

**High Strength Concrete Works
(Concrete Grade higher than C60)**

In giving this approval of plans, I hereby impose the following conditions under item 6 in section 17(1) of the Buildings Ordinance (BO):

- (a) Sampling and testing of steel reinforcing bars should be carried out in accordance with CS2:2012. Testing should be carried out by a laboratory* accredited under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for the particular test concerned. Test results@ should be submitted within 60 days of the delivery of the steel reinforcing bars to the site^. The test reports should be appended with a statement signed by the registered structural engineer (RSE) to confirm the following:
 - (i) All steel reinforcing bars used for the construction and the test specimens covered by the test reports are in accordance with the types and grades of steel shown in the approved plans.
 - (ii) Sampling and testing of steel reinforcing bars used have been carried out in accordance with CS2:2012.
 - (iii) The acceptance criteria appropriate to each type and grade of steel reinforcing bars used have been complied with.
 - (iv) All steel reinforcing bars tests have been carried out by a laboratory* accredited under the HOKLAS.
- (b) All concrete arriving onsite shall come from a concrete supplier registered under the Quality Scheme for the Production and Supply of Concrete (QSPSC). A quality assurance proposal is to be submitted with sufficient preliminary test results to confirm that reliable and consistent concrete can be produced. This should include a detailed assessment of the concreting materials, the mix design and the quality control procedures of the batching plant. In this respect the designed mean resistance to crushing shall initially exceed the specified resistance to crushing by a margin of not less than 12MPa. Details of any subsequent revision of the mix design are to be submitted.
- (c) Adequate facilities are to be provided on site, for sampling the fresh concrete, making, curing and storing the test cubes. At least one sample of concrete shall be taken from every ready mixed vehicle arriving on site. If concrete is site batched, one sample shall be taken from every 10m³ of concrete produced.
- (d) Sampling of fresh concrete, making, curing, storing and compression testing of concrete test cubes should be carried out in accordance with the methods specified in CS1:2010 by a laboratory* accredited under HOKLAS for the particular test concerned. Both sampling and test results@ should be reported on a HOKLAS Endorsed Certificate and submitted within 21 days after sampling and/or testing. The test reports should be appended with a summary which contains information on locations of the concerned structural elements, concrete grades and dates of cast. The summary should also include previous summary information of concrete cube test reports in chronological order. The test reports

should also be appended with a statement signed by the RSE to confirm the following:

- (i) All concrete used for the construction and concrete cubes covered by the test reports are in accordance with the concrete grades shown in the approved plans.
 - (ii) Concrete cube sizes, rates of sampling fresh concrete for testing and acceptance criteria for compressive strength set out in clause 10.3.4.2 of the Code of Practice (CoP) for Structural Use of Concrete 2013 have been complied with.
 - (iii) All sampling of fresh concrete, making, curing, storing and compression testing of concrete test cubes have been carried out by a laboratory* accredited under HOKLAS and in accordance with the methods specified in CS1:2010.
- (e) Insitu core testing on the completed structure shall be carried out. Tests for compressive strength of concrete cores should be carried out in accordance with the method specified in CS1:2010, by a laboratory* accredited under HOKLAS for the particular test concerned. Test results@ should be submitted within 21 days after testing. The test reports should be appended with a statement signed by the RSE to confirm the following:
- (i) All insitu concrete cores taken from the completed structure are in accordance with the coring proposal submitted to the Building Authority.
 - (ii) The test specimen shall preferably be of 100mm diameter and in no case shall it be less than 75mm diameter. The ratio of diameter to the maximum aggregate size shall be not less than 3. The length of core shall be sufficient to give the required length/diameter ratio after end preparation.
 - (iii) Concrete cores should not show evidence of segregation of individual materials. Concrete cores should not exhibit honeycombing which means interconnected voids arising from, for example, inadequate compaction or lack of mortar. For any set of cores representing a test location, the estimated insitu cube strength of each core specimen should be at least 75% of the specified grade strength and the average estimated insitu cube strength of the set should be at least 85% of the specified grade strength. In this respect, the estimated insitu cube strength of each core specimen should be calculated in accordance with CS1:2010.

2. The following conditions in respect of qualified supervision of works are imposed under item 6 in section 17(1) of the BO:

- (a) Qualified site supervision of the high strength concrete works, including sampling of concrete and steel reinforcing bars, making and curing of concrete test cubes and drilling of insitu concrete core samples, by experienced and competent persons as defined in 2(b) and 2(c), should be provided to ensure that the works are carried out in accordance with the plans approved and that the required standards are complied with.

