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**Drainage Services Department Practice Note No. 1/2021**

**Safety Supervision of Work in Confined Space**

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## 1. INTRODUCTION

1.1 The construction, operation and maintenance of DSD's sewerage and drainage systems and sewage treatment facilities often involve works to be carried out in confined spaces like sewers, drains, tunnels, manholes, chambers, tanks, outfalls, etc. Working in confined spaces is dangerous, especially in live sewers and manholes due to the possible presence of dangerous gases and oxygen deficiency, cramped working environment, slippery surface, in-rush of dangerous substances, etc.

1.2 The restricted access and poor ventilation characteristics of a confined space not only create risks of accumulation of dangerous gases and oxygen deficiency but also increase the difficulty in escape and rescue in the event of an emergency. As the danger of the atmosphere is invisible, a lack of awareness of threat has been a major cause of most gassing accidents that involve multiple casualties. Very often the person who attempts to rescue a collapsed co-worker will enter a confined space without realizing the invisible danger and become another victim.

1.3 This Practice Note provides guidelines on the safety supervision of DSD's confined space works and highlights the important issues to be checked. A checklist is developed for this purpose and is enclosed in **Appendix A**. The previous DSD Practice Note No. 3/2012 and the Checklist (Sep 2015 version), which was previously designed for internal use and is now obsolete, are hereby superseded and cancelled.

1.4 DSD's site supervisory staff and consultants, and DSD's in-house staff, who are responsible for the safety supervision of DSD's confined space works, should observe the requirements of this Practice Note, as well as those of the Factories and Industrial Undertakings (Confined Spaces) Regulation and the associated Code of Practice, DSD's Safety Manual (2018) and other divisional instructions concerned, whichever are applicable.

## 2. LEGAL REQUIREMENTS

2.1 The current legislation that governs the safety at work in confined space is the Factories and Industrial Undertakings (Confined Spaces) Regulation. The Regulation sets out the responsibilities of the contractors and the workers engaged in such work. The associated Code of Practice – "Safety and Health at Work in Confined Spaces" issued by the Labour Department provides practical guidance and technical information to facilitate compliance with the Regulation.

2.2 In brief, the Regulation requires the contractor to set up a safe system-of-work for the effective implementation of the following legal duties:

- (a) to appoint a "competent person" (CP) to carry out a risk assessment and make recommendation on suitable safety precautionary measures;
- (b) to ensure that all necessary safety precautionary measures have been taken;
- (c) to issue a certificate, customarily a "permit-to-work" certificate, stating that all necessary precautions have been taken and specifying the period during which workers may remain safe in the confined space;
- (d) to ensure that no workers other than "certified workers" (CW) enter or work in the confined space;
- (e) to ensure that a person, i.e. the "standby person", is stationed outside the confined space to maintain communication with the worker(s) inside;

- (f) to ensure the use of an approved breathing apparatus (BA) and other necessary personal protective equipment (PPE) by workers;
- (g) to formulate and implement appropriate procedures to deal with any serious and imminent danger to workers inside the confined space;
- (h) to provide necessary information, instructions, training and supervision to all workers working in a confined space or assisting with such work from immediately outside the confined space, and
- (i) to provide all necessary equipment to ensure the safety and health of workers in a confined space.

2.3 The Regulation also imposes legal duties on the workers, which include:

- (a) to observe the procedures as may be implemented by the contractor;
- (b) to observe the instructions and advice and attend the training as may be provided by the contractor; and
- (c) to make full and proper use of, and immediately report to the contractor any fault or defect in, any safety equipment or emergency facilities.

### **3. ENHANCED SAFETY MEASURES**

3.1 At the commencement of a contract, the representative or delegate of the Engineer, Project Manager, Service Manager or Supervising Officer, hereinafter collectively called the Engineer's Representative (ER), of DSD's site supervisory staff and consultants' Resident Site Staff (RSS) should check if the main contractor has established a written notification system that enables the ER to be precisely informed of any confined space works to be carried out. The system should also include means to ensure that the main contractor is to be informed for any such work to be carried out by his subcontractors or other persons, especially during public holidays or urgent situations.

