



# **HSE Warehouse and Warehousing HSE Management Procedure**

## **Document No.: CLADDING-HSE-OC-13**

### **1 Purpose**

To standardize the Health, Safety and Environment (HSE) management throughout the entire warehouse and warehousing process of the Company, identify safety risks (e.g., material collapse, chemical leakage), health hazards (e.g., dust, noise) and environmental impacts (e.g., packaging waste pollution) in links including material warehousing acceptance, storage, ex-warehouse, and facility maintenance; establish a closed-loop mechanism of "pre-event prevention, in-process control, and post-event disposal"; prevent warehousing accidents (fire, mechanical injury, environmental pollution); safeguard employees' life and health, the integrity of the Company's material assets, and ecological environment safety; and comply with the requirements of *PIPING SYSTEM PTE LTD Warehouse HSE Management Specifications*, *COMPANY Material Warehousing Safety Control Requirements*, as well as laws and regulations such as the *Regulations on the Safety Management of Hazardous Chemicals* and *Rules for Fire Safety Management of Warehouses*. This procedure is hereby formulated.

### **2 Scope of Application**

This procedure applies to all warehouse and warehousing-related departments of the Company (Warehousing Center / Warehousing Management Department, Procurement Department, Equipment Management Department, HSE Management Department / Quality, Safety and Environmental Protection Department, Requisition Department / User Department, etc.) and all warehousing operation personnel, covering the following scopes:

#### **2.1 Warehouse Types**

- General Material Warehouses: For storing non-hazardous materials such as pipeline accessories, hardware tools, and personal protective equipment;
- Hazardous Chemical Warehouses: For storing flammable/explosive/corrosive materials such as rust inhibitors, cleaning agents, acetylene cylinders, and oxygen cylinders (independently isolated);

- **Special Equipment Storage Areas:** For storing hoisting machinery, small transport vehicles, etc., to be delivered or maintained;
- **Spare Parts Warehouses:** For storing equipment maintenance spare parts (e.g., valves, bearings) and precision instruments (requiring temperature and humidity control);
- **Open-Air Yards:** For storing weather-resistant materials such as large pipelines and pipe fittings (requiring deformation prevention and corrosion protection).

## **2.2 Entire Warehousing Process**

Including material warehousing acceptance, storage zoning, daily inspection, inventory maintenance, loading and unloading, ex-warehouse distribution, waste disposal, warehouse facility maintenance, fire safety, occupational health, and emergency management.

## **2.3 Characteristics of Relevant Materials**

- **Large-Sized Materials:** Pipelines, pipe fittings (requiring deformation prevention and collision prevention);
- **Special Equipment:** Forklifts, small cranes (requiring fixed parking and tipping prevention);
- **Hazardous Chemicals:** Flammable liquids (rust-preventive oil), compressed gases (gas cylinders), corrosive liquids (cleaning agents);
- **Precision Materials:** Testing instruments, meters (requiring dust prevention and constant temperature/humidity);
- **General Materials:** Hardware accessories, personal protective equipment (requiring moisture prevention and mildew prevention).

## **3 Terms and Definitions**

### **3.1 Warehousing HSE Risk Points**

Links in the warehousing process that may cause HSE accidents (e.g., mixed storage of hazardous materials, shelf overloading, electrical short circuits, excessive dust).

### **3.2 Classified Storage of Hazardous Chemicals**

A storage method that isolates hazardous chemicals of different properties (flammable, explosive, corrosive, toxic) in accordance with GB 15577 *General Rules for Storage of Hazardous Chemicals in Warehouses* to avoid cross-contamination or reactions.

### **3.3 Major Warehousing HSE Hidden Hazards**

Hazards that may cause major accidents (e.g., warehouse fires, chemical explosions, material collapse, group occupational injuries) and require immediate work suspension for rectification (see Appendix A for determination criteria).

### **3.4 Inventory Maintenance**

Maintenance measures implemented to ensure material quality and storage safety, such as temperature and humidity monitoring, rust and corrosion prevention, pest and rodent prevention, and dust control.

### **3.5 Warehousing Operation Permit**

A special permit for high-risk warehousing operations (e.g., hazardous material loading/unloading, high-level stacking, hot work, temporary electricity use), specifying risk control measures.

### **3.6 Warehouse Fixed-Location Management**

A management method that plans and marks fixed positions for warehouse areas (storage area, operation area, passage area, office area), materials, and facilities to ensure tidiness and order.

## **4 Responsibility Assignment**

### **4.1 Warehousing Center / Warehousing Management Department (Lead Department)**

- Formulate and revise this procedure in a coordinated manner, and organize HSE training for warehousing operation personnel (hazardous material storage, shelf operation, fire-fighting skills, occupational protection);
- Ensure HSE compliance of warehouse planning and layout, and implement zoned storage and fixed-location management (Appendix E);
- Implement HSE control throughout the warehousing process (warehousing acceptance, storage inspection, loading/unloading, ex-warehouse verification) and fill out the *Warehousing HSE Management Ledger*;
- Maintain warehouse facilities (shelves, fire-fighting equipment, ventilation equipment, emergency equipment) to ensure they are in good condition and effective;
- Take the lead in warehouse HSE hidden hazard investigation and rectification, and organize warehouse emergency drills and fire-fighting training;
- Manage warehousing waste (packaging materials, expired materials) and dispose of them in categories in accordance with environmental protection requirements;
- Implement warehouse occupational health measures (dust prevention, noise reduction, provision of protective equipment) and establish health monitoring files.

## **4.2 HSE Management Department / Quality, Safety and Environmental Protection Department (Centralized Supervision Department)**

- Supervise the implementation of this procedure and participate in HSE review of warehouse planning and major hidden hazard rectification;
- Conduct random inspections on the implementation of warehousing HSE management (compliance of hazardous material storage, effectiveness of fire-fighting facilities, occupational hazard control);
- Test environmental protection and occupational health indicators in warehouses (noise, dust, volatile organic compound concentration) and supervise hazardous waste disposal;
- Participate in the investigation of warehousing HSE accidents, analyze causes, and formulate preventive measures;
- Provide warehousing HSE technical support (risk assessment methods, emergency plan optimization, occupational health protection guidance).

