Laboratory Accreditation and Environmental Testing in Hong Kong

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Hong Kong Accreditation Service
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Content

1. Laboratory Accreditation
2. Types of environmental tests offered in HK
3. Chemical tests required by local regulation/schemes
Laboratory Accreditation

- A 3rd party recognition for a laboratory that it is competent to carry out specific testing activity

  Reliable results, smaller risk


- Technical requirements
  - The laboratory shall be technically competent to perform the activity for which accreditation is sought

- Management requirements
  - The laboratory shall implement a quality management system appropriate to its scope of activities
ISO 9001 vs ISO/IEC 17025

- Certification with ISO 9001 determines compliance of an organisation’s quality management system.
- Certification *does not* specifically evaluate technical competence and *does not* mean demonstration of technical competence to produce valid data and results.
- Accreditation to ISO/IEC 17025 emphasizes technical competence.
- ISO/IEC 17025 covers technical competence requirements that are not covered by ISO 9001.
ISO/IEC 17025 – Technical requirements

Test methods
• Meet customer’s needs
• Standard vs non-standard methods
• Laboratory needs to demonstrate its ability to operate the selected methods and the methods are fit for the intended use

Personnel
• Competent to perform the activity
• Training programme and records
• Competence is assessed and formally authorised before conducting the test independently
ISO/IEC 17025 – Technical requirements

Environmental conditions
- Monitor, control and record environmental conditions
- Effective separation to prevent contamination
- Control access

Sample handling
- Integrity - properties not tempered with
- Identity - from receipt to report/disposal
- Security - no loss
ISO/IEC 17025 – Technical requirements

Equipment

- Calibrated and checked routinely and before use
- Operated by authorised personnel
- Procedures for handling, storage and use
- Defective equipment isolated and labelled

Quality assurance

- Documented quality control plans
- Proficiency testing activities
- Investigate out-of-control situations

Reports

- Accurate, Clear, Unambiguous, Objective
ISO/IEC 17025 – Management requirements

- Top management commitment to quality
- Technical and quality management structure
- Document control
- Review of customer’s requests and contracts
- Review of service suppliers and subcontractors
- Customer service
- Complaint handling
- Corrective/Preventive actions & Improvement
- Record system
- Internal audits
- Management review
Hong Kong Accreditation Service (HKAS)

- The only body providing ISO/IEC 17025 accreditation in HK
- Operates the Hong Kong Laboratory Accreditation Scheme (HOKLAS)
- Accreditation assessments normally conducted onsite at the laboratory
  - HKAS officers/external lead assessors assess the against management system requirements
  - Technical assessors/experts assess the technical competence
- If a laboratory can fulfill all requirements
  - Certificate of Accreditation
  - Accredited tests will be listed on HKAS website
HOKLAS coverage

- Calibration Services
- Chemical Testing
- Chinese medicine
- Construction Materials
- Electrical and Electronic Products
- Environmental Testing
- Food
- Forensic Testing
- Medical Testing
- Miscellaneous
- Pharmaceutical Products
- Physical and Mechanical Testing
- Proficiency Testing Providers
- Reference Material Producers
- Testing Required By The China Compulsory Certification System
- Textiles and Garments
- Toys and Children’s Products
Type of environmental tests covered by HKAS accreditation

- Chemical tests
- Microbiological tests
- Biological toxicity tests
- Noise
- HEPA appliance
- Biosafety Cabinetry
Nature of sample (chemical tests)

– Water, Wastewater, Saline water
– Sediment, Soil, Sludge
– Biota (fish and shellfish)
– Air (indoor, outdoor, ash)
– Waste (solid, semi-solid, liquid, solvent & Oil)
– Asbestos
– Consumer Products (e.g. Paint)
Chemical tests for environmental samples as required by local regulations/schemes
Examples of tests required by local regulations

I. Chapter 358AK

*Technical Memorandum Standards for Effluents discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (issued under Water Control Ordinance, Cap 358 section 21)*

- This technical memorandum sets the quality standards that make effluents acceptable into foul sewers, storm water drains, inland and coastal waters.

