

Advanced Rescue Refresher Training Standard

V4

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1. LIST OF ABBREVIATIONS

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

2. TERMS AND DEFINITIONS

Term	Definition
Active (rescue device in mobile mode setup)	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)



Additional fall protection Describes the use of an independent, additional suitable fall protection system in conjunction with a primary fall protection system. Typically, used during training to provide fall protection to participants as they learn to use fall protection equipment. Additional fall protection may sometimes be referred to as a “backup”.

The additional fall protection system should be chosen in such a way that it will not hinder the exercise. Preferably this additional fall protection is not even noticeable by the participant

As low as reasonably practicable This means that a risk is identified and controlled to a lower level weighted against the effort, time and money needed to control it.

Clear / precise communication

- technician A is giving information to technician B
- technician B repeats the information
- technician A confirms that the repetition is correct
- if repetition was not correct the technician starts at ‘a’ again

Fall arrest Preventing the user of a personal fall protection system from colliding with the ground, structure, or any other obstacle during a free fall

Fall arrest system Personal fall protection system which limits the impact force on the body of the user during fall arrest

Fall prevention Preventing the user of a personal fall protection system from going into a free fall

Flexitime The time that must be utilised in the course, either theory or practical elements, where training provider sees the most valuable for the participants

Generic principle As opposed to product specific training, a generic approach to teaching safety equipment focuses on the similarities and differences in design, functionality and operation between different equipment products

The generic approach is achieved by teaching a variety of rescue equipment products within each rescue equipment category (e.g. rescue stretchers), enabling the course participants to conduct pre-use inspection and to use other rescue equipment products compared to those taught during this module – based on the manufacturer’s user manual but without additional formal training

Consequently, a potential task is placed upon the participants on course completion, requiring them to familiarise themselves with other rescue equipment products in their own organisation e.g. prior to site or work, based on the manufacturer’s user manual



Hip overhang	A technique used during the rescue of a casualty from a ladder where the rescue line is diverted using the side D-ring located at the hip of the rescuer's harness. This creates greater space between the casualty and the ladder
Injured person	The affected person requiring first aid treatment and rescue/evacuation
Must	For clarity where the word 'must' is used in this standard it shall have the same meaning as 'shall'
Passive setup (rescue device in stationary mode setup)	Rescue device in standard mode setup, i.e. the rescue device rigged in the WTG
Personal fall protection system	Assembly of components intended to protect the user against falls from height, including a body holding device and an attachment system, which can be connected to a reliable anchorage point
Power driver for rescue device	Detachable powered unit for operating the ascending function of the rescue device
PPE	Includes personal fall protection equipment
Rescue head support	A device or technique which will support the head of an injured person during a rescue operation (a cervical collar falls into this description)
Rescue system	Personal fall protection system by which a person can rescue themselves or others, in such a way that a free fall is prevented
Restraint system	Personal fall protection system which prevents the user from reaching zones where the risk of a fall from height exists
Shall	Verbal form used to indicate requirements strictly to be followed in order to conform to this training standard and from which no deviation is permitted.
Should	Verbal form used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required
Single rescuer advanced	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



rescue
operation

Tensioned line Aerial ropeway for injured person transportation. Setup horizontally with a rescue device rope rigged between two structural and/or certified anchor points

Transfer board A tool that is used to transport the injured person and is not to be used for immobilisation. Examples of a transfer board are a spine board, extraction board, spec pack, half board, half stretcher etc.

Work positioning system Personal fall protection system which enables the user to work in tension or suspension in such a way that free fall is prevented

Zip line In this standard a zip line has the same meaning as a tensioned line

3. CHANGE LOG

Amendment date	Version	Approved by & date	Description of changes
2 May 2023	4	GWO TC 2023	

Changes throughout:

- New layout
- MAC deleted throughout the standard
- GWO Requirements for Training – title updated

Section 2. Terms and definitions

- Definition for “as low as reasonably practicable” added
- Definition for “additional fall protection” added

Section 4. Scope

- Revised and updated

Section 5.3 Duration

- Text updated to clarify instructions

Section 5.4 Guidance on Delivering Lesson Elements

- Text revised and updated

Section 5.6 Course Codes



- New text added

Section 5.7 Participant Prerequisites for the ART Modules:

- Text simplified with "All personnel participating must meet the participant prerequisites described in the GWO Requirements for Training."

Section 7 Understanding the GWO Taxonomy

- The section Understanding the GWO taxonomy has been replaced with a referral to the GWO Requirements for Training

Annex 1 Equipment List

- Text revised and updated
- Equipment list for working at heights and working at heights & manual handling has been updated
 - All EN/ANSI/GB/BS EN numbers have been updated
 - "Work restraint lanyards" has been changed to "fall restraint lanyards"
 - "Vertical fall arrest system" has been changes to "vertical fall arrest system on a rigid anchor line"
 - "Fixed length fall arrest lanyard" has been changed to "fall arrest lanyard including energy absorber"
 - "Helmets" have been updated to "industrial safety helmet with a chin strap that is released with a force of no less than 150 N and not more than 250 N"
 - "Carabiners" has been changed to "connectors (carabiners)"
- "Evacuation and rescue devices" has been split into two categories: "Rescue devices with lifting capacity" (EN 1496) and "devices for emergency decent" (EN 341)

Annex 3 Risk assessment, lifting and lowering

- Fall protection backup changed to additional fall protection.
-



4. SCOPE

Global Wind Organisation is a non-profit body founded by the wind turbine manufacturers and owners. Our members strive for an injury free work environment in the wind turbine industry, setting common international standards for safety training and emergency procedures.

This standard describes the requirements for advanced rescue refresher training courses that are recommended by the members of GWO. This standard comprises of two modules.

The members of the Global Wind Organisation (GWO) recognise trained persons as competent within basic safety in the wind industry and accept the trained person as possessing the required knowledge to stop an unsafe situation where they as duty-holders are accountable for safety.

This standard has been developed in response to the demand for recognisable safety 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 from G+ and the wind industry.

General feedback on this document can be sent to info@globalwindsafety.org. See globalwindsafety.org on how to raise a complaint about a training provider or report a safety incident occurring during training.

5. GENERAL REQUIREMENTS FOR THE GWO ARTR TRAINING

Upon completion of the Global Wind Organisation (GWO) ARTR training, participants will be able to access and rescue an injured person from a WTG environment.

5.1 Overview

The GWO Advanced Rescue Training Refresher Standard is divided into the following 2 modules:

Module 1: Hub, Spinner and Inside Blade Refresher

Module 2: Nacelle, Tower and Basement Rescue Refresher

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 Standard may mitigate the identified risks.

5.3 Aims and Objectives

The aim of the ARTR Standard is to review and build on previously gained knowledge and skills from the ART training as well as working at heights and manual handling training through theoretical and practical training. Training in accordance with this ARTR standard will enable participants to perform entry-type injured person rescue operations, in a WTG, using industry standard rescue equipment, rescue methods and techniques.



5.4 Duration of the ARTR Standard Modules

The total contact time for completing the stand-alone modules in the advanced rescue refresher training standard is *14 hours and 0 minutes*. This is based on the times given in the module timetables and summarised in table 5.4.1 below.

The training provider must not exceed the time per day given in table 5.4.2 below.

Modules	Duration
Hub, Spinner and Inside Blade Refresher	As per ART
Nacelle, Tower and Basement Rescue Refresher	14 hours 0 minutes

Table 5.4.1 – Duration of the GWO ARTR

	Maximum Duration Per Day
Contact time	8 hours
Total training day	10 hours

Table 5.4.2 – Maximum durations for training days

Note *Contact time includes delivery of course lesson content, 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.

5.5 Guidance on Delivering Lesson Elements

The delivery of this module must comply with the requirements described in the GWO Requirements for Training.

Individual exercises may be combined and integrated to create a more challenging scenario, 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 participants and to provide a more dynamic scenario. For example, removing equipment or marking anchor points as a defect.



Note *If all refresher modules are delivered to the same participants, the redundant elements shall be exchanged to other relevant exercises.*

5.6 Validity Period

The ARTR standard is 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 certificates 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 participant 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 is or training record is expired, the participant must attend the full ARTR Module(s) to obtain a new training record.

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

Course/module	Certificate Validity (Months)
ARTR	24 Months

Table 5.6.1 – GWO NBTRR Certificate validity period

5.7 Course Codes

Module	Course Code
Hub Spinner & Inside Blade Rescue Refresher	ART-HR
Nacelle, Tower and Basement Rescue Refresher	ART-NR
Working at Heights Refresher	WAHR
Manual Handling Refresher	MHR

Table 5.7.1 – Course codes for ART-R modules

Note *After completing the ART-R training, the participants receive both a MHR and WAHR certificate.*

5.8 Participant Prerequisites

All personnel participating must meet the participant prerequisites described in the GWO Requirements for Training.



In addition, participants must hold a valid GWO ART - Nacelle, Tower & Basement Rescue Module; GWO BST Working at Heights; GWO BST First Aid and GWO BST Manual Handling certificates to participate in ARTR.

5.9 Instructor Qualification Prerequisites

A competent GWO Advanced Rescue Training Refresher instructor must adhere to the instructor requirements for GWO training.

5.10 Physical Demands

The ARTR Standard is expected to be physically demanding.

If there is any doubt regarding the medical fitness of any participant, the training provider shall stop training the participant 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 participants other than those required to meet this standard.*

6. GENERAL RESOURCES REQUIRED TO DELIVER ARTR MODULE

The training provider shall ensure that instructor, facilities, and equipment are in place to support the training of participants.

6.1 Instructor

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 Requirements for Training offering GWO training.

A person with first aid qualifications shall be present during all practical training.

The instructor must be:

1. trained in instructional/ lecture techniques and/ or have documented instructional/ teaching experience
2. qualified GWO BST WAH instructor
3. qualified GWO BST Manual Handling instructor
4. trained in GWO BST/BSTR First Aid
5. included in an on-going training program, which includes visits to onshore and/ or offshore WTGs (tower, nacelle, hub) prior to instructing the 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

6. able to apply knowledge and practical skills in alternative rescue methods, techniques and rigging setups compared to those executed by the participants during the practical exercises of the ART Modules
7. able to analyse and justify the ART rescue equipment used, uses and limitations of this equipment included.

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

6.2 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 participants' 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 participant to individually and/or as part of a team, see, hear, and practise 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 for the 'rescue up' exercises, to simulate basement/tower rescue
2. mock-up to simulate under the gearbox with a max. 0.60m diameter access crawl way into the crawl space, a height between 0.60m and 0.30m and minimum 2.00m length (Basement/Tower/Nacelle Module)
3. mock-up to simulate the nacelle:
 - a. figure 6.2.1 provides dimensions to the GWO recommended nacelle mock-up
 - b. the training provider can deviate from the recommended nacelle measures to facilitate a specific turbine design
 - c. the nacelle mock-up must be filled with sufficient simulated assets, to create a realistic nacelle environment



- d. the maximum available contiguous floor space must be less than 3m^2 , excluding walkways of less than 0.60m width
 - e. 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
4. structural and certified anchor points.

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.

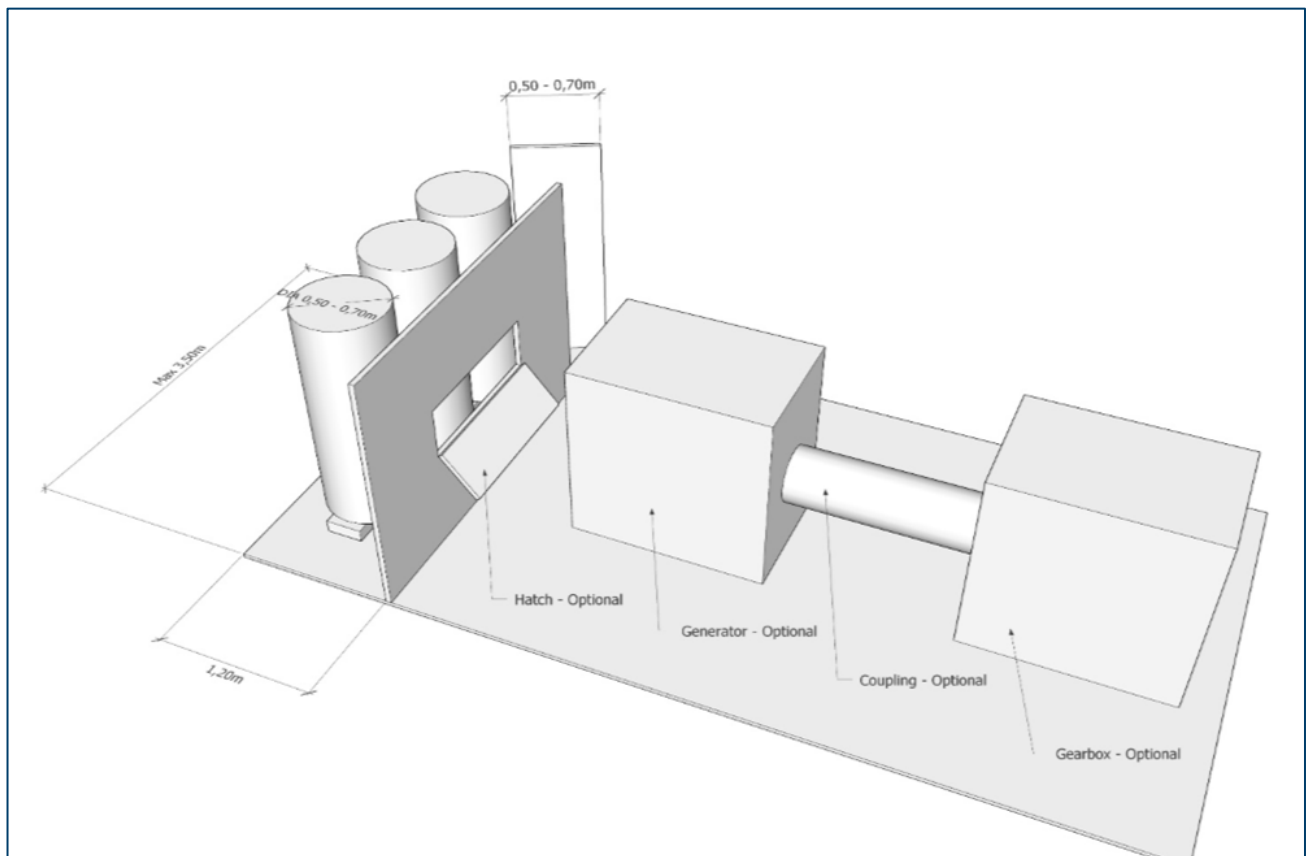


Figure 6.2.1 – Recommended dimensions for the Nacelle Mock-up

6.3 Wind Turbine Environment Explained

What is a wind turbine training environment?

To apply what participants 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 participants' working environment. Thus, identical elements enhance the application of what they have learned: the more identical elements, the better.

A training provider's 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, the goal is to simulate 'training as you work', (or executing training end-to-end) the way participants 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 participant'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 include 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.

'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.

6.4 Training Equipment

The equipment required for training as listed in Annex 1 must be available and must fulfil national legal requirements as listed in table A1-1 in Annex 1 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 participant'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). This enables the participants 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).

Additional fall protection must always be used during training activities at height.

The training provider shall introduce control measures that lower the risks and hazards associated with a fall from height to an acceptable level, following the Hierarchy of Controls in their risk assessment.



GWO recommends a maximum fall factor of 0.5. To calculate this the following formula has been used, using the maximum allowed lanyard of length 2.00m and a fall of 1.00m

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

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

$$\text{Factor (FF)} = 0.5$$

During the evacuation exercises in this module the anchor points used for the attachment of fall arrest lanyards with energy absorbers 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 participants 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 course participants descend from a minimum height using a rescue or evacuation device.

To ensure that all fall protection equipment may be used with enough clearance below the anchor point; and that the participants can experience a descent of sufficient duration for meaningful learning transfer: GWO recommends that the anchor point is a minimum of 6.75m above the ground or structure directly below the anchor point. The recommended 6.75m clearance under the anchor point is explained in detail in Annex 1.

If a training provider deviates from the recommended anchor point height of 6.75m 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:
 - a.i use the value for shock absorber elongation that is provided by the equipment manufacturer, and
 - a.ii demonstrate that the equipment will prevent the person from coming into contact with the ground or structure directly below the anchor point, and
 - a.iii 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 1, and
 - a.iv the potential fall factor shall not exceed 0.5 and
 - a.v participants must experience a descent from a platform that is a minimum of 4.5m above the ground



7. USING THIS STANDARD TO DEVELOP TRAINING

The training in this standard is designed around the GWO taxonomy described in the GWO Requirements for Training. Theoretical and practical activities must be delivered according to the defined taxonomic level in order to reach the described learning objectives.

