

RISK ASSESSMENT

Standards Applied: ISO 45001:2018 (Occupational Health & Safety Management) · ISO 31000:2018 (Risk Management)

Document Ref. HSE-RA-FLS-001	Revision 01	Edition International Edition	Industry Sector FLS, FM & MEP
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Region / Applicability:

Global / Worldwide — Most Stringent Applicable International Standards Adopted Where Local Regulation Is Absent

Prepared by: HSE Department
Date of Issue: 13 August 2026

Status: **CONTROLLED DOCUMENT — Uncontrolled if Printed**



2. Document Information

Field	Details
Document Title	Risk Assessment for the New Installation of Fire Alarm, Voice Evacuation Speaker, and Emergency Lighting System
Document Reference	HSE-RA-XXX-001
Revision	Rev. 01
Document Status	Controlled Document — HSE / Quality Department
Industry Sector	Fire Life Safety (FLS), Facilities Management (FM) & MEP Contracting
Edition	International Edition
Country / Region of Applicability	Global / Worldwide — no country-specific regulatory constraints; most stringent applicable international standards applied where local requirements are absent
Governing Standards	ISO 45001:2018 (Occupational Health & Safety Management Systems); ISO 31000:2018 (Risk Management — Guidelines)
Risk Methodology	5 × 5 Likelihood × Severity Matrix in accordance with ISO 31000:2018
Date of Issue	13 August 2026
Review Cycle	Annually, or upon change in scope, method statement, legislation, or following an incident / near-miss
Document Owner	HSE Manager
Distribution	Project Manager, Site Engineers, HSE Team, Subcontractor Supervisors, Client HSE Representative

3. Applicable Standards & Regulatory References

Standard	Scope & Application
ISO 45001:2018	Occupational Health & Safety Management Systems — Requirements with Guidance for Use. Provides the framework for hazard identification, risk assessment, determination of controls, legal/other requirements, and continual improvement applied throughout this risk assessment.
ISO 31000:2018	Risk Management — Guidelines. Provides the principles, framework, and process (including the 5×5 Likelihood × Severity methodology) used to identify, analyse, evaluate, and treat risks associated with this installation activity.
NFPA 72	National Fire Alarm and Signaling Code (international reference standard). Governs design, installation, testing, and commissioning of fire detection and alarm systems, including voice evacuation systems.
EN 54 (Series)	Fire Detection and Fire Alarm Systems — European/international reference standard covering control and indicating equipment (EN 54-2), power supplies, cable and wiring practice, and voice alarm systems (EN 54-16, EN 54-24).
BS 5839-1	Fire Detection and Fire Alarm Systems for Buildings — Code of Practice for Design, Installation, Commissioning and Maintenance, referenced internationally for cable segregation and wiring integrity.
IEC 60364	Low-Voltage Electrical Installations — international standard applied for isolation, testing, and safe electrical connection practice during termination works.
NFPA 70E	Standard for Electrical Safety in the Workplace — applied for arc-flash risk control, PPE selection, and safe work practice around energized electrical equipment.
EN 1366-3 / ASTM E814	Fire Resistance Tests for Service Installations — Penetration Seals. Governs the selection and installation of certified fire-stopping systems at cable/containment penetrations.
ISO 9612:2009	Acoustics — Determination of Occupational Noise Exposure. Applied to control noise exposure during voice evacuation speaker commissioning and sound-pressure testing.
ILO Code of Practice — Safety and Health in Construction	International Labour Organization guidance applied for working at height, manual handling, and general construction site safety controls where no more specific local regulation exists.

4. Risk Rating Matrix (ISO 31000:2018 — 5×5 Methodology)

Risk Score = Likelihood (L) × Severity (S). Likelihood and Severity are each rated on a scale of 1 (lowest) to 5 (highest).

