

17 May 2021

To: All Authorized Persons
Registered Structural Engineers
Registered Geotechnical Engineers
Registered Inspectors
Registered General Building Contractors
Registered Specialist Contractors
Registered Minor Works Contractors

Dear Sir/Madam,

Amendments to Code of Practice for the Structural Use of Steel 2011

The Technical Committee (TC) on the Code of Practice for the Structural Use of Steel 2011 (the Code) set up by the Buildings Department (BD) regularly collects views and feedback from the practitioners and the stakeholders arising from the use of the Code, and reviews the contents thereof for recommending the necessary update.

2. Having considered the TC's recommendations, certain amendments to the Code (as detailed at the Appendix) are promulgated with immediate effect from the date of this letter. The amendments have been uploaded to BD website www.bd.gov.hk under the "Codes, design manuals and guidelines" page of the "Resources" section.

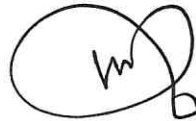
3. The major amendments to the Code include:

- (a) clause 1.5 – addition of a symbol λ_{eff} corresponding to the amendments to clause 8.7.9;
- (b) clause 3.1.2 – clarification on the definition of yield strength;
- (c) Table 3.9 – addition of BS EN 10268 to supersede the withdrawn BS 1449-1-1.5 & 1.11;
- (d) 3rd paragraph of clause 8.7.9 – revision of the formulas defining the effective slenderness ratios about different minor axes;
- (e) clause 11.7.5(iii) – deletion of the requirement to submit Welding Procedure Specification prior to the commencement and carrying out of welding works in cold-formed hollow sections;

/(f) ...

- (f) Table 11.5 – elaboration of the conditions for welding cold-formed areas and adjacent materials;
- (g) clause A1 of Annex A – addition of a criterion for using the latest version of the standards listed in Annex A;
- (h) clause A1.1.5 of Annex A – addition of BS EN 10147:2000; and
- (i) clause A1.7.5 of Annex A – addition of BS EN 10268:2006.

Yours faithfully,

A handwritten signature in black ink, consisting of a large, stylized loop on the left and a smaller loop on the right, with the initials 'H' and 'H' visible in the center.

(HO Hon-kit, Humphrey)
Assistant Director/New Buildings 2
for Building Authority

Amendments to the Code of Practice for the Structural Use of Steel 2011
(May 2021)

Legends:

 Amended

 Deleted

Amendments to the Code of Practice for the Structural Use of Steel 2011 (May 2021)

Item	Current version	Amendments
1. Clause 1.5 ¹	λ_{cr} Elastic critical load factor λ_{LO} Limiting equivalent slenderness (lateral-torsional buckling)	λ_{cr} Elastic critical load factor λ_{eff} Effective slenderness ratio λ_{LO} Limiting equivalent slenderness (lateral-torsional buckling)
2. Clause 3.1.2 ²	<p>3.1.2 Design strength for normal strength steels</p> <p>The design strength, p_y, for steel is given by:</p> $p_y = \frac{Y_s}{\gamma_{m1}} \text{ but not greater than } \frac{U_s}{\gamma_{m2}}$ <p>where</p> <p>Y_s is the yield strength</p> <p>which is defined as the upper yield strength, R_{eH}, the stress at the initiation of yielding for steel materials with clearly defined yield point; or 0.2% proof stress, $R_{p0.2}$, or the stress at 0.5% total elongation, $R_{t0.5}$ for steel materials with no clearly defined yield point, whichever is smaller. In case of dispute, the 0.2% proof stress, $R_{p0.2}$, shall be adopted.</p>	<p>3.1.2 Design strength for normal strength steels</p> <p>The design strength, p_y, for steel is given by:</p> $p_y = \frac{Y_s}{\gamma_{m1}} \text{ but not greater than } \frac{U_s}{\gamma_{m2}}$ <p>where</p> <p>Y_s the yield strength is defined as :</p> <p>(a) the upper yield strength, R_{eH}, the stress at the initiation of yielding for steel materials with clearly defined yield point; or</p> <p>(b) if the yield point cannot be clearly defined, then the 0.2% proof stress, $R_{p0.2}$, or the stress at 0.5% total elongation, $R_{t0.5}$ for steel materials whichever is smaller.</p>

¹ Addition of a symbol λ_{eff} corresponding to the amendments to clause 8.7.9.

² Clarification on the definition of yield strength.

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³ Addition of BS EN 10268 to supersede the withdrawn BS 1449-1-1.5 & 1.11.