When teaching safety equipment, a generic approach shall be applied aiming to avoid additional potential product specific formal training after completion of this training. However, national or regional legislation, company gap analysis and location specific risk assessments may require additional product specific familiarisation which is the responsibility of the duty holder.

In addition to this, all training based on this standard including all related resources shall, as a minimum, meet the requirements described in the GWO Requirements for Training.

8. ADMINISTRATION AND CERTIFICATION OF ARTR MODULE

8.1 Course Participant Performance Assessment

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

Throughout the course the instructor will adhere to the course participant performance assessment form (see the Requirements for Training) with a high focus on evaluating the participants' practical skills.

The trainer keeps a course participant performance assessment form for each course participant until the completion / evaluation of the ARTR Module.

The course participant performance assessment form is a final evaluation tool for the instructors to assess participants during practical elements. It allows measurement of the number of violations in regard to safety, competency, or ability.

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

Training providers may adapt the course participant performance assessment form to other media. Training providers shall have a documented procedure in place for dealing with participants not meeting the stated learning outcomes.



Hub, Spinner and Inside Blade Rescue

(ART-HR)



9. HUB, SPINNER AND INSIDE BLADE RESCUE REFRESHER

Delivery of the Hub Spinner & Inside Blade Rescue Refresher Module (HSIBR-R) covers same content, duration, learning objectives as described in the initial Hub Spinner & Inside Blade Rescue (HSIBR) Module of the ART Standard.

The HISBR Module training can consist of first-time participants and refresher participants in the same classroom. The training is designed to allow the more experienced participants to contribute more actively and share their knowledge with the refresher participants.

Note: If training is conducted with first time participants and refresher participants in the same classroom then first-time participants shall receive an ART-H record in WINDA and refresher participants shall receive an ART-HR record in WINDA



GLOBAL WIND
ORGANISATION

Nacelle, Tower and Basement Rescue Refresher

(ART-NR)



10. NACELLE, TOWER AND BASEMENT RESCUE REFRESHER MODULE

10.1 Aims and Objectives for the NTBRR Module

The aim of this module is to enable participants, through theoretical and practical training, to review and build on previously gained knowledge and skills from the ART Nacelle, Tower & Basement Rescue Module as well as the BST Working at Heights and Manual Handling Modules to enable the course participants to perform injured person rescue operations in a WTG nacelle, tower, and basement, by using industry standard rescue equipment, methods, and techniques.

Overall learning objective:

After having successfully complete this Nacelle, Tower and Basement Rescue Refresher Module, the participants will have the ability to:

- 1) **Act independently** to carry out safe nacelle, tower and basement rescues and take responsibility for the correct order of management in an emergency situation in a wind turbine generator (WTG) environment (Ability, intermediate level)

The participants will show signs of:

1. acknowledging the benefits of having a coordinator in a rescue team, and the responsibility that comes with it
2. taking part in discussing which advanced rescue preparations, and emergency and communication procedures, apply in their own organisation
3. committing themselves to avoid incidents from where they may be exposed to a rescue operation
4. committing themselves to act out this value by demonstrating a pro-active approach and role model behaviour

10.2 Nacelle, Tower and Basement Rescue Refresher Module Timetable

The total contact time for completing this module is 14 hours and 0 minutes. This is based on the times given in the module timetable.

Lesson	Element	Duration
1. Introduction to the training	1.1	Safety instructions and emergency procedures
	1.2	Facilities
	1.3	Introduction
	1.4	Overall aim, objectives and agenda
	1.5	Ongoing assessments (participant performance assessment form)



		1.6	Motivation	
		1.7	Human factors	
			TOTAL	15 min.
2.	Emergency response plan in own organisation	2.1	Emergency response plan in own organisation	
		2.2	Evacuation strategy	
			TOTAL	30 min.
3.	Knowledge review	3.1	Falls	
		3.2	Correct fitting of a harness	
		3.3	Fall arrest systems and fall prevention	
		3.4	Fall arrest lanyards	
		3.5	Anchor points	
		3.6	Attaching a guided type fall arrester	
		3.7	Safe and correct use of an SRL	
		3.8	Rescue and evacuation devices	
		3.9	Inspection of PPE, rescue and evacuation devices	
		3.10	Manual handling	
			TOTAL	75 min.
4.	Measures to prevent injury during training	4.1	Warm up	
			TOTAL	20 min.
5.	Manual handling	5.1	Manual handling	
			TOTAL	30 min.
6.	Working at height – rescue from ladder	6.1	Safe and correct use of rescue equipment from ladder	
			TOTAL	80 min.
7.	Working at height – self-evacuation	7.1	Safe and controlled self-evacuation	
			TOTAL	35 min.
8.	Measures to prevent injury during training	8.1	Warm up	
			TOTAL	20 min.
9.	Evacuation of an injured person from the nacelle to the base of the tower	9.1	Practical exercise evacuation inside and outside of tower	



TOTAL			120 min.
10. Rescue from enclosed space	10.1	Rescue from enclosed space, exercises	
TOTAL			110 min.
11. Rescue from crawl space	11.1	Crawl space rescue - exercises	
TOTAL			200 min.
12. Rescue up	12.1	Rescue up – introduction	
	12.2	Rescue up – inside and outside of the tower – practical exercises	
TOTAL			90 min.
13. Training review	13.1	Training review	
	13.2	Feedback session	
TOTAL			15 min.
GRAND TOTAL			840 min.

Table 10.2.1 – GWO ARTR Nacelle, Tower and Basement Rescue Refresher Module timetable

10.3 Detailed Description of the Nacelle, Tower and Basement Rescue Refresher Module

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

LESSON 1 - INTRODUCTION TO THE TRAINING

15 min.

The aim of this lesson is for the participants to be motivated and to engage in the training safely at a training facility, while recognising what is expected of them during the training.

After having successfully completed this lesson, the participants can:

- 1) **Show interest** in what is expected of them throughout the module (Ability, basic level)
- 2) **Show interest** and explain local emergency procedures and facilities (Ability, basic level)
- 3) **Show interest** in human factors and explain their implications (Ability, basic level)

ELEMENT 1.1 - SAFETY INSTRUCTIONS AND EMERGENCY PROCEDURES

Learning objective:



- 4) The participants **show interest** in the safety and emergency procedures at the training facility (Ability, basic level)



The instructor shall:

- 1.1.1 Explain and ask involving questions aimed at:
 - a. safety instructors according to internal procedures
 - b. emergency procedures and emergency exits in the areas where the participants can expect to be located during the course
 - c. check understanding within the group by facilitating a group discussion



The participants shall:

- 1.1.2 Engage in answering questions on local safety and emergency procedures

ELEMENT 1.2 - FACILITIES

Learning objective:

- 5) The participants can **recognise** the location of facilities at the training location (Knowledge, basic level)



The instructor shall:

- 1.2.1 Present a general description of the facilities at the training location (administration, dining area, restrooms, toilets, etc.)
- 1.2.2 Alternatively, lead a tour and point out facilities



The participants shall:

- 1.2.3 Note relevant facilities and ask questions when in doubt



ELEMENT 1.3 - INTRODUCTION

Learning objective:

- 6) The participants **show interest** in fellow participants and the course content and design (Ability, basic level)



The instructor shall:

- 1.3.1 Explain and ask involving questions aiming at the program of the ARTR Nacelle, Tower & Basement Rescue Refresher Module, including breaks and mealtimes
- 1.3.2 Give a short introduction to themselves, including their backgrounds as instructors
- 1.3.3 Ask for participants' expectations of the training and their learning or development
- 1.3.4 Facilitate a group discussion or Q/A activity on participants expectations overall



The participants shall:

- 1.3.5 Give a short introduction to themselves, including job function and expected primary geographic work location and share expectations on the training

ELEMENT 1.4 - OVERALL AIM, OBJECTIVES AND AGENDA

Learning objective:

- 7) The participants can **recognise** the scope and main objectives of the ARTR Nacelle, Tower & Basement Rescue Refresher Module training (Knowledge, basic level)



The instructor shall:

- 1.4.1 Present the scope and main learning objectives of the ARTR Nacelle, Tower & Basement Rescue Refresher Module training
- 1.4.2 Involve participants with questions on understanding and individual experiences in ARTR Nacelle, Tower & Basement Rescue Refresher Module training



The participants shall:

- 1.4.3 Engage in answering questions and share experiences on ARTR Nacelle, Tower & Basement Refresher Module training

ELEMENT 1.5 - ONGOING ASSESSMENTS (PARTICIPANT PERFORMANCE ASSESSMENT FORM)

Learning objective:

- 8) The participants **recognise** the assessment procedure and the aim of the ongoing assessment (Knowledge, basic level)



The instructor shall:

- 1.5.1 Explain the reasons for the ongoing assessment
- 1.5.2 Explain the layout of the GWO participants' performance assessment form and how it will be used
- 1.5.3 Facilitate a group discussion on the importance of the assessment forms



The participants shall:

- 1.5.4 Engage themselves in discussions and ask questions when in doubt in relation to the assessment procedure

ELEMENT 1.6 - MOTIVATION

Learning objective:

- 9) The participants show an **interest** in engaging in the learning activities (Ability, basic level)



The instructor shall:

- 1.6.1 Explain and lead a discussion on:
 - a. the importance of personal involvement in the course
 - b. the definition of, and the need for, ARTR Nacelle, Tower & Basement Rescue Refresher Module training understanding and abilities



Note *Positive motivation is the driving force for commitment, and the instructor should make a focused effort to support growth of the necessary attitude and motivation in the participants.*



The participants shall:

1.6.2 Engage themselves in discussion and share experiences on ARTR Nacelle, Tower & Basement Rescue Refresher Module training

Note *When the participants succeed by trying out on their own, bring their relevant experience into play and apply learning points from the instructor's feedback, the participants develop a positive attitude and responsibility towards the subject and the performance in the work situation.*

ELEMENT 1.7 - HUMAN FACTORS

The aim of the element is to draw the participants' attention on how human performance and taking responsibility influences a safe work environment, and to prepare for the continued focus on human factors during practical training and exercises.

Learning objectives:

- 10) The participants can **describe** the relevant human factors and their implications (Knowledge, basic level)
- 11) The participants show an **interest** and willingness to focus on human factors during the following practical exercises (Ability, basic level)



The instructor shall:

- 1.7.1 Present how human factors influence accidents in the wind industry (relevant statistics may be used)
- 1.7.2 Lead a discussion about the role of the individual in improving human performance and how this can improve the safety in WTG environments
- 1.7.3 Ensure that constructive feedback on the participant's performance involve human factors criteria when these are defined in the learning objective such as the ability to take responsibility or to act independently

Facts and Human Factors Criteria:

The consequences of human factors in accidents in WTG environments are influenced by the following terms and conditions:

- a. attention and perception



- b. group behaviour and peer pressure
- c. weather conditions
- d. weather delays
- e. noise levels
- f. site layout and housekeeping
- g. fitness and health
- h. domestic and work-related stress
- i. workload (both overload and underload)
- j. fatigue
- k. time pressure and deadlines
- l. alcohol, medication, and substance abuse



The participants shall:

- 1.7.4 Engage in discussions and share experiences on how human factors influence accidents related to ART-R Nacelle, Tower & Basement Rescue Refresher Module, engage in and reflect on received feedback and take responsibility on their own performance and development during the training

LESSON 2 - EMERGENCY RESPONSE PLAN IN OWN ORGANISATION

30 min.

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

After having successfully completed this lesson, the participants can:

- 12) **Show interest** in the specific rescue preparations, emergency, communication, and command procedures, apply in their own organisation (Ability, basic level)
- 13) **Show interest** in the limitations of the rescue preparations available, when deciding on the rescue strategy (Ability, basic level)
- 14) **Show interest** in evacuation strategies during a rescue operation, attending to a clear and preferred evacuation route for the injured person outside or inside the tower (Ability, basic level)



ELEMENT 2.1 - EMERGENCY RESPONSE PLAN IN OWN ORGANISATION

Learning objectives:

- 15) The participants can **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 (Knowledge, advanced level)
- 16) The participants can **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 (Knowledge, advanced level)



The instructor shall:

- 2.1.1 Lead a discussion about what specific nacelle/tower/basement rescue preparations and emergency and communication procedures apply in their own organisation, e.g. concerning:
 - a. number of rescue personnel available (on site) for a rescue operation and availability of additional rescue personnel
 - b. 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)
- 2.1.2 Lead a discussion about communication procedures of operation, for example:
 - a. communication to backup/rescue team, emergency medical treatment (EMT) i.e. ambulance and fire service
 - b. site lead
 - c. service vessel
 - d. helicopter search and rescue (SAR)
 - e. the means of communication, radio, or phone (cell, IP, or satellite phone)
- 2.1.3 Lead a discussion about command procedures of operation, e.g. site lead command or command in rescue team including:
 - a. national and/or local requirements (e.g. confined space regulations and procedures)
 - b. estimated time for professional emergency response providers to arrive



- 2.1.4 Lead a discussion about 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 visualise and enhance learning transfer), for example:
- turbine design (e.g. layout, pathways, access ways, components, obstacles, hatches, helipad)
 - anchor points (certified/structural/location)
 - rescue equipment (type/quantity/location)
 - emergency light (system/equipment)



The participants shall:

- 2.1.5 Actively engage in a discussion about what specific nacelle/tower/basement rescue preparations and emergency and communication procedures apply in their own organisation, e.g. concerning:
- number of rescue personnel available (on site) for a rescue operation and availability of additional rescue personnel
 - 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)
- 2.1.6 Actively engage in a discussion about communication procedures of operation, for example:
- communication to backup/rescue team, emergency medical treatment (EMT) i.e. ambulance and fire service
 - site lead
 - service vessel
 - helicopter search and rescue (SAR)
 - the means of communication, radio, or phone (cell, IP, or satellite phone)
- 2.1.7 Actively engage in a discussion about command procedures of operation, e.g. site lead command or command in rescue team including:
- national and/or local requirements (e.g. confined space regulations and procedures)
 - estimated time for professional emergency response providers to arrive
- 2.1.8 Actively engage in a discussion about 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 visualise and enhance learning transfer), for example:
- turbine design (e.g. layout, pathways, access ways, components, obstacles, hatches, helipad)



- b. anchor points (certified/structural/location)
- c. rescue equipment (type/quantity/location)
- d. emergency light (system/equipment)

ELEMENT 2.2 - EVACUATION STRATEGY

Learning objectives:

- 17) The participants can **perform** the identification and suitable selection of certified and structural anchor points, relevant for various rescue scenarios (Skills, intermediate level)
- 18) The participants can **explain** and apply the concept of lifting angle, angle factor and deviation (Knowledge, intermediate level)
- 19) The participants can **explain** and control common risks of hazardous energies and common hazards of enclosed space areas, when performing rescue operations (Knowledge, intermediate level)
- 20) The participants can **apply** rescue methods and techniques in performing descending and ascending rescue operations, from a WTG nacelle, tower, and basement, using a rescue stretcher and transfer board, manually and powered lowering/raising rescue system (rescue device, pulley system or similar) (Skills, intermediate level)
- 21) The participants can **apply** a harness and other PPE (e.g. helmet, safety glasses) onto an injured person, in an enclosed space (Skills, intermediate level)
- 22) The participants can **apply** skills by packaging an injured person on a rescue stretcher and transfer board 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 (Skills, intermediate level)
- 23) The participants can **perform** manual transport in a balanced way an injured person on a rescue stretcher or transfer board (Skills, intermediate level)

Note *Whenever possible, an injured person should be lowered in a horizontal configuration.*

- 24) The participants can **perform** the skills of changing directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa) when suspended (Skills, intermediate level)
- 25) The participants can **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 (Skills, intermediate level)



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 following:
 - a. medical condition of the injured person
 - b. time constraints
 - c. transition piece size and configuration
 - d. nacelle position to the wind
 - e. evacuation hatch location
 - f. interfering wind speeds, wind directions
 - g. 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 of the following:
 - a. passive or active rescue device setup
 - b. communication with vessel crew
 - c. 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 the potential consequence of an active setup rescue device slowing down or being blocked by the weight of a loose hanging / unsupported length of the unloaded rope's end

Note Explain and demonstrate the above mentioned based on the manufacturer's user manual.

