



HSE Confined Space Entry Safety Management Procedure

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Chapter 1 General Provisions

Article 1 Purpose

To standardize the HSE (Health, Safety and Environment) management of confined space entry operations in the Company, prevent accidents such as poisoning and suffocation, fire and explosion, and oxygen deficiency, safeguard the life safety of operators, the Company's property safety and the safety of the operation environment, and ensure the compliance and controllability of confined space entry operations in links including material warehousing, equipment maintenance and equipment servicing, this procedure is formulated in accordance with laws and regulations such as the *Interim Provisions on Safety Management and Supervision of Confined Space Operations in Industrial and Trading Enterprises*, *Safety Code for Oxygen-Deficient Hazardous Operations* (GB 8958), and requirements of superior units.

Article 2 Basis

This procedure is formulated in accordance with laws, regulations and institutional documents including the *Work Safety Law of the People's Republic of China*, *Fire Protection Law of the People's Republic of China*, *Safety Regulations for Confined Space Operations* (AQ 3028-2008), *Safety Standard for Special Operations in Hazardous Chemical Enterprises* (GB 30871-2022), *Interim Provisions on Safety Management and Supervision of Confined Space Operations in Industrial and Trading Enterprises*, *Safety Code for Oxygen-Deficient Hazardous Operations* (GB 8958), *PIPING SYSTEM PTE LTD HSE Management System Requirements*, *Confined Space Entry Safety Management Specification*, *General Principles for Fire Safety Management of Warehousing Premises*, *HSE Work Permit Management Regulations* and *HSE Emergency Preparedness and Response Management Procedure*.

Article 3 Scope of Application

1. Definition of Confined Space: A closed or semi-closed space within the Company's production and operation areas that meets the following conditions:

- Physical Conditions: Relatively isolated from the outside, with restricted access/egress (e.g., storage tanks, towers, boilers, pipelines, flues, tunnels, basements, manholes, trenches, containers, equipment cavities);
 - Space Characteristics: Poor natural ventilation, prone to accumulation of toxic and harmful substances, flammable and explosive substances, or abnormal oxygen content ($19.5\% \leq$ oxygen concentration $\leq 23.5\%$);
 - Operation Risks: Presence of physical hazards such as poisoning and suffocation, fire and explosion, drowning, collapse, high temperature, and electric shock.
2. Application Scenarios: Applicable to all confined space entry operations of the Company, including but not limited to:
- Warehousing Areas: Internal maintenance of oil storage tanks, closed anti-corrosion coating tanks, and temporary hazardous materials storage tanks;
 - Equipment Maintenance Areas: Internal grinding of pipeline equipment cavities (steel pipe inner walls), cleaning of hydraulic oil tanks, maintenance of crane gearboxes, and internal maintenance of towers/boilers;
 - Loading/Unloading Operation Areas: Inspection of closed container bodies, cleaning of internal spaces of large equipment;
 - Underground Facilities: Operations in basements, manholes, trenches, and cable trenches;
 - Other Areas: Operations in flues, tunnels, and poorly ventilated closed spaces.
3. Applicable Objects: The Company's in-house operators, contractors (outsourced units), and third-party personnel entering the operation areas; covering the entire process of confined space identification, application, approval, implementation, supervision, and acceptance.

Article 4 Management Principles

1. "Identification First, Risk Prioritization": Conduct comprehensive identification of toxic substances, oxygen content, flammable and explosive substances, and physical hazards before operations, and formulate control measures;
2. "Classified Control, Responsibility to Individuals": Classify operation levels based on risk grades, implement differentiated approval, and clarify the responsibilities of operators, supervisors, and approvers;
3. "Full-Process Supervision, Continuous Monitoring": Conduct real-time gas concentration monitoring during operations, ensure supervisors are on duty throughout the process, and strictly prohibit unsupervised operations or solo operations;
4. "Emergency Priority, Closed-Loop Management": Equip with dedicated emergency equipment, formulate special emergency plans, and ensure traceability of the entire operation process.