Likelihood ↓ / Severity →	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
1 Rare	1	2	3	4	5
2 Unlikely	2	4	6	8	10
3 Possible	3	6	9	12	15
4 Likely	4	8	12	16	20
5 Almost Certain	5	10	15	20	25

Score Range	Risk Level	Colour Code	Required Action	Authority Level
1 – 4	LOW	#70AD47	Acceptable. Maintain existing controls; monitor via routine supervision.	Site Supervisor
5 – 9	MEDIUM	#FFD966	Tolerable with additional controls. Implement further risk reduction measures where reasonably practicable within a defined timeframe.	HSE Officer / Site Engineer
10 – 16	HIGH	#ED7D31	Unacceptable without further controls. Work must not proceed until additional controls are implemented and verified.	HSE Manager / Project Manager
17 – 25	CRITICAL	#7B0000	Unacceptable. Stop work immediately. Task requires elimination/substitution-level controls and senior management authorisation before work may commence.	Project Director / Client HSE Representative

5. Authorisation

This risk assessment has been reviewed and approved by the following personnel prior to commencement of works on site.

Role	Name	Signature	Date
Prepared By (HSE Officer)			
Reviewed By (HSE Manager)			
Reviewed By (Project Manager)			
Approved By (Client HSE Representative)			
Approved By (Project Director)			

6. Risk Register

Activity: New installation of Fire Alarm, Voice Evacuation Speaker, and Emergency Lighting System. 20 hazards identified across 10 work areas, assessed per ISO 31000:2018 5×5 methodology (ISO 45001:2018 Cl.6.1.2 / 8.1.2).

No.	Work Area	Activity / Task	Hazard Description	Persons at Risk	Hazard Type	L/S/R (Initial)	Risk Level (Initial)	Control Measures	L/S/R (Residual)	Risk Level (Residual)	Additional Controls	Monitoring Required	Responsible Person	Frequency	Regulatory Ref.
1. Site Mobilisation, Access & Permit to Work															
1	Site Mobilisation, Access & Permit to Work	Site mobilisation and access to active construction/live building areas	Uncontrolled access to active construction site with moving plant and vehicles, resulting in struck-by/collision injury	Installation Technicians, Site Engineers, Visitors	Physical / Mechanical	3×3=9	MEDIUM	- Site induction and Permit-to-Work (PTW) system prior to mobilisation - Segregated pedestrian walkways with physical barriers - Banksman-controlled reversing/manoeuvring of site vehicles	2×2=4	LOW	Mandatory high-visibility PPE (EN ISO 20471); daily toolbox talk on site traffic hazards	Daily site safety inspection	Site HSE Officer	Daily	ISO 45001:2018 Cl.8.1.2; ISO 31000:2018
2	Site Mobilisation, Access & Permit to Work	Access to electrical panel rooms and riser cupboards for survey/setting out	Unauthorised or uncontrolled entry into live panel rooms leading to electric shock or arc-flash exposure	Electrical Technicians, Site Surveyors	Electrical / Administrative	3×4=12	HIGH	- Formal electrical Permit-to-Work with authorised signatory - Lock-Out-Tag-Out (LOTO) procedure applied per IEC 60204-1 - Restricted, keyed/coded access to panel rooms	2×3=6	MEDIUM	Toolbox talk conducted before task start; competency verification of technicians retained on file	PTW compliance audit	HSE Manager	Per shift	ISO 45001:2018 Cl.8.1; NFPA 70E
2. Working at Height — Ceiling Void & MEWP Operations															