3.2 In view of the special nature and risks of DSD's confined space works, the following enhanced safety measures, which are in addition to the legal requirements, are to be implemented for the confined space works incurred in DSD's civil and E&M capital works contracts and maintenance contracts.

- (a) Enhanced Training for "competent persons" (CPs): Any CPs participating in DSD's confined space works are required to attend the "Confined Space Safety Training for Competent Persons engaged in DSD's Works" course run by Construction Industry Council (CIC) as per DSD Technical Circular No. 3/2012 – "Confined Space Training for Competent Persons and Certified Workers Engaged in DSD's Works". CPs who have completed the training and hold a valid certificate are referred to as "Designated Competent Persons" (DCPs).
- (b) Enhanced Training for "certified workers" (CWs): Any CWs participating in DSD's confined space works are required to attend the "Confined Space Safety Training for Certified Workers engaged in DSD's Works" course run by CIC as per DSD Technical Circular No. 3/2012 mentioned above. CWs who have completed the training and holds a valid certificate are referred to as "Designated Certified Workers" (DCWs).

- (c) Continuous Gas Monitoring: Irrespective of the risk assessment report recommending whether periodic monitoring or continuous monitoring is to be carried out in the confined space during the progress of work, the person(s) entering a confined space shall bring along a gas detector to continuously monitor the atmosphere to enable immediate evacuation in case the atmosphere turns unsafe unknowingly.
- (d) Personal Distress Alarm: A personal distress alarm of dead-man type, which is able to give out audio and visual signals soon after a person loses his mobility (commonly 15 to 20 seconds), shall be worn by all persons entering a confined space to facilitate early location and rescue of the person in distress.
- (e) Access Control: A system for recording the number and identity of the persons entering into and exiting from the confined space, which is commonly called a tag-in/tag-out system, shall be established at the entrance to the confined space. The system shall only be manned by personnel stationed outside the confined space (e.g. the standby person), who shall also keep the person-in-charge informed of the register. Expedient entry, especially during odd hours, lone and without safety equipment, is one of the common causes of confined space accidents and must be strictly prohibited.
- (f) Enhanced Supervision by the Contractor:
  - (i) The Contractor shall appoint a “contractor’s representative” at a rank commensurate with the nature, risk and scale of the confined space works (e.g. site agent, sub-agent, safety officer, etc.) to issue the permit-to-work certificate, and notify the ER of such appointed person for acceptance before the works commence.
  - (ii) The Contractor shall appoint a “person-in-charge” who possesses the necessary knowledge and experience of the confined space works to be carried out (e.g. sub-agent, foreman) to receive the permit-to-work certificate and oversee the confined space works, and notify the ER of such appointed person for acceptance before the works commence.
  - (iii) The Contractor shall appoint a person having the qualification of a DCP and knowledge and experience commensurate with the nature, risk and scale of the confined space works to conduct the risk assessment, and shall notify the ER of such appointed person for acceptance before the works commence. Further, the DCP who conducts the risk assessment shall be present full time on site but refrain from acting as a DCW or Standby Person to avoid safety being compromised by resources and time.
  - (iv) The person-in-charge shall assign a person having the qualification of a DCW to act as the “standby person”.
  - (v) The Contractor shall also arrange other staff who is/are not carrying out the confined space works (e.g. site agent, site engineer, safety officer, etc.) to act as an “independent checker”, who shall conduct at least 3 site checks in each shift of confined space operation, depending on the nature, risk and scale of the works.

#### 4. CHECKING OF CONFINED SPACE WORKS

4.1 Upon the Contractor's notification of work in confined space with man-entry, the ER should appoint a staff having the qualification of a CP (or DCP) to check the setting up of the confined space works before works are allowed to proceed. The staff concerned shall check together with the person-in-charge the following:

- (a) whether the Contractor has fulfilled his legal duties as per para. 2.2 above;
- (b) whether the workers have fulfilled their legal duties as per para. 2.3 above; and
- (c) whether the Contractor has implemented and maintained effective the enhanced safety measures as per para. 3.2 above.

