



# **PRODUCT CONFORMITY CERTIFICATION SCHEME**

**FOR**

**MESH REINFORCEMENTS**

**(PCCS – MR)**

**PARTS ONE & TWO**

**Administrative Regulations**

**Technical Regulations**

**Issue 1**

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**HONG KONG CONCRETE INSTITUTE**

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**HONG KONG CONCRETE INSTITUTE**



# **PRODUCT CONFORMITY CERTIFICATION SCHEME**

**FOR**

**MESH REINFORCEMENTS**

**(PCCS - MR)**

**PART ONE**

**Administrative Regulations**

**HONG KONG CONCRETE INSTITUTE**

# Administrative Regulations

## Contents

	<b>Page</b>
<b>1. Introduction</b>	<b>1</b>
<b>2. General definitions</b>	<b>1</b>
<b>3. Prerequisites for participation</b>	<b>4</b>
<b>4. Procedures for application and certification</b>	<b>4</b>
<b>5. Obligations of certified mesh reinforcement manufacturers</b>	<b>7</b>
<b>6. Surveillance assessment and recertification assessment</b>	<b>8</b>
<b>7. Suspension and withdrawal of certification</b>	<b>10</b>
<b>8. Information on certified mesh reinforcement manufacturers</b>	<b>11</b>
<b>9. Appeals against decisions</b>	<b>11</b>
<b>10. Changes to the regulations</b>	<b>11</b>
<b>11. Complaints</b>	<b>11</b>
<b>12. Confidentiality</b>	<b>12</b>
<b>13. Experience and qualification of lead auditors and technical auditors</b>	<b>12</b>

# Product Conformity Certification Scheme

for

## Mesh Reinforcements

### ADMINISTRATIVE REGULATIONS

#### 1. INTRODUCTION

- 1.1 The purpose of the Scheme is to ensure that all mesh reinforcements produced by Certified Mesh Reinforcement Manufacturers meet Purchasers' specified requirements in BS 4483:2005. This is a product certification scheme that requires Certified Mesh Reinforcement Manufacturers to operate a quality system which complies with ISO 9001 and the Regulations of the Scheme.
- 1.2 The Administrative Regulations set out the rules for the operation of the Scheme and the rights and obligations of Certified Mesh Reinforcement Manufacturers in relation to the Scheme.
- 1.3 The Technical Regulations set out technical requirements for the Scheme.
- 1.4 This Scheme is a System 5 product certification scheme in accordance with ISO/IEC Guide 67, including initial assessment of quality and production systems, initial plant inspection and type testing, reassessment of Certified Mesh Reinforcement Manufacturers' quality and production systems, followed by periodic surveillance visits and regular audit testing that take into account the Certified Mesh Reinforcement Manufacturers' quality system and the testing of samples.
- 1.5 A Certification Body who uses this Scheme for certification of mesh reinforcement manufacturing plants may be accredited by Hong Kong Accreditation Service (HKAS) or its Mutual Recognition Agreement (MRA) partners in accordance with this Scheme, ISO/IEC Guide 65 (or the latest version ISO/IEC 17065) and its corresponding IAF Guidance.

#### 2. GENERAL DEFINITIONS

- 2.1 The following definitions are applied to the Regulations:

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

**Applicant:** An individual, firm or company who has formally applied to become a Certified Mesh Reinforcement Manufacturer.

**Areas For Improvement:** Areas for improvement (AFI) are not nonconformities and corrective actions are not mandatory. However, the assessment team judges by their experience that these are potential problem areas which may deserve attention.

**Assessment:** An in-depth appraisal of an Applicant's or a Certified Mesh Reinforcement Manufacturer's quality and technical system at a Plant to assess compliance with the Regulations. It is classified as Certification, Surveillance and Recertification assessments.

**Audit Testing:** Sampling and testing of mesh reinforcements which are ordered by an assessment team during an assessment. In Certification, Surveillance and Recertification Assessments, mesh reinforcements shall be sampled and tested for audit testing. The testing and compliance standards shall be confirmed by the assessment team in considering Purchaser's specifications and the Regulations of this Scheme. The test shall be conducted by an independent HOKLAS or its MRA partners accredited laboratory and the result shall be produced in a HOKLAS endorsed test report or equivalent.

**Auditor:** A nominee of the Certification Body appointed to carry out assessments. Auditors are classified as Lead and Technical Auditors.

**Certificate of Conformity:** The certificate issued by the Certification Body to confirm certification of an Applicant or a Certified Mesh Reinforcement Manufacturer in respect of a particular mesh reinforcement manufacturing plant.

**Certification:** Acceptance by the Certification Body, on The basis of assessments, that the Applicant or the Certified Mesh Reinforcement Manufacturer complies with the Regulations for one or more kind of particular mesh reinforcement.

**Certification Board:** A decision making board of a Certification Body to deliberate and grant a Certification or otherwise to an Applicant or a Recertification to a Certified Mesh Reinforcement Manufacturer.

**Certification Body:** An organization who is accredited by HKAS under the Hong Kong Certification Body Accreditation Scheme (HKCAS) in the field of "Product Certification" to process applications from the Applicant to become a Certified Mesh Reinforcement Manufacturer.

**Certification Mark:** The Certification Body logo which Certified Mesh Reinforcement Manufacturers are licensed to use. The use of this logo should be in accordance with the Regulations.