## **4.3 Procurement Department**

- Coordinate with suppliers to ensure materials delivered are accompanied by complete HSE documents (MSDS, product conformity certificates, safety labels, occupational hazard notifications);
- Cooperate with the Warehousing Center in HSE acceptance of materials for warehousing and coordinate with suppliers for return/replacement of unqualified materials;
- Prioritize the procurement of environmentally friendly packaging materials and energy-saving equipment to reduce waste and energy consumption in the warehousing process.

## **4.4 Equipment Management Department**

- Be responsible for HSE control of storage and maintenance of special equipment (warehousing forklifts, cranes) and warehousing equipment (stackers, conveyors);
- Regularly inspect the safety performance of warehousing equipment (braking, limiting) , guide maintenance, and promptly eliminate outdated equipment;
- Participate in HSE hidden hazard investigation in special equipment storage areas to ensure compliance of equipment parking and electricity use.

## **4.5 Requisition Department / User Department**

- Apply for material collection in accordance with HSE requirements (for hazardous chemicals, provide explanations of usage purposes and protective measures);
- Cooperate with the Warehousing Center to verify the HSE status of ex-warehouse materials (packaging integrity, safety labels, occupational hazard reminders);

- Feedback HSE issues found in the storage link of collected materials (rust, leakage, dust pollution).

## 4.6 Management

- Company Top Management / Management Representative: Approve major decisions on warehouse HSE management (e.g., expansion of hazardous chemical warehouses), major hidden hazard rectification plans, and ensure investment in HSE management resources;
- Company Warehouse-In-Charge Leader: Approve major HSE renovation plans for warehouses and warehousing operation permits (hot work, high-altitude work);
- Head of Warehousing Center: Approve daily maintenance plans and HSE ledgers, and review hidden hazard rectification plans;
- Warehouse Team Leaders: Supervise team members in implementing warehousing HSE procedures, handle minor on-site hazards, and organize pre-shift HSE inspections.

## 4.7 Warehousing Operation Personnel

- Conduct warehousing, storage, and ex-warehouse operations in strict accordance with procedures and refuse illegal instructions (overloading stacking, hot work without permits);
- Correctly wear and use personal protective equipment (safety helmets, dust masks, chemical protective clothing) and conduct pre-shift HSE inspections;
- Immediately stop operations and report when discovering warehousing HSE hazards (shelf deformation, chemical leakage, excessive dust);
- Participate in warehouse emergency drills and fire-fighting training, and master initial fire and leakage disposal as well as first-aid skills.

# 5 Management Procedures

## 5.1 HSE Management for Warehouse Planning and Construction

### 5.1.1 HSE Requirements for Planning

#### 1. Site Selection and Layout:

- Warehouses shall be located away from office areas and living areas, avoid areas prone to geological disasters; the distance between hazardous chemical warehouses and other warehouses shall be  $\geq 50$  meters (in accordance with GB 50016 *Code for Fire Protection Design of Buildings*);
- Internally partition in accordance with fixed-location management requirements (Appendix E): storage area, operation area, passage area (width  $\geq 1.5$  meters), office area, with clear signs for each area;

- Hazardous chemical areas shall be further subdivided into flammable liquid areas, compressed gas areas, and corrosive material areas; the isolation distance between areas shall be  $\geq 10$  meters, with fire and explosion-proof walls and leakage collection tanks (depth  $\geq 10\text{cm}$ ) installed.

## 2. Building Safety:

- Building structures shall meet earthquake resistance ( $\geq$  local basic intensity) and fire protection (fire resistance rating  $\geq$  Class II) requirements; open-air yards shall be equipped with wind and dust suppression nets;
- Warehouse floor load-bearing shall meet material storage requirements (general area  $\geq 5\text{kN/m}^2$ , special equipment area  $\geq 10\text{kN/m}^2$ ), with intact waterproof and moisture-proof layers;
- Walls and floors of hazardous chemical warehouses shall use anti-corrosion and anti-static materials; doors and windows shall be equipped with fire and explosion-proof glass.

## 3. Facility Configuration:

- Fire-Fighting Facilities: Equip fire extinguishers (1 unit per  $50\text{ m}^2$ ), fire sand pools (special for hazardous areas  $\geq 2\text{m}^3$ ), fire hydrants (spacing  $\leq 120$  meters), and automatic fire-extinguishing systems (for hazardous chemical warehouses) in accordance with warehouse area;
- Safety Facilities: Install video surveillance and smoke alarm systems, equip emergency lighting (continuous lighting  $\geq 90$  minutes), and emergency eye wash stations (distance  $\leq 30$  meters from corrosive material areas);
- Ventilation and Protection: Install explosion-proof exhaust fans (air exchange  $\geq 12$  times per hour) in hazardous chemical warehouses, equip constant temperature and humidity systems in precision material areas, and install dust removal equipment in dust operation areas.

### 5.1.2 HSE Review for Construction Acceptance

1. After warehouse construction is completed, the Warehousing Center takes the lead in acceptance, with participation of the HSE Management Department and Equipment Management Department;
2. Key Acceptance Items: compliance of zoning, building safety (earthquake resistance and fire protection), effectiveness of facilities (fire-fighting, ventilation, emergency), and completeness of fixed-location signs;
3. Additional Acceptance for Hazardous Chemical Warehouses: leakage collection capacity, ventilation effect, anti-static grounding (grounding resistance  $\leq 10\Omega$ ), and explosion-proof electrical equipment;
4. Issue the *Warehouse Construction HSE Acceptance Report* (Appendix B) for qualified warehouses before putting them into use; re-acceptance is required after rectification for unqualified ones.

### 5.2 HSE Management for Material Warehousing

## 5.2.1 Warehousing Acceptance Process

### 1. Arrival Receiving:

- Warehousing operation personnel verify material name, specification, and quantity to confirm consistency with purchase orders;
- Inspect material packaging: no damage or deformation for general materials; packaging of hazardous chemicals complies with GB 190 *Packaging Marks for Dangerous Goods*, with warning signs and occupational hazard reminders affixed;
- Collect HSE documents: hazardous chemicals shall be accompanied by MSDS (original or copy with supplier's official seal); special equipment shall be accompanied by conformity certificates; dust materials shall be accompanied by dust-proof storage requirements.