Chapter 2 Management Responsibilities

Article 5 Responsibilities of the HSE Management Department (Quality, Health, Safety and Environmental Department)

1. Formulate and revise this procedure and supporting documents (permit templates, risk identification lists, safety checklists), and supervise implementation by all departments;
2. Review special confined space operation plans (e.g., operations in spaces with highly toxic substances, large towers), be responsible for the final approval of special-grade and first-grade operations, and verify the compliance of the approval process for second-grade operations;
3. Organize HSE training for confined space entry operations (including risk identification, gas detection, use of protective equipment, and emergency rescue), and conduct regular special inspections;
4. Take the lead in investigating confined space operation accidents, analyze causes, formulate corrective measures, and establish accident files;
5. Supervise the configuration and maintenance of dedicated confined space equipment (positive pressure breathing apparatus, gas detectors, rescue tripods) to ensure compliance with national standards.

Article 6 Responsibilities of Operation Area Departments (Operating Units)

1. Warehouse Management Department: Responsible for the identification and registration of confined spaces (storage tanks, closed tanks) in warehousing areas, clear combustibles around the operation site, and set up warning zones;
2. Equipment Management Department: Responsible for the identification and application of confined spaces (pipeline cavities, towers, boilers) in equipment maintenance areas, provide space technical parameters (volume, material, previous stored substances), and implement physical isolation of process pipelines, lockout-tagout of electrical equipment, and isolation of mechanical equipment;
3. Loading/Unloading Management Department: Responsible for the identification and application of confined spaces (containers, internal equipment spaces) in loading/unloading areas, coordinate operation time (avoiding loading/unloading peaks), and inspect the safety of space access/egress;
4. Each department designates a safety officer to take the lead in risk identification and assessment, fill out the *Confined Space Identification List*, update management ledgers, and organize pre-operation safety briefings.

Article 7 Responsibilities of the Outsourcing Management Department

1. Review contractor qualifications (possession of confined space operation permits, and employees holding special operation certificates), sign HSE agreements, and clarify safety responsibilities;

2. Conduct pre-entry training for contractor operators (Company regulations, area risk points) and retain the *Training Record*;
3. Assign dedicated personnel to supervise contractor operations throughout the process and have the right to stop non-compliant operations.

Article 8 Responsibilities of the Human Resources Department

1. Responsible for the recruitment of confined space operation personnel: Review qualifications (no occupational contraindications, possession of valid training certificates), and organize pre-employment and annual physical examinations (focusing on screening cardiopulmonary function and respiratory system diseases);
2. Cooperate with the HSE Department in conducting training and incorporate HSE assessment into performance evaluation;
3. Protect labor rights: Avoid fatigued operations, and reasonably arrange shift rotations (single operation \leq 2 hours).

Article 9 Responsibilities of Operation-Related Personnel

1. Work Supervisor (Applicant):

- Submit operation applications and provide the *Confined Space Entry Permit*, *Risk Identification Report*, and *Safety Measures Plan*;
- Organize risk identification and assessment (toxic gases, oxygen deficiency, high temperature, electric shock, etc.), and implement safety measures such as isolation, ventilation, and detection;
- Designate qualified safety supervisors and operators, coordinate the operation process, and promptly handle abnormal situations.

2. Operation Approver:

- Review the necessity of confined space entry operations (whether entry is mandatory, and whether alternative plans exist);
- On-site verify the implementation of safety measures (whether isolation is in place, and whether protective equipment is complete);
- Issue operation permits, specify validity periods, supervise the operation process, and revoke permits if conditions change.

3. Operators:

- Pass special safety training, work with valid certificates, and have no occupational contraindications;
- Correctly use protective equipment (positive pressure breathing apparatus, safety ropes, anti-static clothing) and strictly implement safety procedures;
- Immediately evacuate and report if experiencing discomfort such as dizziness or nausea during operations, and strictly prohibit entering the space alone.

4. Safety Supervisors:

- Be qualified through special training, master emergency rescue knowledge, and hold valid supervision certificates;
- Remain on duty outside the space throughout the operation (no leaving posts or wandering between posts), and maintain regular communication with operators (once every 10 minutes);
- Monitor changes in the operation environment (gas concentration, ventilation status), immediately stop violations or abnormalities, and activate emergency measures.

