HONG KONG CONCRETE INSTITUTE

PRODUCT CONFORMITY CERTIFICATION SCHEME – REPAIR MORTAR

(PCCS-RM)

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SUPPORTED BY INNOVATION AND TECHNOLOGY COMMISSION

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This Scheme is developed by the Hong Kong Concrete Institute (HKCI) to provide a framework for the certification of the production and supply of repair mortar products. Producers and suppliers of repair mortar products shall also comply with all other statutory regulations and shall operate a quality management system conforming to the requirements stipulated in ISO 9001 standard.

This Scheme is established in accordance with ISO 17067: 2013 with the joint effort of the Drafting Committee and Review Committee with representatives from local academics, government bodies, public organizations, industrial associations, concrete producers, certification bodies and institutions for qualified auditors under the full support from the Executive Board of HKCI.

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All enquiries concerning the status, issue of amendments and interpretation of the content shall be directed to the Drafting Committee through the Secretary of the HKCI.

ADMINISTRATIVE REGULATIONS

Contents

Product Conformity Certification Scheme for Repair Mortar (PCCS-RM)

Part One ADMINISTRATIVE REGULATIONS

1. INTRODUCTION

1.1 This Scheme is established, published and owned by the Hong Kong Concrete Institute (HKCI). Validity and the endorsement of the HKCI for a Certificate of Conformity is verified by bearing the logo of HKCI on the Certificate. The HKCI shall authorize the Certification Body to put the HKCI's logo on the Certificates of Conformity indicating the endorsement subject to an Annual Endorsement Fee payable to the HKCI. Amount of the Annual Endorsement Fee shall be announced by the HKCI from time to time.

1.2 This Scheme shall be read and used in conjunction with ISO17065: 2012 and ISO17067: 2013 or their updated versions thereof. In the event there is discrepancy between this Scheme and these two ISO Standards, the requirements in the ISO Standards shall prevail.

1.3 The purpose of the Scheme is to ensure that all repair mortars produced by Certified Repair Mortar Manufacturers meet the requirements in this Scheme and the Purchasers' specified requirements. This is a product certification scheme that requires Certified Repair Mortar Manufacturers to operate a quality system which complies with ISO 9001 and the Regulations of the Scheme. The requirements against which the repair mortar products under this Scheme are evaluated have been referred to those of the Hong Kong Housing Authority (HKHA).

1.4 These Administrative Regulations set out the rules for the operation of the Scheme and the rights and obligations of Certified Repair Mortar Manufacturers in relation to the Scheme.

1.5 This Scheme is a Type 5 product certification scheme in accordance with ISO/IEC 17067:2013 including the requirements for certification and periodic surveillance.

1.6 Any Certification Body who uses this Scheme for certification of repair mortar manufacturing plants shall be accredited by Hong Kong Accreditation Service (HKAS) or its Multilateral Recognition Agreement (MLA) partners in accordance with this Scheme and ISO/IEC 17065:2012 and shall enter into a licensee agreement with the HKCI in accordance with Section 4.4.2 in this Regulation.

1.7 This Scheme can be freely accessed on the website of the Hong Kong Concrete Institute (HKCI).

1.8 This Scheme is regularly reviewed by the Drafting Committee with the support of the Review Committee including confirmation that it is fulfilling its objectives. Inquiries and comments from stakeholders and interested parties can be fed to the HKCI through the HKCI Secretary for clarifying the interpretation of the content of the Scheme and for

regular review.

2. GENERAL DEFINITIONS

2.1 For the purpose of this document, the terms and definitions given in ISO/IEC 17000: 2020, ISO/IEC 17065:2012, ISO/IEC 17067:2013 and the following definitions are applied to the Regulations.

Administrative Regulations: The regulations which set out basic Administrative Requirements for the Scheme.

Applicant: A registered company who has formally applied to become a Certified Repair Mortar Manufacturer.

Areas for Improvement: Areas for improvement (AFI) are not nonconformities, and corrective actions are not mandatory. However, the audit team judges by their experience that these are areas which may incur nonconformities if special attention is not paid or the potential problem is not resolved.

Audit: An in-depth appraisal of an Applicant's quality management systems, production processes, testing processes and quality of repair mortars for assessing compliance with the Regulations in this Scheme. It is classified as Certification, Surveillance and Recertification Audits.

Audit Testing: Sampling and testing of repair mortars ordered by an audit team during Certification, Surveillance and Recertification Audits in accordance with this Scheme. All tests shall be conducted by HKAS or its Mutual Recognition Agreement (MRA) partners accredited laboratory independent from the Applicant and the results shall be produced in a HOKLAS endorsed test report or equivalent.

Audit Team: Nominee(s) of the Certification Body appointed to carry out audits.

Certificate of Conformity: The certificate is issued by the Certification Body to confirm certification of an Applicant with respect of a particular repair mortar manufacturing plant.

Certification:	Acceptance by the Certification Body, as the result of a successful audit confirming that the Applicant's management system, operation processes and results of which comply with the Regulations in this Scheme.
Certification Body:	An organization who is accredited by HKAS, or its MLA Partners to process applications from the Applicant, to conduct subsequent auditing and certification processes for the Applicant and to grant certification or otherwise to the Applicant.
Certification Mark:	The logos of the HKCI and the Certification Body, that the Participants are licensed to use should be in accordance with the Regulations and the terms and conditions given by the HKCI and the Certification Body.
Drafting Committee:	The committee under HKCI is responsible for the development and maintenance of this Scheme.
Major Nonconformity:	A major nonconformity is a nonfulfillment of a requirement that affects the capability of the management to achieve the intended results. Nonconformities could be classified as major in the following circumstances: (a) if there is a significant doubt that effective process control is in place, or that products or services will meet specified requirements; or (b) a number of minor nonconformities associated with the same requirement or issue could demonstrate a system failure and thus constitute a major nonconformity.
Minor Nonconformity:	A minor nonconformity is nonfulfillment that does not affect the capability of the management system to achieve the intended results.
Participant:	An Applicant who has been successfully certified to this Scheme through Certification Audit and the Certification is continuously maintained.
Plant:	A plant for the production of certified repair mortar product(s).