### 2. HSE Special Acceptance:

- General Materials: Inspect for no rust, no peculiar smell, no dust pollution on the surface; verify temperature and humidity sensitivity labels for precision materials;
- Hazardous Chemicals: Verify packaging tightness (no leakage), completeness of MSDS (including emergency disposal and occupational hazards), and validity period;
- Special Equipment: Inspect parking fixing devices (forklift handbrakes, wheel chocks), safety protection devices (limiting, braking), and appearance damage.

### 3. Handling of Acceptance Results:

- Qualified: Fill out the *Material Warehousing HSE Acceptance Form* (Appendix C), assign storage locations, and enter into the inventory system;
- Unqualified (damaged packaging, missing MSDS, excessive dust): Issue the *Warehousing Rejection Form*, and the Procurement Department shall coordinate with suppliers for return/replacement; unqualified materials are prohibited from warehousing.

## 5.2.2 HSE Control for Loading and Unloading

### 1. Pre-Operation Preparation:

- Inspect the safety status of loading and unloading equipment (forklifts, cranes): effective braking, intact tires, normal limiting; prohibit the use of unqualified equipment;
- For high-risk operations (hazardous material loading/unloading, high-level stacking  $\geq 3$  meters), apply for the *Warehousing Operation Permit* (Appendix D); operation personnel shall wear corresponding protective equipment (chemical protective clothing, safety belts, dust masks);
- Demarcate operation warning areas, set warning signs, prohibit unrelated personnel from entering, and turn on emergency lighting for night operations.

### 2. Operation Process Control:

- General Materials: Handle with care to avoid collision; stacking height shall not exceed the shelf load limit (marked on shelf columns); use sealed handling for dust materials;

- Hazardous Chemicals: Transport flammable liquids in an upright manner; use special trolleys (anti-rolling) for compressed gas cylinders; wear chemical-resistant gloves for corrosive materials;
- Special Equipment: Use special fixing brackets to ensure stable parking; maintain a distance of  $\geq 1.5$  meters from other materials; prohibit overloading handling ( $\leq 90\%$  of the equipment's rated load).

### 3. Post-Operation Cleaning:

- Clean the loading and unloading site; sort packaging waste into special recycling bins; conduct dust cleaning after handling dust materials;
- Inspect the operation area for leakage or spillage; test for ground residues (using test paper or detectors) after handling hazardous chemicals; keep records.

## 5.3 HSE Management for Material Storage

### 5.3.1 Zoned Storage Control

#### 1. General Material Area:

- Stack in accordance with the principle of "heavy items at the bottom, light items at the top; large items at the bottom, small items at the top"; maintain a distance of  $\geq 30\text{cm}$  between shelf layers; passage width  $\geq 1.5$  meters; implement fixed-location signs (Appendix E);
- Regularly inspect shelves: no deformation, no loose bolts, clear load-bearing signs; prohibit overloading (load per layer  $\leq$  shelf design value);
- Store moisture-sensitive materials (pipe fittings) on elevated pallets (height  $\geq 10\text{cm}$ ) and equip dehumidifiers; store dust materials (e.g., cement products) in sealed containers and conduct regular dust removal.

#### 2. Special Equipment Area:

- Store forklifts and small cranes separately; install wheel chocks and handbrakes for fixing; keep keys in unified custody; install protective covers for exposed parts (hooks, drive wheels);
- The storage area floor shall be hardened and provided with anti-slip stripes; equip fire extinguishers (distance  $\leq 10$  meters from equipment); conduct regular lubrication and rust prevention; inspect equipment status monthly.

#### 3. Hazardous Chemical Area:

- Implement the "double-person receiving and dispatching, double-person storage" system; establish the *Hazardous Chemical Storage Ledger* (Appendix F); storage quantity shall not exceed the design limit (flammable liquids  $\leq 500\text{L}$ );
- Store flammable liquids and oxidizers separately (distance  $\geq 5$  meters); fix compressed gas cylinders upright (anti-tipping brackets); maintain a distance of  $\geq 10$  meters from heat sources (lamps, motors);

- Conduct daily inspections: packaging tightness, temperature and humidity (temperature  $\leq 30^{\circ}\text{C}$ , humidity  $\leq 65\%$  in flammable areas), ventilation status; record inspection results; handle abnormalities immediately.

#### 4. Precision Material Area:

- Maintain constant temperature and humidity (temperature  $18\text{-}25^{\circ}\text{C}$ , humidity  $40\%\text{-}60\%$ ); equip temperature and humidity recorders and dust-proof cabinets; record data daily;
- Store materials in sealed packaging; wear dust-free gloves when taking materials; prohibit bringing food or beverages into the area; conduct regular cleaning and disinfection (once a month).

#### 5. Open-Air Yard:

- Stack large pipelines and pipe fittings by specification; install anti-tipping brackets; stacking height  $\leq 3$  layers; maintain a distance of  $\geq 1$  meter between stacks;
- Implement corrosion prevention measures (apply anti-rust paint, cover with rainproof cloth); conduct regular inspections (once a week); handle rust promptly when found.

### 5.3.2 HSE Measures for Inventory Maintenance

#### 1. Daily Maintenance:

- General Materials: Inspect once a week; promptly handle rust, mildew, or dust accumulation (rust removal, ventilation, dust removal);
- Hazardous Chemicals: Inspect packaging daily; verify MSDS validity period monthly; notify the Procurement Department in advance for materials approaching expiration ( $\leq 3$  months);
- Precision Materials: Calibrate the temperature and humidity system monthly; clean equipment surfaces quarterly to avoid dust accumulation;
- Open-Air Materials: Inspect the integrity of rainproof cloth after rain; promptly remove accumulated water to prevent soaking and corrosion.

#### 2. Special Weather Response:

- Rainy Season: Inspect warehouse waterproofing (roof, doors, windows); elevate moisture-sensitive materials; activate dehumidifiers; reinforce rainproof cloth in open-air yards;
- Summer: Strengthen ventilation in hazardous chemical areas; activate cooling equipment (air conditioners, fans); avoid direct sunlight;
- Winter: Inspect water pipe anti-freezing; preheat special equipment (below  $-5^{\circ}\text{C}$ ) to prevent component freezing and cracking;
- Windy and Sandy Weather: Close warehouse doors and windows; cover open-air yards with wind and dust suppression nets; stop outdoor operations.

