HI

From: LCT
Sent: Monday, November 27, 2006 9:31 AM
To: KBK; ST; CCG; TWC; YYF; LSF; CLM; AWL; CHL; LCH; CKH; TCM
Cc: HI; TLS; RT; LCT
Subject: GradientWateTightness[1].pdf

Our Ref: OM-LA/031



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PUB
Water for All: Conserve, Value, Enjoy

Our ref :WRN/17.2
Your ref:

Tel: 67319133
Fax: 63719699
Email: tan_thai_pin@pub.gov.sg

20 Nov 2006

President
Singapore Institute of Architects
79 Neil Road
Singapore 088904

President
Institute of Engineers Singapore
70 Bukit Tinggi Road
Singapore 289758

President
Association of Consulting Engineers Singapore
70 Palmer Road,
#04-06 Palmer House
Singapore 079427

Dear Sirs

GRADIENT AND WATER TIGHTNESS OF SANITARY DRAINLINES AND SEWERS

Sewers and sanitary drainlines constructed by developers convey used water from the premises to the public sewerage system. When put into use, they form part of the overall network which we would want to be both hydraulically efficient and watertight. The technical requirements on pipe gradients and hydrostatic tests to check water tightness are already stipulated in the Code of Practice on Sewerage and Sanitary Works (CPSW).

2 Currently, the results of such water tests carried out or the as-constructed gradient of drainlines have not been explicitly required in the submissions for sewer and drainlines. We intend to issue a circular to all QPs to provide these information when submitting the "Certificate of Completion and Inspection for Sanitary/Sewerage Works" to be effective from Jan 2007.

3 We would like to seek your views on this. The attached draft of the circular provides further details of the implementation and some background for these requirements in the CPSW. WE would like to receive your feedback by 30 Nov 2006 and would be pleased to meet up for a dialogue should you require a discussion before providing the feedback.

4 You may contact Mr. Tan Chee Hoon at 67319564 or Email: tan_chee_hoon@pub.gov.sg should you require any clarifications on the proposed circular. Thank you.

Yours faithfully



TAN THAI PIN
DIRECTOR
WATER RECLAMATION (NETWORK) DEPARTMENT
PUB

CC

CE (CBPU), NEA

Our ref :
Your ref :

Dec 2006

To: All QPs

DRAFT CIRCULAR

Dear Sirs

PUB CIRCULAR
GRADIENT AND WATER TIGHTNESS OF SANITARY DRAINLINES AND SEWERS

Sewers and sanitary drainlines convey used water from the premises to the public sewerage system. Leakage from these pipes will cause pollution of our waterways/reservoirs and pipe blockages in drainlines that do not transport waste well will inconvenience users. It is therefore important for QPs to ensure that new sewers and sanitary drainlines under their development are laid with adequate gradients and examined to be watertight before being put into use.

2 The technical requirements on pipe gradients and hydrostatic tests are already stipulated in the **Code of Practice on Sewerage and Sanitary Works** (CPSW) and relevant sections are listed in **Annex 1** for your easy reference. This circular serves to inform all of a revised procedure to certify and check compliance of these requirements to be effective from **2 Jan 2007**.

Gradient of sanitary drainlines

3 QPs are urged to pay particular attention to the design of sanitary drainlines and to check the drainline gradients during construction. The gradient of the drainline serving a water closet is critical to ensure proper waste transportation. The CPSW stipulates drainline gradients to ensure adequate flow conditions. We have received feedback that in some instances of landed developments with long sanitary drainlines and those encountering obstructions eg. ground beams, drainlines were laid much flatter than required. This has made these sanitary drainlines susceptible to blockage.

4 To ensure drainlines are able to function well in the long run and are constructed as designed, **the designed and as-built gradients** of the sanitary drainlines and top/invert level of the inspection chambers should henceforth be clearly shown in the QP's **detailed plans** and **as-built plans** submitted to CBPU or PUB.

Water Tightness of pipes

5 Inspection and hydrostatic test for sewers and drainlines are currently already stipulated in CPSW to ensure that they do not leak beyond acceptable rates when in use. These tests are necessary during construction stage prior to covering up the sewers and drainlines as any defects of the pipes or joints can still be located and remedied to ensure water tightness.

6 To ensure that such tests are carried out properly, we will require QPs to **witness and endorse results** of the hydrostatic test carried out. From 2007, QPs will need to certify compliance with the "acceptable rate of water loss" stipulated in the CPSW.

