

WATER SUPPLIES DEPARTMENT

STANDARD SPECIFICATION EM-00-01

INSPECTION, TESTING AND REPORTING

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1. **GENERAL**

1.1 **Scope**

This specification covers the requirements for the inspection and testing of plant and equipment by an Independent Inspection Body (IIB) and the reporting thereon.

The plant and equipment required to be inspected and witness tested shall include materials, parts, sub-assemblies, assemblies, sub-systems or systems, etc. designed and provided for that plant and equipment under the Contract.

1.2 **Independent Inspection Body**

The IIB shall be a company or a firm nominated by the Contractor and approved by the Purchaser or the Engineer in the case of a Works Contract (hereinafter referred to as the Purchaser), or directly appointed by the Purchaser for carrying out the inspection work and witnessing the tests for the plant and equipment supplied under the Contract.

The IIB shall fulfill at least one of the requirements below:

- (1) Registered under the Hong Kong Inspection Body Accreditation Scheme (HKIAS) or an accreditation scheme endorsed by any partner of HKIAS' Mutual Recognition Arrangement (MRA); or
- (2) Inspection bodies registered under national accreditation authority not covered by MRA will only be considered when such authority is proved to have equivalent qualifications as a MRA partner; or
- (3) Inspection bodies having at least 10 years of relevant experience in providing similar inspection services.

1.3 **Appointment of IIB**

The Purchaser, at his own discretion, may either approve the appointment of the Contractor's nominee or appoint a different IIB to act on his behalf for inspection and witnessing test of the plant and equipment as required for the Contract.

1.4 **Declaration of No Conflict of Interest**

The IIB and their representatives shall not be any associated body of the Contractor, the manufacturer or its agent of the plant and equipment to be inspected or tested and there shall be no real or perceived conflict of interest for them to carry out inspection and witnessing test duties of the plant and equipment as required for the Contract. In the nomination of IIB for the Purchaser's approval, the Contractor shall submit a declaration of no conflict of interest of the nominated IIB with the Contractor and the manufacturers and their agents concerned.

The representatives of the IIB who carry out the inspection and witnessing test and the representative of the IIB who endorses the inspection report shall also be required to declare in the inspection report that they have no conflict of interest with the Contractor, the manufacturer and its agent of the plant and equipment being inspected or tested.

2. CONTRACTOR'S RESPONSIBILITY

The Contractor shall be responsible for the quality control activities of the plant and equipment.

2.1 Nomination of IIB

If required under the Contract, the Contractor shall nominate a suitably qualified IIB for the inspection. The nomination shall be initiated at least two months before the inspection or the witnessed testing is to take place. The Contractor shall provide the following information of the nominee for the Purchaser's approval :

- (a) Contact information of the IIB including correspondence address, telephone and facsimile numbers and e-mail address etc.;
- (b) Accreditation certificate for inspection service;
- (c) Name and contact information of the representative(s) who will be responsible for carrying out the inspection or endorsing the inspection report on behalf of the nominee; and
- (d) Curriculum vitae of the nominee's representatives together with a statement of experience in the services concerned.

The Purchaser reserves the right to either approve the appointment of the Contractor's nominee or appoint a different IIB.

2.2 Place of Inspection

The Contractor shall state the place of inspection for each item of the plant and equipment. In general, the preferred location is the manufacturer's works for the Factory Acceptance Test (FAT). However, there may be inspection and testing services for some particular plants and equipment such as surge vessels, overhead crane and chlorine pipework etc. that shall be carried out after installation at site according to the relevant statutory requirements of the Hong Kong Special Administrative Region (HKSAR), as specified in the contract.

2.3 Notice to IIB

The Contractor shall give the IIB a minimum of three weeks' advance notice in writing when the plant and equipment will be ready for inspection.

2.4 Facilities for Inspection

The Contractor shall provide access to the IIB for inspecting and testing the plant and equipment, during its production or when production is completed. He shall provide facilities for such inspection including all materials, testing instruments, appliances and labour required for such purposes.

2.5 Testing

The Contractor shall carry out all tests specified. Any item or components found defective, inferior in quality, or failed to achieve the specified performance criteria shall be rejected. The Contractor shall replace or make good any rejected items at his own expenses. The Contractor shall record all test readings during the witnessed tests and obtain the IIB's signature on the result sheets. A copy of the result sheets shall be handed over to the IIB at the end of the test. Results of tests that are required to be carried out but not witnessed shall be made available to the IIB for reference.

