EWEA
THE EUROPEAN WIND ENERGY ASSOCIATION

Working the wind safely

Guidelines on emergency arrangements including first aid

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Glossary

Term	Definition
Employer	All employers, contractors, sub-contractors and (marine) equipment suppliers working at an on- or offshore wind farm.
Manned structure	The lead EPCI (Engineering, Procurement, Construction and Installation) contractor guarantees all risks under the contract. They will manage individual guarantees and warranties provided by other contractors or equipment providers.
First responder	A person who is trained to do medical work, especially emergency first aid, but is not a fully qualified doctor.
Site	Location where wind energy activities take place, regardless of if it is in the design, construction, operational or deconstruction phase.
Unmanned structure	An (offshore) installation on which persons are not normally present and in those instances when persons are present on the installation, their presence is for the purpose of performing operational duties, maintenance, or inspections that will not necessitate an overnight stay.
EWEA	European Wind Energy Association
ERP	Emergency Response Plan
CPR	Cardiopulmonary Resuscitation
ERC	European Resuscitation Council

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INTRODUCTION

These guidelines were produced by EWEA with the help of the EWEA Heath and Safety (HSE) Task Force. They are intended to be used as general guidance providing basic high level information on Emergency Arrangements for operations at onshore and offshore wind farms. The guidelines are not to be perceived as a technical document.

The intended audience for these guidelines are the employers in the wind industry in the European Union and members of EWEA. These guidelines on Emergency Arrangements and first aid aim primarily to provide directions for implementing EU Directive 89/391/EEC, article 8, paragraph 1, through adopting industry best practices throughout the European wind power industry. Relevant marine and offshore regulations should be taken into account when planning for emergency arrangements at offshore locations.

Following industry specific best practices will ultimately reduce the cost of wind energy, by having aligned procedures and joint acceptance. This will provide a safer work environment and a better climate for international companies to conduct their business within the European wind industry.

According to **article 8, paragraph 1, of the European Union Council Directive on the introduction of measures to encourage improvements in the safety and health of workers at work (89/391/EEC):**

- *The employer shall take the necessary measures for first aid, fire-fighting and evacuation of workers, adapted to the nature of the activities and the size of the undertaking and/or establishment and taking into account the other persons present;*
- *The employer shall arrange any necessary contacts with external services, particularly as regards first aid, emergency medical care, rescue work and fire-fighting.*

It should be noted that EU Directive 89/391/EEC has been transposed into the national health and safety legislation of individual EU Member States as a minimum requirement, but individual Member States may adopt more detailed health and safety legislation and/or have additional requirements. Following these guidelines does not relieve employers of their duty to ensure compliance with local legislation. Additionally, employers might need to take stricter measures depending on company policy and the findings of the risk assessment.

1 EMERGENCY ARRANGEMENTS

Every employer is legally required to take every measure that can be reasonably expected to avoid or limit all foreseeable hazards and risks to the safety or health of the employee. In addition they are also expected to take appropriate measures with regards to first aid for accidents, fire-fighting and the evacuation of employees and other individuals on site and to maintain contact with the relevant external emergency services.

This means that while doing everything within their power to prevent accidents, employers have to, at the same time, prepare for emergencies. Preparations can be related to:

- The design of the installation (such as installing the right fire fighting equipment, alternative escape routes, emergency brakes);
- Documentation and organisation (such as setting up an adequate emergency response organisation, appointing first aid and emergency response personnel, evacuation plans, procedures);
- Training and instruction (such as training personnel in fire-fighting and first aid, and instructing personnel on emergency procedures and exercises).

This chapter will address the minimum requirements for the European wind energy industry with regards to the emergency arrangements and possible points of attention that need to be considered when preparing for emergency situations. Local legislation, authorities or individual clients may require more detailed and/or stringent arrangements.

An important aspect of the emergency arrangements is first aid. Specific first aid guidelines will, therefore, be described separately in Chapter 2.

1.1 Design

Prevention is key to avoiding emergencies. It is therefore important that wind farm owners and all parties involved in the design, construction, operation and maintenance of the wind farm cooperate to ensure that hazards and risks are mitigated within the design before collective and individual measures are considered. The final step in the mitigation strategy concerns the limitation of impact through measures including fire fighting and fire containment, first aid, safe evacuation of workers and casualties and rescue, in case of accidents.

