

# **Quality Product Certification Scheme for**

## **Mechanical Couplers (QS/MC)**

Kenneth Kau  
Castco Certification Services Limited  
13 November 2015

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佳力高認證服務有限公司  
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**Quality Product  
Certification Scheme**

**for**

**Mechanical Couplers  
(QS/MC)**

Issue 2  
07 October 2015

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Quality Product Certification Scheme on Mechanical Couplers

Mr Kenneth Kau, Quality Assurance Manager, Castco Certification Services Limited

鋼筋連接套筒認證計劃

佳力高認證服務有限公司 品質保證經理 裘志健先生

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- Quality Assurance Manager &
- Product Certification Auditor

## Summary of Presentation

- Application and Technical Requirements of Mechanical Couplers
- Introduction to Production Certification and Scheme Development
- Certification Process

## Castco Certification Services Limited

- Established in Hong Kong in 2003
- Independent Certification Body
- HKCAS Accreditation:
  - Quality Management System Certn. (ISO 9001)
  - Environmental Management System Certn.  
(ISO 14001)
  - Occupational Health & Safety Management System Certn. (OHSAS 18001)
  - Product Certification

## The 4th Castco-developed Product Certification Schemes :

**1.Sand for soil sand replacement test (2005)**

**2.Sand for cement test (2005)**

**3.Skim Coat Products (2012)**

**4.Mechanical Couplers (2014)**

## Common Product Certification Schemes in Hong Kong (Construction) - Scheme Type 5 / System 5

Product	Product Cert. Scheme ( Owner)
Cement Product 水泥	PCCS-CP (HKCI)
Ready Mixed Concrete 混凝土	QSPSC (HKQAA)
Sand for Cement Test 水泥強度測試用砂	QS/SS (Castco)
Sand for Soil Test 土壤密度測試用砂	QS/RS (Castco)
Passive Fire Protection Products 防火門/ 防火牆	PCCS-PFPP (HKISC)
Ceramic Tiles 瓷磚	PCCS-CT (HKCI)
Tile Adhesives 瓷磚粘結劑	PCCS-TA (HKCI)
Repair Mortars 修補砂漿	PCCS-RM (HKCI)
Aluminium Windows 鋁窗	PCCS-AW (HKISC)
Steel Mesh 鋼網	PCCS-MR (HKCI)

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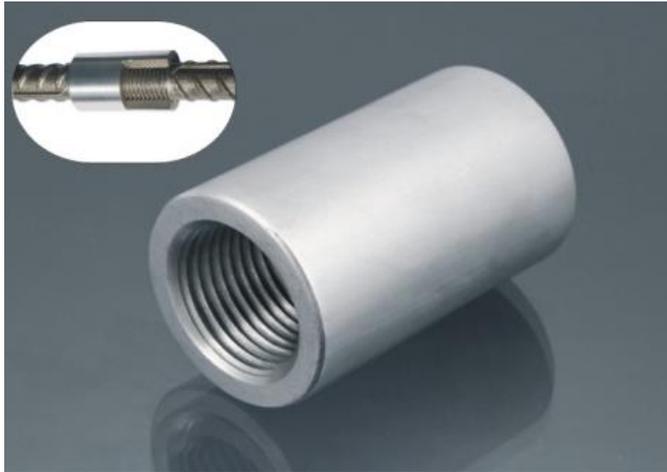
**Quality Product  
Certification Scheme**

**for**

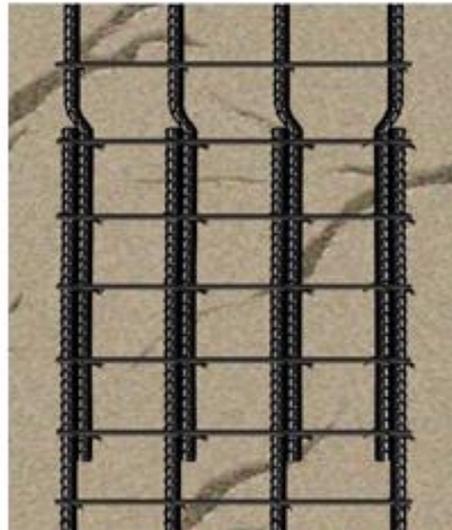
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# Mechanical Couplers



