



Document Reference: OFS-SSS-409-R1

Functional Specification

Fire Detection & Fire Alarm System

| Revision | Date | Description | Originator | Reviewer | Checker | Approver |
|-----------------|-------------|--|-------------------|-------------------------------------|-------------------------------|--|
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| R1 | 06/10/2022 | Issued for use after industry feedback | Vitali Garon | Daniele Giustini, James Staunton | Neil Cowap | Louise O'Flanagan |

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1 SCOPE

This Functional Specification is applicable for use in offshore wind transmission links delivered by the Customer as Contestable Works, to be owned and operated by EirGrid.

This functional specification defines requirements for fire detection and alarm systems for use in onshore compensation compounds (OCC).

This specification should be read in association with the project specific contestable works pack and project documentation and all other relevant functional specifications as issued by EirGrid.

For the purpose of this specification the term Customer shall refer to Offshore Wind Power Developers, Independent Power Producers responsible for the design and build of assets to be handed over to EirGrid.

2 LEGISLATION CODES AND STANDARDS

2.1 LEGISLATION

Equipment offered shall be compliant with the provisions of the latest applicable versions of all relevant Irish legislation and directives of the European Union.

These include the following or latest versions/ amendments as appropriate:

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| SI No. 132 | Safety signs regulations 1995 (implements EEC Directive 92/58) |
| SI No. 291 | Safety, Health and Welfare at Work (Construction) Regulations |
| SI No. 299 | Safety, Health and Welfare at Work (General Application) Regulations 2007 |
| SI No. 445 | Safety, Health and Welfare at Work (General Application) (Amendment) Reg. 2012 |
| Reg (EC) No 1907/2006 | Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) |
| Reg (EC) No 1272/2008 | Classification, Labelling and Packaging of Substances and Mixtures (CLP) |
| Reg (EU) No 517/2014 | Fluorinated greenhouse gases and repealing regulation (EC) No 842/2006 |
| Reg (EU) 2015/2068 | Format of labels for products and equipment containing fluorinated greenhouse gases |
| Reg (EU) 2015/2065 | Format for notification of the training and certification programmes of the Member States |
| Reg EU 2015/2066 | Minimum requirements and the conditions for mutual recognition for the certification of natural persons carrying out installation, servicing, maintenance, repair or decommissioning of electrical switchgear containing fluorinated greenhouse gases or recovery of fluorinated greenhouse gases from stationary electrical switchgear |
| Directive 2011/65/EU | Restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS) |
| Directive 2012/19/EU | Waste electrical and electronic equipment (WEEE) |

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|----------------------|--|
| Directive 2014/30/EU | Harmonisation of the laws of the Member States relating to electromagnetic compatibility |
| ECE/TRANS/275 | Vol. I and II ("ADR 2019") European Agreement Concerning the International Carriage of Dangerous Goods by Road |

Unless the Customer can document that CE marking is not required, equipment shall carry the CE Mark in accordance with Directive 768/2008/EC and the EU Construction Products Regulation (No. 305/2011 – CPR) and adequate documentation to demonstrate full compliance should be retained.

In order to prove compliance, the equipment shall carry the CE Mark in accordance with Direction 768/2008/EC and the EU Construction Products Regulation (No. 305/2011 – CPR) where required.

2.2 NATIONAL INTERNATIONAL AND OTHER APPLICABLE STANDARDS

Except where otherwise stated in the functional specification, materials shall be designed, manufactured, tested and installed according to relevant IEC and/or EN standards.

Where available, the Irish adaptation of European standards (IS EN version), including any national normative aspects shall be applied.

Where no IEC standard or EN standard has been issued to cover a particular subject then an international or British Standard shall be applied. The latest edition and amendments shall apply in all cases.

The equipment shall comply with the latest editions of the international standards, codes and normative references indicated below, and the latest editions of the standards that they reference.

- 1 ISO 9001 Quality Systems – model for Quality Assurance in Design Development, Production, Installation and Servicing.
- 2 The system shall be fully compliant with EN 54 series of standards, Fire Detection and Fire Alarm Systems.
- 3 Symbols on drawings shall be to IEC 60617.
- 4 All equipment shall be compliant with IEC 61000 with regard to electromagnetic compatibility.
- 5 All site activities will be governed by the provisions and regulations given under the Safety, Health and Welfare at Work Act 2005 (and additions and amendments).
- 6 Electrical equipment and wiring installations shall be to I.S. 10101.
- 7 The system shall be fully compliant with I.S. 3218:2009, Code of Practice for Fire detection and Alarm systems for Buildings – System design, Installation and Servicing.