Emergency arrangements are incorporated into the design of the wind farm. Wind energy turbine will at minimum be compliant with the Machine Directive in its latest available version[1]. Points of consideration during the design phase include:

- Alternative escape routes;
- Safe means for evacuating workers and casualties;
- Safe means for rescue;
- Emergency accommodation and emergency rations (e.g. in case of remote locations and offshore);
- Arrangements for treatment of injured personnel (e.g. in remote locations);
- Communication systems (including back-up systems when necessary) to ensure communication between personnel in the field and control centres and emergency services. Special attention is required in case of remote and offshore locations;
- Emergency response arrangements (e.g. first aid equipment, rations and equipment in the event of stranding);
- Emergency lighting;
- Emergency stop systems;
- Warning signs (e.g. caution signs, machine safety signs, emergency escape exit signs), prohibition signs and mandatory signs;
- Fire protection and fire and smoke detection and alarm (acoustic and visual) systems.

[1] Directive 2006/42/EC of the European Parliament and the Council on Machinery

1.2 Documentation and organisation

1.2.1 Organisation

For the construction, operation and decommissioning phases of a project, owner (employer) and contractors will set up an emergency response organisation with defined roles and responsibilities to deal with all foreseeable emergencies. The level of organisation, number of emergency response staff, their training and resources shall be appropriate to the hazards and risks incurred. Emergency response staff shall have such training and resources, be of such numbers and be organised in such a way that they can properly perform their tasks. These tasks will at minimum consist of:

- Providing first aid in the event of accidents and/or;
- Containing and extinguishing fires and containing the consequences of accidents;
- Raising the alarm and evacuating all employees and other individuals in an emergency.

1.2.2 Escape and Evacuation Manual

For all locations in a wind farm (wind turbines, high voltage stations, meteorological masts, etc.), a manual shall be written containing all information regarding escape routes, provisions for evacuation and rescue for all persons on site including personnel, visitors and casualties, first aid provisions, emergency stop systems, fire detection, fire fighting systems, etc. specific to that location/installation and based on the findings of the risk assessment.

A general manual is provided by the turbine manufacturer with each turbine supplied. This turbine manual identifies the turbine risks and contains information on escape and evacuation which should be incorporated in the Escape and Evacuation Manual of the wind farm.

The Escape and Evacuation Manual may include but is not limited to:

- The location of portable fire fighting equipment;
- Location and content of first aid equipment;
- Escape routes;
- Use of specific personal protective equipment and descent devices as escape route equipment;
- When supplied, the location of rescue equipment for work using fall arrest equipment;
- When supplied, the location of rations and equipment in the event of stranding;
- How to attach not permanently installed emergency descent devices (if any) in their operating positions;
- Description of the available emergency stop systems, mechanical blocking of rotor, pitch and yaw movement, including wind speeds for safe operation, application and removal as well as the instructions for the application and removal of the blocking devices;
- The procedures for evacuation of casualties using stretchers;
- All foreseeable emergency situations (to include evacuation and escape).

1.2.3 Emergency Response Plan

An Emergency Response Plan (ERP) covering all the activities at the workplace needs to be in place prior to the start of the activities. Interfaces with all parties working at the same site and between activities that are being carried out at the same time shall be covered. One Emergency Response Plan will be created and maintained for the entire site. In case of multiple parties working at a site with each party having its own ERP, a site emergency response plan bringing together the individual ERPs of the different contractors will be created as a bridging document for the entire site.

When deciding on the emergency response organisation, required numbers of trained persons and required level of (basic) emergency response training, consideration shall be given to the location and accessibility of the site and its installations (turbines, high voltage stations, etc.). Wind farms are often located in remote locations with poor accessibility, increasing the time needed for the professional emergency services to respond to an emergency. In addition, special training is often required for safely accessing certain locations

of the installation (such as the turbines or hubs) which emergency service personnel do not always have. When this is the case, these circumstances will demand a higher level of trained (first aid) personnel and professional equipment present to ensure preservation of life and proper medical care until responsibility can be handed over to the emergency services.

The Emergency Response Plan should be based on the risk assessment, and should be project, turbine and site specific, as each workplace is unique. Different scenarios might occur that will require immediate response from trained personnel and possibly external services. All procedures and roles should be clearly defined for each possible scenario. Any third party or external involvement should be communicated and agreed to in advance.