4.2 During checking, the staff should take note of the following:

- (a) Risk Assessment: It has to be conducted by the Contractor's DCP with extreme care, having due regard to the confined space working environment (e.g. condition of the interior of a manhole, geometry, access and egress points, natural ventilation, presence of utilities, etc.) and surroundings (e.g. seafront, hillside, nearby factories, hospitals, etc. where there is a possibility of sudden ingress of floodwater, hot liquid, solvents or other dangerous materials, whether in form of liquid, solid, dust, fume or vapour, etc.), the nature of the work process and duration, plant and materials to be used (e.g. fire hazard due to use of solvents, oxygen depletion due to use of diesel plant, etc.). Particular attention should also be paid to the effect of weather (e.g. surge in water level inside the drainage and sewerage system during and after a rainstorm).
- (b) Fresh assessment of working conditions: Whenever there is a significant change in the working conditions (e.g. anticipated surge in water level in confined space after a rainstorm), the confined space works shall be suspended and a fresh risk assessment with recommendations on safety and health measures shall be conducted. The previous permit-to-work shall then be cancelled and a new one shall be issued after the recommended safety precautionary measures are effectively implemented.
- (c) Gas Monitoring: It should be conducted by DCPs with adequate training and experience, having regard to the possible changes in the level of concentrations of dangerous gases and oxygen that may arise as a result of change in time and surrounding environment (e.g. sudden discharge from a factory, etc.). Continuous monitoring over a suitable period of time can detect the presence of certain gases that might not be picked up in one single test. Further, common gas detectors are only able to detect concentrations of CH<sub>4</sub>, CO, H<sub>2</sub>S and O<sub>2</sub>. Attention should also be paid to the possible presence of other hazardous gases that may not be detected by common 4-in-1 type gas detectors, e.g. those associated with industrial effluent.
- (d) Access Condition: Access to a typical confined space, e.g. manhole or tank, is often restricted, which is also the cause of poor ventilation leading to accumulation of dangerous gases and increased difficulty for escape and rescue. Attention should be paid to the condition of access including size of opening, floor condition, illumination and means of access (e.g. ladders or man-lifting device, etc.) to check whether it can allow free passage of the rescue personnel and equipment and retrieval of an incapacitated person

speedily. Whenever the site condition permits, an additional access for emergency use shall be provided.

- (e) Safety Equipment: It is important for the person-in-charge to ensure that all necessary safety equipment is provided in sufficient quantities, maintained in good working order and used according to the recommendation of the risk assessment report prepared by the Contractor's DCP. The checking shall also include inspection of the maintenance and calibration certificates of the safety equipment and on-site functional test to verify that the safety equipment is in good working order.
- (f) Permit-to-Work: The period of time that the DCWs are allowed to stay and work in a confined space must be specified in the permit. The permit shall be cancelled after the work is completed and that all personnel shall be evacuated and all tools and equipment shall be removed from the confined space. The permit must not be issued in advance. It should be issued and signed by the contractor's representative and received and signed by the person-in-charge of the confined space works on site immediately before the commencement of work.
- (g) Person-in-charge: The person-in-charge of the confined space works is the most important person and should have the necessary knowledge and experience to oversee the works and all related safety matters. He/she is responsible for ensuring that all safety measures are implemented and maintained effective throughout the works to be carried out. He/she shall also brief the DCWs and standby person of the risks, the safety measures and emergency procedures. He/she shall supervise the works full time during man-entry.
- (h) DCWs: The DCWs shall observe all safety instructions and keep alert at all times to watch out for any sudden danger during work in order to safeguard themselves. They shall carry a gas detector with them and continuously monitor the atmosphere in the confined space. Each DCW must wear a personal distress alarm preferably at waist level. A safety harness attached with a lifeline of which the end is manned by the standby person outside should be worn, unless the risk assessment report recommends the otherwise.
- (i) Standby Person: The standby person shall be a DCW. He/she shall station at the entrance of the confined space full time when someone is inside. He/she shall keep watching out for possible danger and maintain communication with the DCWs inside at regular intervals, normally from 1 to 2 minutes depending on the level of risk, to ensure that the situation inside the confined space remains safe. He/she shall not be engaged in other activities and shall make himself/herself readily available at all times to summon assistance immediately.
- (j) Emergency Preparedness: Emergency preparedness forms an essential part of the necessary safety measures. It shall include the availability of the emergency life-saving equipment, including man-lifting tripod, first-aid box, resuscitator, standby BA for rescue use, etc., and if recommended by the risk assessment report, a qualified first aider. The telephone numbers of the nearest fire station and ambulance depot should also be in hand, especially for the use of the standby person, so that assistance can be summoned immediately. The most important consideration in preparing an emergency plan is how the workers can evacuate safely from the inside of a confined space, and how an incapacitated worker can be retrieved speedily to a safe