3 SERVICE CONDITIONS

For service conditions refer to the latest revision of specification OFS-SSS-400.

4 PERFORMANCE REQUIREMENTS

4.1 TRACKED

The systems shall comprise a manual fire alarm system and automatic fire detection and alarm system to provide early warning of the outbreak of fire in any part of the OCC buildings and oil filled equipment located outdoors. The scope of supply will include complete fire detection and alarm system comprising but not limited to fire detectors, control panels, cabling, interfaces with SCADA, manual call points, relevant accessories.

Alarms should include any internal equipment failures, any power supply failure.

All alarms and acknowledgements should be made available to the EirGrid SCADA. The fire detection and fire alarm system shall be a Type L3 System, as detailed in I.S. 3218.

4.2 ZONES

The OCC areas / rooms shall be divided up into zones for the purpose of identifying the location of the outbreak of fire. Zone identification for the project specific building may depend on the internal partition areas within the building and its internal layout.

Exact zoning depends on project specific layouts, requirements. It shall be developed by Customer in consultation with suppliers and submitted for review by EirGrid.

The fire detection and alarm system shall be designed, manufactured, installed tested and commissioned to the highest standard of reliability by a specialist manufacturer. The number of fire detectors in any room shall be consistent with the manufacturer's recommendation for the particular size of room and the purpose for which the room is used.

4.3 DETECTORS

Automatic smoke and heat detectors shall be certified and well tested from reputable manufacturers. The detector elements and associated wiring shall be encased in rugged, fire-resistant containers, which shall protect the detector element from accidental damage and ingress of moisture or dust.

The design and selection of fire detectors shall be in accordance with the environmental conditions and likely combustion products which can be reasonably be anticipated.

Generally, Ionisation Smoke Detectors will be suitable for the majority of areas, excepting the Kitchen, Battery and Generator rooms where, Rate of Rise/Fixed Temperature detectors are required. All detectors shall be stable under normal site conditions. Beam smoke detectors may be proposed where appropriate to the size of the room.

Substation buildings are continually heated by electric heaters. Detectors shall be chosen and positioned to avoid false alarms from the heaters.

Where detectors are installed in hidden voids remote indication lights shall be provided.

Detectors fixed to false ceiling tiles shall be installed in a neat and symmetrical pattern aesthetically orientated to the ceiling panel arrangement and co-ordinated with other equipment. They shall be rigidly fixed to the support structure and not to removable tiles.

4.4 WIRING

All wiring shall be installed in accordance with I.S. 3218: 2009. All cabling in the risk areas shall be Fire Resistant type cables. . In particular, wiring which, due to its location (e.g. in a workshop area), may be susceptible to mechanical damage shall be installed in conduit. Any inter building wiring shall be heavy-duty multi-core cable, suitable for installation in existing cable ducts.

4.5 CONTROL PANEL

The control panel shall be a multi-zoned panel in accordance with this specification. The panel shall have spare zones (at least 20% spare capacity) for future expansion of the system. The panel shall be set and reset via a key switch. The key switch shall be installed in the control building entrance area.

The system shall give alarm indications and status indications in the control building entrance area.

The panel shall be capable of indicating alarm activation and panel fault to the SCADA system. The panel shall be capable of indicating alarm activation via a separate security system digidialler back to a central monitoring station via a telephone line.

Wiring brought into the panel shall have its use and detector location clearly marked to aid fault location. The method of marking shall be reviewed by EirGrid.

The capacity of the control panel battery shall be sufficient for at least 24 hours operation without external power when the alarm is closed and quiescent.

The control panel should be located such that indications and controls are easily accessible to the fire brigade and to the responsible people in the building. Its location should have adequate lighting, such that the labels and visual indications can be easily seen and read, typically at eye level (1.4m above floor level). Adequate lighting in the location where the control panel is installed shall also be provided in case of loss of main LV AC supply (i.e. from emergency lights).

Its location must be such that background noise levels allows audible indications to be heard and that the risk of mechanical damage to the equipment is low. The control panel must be installed in a location where the environment is clean and dry. It should be installed in an area where the risk of fire is low, and the location is covered by the fire detection system.

4.6 ALARM SIGNALLING DEVICES

The sound level of the bells/sounders at any point in the building shall be 65 dB(A) or 5 dB(A) above any likely noise to persist for longer than 30 seconds, whichever is the greater, if necessary additional bells shall be installed to meet this requirement.

