

PORT WORKS DESIGN MANUAL

CORRIGENDUM No. 1/2014

PART 1 – General Design Considerations for Marine Works

- (a) Section 4.1 – General **Add the following after the 4th bullet point:**
- GEO Technical Guidance Note No. 41 (TGN 41) – Amendments to British Standards References in Technical Guidance Documents for Migration to Eurocodes (GEO, 2014).

- (b) Section 5.1 – General **Add the following after the 1st paragraph:**
- In Hong Kong, marine structures are generally designed to British Standards (BS), in particular, following the guidance and recommendations given in relevant parts of BS 6349 – Maritime Works: Code of Practice. This BS together with the relevant Eurocodes (EC) and their UK National Annexes (UK NA) should be adopted for the design of marine structures.

Particular attention should be paid that the following terms used in the EC are different from those used in this Manual:

<u><i>This Manual</i></u>	<u><i>Eurocodes</i></u>
Design loads or forces	Actions
Dead load	Permanent action
Imposed load (live load)	Variable action
Other loads except dead load (such as wind load, wave load, current load, berthing load and mooring load)	Variable actions
Load condition	Design situation
Load combination	Combination of actions

- (c) Section 5.9 – Wind Loads **Replace** “Hong Kong Code of Practice on Wind Effects (BDD, 1983)” **with** “Code of Practice on Wind Effects in Hong Kong 2004 (BD, 2004)”

- (d) Section 5.12.2(2) – Hydrodynamic Mass Coefficient **Replace** “(BSI, 1994b)” **with** “(BSI, 2014)”

Section 5.12.2(3) – Eccentricity Coefficient

Section 5.12.2(4) – Softness Coefficient

Section 5.12.2(5) –
Berth Configuration
Coefficient

Section 5.13 –
Mooring Loads

(e) Section 6.1 – General **Replace** “(Hong Kong Government, 1992a)” **with** “(HKSARG, 2006a)”

(f) Section 6.2 –
Reinforced Concrete **Add the following paragraph before the 1st paragraph:**
Reinforced concrete structures should be designed to BS EN 1992. Since the design equations in EC and UK NA are made use of the characteristic cylinder strength (f_{ck}), the designer may make reference to Table 3.1 of BS EN 1992-1-1:2004 (BSI, 2004a) for conversion from the characteristic cube strength ($f_{ck,cube}$) which is being used in the GS to the characteristic cylinder strength when carrying out the design. Recommended design parameters for concrete and steel reinforcement given in Table 41 should be adopted in design of marine structures. The partial factors for materials given in Clause 2.4.2.4 of BS EN 1992-1-1:2004 (BSI, 2004a) should also be adopted.

Replace the last sentence of the 1st paragraph with the following:

The specification given in Appendix 21.2 of Section 21 of GS (HKSARG, 2006a) for reinforced concrete in marine environment should be adopted for design of marine structures.

Delete the 2nd paragraph and all bullet points

(g) Section 6.6 – Timber **Replace** “BS 5268: Part 2 (BSI, 1996d)” **with** “BS EN 1995-1-1:2004+A2:2014 (BSI, 2004b)”

(h) Section 6.10 – Fill **Replace** “(Hong Kong Government, 1992b)” **with** “(HKSARG, 2006b)”

(i) REFERENCES **Delete the following references:**
BDD (1983). Code of Practice on Wind Effects, Hong Kong. Building Development Department, Hong Kong, 14p.

BSI (1994b). Maritime Structures – Part 4: Code of Practice for Design of Fendering and Mooring System (BS 6349-4:1994). British Standards Institution, London, 48p.

BSI (1996d). Structural Use of Timber. Part 2 – Code of Practice for Permissible Stress Design, Materials and Workmanship (BS 5268 Part 2:1996). British Standards Institution, London, 168p.

Hong Kong Government (1992a). General Specifications for Civil Engineering Works. Hong Kong Government, 3 volumes.

Hong Kong Government (1992b). General Specifications for Civil Engineering Works: Guidance Notes. Hong Kong Government, 306p.

Add the following references:

BD (2004). Code of Practice on Wind Effects in Hong Kong 2004. Buildings Department, Hong Kong.

BD (2013). Code of Practice for Structural Use of Concrete 2013. Buildings Department, Hong Kong.