**Mechanical Couplers (COP BD),**  
**Mechanical Connectors (AC 133), Splice Couplers,**  
**鋼筋連接套筒, 鋼筋連接器**



**Conventional Lapping of  
steel rebar**



**Use of Mechanical Couplers**

## Benefits of using Mechanical Couplers

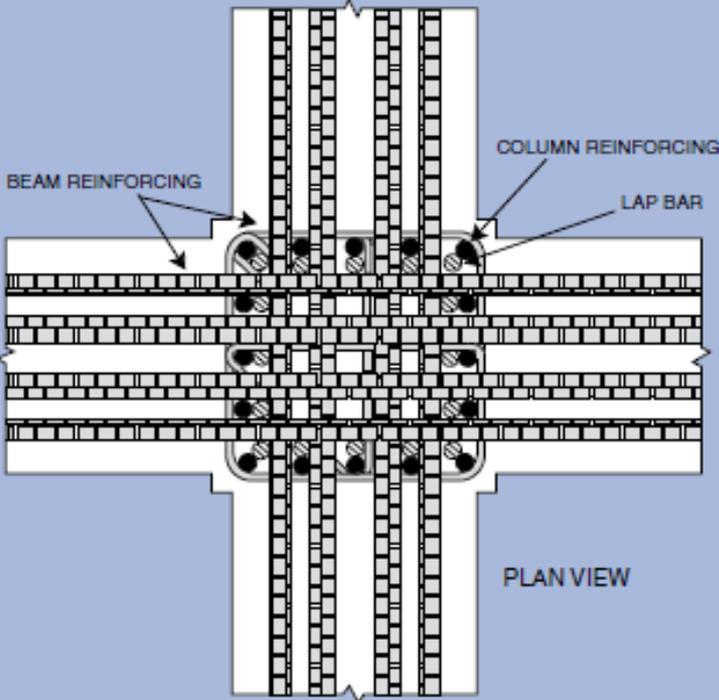


- Rebar common length: 12 m
- As high strength concrete become more commonly adopted and the design of reinforced concrete elements improves, lapped joints are not always an appropriate means of connecting rebar.

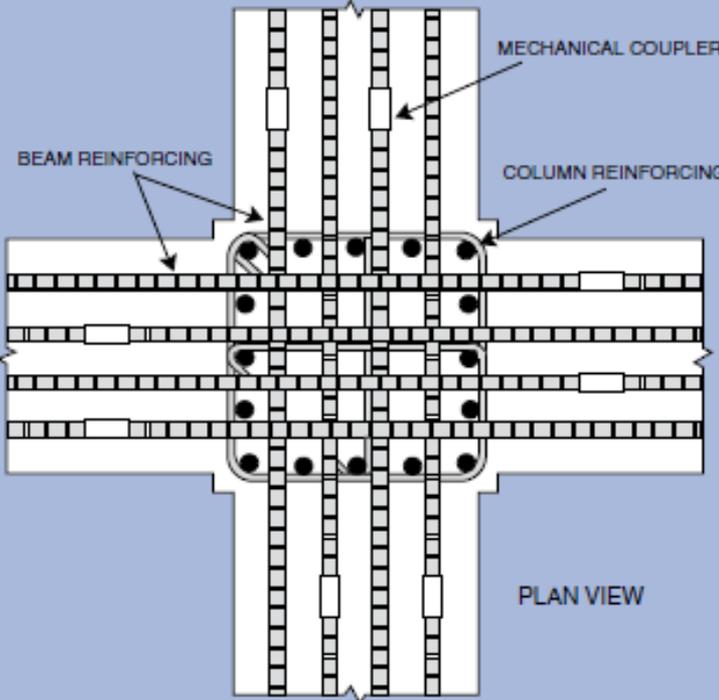
- Lap splicing increases rebar congestion at the lap zone and is one of the major causes for forming rock pockets and voids in the concrete.
- The use of Reinforcing Bar Couplers can simplify the design (reduce the congestion of rebars within the structure) and construction of reinforced concrete and reduce the amount of reinforcement required.