## 5.4 HSE Management for Material Ex-Warehouse

### 5.4.1 Ex-Warehouse Review

1. The Requisition Department submits the *Material Requisition Form*, specifying the purpose of use; for hazardous chemicals, additional explanations of protective measures and usage scenarios shall be provided;
2. Warehousing operation personnel verify the requisition form: material name, specification, quantity; confirm compliance with HSE requisition requirements (requisitions for hazardous chemicals shall correspond to operation permits);
3. Before ex-warehouse of hazardous chemicals and dust materials, verify the qualifications of requisition personnel (hazardous chemical use training certificates, provision of dust operation protective equipment).

### **5.4.2 Ex-Warehouse Verification and Handover**

1. Pick materials in accordance with the "first-in-first-out" principle; verify the HSE status:
  - General Materials: Intact packaging, no damage, clear signs, no dust/rust;
  - Hazardous Chemicals: MSDS accompanies the goods, no packaging leakage, complete warning signs, and accompanying protective equipment (e.g., chemical-resistant gloves);
  - Special Equipment: Intact safety devices, accompanied by operation manuals and occupational hazard notifications;
2. During handover, inform the requisition personnel of HSE precautions for material use (hazardous material storage requirements, equipment operation taboos, dust protection measures);
3. Fill out the *Material Ex-Warehouse HSE Handover Record* (Appendix G), sign and confirm with both parties, and file for retention.

### **5.4.3 Post-Ex-Warehouse Cleaning**

1. Organize storage locations; fill vacancies promptly; maintain neat stacking and clear fixed-location signs;
2. Clean packaging waste and dust generated during picking; sort into recycling bins; store hazardous waste separately;
3. After ex-warehouse of hazardous chemicals and dust materials, inspect the original storage locations for residues or leakage; conduct cleaning, disinfection, and dust removal if necessary.

## **5.5 HSE Management for Warehouse Facility Maintenance**

### **5.5.1 Maintenance Plan Formulation**

The Warehousing Center formulates the *Annual HSE Maintenance Plan for Warehouse Facilities* (Appendix H) by facility type, specifying:

- Shelves: Inspect bolt tightness and beam deformation quarterly; conduct load testing annually (loading 80% of the design load);

- Fire-Fighting Facilities: Inspect fire extinguisher pressure/validity monthly; test fire hydrant water supply (pressure  $\geq 0.15\text{MPa}$ ) and automatic fire-extinguishing systems semi-annually;
- Ventilation/Temperature-Humidity Systems: Clean filters monthly; calibrate sensors quarterly; clean filter bags of dust removal equipment in dust areas monthly;
- Emergency Equipment (Eye Wash Stations, Leakage Collection Tanks): Test water flow/collection capacity weekly; clean monthly; replenish emergency materials in hazardous areas quarterly;
- Electrical Facilities: Inspect line insulation and explosion-proof electrical sealing quarterly; test temporary electrical equipment before use (grounding resistance  $\leq 4\Omega$ ).

## 5.5.2 Maintenance Process Control

1. Before maintenance, apply for the *Warehouse Facility Maintenance Operation Permit*, specifying risk control measures:
  - High-Altitude Work (shelf maintenance  $\geq 3$  meters): Wear safety belts; set warning areas; prohibit work below;
  - Electrical Maintenance (explosion-proof lamps, temporary electricity): Operate with power cut off; post warning signs; use insulated tools; test harmful gas concentration ( $\leq$  occupational exposure limit);
  - Maintenance in Hazardous Areas (chemical warehouses): Ventilate for 30 minutes before operation; wear gas masks; carry emergency leakage treatment kits;
2. Record the *Warehouse Facility Maintenance HSE Record* (Appendix I) during maintenance, specifying maintenance content, results, and problem handling; use qualified spare parts (complying with safety and environmental standards);
3. After maintenance, verify the HSE functions of facilities (shelf load-bearing, fire-fighting facility spray range, dust removal equipment efficiency); put into use only after qualification.

## 5.6 Warehouse HSE Hidden Hazard Investigation and Rectification

### 5.6.1 Investigation Mechanism

1. Daily Investigation: Warehousing operation personnel conduct pre-shift/post-shift inspections using the *Warehouse HSE Inspection Form* (Appendix A), focusing on:
  - Material Storage: No overloading, no mixed storage, clear signs, dust/leakage control;
  - Facility Status: No shelf deformation, intact fire-fighting facilities, no exposed electrical wiring;
  - Operation Environment: Unobstructed passages, no debris accumulation, normal temperature/humidity/dust concentration;

2. Special Investigation: The HSE Management Department conducts joint investigations with the Warehousing Center monthly, covering:
  - Compliance of hazardous chemical storage (zoning, ventilation, grounding, quantity limits);
  - Electrical safety (explosion-proof, line insulation, temporary electricity use);
  - Occupational health (dust prevention, noise reduction, protective equipment wearing);
  - Effectiveness of fire-fighting facilities (fire extinguishers, alarm systems, emergency passages);
3. Seasonal Investigation: Investigate waterproofing/moisture prevention in rainy seasons; investigate fire prevention/cooling in summer; investigate anti-freezing/anti-slip in winter; investigate wind/dust prevention in windy and sandy weather.

### **5.6.2 Hidden Hazard Classification and Disposal**

- Major Hidden Hazards (Appendix A): Immediately stop relevant operations; the Warehousing Center reports to the HSE Management Department within 1 hour; formulate a rectification plan within 24 hours; resume operations only after acceptance of rectification;
- General Hidden Hazards: The Warehousing Center formulates a rectification plan and completes rectification within 3 days; team leaders verify the effect;
- Minor Hidden Hazards: Operation personnel rectify on-site immediately and record in the *Warehouse HSE Inspection Form*.

### **5.6.3 Rectification Closure**

Establish the *Warehouse HSE Hidden Hazard Rectification Ledger* (Appendix J), recording hidden hazard descriptions, rectification measures, responsible persons, and completion time limits; submit an acceptance application after rectification; the HSE Management Department verifies the rectification effect of major hidden hazards to form a closed loop.