Chapter 3 Confined Space Identification and Classification

Article 10 Confined Space Identification

1. Identification Entity: The safety officer of the operation area takes the lead, and jointly conducts annual identification with the HSE and Equipment Departments; identification shall be completed before newly added spaces are put into use;
2. Identification Content:
 - Basic Information: Location, volume, material, size of access/egress, internal facilities;
 - Risk Factors: Previously stored substances, potential toxic substances (benzene, hydrogen sulfide), flammable and explosive substances, physical hazards (high temperature, electric shock, collapse);
 - Protection Requirements: Ventilation method (natural/forced), detection frequency, type of protective equipment;
3. Identification Results: Fill out the *Confined Space Identification List*, establish a management ledger, and hang the sign "Confined Space - No Entry Without Permit" at the space entrance.

Article 11 Operation Classification

1. Special-Grade Confined Space Entry Operations:
 - Application Scenarios:
 - Spaces containing highly toxic substances (cyanides, arsenides) or toxic substances with concentrations exceeding 3 times the occupational exposure limit;
 - Oxygen content < 19.5% or > 23.5% that cannot be improved through ventilation;
 - Presence of flammable and explosive substances (concentration ≥ 10% LEL) or high temperature (≥ 40°C) and high electric shock risks;
 - Emergency repairs conducted at night (22:00-6:00) or under severe weather.
 - Control Requirements: Submit applications 24 hours in advance. The approval process is Work Supervisor → Department Head → HSE Department → Company In-Charge Leader; assign 2 safety supervisors, and have emergency rescue personnel on standby on-site.

2. First-Grade Confined Space Entry Operations:

- Application Scenarios:
 - Spaces containing toxic substances (concentration ≤ 3 times the occupational exposure limit);
 - Oxygen content ranging from 18% to 19.5% or 23.5% to 25%, requiring continuous ventilation to maintain normal levels;
 - Operations in oil storage tanks in warehousing areas, large pipeline cavities in equipment maintenance areas, and towers.
- Control Requirements: Submit applications 12 hours in advance. The approval process is Work Supervisor → Department Safety Officer → Department Head → HSE Department; assign 1 safety supervisor, and conduct gas detection once every 15 minutes.

3. Second-Grade Confined Space Entry Operations:

- Application Scenarios:
 - Spaces with no toxic, flammable, or explosive substances, and oxygen content ranging from 19.5% to 23.5% (maintainable through natural ventilation);
 - Operations in containers in loading/unloading areas, small equipment cavities (volume $< 10\text{m}^3$), and basements.
- Control Requirements: Submit applications 4 hours in advance. The approval process is Work Supervisor → Department Safety Officer → Department Head; assign 1 safety supervisor, and conduct gas detection once every 30 minutes.

Chapter 4 Operation Management Process

Article 12 Operation Application and Approval

1. Application Materials:

- *Confined Space Entry Permit* (fill in operating unit, location, content, time, personnel information, gas detection results, and safety measures confirmation);
- *Risk Identification Report* (including risk factors, assessment conclusions, and control measures);
- Special operation plans (purge, ventilation, rescue plans);
- Copies of operators' special operation certificates, *Training Records*, and gas detector calibration reports.

2. Approval Process:

- Special-Grade: Work Supervisor → Department Head → HSE Department Head → Company In-Charge Leader (validity period ≤ 1 hour);
- First-Grade: Work Supervisor → Department Safety Officer → Department Head → HSE Department Head (validity period ≤ 2 hours);

- Second-Grade: Work Supervisor → Department Safety Officer → Department Head (validity period ≤ 4 hours);
- Approvers must conduct on-site verification and confirm no residual risks before signing.

Article 13 Pre-Operation Preparation

1. Isolation and Purging:

- Disconnect the space from external associated systems (pipelines, electrical, mechanical): Install blind flanges on process pipelines (numbered and registered), implement lockout-tagout for electrical equipment, and strictly prohibit replacing blind flanges with mere valve closure;
- For spaces containing toxic/flammable and explosive substances, purge with nitrogen or air: After purging, the concentration of toxic substances shall be < occupational exposure limit, and the concentration of flammable gases shall be < 10% LEL;
- Conduct sampling and detection after purging: Sampling points shall cover the upper, middle, and lower heights of the space, and test results shall be filled in the *Gas Detection Record*.