Appendix

Item	Current version				Amendments			
	British standard:	S315 MC	315	390	British standard:	S315 MC	315	390
	BS EN 10149-2 & 3	S355 MC	355	430	BS EN 10149-2 & 3	S355 MC	355	430
	High yield strength steels for cold forming	S420 MC	420	480	High yield strength steels for cold forming	S420 MC	420	480
		S260 NC	260	370		S260 NC	260	370
		S315 NC	315	430		S315 NC	315	430
		S355 NC	355	470		S355 NC	355	470
		S420 NC	420	530		S420 NC	420	530
	British standard:	34/20	200	340	British standard:	34/20	200	340
	BS 1449-1-1.5 & 1.11	37/23	230	370	BS EN 10268	37/23	230	370
	Cold rolled steel sheet based on minimum strength	43/25	250	430	Cold-rolled steel flat products with high yield strength for cold forming – Technical delivery conditions	43/25	250	430
		50/35	350	500		50/35	350	500
		40/30	300	400		40/30	300	400
		43/35	350	430		43/35	350	430
		40F30	300	400		40F30	300	400
		43F35	350	430		43F35	350	430
	Australia standard:	G250	250	320	Australia standard:	G250	250	320
	AS 1397	G300	300	340	AS 1397	G300	300	340
	Steel sheet and strip	G350	350	420	Steel sheet and strip	G350	350	420
		G450	450	480		G450	450	480
		G500	500	520		G500	500	520
		G550	550	550		G550	550	550

Item	Current version				Amendments			
	Chinese standard: GB 50018 Technical code of cold-formed thin- wall steel structures	Q235	205	-	Chinese standard: GB 50018 Technical code of cold-formed thin- wall steel structures	Q235	205	-
4. 3 rd paragraph of Clause 8.7.9 ⁴	<p>For web members, buckling about principal axes and axes parallel to the legs should be considered. For angle sections connected by two or more bolts, the slenderness ratio should be calculated from the larger of the actual member length and the following:</p> <p>For buckling about minor v-v axis, $\lambda = 0.35 + 0.7\lambda_v / (93.9\varepsilon)$</p> <p>For buckling about x-x axis, $\lambda = 0.5 + 0.7\lambda_x / (93.9\varepsilon)$ (8.76)</p> <p>For buckling about y-y axis, $\lambda = 0.5 + 0.7\lambda_y / (93.9\varepsilon)$</p> <p>in which $\varepsilon = \sqrt{\frac{275}{\rho_y}}$ and λ is the effective slenderness ratio. λ_v, λ_x and λ_y are respectively the slenderness ratios</p>	<p>For web members, buckling about principal axes and axes parallel to the legs should be considered. For angle sections connected by two or more bolts, the slenderness ratio should be calculated from the following:</p> <p>For buckling about v-v axis, $\lambda_{eff,v} = 0.35 \times 85.8\varepsilon + 0.7\lambda_v$ or λ_v whichever is larger.</p> <p>For buckling about x-x axis, $\lambda_{eff,x} = 0.5 \times 85.8\varepsilon + 0.7\lambda_x$ or λ_x whichever is larger. (8.76)</p> <p>For buckling about y-y axis, $\lambda_{eff,y} = 0.5 \times 85.8\varepsilon + 0.7\lambda_y$ or λ_y whichever is larger.</p> <p>in which $\varepsilon = \sqrt{\frac{275}{\rho_y}}$ and λ_{eff} is the effective slenderness ratio. λ_v, λ_x and λ_y are respectively the slenderness ratios</p>						

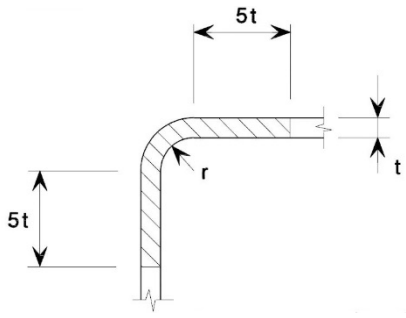
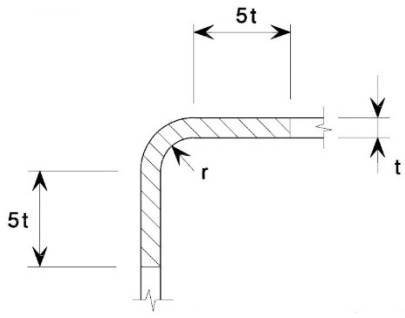
⁴ Revision of the formulas defining the effective slenderness ratios about different minor axes.