**Certified Mesh Reinforcement Manufacturer:** An Applicant who has achieved Certification.

**Critical Non-conformity:** Significant deviations of products from specified requirements in the Regulations, or the absence of, or failure to implement and maintain, a series of required quality management system elements, or a situation which would, on the basis of available objective evidence raise the highest degree of doubts to the conformity of the product that the Certified Mesh Reinforcement Manufacturer produces.

**Major Non-conformity:** Deviation of products from specified requirements in the Regulations, or the absence of, or failure to implement and maintain, one or more required quality management system elements, or a situation which would, on the basis of available objective evidence raise serious doubts to the conformity of the product that the Certified Mesh Reinforcement Manufacturer produces.

**Minor Non-conformity:** Failure to meet one requirement of a clause of ISO 9001 QMS or this Scheme or other necessary reference documents, and which is considered NOT to constitute a risk to the quality of the products that the Certified Mesh Reinforcement Manufacturer produces.

**Plant:** A Plant for the production of certified mesh reinforcements.

**Plant Register:** A register of all certified Plants which have attained Certification and are currently certified, the register is maintained by the Certification Body.

**Purchaser:** An individual, firm or company, who has entered into a contract with a Certified Mesh Reinforcement Manufacturer to purchase certified mesh reinforcements.

**Quality Assurance:** All the activities and functions concerned with the attainment of the quality of mesh reinforcements.

**Quality Control:** The operational techniques and activities that sustain the quality of mesh reinforcements as set out in a specification agreed between the Purchaser and the Certified Mesh Reinforcement Manufacturer and in accordance with the Regulations.

**Quality Manual:** The document describing the Applicant's or Certified Mesh Reinforcement Manufacturer's structures, resources, procedures and methods which together ensure that the Applicant or Certified Mesh Reinforcement Manufacturer can meet the requirements of the Scheme.

**Quality Records:** The records required by the Quality Manual of a Certified Mesh Reinforcement Manufacturer, and to be kept by the Certified Mesh Reinforcement Manufacturer to meet the requirements of the Regulations.

**Quality System Management Office:** A location at which a Certified Mesh Reinforcement Manufacturer's quality and production records are maintained.

**Regulations:** The Administrative Regulations and Technical Regulations.

**Scheme:** The product conformity certification scheme for the certification of the production of mesh reinforcements. The Scheme is owned by the Hong Kong Concrete Institute.



**Technical Committee:** The Committee under HKCI responsible for the drafting, amendment and maintenance of the PCCS-MR Scheme document.

**Technical Regulations:** The regulations set out the technical requirements of the Scheme.

### **3. PREREQUISITES FOR PARTICIPATION**

- 3.1 Any individual, firm or company, engages in the production of mesh reinforcements shall be eligible as an Applicant to apply to become a Certified Mesh Reinforcement Manufacturer.
- 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 nominate a quality system management office and/or a plant office to be responsible for the overall management of the mesh reinforcement production and supply activities of the Plant of the Applicant.
- 3.4 The Applicant shall establish and maintain a documented quality system in accordance with the requirements of the Administrative Regulations. The same quality system shall apply to the production of mesh reinforcements in a Plant of the Applicant within the Scheme.
- 3.5 The Applicant shall obtain relevant permits for the operation of the Plant to fulfill relevant statutory and regulatory requirements and establish a quality system management office to maintain quality records for at least three months before the Certification Assessment.
- 3.6 Upon successful Certification Assessments and subsequent decision made by the Certification Board or equivalent function of the Certification Body, the Applicant shall be granted with a Certificate of Conformity to this Scheme for the product manufactured at its Plant.

### **4. PROCEDURES FOR APPLICATION AND CERTIFICATION**

#### **4.1 Application**

- 4.1.1 For consideration to become a Certified Mesh Reinforcement Manufacturer, an Applicant shall:
  1. complete and submit the application form prescribed by Certification Body;
  2. pay the appropriate fee;
  3. provide the Quality Manual and related documentations for Assessment; and
  4. nominate a person to be the management representative and the Applicant's formal contact with the Certification Body.

## 4.2 Certification Assessment

4.2.1 On receipt of an application, an assessment team consisting of a Lead Auditor and/or one or more Technical Auditors if necessary will assess the quality and technical documentations for compliance with the Regulations and arrange to perform on site assessment of the Quality System Management Office and Manufacturing Plant.

4.2.2 Certification Assessment shall comprise the following:

1. Overall assessment of the quality management and production systems.
2. Manufacturing Plant. The assessment team will assess the plant and equipment including the calibration of such plant and equipment and the operation of the relevant sections of the Certified Mesh Reinforcement Manufacturer's quality and technical systems conforming to the Regulations.
3. Quality System Management Office. The assessment team will assess the quality system relating to the Plant by an assessment of quality and production records.
4. Evaluation of the results of production testing. The assessment team will assess the quality control system by carrying out an evaluation of quality control (QC) testing results covering a minimum of three months. The assessment team will also examine relevant quality and production records to confirm the output of quality control systems, and hence authenticate the conformity of the mesh reinforcements to the specified criteria in the Regulations.
5. Audit testing. The assessment team shall take random representative samples at the point of release of mesh reinforcements from the Plant and/or depots supplied with the mesh reinforcements by the Plant. The first batch of the mesh reinforcements to be certified is used for initial type testing. The relevant requirements specified in the Regulations shall be checked for compliance. The test shall be carried out by an independent HOKLAS or its MRA partners accredited laboratory and the results produced in an endorsed test report. The choice of selecting an accredited laboratory for testing shall be based on the agreement between the Mesh Reinforcement Manufacturer and the Certification Body.

