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### Testing of Reinforcement for Concrete

Buildings Ordinance section 17(1)6 empowers Building Authority to impose requirements for testing reinforcement when approving structural plans or consenting to the commencement of building works.

2. The purpose of such testing is to verify the specified properties of steel bars delivered to site. These verification tests are additional to the routine testing carried out by the manufacturer at the rolling mill from which a mill certificate should be included with the test reports. Authorized persons (APs) and registered structural engineers (RSEs) should ensure that specimens are selected at random from batches of steel reinforcement delivered to site.

#### Hot Rolled Carbon Steel Bars

3. As from 15 April 1996, the new Construction Standard CS2:1995 (CS2) on carbon steel bars for the reinforcement of concrete is adopted by the Buildings Department as an acceptable standard for compliance with the requirements in the Building (Construction) Regulations. This Standard incorporates the full product standard for such steel bars and the requirements for classification and certification of reinforcement by Quality Assured Stockists (QA Stockists) and the requirements for the testing of reinforcement by the end purchaser. The Standard is available for sale at the Government Publication Centre. The main features of CS2 are given in Appendix A.

4. The verification tests imposed under Buildings Ordinance section 17(1)6 shall be the purchaser's tests referred to in CS2:1995 and shall be performed by a Hong Kong Laboratory Accreditation Scheme (HOKLAS) accredited laboratory.

5. The test report should include the following information :

- (a) Classification and Certification by QA Stockists for Class 1, Class 2 and Class 3 reinforcement;
- (b) Full description of test specimens including name of steel manufacturer, country of origin, grade and size as stated by the person submitting them for testing;
- (c) Sketch of pattern of deformation and mill marks;
- (d) Identification of the batch and date of delivery to the site to which the test specimens relate;

/(e) Measured ....

- (e) Measured mass and calculated effective cross-sectional area of test specimens; and
- (f) Results of yield stress, tensile strength, elongation and if required, bend and rebend tests.

### **Other Steel**

6. For steel reinforcement other than carbon steel bars, every batch of steel delivered to the site should be tested to verify the mass, bend and tensile properties in accordance with the purchaser's tests specified in :

- (a) BS 4482:1985 for hard drawn steel wire; and
- (b) BS 4483:1985 for steel fabric.

### **HOKLAS Endorsed Certificates**

7. All verification tests shall be carried out by testing laboratories accredited by HOKLAS. To allow time for the laboratories to apply for CS2 accreditation, a transitional period is provided up to 15 October 1996, i.e. certificates issued on or before 15 October 1996 by the laboratories with HOKLAS accreditation on BS 4449 will still be accepted by the Buildings Department for the purpose of performing purchaser's tests in accordance with CS2. As from 16 October 1996, only the certificates issued by the laboratories with HOKLAS accreditation on CS2 will be accepted by this Department.

8. A similar practice note has been issued to authorized persons and registered structural engineers.

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**The Main Features of Construction Standard CS2:1995**

1. Under this Standard the QA Stockist is to receive the bulk shipments of reinforcement, to check the manufacturer's documentation against the reinforcement supplied, and eventually dispatch the reinforcement to site clearly classified Class 1, Class 2 or Class 3 as appropriate;
2. Reinforcement produced by Quality Assured Manufacturers and handled by a QA Stockist will be classified either Class 1 - fully lot traceable, or Class 2 - not lot traceable. Reinforcement produced by non Quality Assured manufacturers will be classified Class 3. Reinforcement not handled through a QA Stockist will also be classified Class 3 irrespective of whether it is quality assured material or not;
3. A series of purchaser's tests is required to be carried out on all reinforcement delivered to site before it is used in the construction work. The frequency of testing will depend on the classification of the reinforcement. For details of purchaser's testing, please see Section 5 of CS2;
4. The long term objective is to rely on the third party certification of product conformity based on testing and continuous product surveillance and on the quality assurance of the stockists. The purchaser would know the quality of the reinforcement being received and would not need to carry out further testing for quality assured reinforcement. However, in the initial stage of introducing this scheme, the end purchaser testing of quality assured reinforcement should continue; and
5. The Public Works Central Laboratory (PWCL) will monitor the results of the end purchaser's tests over a period of two years, after which a review of the purchaser testing requirements will be undertaken. In order to make the monitoring reviews meaningful, PWCL would only accept rebars for testing provided the bar patterns have been registered at PWCL.