

**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 <sup>1</sup>   | $\lambda_{cr}$ Elastic critical load factor<br>$\lambda_{L0}$ Limiting equivalent slenderness (lateral-torsional buckling)  | $\lambda_{cr}$ Elastic critical load factor<br>$\lambda_{eff}$ <b>Effective slenderness ratio</b><br>$\lambda_{L0}$ Limiting equivalent slenderness (lateral-torsional buckling)   |
| 2. Clause 3.1.2 <sup>2</sup> | <p><b>3.1.2 Design strength for normal strength steels</b></p> <p>The design strength, <math>p_y</math>, 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><math>Y_s</math> is the yield strength</p> <p>which is defined as the upper yield strength, <math>R_{eH}</math>, the stress at the initiation of yielding for steel materials with clearly defined yield point; or 0.2% proof stress, <math>R_{p0.2}</math>, or the stress at 0.5% total elongation, <math>R_{t0.5}</math> for steel materials with no clearly defined yield point, whichever is smaller. In case of dispute, the 0.2% proof stress, <math>R_{p0.2}</math>, shall be adopted.</p> | <p><b>3.1.2 Design strength for normal strength steels</b></p> <p>The design strength, <math>p_y</math>, 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><math>Y_s</math> <b>the yield strength is defined as :</b></p> <p>(a) the upper yield strength, <math>R_{eH}</math>, the stress at the initiation of yielding for steel materials with clearly defined yield point; or</p> <p>(b) <b>if the yield point cannot be clearly defined, then the</b> 0.2% proof stress, <math>R_{p0.2}</math>, or the stress at 0.5% total elongation, <math>R_{t0.5}</math> for steel materials <b>whichever is smaller.</b></p> |

<sup>1</sup> Addition of a symbol  $\lambda_{eff}$  corresponding to the amendments to clause 8.7.9.

<sup>2</sup> Clarification on the definition of yield strength.

## Appendix

| Item                      | Current version  | Amendments  |  |  |  |        |  |  |
|---------------------------|--|---|--|--|--|--------|--|--|
|                           |  | <div> In case of dispute, the 0.2% proof stress, <math>R_p 0.2</math>, shall be adopted.</div> |  |  |  |        |  |  |
| 3. Table 3.9 <sup>3</sup> | Table 3.9 - Yield and ultimate strengths for steels supplied in accordance with various national standards           |   |  |  | Table 3.9 - Yield and ultimate strengths for steels supplied in accordance with various national standards           |        |  |  |
|                           | Type of steel  | Grade   | Yield strength<br>Y <sub>s</sub><br>(N/mm <sup>2</sup> ) | Tensile strength<br>U <sub>s</sub><br>(N/mm <sup>2</sup> ) | Type of steel  | Grade  | Yield strength<br>Y <sub>s</sub><br>(N/mm <sup>2</sup> ) | Tensile strength<br>U <sub>s</sub><br>(N/mm <sup>2</sup> ) |
|                           | British standard:<br>BS EN 10025<br>Hot rolled steel<br>sheet of structural<br>quality                               | S235  | 235  | 360  | British standard:<br>BS EN 10025<br>Hot rolled steel<br>sheet of structural<br>quality                               | S235   | 235  | 360  |
|                           |  | S275  | 275  | 430  |  | S275   | 275  | 430  |
|                           |  | S355  | 355  | 510  |  | S355   | 355  | 510  |
|                           | British standard:<br>BS EN 10147<br>Continuous hot dip<br>zinc coated carbon<br>steel sheet of<br>structural quality | S220 G  | 220  | 300  | British standard:<br>BS EN 10147<br>Continuous hot dip<br>zinc coated carbon<br>steel sheet of<br>structural quality | S220 G | 220  | 300  |
|                           |  | S250 G  | 250  | 330  |  | S250 G | 250  | 330  |
|                           |  | S280 G  | 280  | 360  |  | S280 G | 280  | 360  |
|                           |  | S320 G  | 320  | 390  |  | S320 G | 320  | 390  |
|                           |  | S350 G  | 350  | 420  |  | S350 G | 350  | 420  |