The results shall be evaluated by the assessment team of the Certification Body and an evaluation report shall be produced.

4.2.3 On completion of the Certification Assessment, the assessment team will report the type of nonconformities found and obtain the Applicant's acknowledgement of these. The assessment team will indicate orally a written recommendation for Certification or otherwise.

4.2.4 There are four possible recommendations:

1. **No nonconformity.** Certification will be recommended to the decision making Certification Board or equivalent function of the certification body. Some AFIs may be given for the improvement of the quality and technical systems.

2. **A number of minor nonconformities** which do not cumulatively indicate a major failure of the quality management system and product quality. Certification will be recommended after receipt of a letter giving satisfactory details of corrections and corrective actions which will remove the nonconformities from the system after successful implementation. The time limit for the receipt of the letter will be two weeks.

Note that corrections and corrective actions do not have to be implemented before the receipt of the letter by the Certification Body. Corrections and corrective actions shall be implemented within an acceptable time which will be a maximum of four weeks or such lesser time as the assessment team may decide. Minor nonconformities will be audited on the first subsequent Surveillance Assessment.

3. **A major nonconformity or a number of systematic minor nonconformities** which accumulate to indicate a major failure of the quality management system and product quality. The Applicant will be required to respond giving satisfactory details of corrections and corrective actions which will rectify the nonconformities in the system after successful implementation. The time limit for the written response will be two weeks.

Corrections and corrective actions shall be implemented within an acceptable time which will usually be between one to three months.

Certification will not be recommended until the nonconformities have been rectified from the system and a satisfactory follow up assessment has been carried out.

If the Applicant is not ready for the follow up assessment within six months, the application will be considered unsuccessful. A new application will be required.

4. **A critical nonconformity** indicating that the extent of the system failure is considered by the assessment team to require more than six months for corrections. The Applicant will be required to re-apply for Certification after a period of at least six months following the date of Certification Assessment.

#### 4.3 **Certification**

- 4.3.1 On receipt of the assessment team's written recommendation, the Certification Body will decide to grant Certification or otherwise based on the decision made by the Certification Board or equivalent function.
- 4.3.2 The Applicant shall sign an agreement to be abode by the Regulations and the regulations of the Certification Body. A Certificate of Conformity will be issued to the Applicant for that Plant.
- 4.3.3 Details of the Certified Mesh Reinforcement Manufacturer together with its locations and details of the certified Plant will be included on the Plant Register published in the Certification Body's website or equivalent means.
- 4.3.4 Where an application for participation in this Scheme is rejected or Certification is refused, the Applicant shall have the right of representation to an appeal committee in accordance with the Certification Body regulations.

#### 4.4 **Certificate of Conformity and Certification Mark**

4.4.1 Upon Certification, conformity of mesh reinforcements to the PCCS-MR Scheme requirements shall be indicated by a Certificate of Conformity issued by the Certification Body. The Certified Mesh Reinforcement Manufacturer shall be entitled to use the Certification Body logo as a Certification Mark in accordance with the Certification Body regulations.

4.4.2 Certificate of Conformity shall include, in particular:

- (a) the name and address of the Certification Body,
- (b) the name and address of the Certified Mesh Reinforcement Manufacturer and of the Plant,
- (c) the name(s) of the certified mesh reinforcements,
- (d) statements that the mesh reinforcement conforms to the requirements of the relevant product specification standard and the conformity is established according to the PCCS-MR Scheme,
- (e) the certificate number assigned by the Certification Body.

The Certificate of Conformity shall entitle the manufacturer to use the Certification Mark on packaging materials and any documentation used for the certified mesh reinforcements.

4.4.3 A Certified Mesh Reinforcement Manufacturer may also use the Certification Mark on quotations and delivery notes for Plants which have achieved Certification and may use the Certification Mark on stationery, brochures and other advertising media.

4.4.4 The conformity marking shall consist of the Certification Mark and shall be followed by:

- (a) the identification number of the Certified Mesh Reinforcement Manufacturer,
- (b) the standard designation of the mesh reinforcements to the PCCS-MR Scheme.

### **5. OBLIGATIONS OF CERTIFIED MESH REINFORCEMENT MANUFACTURERS**

5.1 The Certified Mesh Reinforcement Manufacturer shall operate a quality management system in accordance with the relevant requirements in the ISO 9001. The Certified Mesh Reinforcement Manufacturer shall also comply with the Regulations.

5.2 The Certified Mesh Reinforcement Manufacturer's quality and technical documentation shall be applied to its Plant producing and supplying the products within the Scheme.

5.3 The Certified Mesh Reinforcement Manufacturer shall pay an annual fee to Certification Body for each Certification. The Certified Mesh Reinforcement Manufacturer shall also pay an initial assessment fee and all subsequent fees to Certification Body for assessment, surveillance and re-assessment. The amount of all fees will be determined by the Certification Body. The Certified Mesh Reinforcement Manufacturer shall bear the cost of any Audit Testing which may be directed.