Revised procedure

7 We have revised the current forms for **Clearance Certificate** and **Certificate of Completion and Inspection for Sanitary/Sewerage Works** (Form C/QP) to include an endorsement by QPs to:

- check and witness the water tests during pipe laying stage; and
- certify compliance with the gradients and hydrostatic test requirements when applying for the Compliance Certificate.

The details of the revised procedure and proposed changes in the forms are given in **Annexes 2 & 3**. The above new measures will be implemented from 2007 for all submissions **received on or after 2 Jan 2007**.

8 In addition, PUB will check compliance and carry out its own hydrostatic tests for randomly selected projects before granting the Certificate of Completion for the sanitary/sewerage works.

9 We would appreciate it if you could disseminate the contents of this circular to your members.

10 Please contact Mr. Tan Chee Hoon at 67319564 or Email: tan_chee_hoon@pub.gov.sg should you require any clarifications on the circular. Thank you.

Yours faithfully

DIRECTOR
WATER RECLAMATION (NETWORK) DEPARTMENT
PUB

CC
President
Singapore Institute of Architects

President
Institute of Engineers Singapore

President
Association of Consulting Engineers Singapore

President
Real Estate Developers' Association of Singapore

President
Singapore Contractors Association Limited

Annex 1
- Requirements of the Code of Practice on Sewerage and Sanitary Works

(1) Hydrostatic Test Requirements:

(a) All sanitary drainline and sewers of 600 mm and below in diameter, before being surrounded and covered, shall be tested by filling with water.

(b) The pressure shall be measured from the highest point of the pipeline under test and shall be 1.5 metre head of water. Pipelines should not be accepted until they have withstood the required pressure for 30 minutes without a loss in excess of 1.5 litres for 100 m for each 300 mm in diameter.

(c) The acceptable rate of water loss for 30 minutes for the following standard pipe diameters are as follow:

Diameter of Pipe	Acceptable Rate of Water Loss
(1) 100mm	0.005 litres/metre run
(2) 150mm	0.008 litres/metre run
(3) 200mm	0.010 litres/metre run
(4) 300mm	0.015 litres/metre run

(2) Gradients of Sanitary Drainlines

(a) The branch drain-line shall have a minimum diameter of 100mm. The length shall preferably not exceed 10 metres.

(b) The main drain-line shall have a minimum diameter of 150mm and distance between inspection chambers shall not exceed 50 metres.

(c) The branch/main drain-line shall have a constant gradient. The size and gradient of the drain-line shall be chosen to provide adequate carrying capacity and also allow for adequate ventilation.

(d) The choice of gradient for the branch/main drain-line shall be such as to maintain self-cleansing velocity (0.9 m/sec) and not to exceed scouring velocity (2.4 m/sec) under normal discharge condition. The recommended gradients for drainlines are as follows:

Diameter	Maximum Gradient	Minimum Gradient	Maximum Gradient at upstream of backdrop or tumbling bay connection
100mm (branch drainline)	1:20	1:60	NA
150mm (main drainline)	1:30	1:90	1:70
200mm (sewer connection line)	1:30	1:90	1:70

Annex 2

Flow Chart on Procedure for Hydrostatic Test of Sanitary Drainlines for New Development or A/A works to Existing Buildings under BP submission.

Current Procedure

QP submits BP/Sewerage Detailed plan to CBPU, NEA for registration

↓

CBPU, NEA issues Clearance Certificate ← ***The following new clauses in the CBPU's Clearance Certificate:***

"QP shall carry out water testing of sanitary drainlines (including inspection chambers and sewer connection line) and sewers & manholes in accordance with the hydrostatic test requirements as specified in the Code of Practice on Sewerage and Sanitary Works to ensure the sewerage system are watertight.

PUB may carry out its own water testing of the sanitary drainlines and sewers before granting the Sewerage Clearance for Compliance Certificate. QP shall give sufficient notice to PUB to carry out the water tests to avoid delay in obtaining the Compliance Certificate."

↓

QP submits Form A to notify WRN, PUB for commencement of works

↓

QP submits Form B to apply to WRN, PUB for sewer connection

↓

WRN, PUB random witness sewer connection works

↓

QP submits Form C to WRN, PUB to certify completion of works and apply for compliance certificate (TOP/CSC Clearance) ← ***QP is required to declare the following in Form C:***

"I confirm that water tests were conducted for every new drainlines, inspection chambers, sewer connection lines, sewers and manholes in accordance with the Code of Practice on Sewerage and Sanitary Works."

Annex D- Hydrostatic test for Sanitary Drainlines and Sewers.