2.2.9 Explain pros and cons of utilising a rescue stretcher type with lifting bridles; versus a rescue stretcher/transfer board type without lifting bridles; versus no rescue stretcher/transfer board, 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 utilise 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 headfirst, 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 utilising a tagline; while at the same time aiming to avoid a head down configuration of the unconscious injured person so preventing stomach content release

2.2.13 Stress the generic approach to teaching the use of rescue equipment in this lesson focusing on similarities and differences in design, functionality, and operation between different products

2.2.14 Explain the potential task placed upon the participants in their own organisations on course completion, requiring them to familiarise themselves with other rescue equipment products

2.2.15 Provide constructive feedback on the participants' efforts during the exercise with focus on their ability to perform correctly, safely, and responsibly



The participants shall:

2.2.16 Take part in a discussion to examine the rescue and evacuation techniques and the correct use of the rescue stretcher and the lifting bridles. The participants will then complete a question and answer session to further develop their knowledge

LESSON 3 - KNOWLEDGE REVIEW

75 min.

The aim of this lesson is to reduce the risk of short-term and long-term injuries when working at height in a wind turbine and during the practical elements of this course by refreshing the participants knowledge of working at heights and manual handling.

After having successfully completed this lesson, the participants can:



- 26) **Take initiative** and **responsibility** for pre-use inspections of personal fall protection equipment, rescue, and evacuation devices (Ability, intermediate level)
- 27) **Take initiative** and **responsibility** to apply the correct personal fall protection equipment (Ability, intermediate level)
- 28) **Explain** the different maximum angles that are allowed (Knowledge, intermediate level)

ELEMENT 3.1 - FALLS

Learning objectives:

- 29) The participants can **describe** fall indicators on equipment and the indicators that can influence the approach to a rescue (Knowledge, basic level)
- 30) The participants can **describe** different rescue equipment, its functionality and operation (Knowledge, basic level)



The instructor shall:

- 3.1.1 Show examples of, and explain fall indicators on, equipment
- 3.1.2 Explain how different situations can influence the approach to the rescue, injuries / no injuries
- 3.1.3 Explain the risks posed by suspension trauma
- 3.1.4 Stress the generic approach to teaching the use of rescue equipment in this lesson focusing on similarities and differences in design, functionality, and operation between different products
- 3.1.5 Explain the potential tasks placed upon the participants in their own organisations on course completion, requiring them to familiarise themselves with other rescue equipment products
- 3.1.6 Lead a short discussion on the participants' experiences with fall indicators



The participants shall:

- 3.1.7 Discuss and understand the fall indicators on equipment and the indicators that can influence the approach to a rescue. The different designs, functionality, and operation of rescue equipment



ELEMENT 3.2 - CORRECT FITTING OF A HARNESS

Learning objective:

31) The participants can **perform** the correct fitting of a harness (Skills, intermediate level)



The instructor shall:

- 3.2.1 Demonstrate how to carry out a pre-use inspection of a harness
- 3.2.2 Demonstrate how to correctly fit a harness
- 3.2.3 Provide constructive feedback on the participants' performance during the practice



The participants shall:

- 3.2.4 Practise:
 - a. a pre-use inspection of a harness during the scenario-based training
 - b. how to correctly fit a harness during the scenario-based training

ELEMENT 3.3 - FALL ARREST SYSTEMS AND FALL PREVENTION

Learning objective:

32) The participants can **apply** a work positioning lanyard in order to leave hands free for work (Skills, intermediate level)



The instructor shall:

- 3.3.1 Demonstrate how to use the work positioning lanyard
- 3.3.2 Demonstrate how to work with free hands, safely and securely
- 3.3.3 Provide constructive feedback on the participants' efforts during the exercise with focus on their ability to perform correctly, safely, and responsibly



The participants shall:

- 3.3.4 Describe the legal compliance of rail / wire vertical fall arrest systems
- 3.3.5 Practise how to use the work positioning lanyard and how to work with free hands, safely and securely

ELEMENT 3.4 - FALL ARREST LANYARDS

Learning objectives:

- 33) The participants can **perform** how to attach a guided type fall arrester to the fall arrest system (Skills, intermediate level)
- 34) The participants can **perform** how to correctly utilise a fall arrest lanyard, including attachment to the ladder system (Skills, intermediate level)



The instructor shall:

- 3.4.1 Show examples of, and explain the differences between, a double and twin fall arrest lanyard
- 3.4.2 Demonstrate how to use double fall arrest lanyard
- 3.4.3 Demonstrate how to use twin fall arrest lanyard
- 3.4.4 Provide constructive feedback on the participants' performance during the practice



The participants shall:

- 3.4.5 Practise how to attach the fall arrest lanyard to the ladder system in a safe way
- 3.4.6 Practise how to correctly attach fall arrest lanyards to their harness

ELEMENT 3.5 - ANCHOR POINTS

Learning objective:

- 35) The participants can **explain** how to select certified and suitable anchor points (Knowledge, intermediate level)



The instructor shall:

- 3.5.1 Explain the requirements of certified and structural anchor points
- 3.5.2 Explain how to identify suitable anchor points
- 3.5.3 Lead a short discussion on the participants' experiences with anchor points



The participants shall:

- 3.5.4 Practise how to select and utilise certified and structural anchor points

ELEMENT 3.6 - ATTACHING A GUIDED TYPE FALL ARRESTER

Learning objective:

- 36) The participants can **perform** the safe and correct use of SRL as an additional fall protection (Skills, intermediate level)



The instructor shall:

- 3.6.1 Explain the safe and correct use of an SRL for exercises: different types of SRL systems that exist, and how they are used; what length they come in; and difference between wire and straps
- 3.6.2 Demonstrate how to apply a SRL correctly to the harness, either to the attachment point (A -point) on the back or to the attachment point (A-point) in the front
- 3.6.3 Explain the different places an SRL is allowed to be secured
- 3.6.4 Explain the importance of using an SRL as an additional fall protection during exercises
- 3.6.5 Demonstrate how to conduct a pre-use inspection and see if an SRL is approved, possesses documentation and authorisation date
- 3.6.6 Provide constructive feedback on the participants' efforts during the exercise with focus on their ability to perform correctly, safely, and responsibly



The participants shall:

- 3.6.7 Describe which regional legislation applies to their device
- 3.6.8 Describe the legal compliance of rail / wire vertical fall arrest systems



3.6.9 Practise during the scenario-based training

- a. correct choice and use of equipment
- b. correct attachment to rail or wire
- c. correct attachment to harness

ELEMENT 3.7 - SAFE AND CORRECT USE OF AN SRL

Learning objective:

- 37) The participants can **apply** the safe and correct use of a SRL (Skills, intermediate level)



The instructor shall:

- 3.7.1 Demonstrate safe and correct use of a SRL.
- 3.7.2 Provide constructive feedback on the participants' efforts during the exercise with focus on their ability to perform correctly, safely, and responsibly.



The participants shall:

- 3.7.3 Practise safe and correct use of a SRL during the scenario-based training

ELEMENT 3.8 - RESCUE AND EVACUATION DEVICES

Learning objectives:

- 38) The participants **show interest** in rescue and evacuation devices and the requirements for inspection and certification (Ability, basic level)
- 39) The participants can **show interest** in regional legislation that applies to devices (Ability, basic level)



The instructor shall:

- 3.8.1 Explain when, and how, to use rescue and evacuation devices
- 3.8.2 Explain the regional legislation that applies to their devices



- 3.8.3 Explain the requirements for inspection/ certification (vacuum packed/ not vacuum packed)
- 3.8.4 Facilitate a group discussion or Q/A activity on the requirements for inspection / certification with a particular emphasis on regional legislation that applies to their devices



The participants shall:

- 3.8.5 Recognise when, and how, to use rescue and evacuation devices
- 3.8.6 Describe which regional legislation applies to their devices
- 3.8.7 Recognise the requirements for inspection/ certification (vacuum packed/ not vacuum packed)

ELEMENT 3.9 - INSPECTION OF PPE, RESCUE AND EVACUATION DEVICES

Learning objectives:

- 40) The participants **show interest** in which regional legislation applies to their PPE and the formal inspection periods and requirements for certification of PPE in their region (Ability, basic level)
- 41) The participants can **perform** a pre-use inspection of their PPE and carry out a pre-use inspection of rescue and evacuation devices (Skills, intermediate level)



The instructor shall:

- 3.9.1 Explain the regional legislation applies to their PPE
- 3.9.2 Explain the formal inspection periods for certification of PPE in their region
- 3.9.3 Explain the requirements for inspection / certification
- 3.9.4 Demonstrate how to carry out a pre-use inspection of their PPE
- 3.9.5 Demonstrate how to carry out a pre-use inspection of rescue and evacuation devices
- 3.9.6 Provide constructive feedback on the participants' performance during the practice



The participants shall:

- 3.9.7 Describe which regional legislation applies to their PPE
- 3.9.8 Describe formal inspection periods for certification of PPE in their region



- 3.9.9 Recognise the requirements for inspection / certification
- 3.9.10 Practise how to carry out a pre-use inspection of their PPE
- 3.9.11 Practise how to carry out a pre-use inspection of rescue and evacuation devices

ELEMENT 3.10 - MANUAL HANDLING

Learning objectives:

- 42) The participants can **perform** the safe and correct movement of objects utilising correct manual handling techniques (Skills, intermediate level)
- 43) The participants can **explain** how to reduce the risks associated with manual handling tasks (Knowledge, intermediate level)



The instructor shall:

- 3.10.1 Lead a discussion about manual handling, covering the following:
 - a. consequences of long-term injuries arising from poor manual handling
 - b. symptom awareness
 - c. typical reporting methods for injuries
- 3.10.2 Explain spinal anatomy and posture
- 3.10.3 Explain and demonstrate how to plan manual handling tasks using the TILE principle - considering the load weight, maximum reaching distance and aggravating factors (refer to Annex 3)
- 3.10.4 Explain and demonstrate risk control measures and manual handling techniques with a focus on avoiding manual handling and using suitable handling aids
- 3.10.5 Inform the participants that they will be observed and evaluated on applying manual handling theory and practical skills during the remaining part of the module

Note *During the remaining rescue exercises on this course the instructor shall observe and coach the participants in manual handling planning, techniques, execution, and improvement.*

It is important that the participants understand how to apply manual handling planning and techniques to their daily work environment.



The participants shall:

- 3.10.6 Take part in a discussion about manual handling, covering the following:
 - a. consequences of long-term injuries arising from poor manual handling
 - b. symptom awareness
 - c. typical reporting methods for injuries
- 3.10.7 Describe spinal anatomy and posture
- 3.10.8 Explain and practise how to plan manual handling tasks using the TILE principle in addition to risk control measures with a focus on avoiding manual handling and using suitable handling aids

LESSON 4 - MEASURES TO PREVENT INJURY DURING TRAINING

20 min.

The aim of this lesson is to reduce the risk of injury during training by ensuring that the participants are briefed in the control measures employed in the training area and to warm up prior to performing rescue exercises.

After having successfully completed the lesson participants can:

- 44) **Take initiative** and **take responsibility** to reduce the risk of injury by understanding and demonstrating effective risk control measures (Ability, intermediate level)



The instructor shall:

- 4.1.1 Explain control measures for the specific training facilities to avoid injury during training
- 4.1.2 Verify that the participants can explain the principles of operation of the PPE and equipment to be used during practical training sessions
- 4.1.3 Ensure that any hazardous energy sources which may affect the participants during the practical training sessions are isolated and locked out and that the status of the isolations have been communicated to the participants
- 4.1.4 Lead a warm-up session of the major muscle groups of the body, ankles, wrists and back. See suggested exercises in Annex 2.
- 4.1.5 It is the instructor's responsibility to physically verify that each participant who is working at height (including both casualty and rescuer) is always attached to additional fall protection. GWO recommends that a SRL is used as additional fall protection



The participants shall:

- 4.1.6 Take part in the warm-up session of the major muscle groups, ankles, wrists and back
- 4.1.7 Perform a pre-use inspection of their personal fall protection equipment
- 4.1.8 Perform a 'buddy check' of another participant's personal fall protection equipment

LESSON 5 - MANUAL HANDLING

30 min.

The aim of this lesson is to refresh the participants knowledge to be able to use the appropriate methods to control and reduce the risk of injuries.

The lesson will also create awareness of the importance of warming up before manual handling operations to reduce the risk of injury and thereby ensure safe manual handling

After having successfully completed this lesson, participants can:

- 45) **Take initiative** and **take responsibility** to carry out warm-up prior to daily physical work tasks and to utilise correct manual handling techniques and principles to mitigate musculoskeletal injuries (Ability, intermediate level)

ELEMENT 5.1 - MANUAL HANDLING

Learning objectives:

- 46) The participants can **recognise** the importance of warming up prior to daily physical work tasks to ensure safe working practices and reduce risks of injury (Knowledge, basic level)
- 47) The participants can **take initiative** and **take responsibility** to carry out warm-up prior to daily physical work tasks (Ability, intermediate level)
- 48) The participants can **describe** the safe and correct utilisation of correct manual handling techniques (Knowledge, basic level)



The instructor shall:

- 5.1.1 Explain the importance of warm-up as preparation for manual handling operations, including repetitive work, working in awkward positions and heavy lifting



- 5.1.2 Prompt the participants to share experiences about warm-up before manual handling operations
- 5.1.3 Lead a discussion on how to support a culture about warming up on work sites prior to physical work, including climbing
- 5.1.4 Lead a discussion on how to mitigate injuries from:
 - a. working while kneeling
 - b. pushing and pulling loads
 - c. carrying loads by following the TILE principle
 - d. lifting loads
 - e. working with handheld tools
 - f. risks from working in awkward postures
- 5.1.5 During remaining exercises, observe and provide immediate constructive feedback to the participants focusing on the following areas:
 - a. reducing manual handling using suitable handling aids where possible
 - b. ensure TILE principle is executed throughout each exercise



The participants shall:

- 5.1.6 Take active part in discussing and sharing experiences on how to mitigate injuries and ask questions when in doubt of safe and correct manual handling techniques and principles

Note *The lesson elements concerned with manual handling should be practised during subsequent exercises where the participants are performing exercises for rescue and evacuation from height and at any other time where they are handling equipment or props for exercises*

LESSON 6 - WORKING AT HEIGHT – RESCUE FROM LADDER

80 min.

The aim of this lesson is to ensure the participants are competent in performing a rescue operation of an injured person on a ladder.

After successfully having completed this lesson, the participants can:



- 49) **Take initiative** and **take responsibility** to ensure the safe use of rescue equipment and anchor points (Ability, intermediate level)
- 50) **Take initiative** and **take responsibility** to ensure the control measures for manual handling are understood, therefore, reducing the risks associated (Ability, intermediate level)

Note *Where possible the participants shall work in teams of two. There shall be one exercise per course participant. It is recommended to use a live injured person for these exercises.*

ELEMENT 6.1 - SAFE AND CORRECT USE OF RESCUE EQUIPMENT FROM LADDER

Learning objectives:

- 51) The participants can **perform** how to utilise their personal fall protection equipment in a safe and appropriate manner on a ladder (Skills, intermediate level)
- 52) The participants can **perform** how to lower the injured person to the base of the ladder in a safe and controlled manner (Skills, advanced level)
- 53) The participants can **evaluate** the potential risks associated with the of suspension trauma and take appropriate action (Skills, advanced level)



The instructor shall:

- 6.1.1 Stress the generic approach to teaching the use of rescue equipment in this lesson focusing on the similarities and differences in design, functionality and operation between different products and associated accessories
- 6.1.2 Explain the potential task placed upon the participants in their own organisations on course completion requiring them to familiarise themselves with other rescue equipment products
- 6.1.3 Demonstrate how to perform a safe and controlled rescue from a ladder
- 6.1.4 Demonstrate how to safely and correctly use rescue equipment
- 6.1.5 Demonstrate the safe and correct use of personal fall protection equipment
- 6.1.6 Demonstrate how to select and safely use both certified and structural anchor points
- 6.1.7 Demonstrate how to the take appropriate actions to avoid suspension trauma with the injured person
- 6.1.8 Demonstrate how to reduce the risks associated with manual handling and apply further control measures where applicable



The participants shall:

- 6.1.9 Practise the ability to perform a safe and controlled rescue from a ladder
- 6.1.10 Practise the ability to safely and correctly use rescue equipment
- 6.1.11 Practise the safe and correct use of personal fall protection equipment
- 6.1.12 Practise the ability to select and safely use both certified and structural anchor points
- 6.1.13 Practise the ability the take appropriate actions to avoid suspension trauma with the injured person
- 6.1.14 Practise how to reduce the risks associated with manual handling and apply further control measures where applicable

LESSON 7 - WORKING AT HEIGHTS, SELF-EVACUATION

35 min.