2.6 Calibration of Testing Instruments

The accuracy of the testing instruments shall be higher than that required for the equipment being measured and / or calibrated. Only instruments, which have been calibrated and certified for such accuracy traceable to International Standards by an accredited testing laboratory within 12 months preceding the tests, shall be used. The calibration certificates for all instruments shall be made available to the IIB at the time of the inspection.

2.7 Approved Documents

The Contractor shall supply a copy of the Contract Conditions and Specification for the plant and equipment and one complete set of documents approved by the Purchaser including drawings, technical schedules, components lists, and test data sheets to the IIB at least 2 weeks prior to the inspection.

2.8 Re-inspection

If the plant and equipment fails the inspection, the Contractor shall make arrangement with the IIB for a re-inspection after making good or replacing any defective/sub-standard items. No extension of time for the delivery of the equipment shall be given due to such re-inspection.

The Contractor shall notify the Purchaser of the re-inspection. He shall

carry out all the required work and make-up at the earliest time and bear any costs incurred.

2.9 Safety

The Contractor shall take all necessary precautions and make available all necessary protective gears and facilities to ensure the safety of the personnel of the IIB during the inspection. The IIB shall not be required to sign any form of waiver or indemnity concerning his presence or actions at the place of inspection.

2.10 Reporting

The Contractor shall forward to the IIB a complete set of test result sheets immediately after the tests and a complete test report to the IIB within 3 working days after the inspection. The written test report shall include, but not be limited to, the following details:-

- (a) Test data and results for each test bearing the IIB's signature and the date of test.
- (b) Sample calculation for each derived (not directly read) quantity.
- (c) Test results verifying all declared functions and performance characteristics.
- (d) Results and calculations for other tests called for in the Specification, but not required to be witnessed by the IIB.
- (e) Type test results and certificates called for in the Specification.
- (f) Calibration certificates issued by accredited institutes for all instruments used for the testing.

If re-testing and re-inspection has been conducted, the test report concerned shall be supplemented with records of the corrective actions taken and the test results of the make-up inspection and final products.

3. IIB's RESPONSIBILITY

The IIB shall be responsible for the following aspects of the inspection, testing and reporting on the plant and equipment.

3.1 Physical Inspection

The IIB shall carry out physical inspection of the plant and equipment to check for compliance with the Specification including but not limited to the following aspects:-

- (a) Dimensions - agreement with the approved drawings and

Specification.

- (b) Construction - materials and their quality, finish, workmanship for agreement with the approved drawings and Specification.
- (c) Rating plates - agreement with the approved technical schedules.
- (d) Components - agreement with the approved component lists regarding manufacture, country of origin, ratings and degree of protection, etc.

The IIB shall ensure that a complete set of approved drawings, technical schedules and approved component lists and a copy of the Contract Conditions and Specification for the plant and equipment are made available by the Contractor prior to the inspection. The approved documents shall bear the signature of the Purchaser.

3.2 Witnessing Tests

The IIB shall check that the tests are carried out in accordance with the specified requirements and conditions, and the IIB shall refer to relevant International Standards / national standards or statutory requirements of the HKSAR. The IIB shall check the calibration certificates for the testing instruments and ensure that instruments with the appropriate accuracy traceable to International Standards are used. At the end of each test the IIB's representative shall certify the test results and keep a copy of the result sheets.

3.3 Checking of Contractor's Test Report

Upon receipt of the Contractor's test report as required in Clause 2.10 above after the inspection or witnessed test, the IIB shall immediately scrutinise the report with any supplements to ensure that the results are in accordance with the actual tests and the plant and equipment complies with the Specification. Special attention shall be paid to the following:-

- (a) Completeness.
- (b) Accuracy of test results.
- (c) Accuracy of calculations.
- (d) Verification that all declared performance & withstand characteristics are achieved.

If the IIB is not fully satisfied with the Contractor's test report or in his opinion the plant and equipment does not fully comply with the Specification, he shall inform the Purchaser immediately. The plant and equipment shall not be released for shipment / operation until the Contractor remedies all defects and deficiencies. Any non-conforming equipment and items shall be clearly identified and segregated to

prevent unauthorized use.

