GLOBAL WIND ORGANISATION

Solar Safety Training (S-ST)

V1

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CONTENTS

1. LIST OF ABBREVIATIONS

AED	Automatic External Defibrillator
ANSI	American National Standards Institute
AS/NZS	Australia and New Zealand Standard
CO2	Carbone Dioxide
CPR	Cardiopulmonary Resuscitation
CSA	Canadian Standards Association
EN	European Standards
EPIRB	Emergency Position Indicating Radio Beacon
ERC	European Resuscitation Council
GSC	Global Solar Council
GWO	Global Wind Organisation
HSE	Health & Safety Executive (UK)
ILCOR	International Liaison Committee on Resuscitation
MEWP	Mobile Elevated Work Platform
PPE	Personal Protective Equipment
PTSD	Post-Traumatic Stress Disorder
S-ST	Solar Safety Training
SRL	Self-retractable Lifeline
TILE	Task Individual Load Environment

2. TERMS AND DEFINITIONS

Term	Definition
Engage in discussions	Instructor has to create discussions involving the participants.
Fall arrest system	Preventing the user of a personal fall protection system from colliding with the ground, structure, or any other obstacle during a free fall
Group discussion	Learning activity involving all participants. Group discussions may be conducted in smaller groups. The instructor should step back and only interfere to facilitate the experience exchange between participants. Optimal group size is 4 participants.
Manual handling	The transporting or supporting of a load (including lifting, putting down, pushing, pulling, carrying, or moving by hand or by bodily force)
Must	For clarity where the word 'must' is used in this standard it shall have the same meaning as 'shall'
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
Scenario	Refers to a training method that uses fictive simulations to align learning performance with real world job performance
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
Utility Scale Solar PV	Refer to detailed description in Annex 5
Solar industry workplace environment	Refer to detailed description in Annex 5

3. CHANGELOG

Amendment date	Version	Approved by & date	Description of changes

02072025	1	GWO - 18062025	First release

4. SCOPE

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

The Global Solar Council is a non-profit trade body uniting the voice of the solar industry, representing every part of the solar PV value chain across the world. We work directly with industry associations, private sector, governments, international institutions and NGOs to advocate, educate, and strengthen the solar industry.

This standard describes the requirements for Solar Safety Training Modules that are recommended and endorsed by GSC and the members of GWO.

The Global Solar Council and the members of the Global Wind Organisation recognise trained persons as competent within safety in the utility scale Solar PV 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 and GSC based on risk assessments and factual incident and accident statistics.

5. GENERAL REQUIREMENTS FOR THE SOLAR SAFETY TRAINING

Upon completion of the Solar Safety Training Modules, participants will possess an awareness of the hazards encountered when working within the utility scale Solar PV industry and be equipped to control and mitigate these hazards.

The training will equip participants with the knowledge, skills, and abilities to appropriately respond in the event of an emergency and to increase their safety through proper use of personal protective equipment, emergency equipment and procedures.

5.1 Overview

The Solar Safety Training is divided into the following three modules:

Module 1: First Aid
Module 2: First Aid Awareness
Module 3: Safe Solar Work

First Aid and First Aid Awareness

The First Aid and First Aid Awareness modules provide two different training options for the workforce in the Solar PV industry who require training to respond to a medical emergency incident in the solar work environment.

- The First Aid Awareness Module covers the fundamental elements of lifesaving first aid in a medical emergency over a half-day and is equivalent to Lesson 1 and Lesson 2 of the First Aid Module.
- The First Aid Module extends to 1 full day of training, with further lessons in responding to a range medical emergency scenarios within the solar work environment, including additional scenario-based practical exercises. It includes all the fundamental elements of lifesaving first aid from the First Aid Awareness Module.

Note *Duty-holders should determine the most appropriate first aid training for their workforce in accordance with workplace risks assessment, the designated roles and duties of their workforce and any local regulatory requirements.*

Safe Solar Work

The Safe Solar Work module provides participants with important knowledge, skills and abilities in safety practices and for responding to emergencies relevant to utility scale solar PV working. The training includes lessons in Fire Awareness, Manual Handling and Work at Heights.

5.2 Target Group

Personnel who will be working in the solar industry or related fields and will have their duties in a solar utility scale work environment, usually in physical contact with a solar array. Personnel performing job functions assessed as having risks by their employer, duty holder, or due to local regulations, where Solar Safety Training modules may help mitigate those risks.

5.3 Aims and Objectives

Training in accordance with this standard will enable participants to support and care for themselves and others working in the industry by possessing the knowledge, skills and abilities to work safely. Modules include training in First Aid, Fire Awareness, Manual Handling and Work at Heights so that in case of an emergency, participants will be able to provide appropriate first response to emergency situations.

5.4 Duration of the Solar Safety Training Modules

The total contact time for completing the Solar Safety Training standard is to be 11 hours and 25 minutes or 14 hours and 40 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
First Aid	7 hours

First Aid Awareness	3 hours and 45 minutes
Safe Solar Work	7 hours and 40 minutes

Table 5.4.1 – Duration of the S-ST modules

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

Table 5.4.2 - Maximum durations for training day

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

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

Within the module timetables, approximate durations 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.

If a participant fails to meet the learning outcomes of the Solar Safety Training Module, they shall attend a new Safety Training.

5.5 Validity Period

The Solar Safety Standard training is valid for the period stated in Table 5.5.1 (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.

If a certificate is or training record is expired, the participant must attend the applicable Solar Safety Training module(s) training(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)

First Aid	24
First Aid Awareness	24
Safe Solar Work	24

Table 5.5.1 – S-ST certificate validity periods

5.6 Course Codes

Module	Course Code
First Aid	S-FA
First Aid Awareness	S-FAA
Safe Solar Work	S-SW

Table 5.6.1 – Course codes for S-ST Modules

5.7 Participant Prerequisites

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

5.8 Instructor Qualification Prerequisites

A competent GWO Solar-Safety Training instructor must adhere to the instructor requirements described in the GWO Requirements for Training.

6. 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.

Applying skills learned during training to the workplace requires a realistic training environment. Training providers must ensure their facilities closely replicate the actual solar utility-scale work environment, incorporating as many authentic elements as possible. The closer the alignment between the training setting and real working conditions, the more effectively participants can transfer their learning to the workplace.

Note *See Annex 5 – Guidance On The Solar PV Work Environment for elaborate information.*

6.1 Equipment

When teaching safety equipment, a generic approach to 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 training 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.

6.2 Lesson Plans

All training developed from this standard must comply with the requirements set forth in the GWO Requirements for Training. and must be supported by the development of comprehensive lesson plans based on and referenced to the standard.

GLOBAL WIND ORGANISATION

Solar Safety Training First Aid

(S-FA)

7. FIRST AID MODULE

7.1 Aims and objectives for the First Aid Module

The aim of this module is to enable participants to recognise signs and symptoms of life-threating situations and administer safe and effective first aid in the solar industry specific workplace/environment in order to save lives and prevent further injury, until the casualty can be handed over to the next level of care.

After having successfully complete this First Aid module, the participants can:

1) **Act independently** in recognising, assessing, and prioritising the need for first aid and providing lifesaving first aid until the casualty can be handed over to the next level of care in case of an incident in the solar industry specific workplace/environment (Ability, intermediate level)

2) **Take responsibility** for recognising their limitations as a first aider, calling for help and enable evacuation off the casualty in case of an incident in the solar industry specific workplace/environment (Ability, intermediate level)

7.2 Duration of the First Aid Module

The total contact time for completing the First Aid module is estimated to be 7 hours and 0 minutes.

The training provider must not exceed the time per day given in the table 6.2.1 below.

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

Table 7.2.1 – Maximum durations for a training day

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).

7.3 Participant Ratio of the First Aid Module

The ratio shown for theory sessions indicates the maximum number of participants per instructor attending the course.

Practical ratios indicate the maximum number of participants to be instructed by an instructor during each activity.

Module	Session	Instructor to Participant Ratio
Solar Safety Training First Aid	Theory	1:12
	Practical	1:6

Table 7.3.1 – Solar Safety Training First Aid Module instructor to participant ratio

7.4 Equipment for the First Aid Module

The equipment required for training as listed in Annex 1 must be available and must adhere to any local regulatory requirements.

7.5 Timetable of the First Aid Module

The order in which elements of this First Aid Module training are delivered may vary according to the didactical choices of the delivering training provider.

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

Lesson	Element		Duration
1. Introduction to the training	1.1	Safety instructions and emergency procedures	
	1.2	Facilities	
	1.3	Introduction	
	1.4	Scope and main learning objective	
	1.5	Ongoing assessment (participant assessment form)	
	1.6	Motivation	
	1.7	Human factors	
		TOTAL	30 min.
2. Lifesaving first aid	2.1	Response to a first aid incident in the solar industry workplace environment	
	2.2	Primary survey ''C''- A - B - C	
	2.3	''C''- Catastrophic external bleeding	
	2.4	Unresponsive	
	2.5	Obstruction of airways	
	2.6	CPR – Unresponsive, not breathing	
	2.7	Bleeding and shock	
		TOTAL	180 min.

3.	First aid for relevant solar industry specific incidents	3.1	Burn	
		3.2	Chemical contacts to the eye	
		3.3	Medical emergency situations heart attack & stroke	
		3.4	Hypothermia	
		3.5	Fractures	
		3.6	Head to toe examination	
			TOTAL	60 min.
4.	Scenario-based training	4.1	Scenario-based training	
			TOTAL	135 min.
5.	Training review	5.1	Training review	
		5.2	Feedback session	
			TOTAL	15 min.
			GRAND TOTAL	420 min.

Table 7.5.1 – First Aid module timetable

7.6 Detailed Description of the First Aid Module

LESSON 1 - INTRODUCTION TO THE TRAINING

30 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:

3) **Recognise** what is expected of them throughout the module (Knowledge, basic level)

4) **Name** and point out local emergency procedures and facilities (Knowledge, basic level)

5) **Discuss** the relevant human factors and explain their implications (Knowledge, intermediate level)

ELEMENT 1.1 - SAFETY INSTRUCTIONS AND EMERGENCY PROCEDURES

Learning objectives:

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

The instructor shall:

1.1.1 Explain and ask open questions aiming at:

a. Safety instructions according to internal procedures

b. Emergency procedures and emergency exits in the areas where the participants can be expected to be located during the course

The participants shall:

1.1.2 Engage in discussion on local safety and emergency procedures

ELEMENT 1.2 - FACILITIES

Learning objectives:

7) 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, lead a tour and point out facilities, etc.)

The participants shall:

1.2.2 Recognise relevant facilities and ask questions when in doubt

ELEMENT 1.3 - INTRODUCTION

Learning objectives:

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

The instructor shall:

1.3.1 Explain the timetable of the Solar Safety Training First Aid Module, including breaks and mealtimes

1.3.2 Give a short introduction of themselves, including their backgrounds as instructors

1.3.3 Ask for participants' expectations of the training and their learning or development

The participants shall:

1.3.4 Give a short introduction of themselves, including job function and expected primary geographic work location and share expectations of the training

ELEMENT 1.4 - SCOPE AND MAIN LEARNING OBJECTIVE

Learning objectives:

9) The participants can **recognise** the scope and main objectives of the First Aid Module (Knowledge, basic level)

The instructor shall:

1.4.1 Present the scope and main learning objectives of the First Aid Module through a scenario, a challenge or; "your goal with the First Aid Module is…"- message

Note *A suggested learning activity could be to share stories, present scenarios or personal experiences that show the importance of being able to do solar industry specific first aid (what is in it for the participants)*

Where possible PowerPoint slide(s) should be avoided, as part of the introduction. Instead use stories, examples or personal experiences that show the importance of being able to provide solar industry specific first aid and the importance of the Solar Safety Training First Aid Module

1.4.2 Involve participants with questions on understanding and individual experiences on Solar Safety Training First Aid

The participants shall:

1.4.3 Engage in answering questions and share experiences on Solar Safety Training First Aid

ELEMENT 1.5 - ONGOING ASSESSMENT

Learning objectives:

10) The participants can **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 participant performance assessment form and how it will be used

The participants shall:

1.5.3 Engage in discussions and (when in doubt) ask questions - relating to the assessment procedure

ELEMENT 1.6 - MOTIVATION

Learning objectives:

11) The participants can **show interest** 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 S-FA First Aid training understandings 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 in discussions and share experiences on Solar Safety Training First Aid 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 participant develops a positive attitude and responsibility towards the subject and the performance in the work situation*

ELEMENT 1.7 - HUMAN FACTORS

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

Learning objectives:

12) The participants can **describe** solar industry specific human factors (Knowledge, basic level)

13) The participants can **show interest** in human factors during the following practical exercises (Ability, basic level)

The instructor shall:

1.7.1 Present how human factors influence solar industry specific accidents (relevant injury statistics can be referenced and presented)

1.7.2 Lead a discussion about the role of the individual in improving human performance and how this can improve the safety of operations in the solar industry specific work environment

1.7.3 Ensure that constructive feedback on the participant's performance involve human factor 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:

How solar industry specific accidents are influenced by the consequences of human factors and may include the following terms and conditions:

a. attention and perception

b. group behaviour and peer pressure weather conditions

c. weather delays noise levels

d. site layout and housekeeping fitness and health

e. domestic and work-related stress workload (both overload and underload) fatigue

f. time pressure and deadlines

g. alcohol, medication, and substance abuse

The participants shall:

1.7.4 Engage in discussions and share experiences on how human factors influence solar industry specific accidents, engage in and reflect on received feedback

LESSON 2 - LIFESAVING FIRST AID

180 min.

The aim of this lesson is to enable the participants to recognise signs and symptoms of life-threating situations and save lives and preventing injury to the casualty by being able to use primary survey to provide the correct and effective lifesaving first aid in case of a solar industry specific emergency situation.

Additionally, this lesson is to enable the participants to manage an incident and call for help in the solar industry workplace environment and enable evacuation of the casualty(s) in order to save lives.

Life-threatening conditions include:

a. catastrophic external bleeding

b. obstruction of airways

c. unresponsive casualty

d. unresponsive not breathing casualty

e. bleeding and shock

After having successfully completed this lesson, the participants can:

14) **Solve** how to manage different first aid incidents in the solar industry workplace environment in terms of the approach and assessments made (Ability, basic level)

15) **Act independently** to provide lifesaving first aid by using primary survey to identify and treat life-threatening conditions in a prioritised order in a first aid incident in the solar industry workplace environment (Ability, intermediate level)

ELEMENT 2.1 - RESPONSE TO A FIRST AID INCIDENT IN THE SOLAR INDUSTRY WORKPLACE ENVIRONMENT

Learning objectives:

16) The participants can **explain** how to safely respond to a first aid incident in the solar industry workplace environment (Knowledge, intermediate level)

The instructor shall:

2.1.1 Explain and demonstrate example(s) of how to respond to a first aid incident in the solar industry workplace environment:

a. how to follow an efficient and correct first aid structure:

a.i to ensure personal safety, including the correct use of first aid equipment and PPE to minimise the risk of exposure to blood-borne and other potential pathogens

a.ii to ensure scene safety (including electrical hazards)

a.iii providing lifesaving first aid using the primary survey

a.iv call for help

b. analysis and management of an incident call for help

c. call for help

2.1.2 Facilitate a learning activity for the participants such as leading a discussion, asking the participants scenario-based questions or share a questionnaire about how to safely respond to a first aid incident in the solar industry workplace environment

The participants shall:

2.1.3 Engage in the learning activity and share understandings about how to safely manage a first aid incident in the solar industry workplace environment

Note *Element 2.1 may be carried out as part of the practical training e.g. in the scenario- based training in Lesson 4*

ELEMENT 2.2 - PRIMARY SURVEY ''C''- A - B - C

Learning objectives:

17) The participants can **name** the steps in the primary survey "C"- A – B – C (Knowledge, basic level)

18) The participants can **describe** the purpose of doing a primary survey (Knowledge, basic level)

19) The participants can **explain** how to do a primary survey in incidents at the solar industry workplace (Knowledge, intermediate level)

20) The participants can **perform** a correct primary survey in incidents (Skills, intermediate level)

The instructor shall:

2.2.1 Present primary survey "C" A-B-C and the purpose of the primary survey in patient assessment and treatment:

a. C – Catastrophic bleeding

b. A - Airway

c. B - Breathing

d. C - Circulation

2.2.2 Ask the participants involving questions about if they have any experiences with primary survey "C" A - B - C or lead discussions with the participants about the real-life challenges and benefits of primary survey "C" A - B – C

2.2.3 Explain and demonstrate how to use the Primary Survey ("C" A-B-C) in example(s) of incident(s) from the different solar industry specific incident types (see Lesson 3) including:

a. key signs of normal body functioning such as respiratory rate and capillary refill

b. how to spot threats to the nervous, respiratory, and circulatory systems

c. how a minor incident can escalate to a serious incident in the solar industry workplace environment and what to do prevent this

2.2.4 Ask the participants to identify the similarities and differences between the examples of the primary survey shown:

a. what happened?

b. how did the first aider(s) act in the examples shown?

c. in those actions, which were the most important?

d. why were these key actions performed?