2. Ventilation and Detection:

- Forced Ventilation: Use axial fans (air volume ≥ 8 times the space volume per hour), with air inlets and outlets set at the bottom and top of the space to ensure air circulation;
- Gas Detection: Use a calibrated detector (measurement range: 0-10 times the occupational exposure limit for toxic substances, 0-100% LEL for flammable gases, 0-30% for oxygen content);
- Detection Sequence: First detect oxygen content (19.5%-23.5%), then toxic substances (< allowable concentration), and finally flammable gases (< 10% LEL); detection shall be completed within 30 minutes before operation, and entry is prohibited if detection results are unqualified.

3. Preparation of Protective and Emergency Equipment:

- Personal Protection: Operators shall wear positive pressure breathing apparatus (GB/T 16556-2024) or long-tube breathing apparatus (long tube ≤ 20 meters, no damage), fasten safety ropes (load-bearing capacity ≥ 500kg), and wear anti-static clothing and anti-slip shoes;
- Emergency Equipment: On-site equipped with first-aid kits (containing antidotes and tourniquets), emergency lighting (explosion-proof type), stretchers, and rescue tripods (mandatory for special-grade operations), as well as communication equipment (with full walkie-talkie signal coverage).

4. Safety Briefing:

- The safety supervisor shall read out the briefing content (risk points, protective measures, emergency steps) to operators, and all personnel shall sign to confirm;

- Operators shall test-wear protective equipment (check breathing apparatus pressure and safety rope buckles), and the safety supervisor shall verify compliance.

Article 14 Operation Implementation

1. Personnel Entry:

- Operators shall enter through designated channels (ladders, platforms), and are prohibited from climbing non-designated structures; the safety supervisor shall observe throughout the process to avoid equipment hooking or entanglement;
- The number of operators in the space shall be ≤ 2 (≤ 1 for special-grade operations), and overstaffing or solo operations are strictly prohibited; operators shall maintain a safety distance of ≥ 1 meter.

2. Process Control:

- **Gas Detection:** The safety supervisor shall record detection results at specified intervals (once every 10 minutes for special-grade, once every 15 minutes for first-grade, and once every 30 minutes for second-grade operations); immediately stop operations and notify evacuation if concentrations exceed standards;
- **Tool Use:** Use explosion-proof operation tools (explosion-proof electric drills, copper wrenches) to avoid spark generation; place tools/materials in explosion-proof bags, and prohibit throwing or catching;
- **Operation Rotation:** Single operation duration ≤ 2 hours, with rotation intervals ≥ 30 minutes; eating, smoking, or working under the influence of alcohol in the space are strictly prohibited;
- **Supervision Requirements:** Safety supervisors shall not engage in work unrelated to supervision, keep track of operators' status in real time, and confirm communication once every 10 minutes.

3. Operation Suspension:

- Immediately stop operations and evacuate operators if any of the following occurs:
 - Gas concentration exceeding standards or failure of detection equipment;
 - Operators feeling unwell (dizziness, nausea, difficulty breathing);
 - Failure of ventilation equipment, electrical abnormalities, or external emergencies (fire, earthquake);
 - Communication interruption (no walkie-talkie signal).

Article 15 Post-Operation Management

1. On-Site Cleaning and Restoration:

- **Personnel Evacuation:** After all operators evacuate, the safety supervisor shall count the number of personnel to confirm no one is left behind;

- Equipment Recovery: Recover protective equipment (breathing apparatus, safety ropes), check for integrity, and return to storage;
- On-Site Cleaning: Clear tools/materials in the space (no residual bolts or welding slag), remove blind flanges and ventilation equipment, and restore the connection between the space and external systems (confirmed by the Equipment Department);
- Warning Restoration: Close the space access/egress and re-hang warning signs.

2. Acceptance and Archiving:

- The work supervisor and safety supervisor shall fill out the *Confined Space Entry Operation Acceptance Form*, indicating "Operation Completed, On-Site Safe";
- Retrieve the *Confined Space Entry Permit*, and archive it together with the *Risk Identification Report*, *Gas Detection Record*, *Confined Space Operation Inspection Record*, *Acceptance Form*, and *Training Record*;
- Operation area departments shall organize records monthly and submit them to the HSE Department for storage (retention period ≥ 1 year).