- This reduced column size results in a more efficient design and an optimum use of space.
- Mechanical splices eliminate tedious lap calculations.

**LAP SPLICES**



**MECHANICAL SPLICES**



## Benefits of Product Certification

“To promote product **quality** through upstream control” ...

“To ensure consistent production quality”

...

“To enhance traceability of products...”

## Benefits of Product Certification

“To have greater confidence on product quality” ...

“To reduce risk of failure in on-site compliance testing; reduce project delay” ...

# Benefits of Product Certification

## To prevent this...?



## Major Elements in Product Certification:

- **Product conformity Scheme – specification of product**
- **Scope of Certification – Brand name/ Model of the product**
- **Applicant/ Participant – Manufacturer, Supplier, Trader, etc**
- **Certification fee : )**

## Defined 2 types of Products in Scheme:

**Type 1 Couplers &**

**Type 2 Couplers,**

**as stated in**

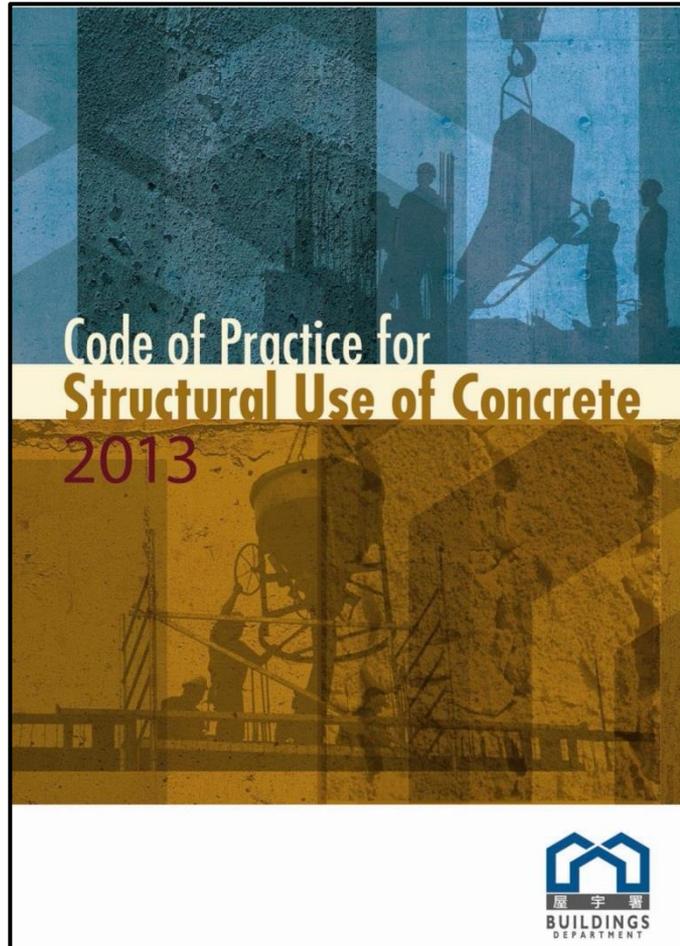
**Code of Practice for Structural Use of**

**Concrete 2013 Buildings Department**

**HKSAR**

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## **Type 1 Couplers - Code of Practice for Structural Use of Concrete 2013 Buildings Department (Cl. 3.2.8.3)**

Type 1 mechanical coupler satisfying the following criteria may be used as an alternative to tension or compression laps:

- (a) when a representative gauge length assembly comprising reinforcement of the diameter, grade and profile to be used, and a coupler of the precise type to be used, is tested in tension the permanent elongation after loading to  $0.6f_y$  should not exceed 0.1 mm; and
- (b) the coupled bar assembly tensile strength should exceed  $287.5 \text{ N/mm}^2$  for grade 250,  $540 \text{ N/mm}^2$  for grade 500B and  $575 \text{ N/mm}^2$  for grade 500C.