3	Working at Height — Ceiling Void & MEWP Operations	Installation of detectors, speakers and luminaires within ceiling voids using ladders/MEWP	Fall from height while accessing ceiling void via ladder or mobile platform, resulting in fracture or fatality	Installation Technicians	Fall from Height	3×5=15	HIGH	- Substitute ladders with certified MEWP/scaffold tower for work above 2 m - Fall-arrest harness anchored to a certified anchor point (EN 361) - Daily pre-use inspection of all access equipment	1×5=5	MEDIUM	IPAF/PASMA-certified operators only; rescue plan established for suspended/arrested falls	Pre-use access equipment inspection checklist	Site Supervisor	Daily before use	ISO 45001:2018 Cl.8.1.2; ILO Code of Practice — Safety and Health in Construction
4	Working at Height — Ceiling Void & MEWP Operations	Handling of tools and cable materials at height above occupied work areas	Falling tools or materials from ceiling void striking personnel below, causing head/impact injury	Ground-Level Workers, Other Trades	Struck-By	3×3=9	MEDIUM	- Exclusion zone/barricading with signage below active work area - Toe boards and debris netting fitted to working platforms - Tool tethering/lanyards for hand tools used at height	1×3=3	LOW	Hard hats (EN 397) mandatory within work zone; supervision by a competent person	Daily work-area inspection	Site Supervisor	Daily	ISO 45001:2018 Cl.8.1.2
3. Cable Containment & First Fix Installation															
5	Cable Containment & First Fix Installation	Installation of cable tray, conduit and containment systems	Manual handling of containment materials causing musculoskeletal injury or back strain	Installation Technicians, Labourers	Ergonomic / Manual Handling	4×2=8	MEDIUM	- Mechanical lifting aids/trolleys for containment bundles over 20 kg - Pre-planned staging points to minimise carry distance - Team-lift procedure mandatory for items over 25 kg	2×2=4	LOW	Manual handling training records maintained for all personnel; task rotation to reduce repetitive strain	Manual handling risk assessment review	HSE Officer	Weekly	ISO 45001:2018 Cl.8.1.2; ILO Ergonomic Guidelines
6	Cable Containment & First Fix Installation	Use of power tools for drilling/fixing of containment supports	Contact with rotating cutting tools/drills causing laceration, and noise-induced hearing loss	Installation Technicians	Mechanical / Physical	3×3=9	MEDIUM	- PAT-tested power tools only, verified before each use - RCD (30 mA) protection fitted to all portable power tools - Fixed guarding maintained on cutting discs and blades	2×2=4	LOW	PPE: safety glasses (EN 166), cut-resistant gloves, hearing protection where levels exceed 85 dB(A); trained/authorised operators only	Power tool inspection log	Site Supervisor	Weekly	ISO 45001:2018 Cl.8.1.2; IEC 60745
4. Cable Pulling, Routing & Second Fix															
7	Cable Pulling, Routing & Second Fix	Pulling of fire alarm, speaker and emergency lighting	Entanglement and strain injury, and cuts from sharp containment edges during cable pulling	Cable Installation Team	Mechanical / Ergonomic	3×2=6	MEDIUM	- Cable rollers and lubricant used to reduce pulling force - Deburred and edge-protected containment along pull route	1×2=2	LOW	Radio communication protocol maintained between pulling team members; cut-resistant gloves (EN 388)	Toolbox talk attendance records	Site Supervisor	Daily	ISO 45001:2018 Cl.8.1.2