5.4 The Certified Mesh Reinforcement Manufacturer shall afford to an assessment team full assistance and cooperation during any assessments, produce documentation and Quality Records when requested, allow an assessment team to have free access to a Plant and Quality Records Centre, and assist with Audit Testing as necessary.

- 5.5 The Certified Mesh Reinforcement Manufacturer shall not sub-contract the production and supply of mesh reinforcements unless specific prior approval has been obtained from the Certification Body. Such approval will only be given if the proposed sub-contractor is also a Certified Mesh Reinforcement Manufacturer and the Purchaser has been informed of and agreed with the sub-contract arrangement.
- 5.6 The Certified Mesh Reinforcement Manufacturer may use the Certification Mark as described before but shall not use it in a manner that may bring HKCI or the Certification Body into disrepute.
- 5.7 The Certified Mesh Reinforcement Manufacturer shall keep the Certification Body informed in writing of changes in its circumstances which may affect Certification. Such changes include:
1. Changes in ownership or name.
  2. The resignation of its management representative or company directors.
  3. Changes in the Quality Manual or significant items in its Plant.
  4. Changes of the location of the Plant and/or Quality System Management Office.
  5. Closure of a manufacturing Plant.
- 5.8 The Certified Mesh Reinforcement Manufacturer shall inform the Certification Body any significant changes to the product, manufacturing process or quality system, which may affect the conformity of the product. In such case, the Certification Body shall evaluate the degree of such changes effected to the product quality and may demand an assessment for such changes, the Certified Mesh Reinforcement Manufacturer may be asked not to release the product before the performance of an on site assessment.
- 5.9 The Certified Mesh Reinforcement Manufacturer shall keep a list of its purchasers, who have purchased the certified mesh reinforcements, for the purpose of recall if it is necessary.

## **6. SURVEILLANCE ASSESSMENT AND RECERTIFICATION ASSESSMENT**

6.1 After Certification, the assessment team will conduct periodic Surveillance Assessments to the Plant and its associated Quality System Management Office, for assessment of the Certified Mesh Reinforcement Manufacturer.

### **6.2 Frequency and Purpose of Surveillance Assessment**

6.2.1 The frequency of routine Surveillance Assessments for the first three-year Certification and subsequent Certification cycles shall be at least every nine months.

Surveillance Assessments shall comprise the following:

1. Manufacturing Plant. The surveillance assessment team will assess plant and equipment including the calibration of such plant and equipment, and assess the operation and conformity of the relevant sections of the Certified Mesh Reinforcement Manufacturer's quality and technical documentation to the Regulations.

2. Quality System Management Office. The surveillance assessment team will assess the quality system of the Plant by an assessment of the quality and production records.
3. Evaluation of the results of production testing. The surveillance assessment team will assess and evaluate the results of all quality control tests since the previous assessment. The surveillance team will also examine relevant quality records to confirm the output of control systems, and hence authenticate the conformity of the mesh reinforcements to the specified criteria in the Regulations and relevant requirements.
4. Audit testing. The surveillance assessment team shall take random representative samples at the point of release of certified mesh reinforcements from the plant and/or depots supplied with the product by the plant. The sample of the certified mesh reinforcement is used for audit testing. The relevant properties specified in the Regulations shall be determined for checking compliance. The test shall be carried out by a HOKLAS or its MRA partners accredited laboratory and the results produced in an endorsed test report.

The results shall be evaluated by the assessment team of the Certification Body and a report shall be produced.

6.2.2 Other Surveillance Assessments will be made for follow up assessment purposes following a report of major or critical nonconformities. Such assessments may require either:

1. a partial assessment to confirm that nonconformities have been corrected; or
2. a full assessment to confirm compliance with the Regulations.

### 6.3 Conclusions from Surveillance Assessment

6.3.1 On completion of each Surveillance Assessment, the surveillance assessment team will report the type of nonconformities found and obtain the Certified Mesh Reinforcement Manufacturer's acknowledgement of these. The surveillance assessment team will indicate orally with a written recommendation for continued Certification or otherwise.

6.3.2 There are four possible recommendations:

1. Certification should be confirmed. The Plant and its associated Quality System Management Office comply with the Regulations and show no nonconformity. Some AFIs may be given for the improvement of the quality and technical systems.
2. Certification should be conditionally confirmed. **A number of minor nonconformities** exist which do not cumulatively indicate a major failure of the quality management system and product quality. Certification will be recommended after receiving a written response from the Certified Mesh Reinforcement Manufacturer stating details of the proposed corrections and corrective actions which, by the judgment of the surveillance assessment team, will rectify the nonconformities in the system after successful implementation.

The time limit for the receipt of the written reply will be two weeks. Corrections and corrective actions shall be implemented within an acceptable time limit which will be a maximum of four weeks or such lesser time as the surveillance assessment team may decide.

3. Suspension of Certification is recommended. A **major nonconformity** exists or a **number of systematic minor nonconformities** exist which accumulate to indicate a major failure of the quality management system and product quality. The Certified Mesh Reinforcement Manufacturer will be required to submit a written reply stating details of the proposed corrections and corrective actions which, by the judgment of the surveillance assessment team, will rectify the nonconformities in the system after successful implementation. The time limit for the receipt of the written response will be two weeks. Surveillance assessment team shall assess the corrections and corrective actions to ensure proposed actions are effectively implemented before the reinstatement of the Certification.