2.2.5 Facilitate participants' practise in how to do a primary survey ("C" A-B-C) in incident(s). Provide a lot of support and guidance to the participants

2.2.6 Give constructive feedback to the participants' performance throughout the activities of this element

The participants shall:

2.2.7 Engage in the learning activity and share understandings about:

a. the examples of the primary survey shown

b. the right way of doing a primary survey

2.2.8 Practice how to do a primary survey ("C" A-B-C) in incident(s)

2.2.9 Reflect on the received feedback and use the feedback to improve their performance

ELEMENT 2.3 - 'C'' – CATASTROPHIC EXTERNAL BLEEDING

Learning objectives:

21) The participants can **explain** how to control catastrophic external bleeding (Knowledge, intermediate level level)

22) The participants can **explain** the risk of and how to detect catastrophic external bleeding (Knowledge, intermediate level)

23) The participants can **solve** how to detect catastrophic external bleeding (Ability, basic level)

24) The participants can **perform** the correct treatment of a casualty with catastrophic external bleeding including the use of first aid equipment (Skills, intermediate level)

The instructor shall:

2.3.1 Present how to control catastrophic external bleeding e.g. through the use of a torniquet, direct pressure and pressure dressings

2.3.2 Show example(s) of the threat of, and how to detect, catastrophic external bleeding

2.3.3 Lead discussions or ask the participants open-ended and involving questions about:

a. how to control catastrophic external bleeding

b. the threat of, and how to detect, catastrophic external bleeding

2.3.4 Facilitate guided practice for the participants in detecting catastrophic external bleeding e.g.:

a. present examples of 'bleeding' casualties; some casualties with catastrophic external bleeding and some casualties that are bleeding, but not considered to be catastrophic external bleeding (e.g. examples of casualties with arterial bleed and examples of other casualties with venous bleed)

b. ask the participants to detect which are the casualties with catastrophic external bleeding and why

2.3.5 Demonstrate correct treatment of a casualty with catastrophic external bleeding including the use of first aid equipment:

a. direct pressure

b. pressure dressings

c. correct use of a tourniquet

d. use of improvised techniques to control catastrophic external bleeding e.g. improvised tourniquet

2.3.6 Facilitate practice for the correct treatment of a casualty with catastrophic external bleeding including the use of first aid equipment:

a. direct pressure and pressure dressings

b. correct use of a tourniquet and improvised tourniquet (two tourniquets may be required to control bleeding)

2.3.7 Give constructive feedback to the participants performance throughout the activities of this element

The participants shall:

2.3.8 Engage in the discussions or answering the questions and share understandings about:

a. how to control catastrophic external bleeding

b. the threat of and how to detect catastrophic bleeding

2.3.9 Engage in the learning activity and practise how to detect catastrophic bleeding

2.3.10 Engage in the practice of how to correctly treat a casualty with catastrophic external bleeding including the use of first aid equipment:

a. direct pressure and pressure dressings

b. correct use of a tourniquet and improvised tourniquet (two tourniquets may be required to control bleeding)

2.3.11 Reflect on the received feedback and use the feedback to improve their performance

ELEMENT 2.4 - UNRESPONSIVE

Learning objectives:

25) The participants can **perform** first aid on an unresponsive casualty (Skills, intermediate level)

The instructor shall:

2.4.1 Explain and demonstrate how to provide first aid to an unresponsive casualty including:

a. reasons for unresponsiveness

b. threats to the casualty airway

c. primary survey (“C” A - B - C)

d. unresponsive and breathing casualty should be managed using positional techniques such as the recovery position (or other national/regional established practices)

2.4.2 Facilitate practice for the participants in providing first aid to an unresponsive casualty

2.4.3 Give constructive feedback to the participants’ performance in providing first aid to an unresponsive casualty

The participants shall:

2.4.4 Engage in answering the questions and share understandings about providing first aid to an unresponsive casualty

2.4.5 Practise providing first aid to an unresponsive casualty

a. threats to the casualty´s airway

b. primary survey (“C” A - B - C)

c. recovery position; first aider recovery position

2.4.6 Reflect on the received feedback and use the feedback to improve their performance

ELEMENT 2.5 - OBSTRUCTION OF AIRWAYS

Learning objectives:

26) The participants can **perform** first aid in case of foreign body airway obstruction (Skills, intermediate level)

The instructor shall:

2.5.1 Explain and demonstrate first aid for obstruction of airways:

a. primary survey ("C" A - B - C)

b. reasons for obstruction of airways

c. mild vs. severe adult airway obstruction

2.5.2 Facilitate practice for the participants in providing first aid in case of obstruction of airways

2.5.3 Give constructive feedback to the participants´ performance in providing first aid in case of obstruction of airways

The participants shall:

2.5.4 Practise providing first aid in case of obstruction of airways e.g. mild and severe adult choking

ELEMENT 2.6 - CPR – UNRESPONSIVE, NOT BREATHING

Learning objectives:

27) The participants can **describe** how CPR can preserve important life conditions for the human body (Knowledge, basic level)

28) The participants can **perform** the correct first aid on an unresponsive, not breathing casualty (Skills, intermediate level)

29) The participants can **recognise** AED safety procedures (Knowledge, basic level)

30) The participants can **apply** an AED safely and correctly following the AED safety procedures (Skills, intermediate level)

The instructor shall:

2.6.1 Lead discussions or brainstorms with the participants about how CPR can preserve important life conditions for the human body; such as CPR providing sufficient oxygen to the brain to minimise injury

2.6.2 Explain and demonstrate first aid for unresponsive and not breathing casualty including:

a. primary survey ("C" A - B - C)

b. reasons for being unresponsive and not breathing

c. performing CPR on adults both with, and without, the use of AED and a pocket mask in accordance with regional first aid guidelines (including AED safety procedures)

2.6.3 Facilitate participants' practice in how to use an AED correctly and safely

2.6.4 Facilitate participants' practice in how to provide first aid for an unresponsive and not breathing casualty

2.6.5 Give constructive feedback to the participants performance in providing first aid to an unresponsive casualty and not breathing casualty

The participants shall:

2.6.6 Engage in the discussions or brainstorms and describe how CPR can help maintain important life conditions for the human body such as CPR providing enough oxygen to the brain to prevent further injury

2.6.7 Practise CPR on adults both with, and without, the use of AED and a pocket mask

2.6.8 Engage in the practice of how to provide first aid for an unresponsive and not breathing casualty:

a. primary survey ("C" A - B - C)

b. performing CPR on adults both with, and without, the use of an AED in accordance with regional first aid guidelines

ELEMENT 2.7 - BLEEDING AND SHOCK

Learning objectives:

31) The participants can **perform** the correct first aid for external bleeding (Skills, intermediate level)

32) The participants can correctly **apply** dressings on a casualty (Skills, intermediate level)

33) The participants can **identify** the symptoms of hypovolemic shock and perform the correct first aid for hypovolemic shock (Skills, intermediate level)

The instructor shall:

2.7.1 Explain and demonstrate how to identify the symptoms of hypovolemic shock and provide the correct first aid for hypovolemic shock:

a. primary survey (“C” A - B - C)

b. signs and symptoms of hypovolemic shock (including delayed capillary refill)

c. reasons for hypovolemic shock (e.g. external, and internal bleeding, open fractures, burns)

d. associated risks with hypovolemic shock

e. use of first aid techniques / methods e.g. psychological first aid, positioning, protecting against the environment e.g. blanket to keep warm

2.7.2 Explain and demonstrate first aid for external bleeding:

a. primary survey (“C” A - B - C)

b. use of first aid dressings

2.7.3 Facilitate practice for the participants in:

a. first aid for external bleeding

b. first aid for shock

Note *Please give feedback to the participants’ performance throughout the activities of this element*

The participants shall:

2.7.4 Practise first aid for shock

a. first aid primary survey (“C” A - B - C)

b. use of first aid techniques / methods e.g. psychological first aid, positioning, protecting against the environment e.g. blanket to keep warm

2.7.5 Practise providing first aid when a casualty is bleeding externally

a. primary survey ("C" A - B - C)

b. use of first aid equipment (tourniquet and bandages)

c. use of improvised techniques to control external bleeding

LESSON 3 - FIRST AID FOR RELEVANT SOLAR INDUSTRY SPECIFIC INCIDENTS

60 min.

The aim of this lesson is to enable the participants to provide the correct and effective first aid in case of injuries where a workforce member needs to be able to provide first aid at the solar industry workplace in order to save lives and prevent further injury.

Note *As far as possible, this lesson must be facilitated by the instructor in an interactive and practical way with engagement of the participants. Lesson 3 may also be carried out as scenarios or practical exercises or selected elements may be supplemented with a practical part, if deemed possible by the instructor*

After having successfully completed this lesson, the participants can:

34) **Solve** how to provide the correct first aid to a casualty injured in the solar industry workplace environment (Ability, basic level)

The relevant injuries include:

a. burns

b. chemical contacts to the eye

c. medical emergency situations: heart attack and stroke

d. hypothermia

e. fractures

ELEMENT 3.1 - BURNS

Learning objectives:

35) The participants can **describe** how to provide the correct first aid to treat burns (Knowledge, basic level)

The instructor shall:

3.1.1 Explain and demonstrate example(s) of how to provide the correct first aid to treat burns including electrical burns and how the availability of water can influence how burns should be treated

3.1.2 Lead discussions with the participants about the example(s) of how to provide the correct first aid to treat burns, for example:

a. how did the instructor provide first aid to treat burns?

b. why were the actions performed?

The participants shall:

3.1.3 Explain the example(s) shown and share understandings about how to provide the correct first aid to treat burns

ELEMENT 3.2 - CHEMICAL CONTACTS TO THE EYE

Learning objectives:

36) The participants can **describe** how to provide the correct first aid to chemical contacts to the eye (Knowledge, basic level)

The instructor shall:

3.2.1 Explain and demonstrate example(s) of how to provide the correct first aid for chemical contacts to the eye

3.2.2 Lead discussion with the participants about the example(s) of how to provide the correct first aid for chemical contacts to the eye:

The participants shall:

3.2.3 Explain the example(s) shown and share understandings about how to provide the correct first aid for chemical contacts to the eye

ELEMENT 3.3 - MEDICAL EMERGENCY SITUATIONS HEART ATTACK & STROKE

Learning objectives:

37) The participants can **describe** how to provide the correct first aid in medical emergency situations: heart attack and stroke (Knowledge, basic level)

The instructor shall:

3.3.1 Explain and demonstrate how to recognise and provide the correct first aid in medical emergency situations:

a. heart attack

b. stroke

3.3.2 Facilitate a discussion for the participants to ensure understanding of medical emergency situations relating to heart attack and stroke

The participants shall:

3.3.3 Share understanding about how to provide the correct first aid in medical emergency situations heart relating to attack and stroke

ELEMENT 3.4 - HYPOTHERMIA

Learning objectives:

38) The participants can **describe** how to provide the correct first aid to a casualty with hypothermia (Knowledge, basic level)

The instructor shall:

3.4.1 Explain and demonstrate example(s) of how to provide the correct first aid to treat hypothermia including how to insulate the casualty

3.4.2 Lead discussion or ask the participants involving questions about the example(s) of how to provide the correct first aid to treat hypothermia

The participants shall:

3.4.3 Explain or answer the questions about the example(s) shown and share understandings about how to provide the correct first aid to treat hypothermia

ELEMENT 3.5 - FRACTURES

Learning objectives:

39) The participants can **describe** how to identify a suspected fracture and provide the correct first aid treatment (Knowledge, basic level)

The instructor shall:

3.5.1 Explain and demonstrate example(s) of how to identify a suspected fracture and provide the correct first aid treatment

3.5.2 Lead discussion or ask the participants involving questions about the example of how to provide the correct first aid to a casualty with a suspected fracture:

The participants shall:

3.5.3 Explain or answer the questions about the example(s) shown and share understandings about how to provide the correct first aid to a casualty with a fracture

ELEMENT 3.6 - HEAD TO TOE EXAMINATION

Learning objectives:

40) The participants can **describe** how to correctly perform a head-to-toe examination in accordance with regional guidelines (Knowledge, basic level)

The instructor shall:

3.6.1 Demonstrate on a person or dummy how to do a head-to-toe examination and explain the focus on identifying other injuries

3.6.2 Lead discussions with the participants about the example(s) of how to do a head -to-toe examination for example:

a. how did the instructor do the head-to-toe examination?

b. what were the steps or actions of the head-to-toe examination?

c. why were these steps or actions performed?

The participants shall:

3.6.3 Explain the example(s) shown and share understandings about how to do a head -to-toe examination

LESSON 4 - SCENARIO-BASED TRAINING

135 min.

The aim of this lesson is to enable the participants to assess, assist and provide the correct lifesaving first aid in a solar industry specific incident.

After having successfully completed this lesson, the participants can:

41) **Take responsibility** for managing first aid incidents with the correct approach and assessments made in the solar industry workplace environment (Ability, Intermediate level)

42) **Act independently** in correctly assessing, assisting, and providing the necessary first aid in an incident in the solar industry workplace environment (Ability, Intermediate level)

43) **Take responsibility** for the correct use of first aid equipment (Ability, Intermediate level)

44) **Discuss** common and expected reactions to acting as a first aider, to an unusual situation and to a casualty (Knowledge, intermediate level)

ELEMENT 4.1 - SCENARIO-BASED TRAINING

The instructor shall:

4.1.1 Explain additional relevant safety procedures in the training area as required

4.1.2 Facilitate practice for the participants in providing lifesaving first aid through scenario- based training. As a minimum, the instructor must ensure that each participant practises the following throughout the scenario-based training:

a. managing first aid incidents

b. providing necessary lifesaving first aid for a casualty that is unconscious and requires CPR

c. correct use of first aid equipment and PPE

d. correct and safe use of an AED

4.1.3 Give constructive feedback and debrief to the participants´ performance throughout the scenario-based training:

a. review positive actions observed during exercise

b. suggest points for improvement

c. acting as a first aider e.g. what are their reactions to this?

d. normal reactions to an unusual situation

The participants shall:

4.1.4 Practice providing lifesaving first aid throughout relevant scenarios. As a minimum, the participants must practise the following through the scenario-based training:

a. managing incidents

b. providing necessary lifesaving first aid

c. correct use of first aid equipment and PPE

d. correct and safe use of an AED

4.1.5 Engage in the debriefing and share their experiences and attitudes

4.1.6 Reflect on the received feedback and use the feedback to improve their performance

Note *This scenario-based training shall be conducted as group work with one or more participants as first aiders, while the other participants act as casualties or observers. Each participant shall, as a minimum, participate as a first aider (e.g. not as a casualty) at least two times. Relevant first aid equipment shall be available and used at all times during scenario-based training. To ensure all of the above mentioned points are covered during scenario-based training, training providers shall combine several of the following first aid situations mentioned below*

Note *Scenarios from the below lists can be combined at will during the scenario-based training as long as all the mandatory scenarios are covered*

The mandatory scenarios to be covered during scenario-based training are:

a. one electrical incident

b. one incident with either a stroke (circulatory, respiratory, central nervous system) or a heart attack

c. two scenarios must include a head-to-toe examination of the casualty

d. CPR using an AED

Additional scenarios which should be considered included in the scenario-based training are:

e. dropped object or serious injury fall from heights

f. hypovolemic shock

g. serious external bleeding

h. unresponsive with normal breathing

i. serious burns (chemical, electrical, thermal and sun)

j. hypothermia

k. crush injury (e.g. finger injuries)

l. chemical contacts to the eye

m. minor incident escalating to a serious incident

LESSON 5 - TRAINING REVIEW

15 min.

The aim of this lesson is to enable the participants to reflect on and process their learning outcome and key takeaways from the module.

ELEMENT 5.1 - TRAINING REVIEW

The instructor shall:

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

The participants shall:

5.1.2 Reflect on their learning outcome and key takeaways from the First Aid Module, aiming to achieve a high learning transfer from the module to their way of working by means of, for example:

a. group discussion or walk and talk

b. questions and answers in class, or where suitable

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

ELEMENT 5.2 - FEEDBACK SESSION

The instructor shall:

5.2.1 Give overall feedback and feed forward on the participants' learning outcomes inspired by the training as well as from the training review

5.2.2 Encourage the participants to examine and grow awareness of which specific elements in their own solar industry workplace environment differ from the training scenario environment (to visualise and enhance learning transfer).

GLOBAL WIND ORGANISATION

Solar Safety Training First Aid Awareness

(S-FAA)

8. FIRST AID AWARENESS MODULE

8.1 Aims and objectives for the First Aid Awareness Module

The aim of this module is to enable participants to recognise signs and symptoms of life threating situations. It equips participants with the basic level of skills required to administer lifesaving first to a casualty in an immediately life situation, and to prevent further injury in order to save lives until the casualty can be handed over to the next level of care.

Note *The First Aid Awareness Module covers the fundamental elements of lifesaving first aid in a medical emergency and is equivalent to Lesson 1 and Lesson 2 of the First Aid Module.*

After having successfully complete this First Aid Awareness module, the participants can:

1) **Act independently** in recognising, assessing, and prioritising the need for first aid and providing lifesaving first aid until the casualty can be handed over to the next level of care in case of an incident in the solar industry specific workplace/environment (Ability, intermediate level)

2) **Take responsibility** for recognising their limitations as a first aider, calling for help and enable evacuation off the casualty in case of an incident in the solar industry specific workplace/environment (Ability, intermediate level)

8.2 Duration of the First Aid Awareness Module

The total contact time for completing the First Aid Awareness Module is estimated to be 3 hours and 45 minutes.