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		cables through congested ceiling voids						• Pre-planned pulling route survey to identify pinch points							
8	Cable Pulling, Routing & Second Fix	Second-fix wiring and circuit segregation between fire alarm and power cabling	Incorrect segregation of fire alarm circuits from power cabling, causing electrical interference, cross-connection or fire risk affecting system integrity	Installation Technicians, Building Occupants (indirect)	Electrical / Technical	3×4=12	HIGH	• Segregation maintained per BS 5839-1 / EN 54 minimum separation distances • Fire-rated cable (FP200/FP600) used throughout containment • Independent, dedicated containment system for fire alarm circuits	1×4=4	LOW	QA/QC inspection and sign-off completed before ceiling closure; as-built cable schedule maintained	QA/QC inspection checklist	Project Engineer / QA Inspector	Per installation zone, before closure	EN 54-1 / BS 5839-1; ISO 45001:2018
5. Fire Alarm Control Panel (FACP) Installation & Termination															
9	Fire Alarm Control Panel (FACP) Installation & Termination	Installation and cable termination at the Fire Alarm Control Panel	Electric shock or arc-flash burns from contact with live circuits during panel installation and termination	Electrical Technicians	Electrical	4×5=20	CRITICAL	• Lock-Out-Tag-Out with isolation verified using a GS38-compliant voltage tester • Work performed only by a Licensed Electrical Worker (LEW) • FACP supply de-energised and isolated prior to termination	1×5=5	MEDIUM	Insulated tools (IEC 60900) and appropriate arc-rated PPE worn; electrical PTW with isolation certificate closed out post-task	Isolation certificate verification	Electrical Supervisor / LEW	Every task	IEC 60364; NFPA 70E; ISO 45001:2018 Cl.8.1.2
10	Fire Alarm Control Panel (FACP) Installation & Termination	Programming, configuration and commissioning of the fire alarm control panel	Incorrect panel programming or cause-and-effect configuration leading to failure of the fire detection/evacuation system during a real fire event	Building Occupants, Facility Staff (future risk)	Technical / Process Safety	4×5=20	CRITICAL	• Commissioning performed only by a manufacturer-certified engineer • Independent third-party witness testing per NFPA 72 / EN 54-13 • Documented cause-and-effect matrix validated against design intent	1×4=4	LOW	Snag list closure verified prior to sign-off; as-commissioned documentation issued to client/Authority Having Jurisdiction	Commissioning test records / witness reports	Commissioning Engineer	At commissioning and annual re-verification	NFPA 72; EN 54-13; ISO 45001:2018
6. Voice Evacuation Speaker Installation															
11	Voice Evacuation Speaker Installation	Installation of ceiling/wall-mounted voice evacuation speakers in occupied areas	Fall from ladder/steps and trip hazard to building occupants during speaker installation in public areas	Installation Technicians, Building Occupants / Public	Fall from Height / Public Safety	3×3=9	MEDIUM	• Podium steps with integral guardrails used in place of stepladders where feasible • Work scheduled during low-occupancy hours • Barricades and cones placed around work area in public zones	1×3=3	LOW	Public warning signage displayed; competent person supervision maintained in occupied areas	Daily work-area inspection	Site Supervisor	Daily	ISO 45001:2018 Cl.8.1.2; ILO Code of Practice — Safety and Health in Construction
12	Voice Evacuation Speaker Installation	Wiring and circuit loading of voice evacuation speaker amplifier circuits	Incorrect speaker circuit loading or wiring causing amplifier overheating and fire risk	Installation Technicians, Building Occupants (future)	Electrical / Fire	2×4=8	MEDIUM	• Circuit loading calculated per manufacturer amplifier tap settings and EN 54-16 • Insulation resistance testing carried out before energising • End-of-line resistor verification on every speaker circuit	1×3=3	LOW	QA sign-off recorded on circuit schedule; periodic thermal check of amplifier cabinets post-commissioning	Insulation resistance test records	Project Engineer	Per circuit, before energisation	EN 54-16; ISO 45001:2018
7. Emergency Lighting Installation															
13	Emergency Lighting Installation	Installation of emergency lighting fixtures adjacent to existing live electrical services	Electric shock or arc-flash from contact with existing live circuits during fixture installation	Electrical Technicians	Electrical	3×5=15	HIGH	• Isolation of existing circuits confirmed via permit and lock-out • Non-contact voltage detector used to verify de-energised state before work • Only authorised electricians permitted to work near live distribution boards	1×5=5	MEDIUM	Barrier and warning signage displayed at distribution boards; arc-flash risk assessment completed per NFPA 70E	Isolation permit review	Electrical Supervisor	Every task	IEC 60364-4-41; ISO 45001:2018
14	Emergency Lighting Installation	Handling and installation of battery packs for	Chemical burn from battery leakage or short-circuit fire during battery handling and storage	Installation Technicians, Storekeepers	Chemical / Electrical	2×3=6	MEDIUM	• Batteries handled strictly per manufacturer Safety Data Sheet (SDS)	1×2=2	LOW	Spill kit available on site; damaged or swollen batteries quarantined and	Battery storage inspection	Store / HSE Officer	Weekly	ISO 45001:2018 Cl.8.1.2; UN38.3 (battery transport, where applicable)