## **5.7 Warehouse Fire Safety HSE Management**

### **5.7.1 Fire Prevention Management**

1. Fire Source Control:
  - Smoking is strictly prohibited in warehouses; post "No Open Flame" signs; equip fire source storage boxes at warehouse entrances;
  - For hot work (e.g., shelf welding), apply for the *Warehousing Operation Permit*; clear combustibles within 5 meters of the operation point; assign fire monitors and equip fire-fighting equipment;
  - Use explosion-proof lamps ( $\leq 60W$ ) in hazardous chemical warehouses; prohibit mobile lighting; install electrical switches outside the warehouse;
2. Combustible Material Management:

- Clean packaging waste (cardboard, plastic) daily; store in temporary fire-proof storage ( $\leq 10 \text{ m}^3$ ); transfer weekly;
- Prohibit storing irrelevant combustibles (e.g., waste paper, rags) in hazardous chemical warehouses; promptly clean leaked flammable liquids with explosion-proof absorbent cotton;

### 3. Passage Management:

- Fire-fighting passage width  $\geq 4$  meters; emergency passage width  $\geq 1.2$  meters; prohibit stacking materials or blocking;
- No obstacles within 1 meter of warehouse entrances, staircases, and fire hydrants; signs are clear and visible.

## 5.7.2 Fire-Fighting Facility Management

### 1. Facility Configuration:

- Equip 4kg dry powder fire extinguishers at a ratio of 1 unit per  $50 \text{ m}^2$  in general warehouses; equip 1 unit per  $25 \text{ m}^2$  in hazardous chemical warehouses, along with fire sand and fire blankets;
- Install automatic sprinkler systems in warehouses with height  $\geq 12$  meters; install gas fire-extinguishing systems in hazardous chemical warehouses;
- Equip emergency lighting and evacuation signs at warehouse exits and staircases; activate automatically after power failure;

### 2. Daily Maintenance:

- Inspect fire extinguisher appearance and pressure daily; verify validity monthly; replace expired or damaged ones immediately;
- Inspect fire hydrant valves and interfaces quarterly to ensure no rust; test water supply pressure and range ( $\geq 10$  meters) annually;
- Test smoke alarm systems monthly; conduct linkage tests of automatic fire-extinguishing systems semi-annually to ensure timely response.

## 5.7.3 Fire-Fighting Training and Drills

1. New employees must receive fire-fighting training (fire extinguisher use, evacuation routes, initial fire disposal) and pass assessments before taking up posts;
2. Conduct fire-fighting drills (fire alarm, personnel evacuation, fire extinguishing operations) once a quarter; record drill effects and optimize plans;
3. Organize fire-fighting skill competitions (fire extinguisher operation, water hose connection) annually to improve operation personnel's emergency capabilities.

## 5.8 Warehouse Occupational Health HSE Management

### 5.8.1 Occupational Hazard Identification and Control

### 1. Hazard Identification:

- Dust Hazards: Particulates generated during handling and storage of dust materials (cement products, metal powder);
- Noise Hazards: Noise generated by the operation of equipment such as forklifts, stackers, and fans ( $\leq 85\text{dB}$ ; control required if exceeding the standard);
- Chemical Hazards: Toxic substances generated by leakage or volatilization of hazardous chemicals (corrosives, volatile organic compounds);
- Physical Strain: Musculoskeletal injuries caused by heavy material handling and prolonged bending operations;

### 2. Control Measures:

- Dust Control: Store and handle dust materials in sealed containers; install dust removal equipment (efficiency  $\geq 95\%$ ); operation personnel wear N95 dust masks;
- Noise Control: Select low-noise equipment ( $\leq 75\text{dB}$ ); install silencers on equipment; operation personnel wear earplugs (noise reduction value  $\geq 20\text{dB}$ );
- Chemical Control: Store hazardous chemicals in sealed containers; strengthen ventilation (air exchange  $\geq 12$  times/hour); wear chemical protective clothing and gas masks;
- Physical Protection: Use equipment such as forklifts and pallets to reduce manual handling; set up rest areas; avoid prolonged continuous operations (10-minute rest every 2 hours).

## 5.8.2 Personal Protective Equipment Management

### 1. The Warehousing Center equips personal protective equipment by operation type (Appendix K):

- General Operations: Safety helmets, anti-slip shoes, reflective vests;
- Dust Operations: N95 dust masks, protective goggles;
- Hazardous Chemical Operations: Chemical protective clothing, chemical-resistant gloves, goggles, gas masks;
- High-Altitude Operations: Safety belts, anti-slip shoes, safety helmets;

### 2. Inspect protective equipment regularly (once a month); replace damaged or expired ones immediately; establish distribution ledgers to record distribution and replacement times;

### 3. Supervise operation personnel to wear and use equipment correctly; prohibit on-site operations for those who fail to wear as required.

## 5.8.3 Health Monitoring and Promotion

### 1. Organize annual occupational health examinations for warehousing operation personnel (add lung function tests for dust operation personnel, and blood routine tests for chemical operation personnel);

2. Establish occupational health monitoring files; record examination results; promptly transfer personnel with occupational contraindications (e.g., asthma, pneumoconiosis) from relevant posts;
3. Conduct quarterly occupational health promotion (lectures, posters) to popularize knowledge on dust, noise, and chemical hazard protection; provide health consultation services.

## 5.9 Warehouse Waste and Environmental Protection HSE Management

### 5.9.1 Classified Disposal of Waste

1. General Waste (packaging cardboard, plastic film, waste paper): Collect centrally and transfer to compliant units for recycling; establish the *General Waste Disposal Ledger*;
2. Hazardous Waste (waste oil barrels, expired chemicals, packaging contaminated with hazardous substances, waste batteries):
  - Store in special sealed containers; affix hazardous waste signs (Appendix L); store separately in hazardous waste storage areas (rainproof, anti-seepage);
  - Establish the *Warehouse Hazardous Waste Disposal Ledger* (Appendix M); record generation quantity, composition, and disposal units (with hazardous waste disposal qualifications);
  - Entrust disposal in accordance with national regulations; obtain disposal waybills and file for retention;
3. Domestic Waste: Set up classified trash bins (recyclable, non-recyclable); clean daily to avoid mosquito breeding and peculiar smells;
4. Wastewater Disposal:
  - Warehouse cleaning wastewater shall be discharged into municipal pipelines after sedimentation; direct discharge is prohibited;
  - Use absorbent cotton to absorb wastewater from hazardous chemical leakage; dispose of as hazardous waste; discharge into sewers is prohibited.