place, in the event of an emergency.

- (k) Hand-dug Tunnel: If the confined space works to be carried out is construction of hand-dug tunnels, reference shall also be made to the Guidance Notes on Safety and Health of Hand-dug Tunnelling Work (Dec 2017) published by the Labour Department.

4.3 In addition, the staff should:

- (a) request the person-in-charge to produce the relevant documentary evidence (e.g. maintenance certificates, calibration certificates, DCW certificates, etc.) for inspection to ensure the validity;
- (b) request for performing functional test of the safety equipment (e.g. BA, personal distress alarm, gas detector, etc.) to ensure they are maintained in good working condition; and
- (c) interview the Contractor's staff (e.g. DCWs, standby person, etc.) and request for demonstration of using the safety and rescue equipment correctly, as necessary.

4.4 After checking, if any non-compliances against the recommendation of the risk assessment report or any obvious defects were found, the staff should require the person-in-charge to rectify them immediately before works are allowed to proceed. The person-in-charge should also be reminded to maintain vigilance at all times to watch out for possible changes in the working environment and order emergency evacuation if situation warrants.

4.5 Lastly, the ER of DSD's site supervisory staff and consultants' RSS shall check, and remind the Contractor as necessary, to ensure that the details of the organization (i.e. roles, responsibilities and qualifications of each and every member participating in the confined space works, lines of communication, etc.), arrangement (i.e. rules and regulations, risk assessment, permit-to-work certificate, work method, safety precautionary measures, etc.) and emergency procedures (i.e. criteria of suspension of work, emergency team and equipment, arrangement of evacuation and rescue, etc.) are incorporated in the Contractor's Safety Plan and regularly updated.

## **5. DETERMINATION OF SUPERVISION LEVEL**

5.1 After the confined space works are allowed to proceed, the ER shall deploy sufficient resource to supervise the works throughout the works duration. A risk classification system, which aims to assist DSD's site supervisory staff and consultants' RSS to determine the supervision level, is enclosed in **Appendix B** for reference.

5.2 The ER of DSD's site supervisory staff and consultants should appoint a staff having the qualification of a CP to supervise the confined space work. The ER or his appointed staff having qualification of a CP (or DCP), should first determine the risk level by evaluating the possible consequence and likelihood of any accidents that may possibly occur in the confined space works and then formulate the necessary supervision level, using the risk level matrix provided. Reference shall also be made to the risk assessment report prepared by the Contractor's DCP. In the event of doubt, the risk level should err on the safe side.

## **6. CONFINED SPACE WORKS UNDERTAKEN BY IN-HOUSE STAFF**

6.1 The officer-in-charge of DSD's confined space works to be carried out by the direct labour force (DLF) and sewage treatment plant staff should appoint a staff having the qualification of a DCP to supervise the works. The enhanced measures (para. 3), guidelines (para. 4) and determination of supervision level (para. 5) should also be followed, except those concerning contractor's personnel.

6.2 For the checklist in **Appendix A**, the appointed staff should perform checking of all applicable items except those concerning contractor's personnel.