The aim of this lesson is to ensure the participants are competent to perform a self-evacuation from an emergency hatch.

After successfully having completed this lesson, the participants can:

- 54) **Act independently** to ensure a safe and controlled self-evacuation using standard wind industry evacuation equipment, from an emergency hatch (Ability, intermediate level)
- 55) **Act independently** to ensure a safe and correct double evacuation with the evacuation or rescue device in an active mode setup including a connecting element between the device and the harness (Ability, intermediate level)

ELEMENT 7.1 - SAFE AND CONTROLLED SELF-EVACUATION

Learning objectives:

- 56) The participants can **perform** a safe and controlled self-evacuation using standard wind industry evacuation equipment from an emergency hatch (Skills, intermediate level)
- 57) The participants can **perform** a safe and correct double evacuation with the evacuation or rescue device in an active mode setup including a connecting element between the device and the harness (Skills, intermediate level)



The instructor shall:

- 7.1.1 Demonstrate the correct rigging and attachment of the evacuation device
- 7.1.2 Demonstrate how to apply fall protection at any point when there is a risk from falling from height
- 7.1.3 Demonstrate how to perform a passive mode setup self-rescue from an evacuation hatch
- 7.1.4 Demonstrate how to perform an active mode setup double evacuation from an evacuation hatch, applying a deflection/friction connector on the rescue device and using a fall restraint lanyard kept as short as possible as a connecting element between the rescue / evacuation device and the harness
- 7.1.5 Demonstrate how to reduce the risks associated with manual handling and apply further control measures where applicable
- 7.1.6 Provide constructive feedback on the participants' efforts during the exercise with focus on their ability to perform correctly, safely, and responsibly

Note *One exercise per participant.*



The participants shall:

- 7.1.7 Practise as a group the correct rigging and attachment of the evacuation device
- 7.1.8 Practise how to apply fall protection at any point when there is a risk from falling from height.
- 7.1.9 Practise a passive mode setup self-rescue from an evacuation hatch
- 7.1.10 Practise an active mode setup double evacuation from an evacuation hatch, applying a deflection/friction connector on the rescue device and using a fall restraint lanyard kept as short as possible as a connecting element between the rescue / evacuation device and the harness
- 7.1.11 Practise how to reduce the risks associated with manual handling and apply further control measures where applicable

LESSON 8 - MEASURES TO PREVENT INJURY DURING TRAINING

20 min.

Aim: The aim of this lesson is to reduce the risk of injury during training by ensuring that the participants are briefed in the control measures employed in the training area and to warm up prior to performing rescue exercises.



After having successfully completed this lesson, the participants can:

- 58) **Show interest** and discuss the major muscle groups (Ability, basic level)
- 59) **Take initiative** to conduct a pre-use inspection of their personal fall protection equipment and a 'buddy check' of another participants' personal fall protection equipment (Ability, intermediate level)
- 60) **Act independently** to apply a harness and other PPE (e.g. helmet, safety glasses) onto an injured person, in an enclosed space in a WTG (Ability, Intermediate level)



The instructor shall:

- 8.1.1 Explain further control measures for the specific training facilities and training to avoid injury during the training
- 8.1.2 Verify that the participants can explain the principles of operation of the PPE and equipment to be used during practical training sessions
- 8.1.3 Ensure that any hazardous energy sources which may affect the participants during the practical training sessions are isolated and locked out and that the status of the isolations has been communicated to the participants
- 8.1.4 Lead a warm-up session of the major muscle groups of the body and the ankles, wrists and back. See suggested exercises in Annex 2.
- 8.1.5 It is the instructor's responsibility to physically verify that each participant who is working at height (including both casualty and rescuer) is always attached to additional fall protection. GWO recommends that a SRL is used as additional fall protection.
- 8.1.6 Lead a short discussion on the principles and importance of PPE



The participants shall:

- 8.1.7 Take part in the warm-up session of the major muscle groups, ankles, wrists and back
- 8.1.8 Perform a pre-use inspection of their personal fall protection equipment
- 8.1.9 Perform a 'buddy check' of another participants personal fall protection equipment

LESSON 9 - EVACUATION OF AN INJURED PERSON FROM THE NACELLE TO THE BASE OF THE TOWER

120 min.



The aim of this lesson is for the participants to be able to evacuate an injured person in a safe and secure manner to the base of the tower, by lowering the injured person on the inside of the tower.

After having successfully completed this lesson, the participants can:

- 61) **Take responsibility** 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 (Ability, intermediate level)
- 62) **Act independently** to 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 transfer board, lowering/raising rescue system (rescue device, pulley system or similar), as a single rescuer (Ability, intermediate level)

ELEMENT 9.1 - PRACTICAL EXERCISE EVACUATION INSIDE AND OUTSIDE OF TOWER

Learning objectives:

- 63) The participants can **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 (Knowledge, intermediate level)
- 64) The participants can **explain** the identification and suitable selection of certified and structural anchor points, relevant for various rescue scenarios, relevant for various rescue scenarios (Knowledge, basic level)
- 65) The participants can **perform** how to apply the concept of lifting angle, angle factor and deviation (Skills, intermediate level)
- 66) The participants can **explain**, how to identify and control common risks of hazardous energies and common hazards of enclosed space areas in a WTG, when performing rescue operations (Knowledge, intermediate level)
- 67) The participants can **perform** how to apply rescue methods and techniques in performing descending rescue operations, from a WTG, using a rescue stretcher and transfer board, lowering/raising rescue system (rescue device, pulley system or similar) (Skills, intermediate level)
- 68) The participants can **perform** how to 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. apply rescue head support, fit helmet, safety glasses etc) onto an injured person, in an enclosed space (Skills, intermediate level)

Note *The use of a rescue sling as an improvised harness is only to be used in an enclosed space where it is not possible to fit a full body harness on an injured person.*



The improvised harness must only be used as a means of extricating an injured person from an enclosed space horizontally. An improvised harness must never be used for lifting or lowering an injured person.

- 69) The participants can **act independently** to package an injured person on a rescue stretcher and transfer board in a vertical or horizontal configuration to enable safe transportation, by doing regular checks, using rescue equipment such as rescue head support and avoiding head down configuration of the unconscious injured person (Ability, intermediate level)
- 70) The participants can **perform** how to manually transport in a balanced way an injured person on a rescue stretcher and on a transfer board (Skills, intermediate level)
- 71) The participants can **perform** how to change directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa), when suspended (Skills, intermediate level)
- 72) The participants can **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 (Skills, intermediate level)
- 73) The participants can **perform** rescue operations, using the injured person's personal fall protection on the injured person - as additional fall protection, if required (Skills, intermediate level)
- 74) The participants can **manage** an evacuation of an injured person from the nacelle to the base of the tower using personal lamp (e.g. helmet light), if required due to poor lighting conditions (Ability, advanced level)
- 75) The participants can **take initiative** and **responsibility** to act as the informal rescue team coordinator performing scene assessment and hazard identification, assessing, and determining the rescue strategy and exercising clear communication (Skills, intermediate level)
- 76) The participants can **perform** clear and precise communication in a stressful rescue operation with members of the rescue team as a team coordinator and as a team member (Skills, intermediate level)
- 77) The participants can **perform** clear and precise communication to other emergency responders (e.g. vessel crew or ambulance crew) including coordinating the handover of an injured person (Skills, intermediate level)
- 78) The participants can **recognise** the benefits of having a coordinator in a rescue team, and the responsibility that comes with it (Knowledge, basic level)
- 79) The participants can **discuss** which advanced rescue preparations, and emergency and communication procedures, apply in their own organisation (Knowledge, intermediate level)



Note *For inside evacuation, where possible, the participants shall work in teams of two to four. One inside evacuation exercise per course participant from the nacelle to primary assembly area (either ground or transition piece). Rescue device in an active setup.*

For outside evacuation, where possible, the participants shall work in teams of two. One outside evacuation exercise per team from the nacelle to primary assembly area (either ground or transition piece). Rescue device in a passive setup and using a tagline.

During each exercise, a course participant shall act as team coordinator for the team performing the exercise. It is recommended that a rescue dummy is used as the injured person for these exercises. Each exercise includes: rescue strategy planning, rescue efforts and instructor-led evaluation.



The instructor shall:

- 9.1.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario
- 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
 - 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/transfer board
 - 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/transfer board (i.e. harness front or back attachment point). Highlight how to organise the rescue team to the specific rescue operation scenario (who does what)
 - f. 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 participants) on completion of the rescue exercise efforts with a focus on:
 - a. positive feedback
 - b. improvement proposals and alternative solutions
 - c. participants' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualise and enhance learning transfer)



- d. course participants' risk mitigation during the exercise
- e. course participants' manual handling risk mitigation and application of further control measures

9.1.4 The instructor shall guide and support the participants with applying:

- a. manually operated lowering and raising systems.
- b. Additional fall protection of injured person, if required

9.1.5 Stress the generic approach to teaching the use of rescue equipment in this lesson focusing on the similarities and differences in design, functionality and operation between different products and associated accessories

9.1.6 Explain the potential task placed upon the participants in their own organisations on course completion requiring them to familiarise themselves with other rescue equipment products



The participants shall:

In a team –

9.1.7 Explain how to identify and control the specific hazards / risks in the WTG during the rescue operation, covering the following:

- a. hazardous energy sources (mechanical, electrical, pressurised systems) i.e. LOTO
- b. enclosed space areas
- c. poor lighting conditions
- d. dropped objects
- e. poor manual handling
- f. temperature/working conditions (dehydration, heat stroke, exhaustion)
- g. injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context)
- h. slips and trips

9.1.8 Explain how to assess and determine evacuation strategy (relevant rescue method, route technique, certified equipment, and required personnel) for a rescue scenario in a WTG

9.1.9 Practise how to prepare the injured person for safe transportation (i.e. apply rescue head support, fit harness and other PPE, and package them on a rescue stretcher or transfer board)

9.1.10 Practise how to manually transport an injured person on a rescue stretcher or transfer board - in a balanced way - or by means of a zip line (areal ropeway) when relevant



- 9.1.11 Practise how to attach the rescue device to the injured person in a safe and proper manner
- 9.1.12 Practise how to utilise tagline(s) during one exercise, when performing outside evacuation
- 9.1.13 Practise how to 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
- 9.1.14 Practise how to select and utilise certified and structural anchor points
- 9.1.15 Practise how to apply the theory of lifting angle, angle factor, deviation, and edge protection
- 9.1.16 Practise how to rig and operate the lowering/raising rescue system in a proper manner aiming to achieve a safe and efficient rigging setup, including the utilisation of an injured person's personal fall protection equipment without compromising additional fall protection
- 9.1.17 Practise how to apply rescue methods, techniques, and clear and precise communication in performing safe ascending/descending rescue operations from a WTG
- 9.1.18 Practise how to perform regular checks of the injured person during the entire rescue operation
- 9.1.19 Practise how to perform the rescue effort as a team member or team coordinator
- 9.1.20 Practise how to 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)
- 9.1.21 Practise how to 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), carrying the rope bag with them
- 9.1.22 Practise how to perform an evacuation (dummy) from a transition piece to a secondary assembly area (vessel), by transitioning the rescue device setup configuration from an active setup (descent inside tower to transition piece) to a passive setup for descent from the transition piece to the vessel, by:
 - a. pulling the rope's end from the rope bag through the device and attaching it to the injured persons harness (enabling a reverse passive setup) and
 - b. attaching the rescue device on the transition piece ensuring it is within reach and can be controlled without the risk of a fall from height and deviating the configuration over the transition piece crane boom (or similar) by the use of a pulley
- 9.1.23 Practise how to reduce the risks associated with manual handling and apply further control measures where applicable

LESSON 10 - RESCUE FROM ENCLOSED SPACE

110 min.



There are several locations on the turbine where 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 participants 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 where first aid can be administered.

After having successfully completed this lesson, the participants can:

- 80) **Take responsibility** to apply the techniques necessary to successfully rescue the injured person from the enclosed space, in a controlled manner (Ability, intermediate level)
- 81) **Show interest** in how to assess and determine rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) in an enclosed space scenario (Ability, basic level)

ELEMENT 10.1 - RESCUE FROM ENCLOSED SPACE – EXERCISES

Learning objectives:

- 82) The participants can **perform** how to apply rescue methods and techniques in descending and ascending rescue operations, from a WTG, using a rescue stretcher and transfer board, lowering/raising rescue system (rescue device, pulley system or similar) (Skills: intermediate level)
- 83) The participants can **perform** how to fit a harness or improvised harness by the use of a rescue sling around the injured person's chest, and other PPE (e.g. apply rescue head support, fit helmet, safety glasses etc.) onto an injured person, in an enclosed space (Skills, intermediate level)
- 84) The participants can **explain** the identification and suitable selection of certified and structural anchor points, for relevant enclosed space scenarios (Knowledge, intermediate level)
- 85) The participants can explain and **perform** the proper utilisation of a specific lowering/raising rescue system, incl. how to properly attach, rig and secure the system, and requirements, applications, limitations, and the maximum raising distance possible for the system (Skills, intermediate level)
- 86) The participants can **explain** how to apply the concept of lifting angle, angle factor and deviation (Knowledge, intermediate level)
- 87) The participants can **explain** how to identify and control common risks of hazardous energies and common hazards of enclosed space areas in a WTG, when performing rescue operations (Knowledge, intermediate level)

Note *The use of a rescue sling as an improvised harness is only to be used in an enclosed space where it is not possible to fit a full body harness on an injured person.*



The improvised harness must only be used as a means of extricating an injured person from an enclosed space horizontally.

An improvised harness must never be used for lifting or lowering an injured person.

- 88) The participants can **evaluate** how they select the suitable attachment point on the injured person and/or transfer board/rescue stretcher, i.e. harness front or back attachment point and in the top or bottom of the transfer board/rescue stretcher (Skills, advanced level)

Note *An injured person must always be attached to an approved attachment point.*

- 89) The participants can **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 them out, constantly evaluating the rescue efforts (Skills, intermediate level)
- 90) The participants can **perform** how to package and manually transport an injured person on a rescue stretcher and transfer board in a vertical or horizontal configuration to enable safe transportation (Skills, intermediate level)
- 91) The participants can **perform** how to change directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa) in a WTG, when suspended (Skills, intermediate level)
- 92) The participants can **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 (Skills, intermediate level)
- 93) The participants can **perform** rescue operations, in a WTG, using the casualties personal fall protection on the injured person, as additional fall protection, if required (Skills, intermediate level)
- 94) The participants can **perform** rescue operations in a WTG enclosed space using a headlamp, if required due to poor lighting conditions (Skills, intermediate level)
- 95) The participants can **evaluate** how to act as the informal rescue team coordinator performing scene assessment and hazard identification, assessing, and determining the rescue strategy (Skills, advanced level)
- 96) The participants can **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 (Skills, intermediate level)
- 97) The participants can **perform** clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew) including coordinating the handover of an injured person (Skills, intermediate level)



- 98) The participants can **perform** how to transport an injured person horizontally over the length of the turbine, with the use of industry rescue equipment rigged in a tensioned line (zip line) (Skills, intermediate level)
- 99) **Recognise** the benefits of having a coordinator in a rescue team, and the responsibility that comes with it (Knowledge, basic level)

Note *Where possible the participants shall work teams of two. One course participant shall act as team coordinator. There shall be two exercises per team. It is recommended to use a rescue dummy as the injured person. Each exercise includes: rescue strategy planning, rescue efforts and instructor-led evaluation.*



The instructor shall:

- 10.1.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario
- 10.1.2 Introduce the specific exercise, including (to the extent needed):
- a. selecting 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 optimise the rescue set up, e.g. refresh how to rig a tensioned line (zip line) 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/transfer board
 - d. to guide and support the participants with exploring different rigging options of attaching the lowering/raising rescue system to the injured person or rescue stretcher/transfer board (i.e. harness's front (or back) attachment point or attachment point at the foot of the rescue stretcher/transfer board)
 - e. to highlight what injured person configuration to apply (i.e. horizontal or vertical configuration)
 - f. to highlight how to organise the rescue team to the specific rescue operation scenario (who does what)
 - g. what specific elements/course contents the instructor's assessment will include
- 10.1.3 Capture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the participants) on completion of the rescue exercise efforts with a focus on:
- a. positive feedback
 - b. improvement proposals and alternative solutions