Plant Register:	The register of currently certified Plants and certified repair mortar product(s) is to be maintained by the HKCI
Purchaser:	An individual, firm or company who entered into a contract with a Certified Repair mortar Manufacturer to purchase certified repair mortar(s).
Regulations:	The combined Administrative Regulations and Technical Regulations.
Review Committee:	A committee formed by stakeholders of this Scheme to review and give comments to the Drafting Committee for the development and maintenance of this Scheme.
Scheme:	The product conformity certification scheme for the certification of the production of repair mortar product(s).
Technical Regulations:	The regulations set out the technical requirements of the Scheme.

3. PREREQUISITES FOR PARTICIPATION

3.1 Any individual, firm or company engaged in the production of repair mortars shall be eligible as an Applicant to apply for certification to this Scheme.

3.2 The Applicant will be required to demonstrate the ability to comply with the Regulations and shall confirm agreement to comply with the Regulations.

3.3 The Applicant shall establish and maintain a documented quality system in accordance with the requirements of ISO 9001 and the Regulations of this Scheme.

3.4 The Applicant shall ensure all relevant statutory and regulatory requirements to produce the repair mortars are fulfilled and maintain quality records for at least three months before the Certification Audit.

3.5 Upon successful Certification Audits and subsequent decision made by the Certification Board or equivalent function of the Certification Body, the Applicant will become a Certified Repair mortar Manufacturer and will be granted a Certificate of Conformity to this Scheme for the repair mortar(s) manufactured at its Plant.

4. PROCEDURES FOR APPLICATION AND CERTIFICATION

4.1 Application

4.1.1 The Certification Body shall determine appropriate application procedures for a new Applicant or an existing Participants making an application to the Certification Body for initial certification or extension of the existing Certification Scope.

4.1.2 The following information shall be supplied by the Applicant to the Certification Body for certification:

(a) Company name and address;

(b) Name and address of the proposed manufacturing plant;

(c) Certification scope;

(d) Company representative for communication with the Certification Body.

(e) Other information as required by the Certification Body.

4.2 Certification Audit

4.2.1 Certification Audit shall be carried out by an Audit Team composing of at least a Lead Auditor and one or more Technical Auditors, who shall be competent to carry out the audit to produce repair mortar product(s).

4.2.2 Certification Audit shall comprise the following:

(a) Overall audit of the quality management system and relevant processes related to the applied certified scope to confirm the conformity of operation processes and the quality of the repair mortar product(s) to the requirements of ISO 9001 and the Regulations of this Scheme.

(b) At the manufacturing Plant, the Audit Team shall assess the operations of relevant processes plant and equipment including but not limited to the control of design process (where appropriate), incoming materials, production process, in-process and product quality control testing, storage, delivery as well as calibration of such plant and equipment and the operation of the relevant sections of the Certified Repair mortar Manufacturer's quality, operational and technical systems conforming to ISO 9001 and the Regulations.

(c) The Audit Team shall assess the quality system of all relevant processes and the associated quality and production records.

(d) The Audit Team shall assess the quality control system and evaluate the quality

control testing results for product compliance. The Audit Team shall also examine relevant quality and production records to confirm the output of quality control systems and hence authenticate the conformity of the repair mortar to the specified criteria in the Regulations.

(e) The Audit Team shall arrange audit testing by taking three packages of spot samples (Audit Testing Samples) at the production point or storage of repair mortar products from the Plant or off-plant depots. The samples taken shall be clearly labeled and be sealed up by putting the signature of a member in the Audit Team or other acceptable means. The Audit Testing Samples shall then be well protected from moisture ingress, contamination or other influences by suitable means such as wrapping up polythene sheets. One Audit Testing Sample shall be taken for certification audit testing conducted by a laboratory accredited by HKAS or its MRA partners in accordance with Table 10.1 of the Technical Regulations in this Scheme. The rest of the Audit Testing Samples shall be retained by the Applicant. The audit testing is considered to be passed if the results of all assigned tests for the first Audit Testing Sample meet the requirements stated in this Scheme. In the event any of the test results of the first Audit Testing Sample fails to meet the requirement(s) stated in this Scheme, both of the retained two Audit Testing Samples shall be sent to a laboratory (same or another laboratory subject to the agreement of the Audit Team) accredited by HKAS or its MRA partners for re-testing of the failed performance parameter(s). The audit testing is passed only when results of both re-test samples meet the requirement(s) stated in this Scheme. Resampling by the Audit Team is required if any one of the retained samples is lost, deteriorates or becomes contaminated when taken for test(s).

4.2.3 On completion of the Certification Audit, the Audit Team will report the findings, if any, and recommendation for Certification or a decline of such with or without condition in an audit report for the acknowledgement of the Applicant based on the audit result.

4.2.4 There are three possible recommendations resulting from the audit:

(a) No nonconformity is identified, and Certification is confirmed. Some Area for Improvement may be given for the improvement of the quality and operation processes.