- (b) The RSE should assign a quality control supervisor to supervise the works full time on site and devise inspection check lists. The minimum qualifications and experience of the quality control supervisor is to be the same as the technically competent person (TCP) of grade T3 under the RSE's stream, as stipulated in the CoP for Site Supervision 2009.
- (c) The registered general building contractor (RGBC)/registered specialist contractor (RSC) should assign a quality control co-ordinator to provide full time on site supervision of the works and devise inspection check lists. The minimum qualifications and experience of the quality control co-ordinator is to be the same as the TCP of grade T1 under the RGBC's/RSC's stream, as stipulated in the CoP for Site Supervision 2009.
- (d) The names and qualifications of the supervisory personnel representing the RSE and the RGBC/RSC respectively should be recorded in an inspection log book. The date, time, items inspected and inspection results should be clearly recorded in the log book. The log book should be kept on site for inspection by representatives of the Buildings Department (BD).

3. Where steel reinforcing bar (rebar) products such as cut and bent rebars, reinforcement cages and the like are fabricated off-site in a prefabrication yard, the following conditions in respect of qualified supervision of *off-site rebar prefabrication works* (referred hereafter as "Prefabrication Works"⁺) are imposed under item 6 in section 17(1) of the BO:

- (a) Qualified site supervision of the Prefabrication Works⁺, including sampling of steel reinforcing bars, by experienced and competent persons as defined in 2(b) and 2(c), should be provided to ensure that the works are carried out in accordance with the plans approved and that the required standards are complied with.
- (b) The names and qualifications of the supervisory personnel representing the RSE and the RGBC/RSC respectively should be recorded in an inspection log book. The date, time, items inspected and inspection results should be clearly recorded in the log book. The log book should be kept in the prefabrication yard and a copy of it should be kept on site for inspection by representatives of the BD.

4. Consent to commence the work will not be granted until the following documents have been submitted and found satisfactory:

- (a) the quality assurance proposal and confirmation of the mix proportion to be adopted as specified in paragraph 1(b) above.
- (b) proposals for the onsite facilities for sampling of fresh concrete and making, curing and storing the test cubes as specified in paragraph 1(c) above.
- (c) proposal for insitu core testing of the finished concrete structure as specified in paragraph 1(e) above.

- (d) the name of the laboratory* accredited under HOKLAS, which will carry out the onsite and laboratory sampling and testing work.
- (e) the name and qualifications of the supervisory personnel** as specified in paragraphs 2(b) & 2(c) above.

#5. Where different concrete grades are used in the construction of superstructure/basement elements, the following condition in respect of quality supervision and control of in-situ reinforced concrete works is imposed under item 6 in section 17(1) of the BO:

- (a) Rebound hammer tests (RHT) should be carried out to the structural concrete elements with higher concrete grade at an early age in accordance with the qualified supervision and testing requirements specified in the Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers (PNAP) APP-167. The RHT records should be kept on site for inspection by the TCP under RSE's stream and representatives of the BD.

#6. As specified in the PNAP APP-167, the RSE and RGBC/RSC should take the necessary follow-up actions when the results of RHT mentioned in paragraph 5 above reach alert level of the concrete strength at early age.

Delete if not involving superstructure or basement works with the use of different concrete grades

* A Directory of Accredited Laboratories in Hong Kong is obtainable from the Hong Kong Accreditation Service (HKAS) Executive, Innovation and Technology Commission.

A laboratory's accreditation for an individual test or calibration may be granted, modified or withdrawn at any time. Up-to-date information on accredited laboratories and their scopes of accreditation are available on the internet at the HKAS website at <http://www.itc.gov.hk/hkas/>.

@ The test carried out by an accredited laboratory should be within its scope of accreditation. To ensure this, test results should be reported on a HOKLAS Endorsed Certificate or equivalent Certificate/Report issued from other laboratory accreditation bodies which have reached mutual recognition agreements/arrangements with the HOKLAS.

^ The 'site' refers to the prefabrication yard for cases covered by paragraph 3 above.

+ Prefabrication Works refer to the fabrication works of steel rebar products, such as cut and bent rebars, reinforcement cages and the like, covered by this approval of plans carried out in the prefabrication yard.

** For the Personal Data contained in the documents/reports mentioned in this Appendix

Purposes of Collection

- (i) The personal data provided will be used by the BD for the following purposes:
 - (a) activities relating to the processing of the submission;
 - (b) activities relating to works specified in this appendix; and
 - (c) facilitating communication between the BD and the related personnel.

Classes of Transferees

- (ii) The personal data provided may be disclosed to:
 - (a) other Government departments, bureaux & relevant organisations for the purposes mentioned in paragraph (i) above; and
 - (b) any person for the purpose mentioned in paragraph (i)(b) above.

Access to Personal Data

- (iii) Data subject has a right of access and correction with respect to personal data as provided for in sections 18 and 22 and principle 6 of Schedule 1 of the Personal Data (Privacy) Ordinance. Data subject's right of access includes the right to obtain a copy of his/her personal data provided by authorized person (AP)/RSE's submission.

Responsibility of AP/RSE

- (iv) AP/RSE should be responsible for disseminating of the above information to the relevant data subjects.