## **7. ENQUIRY**

7.1 The ER or officer-in-charge of in-house confined space works should consult Senior Engineer/Safety Adviser (Tel. No.: 2594 7181) or the Occupational Safety & Health Branch of the Labour Department (Tel. No.: 2559 1410) in case of enquiry.

## **8. REFERENCE DOCUMENTS**

- 8.1 Hong Kong SAR Law CAP 59AE, "Factories and Industrial Undertakings (Confined Spaces) Regulation", HKSAR Government
- 8.2 Code of Practice - Safety and Health at Work in Confined Spaces, Labour Department, HKSAR Government
- 8.3 Guidance Notes on Safety and Health of Hand-dug Tunnelling Work, Labour Department, HKSAR Government
- 8.4 Safety Manual (2018), Drainage Services Department, HKSAR Government
- 8.5 DSD Technical Circular No. 3/2012 – Confined Space Safety Training for Competent Persons and Certified Workers Engaged in DSD's Works

## **9. APPENDICES**

Appendix A - Checklist for Confined Space Works

Appendix B - Risk Classification System of Confined Space Works

( Peter S K CHUI )  
Deputy Director of Drainage Services



**Drainage Services Department**  
**Checklist for Confined Space Works**

Contract No.		Division:
Contract Title		
Works/Task Order No.		
Site Location		
Works to be Performed		
Type of Confined Space		

Checked by:		
Site Supervisory Staff	Name:	Post:
Others (please specify)		
	Name:	Post:
	Name:	Post:

Date of Checking		Time:
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Item	Requirements	please tick			Remarks
		Yes	No	NA	
<b>1.</b>	<b>Risk Assessment</b>				
1.1	Prepared by a DCP <sup>1</sup>				
1.2	Specific to site condition and works to be carried out				
1.3	Gas monitoring performed				
1.4	Hazards identified and risk assessed for:				
	✧ work method to be used				
	✧ plant and materials to be used				
	✧ presence of any hazardous gas, vapour, dust or fume				
	✧ oxygen deficiency				
	✧ ingress of hazardous gas, vapour, dust or fume				
	✧ presence of sludge or other deposits liable to give off hazardous gas, vapour, dust or fume				
	✧ in-rush of free flowing solid (soil, grain, etc.)				

	<ul style="list-style-type: none"> <li>✧ in-rush of free flowing liquid (stormwater, groundwater, sewage, fresh water, etc.)</li> <li>✧ fire or explosion</li> <li>✧ loss of consciousness of a DCW<sup>2</sup> due to rise in body temperature</li> <li>✧ proximity to other plants, process and operations</li> <li>✧ proximity of slopes, drains, utilities, etc.</li> <li>✧ effect of weather</li> <li>✧ access and egress points</li> <li>✧ restrictive nature of confined space</li> <li>✧ electrically conductive nature of confined space (e.g. gas holding tanks, oil tanks, etc.)</li> <li>✧ others (please specify)</li> </ul>				
1.5	Recommendations on necessary safety measures				
	<ul style="list-style-type: none"> <li>✧ use of breathing apparatus (BA) of approved type</li> <li>✧ period of safe stay in confined space specified</li> </ul>				
1.6	Change of conditions in confined space				
	<ul style="list-style-type: none"> <li>✧ a fresh assessment has been made</li> </ul>				
<b>2.</b>	<b>Permit-to-work Certificate</b>				
	<ul style="list-style-type: none"> <li>✧ issued and signed by “contractor’s representative” (e.g. site agent, sub-agent, safety officer, etc.)</li> <li>✧ received and signed by “person-in-charge” on site (e.g. sub-agent, foreman, etc.)</li> <li>✧ immediate gas monitoring results incorporated</li> <li>✧ date and time legibly stated</li> <li>✧ location and type of work to be done specified</li> <li>✧ confirmation of all necessary safety precautions specified in risk assessment report have been implemented</li> <li>✧ period of workers may remain safely in the</li> </ul>				