An internal siren shall be installed in the entrance area with a strobe indication light. External signalling devices with a strobe light shall be installed on the external walls of the building, these devices have to be clearly visible outside the substation and when approaching the building. The external devices shall be protected from damage by a galvanized cage and clearly labelled as a fire alarm device.

4.7 MANUAL CALL-POINTS

Manual call-points should be sited on escape routes, at (inside or outside) each door to escape stairs and at each exit to the open air. They must also be sited near special hazards, such as the battery or generator rooms. Transparent hinged covers must be provided in areas where accidental operation of the system may occur, e.g. in workshop areas.

Manual call-points should be clearly visible, identifiable and easily accessible. Manual Call-points must be installed with a testing facility and any breakable glass element must be laminated such that the glass breaks cleanly and safely with no escape of glass particles.

4.8 GENERAL

It will be necessary for the Customer to carry out a detailed survey, reviews, risk assessments to determine the best detection & alarm system appropriate to the OCC location and building(s) composition. Proposals shall be subject to EirGrid review.. Any proposed deviations from the requirements shall be subject to the approval of EirGrid, refer to derogation procedure.

The complete system should be centrally controlled from, and give indications at, the entrance area of the OCC control building.

20% future capacity should be allowed for in the design of the system.

There should be local alarm annunciation both indoor and outdoor to sound pressure levels (min. 95dBA – see IS.199, 1987).

The system shall be designed to minimise as far as possible nuisance alarms due to weather conditions, temperature or other adverse conditions.

The system shall be supplied from redundant LV AC UPS (uninterruptable power supply) system.

All enclosures and equipment shall have IP ratings and corrosion protection to suit the substation location as detailed below:

- Battery Room: IP65

- Internal Rooms: IP41
- External Devices: IP54

The system shall be self-monitoring with alarms for any faults.

The system shall operate from 230 V 13 A 50 Hz supply. The screen of this cable shall be earthed at each end.

The equipment shall be selected to be immune to electromagnetic interference and be interference suppressed as required by the standards listed in this specification.

The back-up battery supplies should be adequate for 24-hour system quiescent operation.

4.9 MONITORING

The system shall be interfaced and monitored 24 hours by EirGrid SCADA. Any alarm activation shall be available in SCADA and notified to the relevant EirGrid control centre.

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5 MAINTENANCE

Locations of smoke/heat detector shall be selected in consideration of the maintenance requirements, accessibility and risks associated with electrical equipment installed in proximity to each detector. It shall be possible to maintain the fire alarm system without the need for any outage.

6 SPARE PARTS

Refer to general spare parts requirements in OFS-SSS-400 "Onshore Compensation Compound General Requirements".

The Customer shall submit a completed list of recommended spares which are recommended to be retained by the Owner.

All spare parts shall be provided with a description of their function, complete installation instructions and associated drawings. All instructions shall be in English.

Spare parts shall be delivered suitably identified, packed and treated for long periods in storage.

7 TRAINING

The Customer shall submit a training plan which shall describe in detail how the Customer proposes to train EirGrid staff for operation of future EirGrid assets.

Training requirements will be detailed further in OFS-GEN-009 - Operation and Maintenance General Specification.

8 DOCUMENTATION

The system shall be supplied complete with Operation and Maintenance Manuals detailing exact requirements for periodic testing purposes, identifying hazardous materials and handling procedures, sufficient supporting documentation for fault finding and including full schematic diagrams in A3 format. Battery maintenance checks and replacement details should also be included. All requirements for power supplies, builder's work and cable support systems should be detailed.

The installer should supply the user with a logbook and certificates of installation and commissioning.

As a minimum, the following documents are required:

1. Layout drawings showing the intended locations of all devices and cable routes. Each device should be identified by type and by its number in the system.
2. Drawings showing the dimensions, cable entries and mounting method for boxes and cabinets.
3. Schematic diagram of the installation with details of cable types, number of cores, colour codes and conductor sizes.
4. Diagrams showing the purpose of each terminal and the type of connections.
5. Standard data sheets where applicable.
6. Proposed schematic diagram and any supporting layout drawings
7. Technical literature and system support documentation
8. A list of exceptions to this specification, if any.
9. Description of extent of guarantees and warranties.
10. A list of manufacturer recommended Spare Parts
11. Declaration of Response Times and proposed sequence of events to alarms and faults on the system (s).
12. An up-to-date Client/Reference List for equipment similar to that proposed.
13. Quality Approval and Independent Testing Authority Certification and Approvals documentation.
14. Details of corrosion protection and IP ratings for equipment proposed.