A partial or full re-assessment, as directed by the surveillance assessment team, will be required within three months before reinstatement of Certification can be recommended.

4. Withdrawal of Certification is recommended. A critical nonconformity, a major nonconformity or a number of systematic minor nonconformities have not been rectified in the system in accordance with the relevant procedures stated in the Regulations or if the Certified Mesh Reinforcement Manufacturer is persistently failing to comply with its obligation under this Scheme.

#### 6.4 Recertification Assessment

- 6.4.1 The duration of a Certification is three years. Recertification Assessment will be carried out at every third year of each three-year Certification cycle. The Recertification Assessment will be carried out as if it is an initial Certification Assessment.

### 7. SUSPENSION AND WITHDRAWAL OF CERTIFICATION

- 7.1 On receipt of an adverse Assessment report and recommendation from the assessment team on any Plants or associated Quality System Management Office, the Certification Board or equivalent will agree or otherwise that the Certification for the Plant will be suspended or withdrawn.
- 7.2 If the Certified Mesh Reinforcement Manufacturer is, at any time in the opinion of the Certification Board, failing systematically to comply with the Scheme either by reason of suspension of Certification for the majority of its Plants or by reason of its failure to comply with its obligations under the Scheme, then the Certification Body will suspend the Certification for all certified Plants of the Certified Mesh Reinforcement Manufacturer.
- 7.3 If the Certification is suspended in accordance with Clause 7.2, a full Certification Assessment of the Certified Mesh Reinforcement Manufacturer's Plant under the Scheme will be required within three months after the suspension of Certification is made before reinstatement of Certification can be recommended.

- 7.4 If, upon an assessment following suspension in accordance with Clause 7.3, a major nonconformity or a number of systematic minor nonconformities have not been rectified in the system or if the Certified Mesh Reinforcement Manufacturer is persistently failing to comply with his obligations under the Scheme, then the Certification Body may, in its absolute discretion, withdraw all the Certificates of Conformity of the Certified Mesh Reinforcement Manufacturer.
- 7.5 In the event that the Certification Body suspends or withdraws the Certification of any Plants of a Certified Mesh Reinforcement Manufacturer, the Certification Body may publish such decisions in appropriate newspapers or similar media. If the Certification Body has exercised its right to publish such decisions, then the Certification Body will, at the request of the Certified Mesh Reinforcement Manufacturer, publish any decisions reinstating a Certification.
- 7.6 If the Certification for a Plant is suspended or withdrawn, the Certified Mesh Reinforcement Manufacturer shall cease to use the Certification Mark in relation to that Plant.

## **8. INFORMATION ON CERTIFIED MESH REINFORCEMENT MANUFACTURERS**

- 8.1 Upon the request of any Purchasers, end users or any concerned parties of the certified mesh reinforcements, the Certification Body will provide verbal and, if requested, written confirmation of the status of any Certified Mesh Reinforcement Manufacturers or Plant under its register.
- 8.2 Any announcement or confirmation of the suspension or withdrawal of Certification will state the reasons for such suspension or withdrawal.

## **9. APPEALS AGAINST DECISIONS**

- 9.1 The Applicant or Certified Mesh Reinforcement Manufacturer shall have the right of appeal against any decisions of the Certification Board or equivalent to an appeal committee set up under the Certification Body. Details of the appeal procedure are given in the Certification Body regulations.

## **10. CHANGES TO THE REGULATIONS**

- 10.1 The Certification Body will give Certified Mesh Reinforcement Manufacturers at least a three-month written notice of any intended changes to the Certification Body regulations to allow for clarification between Certified Mesh Reinforcement Manufacturers and the Certification Body.
- 10.2 Following any changes to the Certification Body regulations which the Certification Board or equivalent may agree, the Certified Mesh Reinforcement Manufacturer shall be allowed at least three months to carry out any adjustments to their quality assurance scheme which may be required as a result of such changes.

## **11. COMPLAINTS**

- 11.1 Certified Mesh Reinforcement Manufacturers shall keep a record of all written complaints received from any concerned parties. These records shall be made available to the assessment team at the time of any Assessments.



- 11.2 The Certification Body will keep a record of all written complaints, in relation to a Certified Mesh Reinforcement Manufacturer received from any concerned parties. Such complaints will be investigated at the discretion of the Certification Body and reported to the Certification Board or equivalent.
- 11.3 The Certification Body will respond to complainants with a report which is confined to a statement upon the Certification status of the Certified Mesh Reinforcement Manufacturer and its Plants.
- 11.4 The Certified Mesh reinforcement Manufacturers shall take appropriate actions with respect to the Certification Body's decision on the complaint and make good any deficiencies found in the products or services to comply with the requirements of this Scheme.

## **12. CONFIDENTIALITY**

- 12.1 Certified Mesh Reinforcement Manufacturers shall disclose to the assessment team for the purposes of Assessments all information or records obtained from or pertaining to Purchasers and connected with the Scheme.
- 12.2 The assessment team and the Certification Body will not disclose information or records obtained from Certified Mesh Reinforcement Manufacturers except as may be permitted by the Certification Body regulations.