# **Type 1 Couplers - Code of Practice for Structural Use of Concrete 2013 Buildings Department**

(a) Limited Elongation

(b) Sufficient Tensile Strength



A splicing assembly (splice system)  
under test

## Type 2 Couplers - Code of Practice for Structural Use of Concrete 2013 Buildings Department

Type 2 mechanical coupler should satisfy the following criteria:

- (a) The splicing assemblies shall be tested to establish that they comply with the requirements given in clause 3.2.8.3.
- (b) Static tension test: The splicing assemblies must develop in tension the greater of 100 percent of the specified tensile strength,  $R_m$ , of the bar, and 125 percent of the specified yield strength,  $f_y$ , of the bar
- (c) Static compression test: The splicing assemblies must develop in compression 125 percent of the specified yield strength,  $f_y$ , of the bar.

## Type 2 Couplers - Code of Practice for Structural Use of Concrete 2013 Buildings Department (Cl. 3.2.8.4)

- (d) Cyclic tension-and-compression test: The splicing assemblies shall be tested in four stages as given in Table 3.4, and must sustain Stages 1 through 3 without failure. If the conditions of acceptance for the static tension test are complied with in Stage 4, the static tension test may be omitted.

The use of type 2 mechanical coupler should comply with the requirements given in clause 9.9.

Stage	Tension	Compression	Cycles
1	$0.95f_y$	$0.5f_y$	20
2	$2\varepsilon_y$	$0.5f_y$	4
3	$5\varepsilon_y$	$0.5f_y$	4
4	Load in tension to failure		

Notes:

- $\varepsilon_y$  is the strain of reinforcing bar at actual yield stress.
- The actual ultimate tensile strength of the bar is obtained by testing samples from a referenced reinforcing bar. The test samples are obtained from the same referenced reinforcing bar.

# **Type 2 Couplers - Code of Practice for Structural Use of Concrete 2013 Buildings Department**

- (a) Limited Elongation
- (b) Sufficient Tensile Strength
- (c) Sufficient Compressive Strength
- (d) Good Cyclic Tensile and Compression Performance

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# Product Certification Scheme Type (ISO/IEC 17067: 2013)

Conformity assessment functions and activities <sup>a</sup> within product certification schemes		Types of product certification schemes <sup>b</sup>							
		1a	1b	2	3	4	5	6	Nc,d
I	Selection, including planning and preparation activities, specification of requirements, e.g. normative documents, and sampling, as applicable	x	x	x	x	x	x	x	x
II	Determination of characteristics, as applicable, by: a) testing b) inspection c) design appraisal d) assessment of services or processes e) other determination activities, e.g. verification	x	x	x	x	x	x	x	x
III	Review Examining the evidence of conformity obtained during the determination stage to establish whether the specified requirements have been met	x	x	x	x	x	x	x	x
IV	Decision on certification Granting, maintaining, extending, reducing, suspending, withdrawing certification	x	x	x	x	x	x	x	x
V	Attestation, licensing								
	a) issuing a certificate of conformity or other statement of conformity (attestation)	x	x	x	x	x	x	x	x
	b) granting the right to use certificates or other statements of conformity	x	x	x	x	x	x	x	
	c) issuing a certificate of conformity for a batch of products		x						
	d) granting the right to use marks of conformity (licensing) is based on surveillance (VI) or certification of a batch.		x	x	x	x	x	x	
VI	Surveillance, as applicable (see 5.3.4 to 5.3.8), by:								
	a) testing or inspection of samples from the open market			x		x	x		
	b) testing or inspection of samples from the factory				x	x	x		
	c) assessment of the production, the delivery of the service or the operation of the process				x	x	x	x	
	d) management system audits combined with random tests or inspections						x	x	

## A Scheme Type 5 Product Certification Scheme:

- ☑ Establishing product requirements, plan assessment activities;
  