BSI (2004a). Eurocode 2: Design of Concrete Structures – Part 1-1: General Rules and Rules for Buildings (BS EN 1992-1-1:2004) and its respective UK National Annex. British Standards Institution, London.

BSI (2004b). Eurocode 5: Design of Timber Structures – Part 1-1: General – Common Rules and Rules for Buildings (BS EN 1995-1-1:2004+A2:2014) and its respective UK National Annex. British Standards Institution, London.

BSI (2014). Maritime Works – Part 4: Code of Practice for Design of Fendering and Mooring Systems (BS 6349-4:2014). British Standards Institution, London.

GEO (2014). GEO Technical Guidance Note No. 41 (TGN 41) – Amendments to British Standards References in Technical Guidance Documents for Migration to Eurocodes. Geotechnical Engineering Office, Hong Kong.

HKSARG (2006a). General Specification for Civil Engineering Works, 2006 Edition. The Government of the Hong Kong Special Administrative Region, 2 volumes.

HKSARG (2006b). General Specification for Civil Engineering Works, 2006 Edition – Guidance Notes. The Government of the Hong Kong Special Administrative Region.

(j) TABLES

Add Table 41 as follows:

Table 41 Design Parameters for Concrete and Steel Reinforcement

I. Concrete

Parameter	Recommended Value
Compressive strength	Design equations based on cylinder strength (f_{ck}) determined at 28 days, with its equivalent cube strength ($f_{ck,cube}$) given in Table 3.1 of BS EN 1992-1-1:2004 (BSI, 2004a)
Exposure condition	Tidal and splash zones – XS3 Submerged zone – XS2 Aerated zone – XS1
Concrete grade	$f_{ck, cube} = 50$ MPa or above (for XS1, XS2 and XS3)
Nominal concrete cover	60 mm (for XS1) 75 mm (for XS2 and XS3)
Design crack width	Section 3.5.1 of Part 2 of this Manual

Parameter	Recommended Value
Stress-strain curve	Figure 3.8 of (BD, 2013)
Modulus of elasticity	Table 3.2 of (BD, 2013)
Coefficient of thermal expansion	Section 3.1.9 of (BD, 2013)
Drying shrinkage	Section 3.1.8 of (BD, 2013)
Creep	Section 3.1.7 of (BD, 2013)

II. Steel Reinforcement

Parameter	Recommended Value
Yield strength	500 MPa
Modulus of elasticity	200 GPa

- (k) Figures 20 and 21 **Replace** “Source: (BSI, 1994b)” **with** “Reference: (BSI, 2014)”
- (l) Appendix B – **Delete Appendix B**
Recommended
Specification for
Reinforced Concrete
in Marine
Environment

PART 2 – Guide to Design of Piers and Dolphins

- (a) Section 2.1 – **Replace** “(BSI, 1988)” **with** “(BSI, 2010)”
Definitions
- Section 2.6.1 –
Length and Width
- (b) Section 2.6.1 – **Replace** “(BSI, 1994)” **with** “(BSI 2014)”
Length and Width
- (c) Section 2.7.3 – **Amend the last sentence of the 1st paragraph to read as follows:**
Rubber Fenders Section 21 of General Specification for Civil Engineering Works (GS) (HKSARG, 2006) stipulates the testing standards and requirements for rubber fenders.
- (d) Section 3.2.1 – **Add the following after the last sentence:**
Loading Conditions Reference should also be made to Section 5 of BS 6349: Part 2 (BSI, 2010).
- (e) Section 3.3 – Fenders **Replace** “(BSI, 1994)” **with** “(BSI, 2014)”
- (f) Section 3.5.1 – Pier **Replace paragraph 2 with the following:**
Deck Limit state design should be adopted for the reinforced concrete deck, using the partial factors for actions, combination factors and combination formulae

for design situations given in Table A.1, Table A.2 and Table A.3 of Annex A of BS 6349: Part 2 (BSI, 2010), and using the partial factors for materials given in Clause 2.4.2.4 of BS EN 1992-1-1:2004 (BSI, 2004).

Amend the 2nd sentence of paragraph 3 to read as follows:

Reference should be made to Section 7.3 of BS EN 1992-1-1:2004 (BSI 2004).