Requirements for an Emergency Response Plan may consist of, but are not limited to:

- Measures and resources for an emergency response;
- Scenarios that may occur at the workplace;
- The tasks, responsibilities and authorities of all key personnel involved in the emergency response;
- Communication lines and numbers of all internal or external parties during emergencies;
- Contact numbers of all third party emergency services;
- Potential hazards;
- Locations of the site's most significant hazards;

Possible scenarios to be considered may include:

- Abandonment;
- Rescue from height e.g. injured personnel inside the nacelle;
- Emergency lock out of low voltage (LV) and high voltage (HV) equipment;
- Fires e.g. from transformers or switchgears;
- Acute illnesses and personal injuries;
- Pollution;
- Extreme weather e.g. heavy rain and strong winds;
- Unexploded ordenance (UXO), such as war explosives dumped in the sea ;
- Major impact damage e.g. vessel and turbine collision;
- Bomb threat or sabotage.

Emergency drills must be performed. These drills need to be evaluated to ensure correct and effective emergency control. The ERP needs to be reviewed on a regular basis and/or after major accidents and/or near misses, and/or after any changes (e.g. in personnel, equipment etc.) and updated when necessary. Drills, lessons learned and changes in the nature of work will have to be taken into account in these updates.

As a final step in the emergency communication, a contact point for communication with the press and other stakeholders during emergency situations is advised.

1.2.3.1 Offshore

Apart from the ERP for the Offshore wind farm itself, each vessel used at an offshore wind farm needs to have an Emergency Response Plan in accordance with International Maritime Organisation regulations. In addition to the overall requirements for the ERP, in offshore situations, the locations of nearby installations that might be of assistance during emergency situations have to be added to the ERP. An emergency response cooperation plan should be communicated to and agreed with the Coast Guard. The cooperation plan states all arrangements and procedures should external assistance be required and needs to be in place prior to the beginning of activities.

Points to be considered for the ERP offshore may include:

- Turbine abandonment;
- The relevant emergency procedures;
- Medical evacuation (Medevac) procedure;
- Man overboard procedure;
- Responsibilities during an emergency, such as first aid;
- Escape routes on board;
- Vessel collision or grounding;
- Vessels not under command;
- Pollution;

- Extreme weather;
- Emergency equipment on board;
- Overview of all chemicals and fuels shall be provided, by means of Material Safety Data Sheets;
- Diving emergencies (if applicable);
- Crew/ personnel stranding.

1.3 Training

In case of an emergency, all personnel have to be aware of what is expected of them. It is the employer's responsibility to make sure all personnel are sufficiently trained to perform their tasks during an emergency situation in compliance with the ERP and that all persons on site (workers or visitors) have been informed about the emergency arrangements in place (e.g. alarm signals, escape routes, location of fire fighting equipment, assembly points). All parties working onsite are expected to participate in exercises. Training and carrying out exercises is important as it allows all personnel to become familiar with their roles and prepare for real emergency situations. In addition, it shows whether existing procedures are satisfactory and helps validate new procedures.

Training areas may include short, simple training (such as basic awareness for visitors); general training (such as emergency training for all employees); specialised training (such as for key personnel with specific responsibilities in the event of an emergency); and the training of teams (such as the crisis management team).

For low risk work, it is recommended to have at least sufficient persons trained in fire fighting per a regular amount of employees present at any given time. If the risk assessment specifies that the risk of fire or the need of emergency evacuation is high, a number of persons trained for fire fighting and evacuation need to be present to assure an effective and swift evacuation of all present employees can take place. There should be a sufficient number of trained personnel to ensure there is adequate coverage at all times.

Factors to be considered when identifying the necessary number of trained personnel and the required levels of training may include:

- Identified hazards and risks;
- Location of site;
- Expected response time of professional emergency services;
- Holiday coverage;
- Wounded first aiders/emergency responders (in case of workers with additional FA/ER role).

1.3.1 Offshore

During emergency response drills it is advised to train with the vessels or other means of access and egress (e.g. helicopters) used for the offshore site. In addition to valid training and certification, marine personnel should receive additional training specific to the offshore wind project.

1.4 Provisions

Locations of emergency provisions (e.g. fire fighting equipment, emergency evacuation and rescue equipment, and stretchers) must be clearly identifiable and accessible. These provisions should be checked and maintained regularly (e.g. checked for deterioration of equipment, expiry dates, completeness etc.) according to the legal requirements, the manufacturer's or supplier's instructions and the company policy and risk assessment. Apart from the relevant certificates, a maintenance document for the emergency provisions needs to be in place. This maintenance document may include, but is not limited to: an overview of the present emergency provisions, the person in charge of their maintenance and a maintenance plan.