The training provider must not exceed the time per day given in the table 7.2.1 below.

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

Table 8.2.1 – Maximum durations for training day

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).

8.3 Participant Ratio of the First Aid Awareness Module

The ratio shown for theory sessions indicates the maximum number of participants per instructor attending the course.

Practical ratios indicate the maximum number of participants to be supervised by an instructor during each activity.

Module	Session	Instructor to Participant Ratio
Solar Safety Training First Aid Awareness	Theory	1:12
	Practical	1:6

Table 8.3.1 – Solar First Aid Awareness Module instructor to participant ratio

8.4 Equipment for the First Aid Awareness Module

The equipment required for training as listed in Annex 1 must be available and must adhere to any local compliance requirements.

8.5 First Aid Awareness Module Timetable

The order in which elements of this First Aid Awareness Module training are delivered may vary according to the didactical choices of the delivering training provider.

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

Lesson	Element		Duration
1. **Introduction to the training**	1.1	Safety instructions and emergency procedures	
	1.2	Facilities	
	1.3	Introduction	
	1.4	Scope and main learning objective	
	1.5	Ongoing assessment (participant assessment form)	
	1.6	Motivation	
	1.7	Human factors	
		TOTAL	30 min.
2. **Lifesaving first aid**	2.1	Response to a first aid incident in the solar industry workplace environment	
	2.2	Primary survey ''C''- A - B - C	
	2.3	''C''- Catastrophic external bleeding	

		2.4	Unresponsive	
		2.5	Obstruction of airways	
		2.6	CPR – Unresponsive, not breathing	
		2.7	Bleeding and shock	
			TOTAL	180 min.
3.	Training review	3.1	Training review	
		3.2	Feedback session	
			TOTAL	15 min.
		3.3	GRAND TOTAL	225 min.

Table 8.5.1 – Solar First Aid Awareness Module Timetable

8.6 Detailed Description of the First Aid Awareness Module

LESSON 1 - INTRODUCTION TO THE TRAINING

30 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:

3) **Recognise** what is expected of them throughout the module (Knowledge, basic level)

4) **Name** and point out local emergency procedures and facilities (Knowledge, basic level)

5) **Discuss** the relevant human factors and explain their implications (Knowledge, intermediate level)

ELEMENT 1.1 - SAFETY INSTRUCTIONS AND EMERGENCY PROCEDURES

Learning objectives:

6) The participants can **show interest** or curiosity in the safety and emergency procedures at the training facility (Ability, basic level)

The instructor shall:

1.1.1 Explain and ask open questions aiming at:

a. Safety instructions according to internal procedures

b. Emergency procedures and emergency exits in the areas where the participants can be expected to be located during the course

The participants shall:

1.1.2 Engage in discussion about local safety and emergency procedures

ELEMENT 1.2 - FACILITIES

Learning objectives:

7) 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, lead a tour and point out facilities, etc.):

The participants shall:

1.2.2 Note relevant facilities and ask questions when in doubt

ELEMENT 1.3 - INTRODUCTION

Learning objectives:

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

The instructor shall:

1.3.1 Explain the timetable of the First Aid Awareness 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

The participants shall:

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

ELEMENT 1.4 - SCOPE AND MAIN LEARNING OBJECTIVE

Learning objectives:

9) The participants can **recognise** the scope and main objectives of the Solar Safety Training First Aid Awareness Module (Knowledge, basic level)

The instructor shall:

1.4.1 Present the scope and main learning objectives of the First Aid Awareness Module through a challenge or scenario; "your goal with the First Aid Awareness Module is…"- message

Note *A suggested learning activity could be to share stories, present scenarios or personal experiences that show the importance of being able to do solar industry specific first aid (what is in it for the participants)*

Where possible PowerPoint slide(s) should be avoided, as part of the introduction. Instead use stories, examples or personal experiences that shows the importance of being able to provide solar industry specific first aid and the importance of the First Aid Awareness Module

1.4.2 A Involve participants with questions on understanding and individual experiences on First Aid Awareness

The participants shall:

1.4.3 Engage in answering questions and share experiences on First Aid Awareness

ELEMENT 1.5 - ONGOING ASSESSMENT

Learning objectives:

10) The participants can **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 participant performance assessment form and how it will be used

The participants shall:

1.5.3 Engage in discussions and (when in doubt) ask questions - relating to the assessment procedure

ELEMENT 1.6 - MOTIVATION

Learning objectives:

11) The participants can **show interest** 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 S-FAA First Aid Awareness training understandings 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 in discussions and share experiences on First Aid Awareness 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 participant develops a positive attitude and responsibility towards the subject and the performance in the work situation*

ELEMENT 1.7 - HUMAN FACTORS

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

Learning objectives:

12) The participants can **describe** solar industry specific human factors (Knowledge, basic level)

13) The participants can **show interest** in human factors during the following practical exercises (Ability, basic level)

The instructor shall:

1.7.1 Present how human factors influence solar industry specific accidents

1.7.2 Lead a discussion about the role of the individual in improving human performance and how this can improve the safety of operations in the solar industry specific work environment

1.7.3 Ensure that constructive feedback on the participant's performance involve human factor 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:

How solar industry specific accidents are influenced by the consequences of human factors and may include the following terms and conditions:

a. attention and perception

b. group behaviour and peer pressure weather conditions

c. weather delays noise levels

d. site layout and housekeeping fitness and health

e. domestic and work-related stress workload (both overload and underload) fatigue

f. time pressure and deadlines

g. alcohol, medication, and substance abuse

The participants shall:

1.7.4 Engage in discussions and share experiences on how human factors influence solar industry specific accidents, engage in and reflect on received feedback

LESSON 2 - LIFESAVING FIRST AID

180 min.

The aim of this lesson is to enable the participants to recognise signs and symptoms of life threating situations and save lives and preventing injury to the casualty by being able to use primary survey to provide the correct and effective lifesaving first aid in case of a solar industry specific emergency situation.

Additionally, this lesson is to enable the participants to manage an incident and call for help in the solar industry workplace environment and enable evacuation of the casualty(s) in order to save lives.

Life-threatening conditions include:

a. catastrophic external bleeding

b. obstruction of airways

c. unresponsive casualty

d. unresponsive not breathing casualty

e. bleeding and shock

After having successfully completed this lesson, the participants can:

14) **Solve** how to manage different first aid incidents in the solar industry workplace environment in terms of the approach and assessments made (Ability, basic level)

15) **Act independently** to provide lifesaving first aid by using primary survey to identify and treat life-threatening conditions in a prioritised order in a first aid incident in the solar industry workplace environment (Ability, intermediate level)

ELEMENT 2.1 - RESPONSE TO A FIRST AID INCIDENT IN THE SOLAR INDUSTRY WORKPLACE ENVIRONMENT

Learning objectives:

16) The participants can **explain** how to safely respond to a first aid incident in the solar industry workplace environment (Knowledge, intermediate level)

The instructor shall:

2.1.1 Explain and demonstrate example(s) of how to respond to a first aid incident in the solar industry workplace environment:

a. how to follow an efficient and correct first aid structure:

a.i to ensure personal safety, including the correct use of first aid equipment and PPE to minimise the risk of exposure to blood-borne and other potential pathogens

a.ii to ensure scene safety (including electrical hazards)

a.iii providing lifesaving first aid using the primary survey

a.iv call for help

b. analysis and management of an incident call for help

c. call for help

2.1.2 Facilitate a learning activity for the participants such as leading a discussion, asking the participants scenario-based questions or share a questionnaire about how to safely respond to a first aid incident in the solar industry workplace environment

The participants shall:

2.1.3 Engage in the learning activity and share understandings about how to safely manage a first aid incident in the solar industry workplace environment

ELEMENT 2.2 - PRIMARY SURVEY ''C''- A - B - C

Learning objectives:

17) The participants can **name** the steps in the primary survey "C"- A – B – C (Knowledge, basic level)

18) The participants can **describe** the purpose of doing a primary survey (Knowledge, basic level)

19) The participants can **explain** how to do a primary survey in incidents at the solar industry workplace (Knowledge, intermediate level)

20) The participants can **perform** a correct primary survey in incidents (Skills, intermediate level)

The instructor shall:

2.2.1 Present primary survey "C" A-B-C and the purpose of the primary survey in patient assessment and treatment:

a. C – Catastrophic bleeding

b. A - Airway

c. B - Breathing

d. C - Circulation

2.2.2 Ask the participants involving questions about if they have any experiences with primary survey "C" A - B - C or lead discussions with the participants about the real-life challenges and benefits of primary survey "C" A - B – C

2.2.3 Explain and demonstrate how to use the Primary Survey ("C" A-B-C) in example(s) of incident(s) from the different solar industry specific incident types including:

a. key signs of normal body functioning such as respiratory rate and capillary refill

b. how to spot threats to the nervous, respiratory, and circulatory systems

c. how a minor incident can escalate to a serious incident in the solar industry workplace environment and what to do prevent this

2.2.4 Ask the participants to identify the similarities and differences between the examples of the primary survey shown:

a. what happened?

b. how did the first aider(s) act in the examples shown?

c. in those actions, which were the most important?

d. why were these key actions performed?

2.2.5 Facilitate participants' practise in how to do a primary survey ("C" A-B-C) in incident(s). Provide a lot of support and guidance to the participants

2.2.6 Give constructive feedback to the participants' performance throughout the activities of this element

The participants shall:

2.2.7 Engage in the learning activity and share understandings about:

a. the examples of the primary survey shown

b. the right way of doing a primary survey

2.2.8 Practice how to do a primary survey ("C" A-B-C) in incident(s)

2.2.9 Reflect on the received feedback and use the feedback to improve their performance

ELEMENT 2.3 - 'C'' – CATASTROPHIC EXTERNAL BLEEDING

Learning objectives:

21) The participants can **explain** how to control catastrophic external bleeding (Knowledge, intermediate level level)

22) The participants can **explain** the risk of and how to detect catastrophic external bleeding (Knowledge, intermediate level)

23) The participants can **solve** how to detect catastrophic external bleeding (Ability, basic level)

24) The participants can **perform** the correct treatment of a casualty with catastrophic external bleeding including the use of first aid equipment (Skills, intermediate level)

The instructor shall:

2.3.1 Present how to control catastrophic external bleeding e.g. through the use of a torniquet, direct pressure and pressure dressings

2.3.2 Show example(s) of the threat of, and how to detect, catastrophic external bleeding

2.3.3 Lead discussions or ask the participants involving questions about:

a. how to control catastrophic external bleeding

b. the threat of, and how to detect, catastrophic external bleeding

2.3.4 Facilitate guided practice for the participants in detecting catastrophic external bleeding e.g.:

a. present examples of 'bleeding' casualties; some casualties with catastrophic external bleeding and some casualties that are bleeding, but not considered to be catastrophic external bleeding (e.g. examples of casualties with arterial bleed and examples of other casualties with venous bleed)

b. ask the participants to detect which are the casualties with catastrophic external bleeding and why

2.3.5 Demonstrate correct treatment of a casualty with catastrophic external bleeding including the use of first aid equipment:

a. direct pressure

b. pressure dressings

c. correct use of a tourniquet

d. use of improvised techniques to control catastrophic external bleeding e.g. improvised tourniquet

2.3.6 Facilitate practice for the correct treatment of a casualty with catastrophic external bleeding including the use of first aid equipment:

a. direct pressure and pressure dressings

b. correct use of a tourniquet and improvised tourniquet (two tourniquets may be required to control bleeding)

2.3.7 Give constructive feedback to the participants performance throughout the activities of this element

The participants shall:

2.3.8 Engage in the discussions or answering the questions and share understandings about:

a. how to control catastrophic external bleeding

b. the threat of and how to detect catastrophic bleeding

2.3.9 Engage in the learning activity and practise how to detect catastrophic bleeding

2.3.10 Engage in the practice of how to correctly treat a casualty with catastrophic external bleeding including the use of first aid equipment:

a. direct pressure and pressure dressings

b. correct use of a tourniquet and improvised tourniquet (two tourniquets may be required to control bleeding)

2.3.11 Reflect on the received feedback and use the feedback to improve their performance

ELEMENT 2.4 - UNRESPONSIVE

Learning objectives:

25) The participants can **perform** first aid on an unresponsive casualty (Skills, intermediate level)

The instructor shall:

2.4.1 Explain and demonstrate how to provide first aid to an unresponsive casualty including:

a. reasons for unresponsiveness

b. threats to the casualty airway

c. primary survey (“C” A - B - C)

d. unresponsive and breathing casualty should be managed using positional techniques such as the recovery position (or other national/regional established practices)

2.4.2 Facilitate practice for the participants in providing first aid to an unresponsive casualty

2.4.3 Give constructive feedback to the participants’ performance in providing first aid to an unresponsive casualty

The participants shall:

2.4.4 Engage in answering the questions and share understandings about providing first aid to an unresponsive casualty

2.4.5 Practise providing first aid to an unresponsive casualty

a. threats to the casualty´s airway

b. primary survey (“C” A - B - C)

c. recovery position; first aider recovery position

2.4.6 Reflect on the received feedback and use the feedback to improve their performance

ELEMENT 2.5 - OBSTRUCTION OF AIRWAYS

Learning objectives:

26) The participants can **perform** first aid in case of foreign body in case of obstruction of airways (Skills, intermediate level)

The instructor shall:

2.5.1 Explain and demonstrate first aid in case of obstruction of airways:

a. primary survey ("C" A - B - C)

b. reasons for obstruction of airways

c. mild vs. severe adult airway obstruction

2.5.2 Facilitate practice for the participants in providing first aid in case of obstruction of airways

2.5.3 Give constructive feedback to the participants´ performance in providing first aid in case of obstruction of airways

The participants shall:

2.5.4 Practise providing first aid in case of obstruction of airways e.g. mild and severe adult choking

ELEMENT 2.6 - CPR – UNRESPONSIVE, NOT BREATHING

Learning objectives:

27) The participants can **describe** how CPR can preserve important life conditions for the human body (Knowledge, basic level)

28) The participants can **perform** the correct first aid on an unresponsive, not breathing casualty (Skills, intermediate level)

29) The participants can **recognise** AED safety procedures (Knowledge, basic level)

30) The participants can **apply** an AED safely and correctly following the AED safety procedures (Skills, intermediate level)

The instructor shall:

2.6.1 Lead discussions or brainstorms with the participants about how CPR can preserve important life conditions for the human body; such as CPR providing sufficient oxygen to the brain to minimise injury

2.6.2 Explain and demonstrate first aid for unresponsive and not breathing casualty including:

a. primary survey (“C” A - B - C)

b. reasons for being unresponsive and not breathing

c. performing CPR on adults both with, and without, the use of AED and a pocket mask in accordance with regional first aid guidelines (including AED safety procedures)

2.6.3 Facilitate participants’ practice in how to use an AED correctly and safely

2.6.4 Facilitate participants’ practice in how to provide first aid for an unresponsive and not breathing casualty

2.6.5 Give constructive feedback to the participants performance in providing first aid to an unresponsive casualty and not breathing casualty

The participants shall:

2.6.6 Engage in the discussions or brainstorms and describe how CPR can help maintain important life conditions for the human body such as CPR providing enough oxygen to the brain to prevent further injury

2.6.7 Practise CPR on adults both with, and without, the use of AED and a pocket mask

2.6.8 Practice how to provide first aid for an unresponsive and not breathing casualty:

a. primary survey (“C” A - B - C)

b. performing CPR on adults both with, and without, the use of an AED in accordance with regional first aid guidelines

ELEMENT 2.7 - BLEEDING AND SHOCK

Learning objectives:

31) The participants can **perform** the correct first aid for external bleeding (Skills, intermediate level)

32) The participants can correctly **apply** dressings on a casualty (Skills, intermediate level)

33) The participants can **perform** the symptoms of hypovolemic shock and perform the correct first aid for hypovolemic shock (Skills, intermediate level)

The instructor shall:

2.7.1 Explain and demonstrate how to identify the symptoms of hypovolemic shock and provide the correct first aid for hypovolemic shock:

a. primary survey ("C" A - B - C)

b. signs and symptoms of hypovolemic shock (including delayed capillary refill)

c. reasons for hypovolemic shock (e.g. external, and internal bleeding, open fractures, burns)

d. associated risks with hypovolemic shock

e. use of first aid techniques / methods e.g. psychological first aid, positioning, protecting against the environment e.g. blanket to keep warm

2.7.2 Explain and demonstrate first aid for external bleeding:

a. primary survey ("C" A - B - C)

b. use of first aid dressings

2.7.3 Facilitate practice for the participants in:

a. first aid for shock

b. first aid for external bleeding

Note *Please provide feedback to the participants' performance throughout the activities of this element*

The participants shall:

2.7.4 Practise first aid for shock

a. first aid primary survey ("C" A - B - C)

b. use of first aid techniques / methods e.g. psychological first aid, positioning, protecting against the environment e.g. blanket to keep warm

2.7.5 Practise providing first aid when a casualty is bleeding externally

a. primary survey (“C” A - B - C)

b. use of first aid equipment (tourniquet and bandages)

c. use of improvised techniques to control external bleeding

LESSON 3 - TRAINING REVIEW

15 min.