## **13. EXPERIENCE AND QUALIFICATION OF LEAD AUDITORS AND TECHNICAL AUDITORS**

- 13.1 Lead Auditors who are eligible for auditing PCCS-MR quality management system shall have the following registration
  - Registered IPC or Hong Kong Institution of Certified Auditors (HKICA) Lead Auditor in QMS or equivalent.
- 13.2 Technical Auditors who are eligible for auditing PCCS-MR technical management system shall have the following training, experience and qualifications:
  - a. Registered HKICA Product Certification auditor in relevant fields or equivalent,
  - b. A relevant Higher Diploma or Degree in architectural studies, buildings, materials science, structural or civil engineering, or other related fields; and
  - c. With a minimum of two years relevant industry technical experience, or a minimum of two years quality management system audit experience for relevant manufacturing industry, or with appropriate training held by or acceptable to the Hong Kong Concrete Institute for this purpose.

**PRODUCT CONFORMITY CERTIFICATION SCHEME**

**FOR**

**MESH REINFORCEMENTS**

**(PCCS-MR)**

**PART TWO**

**Technical Regulations**

**HONG KONG CONCRETE INSTITUTE**

# Technical Regulations

## Contents

	<b>Page</b>
<b>1. Introduction</b>	<b>1</b>
<b>2. Quality system</b>	<b>1</b>
<b>3. Certified Mesh Reinforcement Manufacturers' quality responsibilities</b>	<b>1</b>
<b>4. Technical definitions</b>	<b>1</b>
<b>5. Requirement of mesh reinforcements</b>	<b>2</b>
<b>6. Evaluation of conformity</b>	<b>4</b>
<b>7. Audit testing</b>	<b>8</b>
<b>8. Marking and labeling</b>	<b>9</b>

# **Product Conformity Certification Scheme**

## **for**

### **Mesh Reinforcements**

#### **TECHNICAL REGULATIONS**

#### **1. INTRODUCTION**

- 1.1 The Technical Regulations set out the technical requirements of the Scheme.
- 1.2 The Technical Regulations shall be read in conjunction with the Administrative Regulations.
- 1.3 Wrapping meshes using wires or bars complying with BS 4482 are not included in this Scheme

#### **2. QUALITY SYSTEM**

- 2.1 An effective quality system shall be established, documented and maintained in accordance with the prevailing ISO 9001 relevant requirements to ensure and demonstrate that the mesh reinforcements produced and supplied under the Scheme conform to the relevant requirements and the Regulations.
- 2.2 There shall be objective evidence that top management is actively in the development, implementation and continual improvement of the effectiveness of the quality management system.

#### **3. CERTIFIED MESH REINFORCEMENT MANUFACTURERS' QUALITY RESPONSIBILITIES**

- 3.1 The Certified Mesh Reinforcement Manufacturer shall nominate a Quality Management Representative who shall have defined authority and responsibility for ensuring that the requirements of ISO 9001 and the Technical Regulations are met.
- 3.2 All staff shall be technically competent for the functions that they perform and are aware of the effects of these functions on the product quality. A proper training procedure shall be set up and maintained for the training of technical staff.

#### **4. TECHNICAL DEFINITIONS**

- 4.1 Welded mesh reinforcement – An arrangement of longitudinal and transverse bars or wires of the same or different diameter and length, arranged substantially at right angles to each other, and factory electrical resistance welded together by machine at the points of intersection.

## 5. REQUIREMENTS OF MESH REINFORCEMENTS

- 5.1 Steel reinforcement bars complying with BS 4449:2005 (A2:2009) shall be used for manufacturing mesh reinforcements. The mesh reinforcement shall meet the requirements in BS 4483: 2005 and these Regulations :
- 5.1.1 Clean and free from loose mill scale, loose rust, oil, grease or any substance which is likely to reduce the bond or affect the reinforcement or concrete chemically;
- 5.1.2 Do not use contaminated or heavily rusted reinforcements unless they are cleaned or satisfactorily treated by an approved method.
- 5.2 The performance requirements for mesh reinforcements shall be in accordance with **Table 1**

**Table 1 – Performance Requirements for Mesh Reinforcements**

Item/Parameter	Standard & Test Methods	Acceptance Criteria
	<b>Steel bar</b>	
<b>Deviation from nominal mass per metre of bar</b>	BS 4449:2005 Clause 7.3.2 Table 7	$\leq \pm 4.5\%$ for bar size >8mm $\leq \pm 6.0\%$ for bar size $\leq 8$ mm
	<b>Mesh reinforcement</b>	
<b>Mass</b>	BS 4483: 2005 Clause 7.3.2	As above
<b>Dimension</b>	BS 4483:2005 Clause 7.3.2	$\pm 25$ mm or 0.5 % whichever is greater, both longitudinal and transverse directions
<b>Pitch</b>	BS 4483: 2005 Clause 7.3.2	$\leq \pm 10$ mm or $\pm 5$ % whichever is greater
<b>Weld shear test</b>	BS 4483:2005 Clause 7.2.4	$\geq 0.25 \times A_n \times R_e$

