Proposal of amendments on EN 1993-1-3:2006

1. General

This paper includes a brief summary for the decision of amendments on EN 1993-1-3:2006 within CEN/TC250 Subcommittee 3 (SC3) “Steel Structures”.

2. Background for Amendments

3. Summary of Amendments

3.1 Numbering System

Each amendment will be identified using the following numbering system:

AM-1-3-2012-01

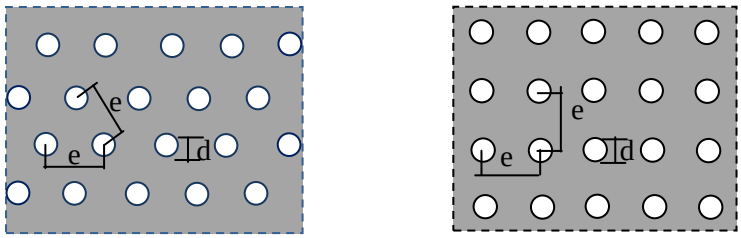
- No. of amendment
- Year
- Part of EN 1993
- Amendment

3.2 Proposed Amendments

AM-1-3-2013- 58	
Subject	Perforated sheeting
Clause No./ Subclause No./ Annex	Section 10.4
Reason for amend-ment	The current version EN 1993-1-3 provides the design rules sheeting with triangular equilateral distribution of perforation. In practice the sheeting with square distribution of perforation is often used, but the information is missing as to the design rules for this case.
Proposed change	Section 10.4 currently states: **10.4 Perforated sheeting** (1) Perforated sheeting with the holes arranged in the shape of equilateral triangles may be calculation, provided that the rules for non-perforated sheeting are modified by introducing thicknesses given below. **NOTE:** These calculation rules tend to give rather conservative values. More economical solu obtained from design assisted by testing, see Section 9. (2) Provided that $0,2 \leq d/a \leq 0,9$ gross section properties may be calculated using 5.1, but r $t_{a,eff}$ obtained from: $t_{a,eff} = 1,18t\left(1-\frac{d}{0,9a}\right)$ ... (where: d is the diameter of the perforations; a is the spacing between the centres of the perforations. (3) Provided that $0,2 \leq d/a \leq 0,9$ effective section properties may be calculated using S replacing t by $t_{b,eff}$ obtained from: $t_{b,eff} = t\sqrt[3]{1,18\left(1-d/a\right)}$ (4) The resistance of a single web to local transverse forces may be calculated using 6.1.9, but r $t_{c,eff}$ obtained from: $t_{c,eff} = t\left[1-\left(d/a\right)^2 s_{per}/s_w\right]^{3/2}$ where: s_{per} is the slant height of the perforated portion of the web; s_w is the total slant height of the web. Replace the Section 10.4 with: **10.4. Perforated sheeting** (1) Sheeting with the perforation arranged as follows (Figure 10.15): - equilateral triangles pattern - vertical squares pattern not simultanously in webs and flanges

may be designed by calculation, provided that the rules for non-perforated sheeting are modified by introducing the effective thicknesses given below.

NOTE: These calculation rules tend to give rather conservative values. More economical solutions might be obtained from design assisted by testing, see Section 9.



(a) (b)

Fig. 2.1.3 Perforation arranged in equilateral triangles (a) and squares (b)

(2) Provided that $0{,}2 \le d/a \le 0{,}9$ gross section properties may be calculated using 5.1, but replacing t by $t_{a,eff}$ obtained from:

for triangular pattern: $$t_{a,eff} = 1{,}18t\left(1 - \frac{d}{0{,}9a}\right) \quad \text{... (10.25a)}$$

for square pattern: $$t_{a,eff} = 1{,}09t\left(1 - \frac{1{,}03d}{a}\right) \quad \text{... (10.25b)}$$

where:
d is the diameter of the perforations;
a is the spacing between the centres of the perforations.