Replace “Appendix B of Part 1 of the Manual” **with** “Appendix 21.2 of Section 21 of GS (HKSARG, 2006)”

(g) Section 3.5.2 – Piles

Add the following after the last sentence of the 1st paragraph:

Reference should be made to GEO Publication No. 1/2006 – Foundation Design and Construction (GEO, 2006), GEO Technical Guidance Note No. 41 (TGN 41) – Amendments to British Standards References in Technical Guidance Documents for Migration to Eurocodes (GEO, 2014) and Code of Practice for Foundations (BD, 2004).

Replace “GS Clause 8.38” **with** “GS Clause 8.42”

Amend the last sentence of the 2nd paragraph to read as follows:

The minimum global factors of safety for piles in soil and rock are given in Table 6.1 of GEO Publication No. 1/2006 (GEO, 2006), which are summarized as follows :

<i>Method of Determining Pile Capacity</i>	<i>Minimum Global Factor of Safety against Shear Failure of the Ground</i>		
	<i>Compression</i>	<i>Tension</i>	<i>Lateral</i>
Theoretical or semi-empirical methods not verified by loading tests on preliminary piles	3.0	3.0	3.0
Theoretical or semi-empirical methods verified by a sufficient number of loading tests on preliminary piles	2.0	2.0	2.0

Replace “GEO Publication No. 1/96 – Pile Design and Construction” **with** “(GEO, 2006) and (GEO, 2014)”

Replace “Sections 6.11 and 6.12 of BS 6349: Part 2 (BSI, 1988)” **with** “Sections 8.11 and 8.12 of BS 6349: Part 2 (BSI, 2010)”

(h) Section 3.8 –
Catwalk

Replace “BS 8110: Part 1 and BS 5400: Part 5” **with** “BS EN 1992-1-1:2004 (BSI, 2004) and BS EN 1994-2:2005 (BSI, 2005)”

(i) Section 3.9.1 –
General

Replace “(Hong Kong Government, 1992)” **with** “(HKSARG, 2006)”

(j) Section 4.3.1 –
Loading Conditions

Add the following after the last sentence:

Reference should also be made to Section 5 of BS 6349: Part 2 (BSI, 2010).

- (k) Section 4.8.1 – General **Replace** “(Hong Kong Government, 1992)” **with** “(HKSARG, 2006)”
- (l) Section 5.1.2 – Layout **Replace** “0.3L” **with** “0.25L”
Replace “(BSI, 1994)” **with** “(BSI, 2014)”
- (m) Section 5.1.3 – Structural Design **Replace** “(BSI, 1988)” **with** “(BSI, 2010)”
- (n) Section 5.2.2 – Design Principles **Delete the 2nd paragraph**
- (o) REFERENCES **Delete the following references:**
BSI (1988). Maritime Structures – Part 2: Design of Quay Walls, Jetties and Dolphins (BS 6349: Part 2: 1988). British Standards Institution, London, 106p.

BSI (1989). Maritime Structures – Part 6: Design of Inshore Moorings and Floating Structures (BS 6349: Part 6: 1989). British Standards Institution, London, 52p.

BSI (1994). Maritime Structures – Part 4: Code of Practice for Design of Fendering and Mooring System (BS 6349: Part 4: 1994). British Standards Institution, London, 48p.

BSI (1997). Structural Use of Concrete – Part 1: Code of Practice for Design and Construction (BS 8110: Part 1:1997). British Standards Institution, London.

GEO (1997). GEO Publication No. 1/96 – Pile Design and Construction. Geotechnical Engineering Office, Hong Kong, 348p.

Hong Kong Government (1992). General Specifications for Civil Engineering Works. Hong Kong Government, 3 volumes.
- Add the following references:**
BD (2004). Code of Practice for Foundations. Buildings Department, Hong Kong.

BSI (2002). Eurocode – Basis of Structural Design (BS EN 1990:2002+A1:2005) and its respective UK National Annex. British Standards Institution, London.

BSI (2004). Eurocode 2: Design of Concrete Structures – Part 1-1: General Rules and Rules for Buildings (BS EN 1992-1-1:2004) and its respective UK National Annex. British Standards Institution, London.

BSI (2005). Eurocode 4 – Design of Composite Steel and Concrete Structures – Part 2: General Rules and Rules for Bridges (BS EN 1994-2:2005) and its respective UK National Annex. British Standards

Institution, London.