- Chemical, physical and microbial quality are covered, with test methods specified
### Examples of tests required by local regulations

#### I. Chapter 358AK

**Table 4** Standards for effluents discharged into *Group B* inland waters  
(All units in mg/L unless otherwise stated; all figures are upper limits unless otherwise indicated)

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Flow rate (m³/day)</th>
<th>≤ 200</th>
<th>&gt; 200 and ≤ 400</th>
<th>&gt; 400 and ≤ 600</th>
<th>&gt; 600 and ≤ 800</th>
<th>&gt; 800 and ≤ 1000</th>
<th>&gt; 1000 and ≤ 1500</th>
<th>&gt; 1500 and ≤ 2000</th>
<th>&gt; 2000 and ≤ 3000</th>
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<tbody>
<tr>
<td>pH (pH units)</td>
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<td>6.5-8.5</td>
<td>6.5-8.5</td>
<td>6.5-8.5</td>
<td>6.5-8.5</td>
<td>6.5-8.5</td>
<td>6.5-8.5</td>
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<td>Temperature (°C)</td>
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<td>Colour (turbid units) (25mm cell length)</td>
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<td>Suspended solids</td>
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<td>Oil &amp; Grease</td>
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<td>Iron</td>
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<td>10</td>
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<tr>
<td>Boron</td>
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<td>4</td>
<td>3</td>
<td>2.5</td>
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<td>Barium</td>
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<td>4</td>
<td>3</td>
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<td>Mercury</td>
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<tr>
<td>Cadmium</td>
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<td>0.001</td>
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<td>Selenium</td>
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<tr>
<td>Other toxic metals individually</td>
<td></td>
<td>0.5</td>
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<tr>
<td>Total Toxic metals</td>
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<td>2</td>
<td>1.5</td>
<td>1</td>
<td>0.5</td>
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<td>0.2</td>
<td>0.2</td>
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<tr>
<td>Cyanide</td>
<td></td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.08</td>
<td>0.08</td>
<td>0.05</td>
<td>0.05</td>
<td>0.03</td>
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<tr>
<td>Phenol</td>
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<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
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<tr>
<td>Sulphide</td>
<td></td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Fluoride</td>
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<td>10</td>
<td>10</td>
<td>8</td>
<td>8</td>
<td>5</td>
<td>5</td>
<td>5</td>
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</tr>
<tr>
<td>Sulphate</td>
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<td>600</td>
<td>600</td>
<td>600</td>
<td>400</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Chloride</td>
<td></td>
<td>1000</td>
<td>1000</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>600</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>Total phosphorus</td>
<td></td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>8</td>
<td>8</td>
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<tr>
<td>Ammonia nitrogen</td>
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<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Nitrate + nitrite nitrogen</td>
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<td>30</td>
<td>30</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>20</td>
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</tr>
<tr>
<td>Surfactants (total)</td>
<td></td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>E. coli (count/100mL)</td>
<td></td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
Examples of tests required by local regulations

I. Chapter 358AK

Analytical methods used by Government Chemist

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>APHA 17ed 4500-H+B</td>
</tr>
<tr>
<td>Temperature</td>
<td>Note (a)</td>
</tr>
<tr>
<td>Colour</td>
<td>Lovibond Tintometer, 25mm cell</td>
</tr>
<tr>
<td>Total Suspended Solids</td>
<td>APHA 17ed 2540 D</td>
</tr>
<tr>
<td>Settleable Solid</td>
<td>APHA 17ed 2540 F</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>APHA 17ed 4300-O G</td>
</tr>
<tr>
<td>Biochemical Oxygen Demand (BOD)</td>
<td>BS 6068: Section 2.14: 1984</td>
</tr>
<tr>
<td>Chemical Oxygen Demand (COD)</td>
<td>ASTM D 1252-88 Test Method B or</td>
</tr>
<tr>
<td></td>
<td>APHA 17ed 5220 C &amp; D</td>
</tr>
<tr>
<td></td>
<td>APHA 17ed 3520 C</td>
</tr>
</tbody>
</table>

Reference Notes:

BS - British Standards Institution.

(a) Temperature sensor should be calibrated against a mercury thermometer of 0.1°C scale.
Examples of tests required by local regulations

II. Environmental, Transport and Work Bureau
Technical Circular (Works) No. 34/2002

Management of Dredge/Excavated Sediment

- This technical circular covers the approval of dredging/excavation proposal and marine disposal of dredged/excavated sediment

- Sediment is classified into 3 categories based on its contaminant levels

- Different categories of sediment will be disposed via different means i.e. open sea or confined site
Examples of tests required by local regulations