(b) There are one or more than one minor nonconformities, which, to the opinion of the Audit Team, do not cumulatively indicate a major failure of the quality management system and product quality. Certification is recommended subject to the acceptance of the proposed corrections and corrective actions as well as the target completion time. The time limit for the receipt of the proposed correction(s) and corrective action(s) will be two weeks after the issuance of audit report by the Audit Team. The proposed completion time of the correction(s) and corrective action(s) shall be a maximum of four weeks, or a longer period accepted by the Audit Team based on the nature of the nonconformities and practicality concern, upon receipt of the proposed correction(s) and corrective action(s) by the Audit

Team.

(c) Rejection of Certification or a reduction of Certification Scope is recommended. A major nonconformity or several systematic minor nonconformities exist which accumulate to indicate a major failure of the quality management system or product quality. The Participant will be required to submit a written proposal for corrections and corrective action(s) within two weeks to the Audit Team for consideration. The Audit Team shall assess the proposed corrections and corrective actions for acceptance that the nonconformities found will be rectified and cleared after successful implementation of the proposed correction(s) and corrective action(s). A partial or full re-audit, as directed by the Audit Team, will be required after implementation of the accepted correction(s) and corrective action(s). Recommendation for Certification shall only be made by the Audit Team providing, to the opinion of the Audit Team, the nonconformity has been cleared and reoccurrence of similar nonconformity has been prevented. If, to the opinion of the Audit Team, the major nonconformity cannot be effectively cleared or reoccurrence of similar nonconformity cannot be prevented within three months after the major nonconformity is identified, Certification of the Participant shall be rejected or the Certification Scope shall be reduced, whichever the Audit Team considers appropriate, and re-application for a new Certification shall be required.

4.3 **Certification**

4.3.1 Recommendation for Certification from the Audit Team shall be passed to the Certification Body for the decision of granting the Certification, or otherwise, to the Applicant.

4.3.2 The Certification Board of the Certification Body shall issue a Certification of Conformity to the successful Applicant with the following content:

(a) Certificate number;

(b) Name and address of the Certification Body;

(c) Name and address of the Participant and the Plant;

(d) Name, model number/code and class of the certified repair mortar;

(e) Statement that the repair mortar conforms to the requirements of relevant grade(s) of the Products to this Scheme, for which the year of publication shall be clear stated

(f) Certification Scope

4.3.3 The Certification Body shall establish a channel for Applicants and Participants to raise appeal for the decision on nonconformities made by the Audit Team.

4.4 **Use of License, Certificates and Marks of Conformity**

4.4.1 The ownership, use and display of licenses, certificates, marks of conformity, and any other mechanisms for indicating the certification of repair mortar products shall be in accordance with the requirements in ISO/IEC 17030 and the regulations of the Certification Body.

4.4.2 A licensee agreement issued by HKCI for controlling the use of certificates, marks or other statements of conformity of the certified repair mortar products shall be signed by the Certification Body.

4.4.3 The use of the certificate, marks of conformity and any logo or material regarding certification to this Scheme shall be subject to the rules set out by the Certification Body and the HKCI, which may be changed from time to time.

5. OBLIGATIONS OF PARTICIPANTS OF THIS SCHEME

5.1 The Participants shall keep the Certification Body informed in writing of changes in his circumstances which may affect Certification. Such changes include:

(a) Change in ownership or name of the company for Certification.

(b)Change of processes which may affect the certification scope

(c)Change of the location of the Plant and/or Quality System Management Office.

(d)Closure or suspension of production for more than 3 months of the manufacturing Plant.

6. SURVEILLANCE AUDIT AND RECERTIFICATION AUDIT

6.1 After Certification, the Audit team will conduct periodic Surveillance Audits for the Certified Scope of the Participants.

6.2 **Frequency and Purpose of Surveillance Audits**

6.2.1 Each term of Certification is three years. Re-certification is required after each Certification term.

6.2.2 The frequency of Surveillance Audits for the first three-year Certification shall be once every nine months.

6.2.3 The frequency of routine Surveillance Audits after the first Re-Certification term shall be once in every twelve months.

6.2.4 Surveillance Audits shall comprise the following:

(a) Overall audit of the quality management system;

(b) Production processes for Certified Repair Mortar Manufacturer;

(c) Evaluation of the results of production testing to confirm conformity of the repair mortars and evaluate the results of all quality control tests since the previous audit; and

(d) The Audit Team shall arrange audit testing by taking three packages of spot samples (Audit Testing Samples) at the production point or storage of repair mortar products from the Plant or off-plant depots. The samples taken shall be clearly labeled and be sealed up by putting the signature of a member in the Audit Team or other acceptable means. The Audit Testing Samples shall then be well protected from moisture ingress, contamination or other influences by suitable means such as wrapping up polythene sheets. One Audit Testing Sample shall be taken for surveillance/re-certification audit testing conducted by a laboratory accredited by HKAS or its MRA partners in accordance with Table 10.1 of the Technical Regulations in this Scheme. The rest of the Audit Testing Samples shall be retained by the Applicant. The audit testing is passed if the results of all assigned tests for the first Audit Testing Sample meet the requirements stated in this Scheme. In the event any of the test results of the first Audit Testing Sample fails to meet the requirement(s) stated in this Scheme, both of the retained two Audit Testing Samples shall be sent to a laboratory (same or another laboratory subject to the agreement of the Audit Team) accredited by HKAS or its MRA partners for re-testing of the failed performance parameter(s). The audit testing is passed only when results of both re-test samples meet the requirement(s) stated in this Scheme. Resampling by the Audit Team is required if any one of the retained samples is lost, deteriorates or becomes contaminated when taken for test(s).

6.3 Conclusions from Surveillance Audit

6.3.1 On completion of each Surveillance Audit, the Audit Team shall report findings, including but not limited to Area for Improvements, Minor and Major Non-conformities, to the Participants for acknowledgement and follow up action(s). The Audit Team will indicate in the audit report for the recommendation resulted from the Surveillance Audit.