Chapter 5 Management of Special Circumstances

Article 16 Night and Cross Operations

1. Night Operations (22:00-6:00):

- Limited to emergency repairs (storage tank leakage, equipment failure), and shall be upgraded to special-grade operations;
- On-site equipped with explosion-proof lighting (illuminance $\geq 50\text{lux}$), add 1 safety supervisor (total 2), and ensure walkie-talkie network signal coverage;
- Conduct additional inspections of electrical equipment (line insulation, explosion-proof grade) to avoid electric leakage and sparks.

2. Cross Operations (Multi-Layer Simultaneous Operations):

- The department shall coordinate uniformly, clarify the main operating unit, and stagger operation times (prohibit simultaneous entry of upper and lower layers);
- Install protective plates (to prevent tool falling) for upper-layer operations, set up warning zones at lower-layer entrances, and prohibit personnel from staying;
- Assign dedicated safety supervisors for each layer, and use walkie-talkies with different frequencies for communication to avoid interference.

Article 17 Emergency Rescue

1. Rescue Principles:

- Strictly prohibit blind rescue: Rescuers must wear positive pressure breathing apparatus and fasten safety ropes, and be equipped with rescue tripods;

- Prioritize external rescue: Pull operators out of the space via safety ropes to avoid increasing risks by sending multiple people into the space;
- Medical Linkage: Call 120 while rescuing, inform the type of poisoning/suffocation (benzene poisoning, oxygen deficiency), and prepare antidotes.

2. Rescue Process:

- Unconscious Operators: The safety supervisor immediately calls for rescue → Rescue team arrives → Fix the tripod → Lower the safety rope into the space → Secure the operator → Pull out to a safe area;
- Poisoning Treatment: Move the operator to a ventilated area → Unfasten the collar → Keep the respiratory tract unobstructed → Use antidotes (if available);
- Oxygen Deficiency Treatment: Immediately perform cardiopulmonary resuscitation → Wait for medical personnel to arrive.

Chapter 6 Emergency Management

Article 18 Emergency Plans

The HSE Department takes the lead in formulating the *Emergency Plan for Poisoning and Suffocation Accidents in Confined Space Entry Operations*, including the following content:

1. Emergency Organization: Commander-in-Chief (Company In-Charge Leader), members (personnel from HSE, Equipment, Medical, and Administrative Departments), with clear rescue divisions of labor;
2. Emergency Equipment: More than 10 sets of positive pressure breathing apparatus, rescue tripods (load-bearing capacity $\geq 500\text{kg}$), first-aid kits (containing antidotes and oxygen cylinders), and explosion-proof communication equipment;
3. Disposal Process (see Appendix 5): Emergency Occurrence → Immediate Report → Activate Plan → Ventilation and Purging → Implement Rescue → Medical Treatment → Accident Investigation → Corrective Measures;
4. Contact Information: Hospital (120), Fire Department (119), superior unit emergency phone number, posted at the entrance of confined spaces.

Article 19 Emergency Training and Drills

1. Training Requirements:

- New Employees: No less than 16 hours of emergency training (poisoning first aid, rescue operations), and may only take up posts after passing the assessment;
- Annual Re-Training: Focus on training for identification of new-type spaces and use of intelligent detection equipment, and update the *Training Record*.

2. Drill Requirements:

- Conduct 1 emergency drill (simulating poisoning and suffocation rescue) every quarter, with participants including operators, safety supervisors, and rescuers;

- Complete the assessment within 7 days after the drill, summarize problems (unskilled rescue actions, delayed equipment retrieval), update the plan, and retain the *Emergency Rescue Drill Record*.

Article 20 Accident Reporting and Disposal

1. In case of accidents (poisoning and suffocation, explosion), on-site personnel shall immediately report to the HSE Department and Emergency Command Center, and shall not delay or conceal the accident;
2. The Emergency Command Center activates the plan and organizes rescue:
 - Minor Injuries (mild dizziness, nausea): Handled by the Company's infirmary, and recorded in the *Work-Related Injury Record Form*;
 - Severe Injuries/Deaths: Immediately report to the HSE Department, cooperate with professional rescue and investigation;
3. After the accident, the HSE Department takes the lead in the investigation: Analyze causes (failure to purge, falsified detection records, non-compliant operations), issue an investigation report, formulate preventive measures, and hold responsible persons accountable.