Item	Current version	Amendments
	about minor v-axis and the x- and y-axes parallel to the two legs.	about the minor v-axis, and the x- and y-axes of the angle sections.
5. Clause 11.7.5(iii) ⁵	<p>11.7.5 Welding at cold-formed zones</p> <p>Welding may be carried out within a length $5t$ either side of a cold-formed area, provided that one of the following conditions is satisfied:</p> <ul style="list-style-type: none"> (i) the cold formed areas are normalized after cold forming but before welding; (ii) the internal radius-to-thickness r/t ratio satisfies the relevant value given in Table 11.5; or (iii) the Responsible Engineer shall submit a Welding Procedure Specification (WPS) as stipulated in clause 14.3.3 for the approval of the Building Authority prior to the commencement and carrying out of welding works in cold-formed hollow sections. 	<p>11.7.5 Welding at cold-formed zones</p> <p>Welding may be carried out within a length $5t$ either side of a cold-formed area, provided that one of the following conditions is satisfied:</p> <ul style="list-style-type: none"> (a) the cold-formed areas are normalized after cold forming but before welding; (b) the internal radius-to-thickness r/t ratio satisfies the relevant value given in Table 11.5; or (c) the welding procedure shall fulfill the Welding Procedure Specification (WPS) as stipulated in clause 14.3.3.

⁵ Deletion of the requirement to submit Welding Procedure Specification prior to the commencement and carrying out of welding works in cold-formed hollow sections.

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6. Table 11.5 ⁶	<p>Table 11.5 Conditions for welding cold-formed areas and adjacent materials</p> <table border="1"> <thead> <tr> <th rowspan="3">Minimum internal radius/thickness (r/t) ratio</th> <th rowspan="3">Strain due to cold forming (%)</th> <th colspan="3">Maximum thickness (mm)</th> </tr> <tr> <th colspan="2">Generally</th> <th>Fully killed</th> </tr> <tr> <th>Predominantly static loading</th> <th>Where fatigue predominates</th> <th>Aluminium-killed steel (AL ≥ 0.02 %)</th> </tr> </thead> <tbody> <tr> <td>≥ 3.0</td> <td>≤ 14</td> <td>22</td> <td>12</td> <td>22</td> </tr> <tr> <td>≥ 2.0</td> <td>≤ 20</td> <td>12</td> <td>10</td> <td>12</td> </tr> <tr> <td>≥ 1.5</td> <td>≤ 25</td> <td>8</td> <td>8</td> <td>10</td> </tr> </tbody> </table>	Minimum internal radius/thickness (r/t) ratio	Strain due to cold forming (%)	Maximum thickness (mm)			Generally		Fully killed	Predominantly static loading	Where fatigue predominates	Aluminium-killed steel (AL ≥ 0.02 %)	≥ 3.0	≤ 14	22	12	22	≥ 2.0	≤ 20	12	10	12	≥ 1.5	≤ 25	8	8	10	<p>Table 11.5 Conditions for welding cold-formed areas and adjacent materials</p> <table border="1"> <thead> <tr> <th rowspan="3">Minimum internal radius/thickness (r/t) ratio</th> <th rowspan="3">Strain due to cold forming (%)</th> <th colspan="3">Maximum thickness (mm)</th> </tr> <tr> <th colspan="2">Generally</th> <th>Fully killed</th> </tr> <tr> <th>Predominantly static loading</th> <th>Where fatigue predominates</th> <th>Aluminium-killed steel (AL ≥ 0.02 %)</th> </tr> </thead> <tbody> <tr> <td>≥ 3.0</td> <td>≤ 14</td> <td>22</td> <td>12</td> <td>22</td> </tr> <tr> <td>≥ 2.0</td> <td>≤ 20</td> <td>12</td> <td>10</td> <td>12</td> </tr> <tr> <td>≥ 1.5</td> <td>≤ 25</td> <td>8</td> <td>8</td> <td>10</td> </tr> </tbody> </table>	Minimum internal radius/thickness (r/t) ratio	Strain due to cold forming (%)	Maximum thickness (mm)			Generally		Fully killed	Predominantly static loading	Where fatigue predominates	Aluminium-killed steel (AL ≥ 0.02 %)	≥ 3.0	≤ 14	22	12	22	≥ 2.0	≤ 20	12	10	12	≥ 1.5	≤ 25	8	8	10
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⁶ Elaboration of the conditions for welding cold-formed areas and adjacent materials.