↓

WRN, PUB carries out audit inspection of completed works ← ***PUB will check compliance and carry out its own hydrostatic test for randomly selected projects.***

↓

WRN, PUB issues Sewerage Clearance for Compliance Certificate (TOP/CSC) to CBPU, NEA ← ***PUB will require QP/Owners to rectify leaks before issue of CSC.***

Annex 3

DRAFT

FORM C/ QP/SEW Sanitary File Ref. No. _____

PUBLIC UTILITIES BOARD
WATER RECLAMATION (NETWORK) DEPARTMENT

Certificate of Completion and Inspection for Sanitary/Sewerage Works

[Under Section 35 (1) (e) and (f) of the Sewerage and Drainage Act (Chapter 294)]

To: Director
Water Reclamation (Network) Department
Public Utilities Board
Environment Building
40 Scotts Road #14-00
Singapore 228231

Date: _____

Project Ref No. (BP No.): _____

Project: _____

Date Work Commenced: _____ **Date Work Completed:** _____

Company's name of Plumber/Contractor:** _____

1. I, _____ NRIC No. _____
(Name of QP)
of _____
(Name of QP firm)

being a Qualified Person, hereby certify that to the best of my knowledge and belief, the * sanitary/sewerage works were carried out and completed in accordance with the above building plans and detailed sanitary plans/sewerage plans, the current Code of Practice on Sewerage and Sanitary Works, Sewerage and Drainage Act (Chapter 294) and the Sewerage and Drainage (Sanitary Works) Regulations and any other conditions under which the plans and amendments thereto were cleared by CBPU (NEA).

2. I also confirm that:
   (a) For Sanitary works,
      (i) there is no sanitary pipe located directly above any potable water tanks.
      (ii) *all branch/main drain-lines were laid to gradients within the allowable limits as specified in the Code of Practice.*
      (iii) *water tests were conducted for every new drainlines, inspection chambers and sewer connection lines in accordance with the Code of Practice.*

   (b) For sewerage works,
      (i) the sewer lines were laid to gradients and alignments to Water Reclamation (Network) Department requirements and in accordance with the sewerage plans.
      (ii) water tests were conducted for every sewer lines *& manholes* and the type of concrete haunching provided for the sewer lines were in accordance with the Code of Practice and the sewerage plans.

3. The following documents are enclosed. I certify that the information contained in the following Annexes is correct. I also confirm that the *sanitary/sewerage works as shown in the "As-Built" plans were carried out in accordance with the Code of Practice on Sewerage and Sanitary Works.

   *Annex A - Numbers of chargeable sanitary appliances installed in the above mentioned project attaching (a) the Allotment of Address from the Comptroller of Property Tax, (b) floor layout plan showing the location of the units.

   *Annex B - "As-Built" plans for the above mentioned *sanitary works/sewerage works (to be endorsed by Registered Surveyor) with minor deviations, if any, incorporated thereon *and "as-built" gradients of drainlines/sewers and top & invert levels of the inspection chambers/manholes indicated.*

   Annex C – Plumber/Contractor's confirmation of completion of sanitary works/sewerage works.

   Annex D – Hydrostatic Tests for Sanitary Drainlines and Sewers

_____
Stamp & Signature of Qualified Person

Name: _____
Address: _____

*Delete if inapplicable

**Note: The Singapore Plumbing Society (SPS) maintains a list of experienced sanitary plumbers whom QP/Developers can engage to carry out the sanitary works.

[Revision No. 7 – Jan2007]

ANNEX D TO FROM C/QP

HYDROSTATIC TESTS FOR SANITARY DRAINLINES & SEWERS

File Ref. _____ **Project Ref No.** _____

Project Title: _____

Name of Qualified Person: _____ **Name of Plumber/Contractor:** _____

(1) Below are the details of water tests carried out on sanitary drainlines, sewer connection line, sewers, inspection chambers and manholes for the above project.

S/ No.	Sewer line (eg. MH No- MH No) / Sewer Connection (IC to MH/Sewer) Sanitary Drainline (IC no to IC no)/ Inspection Chamber / Manhole	Dia./Type of Pipe (eg. Ø200/VCP, Ø150/uPVC)	Length of Pipe line (m)	Rate of Water Lost (litre/sec) & Result (Passed/Failed)	Date of Water Test (dd/mm/yyyy)	Name of person witnessed the water test	Remarks
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

(2) I certify that the sanitary drainage system including the sewer connection line and inspection chambers; sewers and manholes comply with the hydrostatic test requirements as specified in the Code of Practice on Sewerage and Sanitary Works.

_____

(Stamp and Signature of QP)