2 FIRST AID

First aid is defined as “the provision of immediate initial care in case of an accident or sudden illness”. In most cases first aid is given by a non-expert, who is trained and holds a recognised and valid certificate in providing first aid care until a professional can take over. Effective first aid will reduce the severity of injuries and will save lives. The key element is to preserve life until emergency services can take over.

According to EU Directive 89/391/EEC employers have the legal obligation to “take the necessary measures for first aid, fire-fighting and evacuation of workers” and “the number of the workers required to implement such measures, their training and the equipment available to them shall be adequate, taking account of the size and/or specific hazards of the undertaking”.

2.1 Risk assessment

Employers are obliged to carry out first aid risk assessments to provide guidance in the requirements for first aid personnel and provisions at the workplace. Employers are legally required for first aid, fire-fighting and the evacuation of workers, to designate the workers required in implementing such measures, to keep a record of the required number of first aiders and to ensure the required first aid provisions are in place. During the first aid risk assessment the employer needs to consider the hazards and risks that may occur in the workplace and provide actions to mitigate those risks.

At minimum, the first aid risk assessment needs to take into account:

- The size of the organisation (e.g. number of persons on site simultaneously);
- The location of the site;
- The response time for emergency services to that site;
- The type of work carried out at the workplace;
- Vulnerable groups (e.g. young workers, pregnant women, visitors, people with special needs etc.)
- Hazards and risks at the workplace;
- Working at a remote site;
- Whether workers work alone or in teams;
- The requirements for travel;
- If other parties are working at that site;
- Previous incidents;
- The potential for injuries at the workplace;
- The necessary level of first aid provisions needed at the employers workplace
- Sufficient redundancy to ensure adequate coverage by first aiders at all times.

2.1.2 Offshore

Offshore wind energy projects can be more complex and challenging than onshore, requiring a more robust risk assessment. At offshore wind farms, additional factors such as extreme weather and extreme sea conditions (e.g. storms and strong winds resulting in high waves) should be taken into account when carrying out the first aid risk assessment. Additional training for individuals may be required, depending on the specificities of each project, its size and its location. The different phases of the wind farm should also be considered, as each phase may demand different arrangements. For example during the construction phase, there is usually sufficient first aid provision due to the number of vessels and personnel on site. During the operational phase, there are usually fewer vessels so personnel are more self-reliant when it comes to emergencies and first aid.

Time is another important factor that should be considered (time needed to reach shore, time needed for medical help to arrive, etc.). Additionally, cooperation and coordination between personnel (internal) and between personnel and third parties (external) should be considered. It must be ensured that injured people are attended to by trained personnel and provided with medical care at all times and throughout every stage of the emergency, from first aid up to the arrival of professional help.

2.2 First aiders

All employers need to provide a sufficient numbers of first aiders. Dedicated first aiders need to be easily identifiable / recognisable during work hours.

During low risk activities there need to be enough first aiders to cover the criteria mentioned in 2.1. The outcome of the first aid risk assessment may indicate that the risks are high within the organisation. The employer needs to maintain an accurate and actual list of all first aid contacts on the site. Factors that need to be considered when identifying the necessary number of trained personnel and the required levels of training are:

- Identified hazards and risks;
- Location of site;
- Expected response time of professional emergency services;
- Holiday coverage;
- Wounded first aiders/emergency responders (in case of workers with additional FA/ER role).

2.2.1 Offshore

Offshore wind farm sites are remote locations where a high level of self-reliance is expected of personnel. Most individual turbines are regarded as unmanned structures. This may require higher levels of training, including basic first aid training for all persons working offshore. Based on the risk assessment, when an offshore wind farm includes manned structures (e.g. accommodation platforms) the presence of a trained paramedic may be required. Vessels in this case are not considered manned structures.

2.3 Provisions

Workplaces must have first aid provisions in clearly identifiable and accessible boxes. First aid materials should be checked and maintained regularly (e.g. checked for deterioration of equipment, expiry dates, completeness etc.). A maintenance document for the first aid materials needs to be in place. This maintenance document shall include, but not be limited to: an overview of the present first aid materials, the person in charge of the maintenance, and a maintenance plan.