BSI (2010). Maritime Works – Part 2: Code of Practice for the Design of Quay Walls, Jetties and Dolphins (BS 6349-2:2010). British Standards Institution, London.

BSI (2014). Maritime Works – Part 4: Code of Practice for Design of Fendering and Mooring Systems (BS 6349-4:2014). British Standards Institution, London.

GEO (2006). GEO Publication No. 1/2006 – Foundation Design and Construction. Geotechnical Engineering Office, Hong Kong.

GEO (2014). GEO Technical Guidance Note No. 41 (TGN 41) – Amendments to British Standards References in Technical Guidance Documents for Migration to Eurocodes. Geotechnical Engineering Office, Hong Kong.

HKSARG (2006). General Specification for Civil Engineering Works, 2006 Edition. The Government of the Hong Kong Special Administrative Region, 2 volumes.

- (p) TABLES **Delete Table 4**
- (q) Figure 10 – Precast Concrete Construction for Piled Deck Pier **Replace “B.S. 8110” with “BS EN 1992-1-1: 2004 (BSI, 2004)”**
- (r) Figure 16 – Layout of Dolphin **Replace “0.3 L” with “0.25 L”**
- (s) A.2 Example 2 (Page 118) **Replace “1.6 according to BS 5950” with “1.5 according to (BSI, 2002)”**
Replace “1.6 x 975 = 1560 kNm” with “1.5 x 975 = 1462.5 kNm”

PART 4 – Guide to Design of Seawalls and Breakwaters

- (a) Section 4.1 – General **Amend the 3rd sentence of the paragraph to read as follows:**
GEO Publication No. 1/2006 – Foundation Design and Construction (GEO, 2006), GEO Technical Guidance Note No. 41 (TGN 41) – Amendments to British Standards References in Technical Guidance Documents for Migration to Eurocodes (GEO, 2014) and Code of Practice for Foundations (BD, 2004) may provide useful reference for the foundation design of marine structures.
- (b) Section 7.1 - General **Replace “(Hong Kong Government, 1992)” with “(HKSARG, 2006)”**

- (c) Section 9.2.3 – Structural and Design **Amend the 2nd sentence of the 1st paragraph to read as follows:**
They should be designed to BS 6349: Part 2 (BSI, 2010) and BS EN 1992-1-1:2004 (BSI, 2004). The concrete and steel reinforcement parameters given in Table 41 of Part 1 of the Manual should be adopted. In particular, the exposure condition for salt water pumphouses should be XS3 in accordance with Table 4.1 of BS EN 1992-1-1:2004 (BSI, 2004).
- (d) Section 9.2.4 – Ties and Waterstops **Delete**
BS 8007 recommends that
- Delete**
BS 8007 states that
- (e) REFERENCES **Delete the following references:**
BSI (1986). Code of Practice for Foundations (BS 8004:1986). British Standards Institution, London, 157p.
- BSI (1987). Code of Practice for Design of Concrete Structure for Retaining Aqueous Liquids (BS 8007:1987). British Standard Institution, London, 31p.
- Hong Kong Government (1992). General Specifications for Civil Engineering Works. Hong Kong Government, 3 volumes.
- Add the following references:**
BD (2004). Code of Practice for Foundations. Buildings Department, Hong Kong.
- BSI (2004). Eurocode 2: Design of Concrete Structures – Part 1-1: General Rules and Rules for Buildings (BS EN 1992-1-1:2004) and its respective UK National Annex. British Standards Institution, London.
- BSI (2010). Maritime Works – Part 2: Code of Practice for the Design of Quay Walls, Jetties and Dolphins (BS 6349-2:2010). British Standards Institution, London.
- GEO (2006). GEO Publication No. 1/2006 – Foundation Design and Construction. Geotechnical Engineering Office, Hong Kong.
- GEO (2014). GEO Technical Guidance Note No. 41 (TGN 41) – Amendments to British Standards References in Technical Guidance Documents for Migration to Eurocodes. Geotechnical Engineering Office, Hong Kong.
- HKSARG (2006). General Specification for Civil Engineering Works, 2006 Edition. The Government of the Hong Kong Special Administrative Region, 2 volumes.