3.4 Inspection Report by IIB

Within two weeks after the completion of the inspection, the IIB shall, upon checking the Contractor's test report, submit his inspection report, duly signed and endorsed, to the Purchaser by email and mail. The written report of each inspection, test or similar service shall include, but not be limited to:-

- (a) Observations during the inspection and testing.
- (b) List of approved drawings (with revision reference and approval date) and technical schedules against which the plant and equipment was checked.
- (c) Copy of approved equipment and component list.
- (d) Description of each witnessed test with reference to relevant clauses in the Specification, International Standards or other national standards, where applicable.
- (e) Test data and performance curves, compiled for each test and include any multiplication factors, where applicable.
- (f) List of measuring instruments with serial numbers and a copy of their calibration certificates.
- (g) List of items which fail the inspection and reasons for failure.
- (h) Declaration of no conflict of interest with the manufacturers or suppliers of the equipment.
- (i) Other relevant recommendations.
- (j) Acceptance of the plant and equipment for shipment / operation or requirement of a re-inspection and / or retesting.
- (k) Interpretations of inspection and test results.
- (l) Comments or professional opinion as to whether the inspected or tested work complies with requirements of the Contract.
- (m) Records of corrective actions, test results of the make-up and date and location of retest if re-inspection is carried out.
- (n) Manufacturer's registered name.
- (o) Manufacturer's work / site location.

- (p) Project title and number.
- (q) Name, address and telephone number of IIB.
- (r) Dates and locations of inspections and / or tests.
- (s) Name of IIB's representative(s) making the inspections and / or tests.
- (t) Date of issue.

3.5 Re-inspection

The IIB shall carry out re-inspection after the Contractor has made good or replaced the faulty equipment and items. Any updated re-inspection report shall be submitted by the IIB in compliance with the requirements stipulated in Clause 3.4 above.

3.6 Release of Plant and Equipment for Shipment

For an FAT, when the IIB is satisfied that the inspected or the re-inspected plant and equipment complies fully with the Specification (except for any deviation accepted by the Purchaser in writing), the IIB's representative endorsing the inspection report shall take the following additional actions for release of plant and equipment:-

- (a) Declare that the plant and equipment complies with the Specification, and that the deviation and outstanding test, if any, can be made good or completed on site, and that the Contractor's test report is complete and correct.
- (b) Seek consent from the Purchaser to release the plant and equipment for shipment.
- (c) Examine, certify and declare the method of packing and protection for compliance with the Specification upon receiving the Purchaser's consent for release of shipment.

The Contractor shall not despatch the plant and equipment for shipment until the IIB and the Purchaser have given their consent in writing. Such consent shall not relieve the Contractor from any of his liabilities under the Contract.

4 QUALIFICATIONS AND EXPERIENCE OF IIB

In addition to a registration under the HKIAS, or other accreditation schemes endorsed by any partner of HKIAS' MRA, the respective representatives of the IIB for carrying out inspection or witnessing tests and for endorsing the report for inspection and witnessed tests shall possess the following qualifications and experience. Unless otherwise specified in this specification, the person who carries

out inspection/witnessing test shall not be the same person who endorses the report for inspection/witnessing test.

When the plant and equipment shall be inspected and witness tested both at the manufacturer's works and at site, different IIB's shall be employed for these two services.

4.1 FAT at Manufacturer's Works

Plant and Equipment to be inspected / tested	Qualifications of IIB's representative for carrying out inspection / witnessing test	Qualifications of IIB's representative for endorsing the report for inspection / witnessing test
H.V. equipment (Including switchboard, motor, capacitor, transformer)	The person shall at least be a holder of higher certificate in electrical engineering and have at least 5 years of experience in the inspection of the equipment, software and hardware being inspected and tested.	The person shall be a corporate member of the electrical discipline of a professional institution or equivalent ; and have at least 5 years of experience in the inspection of the equipment, software and hardware being inspected and tested.
L.V. equipment (Including switchboard, control panel, capacitor, battery, standby generator, motor, wind turbine, variable speed drive, photovoltaic panel, hydropower device,electrochlorinator)	The person shall at least be holder of higher certificate in electrical engineering and have at least 5 years of experience in the inspection of the equipment, software and hardware being inspected and tested.	The person shall be a corporate member of the electrical discipline of a professional institution or equivalent; and have at least 5 years of experience in the inspection of the equipment, software and hardware being inspected and tested.
Instrumentation equipment (Including flowmeter, SCADA, telemetry equipment, uninterruptible power supplies, communication equipment, control system)	The person shall at least be holder of higher certificate in electrical, electronic, communications, telecommunications, computer and / or information engineering, where applicable and have at least 5 years of experience in the inspection of the equipment, software and hardware being inspected and	The person shall be a corporate member of the control, automation & instrumentation, electrical, electronics or information technology discipline of a professional institution or equivalent, where applicable; and have at least 5 years of experience in the inspection of the equipment, software