6.3.2 There are three possible recommendations resulting from the audit:

(a) No nonconformity is identified and continuation of Certification is confirmed. Some Areas for Improvement may be given for the improvement of the quality and operation processes.

(b) There are one or more than one minor nonconformities, which, to the opinion of the Audit Team, do not cumulatively indicate a major failure of the quality management system and product quality. Certification is recommended subject to the acceptance of the proposed corrections and corrective actions as well as the

target completion time. The time limit for the receipt of the proposed correction(s) and corrective action(s) will be two weeks after the issuance of audit report by the Audit Team. The proposed completion time of the correction(s) and corrective action(s) shall be a maximum of four weeks, or a longer period accepted by the Audit Team based on the nature of the nonconformities and practicality concern, upon receipt of the proposed correction(s) and corrective action(s) by the Audit Team.

(c) Rejection of Certification or a reduction of Certification Scope is recommended. A major nonconformity or several systematic minor nonconformities exist which accumulate to indicate a major failure of the quality management system or product quality. The Participant will be required to submit a written proposal for corrections and corrective action(s) within two weeks to the Audit Team for consideration. The Audit Team shall assess the corrections and corrective actions for acceptance that the nonconformities found will be rectified and cleared up after successful implementation of the proposed correction(s) and corrective action(s). A partial or full re-audit, as directed by the Audit Team, will be required after implementation of the accepted correction(s) and corrective action(s). Recommendation for the continuation of Certification shall only be made by the Audit Team providing, to the opinion of the Audit Team, the nonconformity has been cleared and reoccurrence of similar nonconformity has been prevented. If, to the opinion of the Audit Team, the major nonconformity cannot be effectively cleared or reoccurrence of similar nonconformity cannot be prevented within three months after the major nonconformity is identified, Certification of the Participant shall be withdrawn or the Certification Scope shall be reduced, whichever the Audit Team considers appropriate, and re-application for a new Certification or resumption of the original Certification Scope shall be required.

6.4 **Recertification Audit**

6.4.1 The duration of the Certification is three years. Recertification Audit shall be carried out at the third year after Certification not later than three months before the expiry date of the Certification. Recertification Audit shall be carried out in the same way as an initial Certification Audit.

7. SUSPENSION, CHANGE OF SCOPE AND WITHDRAWAL OF CERTIFICATION

7.1 Pursuant to the condition stated in Clause 6.3.2 (c) of this Regulation, the Certification Body will determine whether the Certification for the Participant is suspended or withdrawn.

7.2 Other than the condition stated in Clause 6.3.2 (c) of this Regulation, if the Participant, to the opinion of the Certification Body, fails to comply with the Participant's responsibilities and obligations under this Scheme, the Certification Body will suspend the Certification of the Participant until the failure is rectified. If such failure continues

for more than three months, the Certification Body may decide to withdraw the Certification of the Participant and re-application for a new Certification shall be required.

7.3 Upon a suspension of the Certification of a Participant, the Certification Body shall serve a written notice to the Participant for such suspension with detail reason(s) of the suspension.

7.4 Upon the decision to withdraw the Certification, the Participant shall serve a written notice to the Certification Body at least one month calendar before the supplies of the certified repair mortars to the Purchasers are ceased.

7.5 If the Certification for a Participant is suspended or withdrawn, the Participant shall immediately cease to use the Certification Mark and shall within two weeks inform the Purchaser(s) for such suspension or withdrawal of the Certification. All kinds of advertisement regarding the Certification shall be ceased and all certification documents shall be returned to the Certification Body by the Participants. Other actions required if the certification is suspended, withdrawn or terminated shall be subject to the rules of the Certification Body, which shall be stated in their contracts with the Participants.

8. INFORMATION ON CERTIFIED REPAIR MORTAR MANUFACTURERS

8.1 Upon the request of any Purchaser, end users or any stakeholder of the certified repair mortars, the Certification Body is obliged to provide verbal or written confirmation, whichever is requested, of the status of any Certified Repair Mortar Manufacturer in its register.

8.2 Reasons for any suspension or withdrawal of Certification shall be stated in the Register as mentioned in Clause 7.3.

9. APPEALS AGAINST DECISIONS

9.1 The Applicant or Participant shall have the right to appeal against any decisions of the Audit Team or the Certification Body. An appeal committee shall be set up under the Certification Body. Details of the appeal procedure shall be provided in the Certification Body regulations and make known to all Applicant and Participant.

10. CHANGES TO REGULATIONS

10.1 In the event of amendments in the Regulations of this Scheme or the regulation of the Certification Body, a grace period of six months, or any other length of the grace period to be announced by the HKCI, shall be given to all Participants for clarification and preparation works for addressing the changed requirements relating to the amendments.

10.2 In the event of a new publication of this Scheme, the grace period given to the Participants shall be subject to the announcement of the relevant committee(s) of the

HKCI. The Certification Bodies and Participants shall make all necessary amendments in their auditing and operating systems and product quality to comply with the new requirements in the Scheme accordingly within the grace period given.

11. COMPLAINTS

11.1 Certified Repair mortar Manufacturers shall keep records of all written complaints received from any parties concerned and corresponding responses. These records shall be made available to the Audit Team at the time of any Audit. The Audit Team shall investigate in detail on such complaints to see if any Area for Improvement or non-conformity has to be raised.

11.2 The Certification Body shall keep records of all written complaints, in relation to a Certified Repair mortar Manufacturer received from any concerned parties. Such complaints shall be investigated at the discretion of the Certification Body. The Certification Body shall report to the Certification Board or equivalent authority for the complaint and respond to the complainants together with the investigation report, if any.