- c. participants' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualise and enhance learning transfer)
- d. course participants' risk mitigation during the exercise
- e. participants' manual handling risk mitigation and application of further control measures

10.1.4 Guide and support the participants with applying:

- a. manually operated lowering and raising systems
- b. additional fall protection of injured person, if required

10.1.5 Stress the generic approach to teaching the use of rescue equipment in this lesson focusing on the similarities and differences in design, functionality, and operation between different products

10.1.6 Explain the potential task placed upon the participants (on course completion) requiring them to familiarise themselves with other rescue equipment products in their own organisations



The participants shall:

In a team –

10.1.7 Explain how to identify and control the specific hazards/risks in the WTG during the rescue operation, by covering the following:

- a. hazardous energy sources (mechanical, electrical, pressurised systems) i.e. LOTO
- b. enclosed space areas
- c. poor lighting conditions
- d. dropped objects
- e. poor manual handling
- f. temperature/working conditions (dehydration, heat stroke, exhaustion)
- g. injured person suspension trauma (repetition from GWO WAH put into an advanced rescue context)
- h. slips and trips

10.1.8 Explain how to assess and determine the optimum rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) for a rescue scenario in a WTG

10.1.9 Demonstrate how to prepare the injured person for safe transportation (i.e. apply rescue head support, fit harness and other PPE, and package them on a rescue stretcher or transfer board)



- 10.1.10 Practise how to 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
- 10.1.11 Practise how to apply proper manual handling techniques when transporting the injured person in a balanced and secure way
- 10.1.12 Explain and demonstrate how to select and utilise certified and structural anchor points
- 10.1.13 Practise how to apply the theory of lifting angle, angle factor, deviation, and edge protection
- 10.1.14 Practise how to rig and operate the lowering/raising rescue system in a proper manner aiming to achieve a safe and efficient rigging setup, including the utilisation of an injured person's personal fall protection equipment without compromising additional fall protection
- 10.1.15 Practise how to apply rescue methods, techniques, and precise and clear communication in performing safe lowering/raising rescue operations from a WTG
- 10.1.16 Practise how to perform regular checks of the injured person during the entire rescue operation
- 10.1.17 Practise how to perform the rescue effort as a team member or team coordinator
- 10.1.18 Show acknowledgement of the added value of having a team coordinator
- 10.1.19 Practise how to conduct a rescue operation in poor lighting conditions
- 10.1.20 Practise how to transport the injured person to the escape hatch by means of a tensioned line (zip line), to control the handling of injured person more efficiently and reduce manual handling
- 10.1.21 Practise how to reduce the risks associated with manual handling and apply further control measures where applicable

LESSON 11 - RESCUE FROM CRAWL SPACE

200 min.

There are several locations on the turbine where 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 participants to rescue an injured person from a crawl space to a location where first aid can be administered.

After having successfully completed this lesson, the participants can:

- 100) **Take initiative** to apply the techniques to successfully rescue the injured person from the crawl space, in a controlled manner (Ability, intermediate level)



- 101) **Act independently** to assess and determine rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) in a crawl space scenario (Ability, intermediate level)
- 102) **Take initiative** to apply rescue methods and techniques in performing a rescue operation, from a crawl space, covering efforts with and without rescue equipment to ensure the optimum result (Ability, intermediate level)

ELEMENT 11.1 - CRAWL SPACE RESCUE – EXERCISES

Learning objectives:

- 103) The participants can **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 them out, constantly evaluating the rescue efforts (Skills, intermediate level)
- 104) The participants can **perform** rescue operations using safe and suitable (certified or structural) anchor points, lifting angles, deviation, and edge protection for the rescue equipment (Skills, intermediate level)
- 105) The participants can **explain** how to assess and determine rescue strategy (relevant rescue method, technique, certified equipment, and required personnel) in a crawl space scenario (Knowledge, intermediate level)
- 106) The participants can **explain** the proper utilisation of a specific lowering/raising rescue system: incl. how to properly attach, rig and secure the system; requirements, applications, limitations and the maximum raising distance possible for the system (Knowledge, intermediate level)
- 107) The participants can **explain** how to identify and control common risks of hazardous energies and common hazards of crawl space areas in a WTG, when performing rescue operations (Knowledge, intermediate level)
- 108) The participants can **perform** how to 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 (Skills, intermediate level)
- 109) The participants can **take initiative** and **take responsibility** to prepare the injured person for safe transportation, by doing regular checks, using rescue equipment such as rescue head support and avoiding head down configuration of the unconscious injured person (Ability, intermediate level)

Note *The use of a rescue sling as an improvised harness is only to be used in an enclosed space where it is not possible to fit a full body harness on an injured person.*



The improvised harness must only be used as a means of extricating an injured person from an enclosed space horizontally. An improvised harness must never be used for lifting or lowering an injured person.

- 110) The participants can **explain** how to determine and select the suitable attachment point on the injured person and/or transfer board/rescue stretcher, i.e. harness front or back attachment point and in the top or bottom of the transfer board/rescue stretcher (Knowledge, intermediate level)

Note *An injured person must always be attached to an approved attachment point.*

- 111) The participants can **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 them out, constantly evaluating the rescue efforts (Skills, intermediate level)
- 112) The participants can **perform** rescue operations, using the casualties personal fall protection on the injured person, as additional fall protection, if required (Skills, intermediate level)
- 113) The participants can **perform** as the informal rescue team coordinator showing scene assessment and hazard identification, assessing, and determining the rescue strategy (Skills, intermediate level)
- 114) The participants can **perform** how to communicate clearly in a stressful rescue operation both with members of the rescue team as a team coordinator, and as a team member (Skills, intermediate level)
- 115) The participants can **perform** clear communication and guidance to other emergency responders (e.g. vessel crew or ambulance crew) including coordinating the handover of an injured person (Skills, intermediate level)
- 116) The participants can acknowledge and **manage** the benefits of having a coordinator in a rescue team, and the responsibility that comes with it (Ability, advanced level)

Note *Where possible the participants shall work teams of two or four. One course participant shall act as team coordinator. There shall be a total of six exercises.*

Note *It is recommended to use a rescue dummy as the injured person. Each exercise includes: rescue strategy planning, rescue efforts and instructor-led evaluation*



The instructor shall:

- 11.1.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario
- 11.1.2 Introduce the specific exercise, including (to the extent needed):



- a. selecting 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 optimise the rescue set up
 - c. to highlight the considerations to determine where in the WTG to package the injured person on a rescue stretcher/transfer board
 - d. to guide and support the participants with exploring different rigging options of attaching the lowering/raising rescue system to the injured person or rescue stretcher/transfer board i.e., harness's front (or back) attachment point; or attachment point at the foot of the rescue stretcher/transfer board
 - e. to highlight how to organise the rescue team to the specific rescue operation scenario (who does what)
 - f. what specific elements/course contents the instructor's assessment will include
- 11.1.3 Recapture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the participants) on completion of the rescue exercise efforts with a focus on:
- a. positive feedback
 - b. improvement proposals and alternative solutions
 - c. participants' reflections on what specific elements in their own WTG environment/practice differ from the training scenario environment (to visualise and enhance learning transfer)
 - d. course participants' risk mitigation during the exercise
 - e. course participants' manual handling risk mitigation and application of further control measures
- 11.1.4 The instructor shall guide and support the participants with applying:
- a. manually operated lowering and raising systems
 - b. additional fall protection of injured person, if required
- 11.1.5 Stress the generic approach to teaching the use of rescue equipment in this lesson focusing on the similarities and differences in design, functionality, and operation between different products
- 11.1.6 Explain the potential task placed upon the participants in their own organisations on course completion, requiring them to familiarise themselves with other rescue equipment products



The participants shall:

In a team –



- 11.1.7 Explain how to identify and control the specific hazards/risks in the WTG during the rescue operation, covering the following:
 - a. hazardous energy sources (mechanical, electrical, pressurised systems) i.e. LOTO
 - b. enclosed space areas
 - c. poor lighting conditions
 - d. dropped objects
 - e. poor manual handling
 - f. temperature/working conditions (dehydration, heat stroke, exhaustion)
 - g. injured person suspension trauma (repetition from GWO BST WAH put into an advanced rescue context)
 - h. slips and trips
- 11.1.8 Demonstrate how to prepare the injured person for safe transportation (i.e. apply rescue head support, fit harness, and other PPE; and package them on a rescue stretcher or transfer board)
- 11.1.9 Practise how to apply proper manual handling techniques when transporting the injured person in a balanced and secure way
- 11.1.10 Practise how to select and utilise certified and structural anchor points
- 11.1.11 Practise how to apply the theory of lifting angle, angle factor, deviation, and edge protection
- 11.1.12 Practise how to 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
- 11.1.13 Practise how to apply rescue methods, techniques, and precise and clear communication in performing safe lowering/raising rescue operations from a WTG
- 11.1.14 Practise how to perform regular checks of the injured person during the entire rescue operation
- 11.1.15 Practise how to perform the rescue effort as a team member or team coordinator
- 11.1.16 Show acknowledgement of and value having a team coordinator
- 11.1.17 Practise how to conduct a rescue operation in poor lighting conditions.
- 11.1.18 Practise how to reduce the risks associated with manual handling and apply further control measures where applicable



LESSON 12 - RESCUE UP

90 min.

Helicopter transport is becoming increasingly important for the offshore wind industry. Without helicopters for emergency transport, the evacuation route will always be towards the base of the tower. Helicopter emergency evacuation 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 infrastructure 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 participants to bring the injured person from a lower platform to the higher platform, outside and inside the tower, by the use of a powered lowering/raising rescue system.

After having successfully completed this lesson, the participants can:

- 117) **Explain** national and local requirements and/or procedures for helicopter rescue in an WTG, including preparing the injured person, preparing the WTG, the helipad safe zones and safe behaviour on a helipad (Knowledge, intermediate)
- 118) **Explain** how to assess and determine evacuation strategy during a rescue operation, ensuring 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 tower-tower sections) (Knowledge, intermediate level)
- 119) **Perform** a pre-use inspection of a random, powered lowering / raising rescue system (Skills, intermediate level)
- 120) **Take initiative** and **take responsibility** to perform the identification and suitable selection of certified and structural anchor points, relevant for various rescue scenarios, relevant for various rescue scenarios (Ability, intermediate level)
- 121) **Take initiative** and **take responsibility** to perform the proper utilisation of a specific powered lowering/raising rescue system, including: 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 (Skills, intermediate level)
- 122) **Apply** the concept of lifting angle, angle factor and deviation (Skills, intermediate level)
- 123) **Explain** how to identify and control common risks of hazardous energies and common hazards of enclosed space areas in a WTG, when performing rescue operations (Knowledge, intermediate level)
- 124) **Apply** rescue methods and techniques in rescue up operations in a WTG from basement to primary assembly area (ground/transition piece), from transition piece inside tower to nacelle/ helipad and from transition piece outside tower to nacelle/helipad, using a rescue stretcher and/or transfer board, raising rescue system (powered rescue system) (Skills, Intermediate level)



- 125) **Perform** how to package an injured person on a rescue stretcher and transfer board in a vertical or horizontal configuration to enable safe transportation, by doing regular checks, using rescue equipment such as rescue head support and avoiding head down configuration of the unconscious injured person (Skills, intermediate level)
- 126) **Perform** how to change directly from balancing an injured person from a horizontal position to a vertical configuration (and vice versa), when suspended (Skills, intermediate level)
- 127) **Perform** rescue operations using the casualties personal fall protection on the injured person (as additional fall protection if required) (Skills, intermediate level)
- 128) **Perform** as the informal rescue team coordinator performing scene assessment and hazard identification, assessing, and determining the rescue strategy (Skills, intermediate level)
- 129) **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 (Skills, intermediate level)
- 130) **Perform** clear communication and give guidance to other emergency responders (e.g. helicopter crew or ambulance crew) including coordinating the handover of an injured person (Skills, intermediate level)
- 131) Acknowledge and **manage** the benefits of having a coordinator in a rescue team and the responsibility that comes with it (Ability, advanced level)
- 132) **Perform** how to utilise 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 (Skills, intermediate level)
- 133) **Apply** 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 (Skills, intermediate level)

Note *Where possible, the participants shall work in teams of two. There shall be a minimum of three exercises per team.*

Note *Each participant shall perform one inside rescue up exercise from either, the basement to the primary assembly area (transition piece), or the primary assembly area (transition piece), inside the tower, to the nacelle helicopter hoist platform. Rescue device in an active setup*

Note *Each team shall perform one outside rescue up exercise from the primary assembly area (transition piece), outside the tower, to the nacelle helicopter hoist platform. Rescue device in a passive setup.*

Note *During each exercise, a participant shall act as team coordinator for the team performing the exercise.*

Note *It is recommended that a rescue dummy is used as the injured person for these exercises.*

Note *Each exercise includes rescue strategy planning, rescue efforts and instructor-led evaluation.*



ELEMENT 12.1 - RESCUE UP – INTRODUCTION

Learning objectives:

- 134) The participants can **explain** national and local requirements and/or procedures for helicopter rescue in an WTG, including preparing the injured person, preparing the WTG, the helipad safe zones and safe behaviour on a helipad (Knowledge, intermediate level)
- 135) The participants can **explain** the identification and suitable selection of certified and structural anchor points, relevant for various rescue scenarios, relevant for various rescue scenarios (Knowledge, intermediate level)
- 136) The participants can **explain** the proper utilisation of a specific powered lowering/raising rescue system, including: how to properly attach, rig and secure the system; and requirements, applications, limitations (Knowledge, intermediate level)
- 137) The participants can **explain** the means of tethering; and the maximum raising distance possible for the system; and associated battery power source (Knowledge, intermediate level)
- 138) The participants can **explain** national and local regional 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 (Knowledge, intermediate level)



The instructor shall:

- 12.1.1 Explain the necessity and relevance of this module
- 12.1.2 Explain that the pre-use inspection of rescue equipment may be omitted only if it is permitted by the manufacturer's user manual and the manufacturer's criteria, or the participants own organisations
- 12.1.3 Demonstrate how to perform a pre-use inspection of the powered lowering / raising rescue system required / chosen to deliver this module, by following the principles of and covering:
 - a. marking and labels
 - b. equipment is within the period of formal inspections
 - c. the product operating temperature range, particularly relevant for the associated battery power source in low temperatures
 - d. checking integrity and the absence of damage, corrosion, saltwater / chemical / lubricant / dirt exposure or contamination
 - e. operation including taut (drill chuck) attachment to the rescue device



- f. object attachment and tethering the driver and associated battery power source(s), if applicable
- g. observe the manufacturer's user manual for specific or additional requirements

12.1.4 Demonstrate the method of rigging and operating the powered devices including:

- a. relevant technical specifications
- b. requirements
- c. applications
- d. limitations
- e. means of tethering preventing dropped objects
- f. maximum raising distance possible for the specific complete powered lowering/raising rescue system and associated battery power source (fully charged)
- g. the option of the rescuer applying fall protection by being attached to the rescue device (detached from the vertical fall arrest systems) if the manufacturer's user manual allow, aiming for increased movability for the rescuer

12.1.5 Discuss with the participants elements to consider when determining the rescue strategy, ensuring 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

12.1.6 Discuss with the participants requirements and procedures for helicopter rescue

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

12.1.8 Stress the generic approach to teaching the use of rescue equipment in this lesson focusing on the similarities and differences in design, functionality, and operation between different products



12.1.9 Explain the potential task placed upon the participants (on course completion) requiring them to familiarise themselves with other rescue equipment products in their own organisations



The participants shall:

12.1.10 Practise a pre-use inspection of the rescue device driver, by following the principles of and covering:

- a. marking and labels
- b. equipment is within the period of formal inspections
- c. the product operating temperature range, particularly relevant for the associated battery power source in low temperatures
- d. checking integrity and the absence of damage, corrosion, saltwater / chemical / lubricant / dirt exposure or contamination
- e. operation including taut (drill chuck) attachment to the rescue device
- f. object attachment and tethering the driver and associated battery power source(s), if applicable
- g. observe the manufacturer's user manual for specific or additional requirements