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		self-contained emergency luminaires						- Storage in a designated fire-rated cabinet away from ignition sources - Insulated terminal caps fitted during transport and storage			disposed of per hazardous waste procedure				
8. Electrical Power Connection & Termination															
15	Electrical Power Connection & Termination	Termination of dedicated power supply from distribution board to FACP and emergency lighting circuits	Electric shock or arc-flash from incorrect isolation during power supply termination	Electrical Technicians	Electrical	3×5=15	HIGH	- Formal LOTO with multi-lock hasp where multiple trades are involved - Test-before-touch procedure using a calibrated voltage tester - Termination performed only by a Licensed Electrical Worker (LEW)	1×5=5	MEDIUM	Electrical PTW closed out and verified upon completion; as-built single-line diagram updated	LOTO / PTW audit	Electrical Supervisor	Every task	IEC 60364; NFPA 70E; ISO 45001:2018
16	Electrical Power Connection & Termination	Connection of temporary construction power supply for test and commissioning equipment	Overloading of temporary power supply causing electrical fire or equipment damage	Site Personnel	Electrical / Fire	2×3=6	MEDIUM	- Load assessment of temporary distribution board before connecting test equipment - RCD-protected (30 mA) temporary supply used throughout - Qualified electrician authorises all temporary connections	1×2=2	LOW	Periodic inspection and testing (PAT) of all portable equipment; temporary installation visually inspected weekly	Temporary electrical installation inspection	Site Electrical Engineer	Weekly	IEC 60364-7-704; ISO 45001:2018
9. Hot Works, Penetrations & Fire Stopping															
17	Hot Works, Penetrations & Fire Stopping	Drilling and coring of fire-rated walls/floors for cable routing	Dust inhalation and striking of embedded services (electrical/water) during drilling and coring	Installation Technicians, Adjacent Occupants	Physical / Structural	3×3=9	MEDIUM	- GPR/service scanning survey conducted before coring or drilling - Hot works/penetration permit system enforced for all penetrations - Method statement reviewed and approved by a structural engineer for load-bearing elements	1×3=3	LOW	RPE (FFP3 respirator) and local exhaust extraction used during coring; adjacent occupants notified in advance of works	Permit-to-work compliance check	Site Engineer	Per penetration	ISO 45001:2018 Cl.8.1.2; ASTM E814
18	Hot Works, Penetrations & Fire Stopping	Fire-stopping and sealing of cable penetrations through fire-rated compartmentation	Improper or incomplete fire-stopping compromising fire compartmentation, increasing fire/smoke spread risk to building occupants	Building Occupants (future), Installation Technicians	Fire / Process Safety	2×5=10	HIGH	- Certified fire-stop system matched to penetration type and fire rating (tested per EN 1366-3 / ASTM E814) - Installation carried out only by trained and certified applicators - Third-party QA inspection with photographic record completed before closure	1×4=4	LOW	Fire-stop schedule maintained for O&M/handover documentation; random audit of closed penetrations performed	Fire-stopping QA inspection and photo log	QA/QC Inspector	Per penetration and final audit	EN 1366-3; ASTM E814; ISO 45001:2018
10. Testing, Commissioning & System Handover															
19	Testing, Commissioning & System Handover	Live activation testing of the fire alarm and voice evacuation system	Unplanned building evacuation, panic or crowd-crush risk arising from live activation testing	Building Occupants, Testing Team	Process Safety / Public Safety	3×3=9	MEDIUM	- Written notification issued to building management/occupants and fire authority prior to testing - Phased, isolated-zone testing conducted with FACP in test mode where possible - Dedicated fire warden coordination maintained during live tests	1×2=2	LOW	Post-test 'all clear' communication protocol implemented; test schedule agreed with facility management in advance	Test notification records	Commissioning Manager	Each test event	NFPA 72; EN 54-13; ISO 45001:2018 Cl.8.2
20	Testing, Commissioning & System Handover	Sound pressure level verification of voice evacuation speakers during commissioning	Exposure to high sound pressure levels during close-proximity commissioning tests causing noise-induced hearing damage	Commissioning Technicians	Physical / Noise	3×2=6	MEDIUM	- Sound pressure level measured to remain within 85 dB(A) 8-hr TWA per ISO 9612 - Test duration limited and rotated among team members - Calibrated sound level meter used to verify compliance at each zone	1×2=2	LOW	Hearing protection (SNR-rated) worn during close-proximity high-volume tests; noise exposure log maintained	Noise exposure monitoring log	HSE Officer	Per commissioning test	ISO 9612:2009; ISO 45001:2018 Cl.8.1.2