12. CONFIDENTIALITY

12.1 All Applicants and Participants shall disclose to the Audit Team for the purposes of Audits all information or records obtained from or pertaining to Purchasers and connected with the Scheme.

12.2 The Audit Team and any other staff of the Certification Body shall not disclose information or records obtained from the Applicants and Participants unless otherwise permitted by the Applicant or Participant concerned.

13. EXPERIENCE AND QUALIFICATION OF LEAD AUDITORS AND TECHNICAL AUDITORS

13.1 Lead Auditors who are eligible for auditing PCCS-RM quality management system shall have the following registration: - Registered IPC (International Personnel Certification Association) or Hong Kong Institution of Certified Auditors (HKICA) Lead Auditor in Quality Management System and Product Certification Auditor, or equivalent.

13.2 Technical Auditors who are eligible to audit the PCCS-RM technical management system shall have the following training, experience and qualifications:

(a) Academic Qualification

A relevant Higher Diploma in architectural studies, building, materials science/engineering, structural or civil engineering, or other physics/chemistry studies.

(b) Practical experience

i) A minimum of two years' technical experience in the manufacturing process.

ii) Have a minimum of one year's experience as a technical auditor for other construction/building product(s) and have completed in-house training for at least 20 man-days provided by their appointed Certification Body for on-site audits at manufacture plant.

14. REGISTRER OF CERTIFIED MANUFACTURERS

14.1 The Certification Body shall be responsible for maintaining a register of certified manufacturers, their certified scope and certified product(s) with updated certification status. This register shall be made available for inquiry from interested parties.

15. LICENSEE AGREEMENT BETWEEN THE HONG KONG CONCRETE INSTITUTE AND THE CERTIFICATION BODY

15.1 The Certification Body shall enter into a Licensee Agreement, stated with mutual responsibilities and chargeable annual fees, with the HKCI to obtain authorization from the HKCI for conducting auditing and/or certification activities using or referring to this Scheme. The Certification Body is legally bound to comply all obligations and responsibilities stated in the Licensee Agreement. All Certificates of Conformity issued under this Scheme by Certification Bodies who has not signed the Licensee Agreement with the HKCI or has failed to comply any of their obligations and responsibilities stated in the Licensee Agreement are deemed invalid and are not recognized by the HKCI.

15.2 The HKCI shall not be liable for the performance, behaviour or any misconduct of the Certification Body, the Applicants and the Participants.

15.3 The HKCI shall not be responsible for the performance of any product certified by Certification Bodies with or without entering into the Licensee Agreement with the HKCI.

15.4 HKCI is obliged to answer enquiries regarding this Scheme from stakeholders of this Scheme.

15.5 It shall be the sole discretion of the Certification Body to determine the need for disclosing the content of the Licensee Agreement with the HKCI to the Applicants and Participants.

END OF ADMINISTRATIVE REGULATIONS

TECHNICAL REGULATIONS

Contents

Product Conformity Certification Scheme for Repair mortar (PCCS-RM)

Part Two TECHNICAL REGULATIONS

1. INTRODUCTION

1.1 These Technical Regulations set out the technical requirements of the Scheme.

1.2 The Technical Regulations shall be read in conjunction with the Administrative Regulations.

2. QUALITY SYSTEM

2.1 An effective quality system shall be established, documented and maintained in accordance with the prevailing ISO 9001 standard and relevant requirements in the Regulations of this Scheme to repair mortar manufacturers.

3. RESPONSIBILITIES OF CERTIFIED REPAIR MORTAR MANUFACTURER

3.1 The Certified Repair Mortar Manufacturer shall take responsibility for the quality of its repair mortar and shall nominate a Quality Management Representative who shall have defined authority and commitment to ensure full compliance with:

(a) their quality management system to ISO 9001;

(b) their quality management manuals/procedures, and.

(c) Product quality stated in the certified scope of the product conformity certification the Certified Repair Mortar Manufacturer is maintaining or newly applying for.

3.2 The Certified Repair Mortar manufacturer shall ensure the provision of adequate and appropriate resources required for the operation of this Scheme. A proper training procedure shall be set up and maintained for staff training and audit of staff competence.

3.3 All measurement and evaluation equipment shall be calibrated and properly maintained internally or externally. External calibration organization shall be accredited, by Hong Kong Accreditation Services (HKAS) or its Mutual Recognition Agreement (MRA) partners or other governmental accreditation such as the China Metrology Accreditation (CMA). The quality of internal calibration shall comply with the requirements of ISO/IEC 17025.

4. DEFINITIONS

Definitions for terms used in this Scheme shall be referred to the Administrative Regulations of this Scheme and those given in ISO17065: 2012 and ISO17067: 2013, wherever appropriate.

5. REQUIREMENTS OF REPAIR MORTAR

The requirements for repairing mortar products are given in Table 5.1 of this Scheme forming the compliance criteria for assessment for repair mortar products for Certification under this Scheme (for details of tests, please see Appendix 1).

Table 5.1: Characteristics of Repair Mortar

Test Code	Characteristics (test method shall be referred in Appendix 1 of the Technical Regulations in this Scheme)	Mortar Class		
		40	25	S (Note 1)
TM1	Range of compressive strength at 28 days (MPa)	30 – 60	20 – 40	$\geq f_{cu} + 7$ (Note 2)
TM2	Minimum tensile strength at 7 days (MPa)	2.0	1.5	--
TM3	Range of modulus of elasticity at 28 days (GPa)	15 – 25	9 – 15	--
TM4	Minimum bond strength at 7 days (MPa)	2.0	1.5	--
TM5	Cracking in Coutinho Ring test at 28 days	No crack	No crack	--
TM6	Minimum Fig Air permeability (seconds)	200	150	--
Note 1	Class S mortars are cementitious based repair mortar products used for repairing concrete defects such as honeycombs			
Note 2	f_{cu} is the characteristic strength of parent concrete (e.g., 35 MPa, 40 MPa, 60 MPa, etc.)			