(3) Provided that $0{,}2 \le d/a \le 0{,}9$ effective section properties may be calculated using Section 5, but replacing t by $t_{b,eff}$ obtained from:

for triangular pattern: $$t_{b,eff} = t\sqrt[3]{1{,}18\left(1 - \frac{d}{a}\right)} \quad \text{... (10.26a)}$$

for square pattern: $$t_{b,eff} = 0{,}98t\sqrt[3]{\left(1 - \frac{0{,}93d}{a}\right)} \quad \text{... (10.26b)}$$

(4) The resistance of a single web to local transverse forces may be calculated using 6.1.9, but replacing t by $t_{c,eff}$ obtained from:

for triangular pattern: $$t_{c,eff} = t\left[1 - \left(\frac{d}{a}\right)^2 \frac{s_{per}}{s_w}\right]^{3/2} \quad \text{... (10.27a)}$$

for square pattern: $$t_{c,eff} = t\left[1 - 0{,}866\left(\frac{d}{a}\right)^2 \frac{s_{per}}{s_w}\right]^{3/2} \quad \text{... (10.27b)}$$

where:
s_{per} is the slant height of the perforated portion of the web;
s_w is the total slant height of the web.

Back-ground infor-mation

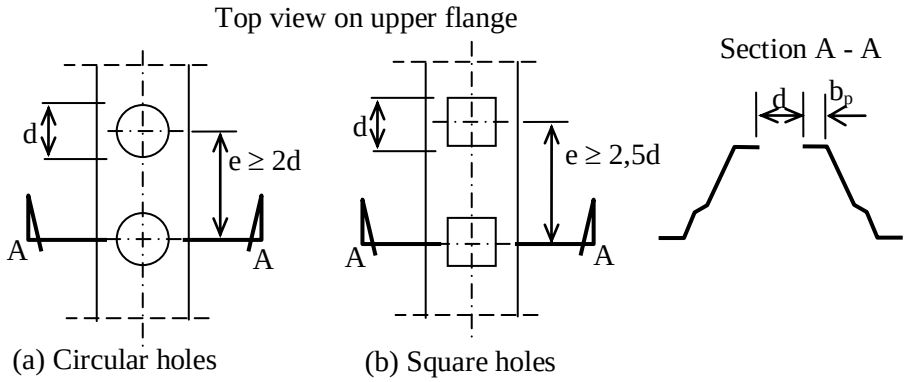
RFCS research project GRISPE:

C. FAUTH (KIT) "WP3 Test report", GRISPE D3.2, 2015

A. PALISSON (Sokol Palisson Consultants) "WP3 TEST ANALYSIS AND INTERPRETATION", GRISPE D3.4, 2015

A. PALISSON (Sokol Palisson Consultants) "WP3 Background guidance for EN 1993-1-3 to design of sheeting with perforations or with a hole", GRISPE D3.5, November 2015

Proposal from A. Palisson, D. Izabel, L. Sokol

AM-1-3-2013- 59	
Subject	Sheeting with a hole in the flange
Clause No./ Subclause No./ Annex	New section section 10.5
Reason for amendment	In practice the square or circular holes in compressed flange are often required for the passage of services, but the information is missing for the design rules for this case.
Proposed change	Add a new Section 10.5: **10.5 Sheeting with a hole in the flange** (1) In case of a circular or square hole in the compressed upper flange, the effective width of the flange parts adjacent to the webs may be determined considering them as as outstand elements of width b_p (see figure 10.16).  **Fig. 10.16: Sheeting with circular (a) or square (b) holes in flange**
Background information	RFCS research project GRISPE: C. FAUTH (KIT) "WP3 Test report", GRISPE D3.2, 2015 A. PALISSON (Sokol Palisson Consultants) "WP3 TEST ANALYSIS AND INTERPRETATION", GRISPE D3.4, 2015 A. PALISSON (Sokol Palisson Consultants) "WP3 Background guidance for EN 1993-1-3 to design of sheeting with perforations or with a hole", GRISPE D3.5, November 2015
	Proposal from A. Palisson, D. Izabel, L. Sokol