The aim of this lesson is to enable the participants to reflect on and process their learning outcome and key takeaways from the module.

ELEMENT 3.1 - TRAINING REVIEW

The instructor shall:

3.1.1 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:

3.1.2 Reflect on their learning outcomes and key takeaways from the Solar Safety Training First Aid Module, aiming to achieve a high learning transfer from the module to their way of working by means of, for example:

a. group discussion or walk and talk

b. questions and answers in class, or where suitable

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

ELEMENT 3.2 - FEEDBACK SESSION

The instructor shall:

3.2.1 Give overall feedback and feed forward on the participants' learning outcomes inspired by the training as well as from the training review

3.2.2 Encourage the participants to examine and grow awareness of which specific elements in their own solar industry workplace environment differ from the training environment (to visualise and enhance learning transfer).

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Solar Safety Training Safe Solar Work

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9. SAFE SOLAR WORK MODULE

9.1 Aims and Objectives for the Safe Solar Work Module

Training within the Safe Solar Work Module is divided into three distinct subjects covering:

1. Fire Awareness
2. Manual Handling
3. Work at Heights

Each subject has its own aims and objectives as detailed below.

Aims and Objectives for Fire Awareness

The aim of Fire Awareness is to enable the participants to prevent fires and make appropriate judgements when evaluating a fire. If the incident is judged to be safe, the participants should be able to efficiently extinguish an initial fire by using basic handheld firefighting equipment.

After having successfully completed this lesson, the participants can:

1) **Act independently** to identify fire hazards and prevent fires in the solar industry workplace environment (Ability, intermediate level)

2) **Take responsibility** for assessing a fire and be able to select the right extinguishing equipment according to the fire classes (Ability, intermediate level)

3) **Act independently** to efficiently extinguish an initial fire by using handheld firefighting equipment (Ability, intermediate level)

Aims and Objectives related to Manual Handling

The aim of Manual Handling is to enable participants to reduce the risk of musculoskeletal injuries for industry workforce members and enable participants to perform their tasks and activities in the safest possible way when working in the work environment.

After having successfully completed this lesson, the participants can:

4) **Take responsibility** for the use of essential manual handling principles to reduce the risk of musculoskeletal injury when performing solar industry specific physical tasks and activities (Ability, intermediate level)

Aims and Objectives related to Work at Height

The aim of work at height is to enable the participants to recognise work at heights, and to assess risks and use protective equipment to work safely at heights.

After having successfully completed this lesson, the participants can:

5) **Take initiative** to assess work at height hazards they encounter in the workplace (Ability, intermediate level)

6) **Take responsibility** to apply the necessary control measures to work safely at heights based on instructions and guidance from their employer (Ability, intermediate level)

Note *Training related to work at heights is not designed to test the participants' capability and aptitude for work at height, e.g. it is not a test for fear of heights or designed to overcome fear of heights*

9.2 Duration of the Safe Solar Work Module

The total contact time for completing the Safe Solar Work Module is estimated to be 7 hours and 40 minutes.

The training provider must not exceed the time per day given in the Table 8.2.1 (below).

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

Table 9.2.1 – Maximum durations for training day

9.3 Participant Ratio of the Safe Solar Work Module

The ratio shown for theory sessions indicates the maximum number of participants per instructor attending the course.

Practical ratios indicate the maximum number of participants to be supervised by an instructor during each activity.

Module	Session	Instructor to Participant Ratio
Safe Solar Work	Theory	1:12
	Practical	1:6

Table 9.3.1 – Safe Solar Work Module instructor to participant ratio

9.4 Equipment for the Safe Solar Work Module

The equipment required for manual handling must be representative to loads commonly handled at utility scale Solar PV sites as well as representative to work situations in the solar industry. Training equipment must comply with national requirements as stated in GWO Requirements for Training.

The equipment required for training as listed in Annex 1 must be available and must comply with any national regulatory requirements, where applicable.

9.5 Safe Solar Work Module Timetable

The order in which elements of this Safe Solar Work module training are delivered may vary according to the didactical choices of the delivering training provider.

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

Lesson	Element		Duration
1. **Introduction to the training**	1.1	Safety instructions and emergency procedures	
	1.2	Facilities	
	1.3	Introduction	
	1.4	Scope and main learning objective	
	1.5	Ongoing assessment (participant performance assessment form)	
	1.6	Motivation	
	1.7	Human factors	
		TOTAL	30 min.
2. **Fire Safety Legislation**	2.1	National legislation and local guidelines	
		TOTAL	5 min.
3. **Fire combustion and fire spread**	3.1	Types of fires	
	3.2	Fire triangle	
	3.3	Fire spread	
	3.4	Fire gases	
		TOTAL	20 min.
4. **Fire extinguishing**	4.1	Contingency plan	
	4.2	Assessing the fire	
	4.3	Fire classes	
		TOTAL	25 min.

5. Fire prevention	5.1	Fire hazards	
	5.2	Fire prevention measures	
		TOTAL	20 min.
6. Firefighting equipment	6.1	Pre-use inspection	
	6.2	Correct use of firefighting equipment	
		TOTAL	20 min.
7. Fire Awareness practice and scenario-based training	7.1	Practical exercises	
		TOTAL	60 min.
8. Injuries, symptoms, and essential manual handling	8.1	How to avoid common solar industry specific musculoskeletal injuries	
	8.2	Typical symptoms of injuries	
	8.3	Essential manual handling principles	
	8.4	Basic dynamic risk assessment and introduction to the TILE principle	
		TOTAL	20 min.
9. Warm up activities	9.1	Warm up activities	
		TOTAL	20 min.
10 Manual handling principles	10.1	Working over shoulder height	
	10.2	Working while kneeling	
	10.3	Push and pull	
	10.4	Carrying	
	10.5	Lifting	
	10.6	Work with handheld tools	
	10.7	Awkward postures	
		TOTAL	110 min.
11 Work at height safety	11.1	Recognising work at height hazards	
	11.2	National legislation and local guidelines	
	11.3	Hierarchy of control and risk assessment	
		TOTAL	45 min.
12 Equipment used for work at height	12.1	Portable ladders	
	12.2	MEWPs and scaffolds	
	12.3	Using a harness for work at height	
		TOTAL	60 min.

13 Housekeeping and Hand Tools	13.1	Housekeeping and Hand Tools	
		TOTAL	10 Min
14 Training Review	14.1	Training Review	
	14.2	Feedback session	
		TOTAL	15 min.
		GRAND TOTAL	460 min.

9.6 Detailed Description of the Safe Solar Work Module

LESSON 1 - INTRODUCTION TO THE TRAINING

30 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 Lesson 1 of Safe Solar Work Module, the participants can:

7) **Recognise** what is expected of them throughout the module (Knowledge, basic level)

8) **Name** and point out local emergency procedures and facilities (Knowledge, basic level)

9) **Discuss** the relevant human factors and explain their implications (Knowledge, intermediate level)

ELEMENT 1.1 - SAFETY INSTRUCTIONS AND EMERGENCY PROCEDURES

Learning objectives:

10) The participants can **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 aiming at:

a. safety instructions according to internal procedures

b. emergency procedures and emergency exits in the areas where the participants can be expected to be located during the course

The participants shall:

1.1.2 Answer questions on local safety and emergency procedures

ELEMENT 1.2 - FACILITIES

Learning objectives:

11) 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 Alternative activity: 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 objectives:

12) The participants can **show interest** in fellow participants and the course content / design (Ability, basic level)

The instructor shall:

1.3.1 Explain and ask involving questions aiming at the programme of the Safe Solar Work Module training, 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

The participants shall:

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

ELEMENT 1.4 - SCOPE AND MAIN LEARNING OBJECTIVE

Learning objectives:

13) The participants can **recognise** the scope and main objectives of the Safe Solar Work Training Module (Knowledge, basic level)

The instructor shall:

1.4.1 Present the scope and main learning objectives of the Safe Solar Work Module training

1.4.2 Involve participants with questions on understanding and individual experiences of Safe Solar Work Module

The participants shall:

1.4.3 Engage in answering questions and share experiences of Safe Solar Work Module

ELEMENT 1.5 - ONGOING ASSESSMENTS (PARTICIPANT PERFORMANCE ASSESSMENT FORM)

Learning objectives:

14) 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 participant performance assessment form and how it is used

The participants shall:

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

ELEMENT 1.6 - MOTIVATION

Learning objectives:

15) The participants can **show interest** 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 Safe Solar Work Module knowledge, skills and abilities relevant to the solar industry specific context

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 participant*

The participants shall:

1.6.2 Engage themselves in discussions and share experiences on Safe Solar Work Module

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 participant develops 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 to how human behaviour and responsibility influences a safe work environment. In addition, the aim is to prepare for a continued focus on human factors during practical training and exercises.

Learning objectives:

16) The participants can **describe** human factors relevant to solar industry specific context, and their implications. (Knowledge, basic level)

17) The participants can **show interest** in human factors during the following practical exercises (Ability, basic level)

The instructor shall:

1.7.1 Present how human factors influence accidents in the solar industry specific context. (relevant data may be used)

1.7.2 Lead a discussion about the role of the individual in improving human behaviour and how this can improve the safety in the solar industry specific context

Facts and Human Factors Criteria:

The consequences of human factors in solar industry specific accidents 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:

1.7.3 Engage in discussions and share experiences of how human factors influence accidents related to the Safe Solar Work module

1.7.4 Engage in and reflect on received feedback and take responsibility on their own performance and development during the training

LESSON 2 - FIRE SAFETY LEGISLATION

5 min.

The aim of this lesson is to enable the participants to comply with legislation and requirements that apply to fire prevention and firefighting equipment related to the industry.

After successfully having completed this lesson, the participants can:

18) **Show interest** in adhering to applicable legislation relevant to fire prevention and firefighting equipment and comply with national legal requirements and local guidelines (Ability, basic level)

ELEMENT 2.1 - NATIONAL LEGISLATION AND LOCAL GUIDLINES

Learning objectives:

19) The participants can **describe** relevant national and solar industry specific legislation and requirements that apply to fire prevention and firefighting equipment in relation to the industry (Knowledge, basic level)

The instructor shall:

2.1.1 Present examples of relevant legislation and requirements that apply to fire prevention and firefighting equipment in relation to the industry workplace

2.1.2 Ask the participants involving questions about relevant legislation and requirements that apply to fire prevention and firefighting equipment in relation to the industry workplace

a. applicable legislation

b. national legislative requirements

c. legal responsibilities

d. local authorities

2.1.3 Ask the participants involving questions about relevant legislation and requirements that apply to fire prevention and firefighting equipment in relation to the national legislation

The participants shall:

2.1.4 Engage in answering the questions and share their understandings about relevant legislation and requirements that apply to fire prevention and firefighting equipment in relation to the solar industry workplace

LESSON 3 - FIRE COMBUSTION AND FIRE SPREAD

20 min.

The aim of this lesson is to provide participants with knowledge to understand combustion, fire spread, the different types of fires and the composition of smoke. In addition, to understand the elements needed for a fire (and more importantly) how to extinguish a fire and the dangers of smoke.

After successfully having completed this lesson, the participants can:

20) **Describe** the different types of fires and the material state, including the type of material surface (Knowledge, basic level)

21) **Describe** the triangle of combustion (Knowledge, basic level)

22) **Describe** fire spread and hazards of fire gases (Knowledge, basic level)

ELEMENT 3.1 - TYPES OF FIRES

Learning objectives:

23) The participants can **describe** the different types of fires and the material state, including the type of material surface (Knowledge, basic level)

The instructor shall:

3.1.1 Present the types of fires (solid, liquid, gas)

3.1.2 Present material state, including how surface size influences combustion

3.1.3 Facilitate a learning activity such as a quiz, questionnaire or ask the participants involving questions about the types of fires and the state of material, including the influence of the size of the surface

The participants shall:

3.1.4 Engage in the activity and share understandings about the types of fires and the state of material, including the influence of the size of the surface

ELEMENT 3.2 - FIRE TRIANGLE

Learning objectives:

24) The participants can **recognise** basic fire theory e.g. the triangle of combustion (Knowledge, basic level)

The instructor shall:

3.2.1 Present the elements needed for a fire to occur with reference to the three sides of the triangle of combustion (oxygen, material, and temperature):

3.2.2 Facilitate a learning activity such as a quiz, questionnaire or ask the participants involving questions about the elements needed for a fire to occur with reference to the three sides of the triangle of combustion

The participants shall:

3.2.3 Engage in the activity and share understandings about the triangle of combustion

ELEMENT 3.3 - FIRE SPREAD

Learning objectives:

25) The participants can **explain** fire spread (Knowledge, intermediate level)

The instructor shall:

3.3.1 Present how fire spreads by (in relation to the solar industry specific context):

a. conduction

b. convection

c. radiation

d. direct burning

3.3.2 Facilitate a learning activity such as a quiz, questionnaire or ask the participants involving questions about how a fire can spread

3.3.3 Give constructive feedback to the participants throughout the activity

The participants shall:

3.3.4 Engage in the activity and discuss how a fire can spread

ELEMENT 3.4 - FIRE GASES

Learning objectives:

26) The participants can **explain** the composition and hazards of fire gases based on the materials in the solar industry workplace (Knowledge, intermediate level)

The instructor shall:

3.4.1 Present the composition and hazards of fire gases based on the materials in the solar industry workplace

3.4.2 Facilitate a learning activity such as a quiz or ask the participants involving questions about the composition and hazards of fire gases based on the materials in the solar industry workplace

3.4.3 Give constructive feedback to the participants throughout the activity

The participants shall:

3.4.4 Engage in the activity and discuss the composition and hazards of fire gases based on the materials in the industry workplace

LESSON 4 - FIRE EXTINGUISHING

25 min.

The aim of this lesson is to enable participants to assess a fire and to be able to identify the right extinguishing equipment according to the fire classes. Furthermore, this lesson shall enable the participants to act according to the contingency plans in a solar industry workplace environment.

After successfully having completed this lesson, the participants can:

27) **Solve** how to assess a fire (Ability, basic level)

28) **Solve** how to act in a given situation based on an assessment of the fire and, if needed, to select the right extinguishing equipment according to the fire classes (Ability, basic level)

29) **Solve** how to act according to the continency plans in a solar industry workplace environment. (Ability, basic level)

ELEMENT 4.1 - CONTINGENCY & EMERGENCY RESPONSE PLAN

Learning objectives:

30) The participants can **describe** examples of a contingency or emergency response plan in a solar industry workplace environment. (Knowledge, basic level)

31) The participants can **describe** examples of the importance of knowing beforehand what to do in an emergency (Knowledge, basic level)

32) The participants can **act independently** and respond to fire drill in accordance with contingency or emergency response plan for site (ability, intermediate level)

The instructor shall:

4.1.1 Share copies of an example of a contingency or emergency response plan in the solar industry workplace environment

4.1.2 Ask the participants involving questions about:

a. the example of a contingency or emergency response plan for the solar industry workplace environment

b. examples of the importance of knowing beforehand what to do in an emergency

4.1.3 Conduct a test drill by asking participants to act independently and follow the emergency response plan and site layout navigation

The participants shall:

4.1.4 Engage in answering the questions and share understandings about:

a. the example of a contingency or emergency response plan for the solar industry workplace environment

b. examples of the importance of knowing beforehand what to do in an emergency

4.1.5 Act independently and follow emergency response plan and site layout navigation

ELEMENT 4.2 - ASSESSING THE FIRE

Learning objectives:

33) The participants can **describe** the fire intensity curve (Knowledge, basic level)

34) The participants can **solve** the challenge of how to assess a fire and how to act based on the assessment of the fire (Ability, basic level)

The instructor shall:

4.2.1 Present the fire intensity curve

4.2.2 Facilitate a learning activity which enables all participants to practise how to assess a fire and how to act based on the assessment of the fire

4.2.3 Give constructive feedback to the participants throughout the activity with an emphasis on ensuring that the participants have a correct understanding of the fire intensity curve; can assess a fire and know what to do based on the assessment of the fire

The participants shall:

4.2.4 Engage in the activity and practise how to assess a fire and how to act based on the assessment of the fire

ELEMENT 4.3 - FIRE CLASSES

Learning objectives:

35) The participants can **describe** the fire classes (Knowledge, basic level)

36) The participants can **describe** methods of extinguishing fire with reference to the fire triangle (Knowledge, basic level)

37) The participants can **describe** which extinguishing equipment found in the solar workplace environment can be used for various fire classes (Knowledge, basic level)

The instructor shall:

4.3.1 Present the fire classes and show examples of different types of fires according to the fire classes

4.3.2 Facilitate a learning activity, where the participants must share understandings about:

a. the fire classes

b. methods of extinguishing fire with reference to the fire triangle

c. which extinguishing equipment found in the solar industry workplace environment can be used for various fire classes

4.3.3 Give constructive feedback to the participants throughout the activity with an emphasis on ensuring that the participants have a correct understanding of the fire classes and the various fire extinguishers available for extinguishing various fire types

The participants shall:

4.3.4 Engage in the activity and share understandings about:

a. the fire classes

b. methods of extinguishing fire according to the fire classes

c. which extinguishing equipment found in the solar industry workplace environment can be used for various fire classes

	Fire Class by Global Region		
Fire Type	Europe	North America	Australia
Combustible Materials	A	A	A
Flammable Liquids	B	B	B
Flammable Gases	C	B	C
Flammable Metals	D	D	D
Electrical Fire	Not Classified	C	E

Cooking Oils and Fats	F	K	F

Table 4.3.1 – Fire classes by region

LESSON 5 - FIRE PREVENTION

20 min.