<b>Item/Parameter</b>	<b>Standard &amp; Test Methods</b>	<b>Acceptance Criteria</b>
	<b>Mechanical properties</b>	
<b>Tensile strength/Yield strength</b>	BS 4449:2005 Clause 7.2.3 Table 4	≥1.05 for bar size ≥ 8mm ≥1.02 for bar size < 8mm
<b>Yield strength</b>	BS 4449:2005 Clause 7.2.3	≥ 500 MPa
<b>Percentage total elongation at maximum force</b>	BS 4449:2005 Clause 7.2.3	≥2.5% for bar size ≥ 8mm ≥1.0% for bar size < 8mm
<b>Rebend test</b>	BS 4449:2005 Clause 7.2.5	No fracture
<b>Surface geometry</b>	BS4449:2005, Clause 7.4	BS4449:2005 Table 8 and Table 9
	<b>Chemical properties</b>	
<b>Carbon equivalent value</b>	BS 4449:2005 Clause 7.1 Table 2	≤ 0.52%
<b>Carbon</b>	BS 4449:2005 Clause 7.1 Table 2	≤0.24%
<b>Sulphur</b>	BS 4449:2005 Clause 7.1 Table 2	≤0.055%
<b>Phosphorus</b>	BS 4449:2005 Clause 7.1 Table 2	≤0.055%
<b>Nitrogen<sup>a</sup></b>	BS 4449:2005 Clause 7.1 Table 2	≤0.014%
<b>Copper</b>	BS 4449:2005 Clause 7.1 Table 2	≤0.85%

Note: <sup>a</sup> Higher nitrogen contents are permissible if the chemical composition shows a minimum aluminium content of 0.02% or if sufficient other nitrogen binding elements (such as titanium, niobium or vanadium) are present.

## 6. EVALUATION OF CONFORMITY

### 6.1 General requirements

6.1.1 The Scheme for the evaluation of conformity includes the following tasks :

- (b) Initial Type Tests (ITT)
- (c) Plant Production Control (PPC) Tests
- (d) Audit Testing (AT)

A Certified Mesh Reinforcement Manufacturer having a quality management system to ISO 9001 and the Regulations in this Scheme is deemed to meet the requirements of Plant Production Control.

### 6.2 Initial Type Tests

On first evaluation of a mesh reinforcement to the requirements of the Regulations, appropriate initial type testing shall be carried out to confirm that the characteristics of the product meet the requirements of the Regulations in this Scheme and the relevant requirements to **Table 2**.

Initial type tests shall also be carried out on existing products after any change in raw materials or manufacturing procedures that can modify the declared values of the characteristics or application properties of the products. In these cases the appropriate initial type testing to be carried out are those, to the opinion of the Certified Mesh reinforcement Manufacturer, based on sound technical projection for the characteristics and properties that can be affected and need confirmation; any new property or properties arising from a change of formulation or manufacturing procedure shall be tested and the results be reported.

Samples for initial type tests shall be selected by the Certification Assessment team on site at the dispatching point of the manufacturing Plant. The tests shall be conducted by a HOKLAS or its MRA partners accredited test laboratory. The results shall be reported in HOKLAS endorsed test certificate or equivalent.

**Table 2 : Initial type test, plant production control test and audit testing frequency**

Test	Test method and requirement	Initial type test (ITT)	Plant Production control Test (PPC)	Audit testing (AT)	
				(Surveillance)	(Recertification)
<b>Steel bar</b>					
<b>Mass</b>	See Table 1	Y	A	Y	Y
<b>Mesh reinforcement</b>					
<b>Mass</b>	See Table 1	Y	A	Y	Y
<b>Dimension</b>	See Table 1	Y	A	Y	Y
<b>Pitch</b>	See Table 1	Y	A	Y	Y
<b>Weld shear test</b>	See Table 1	Y	A	Y	Y
<b>Mechanical properties of steel bar</b>					
<b>Tensile strength Rm</b>	See Table 1	Y	A	Y	Y
<b>Yield strength Re</b>	See Table 1	Y	A	Y	Y
<b>Rm/Re</b>	See Table 1	Y	A	Y	Y
<b>Elongation Agt</b>	See Table 1	Y	A	Y	Y
<b>Rebend test</b>	See Table 1	Y	A	Y	Y
<b>Surface geometry</b>	See Table 1	Y	A	Y	Y
<b>Chemical properties</b>					
<b>Carbon equivalent value</b>	See Table 1	Y	B	Y	Y
<b>Carbon, Sulphur, Phosphorus, Nitrogen &amp; Copper</b>	See Table 1	Y	B	Y	Y

Initial type (ITT) and audit (AT) tests : "Y" means yes. (One specimen for longitudinal and one for transverse direction respectively for Re, Rm, Agt, mass, rebend, surface geometry and all chemical properties.)

Production Control Test frequency :

"A" means 1 test for every 50 tonnes of steel bars, with a minimum of 1 time per week. (One specimen for longitudinal and one for transverse direction respectively for Re, Rm, Agt, mass, rebend and surface geometry.)

"B" means 1 test for each batch of raw material of steel bars. A batch shall not exceed 200 tonnes for steel reinforcing bars of diameter 20mm and above and shall not exceed 100 tonnes for steel reinforcing bars of diameter less than 20mm and is the quantity of bars delivered to factory under one delivery order, of one nominal diameter, and one steel grade and produced by the same manufacturer.



### 6.3 **Plant Production Control Test**

A PPC plan and procedures relevant to the declared properties, as confirmed by the initial type tests, of the Certified Mesh Reinforcement Manufacturer shall be established and implemented in accordance with the requirements in the Regulations.

Any change in raw materials, source of supply, manufacturing procedures or control plan that can affect the properties of the product shall be recorded.

The PPC procedures shall consist of a system for the production quality control to ensure that the product complies with the relevant requirements.