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	≥ 1.0	≤ 33	4	4	6	≥ 1.0	≤ 33	4	4	6
										
						<p data-bbox="1279 794 2040 1066">NOTE: Cold-formed hollow sections according to BS EN 10219 which do not satisfy the limits given in Table 11.5 can be assumed to satisfy these limits if these sections have a thickness not exceeding 12.5 mm and are Aluminium-killed with a quality J2H, K2H, MH, MLH, NH or NLH as defined in BS EN 10219 and further satisfy $C \leq 0.18\%$, $P \leq 0.020\%$ and $S \leq 0.012\%$.</p> <p data-bbox="1279 1145 2040 1273">In other cases welding is only permitted within a distance of 5t from the corners if it can be shown by tests that welding is permitted for that particular application.</p>				

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7. Clause A1 of Annex A ⁷	<p>A1 ACCEPTABLE STANDARDS AND REFERENCES</p> <p>This annex contains the standards considered acceptable to the Building Authority to be used together with the Code. Where it is intended to use other standards or technical references it should be demonstrated that they can achieve a performance equivalent to the acceptable standards as specified in the Code.</p>	<p>A1 ACCEPTABLE STANDARDS AND REFERENCES</p> <p>This annex contains the standards considered acceptable to the Building Authority to be used together with the Code. Where it is intended to use other standards or technical references, or latest version of the standards given in Annex A, it should be demonstrated that they can achieve a performance equivalent to the acceptable standards as specified in the Code.</p>
8. Clause A1.1.5 of Annex A ⁸	<p>A1.1.5 UK and European standards</p> <p>BS EN 10025: 2004 Hot rolled products of non-alloy structural steels - Technical delivery conditions.</p> <p>BS EN 10164: 2004 Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions.</p> <p>BS EN 10210-1: 2006 Hot finished structural hollow sections of non-alloy</p>	<p>A1.1.5 UK and European standards</p> <p>BS EN 10025: 2004 Hot rolled products of non-alloy structural steels - Technical delivery conditions.</p> <p>BS EN 10164: 2004 Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions.</p> <p>BS EN 10210-1: 2006 Hot finished structural hollow sections of non-alloy</p>

⁷ Addition of a criterion for using the latest version of the standards listed in Annex A.

⁸ Addition of BS EN 10147:2000.

Item	Current version	Amendments
	<p>and fine grain structural steels. Part 1: Technical delivery requirements.</p> <p>BS EN 10248-1: 1996 Hot rolled sheet piling of non alloy steels. Part 1: Technical delivery conditions</p>	<p>and fine grain structural steels. Part 1: Technical delivery requirements.</p> <p>BS EN 10248-1: 1996 Hot rolled sheet piling of non alloy steels. Part 1: Technical delivery conditions</p> <p>BS EN 10147: 2000 Continuous hot dip zinc coated carbon steel sheet of structural quality</p>
<p>9. Clause A1.7.5 of Annex A⁹</p>	<p>A1.7.5 UK, European and ISO standards</p> <p>BS 5950-7: 1992 Structural use of steelwork in building. Specification for materials and workmanship: cold formed sections</p> <p>BS EN 10149-1: 1996 Specification for hot-rolled flat products made of high yield strength steels for cold forming. Part 1: General delivery conditions</p> <p>BS EN 10149-2: 1996 Specification for hot-rolled flat products made of high yield strength steels for cold forming. Part 2: Delivery</p>	<p>A1.7.5 UK, European and ISO standards</p> <p>BS 5950-7: 1992 Structural use of steelwork in building. Specification for materials and workmanship: cold formed sections</p> <p>BS EN 10149-1: 1996 Specification for hot-rolled flat products made of high yield strength steels for cold forming. Part 1: General delivery conditions</p> <p>BS EN 10149-2: 1996 Specification for hot-rolled flat products made of high yield strength steels for cold forming. Part 2: Delivery</p>

⁹ Addition of BS EN 10268:2006.

Item	Current version	Amendments
	<p>conditions for thermomechanically rolled steels</p> <p>BS EN 10149-3: 1996 Specification for hot-rolled flat products made of high yield strength steels for cold forming. Part 3: Delivery conditions for normalized or normalized rolled steels</p> <p>BS EN 10219-1: 2006 Cold formed welded structural hollow sections of non-alloy and fine grain steels. Part 1: Technical delivery requirements</p> <p>BS EN 10249-1: 1996 Cold formed sheet piling of non alloy steels. Part 1: Technical delivery conditions</p>	<p>conditions for thermomechanically rolled steels</p> <p>BS EN 10149-3: 1996 Specification for hot-rolled flat products made of high yield strength steels for cold forming. Part 3: Delivery conditions for normalized or normalized rolled steels</p> <p>BS EN 10219-1: 2006 Cold formed welded structural hollow sections of non-alloy and fine grain steels. Part 1: Technical delivery requirements</p> <p>BS EN 10249-1: 1996 Cold formed sheet piling of non alloy steels. Part 1: Technical delivery conditions</p> <p>BS EN 10268: 2006 Cold-rolled steel flat products with high yield strength for cold forming – Technical delivery conditions</p>