$$N_{b,Rd} = \kappa \chi A_{eff} f_o / \gamma_{M1} \tag{6.49}$$

where:

χ is the reduction factor for the relevant buckling mode as given in 6.3.1.2.

κ is a factor to allow for the weakening effects of welding. For longitudinally welded member κ is given in Table 6.5 for flexural buckling and $\kappa = 1$ for torsional and torsional-flexural buckling. In case of transversally welded member $\kappa = \omega_x$ according to 6.3.3.3.

A_{eff} is the effective area allowing for local buckling for class 4 cross-section. For torsional and torsional-flexural buckling see Table 6.7.

$A_{eff} = A$ for class 1, 2 or 3 cross-section

6.3.1.2 Buckling curves

(1) For axial compression in members the value of χ for the appropriate value of $\bar{\lambda}$ should be determined from the relevant buckling curve according to:

$$\chi = \frac{1}{\phi + \sqrt{\phi^2 - \bar{\lambda}^2}} \quad \text{but } \chi < 1{,}0 \tag{6.50}$$

where:

$$\phi = 0{,}5(1 + \alpha(\bar{\lambda} - \bar{\lambda}_0) + \bar{\lambda}^2)$$

$$\bar{\lambda} = \sqrt{\frac{A_{eff} f_o}{N_{cr}}} \tag{6.51}$$

α is an imperfection factor

$\bar{\lambda}_0$ is the limit of the horizontal plateau

N_{cr} is the elastic critical force for the relevant buckling mode based on the gross cross-sectional properties

(2) The imperfection factor α and limit of horizontal plateau $\bar{\lambda}_0$ corresponding to appropriate buckling curve should be obtained from Table 6.6 for flexural buckling and Table 6.7 for torsional or torsional-flexural buckling.

(3) Values of the reduction factor χ for the appropriate relative slenderness $\bar{\lambda}$ may be obtained from Figure 6.11 for flexural buckling and Figure 6.12 for torsional or torsional-flexural buckling.

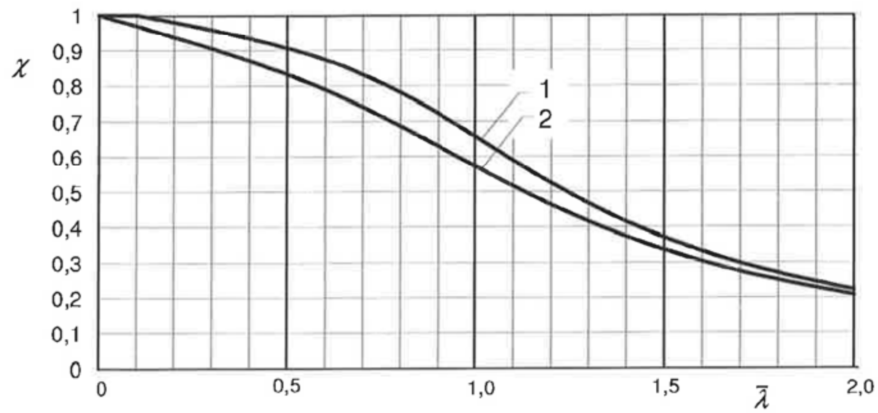
(4) For slenderness $\bar{\lambda} \leq \bar{\lambda}_0$ or for $N_{Ed} \leq \bar{\lambda}_0^2 N_{cr}$ the buckling effects may be ignored and only cross-sectional check apply.

Table 6.5 - Values of κ factor for member with longitudinal welds

Class A material according to Table 3.2	Class B material according to Table 3.2
$\kappa = 1 - \left(1 - \frac{A_1}{A}\right)10^{-\bar{\lambda}} - \left(0{,}05 + 0{,}1\frac{A_1}{A}\right)\bar{\lambda}^{1{,}3(1-\bar{\lambda})}$ with $A_1 = A - A_{haz}(1 - \rho_{o,haz})$ in which A_{haz} = area of HAZ	$\kappa = 1$ if $\bar{\lambda} \leq 0{,}2$ $\kappa = 1 + 0{,}04(4\bar{\lambda})^{(0{,}5-\bar{\lambda})} - 0{,}22\bar{\lambda}^{1.4(1-\bar{\lambda})}$ if $\bar{\lambda} > 0{,}2$

Table 6.6 - Values of α and $\bar{\lambda}_0$ for flexural buckling

Material buckling class according to Table 3.2	α	$\bar{\lambda}_0$
Class A	0,20	0,10
Class B	0,32	0,00



1 Class A material,
2 Class B material

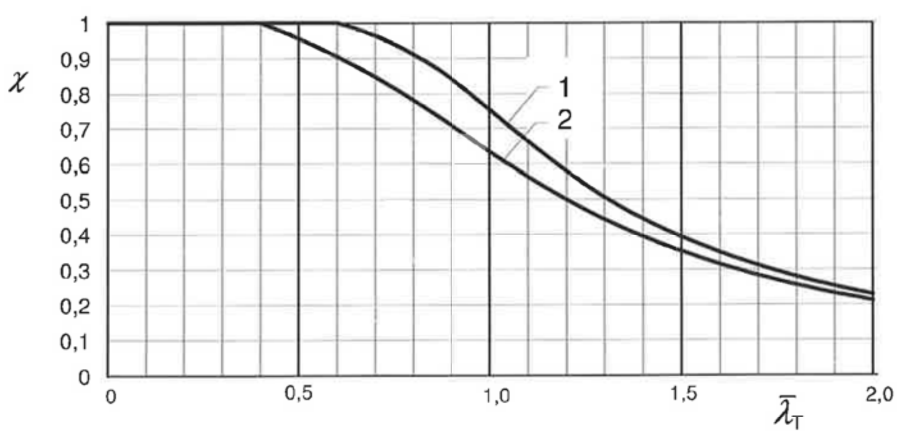
Figure 6.11 - Reduction factor χ for flexural buckling

Table 6.7 - Values of α, $\overline{\lambda}_0$ and A_{eff} for torsional and torsional-flexural buckling

Cross-section	α	$\overline{\lambda}_0$	A_{eff}
General[1)]	0,35	0,4	A_{eff} [1)]
Composed entirely of radiating outstands[2)]	0,20	0,6	A [2)]

1) For sections containing reinforced outstands such that mode 1 would be critical in terms of local buckling (see 6.1.4.3(2)), the member should be regarded as "general" and A_{eff} determined allowing for either or both local buckling and HAZ material.

2) For sections such as angles, tees and cruciforms, composed entirely of radiating outstands, local and torsional buckling are closely related. When determining A_{eff} allowance should be made, where appropriate, for the presence of HAZ material but no reduction should be made for local buckling i.e. $\rho_c = 1$.



1 Cross section composed of radiating outstands,
2 General cross section

Figure 6.12 - Reduction factor χ for torsional and torsional-flexural buckling

6.3.1.3 Slenderness for flexural buckling

(1) The relative slenderness $\overline{\lambda}$ is given by:

$$\overline{\lambda} = \sqrt{\frac{A_{\text{eff}}\, f_o}{N_{\text{cr}}}} = \frac{L_{\text{cr}}}{i}\frac{1}{\pi}\sqrt{\frac{A_{\text{eff}}}{A}\frac{f_o}{E}} \qquad (6.52)$$

where:

L_{cr} is the buckling length in the buckling plane considered