Material and provisions required are based on the findings of the first aid risk assessment. In addition, the following should be considered:

- Defibrillators;
- Basic first aid kit (national requirements vary as to what should be contained in first aid kits, normally depending upon the type of risks faced and the size of the population that it covers);
- First aid travel kit;
- Area suitable for treatment;
- Extended first aid equipment suitable to facilitate a rescue;
- Additional provisions such as survival kits (taking into account environmental conditions).

2.3.1 Offshore

The vessels used for offshore work are as a minimum equipped with the legally required first aid provisions on board. Based on the outcome of the first aid risk assessment (see Chapter 2.1) these provisions will be supplemented with what is required for the specific activity for which the vessel will be utilised.

2.4 Training requirements

The employer has the responsibility of carrying out a risk assessment and informing personnel of the risks and dangers they may face carrying out their work. Additionally, the employer must ensure that the First Aiders are sufficiently trained by recognised training institutes and will hold valid and recognised certificates before the work commences. The training must be suitable to provide necessary first aid after an accident/incident at the workplace. It is considered good practice to provide the personnel with industry

specific training if available. Employers with personnel that work in different countries should take into account that certificates accepted by the authorities of one country are not always accepted by the authorities in another country. When deploying (temporary) personnel to another country, employers are advised to consult with local authorities regarding the acceptability of training certificates.

Task specific risk assessment could lead to additional requirements. For specific activities in and around the wind turbine generator, additional training may be required (e.g. for working with hazardous energies like hydraulics and electrical high and low voltage, working with chemicals, treatment of hypothermia and after harness suspension). For personnel working on electrical installations, additional training for the treatment of electric shocks and burns is necessary.

First aid training must address, as a minimum, the following topics:

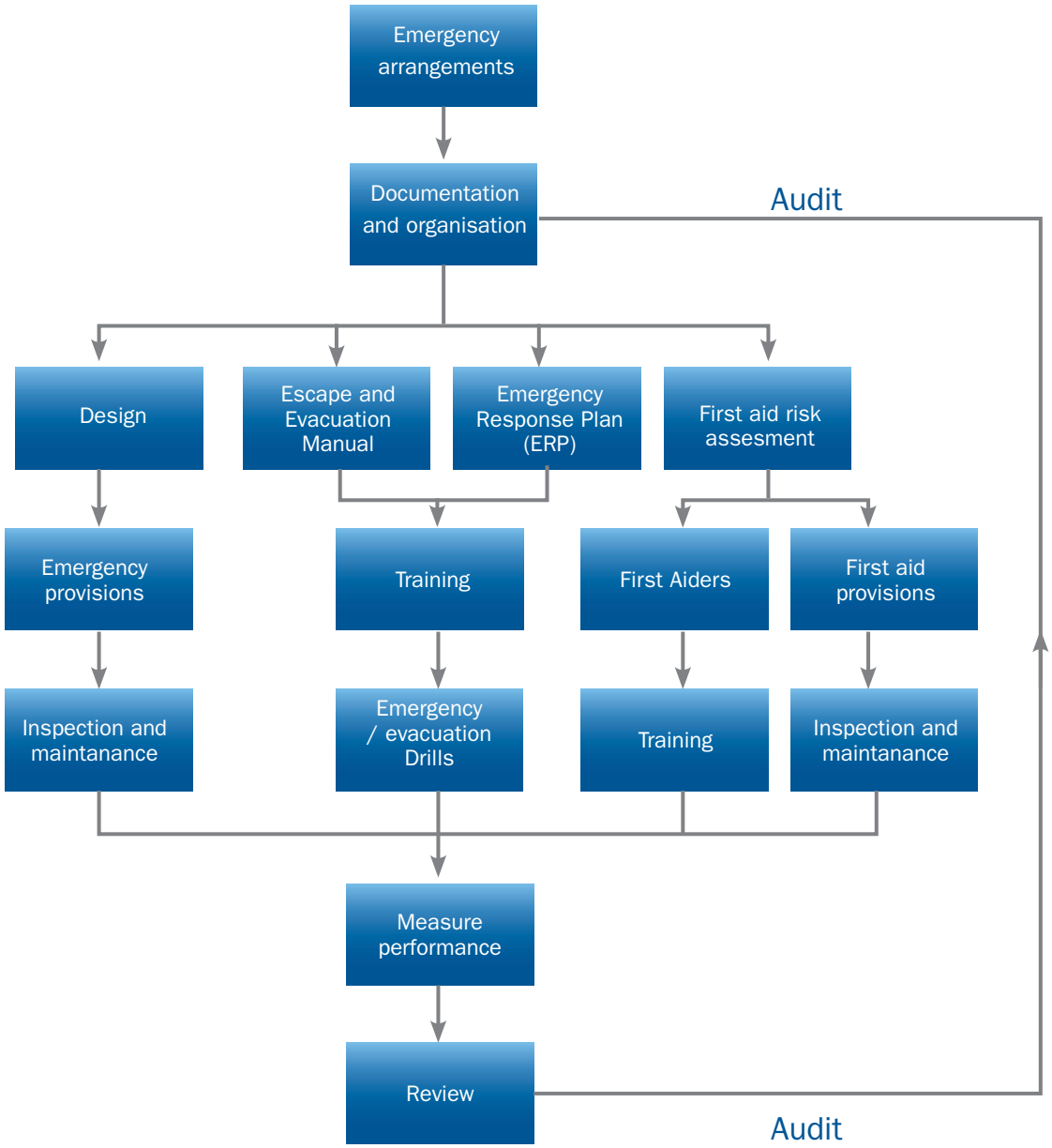
- Basic life support and resuscitation[2] (CPR and mouth to mouth resuscitation in accordance with the guidelines of the ERC);
- Unconsciousness;
- Shock;
- Fractures;
- Burns;
- Control of bleeding, wound dressing;
- Choking;
- First aid for minor injuries;
- Common illnesses, seizures, eye injuries and heart attacks.