The aim of this lesson is to enable the participants to prevent fire in a solar industry workplace environment.

After successfully having completed this lesson, the participants can:

38) **Solve** the challenge of how to identify and mitigate fire hazards in a solar industry workplace environment (Ability, basic level)

39) **Show interest** in the importance of personal behaviour as a fire prevention measure and how to improve fire safety during daily work (Ability, basic level)

ELEMENT 5.1 - FIRE HAZARDS

Learning objectives:

40) The participants can **recognise** fire hazards in a solar industry workplace environment (Knowledge, basic level)

41) The participants can **solve** how to mitigate fire hazards in a solar industry workplace environment (Ability, basic level)

The instructor shall:

5.1.1 Present an example of a situation or scenario with fire hazards in a solar industry workplace environment (manned/unmanned)

5.1.2 Explain and demonstrate in how to identify and mitigate the fire hazards in the shown example(s) of situation(s) or scenario(s) from a solar industry workplace environment (manned/unmanned)

5.1.3 Ask the participants relevant questions about how to identify and mitigate the fire hazards in the example(s)

5.1.4 Provide additional examples of situations or scenarios from a solar industry workplace environment with fire hazards (manned/unmanned)

5.1.5 Facilitate guided practise for the participants in identifying the fire hazards and deciding how to mitigate these hazards in the additional examples

5.1.6 Give constructive feedback to the participants' practice in identifying the fire hazards and deciding how to mitigate these hazards in the additional examples

The participants shall:

5.1.7 Engage in answering the questions and share their understandings about how to identify and mitigate the fire hazards in the examples

5.1.8 Engage in the practice and describe the challenges in identifying and deciding how to mitigate these hazards in the additional examples

ELEMENT 5.2 - FIRE PREVENTION MEASURES

Learning objectives:

42) The participants can **describe** how to improve fire safety in daily work (Knowledge, basic level)

43) The participants can **recognise** fixed systems in the industry workplace (Knowledge, basic level)

44) The participants can **describe** practical fire prevention measures, risk assessments and personal actions in the context of an employer's SSOW (Safe System of Work) (Knowledge, basic level)

The instructor shall:

5.2.1 Lead discussion with the participants about how to improve fire safety in daily work

5.2.2 Present an example of fixed systems in the industry workplace

5.2.3 Present examples and explain different methods of fire prevention (fire watch, water trucks, etc) in the industry workplace.

5.2.4 Explain the principle of risk assessments and their relation to individual responsibilities

The participants shall:

5.2.5 Engage in the discussion and share understandings about how to improve fire safety in daily work

LESSON 6 - FIREFIGHTING EQUIPMENT IN THE SOLAR INDUSTRY WORKPLACE

20 min.

The aim of this lesson is to enable the participants to use firefighting equipment in the solar industry workplace environment efficiently without the risk of injuries.

After having successfully completed this lesson, the participants can:

45) **Solve** how to do a pre-use inspection of various firefighting equipment found in the workplace (Ability, basic level)

46) **Show interest** in distances and correct, efficient, and safe use of various firefighting equipment focusing on solar industry specific equipment (Ability, basic level)

47) **Show interest** in advantages and disadvantages of various firefighting equipment with a focus on equipment found in the workplace (Ability, basic level)

ELEMENT 6.1 - PRE-USE INSPECTION

Learning objectives:

48) The participants can **describe** the importance of pre-use inspection of firefighting equipment (Knowledge, basic level)

49) The participants can **repeat** pre-use inspections of firefighting equipment (Skills, basic level)

The instructor shall:

6.1.1 Lead a discussion or brainstorm with the participants about possible consequences of NOT doing pre-use inspection of firefighting equipment prior to use

6.1.2 Facilitate practical exercise that enable the participants to practise performing pre-use inspections of firefighting equipment

6.1.3 Give the participants constructive feedback throughout the activities

The participants shall:

6.1.4 Engage in the brainstorm and share experiences or understandings about the importance of pre-use inspection of firefighting equipment

6.1.5 Practise pre-use inspections of various firefighting equipment

ELEMENT 6.2 - CORRECT USE OF FIREFIGHTING EQUIPMENT

Learning objectives:

50) The participants can **describe** the advantages and disadvantages of various firefighting equipment in the workplace (Knowledge, basic level)

51) The participants can **describe** the safe distance and precautions for various firefighting equipment (Knowledge, basic level)

52) The participants can **describe** how to use various firefighting equipment correctly, efficiently and safely in the solar industry workplace environment (Knowledge, basic level)

The instructor shall:

6.2.1 Present the advantages and disadvantages of various firefighting equipment in the workplace

6.2.2 Demonstrate safe distance and precautions for various firefighting equipment

6.2.3 Demonstrate correct, efficient, and safe use of various firefighting equipment in the workplace

6.2.4 Ask the participants involving questions throughout about the:

a. advantages and disadvantages of various firefighting equipment in the workplace

b. safe distances and precautions for various firefighting equipment

c. correct, efficient and safe use of various firefighting equipment in the workplace

The participants shall:

6.2.5 Engage in answering the questions and share understandings about the:

a. advantages and disadvantages of various firefighting equipment in the workplace

b. safe distance and precautions for various firefighting equipment

c. correct, efficient and safe use of various firefighting equipment in the workplace

Note *As a minimum, the instructor shall demonstrate how to correctly use a handheld carbon dioxide (CO2) extinguisher, a water extinguisher, and a fire blanket. Dry chemical extinguishers shall be explained*

Where possible and in accordance with local legislation this demonstration should be conducted using live fire and active extinguishing agents

LESSON 7 - FIRE AWARENESS PRACTICE AND SCENARIO-BASED TRAINING

60 min.

The aim of this lesson is to enable the participants to assess a fire and if needed, effectively and safely extinguish a small fire

After successfully having completed this lesson, the participants can:

53) **Act independently** in assessing the fire and act in a correct manner upon discovering a fire in the solar industry workplace environment (Ability, intermediate level)

54) **Take responsibility** for the efficient and safe use of the firefighting equipment in the solar industry workplace environment (Ability, intermediate level)

ELEMENT 7.1 - PRACTICAL EXERCISES

Learning objectives:

55) The participants can **apply** CO2 extinguishers efficiently and safely (Skill, intermediate level)

56) The participants can **apply** fire blankets efficiently and safely (Skill, intermediate level)

The instructor shall:

7.1.1 Facilitate practical exercises that enable the participants to practise the efficient and safe use of:

a. CO2 extinguishers

b. fire blankets

7.1.2 Give constructive feedback throughout the participants' practise of the efficient and safe use of CO2 extinguishers and fire blankets

The participants shall:

7.1.3 Successfully complete the exercises and practise using CO2 extinguishers efficiently and safely

7.1.4 Successfully complete the exercises and practise using fire blankets efficiently and safely

LESSON 8 - INJURIES, SYMPTOMS AND ESSENTIAL MANUAL HANDLING

20 min.

After having successfully completed this lesson, the participants can:

57) **Solve** how to identify typical symptoms of musculoskeletal injuries (Ability, basic level)

58) **Show interest** in the manual handling principles and how these can be used to reduce the risk of injury in their work (Ability, basic level)

Note *Parts of the total learning outcome of Lesson 8 must be covered within the practical exercises in Lesson 10 in exercise introductions and feedback sessions*

ELEMENT 8.1 - HOW TO AVOID COMMON SOLAR INDUSTRY SPECIFIC MUSCULOSKELETAL INJURIES.

Learning objectives:

59) The participants can **describe** common musculoskeletal injuries related to manual handling at the solar industry workplace (Knowledge, basic level)

60) The participants can **describe** examples of risks and hazards of manual handling relevant to the job functions at the solar industry workplace (Knowledge, basic level)

The instructor shall:

8.1.1 Present examples of common muscular and skeletal injuries related to manual handling at the industry workplace including:

a. back injuries e.g. slipped disc

b. muscle strains

8.1.2 Lead a brainstorm or discussion with the participants about examples of risks and hazards of manual handling relevant to the job functions at the industry workplace and the principles of how to improve safety while executing such tasks, such as:

a. working over shoulder height

b. working while kneeling

c. lifting, push and pull

d. carrying

e. working with handheld tools

f. awkward positions

g. forceful exertions

h. repetitive motions

i. twisting

j. contact stress

k. exposure of local body parts and entire body to mechanical vibrations

l. duration of exposure

m. frequency of exposure

n. intensity of exposure

8.1.3 Lead discussions with the participants about:

a. the risks and hazards while executing manual handling related tasks

b. principles of how to improve safety while executing manual handling related tasks

The participants shall:

8.1.4 Engage in the brainstorms / discussions: share experiences and understandings about:

a. common muscular and skeletal injuries related to manual handling at the industry workplace

b. risks and hazards of manual handling relevant to the job functions at the industry workplace

c. how to avoid injuries, the risks and hazards and improve safety while executing manual handling related tasks

Note *Element 8.1 may be carried out during the practical training in Lesson 10 and in the training review in Lesson 14*

ELEMENT 8.2 - TYPICAL SYMPTOMS OF INJURIES

Learning objectives:

61) The participants can **recognise** typical early symptoms of musculoskeletal injuries (Knowledge, basic level)

62) The participants can **take responsibility** to react to early symptoms of musculoskeletal injuries and take initiative for corrective action and seeking medical advice (Ability, intermediate level)

63) The participants can **describe** potential long-term consequences of musculoskeletal injuries (Knowledge, basic level)

The instructor shall:

8.2.1 Facilitate participants' guided practice in identifying key examples of typical symptoms of musculoskeletal injuries

8.2.2 Lead participants in discussions about:

a. experiences with musculoskeletal injuries

b. what to do when typical symptoms of musculoskeletal injuries have been identified

c. the importance of early detection and treatment

8.2.3 Provide constructive feedback to the participants performance in the activities

The participants shall:

8.2.4 Practise how to identify key examples of typical symptoms of musculoskeletal injuries

8.2.5 Reflect on the received feedback, engage in the discussions, and share understandings and experiences about:

a. what to do when typical symptoms of musculoskeletal injuries have been identified

b. the importance of early detection and treatment

ELEMENT 8.3 - ESSENTIAL MANUAL HANDLING PRINCIPLES

Learning objectives:

64) The participants can **describe** essential manual handling principles (Knowledge, basic level)

65) The participants can **describe** the further control measures and how these can be used to reduce risk of injury in the participants' own work (Knowledge, basic level)

The instructor shall:

8.3.1 Explain and demonstrate how to use essential manual handling principles to safely perform frequent manual handling tasks in the industry workplace

8.3.2 Ask the participants involving questions during the practical exercises about how to use essential manual handling principles, for example:

a. how are the essential manual handling principles followed?

b. what are the differences and similarities between the principles?

c. how will the participants be able to follow the principles in their own work?

d. in what situations is the principle of 'good housekeeping' relevant for safe manual handling operations?

8.3.3 Present and lead a discussion about further control measures and how to use these to reduce risk of musculoskeletal injury and protect pre-existing injuries. The hierarchy of control measures are illustrated by figure 8.6.1 Hierarchy of controls. Also see Annex 3 for further information

8.3.4 Ask the participants involving questions about the further control measures and how these can be used to reduce risk of injury in the participants' own work

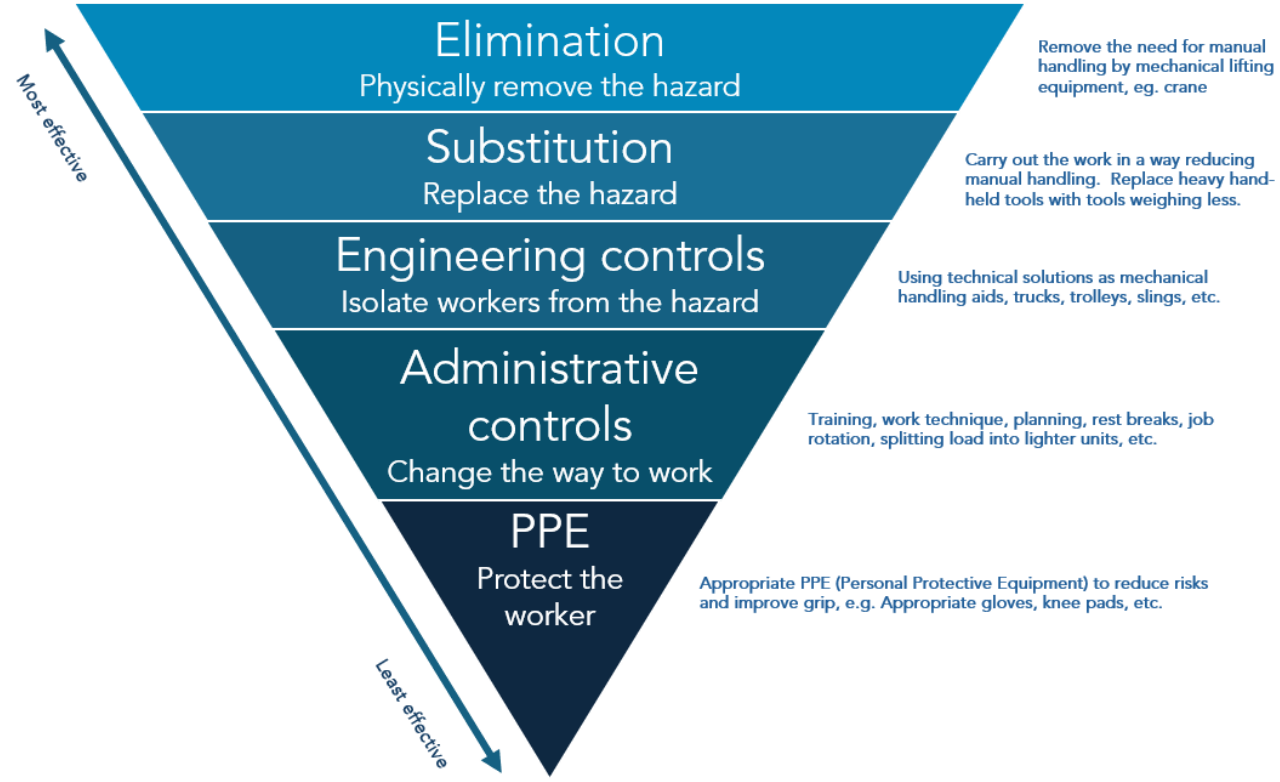


Figure 8.6.1 – Hierarchy of controls

The participants shall:

8.3.5 Engage in answering the questions and share understandings about:

a. the essential manual handling principles

b. the further control measures and how these can be used to reduce risk of musculoskeletal injury in the participants' own work

Note *Loads used for training should be of a realistic and safe weight and must be in line with the guidance in the 'lifting and lowering filter' presented in Annex 3. Also see figure 8.6.2 (below)*

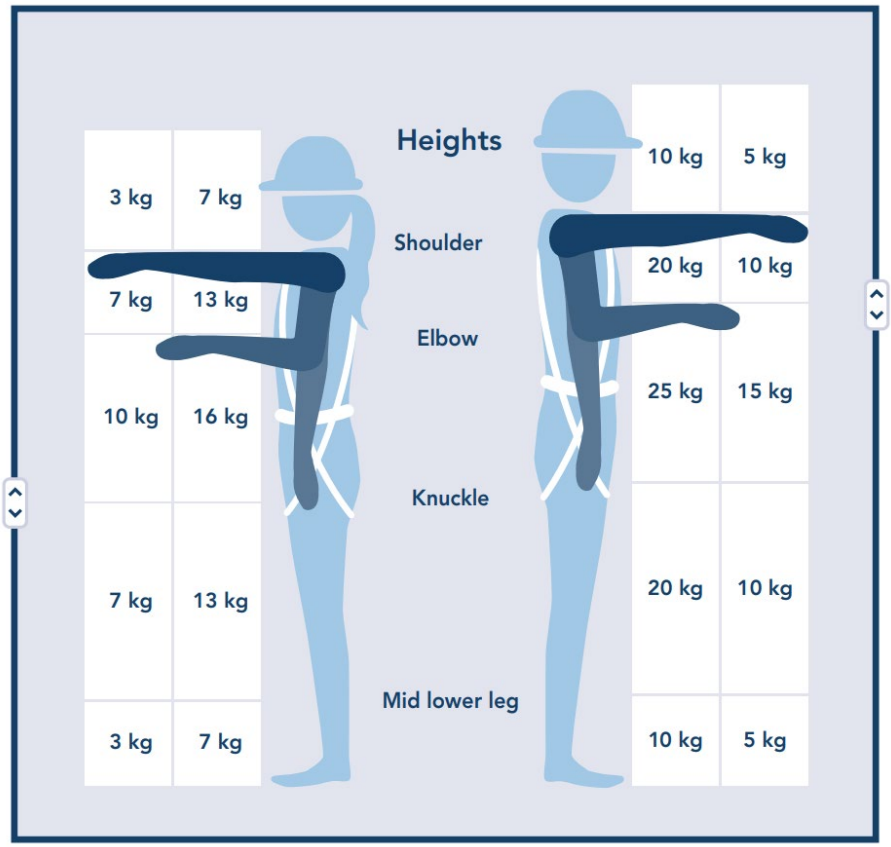


Figure 8.6.2 – Hierarchy of controls

Note *The use of mechanical and manual aids is recommended wherever possible to reduce risk of musculoskeletal injuries*

ELEMENT 8.4 - BASIC DYNAMIC RISK ASSESSMENT AND INTRODUCTION TO TILE PRINCIPLE

Note *See Annex 3 for TILE principle*

Learning objectives:

66) The participants can **describe** the TILE principle and how to apply them in manual handling situations (Knowledge, basic level)

The instructor shall:

8.4.1 Present the TILE principle and their use in relation to basic dynamic risk assessment when planning manual handling operations

8.4.2 Ask involving questions about TILE principle in relation to planning manual handling operations

The participants shall:

8.4.3 Engage in answering questions and share experiences about using TILE principle when planning manual handling operations

Note *TILE principle must be addressed at all times during the practical training in Lesson 4*

LESSON 9 - WARM UP ACTIVITIES

20 min.