### 5.9.2 Environmental Monitoring and Energy Conservation Management

1. The HSE Management Department tests warehouse environmental protection indicators quarterly:
  - Hazardous Chemical Areas: Volatile Organic Compound (VOCs) concentration  $\leq$  GB 37822 *Standards for Control of Volatile Organic Compounds Emissions from Unorganized Sources* ( $\leq 2\text{mg}/\text{m}^3$ );
  - Warehouse Boundary Noise:  $\leq$  GB 12348 *Emission Standard of Environmental Noise at Boundaries of Industrial Enterprises* ( $\leq 65\text{dB}$  during daytime,  $\leq 55\text{dB}$  at night);

- Dust Concentration: ≤ GBZ 2.1 *Occupational Exposure Limits for Hazardous Factors in the Workplace - Part 1: Chemical Hazardous Factors* (total dust ≤ 8mg/m<sup>3</sup>) in operation areas;

## 2. Energy Conservation Measures:

- Select LED energy-saving lamps; turn on warehouse lighting as needed (turn off in unoccupied areas); reduce artificial lighting when natural light is sufficient;
- Optimize the operation of temperature and humidity systems (≥ 18°C in winter, ≤ 26°C in summer) to avoid energy waste;
- Promote recyclable packaging (metal pallets, turnover boxes); reduce the use of disposable packaging (target: 20% annual reduction);
- Analyze warehouse energy consumption data regularly (once a month); identify energy-saving potential and formulate improvement measures.

## 5.10 Warehouse Emergency Management

### 5.10.1 Emergency Plan Formulation

The Warehousing Center, in conjunction with the HSE Management Department, formulates the *Special Emergency Plan for Warehouse and Warehousing*, including:

- Fire Emergency: Use fire extinguishers/fire sand for initial fires; activate alarms for large-scale fires; evacuate personnel to assembly points along evacuation routes;
- Hazardous Chemical Leakage Emergency: Isolate the leakage area (set warning tapes); use absorbent cotton/neutralizers for treatment (use baking soda for acid leakage, boric acid for alkali leakage); prohibit open flames;
- Material Collapse Emergency: Stop operations; evacuate personnel; use cranes to remove collapsed materials to avoid secondary collapse;
- Occupational Health Emergency: Immediately transfer personnel poisoned by dust/chemicals to ventilated areas; wear gas masks; send to hospital if necessary; stop operations for noise-induced injuries and check hearing;
- Clarify the emergency organization structure, response process, and material allocation (Appendix N: Warehouse Emergency Material Allocation List).

### 5.10.2 Emergency Preparation

#### 1. Inspect emergency materials regularly (once a quarter):

- Fire Emergency: Fire extinguishers, fire sand, fire blankets, water hoses;
- Leakage Emergency: Absorbent cotton, neutralizers, plugging tools, chemical protective clothing;
- First-Aid Emergency: First-aid kits (tourniquets, disinfectants), eye wash stations, shower equipment;
- Communication Emergency: Walkie-talkies, emergency phones (posted in visible locations in warehouses);

2. Keep emergency passages and exits unobstructed with clear signs; inspect monthly;
3. New employees must be familiar with the emergency process and assembly point locations upon entry; conduct at least one emergency knowledge training annually.

### **5.10.3 Emergency Disposal**

When an HSE accident occurs in the warehouse:

1. On-site personnel immediately stop operations; take initial control measures (fire extinguishing, leakage blocking, transferring poisoned personnel); evacuate unrelated personnel;
2. Report to the head of the Warehousing Center and the HSE Management Department within 15 minutes; specify the accident type, location, and impact scope (e.g., "Hydrochloric acid leakage in hazardous chemical warehouse, affecting an area of 5 m<sup>2</sup>");
3. Activate the emergency plan; organize emergency rescue; contact external rescue (fire department: 119, medical service: 120, environmental protection department: local environmental protection bureau) if necessary;
4. After accident disposal, the Warehousing Center, in conjunction with the HSE Management Department, investigates the cause; formulates preventive measures; updates the management procedure to avoid recurrence of similar accidents.

## **5.11 Record and Archive Management**

### **5.11.1 Record Content**

The Warehousing Center establishes the *Warehouse HSE Management Archive*, including:

- Planning and Construction: Acceptance reports, zoning diagrams, fixed-location management diagrams;
- Warehousing/Ex-Warehouse Management: Acceptance forms, handover records, hazardous chemical ledgers;
- Facility Maintenance: Maintenance plans, maintenance records, operation permits;
- Hidden Hazard Rectification: Inspection forms, rectification ledgers, acceptance records;
- Fire Safety: Fire-fighting facility inspection records, drill records;
- Occupational Health: Protective equipment ledgers, health monitoring files, training records;
- Environmental Protection: Waste disposal ledgers, monitoring reports;
- Emergency Management: Emergency plans, drill records, accident reports.

### **5.11.2 Retention Requirements**

- Paper Records: Archived by the Warehousing Center; retention period  $\geq 3$  years (retention period  $\geq 5$  years for hazardous chemical and accident records);

- Electronic Records: Synchronously uploaded to the Company's HSE management system; encrypted for storage; regularly backed up; traceable;
- Archive Access: Requires approval from the head of the Warehousing Center; unauthorized copying, alteration, or destruction is strictly prohibited.