6. RAW MATERIALS CONTROL

6.1 Control of Incoming Raw Materials Quality

A quality control system shall be established and operated to ensure all incoming raw materials used to repair mortar conform to the purchaser's specified requirement(s).

6.2 Identification and Inspection of Incoming Materials

All incoming materials shall be inspected for compliance of the requirements including but not limited to:

(a) Confirmation of the source, type and class (whichever applicable) at receipt;

(b) Visual inspection, if possible, at receipt;

(c) Sampling and testing at appropriate stage before being used in repair mortar products with preset frequencies for different materials based on their usage for not more than 1000T of repair mortar product(s). Test regime for materials shall be determined subject to their nature and reference standard, if any.

6.3 All nonconforming materials shall be distinctively labelled and shall be rejected and removed from storage. Repair mortar products containing nonconforming batches of materials shall be traced, identified and prohibited from dispatch. Any repair mortar product that has been dispatched to the Purchaser but is found to contain the nonconforming materials shall be followed up with the client by the participant.

7. RAW MATERIALS STORAGE AND HANDLING

7.1 Powder Materials

All powder materials shall be stored in separate concealed containers, damp-proof bags on lifted floor in sheltered compartment, or by any other appropriate means in such a way as to protect the powder materials from being contaminated or dampened due to weather. Each storage compartment and loading point, if any, shall have a clear marking indicating the type of powder materials.

7.2 Aggregates

Aggregates shall be dried to have the moisture content not exceeding 0.5%. Dried aggregates are sieved to different grading zones and stored in separate damp-proof containers to prevent contamination. Each storage container or location shall be clearly marked to indicate the type and size of aggregates.

7.3 Additives

Additives shall be stored in bulk concealed containers, or damp-proof packaging on raised floors to prevent damping. Containers or damp-proof packaging shall be clearly marked with the name of additives, name of manufacturer and expiry date. Measures shall be taken to avoid the use of expired additive(s) in repair mortar product(s).

8. REPAIR MORTAR PRODUCT DESIGN

8.1 Product Design Input

The input for the mix design of repair mortar products can include but are not limited to:

(a) Specific class as listed in Table 5.1 of the Technical Regulations in this Scheme;

(b) Other statutory and regulatory requirements, if any.

(c) Other customer requirements, if any.

8.2 Design Process Control

(a) The manufacturer shall have designated Competent Professional to be responsible for the design process for all repair mortar products. The Competent Professional shall possess the following qualifications and experience:

(i) Corporate member of the Hong Kong Institution of Engineer in Materials or Building or Civil Discipline or other professional qualification that is acceptable by the Certification Body to be equivalent; or

(ii) Possession of a degree in materials engineering/science or building engineering or civil engineering, or other discipline that is acceptable by the Certification Body to be equivalent plus at least 3 years working experience in manufacturing business; or

(iii) Possession of a higher diploma in materials engineering/science or building engineering or civil engineering, or other discipline that is acceptable by the Certification Body to be equivalent plus at least 5 years working experience in manufacturing business; or

(iv) Other than the qualifications mentioned in (i), (ii) or (iii) above, a competent professional with 8 years of experience in the manufacturing business is also acceptable.

(b) Performance of repair mortar product formulation(s) in the design output shall be verified to ensure compliance of the requirements to product design input through initial type testing in accordance with Clause 10.1(a) of the Technical Regulations in this scheme.

(c) Repair mortar products shall be validated with appropriate means including but not limited to site trial, real application, etc., to confirm the resulting products meet the requirements for the specified application or intended use.

(d) Repair mortar product formulation(s) shall be reviewed regularly by the

Competent Professional to ensure design input requirements are continuously met. Any change to the repair mortar formulation(s) after review shall be made, verified and validated by the Competent Professional.

(e) Records for all the above designed processes shall be kept properly for traceability, and the minimum retention period of such records shall be at least four years unless a longer period is specified by contractual obligations.

9. PRODUCTION PROCESS CONTROL

9.1 Weighing and Batching Equipment Control

(a) Weighing and batching equipment shall be calibrated for its full working range to the accuracy within ±2% at any point of calibration and ±0.5% of the full-scale reading with the following frequency.

(i) At least once per month internally; and

(ii) At least once per every 6 months by 3rd party calibration organization, either accredited by HKAS or its Mutual Recognition Agreement (MRA) partners or other governmental accreditation such as China Metrology Accreditation (CMA).

(b) The accuracy and sensitivity of weighing equipment shall be able to batch materials within the batching tolerance stated in Clause 9.2 (c).

9.2 Materials Measurement Control

(a) Batching processes of materials for manufacturing repair mortar products shall be computer controlled with automatically sensed records except that manually dosing of additive(s) with less than 5% in the total batched weight is acceptable.

(b) Batched weights of polymer additives which are manually dosed shall have electronic records generated by weighing devices.

(c) All materials shall be measured within a tolerance of ±2% of each separate material in the batch, except that for additives the tolerance shall be 5%.

(d) All materials after measurement shall be completely discharged into the mixer for mixing.