- ☑ Conducting document review, on-site audit(s), audit testing - checking product conformity;

- **A Scheme Type 5 Product Certification Scheme:**
  - ☑ Making certification decision and issuing certificate, allowing use of Cert. Mark
  - ☑ Surveillance (audit) – checking production processes, taking audit test samples at production line/ from market, verifying management system effectiveness

## **Development and Maintenance of Castco Product Certification Scheme (QS/MC)**

- Study relevant standards, prepare scheme document
- Seek for feedback from interested parties
- Establish Technical Committee

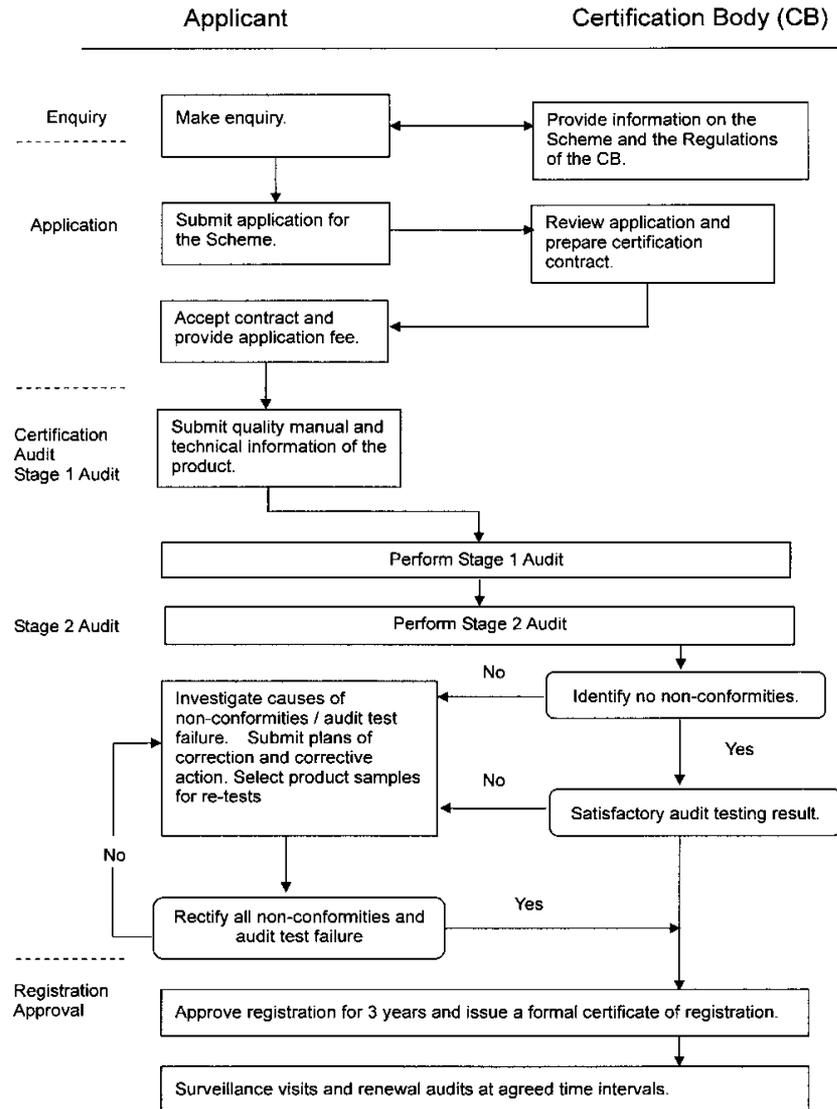
Members of CCSL Technical Committee -  
representatives from:

- Academic Institute**
- Industry Trade Association**
- Manufacturer/ Supplier**
- Testing Laboratory**
- Certification Body**
- Independent Technical Consultant/ User**

- Review the scheme document, confirm and issue the scheme
- Maintain the scheme - regular review meeting and updating the scheme content
- Fulfill other requirements in ISO/IEC 17067

