

Approval & Reception Procedure

DG - Geotechnical Department	
Using construction and demolition inert material as fill material	Document I.D: ARP/DG/25
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1. Reference standard

《Report of feasibility study service result on the using inert material as reclamation filling material, LECM , 2017-April》, 《Marine sediment quality GB 18688 - 2002》, 《The limitation on infilling components of sea reclamation and enclosure project GB 30736 - 2014》, 《Sea water quality standard GB3097 - 1997》, 《Regulamento de Águas e de Drenagem de Águas Residuais de Macau, RADARM》、and project tender document and the relevant technical document.

2. Approval procedure

2.1. Information to be submitted

Construction and demolition inert materials originate from Macao construction waste landfills and other areas managed by relevant departments of the Macao SAR government, which refer to materials mainly including rocks and earth materials generated during civil construction activities in Macao. The supply and screening of inert materials are the responsibility of the relevant departments of the Macao SAR Government. Sources that are not recognized or approved by the relevant departments of the Macao SAR Government will not be approved for use. °

The contractor is responsible for all loading, unloading and transportation during the utilization of inert construction and demolition materials, and submits plans for the selected inert material transportation equipment and construction methods and material source certification documents issued by the relevant departments of the Macao SAR government or its entrusted party and the test reports that show the compliance with the requirements for technical indicators of inert construction and demolition materials in section 3.2.

3. Sampling and testing and reception principles

3.1. Sampling frequency

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A. Material from source : for same material source, 1 sample for test shall be taken for each 10,000 m³. For

10 consecutive samples passed the test, sampling frequency could be adjusted but 1 sample for test shall be taken not less than 50,000 m³. The pass rate of tested samples is not less than 95% show that the material can be judged as qualified.

B. Material to site : 1 sample for test with at least 60 kg shall be taken for each 5,000 m³. The pass rate of tested samples is not less than 95% show that the material can be judged as qualified.

3.2. Technical index of construction and demolition inert material

Construction and demolition inert material from source and to site, sampling works shall be carried out according to requirements mentioned in above section 3.1, and the testing index items and testing results shall be in accordance with the limitation requirements from the below Table 3.1 to Table 3.3.

Table 3.1 Technical index of construction and demolition inert material

Filling Index	Specific Requirement
Grading	Well grading, Coefficient of Uniformity $C_u = d_{60} / d_{10} \geq 5$ ° which : in the particle size distribution curve, d_{10} and d_{60} is the particle size at passing rate of 10% and 60% respectively, maximum particle size less than 90mm °
Plastic index	Plastic index $I_p \leq 16$ °
Physical properties index	1) Particle size less than 90mm ; 2) Debris(mainly steel bar, wood plate, iron wire, glass) : weight ratio less than 2% ; 3) Floating material(mainly construction material packaging paper bag) : weight ratio less than 0.1% ; 4) Shall not contain 《1972 London Convention》 Annex – prohibited for

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Filling Index	Specific Requirement
	<p>dumping of wastes or other matter.</p> <p>5) Shall not contain substances prohibited from import into the Mainland China or matter listed in the national list of hazardous wastes.</p> <p>6) Pond mud, domestic garbage, industrial and chemical waste, animal and plant residues, fishing nets, ropes and other sundries shall not be allowed to be used as construction and demolition inert materials.</p> <p>7) The fill material shall comply with the relevant environmental protection requirements of Macao °</p>
Chemical properties index	<p>1) Construction and demolition inert materials test standard is according to the 《Marine sediment quality GB 18688 - 2002》 - 2nd category (category of sediment).</p> <p>2) For the detection value of sample is not exceeded the limitation of 2nd category (category of sediment) shown in Table 3.2, this batch of sample of construction and demolition inert materials can be transported to specified location using as fill material.</p> <p>3) For the detection value of sample is exceeded the limitation of 2nd category (category of sediment) shown in Table 3.2, leaching test shall be carry out. For the detection value of leaching test of sample is not exceeded the acceptable highest limit shown in Table 3.3, this batch of sample of construction and demolition inert materials can be transported to specified location using as fill material.</p>

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Table 3.2 Chemical index for construction and demolition inert material

NO.	Index Unit: (mg/kg, dry weight)	2 nd category (category of sediment)	Test Method / Reference Standard
1	Mercury (Hg)	0.50	GB 17378.5 or equivalent method / standard
2	Cadmium (Cd)	1.50	GB 17378.5 or equivalent method / standard
3	Lead (Pb)	130.0	GB 17378.5 or equivalent method / standard
4	Zinc (Zn)	350.0	GB 17378.5 or equivalent method / standard
5	Copper (Cu)	100.0	GB 17378.5 or equivalent method / standard
6	Chromium (Cr)	150.0	GB 17378.5 or equivalent method / standard
7	Arsenic (As)	65.0	GB 17378.5 or equivalent method / standard
8	Nickel (Ni)	80.0	HJ 803-2016 or equivalent method / standard
9	Organic Carbon (OC) (%)	3.0	GB 17378.5 or equivalent method / standard
10	Oil	1000.0	GB 17378.5 or equivalent method / standard

Table 3.3 Chemical index of leaching test for construction and demolition inert material

NO.	Index Unit : (mg/L)	Acceptable highest limit	Test Method / Reference Standard
1	Mercury (Hg)	≤ 0.05	GB 5085.3-2007or USEPA 1311 or equivalent method / standard
2	Cadmium (Cd)	≤ 0.2	GB 5085.3-2007or USEPA 1311 or equivalent method / standard
3	Lead (Pb)	≤ 1.0	GB 5085.3-2007or USEPA 1311 or equivalent method / standard
4	Zinc (Zn)	≤ 5.0	GB 5085.3-2007or USEPA 1311 or equivalent method / standard
5	Copper (Cu)	≤ 1.0	GB 5085.3-2007or USEPA 1311 or equivalent method / standard
6	Chromium (Cr)	≤ 2.0	GB 5085.3-2007or USEPA 1311 or equivalent method / standard
7	Arsenic (As)	≤ 1.0	GB 5085.3-2007or USEPA 1311 or equivalent method / standard
8	Nickel (Ni)	≤ 2.0	GB 5085.3-2007or USEPA 1311 or equivalent method / standard
9	Oil	≤ 15.0	GB 5085.3-2007or USEPA 1311 or equivalent method / standard