9.3 Mixing of Materials

Mixing time of each repair mortar product(s) for a specific batching volume shall be determined in accordance with the complexity of repair mortar mix design, mixing efficiency of the mixer and discharge sequence of batched materials. Repair mortar

product manufacturers shall establish a uniformity test, which is traceable to national or international standards, to ensure thorough mixing of the repair mortar product(s) is achieved with the designated mixer and the determined mixing time. The uniformity test shall be conducted at least once a year to confirm the required mixing efficiency is continuously achieved. The documented information for the uniformity test shall be maintained.

9.4 Packaging and Identification of Products

(a) Repair mortar product(s) shall be packed in either totally concealed container made of plastic or other waterproof material, or paper bags composed of at least 3 plies of paper and 1 ply polythene sheet to prevent from dampening.

(b) Weight checking devices shall be provided to ensure the accuracy of ±1 kg or ±3% of the nominal package weight, whichever is smaller of repair mortar product(s). All over-weighted or under-weighed repair mortar product(s) shall not be dispatched.

(c) Batch numbers shall be printed on each package of repair mortar products for the identification of product code, date of manufacturing, expiry date and other information for traceability.

(d) Packed repair mortar product(s) shall be protected from dampening by wrapping with polyethylene sheets or other appropriate means.

9.5 Product Storage, Sampling, Dispatch and Delivery

(a) Finished repair mortar products shall be stored off floor at covered areas before dispatch.

(b) On each production day, one sample of repair mortar product shall be taken for every 50 tons of production for product releasing tests stipulated in Clause 10.1 (b).

(c) Repair mortar products shall be dispatched on first-in-first-out basis and be delivered to Purchasers in such a way that the products are well protected from dampening during transportation.

10. INITIAL TYPE TESTING, PRODUCT RELEASING TEST, PRODUCTION CONTROL TESTING AND AUDIT TESTING

10.1 General Requirements

Repair mortar Manufacturer shall establish and implement documented procedures for the evaluation of product conformity including but not limited to:

(a) Initial type test

Initial Type Test shall be conducted under the following scenarios:

(i) Before actual production for supply of a new repair mortar formulation; or

(ii) Addition of a new ingredient to a currently adopted repair mortar formulation; or

(iii) Change of the type or property class (such as strength) of an ingredient other than inert filler in a currently adopted repair mortar formulation; or

(iv) Adjustment of the content of cementitious materials by more than 10% of its own quantity in the original proportion in a currently adopted repair mortar formulation; or

(v) Adjustment of the content of additives by more than 20% of its own quantity in the original proportion in a currently adopted repair mortar formulation.

An initial type test shall be carried out in accordance with Table 10.1.

(b) Product releasing test

The Repair Mortar Manufacturer shall establish and implement document procedures for product releasing test of repair mortar product and the associated releasing criteria for dispatch. Each sample of repair mortar taken in accordance with Clause 9.5 (b) shall be tested for the physical properties including but not limited to the following:

(i) Grading of the repair mortar product;

(ii) Water retentivity; and

(iii) Other test(s), if any, as determined by the Repair Mortar Manufacturer for product releasing test.

(c) Production control test

Repair Mortar Manufacturers shall conduct routine production control testing in accordance with the production control testing frequencies given in Table 10.1 to ensure continuous compliance of the characteristic requirements with respect to the declared class of the repair mortar products and any other stated customer requirements.

(d) Audit Testing

Audit testing shall be carried out for the repair of mortar product(s) during Certification Audit, Surveillance and Re-certification Audits for the Certified Repair Mortar Manufacturer in accordance with Table 10.1.

(e) Statistical tools

Repair mortar manufacturer shall establish and implement statistical tools for analyzing test results obtained from all the tests stipulated in Clause 10.1 (b) & (c) for design review as stated in Clause 8.2 (d).

10.2 Testing Laboratories

All tests for repair mortar products stipulated in Clause 10.1 (a), shall be conducted by a laboratory accredited by HKAS or its MRA partners while those tests stipulated in Clause 10.1 (b) & (c) can be conducted internally or externally. An internal laboratory, either owned by the repair mortar product manufacturer or its affiliates, shall be equipped with test equipment required to complete the tests. All test equipment in the internal laboratory shall be calibrated at least once a year, either internally or externally, in accordance with relevant standards. The quality of the internal laboratory shall comply with the requirements of ISO/IEC 17025. External laboratories for conducting the tests and for calibration of test equipment shall be accredited by HKAS or its MRA partners or other governmental accreditation such as China Metrology Accreditation (CMA) for the tests concerned.

Table 10.1: Test Items and Frequencies

<table>
<tr><th rowspan="2">Test</th><th rowspan="2">Initial Type Test</th><th rowspan="2">Production Control Test</th><th colspan="2">Audit Testing</th></tr>
<tr><th>Surveillance</th><th>Certification & Re-certification</th></tr>
<tr><td>Compressive Strength Test at 28 days (TM1)</td><td rowspan="7">All tests</td><td rowspan="7">All tests within 1 year or for every 1000 tons of production , whichever is more frequent</td><td rowspan="7">Two tests to be selected by the Audit Team</td><td rowspan="7">All tests</td></tr>
<tr><td>Tensile Strength at 7 days (TM2)</td></tr>
<tr><td>Modulus of Elasticity Test at 28 days (TM3)</td></tr>
<tr><td>Bond Strength Test at 7 days (TM4)</td></tr>
<tr><td>Cracking in Coutinho Ring Test at 28 days (TM5)</td></tr>
<tr><td>Air Permeability Test (TM6)</td></tr>
</table>

11. REVIEW OF QUALITY MANAGEMENT SYSTEM

Compliance of the quality management system to the requirements in ISO 9001 and the Regulations in this Scheme shall be systematically reviewed at least once every nine months and at least once every twelve months in and after the first three-year. Certification respectively to ensure the adequacy and effectiveness of the system and the continuous product conformity of the Certified Repair mortar Product(s). The documented information for such a review shall be maintained.