Chapter 7 Inspection and Assessment

Article 21 Inspection Mechanisms

1. Daily Inspection: The safety officer of the operation area inspects the operation site daily, focusing on verifying:
 - Validity of the *Confined Space Entry Permit*, performance of safety supervisors' duties, and completeness of the *Gas Detection Record*;
 - Integrity of protective equipment (breathing apparatus pressure, safety rope wear) and availability of emergency equipment;
 - Immediately stop violations if found, fill out the *Confined Space Operation Violation Rectification Form*, and require rectification within a time limit.
2. Special Inspection: The HSE Department conducts monthly special inspections, focusing on:
 - Completeness of operation records for high-risk spaces (storage tanks, towers, boilers);
 - Calibration of gas detectors (once every 3 months) and maintenance of protective equipment;
 - Compliance of contractor operations (qualifications, *Training Records*, supervision and oversight).
3. Annual Audit: The Company organizes an annual system audit and entrusts a third-party institution to evaluate:

- Effectiveness of system implementation (approval process, purging and ventilation, emergency disposal);
- Personnel capabilities (training assessment pass rate, mastery of emergency skills);
- Propose improvement suggestions (introduction of intelligent detection systems, optimization of rescue equipment).

Article 22 Assessment and Rewards/Punishments

1. Rewards:

- Departments with no violations or accidents within a year shall receive HSE performance bonus points (accounting for 15% of the total score);
- Individuals (safety supervisors, safety officers) who promptly stop major hazards (unauthorized entry without purging, operation with excessive detection results) shall be rewarded RMB 1,000-3,000;
- Individuals who propose adopted improvement suggestions (optimization of purging processes, introduction of new-type breathing apparatus) shall be rewarded RMB 2,000-5,000.

2. Punishments:

- For unauthorized entry without a permit: The work supervisor shall be fined RMB 2,000, and the department head shall be fined RMB 5,000; those causing accidents shall be held accountable, and those involving violations of laws shall be transferred to judicial authorities;
- For safety supervisors leaving posts or falsifying detection records: Suspend their qualifications for 6 months and deduct 30 performance points;
- For contractor violations: Deduct the HSE performance bond (RMB 10,000-50,000), and terminate cooperation for serious violations;
- For general accidents (loss < RMB 100,000 or minor injuries): The department head shall be suspended for inspection, and the responsible person shall have 50% of their performance deducted; for major accidents (loss ≥ RMB 500,000 or severe injuries/deaths): Pursue criminal liability.

Chapter 8 Supplementary Provisions

Article 23 Relevant Documents

1. *Work Safety Law of the People's Republic of China*
2. *Interim Provisions on Safety Management and Supervision of Confined Space Operations in Industrial and Trading Enterprises*
3. *Safety Regulations for Confined Space Operations (AQ 3028-2008)*
4. *Safety Standard for Special Operations in Hazardous Chemical Enterprises (GB 30871-2022)*

5. *Safety Code for Oxygen-Deficient Hazardous Operations (GB 8958)*
6. *HSE Management System Requirements*
7. *Confined Space Entry Safety Management Specification*
8. *HSE Work Permit Management Regulations*
9. *HSE Emergency Preparedness and Response Management Procedure*

Article 24 Record Forms

1. *Confined Space Entry Permit*
2. *Confined Space Identification List*
3. *Risk Identification Report*
4. *Gas Detection Record*
5. *Confined Space Operation Inspection Record*
6. *Confined Space Entry Operation Acceptance Form*
7. *Confined Space Operation Violation Rectification Form*
8. *Emergency Rescue Drill Record*
9. *Training Record*
10. *Work-Related Injury Record Form*

Article 25 Interpretation and Effectiveness of the Procedure

1. This procedure shall be interpreted by the Company's HSE Management Department (Quality, Health, Safety and Environmental Department);
2. This procedure shall take effect from the date of issuance, and the former *Confined Space Operation Safety Regulations of Pipeline Materials and Equipment Co., Ltd.* shall be repealed simultaneously.