	confined space stated				
	✧ displayed conspicuously at the entrance of the confined space				
<b>3.</b>	<b>Contractor's Personnel</b>				
3.1	Contractor's representative (pls. tick) <input type="checkbox"/> Site Agent <input type="checkbox"/> Sub-agent <input type="checkbox"/> Safety Officer <input type="checkbox"/> Others, pls. specify _____				
	✧ appointed by the contractor and accepted by the ER				
3.2	Person-in-charge of confined space work (pls. tick) <input type="checkbox"/> Sub-agent <input type="checkbox"/> Foreman <input type="checkbox"/> Others, pls. specify _____				
	✧ appointed by the contractor and accepted by the ER				
	✧ supervise the work full time during man-entry				
	✧ ensure all safety measures are implemented				
	✧ ensure all safety equipment are available and in good working order				
	✧ ensure emergency procedures are in place				
	✧ having briefed DCWs of the risks identified, the necessary safety measures and emergency procedures as per risk assessment report				
3.3	DCP				
	✧ appointed by the contractor and accepted by the ER				
	✧ perform the risk assessment as per Item 1.1				
	✧ attend the Site until all persons in confined space are withdrawn, and wear reflective jacket marked "Competent Person"				
3.4	DCW <sup>2</sup> (total _____ persons)				
	✧ hold a valid certificate				
	✧ understand the risks identified, the necessary safety measures and emergency procedures				
	✧ make full and proper use of safety equipment				
3.5	Standby Person				
	✧ holds a valid DCW certificate				
	✧ station full time at the confined space entrance and wear reflective jacket marked "Standby Person"				
	✧ maintain communication with the DCWs inside				
3.6	Independent Checker (pls. tick)				

	<input type="checkbox"/> Site Agent <input type="checkbox"/> Site Engineer <input type="checkbox"/> Safety Officer <input type="checkbox"/> Others, pls. specify _____				
	◇ conduct regular safety inspection (pls. specify frequency)				
<b>4.</b>	<b>Site Setup</b>				
	◇ temporary traffic arrangement (TTA) in order				
	◇ lighting, signing and guarding (LSG) in order				
	◇ entrance to confined space guarded				
	◇ safe means of access to and egress from workplace				
	◇ tag-in/tag-out system established and manned				
	◇ emergency escape route and muster point shown				
	◇ others (please specify)				
<b>5.</b>	<b>Safety Equipment</b> (as per risk assessment report)				
	◇ mechanical ventilation (e.g. blowers)				
	◇ head lamps				
	◇ torches				
	◇ suitable BA of approved type				
	◇ dead-man type personal alarm				
	◇ gas detector (with calibration certificate)				
	◇ two-way spark-proof communication device				
	◇ groundwater monitoring system <sup>3</sup>				
	◇ settlement monitoring system <sup>3</sup>				
	◇ water level alarm <sup>3</sup>				
	◇ closed-circuit television (CCTV) <sup>3</sup>				
	◇ fire detection device (if hot work is necessary) <sup>3</sup>				
	◇ external audio-visual alarm system <sup>3</sup>				
	◇ others (please specify)				

<b>6.</b>	<b>Emergency Equipment (as per risk assessment report)</b>				
	✧ man-lifting tripod				
	✧ rescue lifeline				
	✧ resuscitator				
	✧ BA for rescue and emergency				
	✧ first aid box				
	✧ stretcher				
	✧ firefighting equipment				
	✧ lifebuoy				
✧ others (please specify)					
<b>7.</b>	<b>Personal Protective Equipment</b>				
	✧ safety helmet with chin strap				
	✧ protective clothing				
	✧ safety gloves				
	✧ skid-resistant safety footwear				
	✧ safety goggles				
	✧ hearing protection				
	✧ safety harness attached to lifeline				
	✧ respirator				
✧ others (please specify)					
<b>8.</b>	<b>Additional Safety Measures (please specify)</b>				

<b>9.</b>	<b>On Completion of Works</b>				
	✧ removal of all persons, materials, plants and equipment from the confined space				
	✧ cancellation of permit and return to contractor's representative				
	✧ confirmation of completion of works by the contractor's representative				
<b>10.</b>	<b>Comment / Suggestions</b>				