12. CLASSIFICATION AND DESIGNATION

Classification and designation of repair mortar products(s) shall be in accordance with this Scheme and shall be clearly stated in the Certification Scope.

13. MARKING AND LABELLING

13.1 General Requirements

Information, including but not limited to the following, for the certified repair mortar product(s) shall be clearly marked and labelled on packaging material (e.g., packaging bag) or the product technical data sheet.

(a) Name of product;

(b) Classification of the repair mortar product;

(c) Brand and place of origin;

(d) Instructions for use or method statement for application;

(e) Mix proportion with other addition(s) (e.g., water) if any;

(f) Date or batch code of production (for packaging material only);

(g) Shelf life or expiry date; and

(h) Required conditions of storage.

END OF TECHNICAL REGULATIONS

Disclaimer:

It is the only intention of Hong Kong Concrete Institute (HKCI) to provide information and materials in this Scheme for the Participants to establish, maintain and continuously improve their processes for the manufacturing of repair mortar products. No warranty is given by HKCI as well as the owners of the standards and specifications referred in this Scheme of any kind, either expressed or implied, to anybody or any party for the conformity of quality, non-infringement, security, accuracy, fitness, fitness for purpose, appropriateness for the application and any other declaration of the certified repair mortar products. Endorsement of the HKCI for the Certificate of Conformity, which is evidenced by bearing the HKCI logo, shall only mean the fulfillment of the Certification Body for its obligations given in the contract between the HKCI. The HKCI shall by no means be responsible for the performance, conduct and ethics of the Certification Bodies, the Applicants, the Participants, the Certified Plant and the Certified Products as well as any other parties, stakeholders and products related to the Certificates of Conformity endorsed by HKCI.

Appendix 1 – Testing for Characteristics of Repair Mortar Products (latest versions of the specified test methods, if specified by clients, shall prevail.)

(a) Compressive strength (TM1)

The compressive strength of the repair mortar specimens shall be determined in accordance with BS 6319: Part 2: 1983 except that the cube size shall be 70.7 mm. Curing shall be carried out at a temperature of 27±2 ºC and at a relative humidity of 55±5%. Specimens shall be left in molds and covered with polythene for 3 days. They shall then be uncovered, demolded and stored as above until required for testing.

(b) Tensile strength (TM2)

The tensile strength of the repair mortar specimens shall be determined in accordance with BS 6319: Part 7: 1985. Curing shall be carried out at a temperature of 27±2 ºC and at a relative humidity of 55±5%. Specimens shall be left in molds and covered with polythene for 3 days. They shall then be uncovered, demolded and stored as above until required for testing.

(c) Modulus of Elasticity (TM3)

The modulus of elasticity in compression of repair mortar specimens shall be determined in accordance with BS 6319: Part 6: 1984. Curing shall be carried out at a temperature of 27±2 ºC and at a relative humidity of 55±5%. Specimens shall be left in molds and covered with polythene for 3 days. They shall then be uncovered, demolded and stored as above until required for testing.

(d) Bond Strength (TM4)

The bond strength of the repair mortar shall be determined using a modified tensile strength test method to BS6319: Part 7: 1985 described below. A high strength mortar briquette specimen shall be made and cured for 28 days. The mortar shall have a tensile strength in excess of 4 MPa when tested at 28 days to BS6319: Part 7: 1985. One half of the broken briquette shall be returned to the mold, primed with the appropriate bond coat and the remaining section of the mold shall be filled with the repair mortar under test. The repaired briquette shall be cured at a temperature of 27±2ºC and at a relative humidity of 55%±5% and then tested as described in BS6319: Part 7: 1985. The failure mode and bond strength shall be recorded.

(e) Shrinkage Cracking (TM5)

Shrinkage cracking of repair mortar shall be tested by the Coutinho Ring test as described below. The mould for this test shall be formed from steel to provide an annular specimen with an inner diameter of 115±0.1 mm, an outer diameter of 175±0.1 mm and a depth of

50±0.1 mm. Mold oil shall be applied to ease demolding. The mixed repair mortar shall be compacted within the mold. The compacted specimen together with the mould shall be kept at a temperature of 27±2oC and at a relative humidity of 55%±5% throughout the test unless otherwise specified. Record mass of specimen when demolded. After casting the specimen, it is protected to prevent any change of humidity with the outside environment. After 24 hours, the specimen is returned with the outer mold ring and base plate removed and the inner ring still in place to the conditioning environment. The repair mortar specimen shall be monitored daily for cracking until day 7 and then at day 14, 21 & 28, and the number and width of the cracks of the specimens recorded. Record mass of the specimen when cracking first occurs.

(f) Permeability (TM6)

The permeability of the repair mortar product shall be determined by the modified Figg test described in "Improvements to the Figg method for determining the air permeability of concrete", Cather, Figg, Marsden and O'Brien. Mag. Conc. Res 36 No. 129 Dec. 1984. The test shall be carried out on 100 x 100 x 100 mm cube specimens cured in the mold covered in polythene at a temperature of 27±2oC and at a relative humidity of 55%±5%. After three days, the specimens shall be demolded and kept under the same environment for a further 18 days. The specimens shall be dried in an oven for 14 days at 50oC prior to testing for permeability. The leakage of the apparatus shall be determined before and after the test using the method described in the above reference. If the leakage exceeds 0.01 kPa/sec, test results shall be discarded, and the specimens shall be re-tested after the apparatus is repaired.

END OF TECHNICAL REGULATIONS

Appendix 2 – Typical Manufacturing Process of Repair Mortar Products (for reference only)