



**Civil Engineering and Development Department  
Technical Circular No. 04/2021**

**Restrictions on the Use of Hand-dug Caissons**

**Introduction**

This technical circular (TC) provides the departmental procedures to be adopted for public works projects undertaken by the Civil Engineering and Development Department (CEDD) involving the use of hand-dug caissons (HDC), and the respective approval process to seek permission for their use.

**Effective Date**

2. This TC shall take immediate effect.

**Effect on Existing Circular**

3. This TC supersedes CEDD TC No. 35/2004, which is hereby cancelled. This revision is mainly to update the departmental requirements on adopting HDC and include the prevailing guidance materials.

**Background**

4. HDC<sup>1</sup> have been used in Hong Kong for many years and have had a disturbing history of high accident rate and health hazards to workers. A general ban on the use of HDC in public works projects was introduced in July 1993 and guidelines on the circumstances in which HDC may be used are given in Section 4.6.7 of Chapter 4 of the Project Administration Handbook (PAH). It is stipulated that any use of HDC requires the prior approval of the Head of Department.

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<sup>1</sup> HDC is defined in Section 2(1) of the Buildings Ordinance as any foundation or earth-retaining structure, or part thereof, the construction of which includes the excavation of a shaft in the ground by means of digging carried out by any person inside the shaft with or without the aid of machine tools.

## **Policy**

5. The use of HDC in public works projects shall be avoided as far as possible. However, there may be exceptional circumstances where HDC would represent the most practical option and no other safe engineering alternative is available. In cases where HDC are permitted, all necessary precautionary measures shall be adopted to safeguard workers against accidents and health hazards during construction.
6. HDC shall not be specified or included in any design for works contracts undertaken by CEDD without prior approval from the Director of Civil Engineering and Development (DCED). In addition to the guidelines given in Section 4.6.7 of Chapter 4 of PAH, the use of HDC shall comply with the following requirements –
- (a) where both the design and construction for a project are undertaken by CEDD, DCED's approval for the use of HDC shall be sought before inviting tenders for the construction contract under the project;
  - (b) where the design is undertaken by CEDD for other department(s), DCED's approval for the use of HDC shall be sought before delivery of the design to the department(s) concerned for tendering or construction purposes;
  - (c) where the construction works are entrusted to CEDD by other department(s), DCED's approval for the use of HDC shall be sought before accepting the entrustment; and
  - (d) DCED will only grant approval if HDC are the only practical and economical solution or there is no safe engineering alternative, and that all necessary precautionary measures are taken to safeguard workers against accidents and health hazards.

## **Procedures**

7. As soon as the need to use HDC is identified, an assessment shall be carried out to examine the risk of this option and whether there are other feasible alternatives. The Labour Department shall be consulted on the safety requirements for the construction of HDC. If the use of HDC is considered to be the lowest risk practical option, the Head of Division shall submit a memo together with a detailed proposal through the Head of Branch/Deputy Project Manager and the Head of Office/Project Manager to DCED. The proposal must cover the points stipulated in **Appendix A**. The memo shall be copied to Senior Engineer/Safety and Environmental Adviser.
8. The Head of Branch/Deputy Project Manager and Head of Office/Project Manager, after satisfying themselves with the proposal to use HDC, shall signify their

support on the memo and forward it to DCED for approval.

9. This TC does not apply to designs prepared by other departments or their consultants and submitted to the Geotechnical Engineering Office (GEO) for geotechnical auditing. However, where such designs include the use of HDC, concerns for safety and health should be conveyed to the designers, who should be made aware of Section 4.6.7 of Chapter 4 of PAH and its requirements.

### **Enquiries**

10. Enquiries on this TC should be addressed to Chief Geotechnical Engineer/Mainland West, GEO, CEDD.

( Signed )

( Albert W B LEE )

Director of Civil Engineering and Development (Atg.)

**Submission to DCED for Approval  
for the Use of Hand Dug Caissons (HDC)**

**The following shall be included in the submission**

- (a) Drawings showing the location, elevations and sections together with relevant site photographs where HDC are proposed.
- (b) Details of sizes, spacings and depths of HDC.
- (c) A brief description of the project and arguments as to why there are no feasible or suitable alternatives. If there are alternatives, what are the implications of using the alternatives. Points should cover the economics, practical difficulties, works sequences, programmes, and any other relevant points the designer may have.
- (d) A risk assessment (including proposed mitigation measures) for using HDC shall cover the following issues -
  - (i) *Ground conditions* - The geology of the terrain, engineering properties of the soil, possible presence of hazardous materials, ground water levels and any adjacent water-carrying utilities shall be determined. The stability of the HDC, the risk of drowning or entrapment inside the HDC shall be assessed and the preventive measures shall be proposed.
  - (ii) *Atmosphere* - The safety measures to be taken to address the risk of asphyxiation, loss of consciousness, fire or explosion, and the health hazard of silicosis. The potential hazards of hazardous gas, vapour, dust, fume, lack of oxygen, high humidity and heat stress shall be addressed. Mitigation measures should include the use of suitable personal protective equipment.
  - (iii) *Falling objects and other work-related safety and health hazards* - Identify the potential safety and health hazards, the preventive safety measures and method of construction to mitigate the risk of the identified hazards.
  - (iv) *Access and egress* – The measures to be taken to provide safe means of access and egress during works and in case of emergency.
  - (v) *Damage to adjacent properties and utilities* - An assessment of the possible effects of the caisson works on adjacent properties, including settlement, horizontal movements, distortion, and cracking of building structures, roads, utilities, and other installations.
  - (vi) *Contractual problem* - An assessment of unforeseen conditions (e.g. ground conditions, any water carrying utilities) which could lead to the need for a redesign of the works involved.
- (e) The outcome of consultation with the Labour Department regarding the use of HDC for the project.

- (f) Particular Specification clauses for HDC to be included in the contract documents. The Particular Specification clauses shall cover safety precautions, preventive measures for potential safety and health hazards, construction sequence, provision of temporary support, methods of dewatering, ground treatment, monitoring requirements, etc. recommended in the above risk assessment. The Labour Department shall be consulted on the safety requirements for the construction of HDC. The Contractor shall be required to develop a safe system of work for HDC construction including the employment of Competent Persons and Certified Workers, all in compliance with the requirements of the above Particular Specification clauses, Factories and Industrial Undertakings (Confined Spaces) Regulation, “Code of Practice – Safety and Health at Work in Confined Spaces” and other relevant publications issued by the Labour Department and/or other authorities.