Lesson 9 should be conducted in connection to the practical training in Lesson 10.

The aim of this lesson is to make participants aware the importance of warming up before manual handling operations to reduce the risk of musculoskeletal injury.

67) The participants can **recognise** the importance of warming up prior to daily physical work tasks to ensure safe working practices and reduce the risks of musculoskeletal injury (Knowledge, basic level)

68) The participants can **take initiative** to warm up prior to daily physical work tasks (Ability, intermediate level)

ELEMENT 9.1 - WARM UP ACTIVITIES

The instructor shall:

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

9.1.2 Prompt the participants to share experiences about warming up before manual handling operations

9.1.3 Lead a discussion on how to support a culture about warming up on work sites prior to physical work, including climbing

9.1.4 Lead a warm-up session of the major muscle groups of the body and the ankles, wrists and back, including:

a. mobility of joints

b. increase heart rate to oxygenate the muscles (warm-up)

c. stretching

The participants shall:

9.1.5 Share experiences on manual handling operations and related warm up activities

9.1.6 Discuss advantages and challenges to warming up prior to physical work activities

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

Note *Warm-up activities should be engaging and motivating for the participants, and they should be possible to perform as a daily routine on the work site. This way, transfer between the training and the work situation will be ensured. In Annex 2: Guideline for Warm-up Exercises to this ST Module, a guideline for a warm-up programme is presented*

LESSON 10 - MANUAL HANDLING PRINCIPLES

110 min.

The aim of this lesson is to enable the participants to use essential manual handling principles in a variety of relevant scenarios in the solar industry workplace environments.

Note *Guidelines on filters for lifting, carrying, and lowering loads, on how to identify low risk tasks, and on good handling techniques are presented in Annex 3*

After successfully having completed this lesson, the participants can:

69) **Act independently** in using essential manual handling principles to reduce the risk of musculoskeletal injury when working in the solar industry specific workplace (Ability, intermediate level)

70) **Take responsibility** for mitigating musculoskeletal injuries (when lifting; pushing and pulling loads; and when working in awkward postures) by using suitable manual handling principles and aids where possible (Ability, intermediate level)

Note *The scenario-based training exercises should reflect the environment and the work tasks that solar industry specific workforce members face on the job enabling the participants to practise how to mitigate the musculoskeletal injuries risks related to manual handling*

Note *Scenario-based exercises must follow the TILE principle and include loads of different shapes, sizes, and weights. The use of manual handling aids must be considered, when planning the manual handling operation and must be included where relevant*

Note *Scenario-based exercises may be conducted as a coherent exercise, where several elements are included*

ELEMENT 10.1 - WORKING OVER SHOULDER HEIGHT

Learning objectives:

71) The participants can **recognise** the risks from working over shoulder heights (Knowledge, basic level)

72) The participants can **take initiative** to mitigate the risk of musculoskeletal injuries by applying TILE principle, safe work procedures and using relevant aids when working over shoulder heights (Ability, intermediate level)

Note *Whenever possible, a work task should be planned to reduce activities above shoulder height*

The instructor shall:

10.1.1 Present and explain how to mitigate working over shoulder height and how to mitigate musculoskeletal injuries when working over shoulder height

10.1.2 Facilitate a scenario-based exercise covering working over shoulder height: e.g. placing parts and loads; bolt tensioning; reaching and ladder scenarios

10.1.3 Observe the participant's performance and give constructive feedback throughout on the participant's practice with a focus on:

a. the participants using safe techniques and appropriate planning

b. reducing manual handling using suitable handling aids, where possible

c. the use of the manual handling principles

The participants shall:

10.1.4 Successfully complete exercises covering working over shoulder height and ask questions when unsure of safe manual handling techniques and principles

10.1.5 Apply TILE principle when planning the manual handling operation

10.1.6 Reflect on the received feedback in order to perform manual handling the best possible way

ELEMENT 10.2 - WORKING WHILE KNEELING

Learning objectives:

73) The participants can **recognise** the risks of musculoskeletal injuries from working while kneeling (Knowledge, basic level)

74) The participants can **take initiative** to mitigate the risk of musculoskeletal injuries by applying TILE principle, safe work procedures and aids when working while kneeling (Ability, intermediate level)

The instructor shall:

10.2.1 Explain and present how to mitigate musculoskeletal injuries from working while kneeling. For example: alternating between sitting and standing, organising work task between colleagues and how to mitigate musculoskeletal injuries when working while kneeling (e.g. by using knee pads and mats)

10.2.2 Facilitate a scenario-based exercise covering working while kneeling (e.g. cleaning, preparing panel frames and tightening bolts)

10.2.3 Observe the participant's performance and give constructive feedback throughout the participant's practice with a focus on:

a. the participants using safe techniques and appropriate planning

b. reducing working whilst kneeling by using suitable handling aids where possible

c. the use of the manual handling principles

d. using e.g. knee pads and mats to mitigate musculoskeletal injuries

The participants shall:

10.2.4 Successfully complete exercises covering working while kneeling and ask questions when unsure of safe manual handling techniques and principles

10.2.5 Apply TILE principle when planning the manual handling operation

10.2.6 Reflect on the received feedback in order to perform manual handling in the best possible way

ELEMENT 10.3 - PUSH AND PULL

Learning objectives:

75) The participants can **recognise** the risks from pushing and pulling loads (Knowledge, basic level)

76) The participants can **take initiative** to mitigate the risk of musculoskeletal injuries by applying TILE principle, safe work procedures and aids when pushing and pulling loads (Ability, intermediate level)

The instructor shall:

10.3.1 Explain and present how to mitigate musculoskeletal injuries from pushing and pulling loads manually

10.3.2 Facilitate a scenario-based exercise covering moving loads, e.g. when receiving goods, mounting panels, etc.

10.3.3 Observe the participant's performance and give constructive feedback throughout the exercise with a focus on:

a. the participants using safe techniques and appropriate planning

b. reducing manual handling using suitable handling aids where possible

c. the use of manual handling principles

The participants shall:

10.3.4 Successfully complete exercises covering pushing and pulling loads and ask questions when unsure of safe manual handling techniques and principles

10.3.5 Apply TILE principle when planning the manual handling operation

10.3.6 Reflect on the received feedback concerning pushing and pulling loads in the best possible way in relation to avoid musculoskeletal injuries

ELEMENT 10.4 - CARRYING

Learning objectives:

77) The participants can **recognise** the risks from carrying loads (Knowledge, basic level)

78) The participants can **take initiative** to mitigate the risk of musculoskeletal injuries by applying TILE principle, safe work procedures and aids when carrying loads (Ability, intermediate level)

The instructor shall:

10.4.1 Explain and present how to mitigate musculoskeletal injuries from carrying loads by following the TILE principle

10.4.2 Facilitate a scenario-based exercise covering different loads, e.g. shapes, size, weights, in different route scenarios, such as: uneven surfaces, trenches, thresholds and ramps

10.4.3 Observe the participant's performance and give constructive feedback throughout the participant's practice with a focus on:

a. the participants using safe techniques and appropriate planning

b. reducing manual handling using suitable handling aids where possible

c. the use of manual handling principles

The participants shall:

10.4.4 Successfully complete lifting loads exercises and ask questions when unsure of safe manual handling techniques and principles

10.4.5 Apply TILE principle when planning the manual handling operation

10.4.6 Reflect on the received feedback to perform manual handling in the best possible way

Note *Use relevant lifting equipment when possible and avoid carrying loads on stairs*

ELEMENT 10.5 - LIFTING

Learning objectives:

79) The participants can **recognise** the risks from lifting loads (Knowledge, basic level)

80) The participants can **take initiative** to mitigate the risk of musculoskeletal injuries by applying TILE principle, safe work procedures and aids when lifting loads (Ability, intermediate level)

The instructor shall:

10.5.1 Present and explain risks from lifting loads and how to mitigate musculoskeletal injuries from lifting, e.g. weight, grip, posture, and position of the load relative to the body

10.5.2 Facilitate a scenario-based exercise covering lifting different kinds of loads, e.g. panels, torque tubes, shapes, and unbalanced loads. The exercise must include considerations covering the task, individual capabilities, the load, and the work environment (TILE)

10.5.3 Observe the participants' performance and give constructive feedback throughout the participants practice with a focus on:

a. the participants using safe techniques and appropriate planning

b. reducing manual handling using suitable handling aids where possible

c. the use of manual handling principles

The participants shall:

10.5.4 Successfully complete lifting loads exercises and ask questions when unsure of safe manual handling techniques and principles. The participants must practise in teams of two or more persons (or otherwise according to local policy) to perform a safe lift of a load that weighs no more than 30kg and is unwieldy; difficult to grasp; difficult to grip; with contents likely to move or shift (e.g. a rescue dummy)

10.5.5 Apply TILE principle when planning the manual handling operation

10.5.6 Reflect on the received feedback to perform manual handling the best possible way

ELEMENT 10.6 - WORK WITH HANDHELD TOOLS

Learning objectives:

81) The participants can **recognise** the risks from repetitive work and from working with handheld tools (Knowledge, basic level)

82) The participants can **take initiative** to mitigate the risk of musculoskeletal injuries by applying TILE principle, safe work procedures and aids when working with handheld tools (Ability, intermediate level)

The instructor shall:

10.6.1 Present and explain risks by working with handheld tools; e.g. repetitive work and heavy tools

10.6.2 Facilitate a scenario-based exercise and a discussion covering how to mitigate musculoskeletal injuries from repetitive work and working with handheld tools

10.6.3 Observe the participant's performance and give constructive feedback throughout the participant's practice with a focus on:

a. the participants using safe techniques and appropriate planning

b. reducing musculoskeletal injuries from repetitive work and work with handheld tools

c. the use of manual handling principles

The participants shall:

10.6.4 Successfully complete exercises focusing on how to mitigate injuries from working with handheld tools; ask questions when unsure of safe manual handling techniques and principles and engage in discussions

10.6.5 Apply TILE principle when planning the manual handling operation

10.6.6 Reflect on the received feedback to perform manual handling the best possible way

ELEMENT 10.7 - AWKWARD POSTURES

Learning objectives:

83) The participants can **recognise** the risks from working in awkward postures (Knowledge, basic level)

84) The participants can **take initiative** to mitigate the risk of musculoskeletal injuries by applying TILE principle, safe work procedures and aids when working in awkward postures (Ability, intermediate level)

The instructor shall:

10.7.1 Present and explain risks from working in awkward postures (such as: when the torso is twisted or bent; in combination with loads and distance away from the body) and how to mitigate musculoskeletal injuries from working in awkward postures

10.7.2 Facilitate an exercise covering working in awkward postures and how to mitigate musculoskeletal injuries, e.g. when working in restricted spaces, working from a ladder and during rescue scenarios

10.7.3 Observe the participant's performance and give constructive feedback throughout the participant's practice with a focus on:

a. using safe techniques and appropriate planning

b. reducing manual handling by using suitable handling aids and work positions where possible

c. the use of manual handling principles:

The participants shall:

10.7.4 Take active part in exercises focusing on how to mitigate musculoskeletal injuries from working in awkward postures and ask questions when in doubt of safe manual handling techniques and principles

10.7.5 Apply TILE principle when planning the manual handling operation

10.7.6 Reflect on the received feedback from performing manual handling when working in awkward postures in the best possible way

LESSON 11 - WORK AT HEIGHT SAFETY

45 min.

The aim of this lesson is to enable the participants to recognise work at height in their workplace, and to be prepared to assess the risks to themselves and others, and to take initiative to implement safety measures to mitigate those risks.

After successfully having completed this lesson, the participants can:

85) **Take Responsibility** to identify work at height in their working environment and implement control measures to avoid working at height whenever possible, or otherwise control the risks to themselves or others from work at height (Ability, intermediate level)

ELEMENT 11.1 - RECOGNISING WORK AT HEIGHT HAZARDS

Learning objectives:

86) The participants can **recognise** the risks and safety precautions associated with work at height, including ladders, scaffolding, MEWPs, and fragile surfaces (Knowledge, basic level)

87) The participants can **recognise** common causes of falls from a height, such as failure to provide a safe place of work or inadequate risk assessments (Knowledge, basic level)

The instructor shall:

11.1.1 Present typical solar workplace scenarios to participants that involve varied types of work at height, quizzing them on what is or is not work at height

11.1.2 Facilitate a discussion with participants on common causes of falls from height, using scenarios or case studies to highlight the impact of inadequate safety measures

11.1.3 Illustrate and explain the risks and control measures associated with different work at height scenarios using images, videos, and examples from the solar work environment, including

a. ladders

b. scaffolding

c. MEWPs

d. fragile surfaces

The participants shall:

11.1.4 Engage in discussion about the scenarios, identifying risks and necessary safety precautions.

ELEMENT 11.2 - NATIONAL LEGISLATION AND LOCAL GUIDELINES

Learning objectives:

88) The participants can **show interest** in complying with legislation relevant to work at heights (Ability, basic level)

89) The participants can **recognise** legislation and guidelines relevant to work at heights (Knowledge, basic level)

The instructor shall:

11.2.1 Present examples of applicable legislation relevant to work at height

11.2.2 Ask the participants open-ended questions about the legislation and the possible impact of legal responsibilities to their way of working

The participants shall:

11.2.3 Engage in answering the questions and share understandings about applicable legislation and legal responsibilities and how these may impact their work practices

ELEMENT 11.3 - HIERARCHY OF CONTROL AND RISK ASSESSMENT

Learning objectives:

90) The participants can **explain** the hierarchy of controls for work at heights (Knowledge, intermediate level)

91) The participants can **apply** the work at height hierarchy of control to eliminate or control work at height risks in the workplace (Skill, intermediate level)

92) The participants can **apply** the correct fall protection measures by identifying appropriate safety controls for different work at height scenarios (Skill, intermediate level)

The instructor shall:

11.3.1 Explain the Hierarchy of Controls for work at height, and illustrate how it applies to a range of common work tasks in a solar working environment:

a. avoid working at height

b. prevent a fall from occurring

c. mitigate consequences of a fall

11.3.2 Facilitate a group discussion about their application in relation to work at height hazards for solar work environments

11.3.3 Use real-life examples or workplace incidents to demonstrate application of higher-level controls such as avoiding work at height, over lower-level measures like PPE

11.3.4 Explain the importance of planning and organising work at height activities considering the following factors

a. weather

b. location

c. fragile surfaces

d. falling objects

11.3.5 Demonstrate that a place should be considered "at height" if a person can be injured falling from it, even if it is at or below ground level

The participants shall:

11.3.6 Engage in discussion about the five levels of controls and reflect on their possible implications for their safe work environment and in relation to work at height hazards

11.3.7 Engage in a discussion of risks associated with work at height activities for different activities

a. identify places that should be considered 'at height' in example scenarios

LESSON 12 - EQUIPMENT USED FOR WORK AT HEIGHT

60 min.

The aim of this lesson is to familiarise participants with a range of equipment used for work at height in solar PV work environment and be equipped to apply appropriate safety measures for use of portable ladders, mobile elevated work platforms (MEWPs) and small mobile scaffolds towers.

In addition, this lesson provides an opportunity for participants to correctly inspect, fit and adjust a typical harness used for work at height.

After having successfully completed this lesson, the participants can:

93) **Take responsibility** for the correct inspection and use of a harness (Ability, intermediate level)

ELEMENT 12.1 - PORTABLE LADDERS

Learning objectives:

94) The participants can **recognise** typical ladder types used in solar PV work environments (Knowledge, basic level)

95) The participants can **recognise** ladder classification, load capacities, and the importance of using the correct ladder based on the type of work (knowledge, basic level)

96) The participants can **perform** the correct inspection of portable ladders, and correctly position and stabilise a portable ladder ready for use (Skills, intermediate level)

The instructor shall:

12.1.1 Illustrate different portable ladder types used in solar PV work environments including

a. their characteristics

b. ladder classification

c. load capacities

d. selection criteria based on typical tasks

12.1.2 Demonstrate correct pre-use inspection of portable ladders, identifying potential defects related to:

a. side rails

b. rungs or steps

c. bolts and rivets

d. joints between the side rails and the individual rungs or steps

e. safety features such as safety bar or podium steps

12.1.3 Demonstrate proper positioning and stabilisation techniques, including the 4:1 rule and securing methods.

12.1.4 Demonstrate best practice for safe ladder use such as maintaining three points of contact and avoiding overreaching.

