RISK ASSESSMENT

TESTING & COMMISSIONING - PLUMBING SYSTEM

Drainage (Soil, Waste & Rainwater) | Water Supply (PPR, Pumps, Solar Water Heater, Chiller)
Ground Floor & Roof - Residential Villa

Document Reference: HSE-RA-ABC-001

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Classification: CONTROLLED DOCUMENT — HSE / Quality Department

Industry / Sector: Civil, Plumbing, Mechanical, Construction
Edition: International Edition
Applicable Region: United Arab Emirates (UAE)

Prepared in accordance with ISO 45001:2018, ISO 31000:2018, ADOSH,
Civil Defence and Municipality requirements

1. Document Information

FIELD	DETAILS
Document Title	Risk Assessment - Testing & Commissioning of Plumbing System
Document Reference	HSE-RA-XXX-001
Revision No. / Date	Rev. 01 / 07 July 2026
Classification	Controlled Document - HSE / Quality Department
Scope	Drainage (Soil, Waste & Rainwater); Water Supply (PPR, Pumps, Solar Water Heater, Chiller) - Ground Floor & Roof, Residential Villa
Industry / Sector	Civil, Plumbing, Mechanical, Construction
Applicable Region	United Arab Emirates (UAE)
Applicable Standards	ISO 45001:2018, ISO 31000:2018, ADOSH, Civil Defence, Municipality Regulations
Risk Methodology	5x5 Likelihood x Severity Matrix (ISO 31000:2018)
Prepared By	QHSE Department
Reviewed By	HSE Manager
Approved By	Project Manager

2. Applicable Standards

STANDARD / REGULATION	SCOPE & APPLICATION
ISO 45001:2018	Occupational Health & Safety Management Systems - framework for hazard identification, risk assessment and determination of controls (Clause 6.1.2, 8.1).
ISO 31000:2018	Risk Management Guidelines - provides the principles and 5x5 likelihood x severity methodology applied throughout this risk register.
ADOSH (Abu Dhabi Occupational Safety & Health System)	Framework of Codes of Practice covering excavation, working at height, electrical safety, manual handling, chemical safety and lifting operations applicable to construction and MEP activities in the Emirate of Abu Dhabi.
UAE Federal Law No. 24 of 2019 (Building & Construction) / Federal Decree-Law No. 33 of 2021 (Labour)	Statutory requirements for construction site safety, workers' welfare and employer OSH obligations across the UAE.
Civil Defence Regulations (UAE)	Fire and life safety requirements applicable to plumbing, mechanical and utility works within occupied or under-construction facilities.
Municipality Regulations (Local Authority)	Local permitting, excavation, drainage connection and utility works approval requirements for the project Emirate.
MOHRE Ministerial Decrees	Regulates outdoor/rooftop working hours during summer months (mid-day work ban) to control heat-stress exposure.
WHO Guidelines for Drinking-water Quality	International reference standard applied for disinfection and flushing of potable water supply systems.

3. Risk Rating Matrix

SCORE (L x S)	RISK LEVEL	COLOUR	REQUIRED ACTION	AUTHORITY FOR ACCEPTANCE
1-4	**LOW**		Acceptable - no additional controls required; maintain existing controls and monitor.	Site Supervisor
5-9	**MEDIUM**		Tolerable - implement additional controls where reasonably practicable within defined timescale.	Site Engineer / HSE Officer
10-16	**HIGH**		Unacceptable without further controls - work must not proceed until additional controls are implemented and verified.	HSE Manager / Project Manager
17-25	**CRITICAL**		Stop work - immediate action required; activity suspended until risk reduced through elimination, substitution or engineering controls.	Project Manager / Senior Management

4. Authorisation

ROLE	NAME	SIGNATURE	DATE
Prepared By (QHSE Officer)			
Reviewed By (HSE Manager)			
Approved By (Project Manager)			
Client Representative			

5. Risk Register

Methodology: Risk Score (R) = Likelihood (L, 1-5) x Severity (S, 1-5). LOW 1-4 | MEDIUM 5-9 | HIGH 10-16 | CRITICAL 17-25.