12.1.11 Practise the method of rigging and operating the powered devices including:

- a. relevant technical specifications
- b. requirements
- c. applications
- d. limitations
- e. means of tethering preventing dropped objects
- f. maximum raising distance possible for the specific complete powered lowering/raising rescue system and associated battery power source (fully charged)
- g. the option of the rescuer applying fall protection by being attached to the rescue device (detached from the vertical fall arrest systems) if the manufacturer's user manual allow. With the aim of increased movability for the rescuer

Note *The participants will also take part in a group discussion to ensure participants requirements and procedures for helicopter rescue and rescue strategies are fully understood*



ELEMENT 12.2 - RESCUE UP, INSIDE AND OUTSIDE OF THE TOWER – PRACTICAL EXERCISES

Learning objectives:

- 139) The participants can **perform** as the informal rescue team coordinator conducting a scene assessment and hazard identification, assess, and determining the rescue strategy and exercising clear communication (Skills, intermediate level)
- 140) The participants can **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 (Skills, intermediate level)
- 141) The participants can **perform** how to utilise 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 (Skills, intermediate level)
- 142) The participants can **perform** how to utilise 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 (Skills, intermediate level)



The instructor shall:

- 12.2.1 Highlight specific control measures to prevent injury during training relevant to this specific exercise scenario, according to control measures to avoid injury during training (Annex 2 -Exercises)
- 12.2.2 Introduce the specific exercise, including (to the extent needed):
 - a. selecting 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 rescue device setup
 - c. highlight what injured person configuration to apply (i.e. horizontal, or vertical configuration)
 - d. highlight how to organise the rescue team to the specific rescue operation scenario (who does what)
 - e. what specific elements/course contents the instructor's assessment will include
- 12.2.3 Capture the connected learning objectives/topics for this lesson in the evaluation (i.e. feedback to the participants) on completion of the rescue exercise efforts with a focus on:
 - a. positive feedback



- b. improvement proposals and alternative solutions
- c. participants' reflections on what specific elements in their own WTG, environment/practice differ from the training scenario environment (to visualise and enhance learning transfer)
- d. participants' risk mitigation during the exercise
- e. participants' manual handling risk mitigation and application of further control measures

12.2.4 Guide and support the participants with applying:

- a. powered raising rescue systems
- b. additional fall protection of injured person

12.2.5 Demonstrate how to use a bridle setup using one anchor sling attached to the front and back attachment points of the injured persons harness to:

- a. ensure the injured person is suspended as close to vertical as possible
- b. allow room for the rescuer to manoeuvre between the injured person and the rescue device

12.2.6 Explain the potential issue of insufficient lifting height for entering the nacelle when the injured person is suspended in a bridle setup that is too long

12.2.7 Demonstrate how the rescuer can apply fall protection by being attached to the rescue device (detached from the vertical fall arrest system) if the manufacturer's user manual allow

12.2.8 Stress the generic approach to teaching the use of rescue equipment in this lesson focusing on the similarities and differences in design, functionality, and operation between different products

12.2.9 Explain the potential task placed upon the participants in their own organisations on completion, requiring them to familiarise themselves with other rescue equipment products

12.2.10 Provide constructive feedback on the participants' efforts during the exercise with focus on their ability to perform correctly, safely, and responsibly



The participants shall:

12.2.11 In a team, explain how to identify and control the specific hazards/risks in the WTG during the rescue up operation, covering the following:

- a. hazardous energy sources (mechanical, electrical, hydraulic, pressurised systems) i.e. LOTO
- b. enclosed space areas
- c. poor lighting conditions
- d. dropped objects



- e. poor manual handling
- f. temperature aiming to achieve a high learning transfer from the module to their way of working

After having successfully completed this lesson, the participants can:

- 143) **Take initiative** to avoid incidents requiring a rescue operation (Ability, intermediate level)
- 144) **Act independently** to show commitment to this value by demonstrating a pro-active approach and role model behaviour (Ability, intermediate level)
- 145) **Show interest** in the formative evaluation of the module in a constructive and demonstrating a pro-active approach and role model behaviour (Ability, basic level)

LESSON 13 - TRAINING REVIEW

15 min.

Learning objective:

- 146) The participants can **recognise** and process their learning outcome and key takeaways from the module, aiming to achieve a high learning transfer from the module to their way of working (Knowledge, basic level)

ELEMENT 13.1 - TRAINING REVIEW



The instructor shall:

- 13.1.1 Re-present the overall aims and learning objectives of the module for the participants' comparison of their learning outcomes and the achievement of their previously stated expectations for the module



The participants shall:

- 13.1.2 Reflect on their learning outcome and key takeaways from ARTR Nacelle, Tower & Basement Refresher Module training, aiming to achieve a high learning transfer from the module to their way of working by means of e.g.
 - a. group discussion or walk & talk
 - b. questions & answers in class, or where suitable

Note *The instructor may additionally conduct a local evaluation of the training.*



ELEMENT 13.2 - FEEDBACK SESSION

Learning objective:

147) The participants can **recognise** and reflect on their key takeaways from the module, aiming to achieve a high learning transfer from the module to their way of working (Knowledge, basic level)



The instructor shall:

- 13.2.1 Give an overall feedback and feed forward on the participants' learning outcome inspired by the training as well as from the training-review-session
- 13.2.2 Encourage the participants to examine and grow awareness of which specific elements in their own WTG type/WTG environment differ from the training scenario environment (to visualise and enhance learning transfer). In addition, to discuss with colleagues about how the ARTR Nacelle, Tower & Basement Refresher Module content, methods and techniques are similar or different to the local specific conditions identified after the module completion



The participants shall:

- 13.2.3 Reflect on their learning outcome and key takeaways from ARTR Nacelle, Tower & Basement Refresher Module training, aiming to achieve a high learning transfer from the module to their way of working by means of e.g.
 - a. group discussions or walk & talk
 - b. questions & answers in class, or where suitable



Annexes



ANNEX 1 - EQUIPMENT LIST

The following pages contain the lists of equipment required for delivering each of the modules contained within this training standard. All equipment shall meet the criteria defined in the GWO Requirements for Training.

The following equipment is required during the entire duration of the modules in this advanced rescue training standard to meet the needs of the specific training module:

1. Rescue stretcher
 - a. at least two different products
2. Transfer board
 - a. product is required to have an attachment point* rigged at the top and bottom

*This can be achieved by attaching / choking an anchor sling through the handles of the foot / top of the transfer board with a connector attached

Note *Transfer board is not to be used for immobilisation. Whenever it is possible, an injured person should be lowered in horizontal configuration.*

3. Cervical collar for rescue purpose
 - a. at least two different products:
 - a.i one rigid collar
 - a.ii one soft collar

Note *The use of a cervical collar during rescue operations in this standard is intended only as a means to support the head and as a result help in maintaining an open airway of an unconscious injured person during parts of rescue operations where this is not possible by other means.*

Furthermore, it is intended that the collar is removed as soon as it is possible to support the head and maintain the airway by other means. Therefore, the use of collars in this instance is not considered as routine.

4. Manually operated lowering/raising rescue systems for limited distance rescue
 - a. pulley system, with rope grab
 - a.i at least two different products
 - b. rescue device
 - b.i at least two different products – must have differences in design, functionality and operation



b.ii must be compatible with a power driver for a rescue device

5. power driver for rescue device
6. pulleys
7. edge protector for rope
8. tag line
9. headlamp
10. radios when applicable
11. rescue dummy min. 50 kg.

GWO BST/BSTR Working at Heights related equipment:

12. full body harness
 - a. at least two different products
13. work restraint lanyards
 - b. at least two different products
14. fall arrest lanyards with an energy absorber
 - c. one flexible Y-type
 - d. one fixed adjustable Y- or I-type
 - e. recommended, but not required, one fixed or flexible V-type
15. helmets and safety glasses
16. vertical fall arrest system
17. self-retractable lifeline (SRL)
18. rescue slings

Note *The European standard for slings specifies safety requirements and test methods for slings used for mountaineering (slings are used as anchor points and since there are no industrial standard for slings, they must also comply with the requirements in EN7795 type B, anchor devices)*

19. Connector with mandatory automatic locking system
20. Anchor points (Certified and Structural)



Note *The height of the anchor point shall ensure that in the event of a fall there will be enough space below the anchor point to allow the energy absorber in a fall arrest lanyard to fully deploy whilst preventing the person who is falling from coming into contact with the ground or structure below the anchor point. The GWO recommends an anchor point height of 6.75m for the rescue and evacuation exercises*

The recommended 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 includes factors like the height of the person and harness stretch, to account for these variables this is set to 2.00m.

Using the value for HH (2.00m), the maximum allowed values for LL (2.00m) & DD (1.75m), and the minimum allowed value C (1.00 m), we get,

$$RD = LL + DD + HH + C$$

And,

$$RD = 2.00 \text{ m} + 1.75 \text{ m} + 2.00 \text{ m} + 1.00 \text{ m},$$

Therefore,

$$RD = 6.75\text{m}$$

Therefore, the GWO recommends that the anchor points used during the evacuation exercises are placed a minimum of 6.75m above the ground or any structure which a person may come into contact with, in the event of a fall.

Note *Any equipment used during this GWO training module shall meet or exceed the minimum requirements of the national standards listed in table A1-1a.*



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.

Equipment	Country Specific Equipment Standards			
	Europe	North America	China	United Kingdom
Full Body Harness	EN 361+358	ANSI/ASSP Z359.11	GB 6095 +GB 6095 W/GB 6095 Q	BS EN 361+358
Fall restraint lanyards	EN 358	ANSI/ASSP Z359.3	GB 24543 W/GB 24543 Q	BS EN 358
Fall arrest lanyard including energy absorber	EN 354 and/or EN 355	ANSI/ASSP Z359.13	GB 24543 Z+GB/T 24538	BS EN 354 and/or BS EN 355
Industrial safety helmet with a chinstrap that is released with a force of no less than 150 N and no more than 250 N	EN 397 +A1	ANSI Z89.1 Type I	GB 2811	BS EN 397 +A1
Vertical fall arrest system on a rigid anchor line	EN 353-1	ANSI/ASSP Z359.15	GB 24542/GB 24537/GB 24543 Z/GB 30862+GB/T 24538/GB 24544	BS EN 353-1
Self Retracting Lifelines (Retractable type fall arresters)	EN 360	ANSI/ASSP Z359.14	GB 24544	BS EN 360
Anchor Points	EN795	ANSI/ASSP Z359.18	GB 30862	BS EN795
Slings	EN 354 + 795	ANSI/ASSP Z359.12	GB 24543 Z+GB 30862	BS EN 354 + 795



Connectors (Carabiners)	EN 362	ANSI/ASSP Z359.12	GB/T 23469	BS EN 362
Static ropes	EN 1891	ANSI/ASSP Z459.1 NFPA 1983	GB/T 23268.2	BS EN 1891
Rescue devices with lifting capacity	EN 1496	ANSI/ASSP Z359.4		BS EN 1496
Devices for emergency decent	EN 341	ANSI/ASSP Z359.4	GB/T 38230 A or GB/T 38230 B or GB/T 38230 C	BS EN 341

Table Equipment List – A1-1a



ANNEX 2 - GUIDELINES FOR WARM-UP EXERCISES

Monday

Warm-up routine for wind technicians

Seven programmes, each with four exercises to be repeated twice; total duration approx. 10 minutes. The exercises are put together to achieve full-body warm-up and stretching.



1. Chest and shoulder stretch

Fold your hands behind you, push your chest forward and pull your arms back until you feel a good stretch in your chest and shoulders. Hold for 30 seconds.

Duration: 30 sec, Sets: 2



2. Arm Scissors

Stand with your feet together. Raise your arms forwards and upwards to approximately chest height. Breathe out and lift one arm towards the ceiling while lowering the other arm towards the floor with both palms facing forward. Continue moving both arms backwards until you feel a stretch in your pectoral muscles. Avoid arching your back.

Duration: 30 sec, Sets: 2



3. Stretch the back of your thigh and calf

Stand with one knee slightly bent and the other leg straight. Support your hands on the knee and keep your back straight. Slowly lower your upper body forwards until you feel a stretch on the back of your leg. Hold for 30 seconds and switch legs.

Duration: 30 sec, Sets: 2



4. Swing leg back and forth

Find support against a wall or hold onto a partner and swing your leg forwards and backwards. Try to keep your upper body steady in a good posture. Continue for 30 seconds, then switch legs. You can also practise your balance by not holding onto anything.

Duration: 30 sec, Sets: 2

Warm-up program and illustrations developed and provided by
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Tuesday

Warm-up routine for wind technicians

Seven programmes, each with four exercises to be repeated twice; total duration approx. 10 minutes. The exercises are put together to achieve full-body warm-up and stretching.



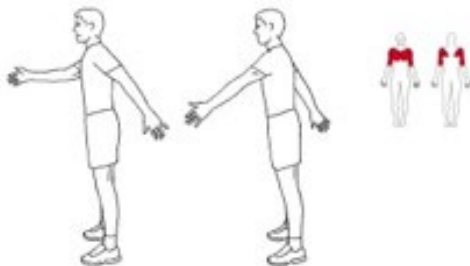
5. Sideward lunge

Stand with your legs together and your hands on your hips. Use your active leg to step to the side and place your weight on your active leg.

The movement stops when your foot hits the floor. In the end position, your active leg is bent and your supporting leg is almost straight. Press up and return to the starting position.

Repeat to the other side.

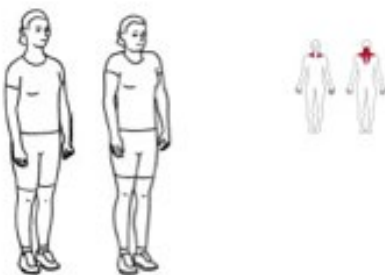
Sets: 2 , Reps: 10



6. Standing back and forth arm swing

Stand with the arms hanging straight down along your side. Relax the shoulders and swing the arms alternately back and forth.

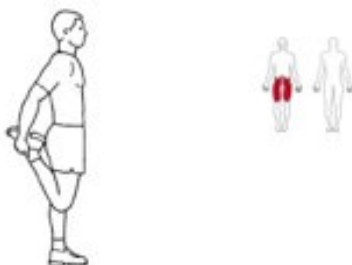
Sets: 2 , Duration: 30 sec



7. Shoulder Shrugs

Lift your shoulders as high as possible while you take a deep breath in, lower your shoulders while you exhale. Push your shoulders down as much as possible.

Sets: 2 , Duration: 30 sec



8. Stretch front side thigh and hip

Stand up straight. Grab one ankle and pull your heel towards your buttocks. Push your hips forwards until you feel the stretch on the front of your thigh. Keep your knees together. Hold for 30 seconds and switch legs.

Duration: 30 sec, Sets: 2

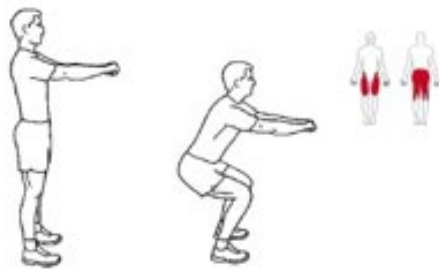
Warm-up program and illustrations developed and provided by
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Wednesday

Warm-up routine for wind technicians

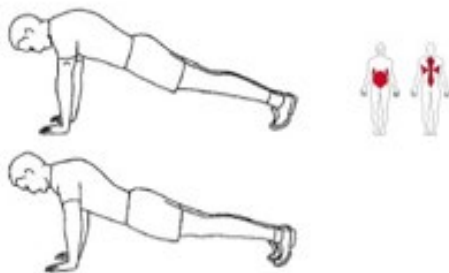
Seven programmes, each with four exercises to be repeated twice; total duration approx. 10 minutes. The exercises are put together to achieve full-body warm-up and stretching.



9. Static squat hold

Stand with your feet shoulder-width apart and your arms straight out in front of you. Move into a sitting position with your thighs approximately in a horizontal position and hold this position. Hold the position until you feel a stinging/warm sensation in your thighs (minimum 30 seconds). Push yourself back up again.

Sets: 2 , Duration: 30 sec



10. Scapular Push-ups

Support yourself on your arms and toes. Keep your body straight throughout the exercise. Try separating your shoulder blades by extending your upper back towards the ceiling. Slowly lower your upper back, pulling your shoulder blades together.