II. Environmental, Transport and Work Bureau Technical Circular (Works) No. 34/2002

<table>
<thead>
<tr>
<th>Sediment Quality Criteria for the Classification of Sediment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contaminants</strong></td>
</tr>
<tr>
<td><strong>Metals (mg/kg dry wt.)</strong></td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
</tr>
<tr>
<td>Copper (Cu)</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
</tr>
<tr>
<td>Nickel (Ni)*</td>
</tr>
<tr>
<td>Lead (Pb)</td>
</tr>
<tr>
<td>Silver (Ag)</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
</tr>
<tr>
<td><strong>Metalloid (mg/kg dry wt.)</strong></td>
</tr>
<tr>
<td>Arsenic (As)</td>
</tr>
<tr>
<td><strong>Organic-PAHs (μg/kg dry wt.)</strong></td>
</tr>
<tr>
<td>Low Molecular Weight PAHs</td>
</tr>
<tr>
<td>High Molecular Weight PAHs</td>
</tr>
<tr>
<td><strong>Organic-non-PAHs (μg/kg dry wt.)</strong></td>
</tr>
<tr>
<td>Total PCBs</td>
</tr>
<tr>
<td><strong>Organosolvents (μg TBT/L in Interstitial water)</strong></td>
</tr>
<tr>
<td>Tributyltin*</td>
</tr>
</tbody>
</table>

* The contaminant level is considered to have exceeded the UCEL if it is greater than the value shown.

Category L – all contaminants < LCEL
Category M – any contaminant > LCEL but all < UCEL
Category H – any contaminant > UCEL
Examples of tests required by local regulations

II. Environmental, Transport and Work Bureau
Technical Circular (Works) No. 34/2002

- Further biological toxicity tests may be required to determine the appropriate disposal method
- All tests must be conducted by laboratories accredited by HOKLAS or by equivalent for the tests concerned
Examples of tests required in local regulations

III. Chapter 499

*Environmental Impact Assessment Ordinance*

Risk-based Remediation Goals (RBRGs) was promulgated for use on 15 November 2007 for assessment of contaminated sites for different land use scenarios.

For different land usage i.e. urban residential, rural residential, industrial, and public parks, there are different limits set for chemicals that can be present in its water and soil.
Examples of tests required by local regulations

III. Chapter 499

Environmental Impact Assessment Ordinance

– Totally 54 chemical of concerns (COCs) were selected:

  Volatile organic chemicals (VOCs) – 13 chemicals
  Semi-volatile organic chemicals (SVOCs) – 19 chemicals
  Metals – 15 chemicals
  Dioxins and Polychlorinated Biphenyls (PCBs) – 2 chemicals
  Petroleum carbon ranges – 3 groups
  Other inorganic compounds – 1 chemical
  Organometallics – 1 chemical

– All laboratory tests must be accredited by HOKLAS or one of its Mutual Recognition Arrangement partners
Examples of tests required by local regulations

IV. Chapter 311

*Air Pollution Control Ordinance*

Section 76 (1)

• An owner of premises who is required to carry out sampling, measurement or analysis of a substance containing, or suspected to contain, asbestos containing material in the premises ... shall appoint a registered asbestos laboratory to carry out the sampling, measurement or analysis.

• Tests required include the identification of asbestos species and counting of asbestos fibers present in the sample collected.
Quality Water Supply Scheme for Buildings – Fresh Water (Plus)

- Administered by WSD
- Voluntary
- To ensure good quality of water at the taps and avoid/minimise failures in water supply
- Test parameters:
  - pH, colour, turbidity, conductivity
  - Microbiological
  - Heavy metals (e.g. Pb, Cd, Ni, Cr)
- Heavy metal tests must be conducted by HKAS accredited laboratories
- Metal tests also applicable to newly installed fresh water inside service (mandatory)
Indoor Air Quality Certification Scheme

- Administered by EPD
- Voluntary
- To improve indoor air quality in offices and public places e.g. shopping mall
- ‘Good’ and ‘Excellence’ class based on real-time measurements and analysis of air samples
- Chemical tests for air samples:
  - Nitrogen Dioxide
  - Formaldehyde

➤ Must be conducted by HKAS accredited laboratories
Laboratories accredited by HOKLAS under ‘Environmental Testing’

Government – 11
Academic – 3
Commercial – 31
Laboratories accredited for chemical tests under ‘Environmental Testing’

<table>
<thead>
<tr>
<th>Test areas</th>
<th>No. of accredited laboratories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water and wastewater</td>
<td>42</td>
</tr>
<tr>
<td>Sediment, soil, sludge, biota</td>
<td>12</td>
</tr>
<tr>
<td>Air quality monitoring</td>
<td>13</td>
</tr>
<tr>
<td>Asbestos</td>
<td>4</td>
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</tbody>
</table>

A complete list can be found in HKAS website at [www.hkas.gov.hk](http://www.hkas.gov.hk)
- Thank you -