUFFICIENTLY TRAINED PERSONNEL

GWO recommends that decisions concerning the ratio of AR trained personnel is based on the employer's risk assessment and work specific characteristics.

The basic elements to consider when determining the ratio of AR trained personnel are:

1) The activities being undertaken (risk & complexity), e.g. service or construction tasks, or special projects
2) Organizational limitations to ensure that the required AR trained personnel are available. Such as variations in the team's composition and size.
3) The reasonably expected support of professional emergency responders, including availability of personnel trained for heights and their reasonable expected response time.

The guiding principle when determining the required amount of trained staff, is that the emergency response time of a trained Emergency responder should be as small as is reasonable possible. In other words, if training additional employees in advanced rescue provides a significant reduction in response time, then GWO advices to train those additional employees.

Personnel must meet the prerequisites of GWO Advanced Rescue Training as stated in GWO Advanced Rescue Training Standards.

4. ADVANCED RESCUE EQUIPMENT

Suitable equipment for rescue purpose ensures successful rescue operations as much as personnel with the right competencies, thus in addition to equipment specified in GWO Basic Safety Training Standard, GWO recommends ensuring the availability of the below equipment for advanced rescuers executing advanced rescue operations:

1) Rescue stretcher and/or spine board, suitable to manoeuvre within the turbine

2) Cervical collar
3) Manually operated lowering/raising rescue systems for limited distance rescue
4) Rescue device and/or pulley system with rope grab
5) Power driven lowering/raising rescue system, if rescue up is a potential scenario, e.g. Evacuation to a hoisting platform, or rescue from a tower basement
6) Pulleys
7) Edge protector for rope
8) Tag line of sufficient length
9) Flash light (helmet light)
10) Radios

A full list of the training equipment required for each module and the applicable standards that equipment must satisfy can be found in annex 3.