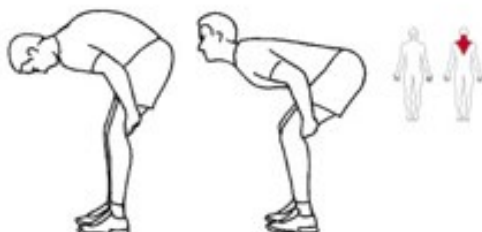
Sets: 2 , Duration: 30 sec



11. Shoulder rotation w/ 90 degree abduction

Lift your arms with your elbows pointing to the sides. Bend your elbows to an approximately 90-degree angle. Move your arms so that they point upwards and downwards in an alternating motion. The movement should take place in the shoulder joints.

Sets: 2 , Duration: 30 sec



12. Stretch and bend your back

Stand on a mat with feet hip-width apart. Bend the knees and hips, and clasp your hands behind your knees. Breathe in and round your back, exhale while arching your back.

Sets: 2 , Duration: 30 sec

Warm-up program and illustrations developed and provided by
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Thursday

Warm-up routine for wind technicians

Seven programmes, each with four exercises to be repeated twice; total duration approx. 10 minutes.
The exercises are put together to achieve full-body warm-up and stretching.



13. Push-ups

Rest on your hands and feet with your body straight and tense.

Your hands must be placed at a distance that is slightly wider than shoulder-width apart. Lower your upper body towards the floor and push up again without flexing your hips. If you cannot do 10 repetitions, perform the exercise on your knees.

Sets: 2 , Reps: 10



14. Squat

Stand with your feet shoulder-width apart and your arms straight out in front of you. Bend your knees to 90 degrees then press up again. Keep your back straight and your eyes looking straight ahead throughout the motion. Alternatively, hold the deep position for a few seconds before pressing back up.

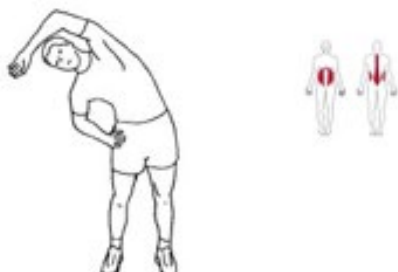
Sets: 2 , Reps: 10



15. Neck stretch

Hold your hand over your collar bone. Bend your neck towards the opposite side of where your hand is and rotate your head to the same side as you bend your neck. Look down. Feel the stretch on the front of your neck. Hold for about 30 seconds.

Duration: 30 sec, Sets: 2



16. Standing side stretch

Lift one arm above your head and slowly bend your upper body to the opposite side. Feel the stretch on the side of your body. Hold the position for 30 seconds. Change sides and repeat the exercise.

Duration: 30 sec, Sets: 2

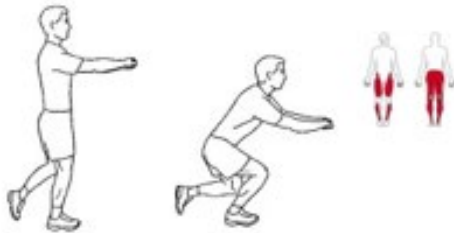
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Friday

Warm-up routine for wind technicians

Seven programmes, each with four exercises to be repeated twice; total duration approx. 10 minutes. The exercises are put together to achieve full-body warm-up and stretching.



17. Single leg squat

Stand on one leg with your arms straight, in front of you. Your passive leg may be put behind your active leg for support only. Bend your knee 90 degrees and push back up. Keep your back straight and look ahead throughout the movement. Repeat with opposite leg.

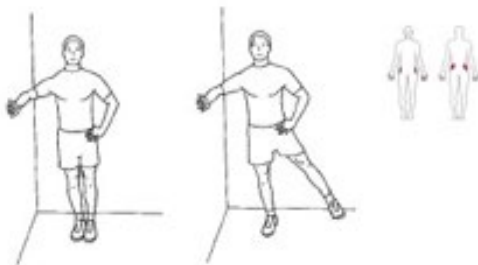
Sets: 2 , Reps: 10



18. Neck stretch

Place one hand on your head and gently pull your head down towards your shoulder. Relax the opposite shoulder. When you feel the stretch on the side of your neck, hold for 30 seconds. Switch sides and repeat the exercise.

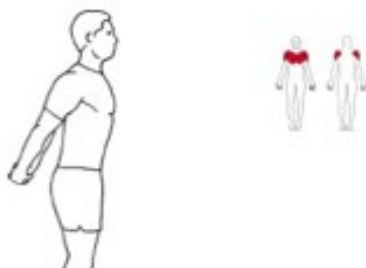
Sets: 2 , Duration: 30 sec



19. Standing outward leg lift

Stand next to a wall, using one hand for support. Extend your leg to the side and slowly return to the starting position. Keep your pelvis stable. You may also do the exercise without the wall or with the support of a partner.

Repetitions: 10 , Sets: 2



20. Stretch your chest and shoulders

Fold your hands behind your back, open your chest and push your arms backwards until you feel a stretch in your chest and shoulders. Hold for 30 seconds.

Sets: 2 , Duration: 30 sec

Warm-up program and illustrations developed and provided by
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Saturday Warm-up routine for wind technicians

Seven programmes, each with four exercises to be repeated twice; total duration approx. 10 minutes. The exercises are put together to achieve full-body warm-up and stretching.



21. Backwards leglift

Start in the push-up position with your hands placed under your shoulders. Pull your belly button towards your spine and tighten your leg and upper body muscles. Breathe in, lifting one straight leg towards the ceiling, then lower it again.

Switch legs until you have done a total of 10 repetitions.

Sets: 2 , Reps: 10



22. Hand on the back

Place your hand on your back and try to reach the opposite shoulder blade. Hold the position for 30 seconds. Switch arms.

Duration: 30 sec, Sets: 2

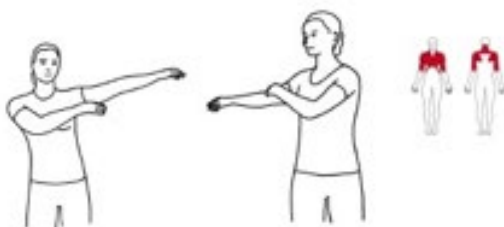


23. Write the number eight

Stand with one arm straight at shoulder height. Write the number eight with this arm, switch arms and repeat.

Perform the exercise for approximately 30 seconds with each arm.

Sets: 2 , Duration: 30 sec



24. Arm Swing w/torso rotation

Swing your arms freely from side to side. Let your upper body, hips and pelvis follow the motion. Stand balanced and steady on your feet. Keep the shoulders relaxed during the motion. Breathe naturally.

Sets: 2 , Duration: 30 sec

Warm-up program and illustrations developed and provided by
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Sunday

Warm-up routine for wind technicians

Seven programmes, each with four exercises to be repeated twice; total duration approx. 10 minutes. The exercises are put together to achieve full-body warm-up and stretching.



25. Reverse lunge

Stand with your feet together and your hands on your hips. Lift one leg and take a large step backwards shifting your weight backwards. When your leg touches the floor, slowly descend until your knee almost touches the floor and briefly hold the position. Press up and return to the starting position.

Sets: 2 , Reps: 10



26. Stretch of back and shoulders

Stand with your hands folded behind your head. Move your elbows slowly forwards and backwards. For each repetition, push a little bit further, increasing the range. But remember that it must not be painful.

Duration: 30 sec, Sets: 2



27. Stretch of neck and shoulder

Keep your hands behind your back, lower both shoulders and lean your head down toward one shoulder. Hold for 30 seconds and repeat for opposite side.

Duration: 30 sec, Sets: 2



28. Stretch of shoulders and upper back

Reach one arm up and behind your neck with fingers pointing towards the opposite shoulder blade. Reach the other arm behind your lower back with fingers pointing towards the opposite shoulder blade. Move your hands towards each other and if possible make your finger tips touch and grab hold. Hold the position for 30 seconds if you can. Do the same to the opposite side.

Duration: 30 sec, Sets: 2

Warm-up program and illustrations developed and provided by
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ANNEX 3 - MANUAL HANDLING RISK ASSESSMENT

This is an instructor guidance elaborating the concept of aggravating factors related to manual handling risk assessment.

The baseline of assessing manual lifts is the load weight and the distance from the spine in the lower back (the reaching distance), respectively.

While assessing manual handling, a number of additional risk factors to the lift must be considered, which, individually and especially combined, will enhance the strain on the musculoskeletal system. These factors are the so-called aggravating factors.

Prior to delivering the Manual Handling Module, instructors should review local instructions and risks assessments for the tasks planned, including assessment of whether a given task should be solved by the participants by using a handling aid.

1. Load Weight and Reaching Distance

The following guidance introduces some simple tools to help identify 'low-risk' manual handling tasks and introduces a hierarchy of control that can be used to help identify simple solutions to reduce risk from manual handling further. Tasks outside of these guidelines should be assessed by an appropriately qualified professional using more detailed assessment tools or a full manual handling risk assessment for the task.

Lifting and lowering filters

Use the guideline filters for lifting and lowering in Figure Annex 3.1 to help you identify low-risk tasks. The guideline filters do not set specific weight limits, so the guidelines are not 'safe limits' for lifting and carrying. They use broad assumptions or generalisations where, if met, the risk of injury is considered to be low.

Working outside the limits is likely to increase the risk of injury, which can lead to ill health. The guidelines are derived from lifting capacity data which show differences between men and women in the population (rather than individuals). Where the handling task falls within the filter guidelines, you do not normally need to do any other form of risk assessment unless you have individual workers who may be at significant risk. If you are unsure, complete a more detailed assessment.

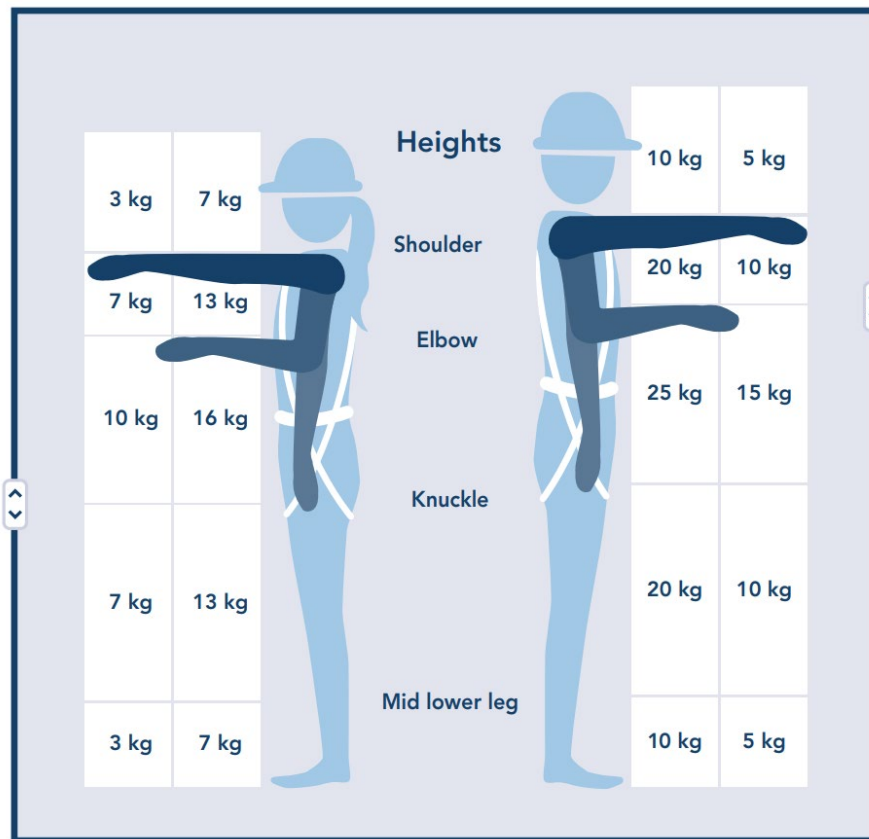


Figure Annex 3.1 – Lifting and lowering filters

Note *Figure Annex 3.1 assumes that the load is easily grasped with both hands and is handled in reasonable working conditions, with the worker in a stable body position.*

Risk assessment, lifting and lowering

1. Each box in Figure Annex 3.1 contains a filter value for lifting and lowering in that zone. The filter values in the boxes are reduced if handling is done with arms extended, or at high or low levels, as that is where injuries are most likely to happen and will most likely be harmful to health. Such lifts must be evaluated separately.
2. Observe the work activity you are assessing and compare it to Figure Annex 3. First, decide which zone or zones the worker's hands pass through when moving the load. Then assess the maximum weight being handled. If it is less than the value given in the matching box, it is within the guidelines.
3. If the worker's hands enter more than one zone during the operation, use the smallest weight. Use an in-between weight if the hands are close to a boundary between zones.



4. Lifting and lowering: Do I need to make a more detailed assessment? You will need to make a more detailed assessment using an appropriate tool or full risk assessment checklists (or equivalent) if:
 - f. the handling operation must take place with the hands outside the zones in Annex 3
 - g. the weight exceeds those in Annex 3
 - h. the handling involves torso twisting
 - i. the handling is more frequent than one lifts every two minutes
 - j. the handling is done by a team
 - k. the handling operations are complex, for example, the weights vary significantly or there are several start and finish locations
 - l. the lift does not meet the conditions given for using the guidelines, for example, if the load is difficult to grasp or handle
 - m. the person lifting may be at significant risk, for example, new or expectant mothers, young workers, those new to the job, or those with a disability, significant health problem or recent injury

Carrying risk assessment

You can apply the filter weights for lifting and lowering in Figure 1 to carrying operations where the load:

- a. is held against the body
- b. is carried no further than about 10 m without resting
- c. does not prevent the person from walking normally
- d. does not obstruct the view of the person carrying it
- e. does not require the hands to be held below knuckle height or much above elbow height
- f. where you can carry the load securely on the shoulder without lifting it first (for example, by sliding it onto your shoulder), you can apply the filter values up to 20m

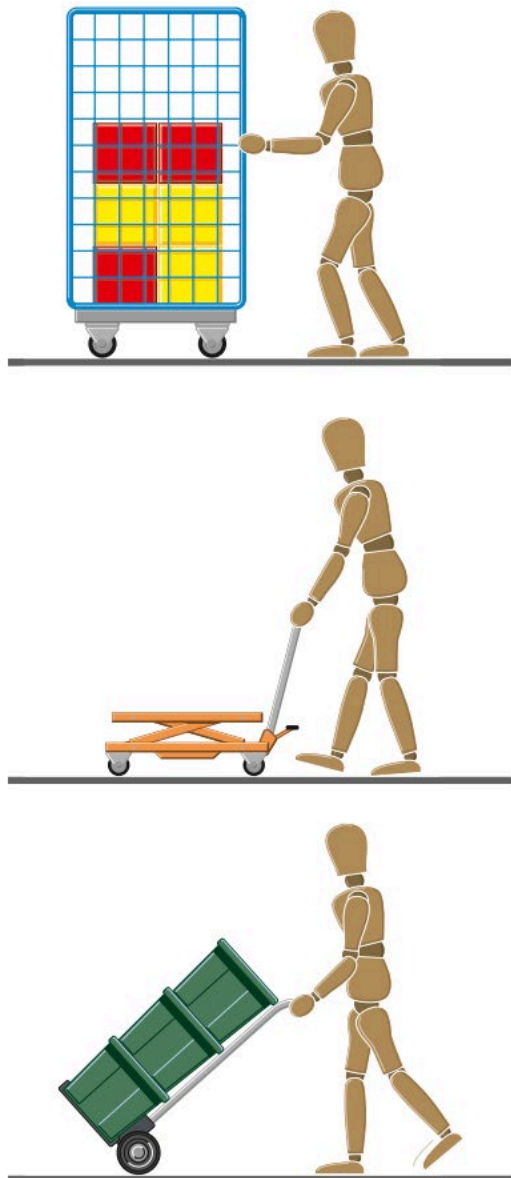


Figure Annex 3.2 – Acceptable push/pull postures¹

Pushing and pulling risk assessment

In pushing and pulling operations, the load might be slid, rolled or moved on wheels. Observe the worker's general posture during the operation. Figure Annex 2 shows some acceptable push/pull postures. The task is likely to be low risk if:

- a. the force is applied with the hands
- b. the torso is largely upright and not twisted
- c. the hands are between hip and shoulder height
- d. the distance moved without a pause or break is no more than about 20m

When do I need to make a more detailed assessment?

If the load can be moved and controlled very easily, for example with one hand, you do not need to do a more detailed assessment. You should make a more detailed assessment using, for example, the RAPP tool or full risk assessment checklists (or equivalent) if:

- a. the posture shows that the task requires significant forces, for example, leaning
- b. there are extra risk factors like slopes, uneven floors, constricted spaces or trapping hazards

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2. Aggravating factors

The aggravating factors of the lifting operation must be considered which, individually and especially in combination, will enhance the strain on the musculo-skeletal system posing a risk of injury and manual handling harmful to health.