12.1.5 Provide hands-on practice opportunities for participants to inspect, position, and stabilise a portable ladder safely.

12.1.6 Observe participants as they perform ladder inspections and setups, providing corrective feedback when necessary.

The participants shall:

12.1.7 Perform a pre-use inspection of a mobile ladder.

12.1.8 Demonstrate the correct positioning and stabilisation of a mobile ladder on various surfaces.

12.1.9 Answer questions on safe techniques such as maintaining three points of contact and avoiding overreaching.

12.1.10 Engage in a group discussion, sharing experiences or insights on ladder use, safety, ladder classification and load capacity

ELEMENT 12.2 - MEWP´s AND SCAFFOLDS

Learning objectives:

97) The participants can **recognise** the basic types of MEWPs and mobile scaffold towers, their primary uses, and key safety considerations, including common hazards. (knowledge, basic level)

The instructor shall:

12.2.1 Present an overview of MEWPs and mobile scaffold towers, explaining their types, uses, and safety considerations.

12.2.2 Explain common hazards associated with MEWPs and scaffolding, including falls and equipment failure.

The participants shall:

12.2.3 Name and describe different types of MEWPs and mobile scaffold towers.

12.2.4 Identify and recognise primary uses and key hazards associated with MEWPs and scaffolding.

ELEMENT 12.3 - USING A HARNESS FOR WORK AT HEIGHT

Learning objectives:

98) The participants can **perform** a pre-use inspection of a full body harness (Skills, intermediate level)

99) The participants can **perform** the correct fit and adjustment of a random full body harness (Skills, intermediate level)

100) The participants can **perform** a pre-use inspection of a fall arrest and travel restraint lanyard (Skills, intermediate level)

101) The participants can **perform** the attachments of fall arrest and travel restraint lanyards correctly to the harness (front and/or dorsal attachment points, and/or side D-rings) (Skills, intermediate level)

102) The participants can **apply** the correct use fall arrest and travel restraint lanyards with focus on their own personal safety (Skills, intermediate level)

The instructor shall:

12.3.1 Briefly introduce the generic approach to safety equipment as described in the Annex 1

12.3.2 Explain the principles and importance of self-inspection of a full body harness for defects and significant wear, including:

a. observe proper size

b. markings and labels

c. operating weight and temperature range

d. equipment is within period of formal inspections

e. fall indicator

f. dorsal attachment point is seated centrally between shoulders

g. stitching

h. metal parts

i. straps

j. back protection

k. attachment points and D-Rings

l. soiling of harness (e.g. oil spills)

m. locks

n. observe manufacturer's user manual for specific or additional requirements

12.3.3 Demonstrate how to perform a pre-use inspection of a full body harness

12.3.4 Stress the generic approach to pre-use inspections of a full body harness focusing on similarities and differences in design, functionality, and operation between different products

12.3.5 Highlight the potential task placed upon the participants (in their own organisation at course completion) requiring them to familiarise themselves with other safety equipment products

12.3.6 Provide constructive feedback on the participants' performance during the practice

12.3.7 Explain the importance of correctly adjusting a full body harness

12.3.8 Demonstrate how to correctly fit and adjust a full body harness ensuring a snug fit and the following specifics:

a. shoulder straps shall be loosened

b. leg straps sit well

c. abdominal strap shall sit well

d. chest strap (strapped slightly above or on the chest)

e. pivot link shall be at the hip and shall be flexible. It must not sit so high that it may damage ribs and internal organs during a fall

12.3.9 Demonstrate how to perform pre-use inspection of a fall arrest and travel restraint lanyard covering:

a. markings and labels

b. operating weight and temperature range

c. equipment is within period of formal inspections

d. integrity, damage, corrosion, saltwater exposure and significant wear of: lanyard rope, webbing, plastic, metal and heat-shrinkable tubing

e. all moving parts work correctly, with no excessive play

f. connectors (carabiners) operate, and lock as intended and cannot disconnect completely

g. length adjustment function (if fitted) operates, and locks as intended

h. observe manufacturer's user manual for specific or additional requirements

12.3.10 Stress the generic approach to pre-use inspection of a fall arrest and travel restraint lanyard focusing on similarities and differences in design, functionality, and operation between different products

12.3.11 Explain the potential task placed upon the participants in their own organisation on course completion, requiring them to familiarise themselves with other safety equipment products

12.3.12 Demonstrate how to correctly attach fall arrest and travel restraint lanyards to the harness (front or dorsal attachment point) according to manufacturer's user manual and relevant country-specific requirements/restrictions

12.3.13 Provide constructive feedback on the participants' performance during the practice

12.3.14 Demonstrate how to correctly attach fall arrest and travel restraint lanyard to certified and structural anchor points

12.3.15 Facilitate a practical exercise at ground level for the participants to correctly attach fall arrest and travel restraint lanyard to certified and structural anchor points

12.3.16 Provide constructive feedback on the participants' performance during the practice

The participants shall:

12.3.17 Practise the ability to perform a pre-use inspection of any full body harness (demonstrated during this module)

12.3.18 Practise how to correctly identify the standard markings and inspection dates on a full body harness

12.3.19 Practice how to correctly fit and adjust a harness

12.3.20 Practise how to perform a pre-use inspection of fall arrest and travel restraint lanyards covering the points demonstrated in this element

12.3.21 Practise how to attach fall arrest and travel restraint lanyards correctly to the harness

12.3.22 Identify and select certified and structural anchor points for the attachment of fall arrest and travel restraint lanyards

12.3.23 Practise the ability to correctly attach fall arrest and travel restraint lanyards during practical exercises, covering the scenarios presented in this element (only at ground level)

LESSON 13 - HOUSEKEEPING AND HAND TOOLS

10 min.

The aim of this lesson is to support a culture of safe work by always keeping the workplace clean and tidy, and applying correct tools for a given task.

ELEMENT 13.1 - HOUSEKEEPING AND HAND TOOLS

Learning objectives:

103) The participants can **describe** the importance of good housekeeping and the consequences of poor housekeeping when working in a solar industry workplace (Knowledge, basic level)

104) The participants can **take responsibility** of proper housekeeping within the working environment (Ability, intermediate)

The instructor shall:

13.1.1 Facilitate discussions with the participants about:

a. the principles of proper housekeeping, based on national legal requirements and guidelines, as well as recognised workplace housekeeping principles

b. creating and applying standard operational procedures for systematically keeping the workplace tidy such as

b.i organising your work area and connected tools, equipment, accessories, minor components, items, parts and chemical products

b.ii storing items securely when not in use and not leaving items unsecured where there is a risk of dropped items (becoming pre-existing drop hazards from previous tasks)

c. the importance of having everything clean and tidy (e.g. monitor and remove dust accumulations from mechanical brake systems prior to and during work) and its impact on safety and quality, e.g. preventing accidents, allowing you to vary your ergonomical work positions in a good manner

d. knowing what specific PPE to wear, habits like using rags vs. rubbing your hands in your clothes, knowing where the spill kit is and how to use it, and what your emergency plan dictates on spills

e. the consequences of poor housekeeping

f. the importance of personal commitment to good housekeeping

g. the principles of segregation of hazardous waste and requirements according to company specific procedures

13.1.2 Ensure that the participants practice lesson elements concerned with housekeeping throughout all practical exercises and activities of this module and subsequent technical modules. The instructor shall inform the participants that they will be observed and assessed on this, and based on this provide immediate constructive feedback to the participants focusing on the following areas:

a. Organizing your work area and connected tools, equipment, accessories, minor components, items, parts and chemical products

b. Storing items securely when not in use and not leaving items unsecured where there is a risk of dropped items (becoming pre-existing drop hazards from previous tasks)

c. Knowing what specific PPE to wear, habits like using rags vs. rubbing your hands in your clothes, knowing where the spill kit is and how to use it, and what your emergency plan dictates on spills

d. The principles of segregation of hazardous waste and requirements according to company and location specific procedures

13.1.3 During practical training, pose questions about the participants' knowledge and awareness of housekeeping and hazardous waste and especially in regard to oil spills and segregation of hazardous waste

The participants shall:

13.1.4 Share knowledge and experiences of dropped object incidents because of incorrect selection of transport methods and storage of tools, equipment, accessories, minor components, items, and parts at point of use.

13.1.5 Discuss best practice for correct transport, storage and placement of tools, equipment, accessories, minor components, items, and parts.

13.1.6 Discuss examples in company specific procedures of how to safely store and transport tools and components to ensure prevention of dropped objects.

13.1.7 Throughout practical training scenarios and activities, apply principles of proper housekeeping including segregate hazardous waste according to location specific procedures

LESSON 14 - TRAINING REVIEW

15 min.

The aim of this lesson is to enable the participants to reflect on and process their learning outcome and key takeaways from the module, aiming to achieve a high learning transfer from the module to their way of working.

ELEMENT 14.1 - TRAINING REVIEW

The instructor shall:

14.1.1 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:

14.1.2 Reflect on their learning outcome and key takeaways from ST Safe Solar Work Module, 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

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

ELEMENT 14.2 - FEEDBACK SESSION

The instructor shall:

14.2.1 Give overall feedback and feed forward on the participants' learning outcomes inspired by the training as well as from the training review

14.2.2 Encourage the participants to examine and grow awareness of which specific elements in their own industry workplace/ work environment differ from the training scenario environment (to visualise and enhance learning transfer). In addition, and after the module completion, to discuss with colleagues about how the ST Safe Solar Work content, methods and techniques are similar or different to specific, local condition.

GLOBAL WIND ORGANISATION

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.

1. Solar Safety Training First Aid

The following equipment is required during the entire duration of the Safety Training First Aid Module training

1. Anatomical torso or graphical representation or illustration of human anatomy
2. Airway model or graphical representation or illustration of an airway model
3. A minimum of one resuscitation dummies (adult) per four participants
4. First aid equipment which as a minimum must include:
    a. AED
    b. tourniquet
    c. bandages – pressure dressings
    d. eye flush
    e. pocket mask for CPR
    f. appropriate PPE (e.g., protection gloves, eye protection)
5. Make-up kit for first aid scenarios
6. AED training unit and as minimum one AED training unit per resuscitation dummy
7. Blankets / thermal protective aid (TPA)

Any equipment used during this GWO training module shall meet or exceed the minimum requirements of the national standards in the country where the training is taking place. 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

2. Solar Safety Training First Aid Awareness

The following equipment is required during the entire duration of the Safety Training First Aid Module training

1. Anatomical torso or graphical representation or illustration of human anatomy

2. Airway model or graphical representation or illustration of an airway model
3. A minimum of one resuscitation dummies (adult) per four participants
4. First aid equipment which as a minimum must include:
    a. AED
    b. tourniquet
    c. bandages – pressure dressings
    d. eye flush
    e. pocket mask for CPR
    f. appropriate PPE (e.g., protection gloves, eye protection)
5. Make-up kit for first aid scenarios
6. AED training unit and as minimum one AED training unit per resuscitation dummy
7. Blankets / thermal protective aid (TPA)

Any equipment used during this GWO training module shall meet or exceed the minimum requirements of the national standards in the country where the training is taking place. 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

3. Solar Safety Training Safe Solar Work

Manual Handling (Lesson 8-10)

The following equipment is required during the entire duration of the Manual Handling lessons training to meet the needs of the Safe Solar Work Module

1. A lumbar vertebrae model for educational purposes
2. A model of a shoulder for educational purpose
3. A load that weighs no more than 30kg and is unwieldy e.g. difficult to grasp, difficult to grip, with contents likely to move or shift (e.g. a rescue dummy)
4. Personal protective equipment
5. Other lifting props for manual handling - weighing a maximum 15kg

Any equipment used during this GWO training module shall meet or exceed the minimum requirements of the national standards in the country where the training is taking place

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

Fire Awareness (Lesson 2-7)

The following equipment is required to meet needs for the Fire Awareness Lessons

1. Handheld CO2 and water extinguishers
2. Fire blankets (fire beaters can used as supplement)
3. Dummies
4. Personal protective equipment (PPE)
5. Personal escape mask (optional)

Any equipment used during this GWO training module shall meet or exceed the minimum requirements of the national standards in the country where the training is taking place

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

Work At Height (Lesson 11-12)

The following equipment is required to instruct the work at height lessons.

Within each equipment category one product or more must be operative for practical training. Required additional different products are accepted in a limited quantity as products for hands on demonstration.

The instructor must select the most relevant products according to their geographic location and target audience

1. Full body harness:
    a. at least two different products
2. Fall restraint lanyards:
    a. at least two different adjustable products
3. Fixed length fall arrest lanyards with an energy absorber:
    a. one flexible Y-type
    b. one fixed adjustable Y – or I-type
    c. recommended but not required: one fixed or flexible V-type
4. Helmets

5. Connectors (carabiners) with mandatory automatic closing and locking system

6. Anchor points

7. Portable Ladder

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 shock absorber in a fixed length fall arrest lanyard to fully deploy while preventing the person who is falling from coming into contact with the ground or structure below the anchor point*

	Country Specific Equipment Standards			
Equipment	Europe	North America	China	United Kingdom
Portable Ladder	EN131	ANSI ASC A14. 1&5-2017	GB 12142-2007 / GB/T 27685-2011	BSEN131
Full Body Harness	EN 361	ANSI/ASSP Z359.11	GB 6095 +GB 6095 W/GB 6095 Q	BS EN 361
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
Anchor Points	EN795	ANSI/ASSP Z359.18	GB 30862	BS EN795
Connectors (Carabiners)	EN 362	ANSI/ASSP Z359.12	GB/T 23469	BS EN 362

Table A1: National compliance requirements for equipment

ANNEX 2 - GUIDLINE FOR WARM-UP EXERCISES

Monday: Warm-up routine for solar 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

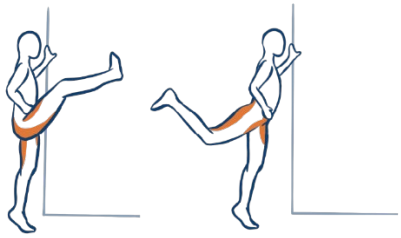
Stand with your feet together. Raise your arms forwards and upwards to approximately chest height. Breathe out and lift one arm towards the ceiling while lowering the other arm towards the floor with both palms facing forward. Continue moving both arms backwards until you feel a stretch in your pectoral 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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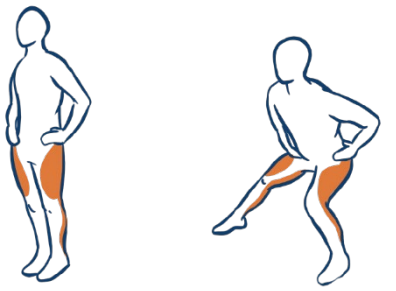
Tuesday: Warm-up routine for solar technicians

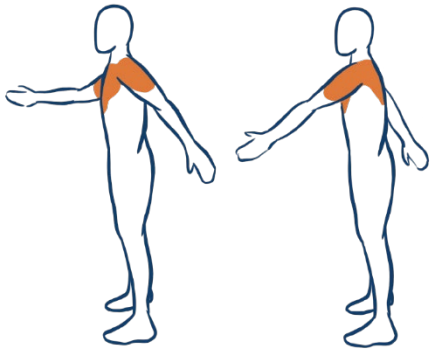
Seven programmes, each with four exercises to be repeated twice; total duration approx. 10 minutes. The exercises are put together to achieve full-body warm-up and stretching.



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.

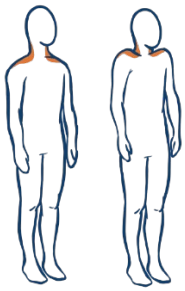
Sets: 2, Reps: 10



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

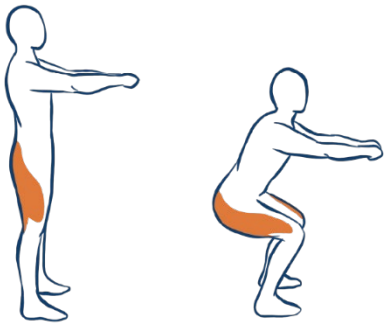
Stand up straight. Grab one ankle and pull your heel towards your buttocks. Push your hips forwards until you feel the stretch on the front of your thigh. Keep your knees together. Hold for 30 seconds and switch legs.

Duration: 30 sec, Sets: 2

Warm-up program and illustrations developed and provided by

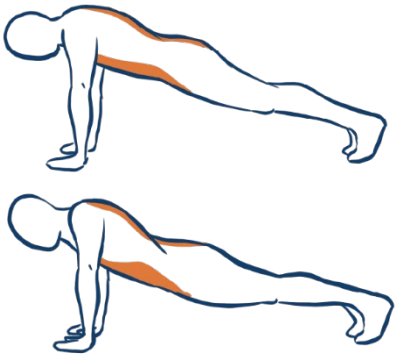
Wednesday: Warm-up routine for solar technicians

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.