# Certification Process

## Workflow of Product Conformity Certification Scheme – Certification Audit



## Certification Process

An applicant/ participant shall:

- Submit application form and confirms certification agreement
- Nominate a quality system management office and a manufacturing plant

## An Applicant shall:

- Establish/ maintain a quality management system and production control procedures
- Demonstrate to meet – relevant Statutory and Regulatory requirements for operation of the plant
- Implement the management system/ production; maintain quality records for a period before audits

## Certification Process

CB will:

- Conduct preliminary document review
- Conduct Stage 1 and Stage 2 audits  
(Initial Certification)
- Report conformity (**Non-conformities, Areas for Improvement, etc.**) after audits

## Certification Process - Procedures for Assessment

- Select audit test sample- sent to laboratory which is agreed between Manufacturer and CB
- Review audit test results; produce a test result evaluation report; check for conformity
- Make certification decision- issues certificate, allow use of certification mark

## Certification Process

Essential check points during audits at plant:

- Inspection and testing of raw materials;
- Maintenance/ control of production equipment and processes (- under expected conditions);
- Inspection and testing on finished products

## Certification Process – Audit findings

### 4 Possible Recommendations by Audit Team:

1. **No NC** : Certification recommended
2. **Minor NCs** : Certification is recommended after receipt of correction and corrective action details
3. **Major NC / Systematic minor NCs**:  
A follow-up assessment is required
4. **Numerous Major NCs** which cannot fixed shortly:  
Withdrawal of application

# Issuing Certificate of Conformity

Certificate No. : PC8888

This is to certify that

供應商: 香港 XXXX 有限公司  
Supplier: **Hong Kong XXXX Co., Limited**  
Supplier Add.: Room xxxx, 18/F, xxxx Centre, 29 xxxx Street, Kowloon, Hong Kong

生產商: **xxxx 廠有限公司**  
生產商廠房地址: xxxx xxxx xxxx



have been found to conform to  
Quality Product Certification Scheme for Mechanical Couplers  
QS/MC Issue 1 Aug 2013  
Castco Certification Services Limited

for the manufacture of the following product(s)\*:

“XXXX” Brand Mechanical Couplers,  
Type 1 (Buildings Department Code of Practice for Structural Use of Concrete 2013)  
\*details of product refer to appendix

Signed for and on behalf of

**CASTCO CERTIFICATION SERVICES LIMITED**

1<sup>st</sup> Surveillance  
Audit Label

2<sup>nd</sup> Surveillance  
Audit Label

3<sup>rd</sup> Surveillance  
Audit Label

4<sup>th</sup> Surveillance  
Audit Label

5<sup>th</sup> Surveillance  
Audit Label

**Draft**

Chief Executive

The certified organization must successfully pass the surveillance audits to maintain the validity of the certificate before the date of expiry.  
Please check the validity of the certificate at [www.castco.com.hk](http://www.castco.com.hk)

In accordance with the Terms and Conditions of Services, Castco Certification Services Ltd. (CCSL) undertakes no liability or responsibility for any service supplied in accordance with the requirements of this Certification Scheme. The HKCAS accreditation symbol shown in this certificate indicates HKCAS accreditation in respect of those activities granted to CCSL covered under registration number 009. This certificate is the property of CCSL and shall be returned when required by CCSL.

Registered address : Units 1-5, 2/F Techno Centre, 33 On Kai Street, Fanling, New Territories, Hong Kong  
Tel. : (852) 2677 2138 Fax : (852) 2677 0551

Original Certification  
Issue Date

Expiry  
Issue no. 1

**Sample**

## Allow use of Certification Mark:

- Products
- Packaging materials
- Quotations
- Delivery notes
- Stationery
- Other related advertising materials



Certification No.\* XXXX

## Surveillance and Recertification Audits

- SV: at least every 9 months;
- Re-certification: after 3-year certification cycle
- SV activities comprise: audit at plant & site (verifying actions to previous NC, quality record office, witness production and application, plant production control testing, audit testing)

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**~ Thank You ~**

For more information, please browse

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