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

## Appendix

| Item | Current version  |         |     |     | Amendments   |         |     |     |
|------|--|---------|-----|-----|--|---------|-----|-----|
|      | British standard:<br>BS EN 10149-<br>2 & 3<br>High yield strength<br>steels for cold<br>forming          | S315 MC | 315 | 390 | British standard:<br>BS EN 10149-<br>2 & 3<br>High yield strength<br>steels for cold<br>forming  | S315 MC | 315 | 390 |
|      |  | S355 MC | 355 | 430 |  | S355 MC | 355 | 430 |
|      |  | S420 MC | 420 | 480 |  | 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:<br>BS 1449-1-<br>1.5 & 1.11<br>Cold rolled steel<br>sheet based on<br>minimum strength | 34/20   | 200 | 340 | British standard:<br>BS EN 10268<br>Cold-rolled steel<br>flat products with<br>high yield strength<br>for cold forming –<br>Technical delivery<br>conditions | 34/20   | 200 | 340 |
|      |  | 37/23   | 230 | 370 |  | 37/23   | 230 | 370 |
|      |  | 43/25   | 250 | 430 |  | 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:<br>AS 1397<br>Steel sheet and<br>strip   | G250    | 250 | 320 | Australia standard:<br>AS 1397<br>Steel sheet and<br>strip   | G250    | 250 | 320 |
|      |  | G300    | 300 | 340 |  | G300    | 300 | 340 |
|      |  | G350    | 350 | 420 |  | 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:<br>GB 50018<br>Technical code of<br>cold-formed thin-<br>wall steel structures   | Q235<br>Q345 | 205<br>300 | -<br>- | Chinese standard:<br>GB 50018<br>Technical code of<br>cold-formed thin-<br>wall steel structures  | Q235<br>Q345 | 205<br>300 | -<br>- |
| 4. 3 <sup>rd</sup> paragraph of<br>Clause 8.7.9 <sup>4</sup> | <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,<br/> <math>\lambda = 0.35 + 0.7\lambda_v / (93.9\varepsilon)</math><br/> For buckling about x-x axis,<br/> <math>\lambda = 0.5 + 0.7\lambda_x / (93.9\varepsilon)</math><br/> For buckling about y-y axis,<br/> <math>\lambda = 0.5 + 0.7\lambda_y / (93.9\varepsilon)</math></p> <p>in which <math>\varepsilon = \sqrt{\frac{275}{\rho_y}}</math> and <math>\lambda</math> is the effective slenderness ratio. <math>\lambda_v</math>, <math>\lambda_x</math> and <math>\lambda_y</math> 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,<br/> <math>\lambda_{eff,v} = 0.35 \times 85.8\varepsilon + 0.7\lambda_v</math> or <math>\lambda_v</math> whichever is larger.<br/> For buckling about x-x axis,<br/> <math>\lambda_{eff,x} = 0.5 \times 85.8\varepsilon + 0.7\lambda_x</math> or <math>\lambda_x</math> whichever is larger.<br/> For buckling about y-y axis,<br/> <math>\lambda_{eff,y} = 0.5 \times 85.8\varepsilon + 0.7\lambda_y</math> or <math>\lambda_y</math> whichever is larger.</p> <p>in which <math>\varepsilon = \sqrt{\frac{275}{\rho_y}}</math> and <math>\lambda_{eff}</math> is the effective slenderness ratio. <math>\lambda_v</math>, <math>\lambda_x</math> and <math>\lambda_y</math> are respectively the slenderness ratios</p> |              |            |        |

<sup>4</sup> 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 <b>the</b> minor v-axis, and the x- and y-axes <b>of the angle sections.</b>   |
| 5. Clause 11.7.5(iii) <sup>5</sup> | <p><b>11.7.5 Welding at cold-formed zones</b></p> <p>Welding may be carried out within a length <math>5t</math> either side of a cold-formed area, provided that one of the following conditions is satisfied:</p> <ul style="list-style-type: none"> <li>(i) the cold formed areas are normalized after cold forming but before welding;</li> <li>(ii) the internal radius-to-thickness <math>r/t</math> ratio satisfies the relevant value given in Table 11.5; or</li> <li>(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.</li> </ul> | <p><b>11.7.5 Welding at cold-formed zones</b></p> <p>Welding may be carried out within a length <math>5t</math> either side of a cold-formed area, provided that one of the following conditions is satisfied:</p> <ul style="list-style-type: none"> <li><b>(a)</b> the cold-formed areas are normalized after cold forming but before welding;</li> <li><b>(b)</b> the internal radius-to-thickness <math>r/t</math> ratio satisfies the relevant value given in Table 11.5; or</li> <li><b>(c)</b> the <b>welding procedure</b> shall <b>fulfill the</b> Welding Procedure Specification (WPS) as stipulated in clause 14.3.3.</li> </ul> |