## 6 Supporting Documents

- *Warehouse HSE Management Specifications*
- *COMPANY Material Warehousing Safety Control Requirements*
- *Regulations on the Safety Management of Hazardous Chemicals* (State Council Decree No. 591)
- *Rules for Fire Safety Management of Warehouses* (Ministry of Public Security Decree No. 6)
- *GB 50016 Code for Fire Protection Design of Buildings*
- *GB 15577 General Rules for Storage of Hazardous Chemicals in Warehouses*
- *GB 190 Packaging Marks for Dangerous Goods*
- *GBZ 2.1 Occupational Exposure Limits for Hazardous Factors in the Workplace - Part 1: Chemical Hazardous Factors*
- *Company HSE Emergency Management Procedure*
- *Company Hazardous Waste Management Measures*
- *Company Fire Safety Management System*
- *Company Personal Protective Equipment Management Regulations*

## 7 Appendices

### Appendix A: Warehouse HSE Inspection Form (Integrating Original Major Hidden Hazard Determination Standards, Adding Daily Inspection Items)

Inspection Category	Inspection Item	Inspection Standard	Inspection Method	Inspection Cycle	Determination of Major Hidden Hazards (Meet One of the Following)
Building Safety	Building Structure	Intact, no damage or cracks, up to	Visual Inspection +	Monthly	Structural cracks/deformation, fire

		standard for earthquake resistance and fire protection	Professional Testing		resistance rating not up to standard
	Floor Load-Bearing	No settlement or damage, meeting storage requirements	Visual Inspection + Load Testing	Quarterly	Floor settlement $\geq 5\text{cm}$ , unable to bear design load
Fire-Fighting Facilities	Fire Extinguishers	Normal pressure (green zone), within validity period, neatly arranged	Visual Inspection + Pressure Check	Weekly	Over 5 expired/under-pressure fire extinguishers, no fire sand/fire blankets
	Fire Hydrants	No rust, intact valves, pressure $\geq 0.15\text{MPa}$	Visual Inspection + Pressure Testing	Semi-Annually	No water/unopenable fire hydrants, failed automatic fire-extinguishing system
	Emergency Passages	Width $\geq 1.2$ meters, unobstructed, clear signs	Visual Inspection + Tape Measurement	Daily	Over 50% blocked passages, no evacuation signs
Storage Management	Material Stacking	Neat and stable, no overloading, zoned storage	Visual Inspection + Load Mark Check	Daily	Shelf overloading and bending, mixed storage of hazardous materials
	Hazardous Chemicals	Sealed, no leakage, temperature/humidity $\leq 30^\circ\text{C}/65\%$ ,	Visual Inspection + Thermo-Hygrometer	Daily	Untreated leakage, uncontrollable temperature/humidity

		double-person management			exceeding standards
Electrical Safety	Circuits/Switches	No exposure or aging, explosion-proof electrical equipment used in explosion-proof zones	Visual Inspection + Insulation Testing	Monthly	Exposed/short-circuited circuits, damaged explosion-proof electrical equipment
	Temporary Electricity	With permit, good grounding, no random wiring	Visual Inspection + Grounding Testing	Before Use	Unauthorized electricity use, grounding resistance > 10Ω
Occupational Health	Dust Concentration	Operation area ≤ 8mg/m <sup>3</sup> , correct wearing of protective equipment	Detector + Visual Inspection	Monthly	Dust concentration > 15mg/m <sup>3</sup> , no protective measures
	Noise	Operation area ≤ 85dB, wearing of earplugs	Sound Level Meter + Visual Inspection	Monthly	Noise > 95dB, no noise reduction measures
Environmental Protection	Waste Disposal	Classified storage, separate storage of hazardous waste	Visual Inspection	Weekly	Hazardous waste mixed with general waste, ground pollution from leakage

**Appendix B: Warehouse Construction HSE Acceptance Report (Template) (Omitted, Same as Original Appendix C, Adding Building Earthquake Resistance and Fixed-Location Management Acceptance Items)**

**Appendix C: Material Warehousing HSE Acceptance Form (Template) (Omitted, Same as Original Appendix D, Adding Occupational Hazard Document Verification Items)**

**Appendix D: Warehousing Operation Permit (Template) (Omitted, Same as Original Appendix E, Adding Temporary Electricity and Dust Operation Permit Items)**

**Appendix E: Warehouse Fixed-Location Management Standards (Newly Added)**

Area Type	Division Requirements	Sign Requirements	Management Standards
Storage Area	Zoned by material properties (general/hazardous/precision), with isolation lines (yellow solid lines, width 5cm)	Blue signs (general area), red signs (hazardous area), green signs (precision area); indicating area name, material type, responsible person	Materials neatly stacked, distance $\geq 10$ cm from isolation lines, no cross-area storage
Operation Area	Clear division of loading/unloading areas and picking areas; area $\geq 1.5$ times the turning radius of operation equipment	Yellow signs; indicating "Operation Area, No Unauthorized Entry"; white dashed lines for operation tracks on the ground	Warning cones set during operation; clean materials/tools after operation, no debris accumulation
Passage Area	Main passage width $\geq 2$ meters, auxiliary passage width $\geq 1.5$ meters, turning radius $\geq 1.8$ meters (for forklift operation)	Green ground signs; hanging signs indicating "Passage Area, No Stacking"; arrows for	No materials/tools occupied, no water/oil on the ground, sufficient lighting

		direction guidance	
Office Area	Isolated from storage/operation areas (distance $\geq$ 5 meters), separated by glass windows	White signs; indicating "Office Area"; access control at the entrance	No material storage, keep tidy, no food/beverages brought in
Hazardous Waste Area	Independently set near hazardous chemical warehouses (area $\geq$ 10 m <sup>2</sup> ), anti-seepage treatment on the ground	Red signs; indicating "Hazardous Waste Storage Area, No Open Flame"	Classified storage, sealed containers, affixed with hazardous waste signs, daily inspection

**Appendix F: Hazardous Chemical Storage Ledger (Template) (Omitted, Same as Original Appendix F, Adding Storage Quantity Limits and Occupational Hazard Reminder Items)**

**Appendix G: Material Ex-Warehouse HSE Handover Record (Template) (Omitted, Same as Original Appendix G, Adding Occupational Hazard Precaution Notification Items)**

**Appendix H: Annual HSE Maintenance Plan for Warehouse Facilities (Template) (Omitted, Same as Original Appendix H, Adding Dust Removal Equipment and Emergency Eye Wash Station Maintenance Items)**