[2] Training in working with an external defibrillator is recommended.

3 SUMMARY

In all management systems, it is important to measure the performance of all procedures, review and audit all parts of the system, updating and amending accordingly with the aim of constant improvement.

The obligations of employers in the wind industry in accordance with the EU Directive 89/391/EEC and these guidelines are summarised in the flow chart below. The chart provides a simple framework for the employers. In practice, individual projects in different countries may have different communication lines.



4 SOURCES

- Council Directive on the introduction of measures to encourage improvements in the safety and health of workers at work (89/391/EEC)
- Directive 2006/42/EC of the European Parliament and the Council on Machinery – Provides the regulatory basis for the harmonisation of the essential health and safety requirements for machinery.

Check applicable regulations in each EU member state. National regulations may include additional details and requirements.

Members of the EWEA HSE Task Force:

- A2SEA
- ABB A/S
- Acciona
- Allianz Specialised Investments
- Asociación Empresarial Eólica (AEE)
- Ballast Nedam Offshore Energy
- BreakBulk & Offshore Wind Terminal
- BTI Light Systems
- Bundesverband WindEnergie (BWE)
- BZEE Consult GmbH
- Chris Westra Consulting
- C-Power
- Det Norske Veritas (DNV)
- Detam High Solutions
- Deutsche WindGuard Offshore
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- ECN (Energy Research Centre)
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- Falck Nutec - Maritime & Offshore
- FEE - France Energie Eolienne
- Firetrace International
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- GE Energy
- Germanischer Lloyd Industrial Services
- GES
- GL Garrad Hassan
- Global Energy Services Siemsa (GES)
- Humberside Offshore Training Association
- LM Wind Power Service & Logistics
- Mammoet Europe
- New Zealand Wind Energy Association
- Nordex
- Nordic Dive Enterprise
- Norwea
- NOW Ireland (National Offshore Wind Association of Ireland)
- NWEA (Netherlands Wind Energy Association)
- Offshore Marine Management
- ReinosoConsultors Investment
- Renewable Energy Systems Group
- RenewableUK
- REpower systems
- RES
- Romax Technology
- RWE Innogy
- Seahealth Denmark
- Siemens Wind Power
- Sperian
- SSE Renewables (Airtricity)
- Statoil
- Stiftung Offshore Windenergy
- Swedish Wind Energy Association
- Syndicat des Energies Renouvelables
- Total Wind B.V.
- Tractel Group - Tractel Benelux
- VDMA Power Systems
- Vestas
- Visser & Smit Marine Contracting (VSMC)
- WAB (Windenergie-Agentur Bremerhaven/Bremen)
- Windhoist
- WPD-Offshore France