Examples of aggravating factors, categorised related to the four elements of the TILE principle:

3. Basic Dynamic Risk Assessment – Title Principle

All manual handling tasks should be preceded by a basic dynamic risk assessment carried out by the persons planning to carry out the task before commencing the activity. This can be conducted using the simple and well-known TILE principle.

T – Task	I – Individual(s)	L – Load	E – Environment
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For 'Task' considerations should include:

- g. no suitable handling aid available
- h. holding loads away from torso
- i. lifting below knee height or above shoulder height
- j. carrying, pushing, pulling or precise positioning of the load
- k. twisting
- l. stooping
- m. reaching upwards
- n. large vertical movement
- o. long carrying distances
- p. strenuous pushing or pulling
- q. unpredictable movement of loads
- r. frequent or prolonged physical effort
- s. lifting for a longer period of time
- t. insufficient rest or recovery
- u. team effort, see note



- v. a work rate imposed by a process

Note *Team handling is, in general, not a legitimate substitute for using handling aids*

For 'Individual(s)' capability considerations should include:

- a. no warm-up
- b. require unusual capability
- c. pose a risk to those with a health problem or a physical or learning difficulty
- d. previous and pre-existing injuries
- e. pose a risk to those who are pregnant
- f. pose a risk to new workers/young people
- g. require special information/training
- h. unusual strength or height required for the activity
- i. specialist knowledge or training required

For the 'Load' considerations should include:

- a. heavy
- b. bulky or unwieldy
- c. difficult to grasp
- d. difficult to grip
- e. unstable or unpredictable
- f. contents likely to move or shift
- g. intrinsically harmful (e.g. sharp/hot)
- h. sharp edges

For the (work) 'Environment' considerations should include:

- a. constraints on posture, e.g. working on knees, laying on back
- b. restricted spaces



- c. poor floors, e.g. greasy, wet, uneven
- d. variations in levels, e.g. stairs, thresholds
- e. hot/cold/humid conditions
- f. strong air movements, e.g. outside of tower, nacelle, etc.
- g. poor lighting conditions
- h. weather conditions; rain, gust, wind, temperature?

Additionally, it is recommended to consider additional factors including whether the activity is hindered or enhanced by wearing particular protective clothing or PPE and work/organisation (psycho-social) factors such as training, sudden changes in workload, communication, consultation, etc.

4. Good Handling Technique

A good handling technique is no substitute for other risk-reduction steps, such as providing lifting aids, or improvements to the task, load or working environment. Moving the load by rocking, pivoting, rolling or sliding is preferable to lifting it in situations where there is limited scope for risk reduction. However, good handling technique forms a very valuable addition to other risk-control measures. To be successful, good handling technique needs both training and practice. The training should be carried out in conditions that are as realistic as possible, emphasising its relevance to everyday handling operations in the workplace.

There is no single correct way to lift and there are many different approaches, each with merits and advantages in particular situations or individual circumstances. The content of training in good handling technique should be tailored to the particular handling operations likely to be carried out, beginning with relatively simple examples and progressing to more specialised handling operations as appropriate. For example:

- a. employees should be able to identify loads that may cause injury when handled. Increases in size often indicate an increase in weight and difficulty of handling
- b. where the size of the item is less important than how full it is, e.g. in the case of a dustbin containing refuse, they should assess the load by looking inside it or use techniques such as rocking the load from side to side before attempting to lift it
- c. they should also treat unfamiliar loads with caution. Drums which appear to be empty or other closed containers should be tested, e.g. by trying to raise one end
- d. they should apply force gradually when testing loads. If employees feel too much strain, they should be encouraged to look for another way of handling the load safely

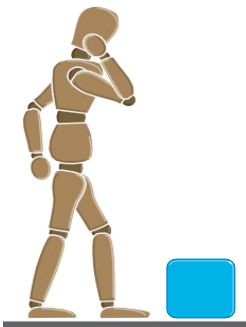
The following list illustrates some important points which are relevant to a basic two-handed symmetrical lift – a lift using both hands that takes place in front of and close to the body, without any twisting.



Basic Lifting Operations



Rocking a load to assess its ease of handling



Think before handling/lifting. Plan the lift/ handling activity. Where is the load going to be placed? Use appropriate handling aids where possible. Will help be needed with the load? Remove obstructions, such as discarded wrapping materials. For long lifts, such as from floor to shoulder height, consider resting the load mid-way on a table or bench to change grip.



Keep the load close to the waist. Keep the load close to the waist for as long as possible while lifting. The distance of the load from the spine at waist height is an important factor in the overall load on the spine and back muscles. Keep the heaviest side of the load next to the body. If a close approach to the load is not possible, try to slide it towards the body before attempting to lift it.

Figure Annex 3.3 – Basic lifting operations²

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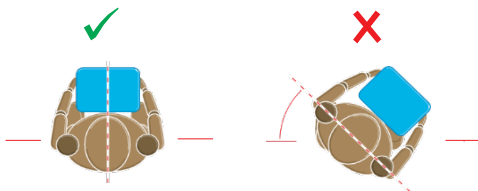
Adopt a stable position. The feet should be apart with one leg in front of the other (alongside the load if it is on the ground) to increase the stability of the worker's posture. The worker should be prepared to move their feet during the lift to maintain a stable posture. Wearing over-tight clothing or unsuitable footwear may make this difficult.



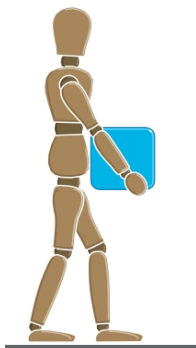
Ensure a good hold on the load. Where possible, hug the load as close as possible to the body. This may be better than gripping it tightly only with the hands.

Moderate flexion (slight bending) of the back, hips and knees at the start of the lift is preferable to either fully flexing the back (stooping) or fully flexing the hips and knees (full/ deep squatting).

Don't flex the back any further while lifting. This can happen if the legs begin to straighten before starting to raise the load. The worker should start the movement with the strong leg muscles while keeping the back posture constant.



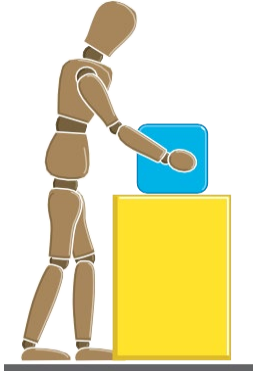
Avoid twisting the back or leaning sideways especially while the back is bent. Keep shoulders level and facing in the same direction as the hips. Turning by moving the feet is better than twisting and lifting at the same time.



Keep the head up when handling. Look ahead not down at the load once it has been held securely.

Move smoothly. Do not jerk or snatch the load as this can make it harder to keep control and can increase the risk of injury.

Don't lift or handle more than can be easily managed. There is a difference between what people can lift and what they can safely lift. If in doubt, seek advice or get help.

Figure Annex 3.4 – Basic lifting operations³

Put down, then adjust. If precise positioning of the load is necessary, put it down first, then slide it into the desired position.

Figure Annex 3.5– Basic lifting operations⁴

Source of Reference:

This Annex is based upon:

- e. legal requirements and guidelines of the Danish and UK EHS authorities and legislation on manual handling
- f. G+ Manual Handling Case Studies doc
- g. <https://www.hse.gov.uk/pubns/books/l23.htm>
- h. Equinor Ergonomics and Manual Handling Study 2018
- i. contains public sector information published by the UK Health and Safety Executive and licensed under the Open Government Licence'

Note *Local legal requirements must always be adhered to when performing manual handling.*

³ UK Government Copyright (by permission)

⁴ UK Government Copyright (by permission)



ANNEX 4 - VERSION HISTORY

Amendment date	Version	Approved by & date	Description of changes
December 2022	V3.1	GWO TC	<ul style="list-style-type: none"> In Annex 1 Equipment (Table A1-1a - Country specific equipment standards - ARTR Modules) PP 79. Full Body Harness reference for Europe and UK. The following erroneous reference removed "...or EN 813" (Europe). In UK, "...or BS EN 813".
April 2022	V3.0	GWO TC	<ul style="list-style-type: none"> Taxonomy alignment throughout The section Understanding GWO learning objectives has been updated to reflect the reviewed GWO Taxonomy Framework. All learning objectives have been updated with action verbs that reflect the taxonomic levels (basic, intermediate, and advanced level) and the domain (knowledge, skills, and ability) without changing the content of the element. Action verb 'demonstrate' in learning objectives is changed to relevant action verb level/domain. Learning activity "demonstrate" was changed to 'practise' because during training activities, the participants are in a learning process and abilities should be trained, not evaluated. Learning activities have been aligned to match the updated learning objectives with a focus on participant engagement. Delegates have been changed to Participants, as participant is the proper designation for a person participating in an activity. Training staff has been changed to Instructors. The instructor's perspective has been changed to a generic perspective accommodating different types of training. All instructor guidelines have been compiled in one section under the individual elements. More guidelines on the use of feedback have been added to emphasise its importance and ensure its effective use by involving the participants. All learning objectives have been numbered throughout the standard. New learning objectives have been created for all lessons that describe the overall ability the participants should acquire during the specific lesson. This focuses the attention on how knowledge and skills support the responsible performance of the employee in the context of the job and the deeper involvement enables participants to learn and remember more deeply.



- Learning objectives previously positioned at the beginning of a training lesson have been moved to the relevant lesson elements and updated with new taxonomic levels (basic, intermediate, and advanced) and action verbs that reflect these levels. This makes more evident the connection between the learning objectives, the instructor actions, and the participants actions.
- The Introduction lesson for all standards has been updated to ensure alignment between all GWO training standards for generic lessons.
- The Training Review lesson for all standards has been updated to ensure alignment between all GWO training standards for generic lessons.
- For all modules, the title of lesson Learning outcomes of the ARTR Module changed to Detailed description of the ARTR Module.
- There are no changes to the technical content and the time duration of the standard. A typo change in the duration text for the Hub module has been amended.
- The most recent change log (version three has been moved to section three in align with other standards resulting in a renumbering of sections throughout the following that follow.

1st April 2020 02 GWO TC April 2020

First review of ARTR standard

- Comprehensive review of the ART modules.

Document changes

- Formatting of document changed and aligned throughout, this includes numbering all sections, lessons, elements, sub-sections and tables for ease of reference and reading.
- The term 'delegate' changed to 'course participant' or 'participant'.
- Equipment lists for all modules have been moved to Annex 3.

Anchor point height review

- The requirement for and anchor point height has been changed to a recommendation, with additional control measures if using a lower height.

Cervical collar review

- The applicable lessons have been updated with risk reduction measures.
- New Annex 6 inserted.

Manual handling review

- The applicable lessons have been updated with manual handling elements to refresh the manual handling training as part of the ARTR course.

Overall changes

- Version changed from 01 to 02.



- Added taxonomy domain and level to all learning objectives (e.g. L2- knowledge), additionally taxonomy action verbs have been highlighted in bold text.
- Taxonomy action verbs have been moved to each lesson element.
- Spelling and grammar corrections throughout

Section specific changes

Table of contents

- Updated to reflect changes to the standard.

Terms and definitions

- Updated with additional items.

Change log

- Format and layout changed for ease of reading.

5.2 Aims and objectives

- Amended to include manual handling refresher.

5.6 Duration of ARTR Modules

- Section reworked to give clarity to contact time and total training day.
- Duration given as total contact time.
- Inserted table 5-7 to clarify maximum durations per day.

6.1 Training staff

- Amended to require the instructor to be qualified to teach GWO manual handling.

6.4 Practical training facilities

- Section reworked for ease of reading.

6.6 Training equipment

- Added generic approach explanation.
- Inserted description of fall factor.
- Inserted additional requirements if anchor point height is not achieved.
- Inserted references to Annex 3.

7.1 Taxonomy

- Explanation inserted after table 7-1.

8.3 Taxonomy

- Text and table 8-3 amended to include manual handling refresher.

Section 9 Hub, Spinner and inside Blade rescue module

- Moved from section 10 to align layout across GWO Standards.



Section 10 Nacelle, Tower and Basement rescue module

- Due to moving section 10, all subsections renumbered to 10.xx.

10.3 Course participants prerequisites for the NTBR rescue module

- inserted.

10.4 Duration of the NTBR rescue module

- Section reworked to give clarity to contact time and total training day.
- Duration given as total contact time.
- Inserted table 9-3 to clarify maximum durations per day.

10.6 Equipment for NTBR rescue module

- Added generic approach explanation.
- Equipment list moved to annex 3.

10.7 NTBR rescue module timetable

- Times adjusted in line with module changes.

10.8 Detailed description of the NTBR rescue module

Lesson 1 – introduction

- Time reduce to 15 minutes.

Lesson 2 – Emergency response plan in your own organisation

- 2.1.1, 2.1.2 & 2.1.6 layout changed for ease of reading.
- 2.2.1 layout changed for ease of reading.
- 2.2.8 inserted.
- 2.2.12 & 2.2.13 inserted.

Lesson 3 – Knowledge review

- Time increased to 75 minutes (due to addition of element 3.10)
- Learning objective 9 inserted.
- Phrase 'knowledge of' removed from all element titles.
- 3.1.4 & 3.1.5 inserted.
- 3.3.1, 3.3.2 & 3.2.3 reworded for clarification.
- Element 3.10 inserted.

Lesson 4 – Measures to prevent injury during training

- Name changed.
- Content and duration aligned with BST W@H.



Lesson 5 – Manual handling

- New lesson. Based on BST W@HR combined module.

Lesson 6 – Safe and correct use of rescue equipment from ladder

- Renumbered from lesson 5. To accommodate new lesson 5.
- Instructor notes moved to after learning objectives.
- 6.1.1 & 6.1.2 inserted.

Lesson 7 – Working at height – self evacuation

- Renumbered from lesson 6. To accommodate new lesson 5.
- Instructor notes moved to after the learning objectives.
- Learning objective 2 inserted.
- 7.1.4 & 7.1.5 inserted.

Lesson 8 – measures to prevent injury during training

- New lesson reflecting two-day training course.

Lesson 9 – Evacuation of an injured person ...

- Renumbered from lesson 7. To accommodate new lesson 5 & 8.
- Instructor notes moved to after the learning objectives.
- Note inserted after learning objective 6.
- 9.1.3.e inserted.
- 9.1.5 & 9.1.6 inserted.
- 9.1.7 layout changed for ease of reading.
- 9.1.9 terminology changed from 'cervical collar' to rescue head support'
- 9.1.22 & 9.1.23 inserted.

Lesson 10 – Rescue from an enclosed space

- Renumbered from lesson 8. To accommodate new lesson 5 & 8.
 - Instructor notes moved to after the learning objectives.
 - Note inserted after learning objective 8.
 - 10.1.3.e inserted.
 - 10.1.5 & 10.1.6 inserted.
 - 10.1.7 layout changed for ease of reading.
-



- 10.1.21 inserted.

Lesson 11 – Rescue from a crawl space

- Renumbered from lesson 9. To accommodate new lesson 5 & 8.
- Instructor notes moved to after the learning objectives.
- Note inserted after learning objective 9.
- 11.1.3.e inserted.
- 11.1.5 & 11.1.6 inserted.
- 11.1.7 layout changed for ease of reading.
- 11.1.18 inserted.

Lesson 12 – Rescue up

- Renumbered from lesson 10. To accommodate new lesson 5 & 8.
- Instructor notes moved to after the learning objectives.
- Learning objective 2 inserted.
- 12.1.2 & 12.1.3 inserted.
- 12.1.4 layout changed for ease of reading.
- 12.1.4.g inserted.
- 12.1.8 & 12.1.9 inserted.
- 12.2.3.e inserted.
- 12.2.5 to 12.2.9 inserted.
- 12.2.10 layout changed for ease of reading.
- 12.2.22 inserted.

Lesson 13 – Evaluation

- Renumbered from lesson 11. To accommodate new lesson 5 & 8.
- Time reduced to 15 minutes.

Annex 3 – Equipment list

- Updated in light of generic approach.
- Requirement for an anchor point height of 6.75 m changed to a recommendation. Based on changes to GWO WAH. References to a minimum height requirement of 6.75 m have been removed throughout the standard

Annex 5 – Manual handling risk assessment



- Inserted.

Annex 6 – Head support during rescue

- Inserted

October 2018 01 GWO TC October
2018

First Edition