No.	Work Area	Activity / Task	Hazard Description	Persons at Risk	Hazard Type	Initial L / S / R	Initial Risk Level	Control Measures	Residual L / S / R	Residual Risk Level	Monitoring Required & Frequency	Responsible	Reg. Ref.
1. Excavation & Trench Works for Underground Drainage													
1	Excavation & Trench Works for Underground Drainage	Excavating trenches for below-ground drainage pipework	Trench collapse / cave-in during excavation burying or crushing operatives working within the trench	Excavation Operatives, Trench Workers, Site Supervisor	Mechanical / Struck-by	4 / 5 / 20	CRITICAL	1. Eliminate: avoid deep open-cut where alternative routing feasible. 2. Engineering: install trench box / hydraulic shoring for depths >1.2m per soil classification (ADOSH Code of Practice, OSHA 1926 Subpart P equivalent). 3. Benching/battering to safe angle of repose. 4. Competent person to inspect trench daily and after rain/vibration before entry. 5. Spoil and materials kept minimum 1m from trench edge.	1 / 5 / 5	MEDIUM	Daily pre-shift excavation inspection; Weekly	Site Engineer / HSE Officer	ADOSH CoP; ISO 45001 Cl.8.1
2	Excavation & Trench Works for Underground Drainage	Excavating in proximity to existing buried utilities	Strike of live electrical cable or pressurised water/gas line during digging causing electrocution or injury	Excavator Operator, Banksman, Trench Workers	Electrical / Utility Strike	3 / 5 / 15	HIGH	1. Obtain utility drawings and conduct GPR / cable-avoidance survey prior to breaking ground. 2. Permit to Dig issued by client/Civil Defence authority. 3. Hand-dig trial pits within 500mm of marked services. 4. Dedicated banksman to direct plant at all times.	1 / 4 / 4	LOW	Prior to excavation start; Continuous during digging	HSE Officer / Site Engineer	UAE Federal Law No.24 (2019); ADOSH
2. Drainage Pipe Installation (Soil, Waste & Rainwater)													
3	Drainage Pipe Installation (Soil, Waste & Rainwater)	Lifting and positioning UPVC soil/waste/rainwater pipes and fittings	Manual handling injury from lifting and carrying pipe lengths in awkward trench/roof positions causing musculoskeletal strain	Plumbers, Helpers	Ergonomic	4 / 3 / 12	HIGH	1. Use mechanical lifting aids/pipe rollers where practicable. 2. Team lift (2-person minimum) for items over 25kg. 3. Manual handling training per ISO 45001 competency requirements. 4. Task rotation to limit repetitive strain.	2 / 3 / 6	MEDIUM	Toolbox talk before each shift; Weekly supervision check	Site Supervisor	ADOSH Manual Handling Guideline
4	Drainage Pipe Installation (Soil, Waste & Rainwater)	Solvent-cement jointing of UPVC drainage pipework	Inhalation exposure to solvent cement/adhesive vapours during pipe jointing causing respiratory irritation and dizziness	Plumbers	Chemical	3 / 3 / 9	MEDIUM	1. Ensure cross-ventilation in confined trench/riser spaces. 2. Review SDS and store adhesives in ventilated cabinet. 3. Respirator with organic-vapour cartridge for confined-space jointing. 4. No naked flame or smoking within work zone.	1 / 3 / 3	LOW	Pre-task SDS briefing; Each shift	HSE Officer	GHS/SDS; ADOSH Chemical Safety CoP
3. Water Supply Pipe Installation (PPR)													