Article 26 Appendices

1. Appendix 1: *Confined Space Entry Permit Template (Special-Grade/First-Grade/Second-Grade)*
2. Appendix 2: *Confined Space Operation Safety Checklist*
3. Appendix 3: *Confined Space Entry Operation Safety Prohibitions*
4. Appendix 4: *Gas Detection Standards*
5. Appendix 5: *Confined Space Operation Emergency Disposal Flowchart*

Appendices

Appendix 1: Confined Space Entry Permit (Template)

Item	Content to be Filled
Operating Unit	(e.g., Warehouse Management Department, Equipment Maintenance Department, XX Contractor)
Work Location	(Detailed location, e.g., Tank Area - No.1 Oil Tank, Pipeline Cavity in Area A of Equipment Workshop)
Work Content	(e.g., "Maintenance of Anti-Corrosion Layer Inside Tank", "Grinding of Pipeline Inner Wall", "Cleaning of Container Interior")
Work Time	From ____ year ____ month ____ day ____ hour ____ minute to ____ year ____ month ____ day ____ hour ____ minute (Validity: Special-Grade ≤ 1h, First-Grade ≤ 2h, Second-Grade ≤ 4h)
Work Grade	<input type="checkbox"/> Special-Grade <input type="checkbox"/> First-Grade <input type="checkbox"/> Second-Grade
Operator Information	Operator 1: _____ Certificate No.: _____; Operator 2: _____ Certificate No.: _____
Safety Supervisor Information	Safety Supervisor: _____ Certificate No.: _____; Contact Phone: _____
Gas Detection Results	Oxygen Content: %; Toxic Gas (): _____ mg/m ³ ; Flammable Gas: _____ % LEL; Detection Time: _____
Safety Measures Confirmation	1. Blind flange installation completed <input type="checkbox"/> 2. Forced ventilation activated <input type="checkbox"/> 3. Protective equipment in place <input type="checkbox"/> 4. Emergency equipment prepared <input type="checkbox"/>
Approval Comments	Department Safety Officer: _____ Date: _____; Department Head: _____ Date: _____
	HSE Management Department: _____ Date: _____; Company In-Charge Leader (for Special-Grade): _____ Date: _____
Work Termination Confirmation	On-site cleaned, no safety hazards: Work Supervisor: _____ Safety Supervisor: _____ Date: _____

Appendix 2: Confined Space Operation Safety Checklist

Inspection Category	Inspection Item	Inspection Content	Inspection Standard	Inspection Result (<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified)	Remarks
Personnel Qualifications	Operator Qualifications	Special operation certificate, <i>Training Record</i>	Valid certificate, qualified training, no occupational contraindications	<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified	Retain copies
	Safety Supervisor Qualifications	Supervision qualification certificate, emergency training status	Valid certificate, mastery of rescue knowledge, complete training records	<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified	
Space Preparation	Isolation Measures	Blind flanges, lockout-tagout, mechanical isolation	Blind flanges numbered and registered, electrical equipment locked out and tagged out	<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified	Check blind flange sealing
	Ventilation Status	Fan operation, ventilation port setup	Fans operating normally, ventilation ports covering upper and lower parts of the space	<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified	Check if air volume meets standards
Gas Detection	Oxygen Content	Detection 30 minutes before	19.5%-23.5%	<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified	Record detection time

		operation, and at specified intervals during operation			
	Toxic Gases	Detection value of corresponding substances	< Occupational exposure limit (allowable concentration)	<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified	Specify substance type
	Flammable Gases	Detection value of lower explosive limit (LEL)	< 10% LEL	<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified	
Protective Equipment	Personal Protection	Breathing apparatus, safety ropes, anti-static clothing	Sufficient pressure in breathing apparatus, no wear on safety ropes, compliant clothing	<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified	Confirm via test-wearing
	Emergency Equipment	Rescue tripods, first-aid kits, communication equipment	Tripods with qualified load-bearing capacity, complete first-aid supplies, unobstructed communication	<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified	Tripods mandatory for special-grade operations
On-Site Management	Warning Zone Setup	Warning tapes, signs	Reasonable warning zone scope, hung with "No Entry" signs	<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified	
	Emergency Access	Access width, unobstructed status	Width \geq 1.2 meters, no obstacles	<input type="checkbox"/> Qualified <input type="checkbox"/> Unqualified	

Inspector's Signature:		Inspection Date: ____ year ____ month ____ day	Work Supervisor's Confirmation:		
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Appendix 3: Confined Space Entry Operation Safety Prohibitions

1. Personnel Prohibitions

1. Strictly prohibit personnel without special operation certificates or *Training Records* from entering confined spaces for operations;
2. Strictly prohibit unsupervised operations, solo operations, or operations under the influence of alcohol;
3. Strictly prohibit personnel with occupational contraindications (hypertension, heart disease, epilepsy) from entering confined spaces for operations;
4. Strictly prohibit personnel who have not received safety briefings or mastered emergency measures from conducting operations.