**Appendix I: Warehouse Facility Maintenance HSE Record (Template) (Omitted, Same as Original Appendix I, Adding Electrical Insulation Testing and Dust Filter Bag Cleaning Record Items)**

**Appendix J: Warehouse HSE Hidden Hazard Rectification Ledger (Template) (Omitted, Same as Original Appendix K)**

## Appendix K: Personal Protective Equipment Allocation Standards for Warehousing Operations (Newly Added)

Operation Type	Mandatory Protective Equipment	Optional Protective Equipment	Replacement Cycle
General Operations	Safety helmet, anti-slip shoes, reflective vest	Protective gloves	Safety helmet: 2 years; Shoes: 1 year; Vest: 6 months
Dust Operations	N95 dust mask, protective goggles, safety helmet	Dust-proof clothing	Mask: 7 days; Goggles: 3 months; Dust-proof clothing: 6 months
Hazardous Chemical Operations	Chemical protective clothing, chemical-resistant gloves, goggles, gas mask	Anti-slip shoes, safety helmet	Chemical protective clothing: 1 year (or replacement when damaged); Gloves: 1 month; Mask filter cartridge: 3 months
High-Altitude Operations ( $\geq 3$ meters)	Safety belt, safety helmet, anti-slip shoes	Protective goggles	Safety belt: 2 years (qualified after testing); Shoes: 1 year
Electrical Maintenance Operations	Insulated gloves, insulated shoes, safety helmet	Protective goggles	Insulated gloves: 6 months (withstand voltage testing); Shoes: 1 year

## Appendix L: Hazardous Waste Signs (Example) (Newly Added)

- Sign Size: 30cm×20cm (rectangle), red border, yellow background;
- Sign Content: Upper part - hazardous waste warning sign (skull and crossbones pattern); Lower part - indicate waste name (e.g., "Waste Hydrochloric Acid Barrels"), generating unit, contact person and phone number;
- Posting Location: Front of hazardous waste storage containers, entrance of hazardous waste area.

## Appendix M: Warehouse Hazardous Waste Disposal Ledger (Template) (Omitted, Same as Original Appendix L)

## Appendix N: Warehouse Emergency Material Allocation List (Newly Added)

Emergency Type	Material Name	Specification	Quantity (Per 1000 m <sup>2</sup> Warehouse)	Storage Location	Inspection Cycle
Fire Emergency	Dry Powder Fire Extinguisher	4kg/unit	20 units	Within 5 meters of each warehouse exit	Weekly
	Fire Sand	2m <sup>3</sup> /pile	2 piles	Entrance of hazardous chemical area	Monthly
	Fire Blanket	1m×1m/piece	10 pieces	Operation area, hazardous chemical area	Monthly
Leakage Emergency	Absorbent Cotton	500g/package	50 packages	Emergency box in hazardous chemical area	Monthly
	Neutralizer (Baking Soda/Boric Acid)	10kg/barrel	2 barrels each	Emergency box in hazardous chemical area	Quarterly

	Plugging Glue	500ml/tube	10 tubes	Emergency box in hazardous chemical area	Quarterly
First-Aid Emergency	First-Aid Kit	Including tourniquet, povidone-iodine, gauze	5 kits	Warehouse office, operation area	Monthly
	Eye Wash Station	Desktop type	2 stations	Hazardous chemical area, corrosive material area	Weekly
	Shower Equipment	Vertical type	1 station	Hazardous chemical area	Weekly
Communication Emergency	Walkie-Talkie	Explosion-proof type	5 units	Warehouse team leaders, operation personnel	Weekly (Charging)
	Emergency Phone	Wall-mounted type	3 units	Warehouse entrance, hazardous chemical area, operation area	Daily (Call Testing)

## Appendix O: Hazardous Chemical Storage Requirements (Newly Added)

### O.1 Storage Site Requirements

- Special Warehouse: Fire resistance rating  $\geq$  Class II, ground as non-sparking ground (e.g., epoxy resin), walls paved with anti-corrosion tiles;

- Explosion-Proof Facilities: Use explosion-proof lamps ( $\leq 60W$ ), explosion-proof switches; circuits protected by galvanized steel pipes;
- Ventilation Facilities: Explosion-proof exhaust fans (air volume  $\geq 12$  times the warehouse volume per hour), wind caps installed on the roof;
- Protection Facilities: Leakage collection tanks (depth  $\geq 10cm$ , volume  $\geq 10\%$  of the maximum storage tank), emergency eye wash stations (distance  $\leq 30$  meters from corrosive materials);
- Sign Facilities: Post "Hazardous Chemical Warehouse, No Unauthorized Entry" at the entrance; post warning signs by material type in the area.

## **O.2 Storage Operation Requirements**

- Quantity Limit: Storage of flammable liquids in a single warehouse  $\leq 500L$ ; storage of compressed gas cylinders  $\leq 20$  cylinders (oxygen and acetylene stored separately, distance  $\geq 5$  meters);
- Stacking Requirements: Stack flammable liquid barrels  $\leq 2$  layers; stack corrosive materials  $\leq 1$  layer; fix gas cylinders upright (anti-tipping brackets);
- Temperature and Humidity Control: Temperature  $\leq 30^{\circ}C$  (activate air conditioners in summer) and humidity  $\leq 65\%$  (use dehumidifiers) in flammable areas;
- Inspection Frequency: Inspect packaging tightness and temperature/humidity daily; verify inventory quantity weekly; conduct leakage testing (using gas detectors) monthly;
- Taboo Requirements: Isolate acidic and alkaline materials (distance  $\geq 10$  meters); isolate oxidizers and flammables (distance  $\geq 10$  meters); mixed storage is prohibited.

## **8 Supplementary Provisions**

**8.1 This procedure shall be interpreted by the Company's Warehousing Center.**

**8.2 This procedure shall come into force on the date of issuance. In case of any inconsistency between the existing warehouse and warehousing HSE management regulations and this procedure, this procedure shall prevail.**

**8.3 This procedure shall be revised once a year, or updated in a timely manner according to changes in national laws and regulations, CNPC/Pipeline Bureau management requirements, and Company business.**

**8.4 For matters not covered in this procedure, refer to the *Warehouse HSE Management Specifications* and relevant laws and regulations.**