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5	Water Supply Pipe Installation (PPR)	Heat-fusion jointing of PPR water supply pipes	Contact burns from PPR heat-fusion welding machine (surface temperature approx. 260°C) during pipe jointing	Plumbers, Pipe Fitters	Thermal / Mechanical	4 / 3 / 12	HIGH	1. Heat-resistant gloves (EN 407) are mandatory for machine operators. 2. Fusion machine fitted with heating-plate guard and stand. 3. Designated cooling/lay-down area away from foot traffic. 4. Only trained and certified fusion operators to use equipment.	2 / 3 / 6	MEDIUM	Daily equipment inspection; Each shift	Site Supervisor	ISO 45001 Cl.8.1; Manufacturer O&M Manual
6	Water Supply Pipe Installation (PPR)	Pressure testing of PPR water supply lines	Slip and fall due to water leakage/spillage on floor surfaces during pressure testing of pipework	Plumbers, QC Inspector	Slips, Trips & Falls	3 / 2 / 6	MEDIUM	1. Immediate containment and mopping of spills. 2. Anti-slip mating placed at test locations. 3. Warning/wet-floor signage displayed. 4. Good housekeeping maintained throughout testing.	1 / 2 / 2	LOW	Continuous during test; Post-test housekeeping check	QC Inspector	ISO 45001 Cl.8.1
4. Pump Room Installation & Testing													
7	Pump Room Installation & Testing	Electrical wiring and function testing of booster/transfer pump motors	Electric shock or electrocution during wiring, termination and live testing of pump motor circuits	Electricians, MEP Technicians	Electrical	3 / 5 / 15	HIGH	1. Lock-Out Tag-Out (LOTO) procedure applied before any panel work. 2. Only licensed electricians are permitted to work on live circuits. 3. Insulated tools and voltage-rated test equipment used. 4. ELCB/RCD tested and verified functional prior to energisation. 5. Insulated gloves (Class 0, 1000V) worn during testing.	1 / 5 / 5	MEDIUM	Permit to Work verification before energisation; Each activity	Electrical Supervisor / HSE Officer	UAE Federal Law No.24 (2019); IEC 60364
8	Pump Room Installation & Testing	Lifting and positioning of pump sets within pump room	Crush injury to hands or feet during manual/mechanical lifting and final positioning of pump units	Riggers, Plumbers	Mechanical	3 / 4 / 12	HIGH	1. Use certified lifting equipment (chain block/trolley) rated for pump weight. 2. Trained banksman to direct lift. 3. Exclusion zone established beneath suspended loads. 4. Safety footwear with steel toe-cap (EN ISO 20345) mandatory.	1 / 4 / 4	LOW	Pre-lift inspection; Each lift operation	Site Supervisor	ADOSH Lifting Operations CoP
5. Solar Water Heater Installation (Roof)													
9	Solar Water Heater Installation (Roof)	Installing and anchoring solar water heater panels/tanks on villa roof	Fall from height from unprotected roof edge during SWH panel and tank installation resulting in fatal or serious injury	Roofers, Installation Technicians	Working at Height	3 / 5 / 15	HIGH	1. Guardrails/edge protection erected at all open roof perimeters. 2. Full-body harness with double lanyard (EN 361) anchored to certified anchor point for work beyond edge protection. 3. Work at Height Permit issued and verified by HSE Officer. 4. Fall arrest system inspected before each use.	1 / 5 / 5	MEDIUM	Daily harness/anchor inspection; Before each roof access	HSE Officer / Site Supervisor	ADOSH Working at Height CoP; ISO 45001 Cl.8.1
10	Solar Water Heater Installation (Roof)	Rooftop works during daytime UAE summer conditions	Heat stress, dehydration and heat exhaustion/heat stroke	All Roof-Level Workers	Environmental / Physical	4 / 3 / 12	HIGH	1. Comply with MOHRE mid-day work ban (15 June-15 Sept, 12:30-15:00).	2 / 3 / 6	MEDIUM	Continuous during summer months;	HSE Officer	MOHRE Ministerial Decree; ADOSH

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			from prolonged rooftop work in high ambient temperature					2. Hydration stations provided with cool drinking water. 3. Shaded rest areas are available at roof access points. 4. Buddy system to monitor for heat-illness symptoms.			Hourly welfare checks		Heat Stress Guideline
6. Chiller Unit Installation & Testing (Roof)													
11	Chiller Unit Installation & Testing (Roof)	Charging and functional testing of roof-mounted chiller unit refrigerant circuit	Refrigerant gas leak/exposure during charging and commissioning causing asphyxiation risk or cold-contact frostbite	HVAC Technicians	Chemical / Mechanical	3 / 4 / 12	HIGH	1. Portable refrigerant leak detector used during charging. 2. Work is carried out in well-ventilated open roof area. 3. Safety goggles and insulated gloves (EN 511) worn during charging. 4. Only F-gas certified technicians are permitted to handle refrigerant.	1 / 4 / 4	LOW	Continuous gas detection during charging; Each activity	HVAC Supervisor	UAE Federal Law No.24 (1999) Environment; F-Gas Regulation
12	Chiller Unit Installation & Testing (Roof)	Mechanical lifting and positioning of chiller unit on roof structure	Crush or back injury during mechanical lifting and manoeuvring of heavy chiller unit into final roof position	Riggers, HVAC Technicians	Mechanical / Ergonomic	3 / 4 / 12	HIGH	1. Mobile cranes with certified operator and valid third-party certificate used for lift. 2. Documented lifting plan reviewed and approved before lift. 3. Ground and roof-level exclusion zones established. 4. Tag lines are used to control load during lift.	1 / 4 / 4	LOW	Pre-lift equipment inspection; Each lift	Lifting Supervisor	ADOSH Lifting Operations CoP
5. 7. Pressure Testing of Plumbing Systems													
13	Pressure Testing of Plumbing Systems	Hydrostatic pressure testing of drainage and water supply pipework	Sudden pipe or fitting failure under test pressure ejecting fragments or fluid causing impact/laceration injury	Plumbers, QC Inspector	Mechanical	3 / 4 / 12	HIGH	1. Test pressure is limited to manufacturer's rated maximum with appropriate safety margin. 2. Calibrated pressure-relief valve fitted to test rig. 3. Exclusion zone established around pipework during pressurisation. 4. Pressure increased gradually in stages withhold points.	1 / 4 / 4	LOW	Continuous during test; Each test cycle	QC Inspector / Site Engineer	ASTM F2164; ISO 45001 Cl.8.1
14	Pressure Testing of Plumbing Systems	Valve operation and system charging during pressure test set-up	Water hammer/sudden pressure surge causing pipe rupture, flooding and consequential slip hazard	Plumbers	Mechanical	2 / 3 / 6	MEDIUM	1. Valves opened/closed gradually to avoid surge. 2. Air-release valves fit at high points before charging. 3. Test procedure conducted per manufacturer/ASTM standard sequence.	1 / 3 / 3	LOW	Before and during charging; Each test	Site Engineer	ASTM F2164
4. 8. Flushing & Disinfection of Water Systems													
15	Flushing & Disinfection of Water Systems	Chemical disinfection of domestic water supply pipework using chlorine-based agents	Skin, eye and respiratory exposure to chlorine/sodium hypochlorite solution during disinfection dosing and flushing	Plumbers, HSE Officer	Chemical	3 / 4 / 12	HIGH	1. Chemical-resistant gloves, goggles and aprons (EN ISO 374) worn during dosing. 2. SDS reviewed and communicated to all personnel before task. 3. Adequate ventilation maintained in dosing area.	1 / 4 / 4	LOW	Pre-task SDS briefing; Each disinfection cycle	HSE Officer	WHO Guidelines; ADOSH Chemical Safety CoP