Plant and Equipment to be inspected / tested	Qualifications of IIB's representative for carrying out inspection / witnessing test	Qualifications of IIB's representative for endorsing the report for inspection / witnessing test
	tested.	and hardware being inspected and tested.
Pumpset (Performance test)	The person shall at least be a holder of diploma or certificate in mechanical or marine engineering or relevant engineering discipline. He shall have at least 5 years of inspection experience in the relevant field.	The person shall be qualified with a degree in mechanical or marine engineering or relevant discipline, and be a corporate member of a mechanical, or marine or relevant discipline of a professional institution or equivalent; and have at least 5 years of experience in inspection of similar equipment.
* Pressure / Surge Vessel and Pipe Fitting (Non-destructive testing of welded joints)	The person shall hold an appropriate certificate of competence (i.e. certified to be competent to carry out non-destructive tests stipulated in the design standard of the equipment) which is recognised by the local Authority. He shall have at least 5 years of inspection experience in the relevant field.	The person shall hold an appropriate certificate of competence (i.e. certified to be competent to carry out non-destructive tests stipulated in the design standard of the equipment) which is recognised by the local Authority. He shall have at least 5 years of inspection experience in the relevant field.
Valve and Pipe Fitting (Hydraulic test and examination)	The person shall at least be a holder of diploma or certificate in mechanical or marine engineering or a relevant engineering discipline. He shall have at least 5 years of inspection experience in the relevant field.	The person shall at least be a degree holder in mechanical or marine engineering or a relevant engineering discipline or equivalent. He shall have at least 5 years of inspection experience in the relevant field.

Plant and Equipment to be inspected / tested	Qualifications of IIB's representative for carrying out inspection / witnessing test	Qualifications of IIB's representative for endorsing the report for inspection / witnessing test
Other M&E Equipment (including performance test and examination)	The person shall at least be a holder of diploma or certificate of a relevant engineering discipline and have at least 5 years of experience in the inspection of the equipment, being inspected and tested.	The person shall be a corporate member of a relevant engineering discipline of a professional institution or equivalent; and have at least 5 years of experience in the inspection of the equipment being inspected and tested.

4.2 Inspection and Testing Services at Site

Plant and Equipment to be inspected / tested	Qualifications of IIB's representative for carrying out inspection / witnessing test	Qualifications of IIB's representative for endorsing the report for inspection / witnessing test
Pressure / Surge Vessel (Hydraulic test and examination)	The person shall at least be a holder of diploma or certificate in mechanical or marine engineering or a relevant engineering discipline. He shall be an appointed examiner defined under the Boilers and Pressure Vessels Ordinance of the HKSAR or shall hold the equivalent qualification satisfying local statutory requirements. He shall have at least 5 years of inspection experience in the relevant field.	N/A

Plant and Equipment to be inspected / tested	Qualifications of IIB's representative for carrying out inspection / witnessing test	Qualifications of IIB's representative for endorsing the report for inspection / witnessing test
Chlorine Pipework (Examination, testing and certification)	The person shall at least be a holder of diploma or certificate in mechanical or marine engineering or a relevant engineering discipline. He shall be a FSD authorised surveyor. He shall have at least 5 years of inspection experience in the relevant field.	N/A
Crane and Lifting Appliance (Test and Thorough Examination)	The person shall be a registered professional engineer within a relevant discipline satisfying the local statutory requirements; and be a competent examiner defined under the F&IU (Lifting Appliances and Lifting Gear) Regulations of the HKSAR.	N/A

Note : * For this particular item, it is acceptable that the person who carries out inspection/witnessing test is the same person who endorses the report for inspection/witnessing test.

FSD = Fire Services Department of the Hong Kong Special Administrative Region Government

- End of this specification -