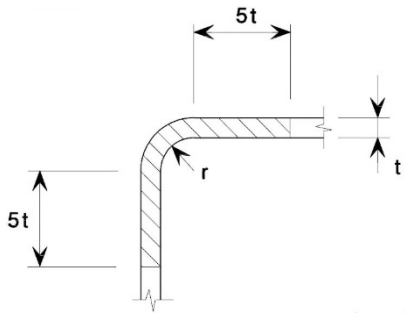
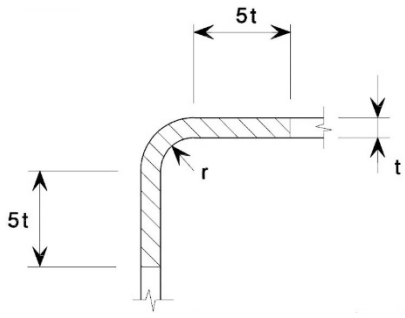
<sup>5</sup> Deletion of the requirement to submit Welding Procedure Specification prior to the commencement and carrying out of welding works in cold-formed hollow sections.

## Appendix

| Item                       | Current version   |                                |                        |    |   | Amendments  |                                |                              |                            |   |
|----------------------------|---|--------------------------------|------------------------|----|---|---|--------------------------------|------------------------------|----------------------------|---|
| 6. Table 11.5 <sup>6</sup> | Table 11.5      Conditions for welding cold-formed areas and adjacent materials |                                |                        |    |   | Table 11.5      Conditions for welding cold-formed areas and adjacent materials |                                |                              |                            |   |
|                            | Minimum internal radius/ thickness (r/t) ratio                                  | Strain due to cold forming (%) | Maximum thickness (mm) |    | Fully killed Aluminium-killed steel (AL ≥ 0.02 %) | Minimum internal radius/ thickness (r/t) ratio                                  | Strain due to cold forming (%) | Maximum thickness (mm)       |                            | Fully killed Aluminium-killed steel (AL ≥ 0.02 %) |
|                            |   |                                | Generally              |    |   |   |                                | Predominantly static loading | Where fatigue predominates |   |
|                            |   |                                |                        |    |   |   |                                |                              |                            |   |
|                            |   |                                |                        |    |   |   |                                |                              |                            |   |
|                            | ≥ 3.0   | ≤ 14                           | 22                     | 12 | 22  | ≥ 3.0   | ≤ 14                           | 22                           | 12                         | 22  |
|                            | ≥ 2.0   | ≤ 20                           | 12                     | 10 | 12  | ≥ 2.0   | ≤ 20                           | 12                           | 10                         | 12  |
|                            | ≥ 1.5   | ≤ 25                           | 8                      | 8  | 10  | ≥ 1.5   | ≤ 25                           | 8                            | 8                          | 10  |

<sup>6</sup> Elaboration of the conditions for welding cold-formed areas and adjacent materials.

## Appendix

| Item | Current version  |           |   |   |   | Amendments  |           |   |   |   |
|------|--|-----------|---|---|---|---|-----------|---|---|---|
|      | $\geq 1.0$   | $\leq 33$ | 4 | 4 | 6 | $\geq 1.0$  | $\leq 33$ | 4 | 4 | 6 |
|      |  |           |   |   |   |    |           |   |   |   |
|      |  |           |   |   |   | <p>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 <math>C \leq 0.18\%</math>, <math>P \leq 0.020\%</math> and <math>S \leq 0.012\%</math>.</p> <p>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> |           |   |   |   |



## Appendix

| Item                                     | Current version   | Amendments   |
|--|---|--|
| 7. Clause A1 of Annex A <sup>7</sup>     | <p><b>A1 ACCEPTABLE STANDARDS AND REFERENCES</b></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><b>A1 ACCEPTABLE STANDARDS AND REFERENCES</b></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, <b>or latest version of the standards given in Annex A,</b> 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 <sup>8</sup> | <p><b>A1.1.5 UK and European standards</b></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><b>A1.1.5 UK and European standards</b></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>  |

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

<sup>8</sup> Addition of BS EN 10147:2000.

## Appendix

| 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><b>BS EN 10147: 2000</b> <b>Continuous hot dip zinc coated carbon steel sheet of structural quality</b></p>   |
| 9. Clause A1.7.5 of Annex A <sup>9</sup> | <p><b>A1.7.5 UK, European and ISO standards</b></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><b>A1.7.5 UK, European and ISO standards</b></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> |

<sup>9</sup> Addition of BS EN 10268:2006.

## Appendix

| 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> |