2. Operation Prohibitions

1. Strictly prohibit unauthorized operations without applying for the *Confined Space Entry Permit*;
2. Strictly prohibit operations without implementing safety measures (isolation, ventilation, detection);
3. Strictly prohibit operations with unqualified gas detection results (excessive oxygen content/toxic/flammable gases);
4. Strictly prohibit operations beyond the scope of the permit (time, area, content).

3. Protection Prohibitions

1. Strictly prohibit entering toxic/oxygen-deficient spaces without wearing positive pressure breathing apparatus (or long-tube breathing apparatus);
2. Strictly prohibit arbitrarily removing protective equipment such as safety ropes and anti-static clothing;
3. Strictly prohibit using unqualified or uncalibrated gas detectors and protective equipment;
4. Strictly prohibit using rescue equipment in violation of regulations (e.g., forced rescue without fixing tripods).

Appendix 4: Gas Detection Standards

1. Detection Frequency and Requirements

1. Detection Timing:

- Before Operation: Complete the first detection within 30 minutes before the start of operation;
- During Operation: Once every 10 minutes for special-grade operations, once every 15 minutes for first-grade operations, and once every 30 minutes for second-grade operations;
- In Case of Abnormalities: Conduct immediate detection when space conditions change (ventilation failure, external leakage) or operators feel unwell;
- After Interruption: Re-conduct detection before re-entering if the operation is interrupted for more than 30 minutes.

2. Detection Scope:

- Sampling points shall cover the upper (top), middle, and lower (bottom) heights of the confined space to ensure no detection blind spots;
- Focus on detecting dead corners of the space (e.g., tank bottom, pipeline bends) to avoid accumulation of toxic gases.

2. Qualification Standards

Gas Type	Detection Indicator	Qualification Standard	Remarks
Oxygen Content	Volume fraction of oxygen in the space	19.5%-23.5%	< 19.5% is oxygen-deficient, > 23.5% is oxygen-rich
Flammable Gases	Volume fraction of lower explosive limit (LEL)	< 10% LEL	Immediate ventilation and purging if exceeding the standard; strictly prohibit hot work
Toxic Gases	Concentration of corresponding substances	< National specified occupational exposure limit (allowable concentration)	e.g., Hydrogen sulfide < 10mg/m ³ , Benzene < 6mg/m ³ (time-weighted average)
Other Harmful Gases	Concentration of corresponding	< Relevant standard limits	e.g., Carbon monoxide <

	substances		30mg/m ³
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Appendix 5: Confined Space Operation Emergency Disposal Flowchart

flowchart TD

A[Emergency Occurs (Personnel Discomfort/Gas Over-Standard)] --> B[Safety Supervisor Immediately Stops Operation, Reports to HSE Department + Emergency Command Center]

B --> C[Activate the *Emergency Plan for Poisoning and Suffocation Accidents in Confined Space Entry Operations*]

C --> D[Rescue Team Arrives: Turn on Forced Ventilation to Purge Gas in the Space]

D --> E[Implement Rescue: Use Tripod + Safety Rope, Rescuers Wear Positive Pressure Breathing Apparatus to Pull Operators Out of the Space]

E --> F[Medical Treatment: Move to Ventilated Area, Check Vital Signs → Minor Injuries (Handled by Company Infirmary)/Severe Injuries (Call 120 for Medical Treatment)]

F --> G[Protect Accident Scene: Retain Gas Detection Records and Protective Equipment Status, Prohibit Unrelated Personnel from Entering]

G --> H[HSE Department Leads the Establishment of an Investigation Team to Analyze Accident Causes (Failure to Purge/Falsified Detection/Non-Compliance)]

H --> I[Formulate Corrective Measures (Strengthen Training/Increase Detection Frequency), Update Procedures, and Implement Accountability]