The production control shall consist of the following main phases:

- (a) inspection and testing of raw materials,
- (b) inspection and testing of production equipment and process,
- (c) inspection and testing on finished products.

#### 6.3.1 **Production**

##### 6.3.1.1 **Raw materials**

The manufacturer shall ensure that raw materials are not used until it has been verified that they comply with the required specifications.

There shall be a documented system/ procedure on each of the following items:

- (a) Materials purchased from steel mill – reinforcing steel shall be produced by a steel mill certified to ISO 9001 by certification body accredited by HKAS or its MRA partners for the relevant scope. Purchasing procedures shall include all aspects of the material specification which are important in ensuring satisfactory material quality and identity;
- (b) Materials purchased through steel distributors – traceability shall be traced back to the production data of steel mill and each batch to its specific order;
- (c) Purchase order – materials received shall meet the requirements of the purchase order. The procedure shall include the inspection and correlation of purchase orders, advice notes, bundle/cast identity, rolled on marks where appropriate and test information;
- (d) Stock holding – materials held in stock and subsequently processed shall be recorded and identified. The record system shall ensure traceability of each batch fabricated from standard lengths or coils to its parent casts and each batch to a specific order. Records shall be maintained for a minimum period of ten years from the date delivery.

### 6.3.1.2 Production process

The manufacturer shall identify and define the plant and production processes and ensure that the processes are carried out under controlled conditions clearly described in the procedures. The processes are verified by means of inspections and tests documented in a plan, as frequency and values or criteria are required both on equipment and on operations in the process. The actions to be taken when control values or criteria are not obtained shall be given.

There shall be a documented operation system on each of the following items:

- (a) Finished diameter of reinforcing steel – the control of degree of cold work shall include the monitoring and recording of dimensional and shape control during production and shall ensure that the steel is suitable for further processing into reinforcement for concrete;
- (b) Cutting and bending of reinforcing steel – comply with BS 8666 or the customer specification. The procedure shall address the cutting and bending of non-standard shape codes. All parameters from the scheduling are to be inspected and recorded;
- (c) Non-conforming materials – the procedure for handling of non-conforming materials shall include adequate segregation, identification and disposal. Records shall be maintained;
- (d) Welding –all welded fabric shall be factory made and machine welded. The joints, at the intersection of the longitudinal bars and the transverse bars, shall be made by electrical resistance welding to provide specified shear resistance. The number of broken welds shall not exceed 4% of the total number of cross welded joints in the sheet, nor exceed half the number of cross welded joints along any one bar;
- (e) Maintenance of equipment – the calibration of process control equipment and instruments shall be in accordance with a measurement management system (e.g. BS EN ISO 10012) acceptable to the Certification Body and stated in a maintenance programme.

### 6.3.2 Finished products

The number and size of the samples, the frequency of sampling, test performed and the result obtained shall be recorded. The test shall be conducted at least with the frequency specified in **Table 2**. For the purposes of PPC, alternative tests to those given in **Table 2** may be used, provided that a correlation of the test results between both tests, for the product in question, is established.

There shall be a documented system/procedure on each of the following items:

- (a) Storage of finished products – the procedure shall include measures which prevents damage, deterioration and contamination;
- (b) Testing and inspection – the procedure shall describe methods for transmitting test information such as inspection and all associated records and testing results of the finished products in accordance with BS 4483 and customer requirements;
- (c) Despatch and Packaging – the procedure shall ensure that material meets the requirements of the customer’s specification. This shall include material handling and packaging to ensure maintenance of quality during delivery. In particular, there shall be sufficient numbers of durable identification labels, attached to the finished products in a way that reduces the risk of loss of identification data up to its point of further processing into mesh reinforcement.

### 6.3.3 Statistical techniques

Where and when possible and applicable, the results of inspections and testing shall be interpreted by means of statistical techniques, by attributes or by variables, to verify the product characteristics, and hence to determine if the production complies with the compliance criteria and the product complies with the declared values.

The evaluation shall be carried out in accordance with BS 4483:2005.

### 6.4 Registration and traceability

The Certified Mesh Reinforcement Manufacturer shall establish and maintain suitable procedures for the identification and traceability of materials from receipts of raw materials and during all stages of production and delivery.

Traceability of the mesh reinforcement products based on an electronic means (such as radio frequency identification (RFID), or bar code systems) is recommended. The use of this system provides a control mechanism of the authenticity of the mesh reinforcement products throughout the supply chain from the factory to the purchaser. Traceability provided by other means or systems should be proven to be satisfactory and accepted by the Certification Body.

## 7. AUDIT TESTING

- 7.1 Audit testing of samples for Surveillance Assessments and Recertification Assessments shall be in accordance with **Table 2**.

## **8. MARKING AND LABELLING**

### **8.1 General Requirements**

Products complying with the Regulations of the PCCS-MR Scheme shall be clearly marked with the following information:

- (a) Brand name of the product,
- (b) Manufacturer's mark and place of origin,
- (c) Date or code of production, and conditions of storage,
- (d) PCCS-MR and relevant requirements,
- (e) Type of product,
- (f) Model and serial numbers,
- (g) Details of size,
- (h) Address of manufacturer,
- (i) Packing and quantity,
- (j) Any other manufacturer's specification or recommendations on the use of this mesh reinforcements.

The information shall be marked on the packaging and/or the product's technical data sheet.

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