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								4. Eyewash station is available on site. 5. Disinfection carried out per WHO Guidelines for Drinking-water Quality and ADOSH requirements.					
16	Flushing & Disinfection of Water Systems	Discharge of flushing water from system to drainage	Slip hazard from uncontrolled flushing-water discharge onto walkways and work areas	Plumbers, Site Workers	Slips, Trips & Falls	3 / 2 / 6	MEDIUM	1. Discharge hose directed to designated drainage point. 2. Warning signage placed around discharge area. 3. Non-slip safety footwear worn by all personnel.	1 / 2 / 2	LOW	During each flushing operation	Site Supervisor	ISO 45001 Cl.8.1
9. Commissioning & Functional Testing													
17	Commissioning & Functional Testing	Functional testing of pump control panels and electrical starters	Electric shock during energisation and functional testing of pump control panels and starters	MEP Engineer, Electricians	Electrical	2 / 5 / 10	HIGH	1. Permit to Work obtained before energising any panel. 2. Isolation verified with calibrated voltage tester before work. 3. Insulated PPE and tools used throughout testing. 4. Only competent commissioning engineer to conduct live testing.	1 / 5 / 5	MEDIUM	Before each energisation; Each test	MEP Engineer	IEC 60364; UAE Federal Law No.24 (2019)
18	Commissioning & Functional Testing	Running of pumps and compressors during commissioning trials	Noise exposure from operating pumps/compressors during extended commissioning runs causing hearing damage	MEP Technicians	Physical / Noise	3 / 2 / 6	MEDIUM	1. Hearing protection (NRR 25dB minimum) issued and worn in pump room during trials. 2. Noise levels monitored with sound level meter. 3. Exposure duration is limited to ADOSH noise exposure limits. 4. Noise hazard signage displayed at pump room entrance.	1 / 2 / 2	LOW	Noise monitoring during trial run; Each commissioning session	HSE Officer	ADOSH Occupational Noise CoP
10. Working at Height / Roof Access for T&C Activities													
19	Working at Height / Roof Access for T&C Activities	Roof access via ladder/scaffold stair tower for T&C inspection	Fall from unprotected roof edge or access ladder during testing & commissioning inspection walk-through	HSE Officer, QC Inspector, Technicians	Working at Height	2 / 5 / 10	HIGH	1. Fixed access ladder with safety cage or scaffold stair tower provided for roof access. 2. Edge protection guardrails (1.1m minimum) maintained at all open roof perimeters. 3. Full-body harness worn when accessing areas without guardrails. 4. Work at Height Permit verified before access.	1 / 5 / 5	MEDIUM	Daily access route inspection; Before each roof access	HSE Officer	ADOSH Working at Height CoP
20	Working at Height / Roof Access for T&C Activities	Handling tools and small materials at roof level during T&C	Falling tools or materials from roof level striking personnel working at ground level below	Ground-Level Workers, Pedestrians	Mechanical / Struck-by	3 / 4 / 12	HIGH	1. Tool lanyards are used for all hand tools at roof level. 2. Exclusion zone barricaded at ground level directly below active work areas. 3. Hard hats (EN 397) mandatory for all personnel in vicinity. 4. Toe boards fitted to scaffold/roof edge platforms.	1 / 4 / 4	LOW	Before work commences; Continuous during roof activity	Site Supervisor	ADOSH CoP; ISO 45001 Cl.8.1