Notes:

1. DCP means a “Designated Competent Person” who has attended the “Confined Space Safety Training Course for Competent Persons Engaged in DSD’s Works” run by Hong Kong Institute of Construction, Construction Industry Council, (HKIC, CIC) and holds a valid certificate as per DSD TC No. 3/2012 – Confined Space Safety Training for Competent Persons and Certified Workers Engaged in DSD’s Works.
2. DCW means a “Designated Certified Worker” who has attended the “Confined Space Safety Training Course for Certified Workers Engaged in DSD’s Works” run by Hong Kong Institution of Construction, Construction Industry Council (HKIC, CIC) and holds a valid certificate as per DSD TC No. 3/2012 – Confined Space Safety Training for Competent Persons and Certified Workers Engaged in DSD’s Works.
3. Applicable to construction of hand-dug tunnels as stipulated in the Guidance Notes on Safety and Health of Hand-dug Tunnelling Work (Dec 2017) published by the Labour Department.
4. The checklist is not exhaustive. The ER of DSD’s site supervisory staff or consultants’ RSS, or officer-in-charge of in-house confined space works, should modify the checklist to suit the specific need.
5. For confined space works undertaken by DSD’s in-house staff, the appointed staff should perform checking of all applicable items except those concerning contractor’s personnel.

### Risk Classification System of Confined Space

This risk classification system aims to assist the representative or delegate of the Engineer, Project Manager, Service Manager or Supervising Officer, hereinafter collectively called the Engineer's Representative (ER), of DSD's site supervisory staff and consultants' RSS to determine the supervision level of confined space work.

Risk Level Matrix (Risk Level = Consequence x Likelihood)

Consequence	Likelihood			
	Likely Occurs repeatedly	Less Likely May occur sometimes	Possible Could occur in time	Unlikely Occurs unlikely
<b>Severe</b> Immediate danger to life and prolonged harmful effects inside the confined space	Level A	Level B	Level B	Level C
<b>Moderate</b> Potential hazards which would cause major injury and illness inside the confined space	Level A	Level B	Level C	Level D
<b>Minor</b> Potential hazards to cause minor injury inside the confined space	Level B	Level C	Level C	Level D

### Supervision Requirement

Risk Level	Supervision Level Required
Level A	Full time attendance during the man-entry period
Level B	Inspection Frequency – no less than twice every day
Level C	Inspection Frequency – no less than once every day
Level D	Inspection Frequency – no less than once every 2 days

Examples:

- Example 1     Confined space work in a live sewage manhole in industrial area
- Consequences* -     Severe (Immediate danger to life and prolonged harmful effects inside the confined space)
- Likelihood* -         Likely (Occurs repeatedly)
- Therefore, the Risk Level should be Level A.
- Example 2     Confined space work in a stormwater drain without the presence of foul sewage and under good ventilation condition
- Consequences* -     Moderate (Potential hazards which would cause major injury and illness inside the confined space)
- Likelihood* -         Possible (Could occur in time)
- Therefore, the Risk Level should be Level C.
- Example 3     Confined space work in a newly constructed sedimentation tank
- Consequences* -     Minor (Potential hazards to cause minor injury inside the confined space)
- Likelihood* -         Unlikely (Occurs unlikely)
- Therefore, the Risk Level should be Level D.

Notes:

1. The risk classification system is derived from the Risk Matrix described in the “Risk Assessment – A Practical Guide” written by Brian Kazer and published by The Institute of Occupational Safety and Health, UK.
2. The ER should review the possible consequence and the likelihood for evaluating the risk level by means of the risk level matrix so as to determine the supervision level accordingly. In the event of doubt, the risk level should err on the safe side.
3. It should be noted that the site condition varies from one confined space to another. The ER should conduct the evaluation on a case-by-case basis and the situation should be reviewed whenever there has been a significant change in the conditions of the confined space or the works to be carried out therein.
4. Officer-in-charge of DSD’s in-house confined space works should also make use of this risk classification system as appropriate.