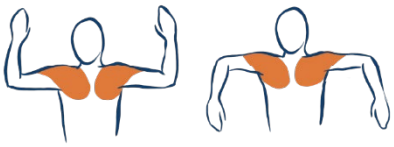
9. Static squat hold

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



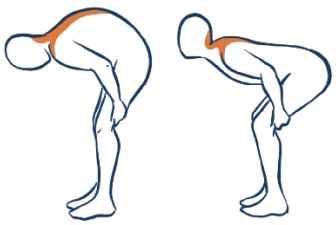
10. Scapular Push-ups

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

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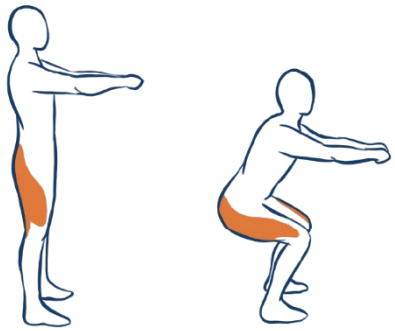
Thursday: Warm-up routine for solar technicians

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.

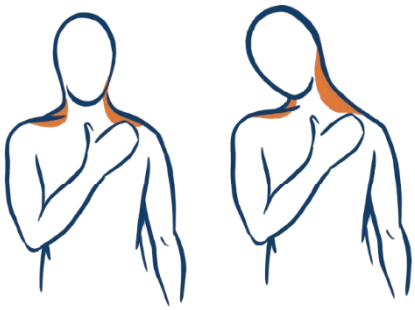
Sets: 2, Reps: 10



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

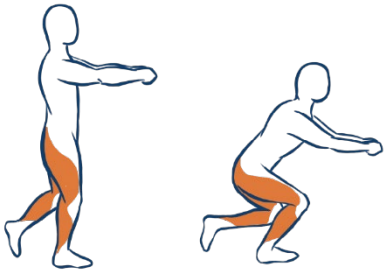
Lift one arm above your head and slowly bend your upper body to the opposite side. Feel the stretch on the side of your body. Hold the position for 30 seconds. Change sides and repeat the exercise.

Duration: 30 sec, Sets: 2

Warm-up program and illustrations developed and provided by

Friday: Warm-up routine for solar 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

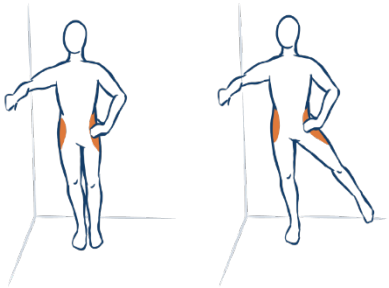
Stand on one leg with your arms straight, in front of you. Your passive leg may be put behind your active leg for support only. Bend your knee 90 degrees and push back up. Keep your back straight and look ahead throughout the movement. Repeat with opposite leg.

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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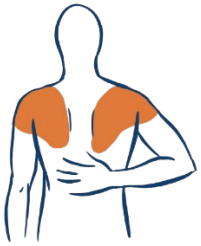
Saturday: Warm-up routine for solar technicians

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.

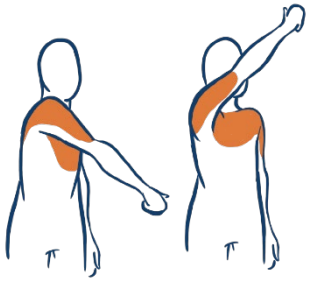
21. Backwards leg lift

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



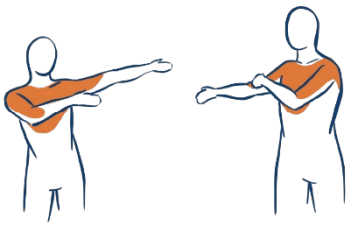
22. Hand on the back

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

Sunday: Warm-up routine for solar 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 fingertips 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

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, 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 instructors 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 (shown in Figure 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.

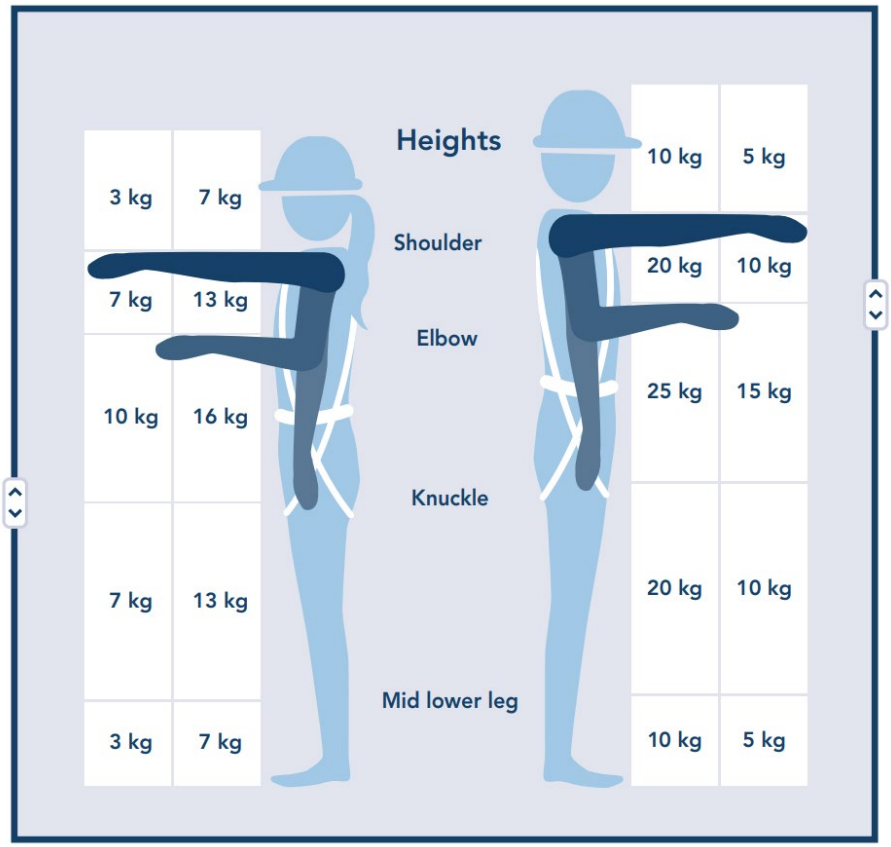


Figure 1-Lifting and lowering filters

Note *Figure 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 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 1. 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, e.g. full risk assessment checklists (or equivalent) if:

    a. the handling operation must take place with the hands outside the zones in Figure 1

    b. the weight exceeds those in Figure 1

    c. the handling involves torso twisting

    d. the handling is more frequent than one lifts every two minutes

    e. the handling is done by a team

    f. the handling operations are complex, for example, the weights vary significantly or there are several start and finish locations

    g. the lift does not meet the conditions given for using the guidelines, for example, if the load is difficult to grasp or handle

    h. 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 10m 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

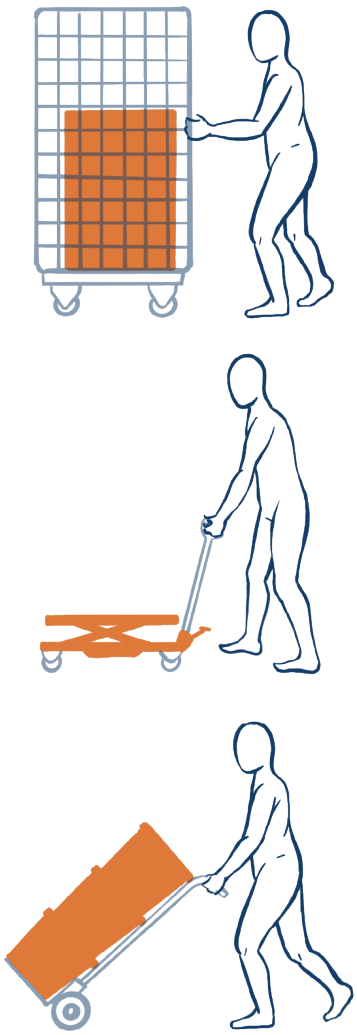


Figure 2 Acceptable push/pull postures

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 2 shows some acceptable push/pull postures. The task is likely to be low risk if:

- the force is applied with the hands
- the torso is largely upright and not twisted
- the hands are between hip and shoulder height
- 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:

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

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 musculoskeletal system posing a risk of injury and manual handling harmful to health.

Examples of aggravating factors; categorised by the four elements of the TILE principle:

Basic dynamic risk assessment – TILE 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 approach.

T-Task	I-Individual(s)	L-Load	E-Environment

For 'Task' considerations should include:

g. no suitable handling aid is 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 reaching upwards

k. twisting or stooping

l. large vertical movement

m. long carrying distances

n. strenuous pushing or pulling

o. unpredictable movement of loads

p. frequent or prolonged physical effort

q. lifting for a longer period of time

r. insufficient rest or recovery

s. team effort

t. a work rate imposed by a process

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

a. pose a risk to those with a health problem or a physical or learning difficulty

b. no warm-up

c. require unusual capability previous and pre-existing injuries

d. pose a risk to those who are pregnant

e. pose a risk to new workers/young people

f. require special information/training

g. unusual strength or height required for the activity

h. 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 (psychosocial) factors such as training, sudden changes in workload, communication, consultation, etc.

3. 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:

i. 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

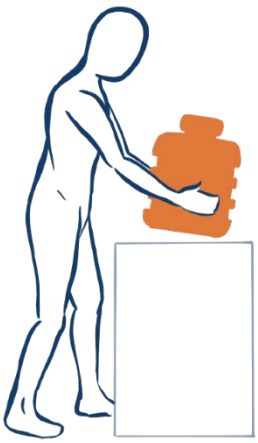
j. where the size of the item is less important than how full it is, e.g. in the case of a dustbin containing refuse, they should assess the load by looking inside it or use techniques such as rocking the load from side to side before attempting to lift it

k. 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

l. 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

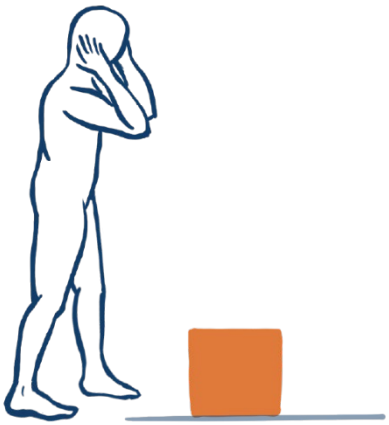
The following list illustrates some important points which are relevant to a basic two-handed symmetrical lift – a lift using both hands that takes place in front of and close to the body, without any twisting.

Basic lifting operations



Rocking a load to assess its ease of handling.

Figure 3 Basic lifting operations



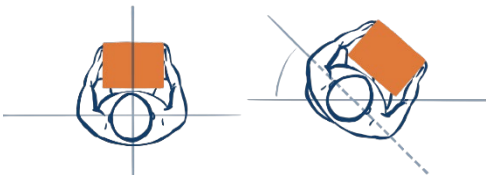
Think before handling/lifting. Plan the lift/ handling activity. Where is the load going to be placed? Use appropriate handling aids where possible. Will help be needed with the load? Remove obstructions, such as discarded wrapping materials. For long lifts, such as from floor to shoulder height, consider 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.

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.

Figure 4 Basic lifting operations



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.

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

Figure 5 basic lifting operations

Source of reference

This Annex is based upon:

requirements and guidelines of the Danish and UK EHS authorities and legislation on manual handling

a. G+ Manual Handling Case Studies doc.

b. https://www.hse.gov.uk/pubns/books/l23.htm

c. Equinor Ergonomics and Manual Handling Study 2018

d. contains public sector information published by the UK Health and Safety Executive and licensed under the Open Government Licence'

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

ANNEX 4 - VERSION HISTORY

Amendment date	Version	Approved by & date	Description of changes
02072025	1	GWO - 18062025	First release

ANNEX 5 - GUIDANCE ON THE SOLAR INDUSTRY WORKPLACE ENVIRONMENT

Utility Scale Solar PV workers are the main target audience for training developed from this standard.

1. What is Utility-Scale Solar?

Utility-scale solar refers to large-scale photovoltaic (PV) power plants designed to generate electricity primarily for distribution through the grid network. The plants are typically ground-mounted systems constructed to deliver renewable electricity to utilities and grid operators.

Exact definitions of utility scale sites and their work environment may vary in different countries and different organisations, but unlike smaller residential or commercial installations, utility-scale solar PV is generally defined as having a minimum capacity around 5 megawatts (MW) to over 1 gigawatt (GW). Utility-scale solar provides significant cost advantages due to economies of scale, leading to reduced per-watt installation costs compared to smaller-scale solar projects.

For the purposes of the GWO training standards, the term 'Utility Scale Solar PV' refers to a solar working environment at the industrial scale, which is distinct from a rooftop installed solar PV work environment, at either domestic or commercial scale.

There is no specific scale at which at solar PV array must be considered utility scale and the standard can also be used to train workforce performing tasks at smaller, net-metered installations, which otherwise would not be associated with utility scale operations.

However, this standard is not designed for rooftop working or related hazards, where a perimeter barrier may not be present to separate the solar arrays from a rooftop edge.

2. The Work Environment for Utility-Scale Solar

Utility-scale solar farms can range in size from a few acres to hundreds of acres and are typically situated in remote or rural areas where there's ample sunlight and land availability. This means sites are often located far from urban centres, increasing the challenge for ensuring a timely response by emergency response services in the event of an incident.

Utility-scale solar farms present unique emergency response challenges due to their size, remote locations, and the potential for electrical and fire hazards associated with their equipment. These challenges include developing robust emergency plans, ensuring effective communication, and training personnel to handle specific incidents. Additionally, extreme weather and the large-scale nature of these farms necessitate training, equipment and procedures for responding to incidents.

Large-Scale Nature and Remote Locations:

Utility-scale solar farms are often located in remote areas, making access for emergency responders difficult and potentially delaying response times. The large scale of these farms can make locating a work party or a casualty particularly challenging in the case of an emergency.

The large scale of the installation creates challenges for the management of manual handling and ergonomics, due to extensive repetitive work required during component mounting and installation. Moving of solar panels also presents a particular manual handling hazard, due to the large dimensions and exposure to wind in the environment.

Electrical Hazards:

Solar farms utilise high-voltage electrical systems presenting a risk of arc flash, electrical burns or electrocution during serious faults or emergencies. Specialised electrical equipment like inverters, transformers, and battery energy storage systems, require trained personnel to handle incidents involving these technologies.

Fire Hazards:

The large number of panels, wiring, and equipment creates a high fire load, and fires can spread rapidly, potentially damaging equipment and disrupting power generation. Organic materials growing within the solar farm can provide a further fire load meaning careful management and removal of dry growth must be ensured to reduce serious fire hazards.

Coordination and Communication:

Effective communication and coordination between site workers, emergency responders, utility personnel, and local authorities are crucial for managing emergencies at solar farms. Fires or other incidents at solar farms can pose a risk to nearby communities and require a coordinated response to ensure public safety.

Extreme Weather:

Due to the remote and open area locations selected for utility-scale solar farms, they may be susceptible to extreme weather events like hail, wind, and lightning, which can damage panels, inverters, and other infrastructure and create challenges for safe work and emergency response.

Environmental Concerns:

Waste materials on utility-scale solar sites can have environmental consequences, requiring planned management, control and disposal of site waste, as well as specialised cleanup procedures and coordination with environmental agencies.

3. Major Components for Utility-Scale Solar PV

A utility-scale solar PV power plant includes several key components working together efficiently to convert solar energy into usable electrical power:

Photovoltaic (PV) Modules / Solar Panels

- PV Modules or Solar Panels are composed of solar cells converting sunlight directly into electrical current.
- Panels are systematically arranged in extensive arrays, optimally angled and positioned to maximise exposure to sunlight throughout the year.

Inverters

- Inverters are essential for converting the direct current (DC) output from the PV panels into alternating current (AC), enabling grid integration.
- Inverters manage and optimise power conversion for the entire PV system, ensuring performance efficiency and reliability.

Mounting Systems

- Robust mounting systems securely hold PV panels at optimal angles and heights, facilitating maximum solar irradiance and ease of maintenance.
- Utility-scale installations typically employ tracking systems to rotate panels to optimise sunlight exposure.

Tracking Equipment

- Single-axis trackers rotate panels from east to west, while advanced dual-axis trackers provide even higher efficiency by aligning panels continuously with the sun's trajectory throughout the day.
- Site-specific conditions such as geography, soil type, and climate will influence the choice of tracking system.

4. Ensuring a realistic training environment

Providers should ensure training scenarios accurately mirror the scale, operational complexity, and logistical considerations involved in real-world utility-scale solar installation, assembly, and commissioning processes. This realistic training will better prepare participants for the competencies required in actual industry conditions.

To effectively replicate a utility-scale solar environment for training purposes, providers should include the following realistic elements:

- Installation of panel mounting systems and securing of PV modules.
- Assembly and installation of electrical components including power cabling, solar PV connectors, panels and combiner boxes.
- Performance of electrical connections ensuring adherence to safety standards and quality assurance.
- Implementation of robust installation protocols, including conducting a full system installation inspection walk down.